Attachment 6

ATTACHMENT 6: MODELLING OF COMPOSITIONAL CRITERIA TO DETERMINE THE ELIGIBILITY OF FOODS TO CARRY A HEALTH CLAIM

CONTENTS

1. INTRODUCTION

At Draft Assessment, a simple approach was taken for generic compositional criteria for determining whether or not a food was eligible to carry a general level health claim (referred to as disqualifying criteria),based on the levels of total sugar, saturated fat, and sodium per serve. Among the comments received during public consultation were that in this approach there were various basic foods which were ineligible to carry health claims, including some types of raw fruit, that the model did not include energy content, and that serve sizes are not defined in the food regulations.

Since then, FSANZ has considered alternative approaches to defining eligibility criteria, with a view to ensuring that the eligibility of foods for carrying claims will align better with national dietary guidelines. Consideration was given to the criteria for determining the preferred model. Three new approaches (comprising of five models) were investigated. In addition, some refinements were made to the model proposed at Draft Assessment, which led to the development of two variants of this model.

The Dietitians Association of Australia (DAA) and others developed the first new approach, which was based on setting criteria for nine different categories of food. Two models were tested using this approach: the first model was based on the DAA model with the second model a refinement of the original DAA model.

The second approach was based on the nutrient profile of a food, taking account of both nutritive and risk-increasing aspects. The two models that used this approach were based on a model developed by M Rayner and colleagues for the UK Food Standards Agency. One approach used a per 100 g base for deciding whether foods are eligible or not whereas the other also allowed a per 100 ml base for foods which use this in the nutrition information panel.

A third approach was partly based on energy density and like the model proposed at Draft Assessment, it was a threshold model. Each of the approaches was tested against over 10 000 foods using a database of Australian and New Zealand food products.

2. DESCRIPTION OF THE MODELS TESTED

2.1 Basis of the criteria underlying the eight models

The models reflect a range of approaches with different bases for deciding whether foods and beverages are eligible or ineligible to carry a health claim:

Table 1. Approaches used to assess products against compositional eligibility criteria in different models

Model	Base	Type	Classification	Approach
1, 2, 3	Per serve	Across the board	Threshold	Only 'risk increasing' nutrients included
4	Per 100 g	Category based	Threshold	'Risk decreasing' nutrients to offset the 'risk increasing' components are implicit in use of categories which have different cut offs for the 'risk increasing' components between categories; and explicit use of a positive nutrient in one category
5	Per 100 g	Category based	Threshold	'Positive' Risk decreasing' nutrients to offset the negative risk increasing components are implicit in use of categories and& explicit use of positive risk decreasing nutrients for two categories
6	Per 100 g	Across the board	Scoring	'Risk decreasing' nutrients explicitly offset the risk increasing components in the scoring system
7	Per 100 g/ml	Mostly across the board	Scoring	'Risk decreasing' nutrients explicitly offset the risk increasing components in the scoring system; risk decreasing nutrients implicitly define the small number of categories for which the 'risk increasing' component criteria are less stringent
8	Energy density and per 100 g	Mostly across the board	Threshold	'Risk increasing' components only; the small number of categories are defined because they have high levels of one risk increasing component and the criterion for that risk increasing component is less stringent

There is an intrinsically different approach between category-based models which are directed at identifying preferred choices within categories and across-the board models which score characteristics using the same cut offs irrespective of the category that the food or beverage lies in. There is also a different underlying philosophical approach between the models that only score on components for which reductions in intake are recommended (i.e. the 'risk increasing' components) and those which allow the amount of the 'risk increasing' nutrients to be offset by nutrients or types of foods for which increased intakes are recommended.

2.2 Models 1, 2 and 3

Model 1 was that suggested in the Draft Assessment Report. As the database changed for the current assessment, it was used as the starting point for reference despite its known problems. This was a per serve across-the-board model which required foods and beverages to meet all three criteria relating to saturated fat, sodium and sugar. The cut points had been selected on the basis of the recommended daily intake of the three components. (Weblink to Attachment 5 to the DAR)

Model 2 was a variation of the model suggested in the Draft Assessment Report, which required foods and beverages to meet only two of the much stricter criteria for saturated fat, sodium and sugar.

Model 3 is an extension of Model 2 but it also sets criteria for the third component leading to an overall more stringent set of criteria than for Model 1.

2.2.1 Model 1: Draft Assessment criteria (a per serve model) – for comparison

Model description

- A product is not eligible if it contains
  - Sodium <= 325 mg/serve and
  - Saturated fat <= 4 g/serve and
  - Total sugars <= 16 g/serve
- Specific criteria will apply to meals and main dish products. These products may carry a health claim if they contain:
  - Sodium <= 775 mg/serve and
  - Saturated fat <= 7 g/serve and
  - Total sugars <= 31 g/serve

2.2.2 Model 2: Modified Draft Assessment V1 (a per serve model)

A product is not eligible if it meets two of the following criteria

- Sodium <= 160 mg/serve
- Saturated fat <= 2 g/serve
- Total sugars <= 8 g/serve

Note that there is no limit on the amount of the third component.

2.2.3 Model 3: Modified Draft Assessment V2 (a per serve model)

A product is not eligible if it meets two of the following criteria

- Sodium <= 160 mg/serve
- Saturated fat <= 2 g/serve
- Total sugars <= 8 g/serve

And the third component meets the relevant following criterion

- Sodium <= 265 mg/serve
- Saturated fat <= 3.3 g/serve
- Total sugars <= 13 g/serve

2.3 Models 4 and 5

To overcome the limitations of Model 1 which was included in the Draft Assessment Report, the DAA and other non-government organisations proposed that separate criteria should be set for different food groups. Criteria relating to up to three of the following components per food category (energy, saturated fat, sodium, sugar, calcium) with different cut points set for different categories (Model 4). This followed the steps outlined by Mullis et al (1990).

Model 5 was a refinement of Model 4 and was developed by the contractor engaged to test the various models. This model added fibre as an extra criterion for classifying cereals and sub-divided some categories.

The definitions of the boundaries around the food categories for these models were not underpinned by definitions or regulatory considerations. Thus the classification of some foods was subjective. This approach was considered satisfactory as an initial assessment of the merits of the different types of models, in order to determine which should be developed further. However it was acknowledged that the use of a category-based model would require clear underpinning of definitions of categories to be workable.

2.3.1 Model 4: Dietitians' Association of Australia

Model 4 is a per 100 g model that includes energy content.

Table 2. Model 4: Compositional eligibility criteria, by food category

Food category	A product is eligible if it meets all of the following criteria per 100 g			
	Energy (kJ)	Saturated fat (g)	Sodium (mg)	Calcium (mg)
Bread & other cereal products (breakfast cereals, cakes, biscuits, noodles, pasta, rice, savoury biscuits and snack foods	< 1600	< 3	< 500	-
Fruit and vegetables (fresh, frozen, pickled)	< 1100	< 3	< 300	-
Milk, milk products and alternatives (cheese, yoghurts, milk and soy based drinks, with a minimum of 50% dairy or ingredients				
- cheese	-	< 18	< 600	-
- other milk products, milk, and alternatives	< 500	< 2	-	>100
Meat, fish, eggs, legumes (including fresh and processed meat, poultry and seafood with minimum 50% meat/poultry/seafood	< 800	< 4	< 450	-
Fats, oils, edible oil spreads, cream, dressings, nuts, seeds and their spreads	< 3700	< 20	< 450	-
Meal and main dishes	< 800	< 4	< 450	-
All other foods	< 1000	< 2	< 300	-
Beverages (cordials, soft drinks, fruit and vegetables juices, and dairy drinks with <50% dairy)	< 175	-	< 150	-

2.3.2 Model 5: Variant of the Dietitians Association of Australia model

Model 5 is a refinement of Model 4 in subsection 2.3.1, with the addition of extra categories (shown in italics) and adding fibre as a criterion for one category.

Table 3. Model 5: Refined compositional eligibility criteria, by food category

Food category	A product is eligible if it meets all of the following criteria per 100 g				
	Energy (kJ)	Saturated fat (g)	Sodium (mg)	Calcium (mg)	Fibre (g)
Bread & other cereal products (breakfast cereals, cakes, biscuits, savoury biscuits (crackers) and cereal-based snack foods	< 1600	< 3	< 500	-	> 1.5
Other cereal based products (noodles, pasta, rice)	*< 1600*	*< 3g*	*< 500*	-	-
Fruit and vegetables (fresh, frozen, pickled)	< 1100	< 3	< 300	-	-
Fruit (dried) and fruit spreads (conserves, jams etc)	*< 1300*	*<3*	*< 300*	-	-
Milk, milk products and alternatives (cheese, yoghurts, milk and soy based drinks, with a minimum of 50% dairy or ingredients					
- cheese	-	< 18	< 600	-	-
- other milk products, milk, and alternatives	< 500	< 2	-	> 100	-
Meat, fish, eggs, legumes (including fresh and processed meat, poultry and seafood with minimum 50% meat/poultry/seafood)	< 800	< 4	< 450	-	-
Nuts, seeds and their spreads	*< 3700*	*< 15*	*< 300*		-
Fats, oils, edible oil spreads, cream, dressings	< 3700	<20	< 450	-	-
Meal and main dishes	< 800	< 4	< 450	-	-
All other foods (e.g. confectionery, dairy desserts, ice cream, sandwiches, sauces, soup, sweeteners, etc)	< 1000	< 2	< 300	-	-
Beverages (cordials, soft drinks, fruit and vegetables juices, and dairy drinks with <50% dairy)	< 175	-	<150	-	-

2.4 Models 6 and 7

The UK Nutrient Profiling Model (Model 6) first 'rules out' products based on their energy, saturated fat, sodium and sugar content and then 'rules back in' some of the ruled-out products based on certain desirable features. The two-year development of this model is described in the Annex to this Attachment.

FSANZ has undertaken further development of this model to ensure greater alignment with the draft Standard for Nutrition, Health and Related Claims (Model 7). Although the calculations were the same as for Model 6, cut points have been adjusted for certain product categories (edible oils and spreads and cheeses). Like Model 6, beverages and foods are not eligible to carry health claims using a different cut off for the total number of points. However, Model 7 allows milk, as defined in Standard 2.5.1 – Milk, and Standard 2.5.7 – Dried Milks, Evaporated Milks and Condensed Milks, to be classified using the same cut off as foods rather than the beverage cut off and products declaring composition per 100 ml in the nutrition information panel may calculate the points per 100 ml rather than per 100 g.

2.4.1 Model 6 – UK Nutrient profiling model

Model 6 is a per 100 g model that includes energy content. The steps for the 'risk-increasing' components (in Table 4) are based on the Guideline Daily Amounts (GDAs) for children aged 11-16 years.

Step 1: calculate total Baseline points for risk-increasing components by summing points for each of the following components:

Table 4. Model 6: Criteria for the calculation of Baseline points [1]

Points	Per 100 g			
	Energy (kJ)	Saturated fat (g)	Total sugars (g)	Sodium (mg)
0	< =335	< =1	< =4.5	< =90
1	> 335	> 1	> 4.5	> 90
2	> 670	> 2	> 9	> 180
3	> 1005	> 3	> 13.5	> 270
4	> 1340	> 4	> 18	> 360
5	> 1675	> 5	> 22.5	> 450
6	> 2010	> 6	> 27	> 540
7	> 2345	> 7	> 31	> 630
8	> 2680	> 8	> 36	> 720
9	> 3015	> 9	> 40	> 810
10	> 3350	> 10	> 45	> 900

[1] Baseline points called 'A' points in the UK Nutrient Profiling model

Step 2: calculate Modifying Points for risk decreasing components:

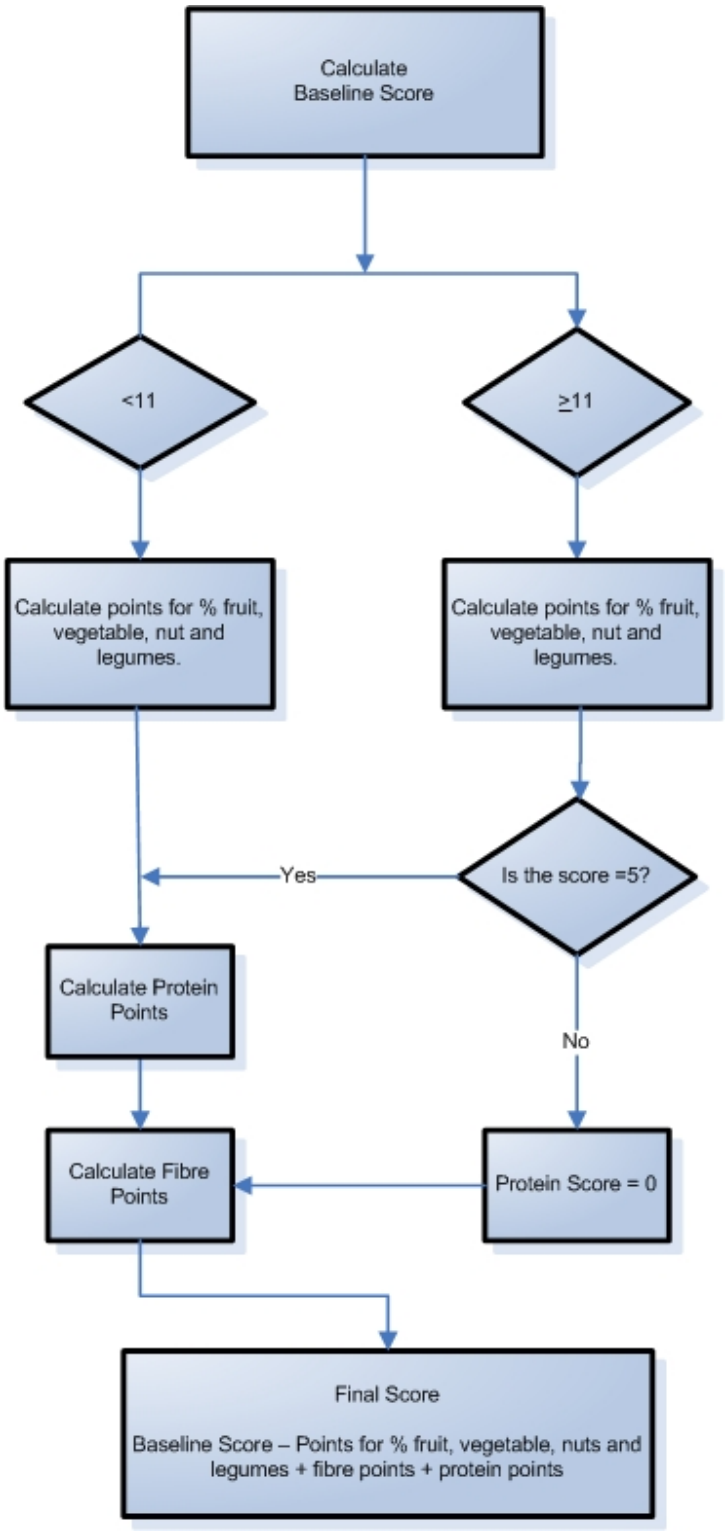
Table 5. Model 6: Criteria for the calculation of Modifying points [1]

Points	Fruit, vegetables, nuts, legumes[2] (%)	Per 100 g	
		Fibre (g)	Protein (g)
0	< =40	< =0.9	< =1.6
1	> 40	> 0.9	> 1.6
2	> 60	> 1.9	> 3.2
3	-	> 2.8	> 4.8
4	-	> 3.7	> 6.4
5	> 80	> 4.7	> 8.0

[1] Modifying points called 'C' points in the UK Nutrient Profiling model
[2] Note rules relating to dried/concentrated fruit and vegetables

Step 3: calculate total points = Baseline points – Modifying points using the flow chart in Figure 1.

Figure 1: Flow chart for Model 6



Step 4: classify total points: a food is eligible if total points < 4
a drink is eligible if total points < 1

Note: for the purpose of allocating a score to a food based on its percentage fruit, vegetables and nuts, the UK approach was to include legumes, fungi and seaweed as vegetables. Furthermore:

> "Only fruit and vegetables, including those that are sliced, peeled, tinned, frozen, cooked, dried or minimally processed (such as juices or purees) should count for the purpose of calculating a score. Fruit and vegetables which have been subject to further processing (e.g. by converting them to concentrated juices*, powders or oils) should not count (* 100% fruit juice reconstituted from juice concentrate is an exception).
>
> Nuts which are whole, roasted, chopped, grated or ground should count.
>
> The weight of dried fruit, vegetables or pureed tomatoes should be multiplied by 2 (in the numerator and denominator) when calculating the amount in g per 100g of fruit vegetables and nuts. No multiplier should be applied to the weight of juice and purees (other than tomato).
>
> It would not be appropriate for ingredients such as concentrated fruit juice sugars that are added to foods to increase sweetness to count for the purposes of calculating a score in the same way as intact fruit and vegetables" (Scarborough et al, 2005).

The above summarises the UK approach to calculating the percentage of fruit, vegetables, nuts and legumes for this model. It has been adopted with minor modifications for Model 7, the preferred FSANZ approach. See elsewhere in this document for more detail about the definitions and other stipulations relating to the calculation for Model 7.

2.4.2 Model 7 – FSANZ adaptation of the UK Nutrient Profiling model

As for Model 6, except Model 7 includes higher scores for energy, saturated fat and sodium for fats and oils, margarines, butter and cheeses.

Step 1: calculate Baseline points by summing points for each of the components in Table 6.

Table 6. Model 7: Criteria for the calculation of Baseline points

Points	Per 100 g or 100 ml			
	Energy (kJ)	Saturated fat (g)	Total sugars (g)	Sodium (mg)
0	< =335	< =1	< =4.5	< =90
1	> 335	> 1	> 4.5	> 90
2	> 670	> 2	> 9	> 180
3	> 1005	> 3	> 13.5	> 270
4	> 1340	> 4	> 18	> 360
5	> 1675	> 5	> 22.5	> 450
6	> 2010	> 6	> 27	> 540
7	> 2345	> 7	> 31	> 630
8	> 2680	> 8	> 36	> 720
9	> 3015	> 9	> 40	> 810
10	> 3350	> 10	> 45	> 900
Cheeses with calcium content > 320mg/100 g and fats & oils & margarines may extend the points as follows:				
11	> 3685	> 11		> 990
12		> 12		> 1080
13		> 13		> 1170
14		> 14		> 1260
15		> 15		> 1350
16		> 16		> 1440
17		> 17		> 1530
18		> 18		> 1620
19		> 19		> 1710
20		> 20		> 1800
21		> 21		> 1890
22		> 22		> 1980
23		> 23		> 2070
24		> 24		> 2160
25		> 25		> 2250
26		> 26		> 2340
27		> 27		> 2430
28		> 28		> 2520
29		> 29		> 2610
30		> 30		> 2700

Steps 2 and 3 are the same as for Model 6 (noting step 3 can be based on the level per 100 ml in Model 7).

Step 4: classify total points, as shown in Table 7 below.

Table 7: Model 7: Maximum nutrient profile score allowed for different product categories

Product	Is eligible if total points are:
• Edible oil as specified in Standard 2.4.1 • Edible oil spreads, including margarine, as specified in Standard 2.4.2 • Cheese as specified in Standard 2.5.4 with calcium level of >320mg/100g	< 28[a]
• Milk as specified in Standard 2.5.1 and evaporated milks or dried milks as defined in Standard 2.5.7, with the addition of some vitamins and minerals (Standard 1.3.2), food additives (Standard 1.3.1) and processing aids (Standard 1.3.3) permitted • Food except as listed above or beverages as listed below	< 4[b]
• Beverages except milk as specified in Standard 2.5.1 and in Standard 2.5.7	< 1[b]

[a] calculated using uncapped Baseline points
[b] calculated using Baseline points capped at 10 for each component

2.5 Model 8

The development of this model is described by Nijman et al (2006). The original purpose of the model was to provide a direction and target for the improvement of Unilever's products with respect to saturated and trans fatty acids, sodium and sugar content. Because it is intended to be applied to the entire product range throughout the world, targets were not based on any particular national recommendation. Rather the range of recommendations across various countries was examined. In the paper, 3 categories of foods, and therefore two sets of cut offs, are defined (Nijman et al, 2006). Category 1 foods conform to the strictest international recommendations for all four components, Category 2 foods conform to the less strict recommendations for all four components, and Category 3 foods do not conform to the less strict set of recommendations for one or more components. To test whether this approach would yield useful nutrient profiling criteria for the current purposes, Model 8 has tested the cut offs separating Categories 2 and 3 (i.e. the less strict set).

This approach to defining cut offs has several features that are quite different from the previous models. The most obvious is that each of the four components is examined as an energy density and also in at least one other way. Some of these additional criteria are chosen so that foods with insignificant amounts of the component are not excluded. For example, diet soft drink contains small amounts of sodium from the artificial sweeteners but little energy and so it exceeds the cut

off based on energy density (<38 mg sodium/100 kJ) but however it does not exceed the 'insignificant amount' cut off of 100 mg sodium/100 g product.

Table 8: Threshold levels for Model 8

A product is classified in two steps:

Step 1: assess each component against the two or three possible criteria and select the most favourable result (i.e. if the component lies below the cut off for any of the possible criteria, then the result for the component is that it is eligible to carry a health claim)

Step 2: a product is ineligible if one or more of the components is assessed as ineligible in Step 1.

A product is eligible if it meets the following criteria:		
Component		Cut off
Generic cut offs for most foods and drinks		
Sodium	either	≤ 38 mg/100 kJ #
	or	≤ 100 mg/100 g product and
Trans fatty acids	either	≤ 2 % total energy
	or	≤ 0.2 g/100 g product and
Saturated fat	either	≤ 13 % total energy
	or	≤ 33 g/100g total fat
	or	≤ 2 g/100 g product and
Sugar	either	≤ 25 % total energy as total sugar
	or	≤ 7 g added sugar/100 g product
Category specific cut offs for particular components (other generic cut offs apply)		
Sugar	Frozen desserts & ices	≤ 17 g added sugar/100 g product no cut off for total sugar
Sodium	Soups	≤ 360 mg/100 g product
	Meal sauces	≤ 540 mg/100 g product
	Table sauces & dressings	≤ 1080 mg/100 g product
	Edible oil spreads	≤ 720 mg/100 g product
	Meal replacement products	≤ 57 mg/100 kJ

converted from the cut off of 1.6mg/kcal (Nijman et al, 2006)

The other different feature of this model is that the small number of categories are defined based on their composition of a risk-increasing component and these criteria loosen the cut offs for these components. By contrast, in the other models with categories, the definition of categories is implicitly or explicitly based on 'positive' components. Model 8 is also the only model to include trans fatty acids as a classifying component.

3. BASIS OF THE CRITERIA UNDERLYING THE UK NUTRIENT PROFILING MODEL

3.1 Model 6 criteria

The steps in the UK Profiling model were based on Guideline Daily Amounts (GDAs), which are derived from UK recommended intakes and other nutrition guidelines. The steps for increasing Baseline point scores (shown in Table 4) were selected to be the same percentage (3.8%) of the calculated GDA on the grounds that the cut points across these components should be proportionally the same. This means that a Baseline point for one component equates to the same increment of the recommendation as a Baseline point for any other component irrespective of the category of the food. This approach is conceptually similar to scoring systems for heart disease risk based on several risk factors. The base of 2000 kcal (8400 kJ) was set; this is the average energy requirement of moderately active women, sedentary men and teenage girls and is considered a reasonable base for anyone over the age of four years (Working Group Report, 2005).

The numerical recommendations underlying the nutrients and food components in Model 6 (the UK Profiling Model) are shown in Table 9 together with the equivalent recommendation for adult women aged 19-50 years who are moderately active based on Australian and New Zealand recommendations (NHMRC and Ministry of Health, 2006).

It is evident that the UK recommendations are similar to recommendations in Australia and New Zealand. Although there is no recommendation regarding total sugar intake, FSANZ estimated the intake of intrinsic sugars from consuming the recommended levels of fruit (24g sugar), vegetables (4 g sugar) and bread (5 g sugar) and milk sugars from the recommended level of milk intake (25 g sugar) is very similar to the equivalent noted in the UK. Therefore the UK recommendation for total sugar was regarded as reasonable for current purposes. Hence, the steps in the UK Baseline and Modifying point tables were adopted without modification.

As predicted by its developer, this model would need some modification if used for a different purpose (M Rayner, personal communication).

Table 9. Comparison between the nutritional recommendations for the UK Nutrient Profile Model and Reference Values for Australia and New Zealand moderately active women

Nutrient	Origin of recommendations for UK Nutrient Profile model	Equivalent Australian and New Zealand reference values, based on a moderately active woman (19-50years)
Energy	2130 kcal (8916 kJ) Weighted average of the EAR for boys and girls in the 11-14 and 15-18 year age bands	8750 kJ Based on: median height for adult women in the 1995 Australian National Nutrition Survey was 161.4cm. At BMI=22 and a PAL of 1.6, this yields an EAR of 8700-8800 kJ per day (rounded to 8750 kJ)
Saturated fat	11% of energy (26 g)	10% energy (26 g) (Australia); 12% energy (New Zealand)
Total sugar	21% of energy The UK has recommendations for non-milk extrinsic sugar (11% total energy) but not total sugar. Owing to problems with defining this and because labelling regulations specify total sugar, a total sugar GDA was developed. A 'typical' woman's diet which met the 5-a-day recommendations was estimated to contain 20.7% energy from total sugars (being the sum of 10% from non-milk extrinsic sugars and the remainder from intrinsic sugars (from bread, vegetables and fruit) and milk sugars.	No Nutrient Reference Values. Estimated intake of intrinsic sugar in bread, vegetables and fruit and milk sugar from recommended serves of core foods in the Australian Guide to Healthy Eating: 58 g, equivalent to 10.5% energy. The Australian Dietary Guidelines comment that there is no evidence that 15-20% energy from sugars is incompatible with a healthy diet (Department of Health and Family Services); the New Zealand Dietary Guidelines suggest no more than 15% of total energy should be derived from sucrose and free sugars.
Sodium	2400 mg Based on the RNI of 1600 mg/day multiplied by 1.5 to achieve consistency with the UK Scientific Advisory Committee on Nutrition recommendation of 2400 mg.	UL = 2300 mg
Protein	RNI rounded to nearest 5 (45 g for women)	RDI = 46 g
Fibre	20-24 g The amount specified by COMA (18 g) for a daily faecal weight of at least 100 g was based on the Englyst method; this was converted to the equivalent using the AOAC method	AI = 25 g
Fruit and vegetables	50% increase in consumption is recommended which would give a total of 380 g/day (excludes potato which is classed with breads)	Australian recommendations: 300 g fruit 375 g vegetables (including potatoes) (Australia); no equivalent recommendation for New Zealand.

Key:
AI = Adequate Intake
AOAC = Association of Official Analytical Chemists
BMI = Body Mass Index
COMA = Committee on Medical Aspects of Food and Nutrition Policy
EAR = Estimated Average Requirement
GDA = Guideline Daily Amount
PAL = Physical Activity Level
RDI = Recommended Dietary Intake
RNI = Reference Nutrient Intake
UL = Upper Level

4. TESTING THE MODELS

The database used for testing the models was a composite of three databases; the Australian AUSNUT database, the New Zealand Crop and Food FOODfiles database and a custom-built database of current Australian brand name foods. The latter database was developed by Alan Barclay. It was compiled from a survey of a major Australian supermarket from August to October, 2005 (Gately and Barclay, 2006). It contained brand name information on approximately 5000 foods and beverages that were considered to be widely available throughout Australia at the time. Nutrition information was obtained directly from the foods nutrition information panels, and was inputted directly into a custom-built Access database. Where extra preparation (e.g. draining, or reconstitution) of the food or beverage was required by the purchaser before consuming a food, nutrition information based on the food in the final form was entered into the database when available. The nutrition information panels provided data on the kilojoule, protein, fat, saturated fat, carbohydrate, sugars and sodium content of all foods, along with other nutrients like dietary fibre and calcium when nutrition content claims were made.

This database of Australian brand-name foods was merged with the Australian AUSNUT database of around 4 500 generic foods to form a database of approximately 9000 Australian foods. The database of 2 500 generic New Zealand foods and beverages was obtained from New Zealand's Crop & Food Research's FOODfiles and merged with the Australian foods, leaving a total of 11 505 foods and beverages with nutrition information for kilojoule, protein, fat, saturated fat, carbohydrate, sugars and sodium, 8084 foods and beverages with dietary fibre, and 7606 with calcium. This database was further reduced to 10 949 foods and beverages when infant foods and alcoholic beverages were removed. Alcoholic beverages are not eligible to make any health claims. Infant formula is also prohibited from making health claims. The elimination of other infant foods from the database means that this product sector has not been rigorously tested to determine how many of these foods are eligible to carry health claims.

Serve sizes for products were either the manufacturers' specified serve sizes (for those from the Australian brand name database) or the generic serve sizes specified in the AUSNUT and FOODfiles databases. The final database provided nutrient information per 100 g (for AUSNUT and FOODfiles and most foods in the brand name database). Some products in the brand name database had nutrient information per 100ml because this is how the nutrition information panel is constructed (e.g. juice, milk, oils, salad dressings and condiment-type sauces). Models 1, 2 and 3 were calculated using the serve size information. Models 4, 5, 6 and 8 were calculated using information per 100 g and so did not use information from the brand name data for juice, milk etc. Model 7 allowed calculation per 100 ml. For consistency across models, the more generic information in AUSNUT and FOODfiles was converted to per 100 ml information using specific gravities (FSANZ, 2004) and the results also compared to the classification of specific brand name liquids.

Models 4 and 5 rely on the definition of food categories. This classification was done in the merged database by the proposers of these models. However, FSANZ notes that a small number of products were classified in a way that does not align with current definitions in the Food Standards Code.

The testing procedures conducted during the development of the UK model excluded raw produce from the database used to test various models (Rayner et al., 2004) because the purpose of the model is related to advertising to children. However, it is intended that raw produce would be allowed to carry health claims in Australia and New Zealand and so raw, processed and cooked foods were all retained in the database.

It should be noted that all comments about foods being eligible or not eligible in this report relate to the composition of foods from these databases. Manufacturers reformulate their products and so any particular product may perform differently in early 2007 than is described in this report based on pre-2006 composition information.

Each food was assessed as being ineligible or eligible to carry a health claim under each model. 'Uncertain' classifications were also given because some models depended on fibre or calcium, which currently can only be listed on the label if certain criteria are met. Sometimes the serving size was missing from the database which meant that Models 1, 2 and 3 could not be completed. A number of processed or multi-ingredient foods were initially classified as 'uncertain' for Model 6 because their final score depended on the information about percentage of the product which was fruit/vegetables/nuts/legumes and this is not normally found in nutrient databases. However it was possible to see that many fruits, vegetables, breads, low fat meat and dairy were eligible even without this additional information whereas confectionery and high fat snack foods were ineligible to carry a health claim.

Based on the initial testing, Models 4 and 6 were the most promising (Model 8 was not published until late 2006, after the initial testing was completed). However, Model 4 suffered from the general challenge for a category-based system which is to define the categories in an exhaustive and mutually-exclusive manner. This is especially problematic if the system is to be largely self-regulated and does not have an overseeing committee to adjudicate on classifications. Therefore Model 6 was selected in the first instance for further work by FSANZ. The database was supplemented by allocating % fruit/vegetables/nuts/legumes to important foods, based on targeted label reading, and alternative calculations and considerations made to explore whether some apparent problems could be overcome.

Model 8 (Nijman et al, 2006) includes trans fatty acids and added sugars. Many foods have been tested for trans fatty acid content in both Australia and New Zealand over recent years and this had been compiled as part of a report to the Food Regulation Ministerial Council (FSANZ, 2007, unreleased report). This information was added to the database in use for the current project. Added sugar information is not available in the Australian and New Zealand databases. Estimates were based on known composition (e.g. 0% of sugar in raw fruit is derived from added sugar whereas 100% of sugar in boiled lollies is added), or estimated by subtracting the amount of lactose in 100 g milk from the total sugar content of products such as sweetened yoghurt and custard, or by subtracting the amount of sugar in artificially sweetened canned fruit from the total sugar content of fruit canned in juice or syrup). In addition, the added sugar cut off of < 7 g/100 g means that any food that contains < 7 g total sugar automatically meets this criterion, even if the exact proportions of added and not-added sugar is unknown. Further, a food is not eligible if it does not meet the criteria for at least one of the components. Hence there is no need to know the added versus non-added sugar content of a food if, for example, it is ineligible based on

saturated fat content, as is the case for many biscuits. As a result, many foods could be classified successfully, despite gaps in the data. However, many foods could not be classified. The inability to determine added sugar content by analysis is why total sugar is often preferred over added sugar in classification systems.

4.1 Development of Model 7: specific considerations regarding adopting the UK Nutrient Profiling Model for use in Australia and New Zealand

As noted, examination of the models was an iterative process and Model 7 was developed after Models 1-6 were examined. For simplicity, the results for Model 7 are presented alongside the results of the other models.

The purpose of the UK Profiling Model was to balance the advertising to children of foods high in saturated fat, sugar and salt (Rayner et al, 2004). This purpose is similar, but not identical, to the purpose of the model required for defining nutrient profiling criteria for determining the eligibility of foods to carry health claims, which is to rule out foods which are inappropriate for carrying general level health claims irrespective of their 'qualifying' component levels. A particular point of difference is that the Australia and New Zealand system would not target children only.

Testing Model 6 revealed several aspects of the UK Profiling Model that needed modification to adapt the model for use in Australia and New Zealand for the purpose of setting nutrient profiling criteria for food vehicles which might carry general level health claims. These aspects are discussed below in subsections 4.1.2 – 4.1.5. Points from the two sets of nutrients in tables in the UK system are referred to as 'A' points for the risk increasing components and 'C' points for risk decreasing nutrients. To improve clarity in the current document, FSANZ has renamed these terms in both Models 6 and 7 as 'Baseline' points and 'Modifying' points, respectively.

4.1.1 Electronic Calculator

To aid readers of this document in assessing the proposed Model for themselves, an electronic calculator has been developed and can be found on the FSANZ website at (weblink to E-Calculator). On the website, this calculator is called the 'Health Claims Nutrient Profiling Calculator' to make it more clearly distinguishable from the Nutrition Information Panel Calculator. At present, information from labels or food composition tables must be entered manually into the calculator, which will then state whether the item is eligible or not eligible to carry health claims. After gazettal, the Health Claims Nutrient Profiling Calculator will be merged with the Nutrition Information Panel Calculator, so that those entering recipes as part of product development would obtain both sets of information at the same time.

4.1.2 Some products declare nutrient information per 100 ml rather than per 100 g

The intention is to require manufacturers to declare all food composition relied upon to make the health claim on the label. The UK system uses a base of 100 g for calculating the criteria, but in the Food Standards Code for Australia and New Zealand, some products are allowed to declare their nutrition information panels per 100 ml rather than per 100 g. Therefore the effect of using

a base of 100 ml on the classification of milk, juices, juice drinks, soft drinks, cordials, sauces and dressings and oils was examined.

Tables 10 and 11 compare the classification of selected products using 100 g and 100 ml as the base of calculation. Note that the cut off for drinks is < 1 whereas for foods it is < 4 and so fruit drink with total points of 2 is ineligible whereas oyster sauce with total points of 3 would be eligible. All oils were ineligible (see Section 4.1.3 for further discussion). Using a base of 100 ml does not materially alter the classification of fruit juices, soft drinks and cordials, bottled water, tea, coffee or savoury sauces and dressings (Table 10).

The results from milk and related products are shown in Table 11. It has several notable features. Firstly, the documentation behind the UK model clearly states that plain whole milk scores < 1 total point (Rayner M et al., 2005) and therefore would be eligible but Table 11 shows that this is not true of all whole cow milks in Australia and New Zealand. In particular, the higher score for whole Australian milk is due to the lactose content of 4.7 g/100 g whereas New Zealand whole milk contains 4.3-4.5 g/100 g. Secondly, because the specific gravity of milk is 1.04 g/ml, some New Zealand whole milks are ineligible if the calculations are done per 100 ml (i.e. per 104 g) rather than per 100 g.

Sweetened whole milk is not eligible to carry health claims using either base for calculation, as are milkshakes and milk drinks. Most soy-based milk alternatives scored < 1 total points. Among the rice-based milk alternatives, those with low protein score 1 total point whereas those with protein levels more similar to cow milk score < 1 total point owing to the modifying points for protein. Yoghurts, being classed as a food, are eligible if they score < 4 total points even though the parent product, whole milk, might be not be eligible.

Therefore, it was decided to allow plain whole milk to meet the same criteria as food (i.e. eligible if total points are < 4). The definition of products that are allowed to use this extension are those products that meet the definition of milk in Standard 2.5.1 – Milk, and dried and evaporated milks in Standard 2.5.7 – Dried Milks, Evaporated Milks and Condensed Milks of the Food Standards Code. Note that these standards cover only plain milk (from any milking animal) with permitted processing aids or additives or fortified with permitted vitamins and minerals. As was the case with concentrated juices, evaporated milk may declare composition after reconstitution with water and so maybe scored in this form. Milk drinks and sweetened flavoured whole milks are not manufactured under these standards and so they are assessed against the < 1 total point criterion. Flavoured low fat animal milks score < 1 total point and so are eligible to carry health claims.

Table 10. Classification of selected foods and drinks which declare nutrient information per 100 ml, using calculations per 100 ml and per 100 g

Product name	Specific Gravity	Total points, Model 6, (per 100 g)	Classification in Model 6	Total points, Model 7, (per 100 ml)	Classification in Model 7
Juice,Fruit, not further specified	1.05	-4	E	-4	E
Juice concentrate,orange,unsweetened	1.20	0	E	2	*
Fruit drink,not further specified	1.04	2	NE	2	NE
Fruit drink concentrate,orange/mango,diluted	1.20	2	NE	2	NE
Soft Drink,Lemonade,regular	1.04	2	NE	2	NE
Soft Drink,Lemonade,artificially sweetened	1.00	0	E	0	E
Cordial,citrus fruit juice,artificially sweetened,recommended dilution	1.05	0	E	0	E
Cordial,diluted, not further specified	1.05	2	NE	2	NE
Flavoured drink,fruit,from dry base,recommended dilution	1.05	1	NE	2	NE
Mineral Water,Fruit Flavours,Regular	1.04	2	NE	2	NE
Soda Water	1.04	0	E	0	E
Water,New Zealand,bottled	1.00	0	E	0	E
Mineral Water,Natural	1.00	0	E	0	E
Tea,black,brewed from leaf/teabags,regular	1.00	0	E	0	E
Coffee,espresso,brewed	1.01	0	E	0	E
Coffee,white with milk,cappuccino,regular	1.01	0	E	0	E
Coffee,turkish	1.07	0	E	1	NE
Cream,Pure(Fat>35%)	1.01	14	NE	15	NE
Cream,Sour,Light(Fat>18%)	1.02	12	NE	13	NE
Sauce,oyster	1.22	2	E	3	E
Sauce,soy	1.05	7	NE	7	NE

*would be ineligible if based on unreconstituted product but this product could calculate its score based on diluted form

Table 10. Classification of selected foods and drinks which declare nutrient information per 100 ml, using calculations per 100 ml and per 100 g (continued)

Product name	Specific Gravity	Total points, Model 6, (per 100 g)	Classification in Model 6	Total points, Model 7, (per 100 ml)	Classification in Model 7
Sauce,tabasco	0.98	10	NE	10	NE
Sauce,tomato	1.04	9	NE	11	NE
Sauce,Worcestershire	1.22	13	NE	15	NE
Vinegar	1.01	0	E	0	E
Mayonnaise	1.05	21	NE	23	NE
Brand X, French Dressing	1.03	12	NE	12	NE
Brand X, Italian Dressing	1.03	11	NE	12	NE
Brand Y, Lite Italian Dressing	1.11	11	NE	11	NE

Key: NE = not eligible; E = eligible
Note: drinks are eligible if they score <1 total point, foods are eligible if they score <4 total points

Table 11 Classification of selected milks using calculation per 100 ml and per 100 g

Country	Product name	Specific Gravity	Total points, Model 6, (per 100 g)	Classification in Model 6	Total points, Model 7, (per 100 ml)	Classification in Model 7
Aust	Milk,Fluid,Whole,High Fat (Fat>4%)	1.03	2	NE	2	E#
NZ	Milk,fluid,standard	1.03	0	E	1	E#
Aust	Milk,Fluid,Whole	1.03	1	NE	1	E#
NZ	Milk,fluid,whole	1.03	0	E	0	E
NZ	Milk,UHT,standardised	1.03	0	E	1	E#
NZ	Milk,fluid,reduced fat (1.5%)	1.04	-3	E	-3	E
Aust	Milk,Fluid,Reduced Fat (Fat 1-2%),NFS	1.04	-1	E	-1	E
NZ	Milk,fluid,skim	1.04	-1	E	-1	E
Aust	Milk,Fluid,Skim/Nonfat (Fat<0.16%)	1.04	-1	E	-1	E
Aust	Milk,Evaporated,Whole,Undiluted	1.07	5	NE	5	NE
Aust	Milk,Fluid,From Evaporated,Whole,Reconstituted	1.03	1	NE	1	E#
Aust	Milk,Fluid,From Powder,Whole,Reconstituted	1.03	1	NE	1	E#
NZ	Milk,goat,whole	1.03	0	E	0	E
NZ	Milk,UHT,chocolate flavour	1.06	1	NE	1	NE
Aust	Milk,Reduced Fat,Chocolate,Commercial	1.06	0	E	0	E
Aust	Milk,Low Fat,Chocolate,Commercial	1.06	-2	E	-2	E
NZ	Milk shake,assorted flavour	1.03	5	NE	5	NE
NZ	Milk shake,no flavouring	1.03	0	E	1	NE
Aust	Milkshake,Skim,Chocolate,Commercial	1.03	0	E	0	E
Aust	Supplemented Milk Drink,Fluid,Whole,With Added Vitamins	1.03	1	NE	1	NE

Key: NE = not eligible; E = eligible; E# = eligible because the product is permitted to use the <4 total points criterion, other drinks must meet the <1 total point criterion to be classified as eligible

4.1.3 Hard cheeses rich in calcium are ineligible in the UK system

Virtually all cheeses were ineligible in the UK system (Model 6). Those that were eligible are low or relatively low in calcium (see Table 12). The calcium content in cheese tends to increase as the fat content increases. By contrast, in many other foods, desirable nutrients tend to decrease as fat content increases (e.g. iron in meat). In view of the desirability of encouraging calcium intake in many sections of the population, modifications were explored with a view to ensuring that some of the high calcium cheeses with lower saturated fat and/or sodium contents were eligible.

Table 12: Points and calcium content of cheeses that are eligible in Model 6 (the UK system)

Country	Product name	UK base points	UK Protein points	UK Total points (Model 6)	Calcium (mg/100g)[1]
Aust	Cheese, Cottage, Low Fat	2	5	-3	77
Aust	Cheese, Cottage, Low Fat, With Vegetables	2	5	-3	75
NZ	Cheese, cottage, low fat	2	5	-3	77
Aust	Smooth ricotta cheese light	4	5	-1	
Aust	Low fat cottage cheese	4	5	-1	105
Aust	Cheese, Cottage, Low Fat, Salt Reduced	5	5	0	118
Aust	Cheese, Cottage, Creamed	6	5	1	70
Aust	Smooth ricotta cheese with spinach	6	5	1	
Aust	Cheese, Quark, Low Fat	6	5	1	85
Aust	Cheese, Cottage, not further specified	6	5	1	82
Aust	Cheese, Cottage, Low Fat, Creamed	6	5	1	79
Aust	Low fat cottage cheese onion and chives	6	5	1	250
Aust	Low fat creamed cottage cheese	6	5	1	
Aust	Cottage cheese	6	5	1	101
Aust	Low fat cottage cheese plain	6	5	1	260
Aust	Low fat cottage cheese	6	5	1	
NZ	Quark	7	5	2	153
Aust	Cheese, Cottage	7	5	2	73
Aust	Ricotta smooth	7	5	2	
Aust	Cheese, Cream, spreadable extra light	7	5	2	
Aust	Cheese, Cottage, Creamed, With Vegetables	7	5	2	72
NZ	Cheese, cottage	7	5	2	61
Aust	Ricotta for cheesecakes	8	5	3	
Aust	Cheese, Ricotta, Reduced Fat	8	5	3	245
Aust	Natural cottage cheese	8	5	3	63

[1] calcium values missing if not declared on the label.

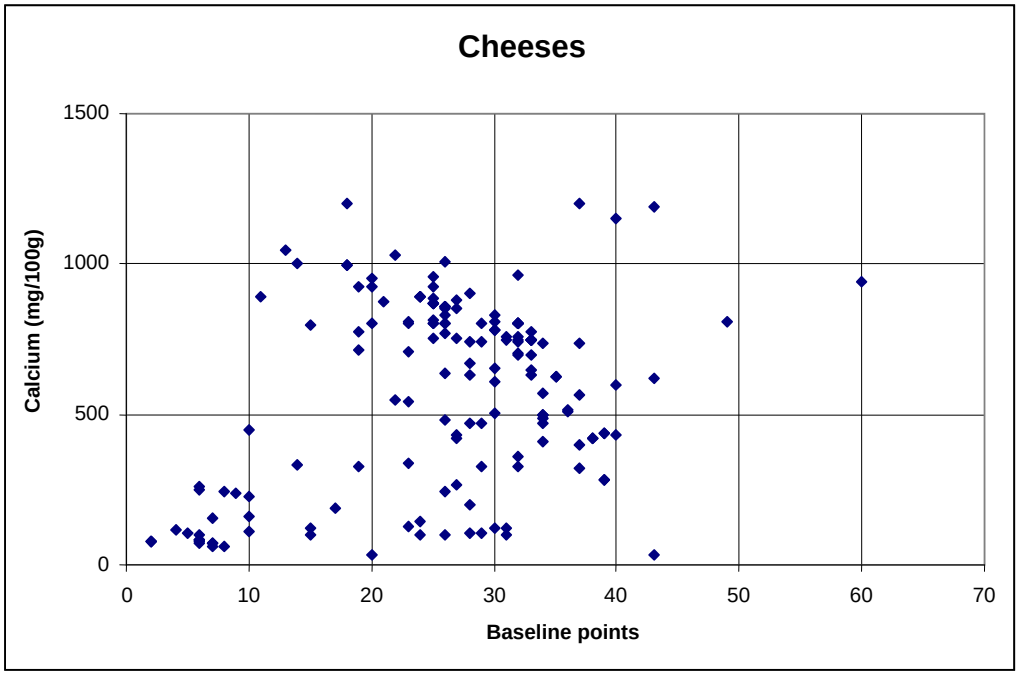
In the UK system, the Baseline points for each component are capped at a maximum of 10 per component (Table 4). Many cheeses scored 10 points for both saturated fat and sodium even

though some of these were reduced fat or lower sodium cheeses and some were full fat cheeses. The consequence of uncapping these points and extending them upwards to 30 in steps of the same size was explored (Table 6). As shown in Figure 2, this allowed the score of cheeses to become more spread out[1].

Products are allowed to make 'source of calcium' claims if they contain > 80 mg/serve and this will be the qualifying criterion for general level health claims about calcium. The declared serve size of hard cheeses is typically between 21-25 g. Therefore >320 mg calcium/100 g was chosen to identify cheeses which can take advantage of using the uncapped points. Among these cheeses, the range of uncapped Baseline points is 10-60 (Figure 2). Note also that although, in theory, cheeses could score for Modifying points, in practice few contain appreciable amounts of fruit, vegetables, nuts, pulses or fibre and the high Baseline score for hard cheeses prevents scoring for protein; hence total points are equal to Baseline points for most cheeses except low fat cheeses and some fruit or nut containing cheeses. Examining these cheeses and oils (which also have a similar problem, see below) simultaneously lead to the selection of < 28 total points as the cut off for these two groups of foods to be eligible to carry health claims.

The definition of products that are allowed to be assessed using this extension is products that meet Standard 2.5.4 - Cheese of the Food Standards Code. Cheeses which do not exceed 320 mg Calcium/100 g (e.g. various cottage cheeses) are also eligible if they score < 4 total points using the capped Baseline points, as is the case for other foods.

Figure 2. Scatter plot showing the calcium content and uncapped base points for cheeses



[1] The total sugar points are not extended in Table 6 for the reason that cheese and oils do not contain high sugar levels, similarly, oils are the most concentrated form of energy and this is covered by a maximum point score of 11

4.1.4 Poly- and mono-unsaturated oils and margarines are ineligible in the UK system

Increased intakes of unsaturated fats, relative to intake of saturated fats, are recommended. Reduced fat ('diet') margarines scored between 10-14 Baseline points and other oils, fats and spreads scored 16 or more points. Hence all of them are ineligible to carry claims in the UK system. Using the same approach as was used for cheeses, the Baseline points were uncapped and this created a wider spread of scores among the products. For example, both salt-free butter and safflower oil score 19 in the UK system but they score 49 and 20 Baseline points respectively, if the points are uncapped. Note that Models 1-6 and 8, including the UK system, calculate the criteria per 100 g whereas Model 7 allows calculation per 100 ml because oils commonly express their nutrition information panel data in this form.

Examining the uncapped points for cheeses and oils simultaneously lead to the selection of < 28 total points as the cut off for these two categories to be eligible to make health claims. This cut off prevents some of the higher sodium polyunsaturated spreads from being eligible to carry claims. A number of fats, oils and spreads spanning the range of points are shown in Table 13. Foods which appear to be the same are not always identical; whether they are or are not eligible depends on their exact compositions. Only three products changed classification as a result of allowing these calculations to be done per 100 ml: particular types of cod liver oil, peanut oil and wheat germ oil were eligible using per 100 ml but had become ineligible using per 100g (the specific gravity of most oils is 0.92 g/ml).

Other methods could have been chosen, such as including the ratio of saturated to unsaturated fats. However this would have introduced a new set of tables and calculations into the system and it was thought better to keep the system as consistent as possible.

The definition of products that are allowed to be assessed using this extension is products that meet Standard 2.4.1 - Edible Oils or Standard 2.4.2 - Edible Oil Spreads of the Food Standards Code.

Table 13. Selected fats, oils and spreads showing the range of possible scores of uncapped Baseline points

Product	Energy (kJ)	Saturated fat (g)	Na (mg)	Model							Uncapped baseline points
				1	2	3	4 & 5	6	7	8	
Margarine, reduced fat, low salt	1570	6.12	156	E	E	E	E	NE	E	NE	11
Brand 'V' phytosterol extra light spread	1170	6.8	380	E	E	E	E	NE	E	E	13
Oil, Sunflower, Monounsaturated	3700	6.7	0	E	E	E	NE	NE	E	E	17
Brand 'W' phytosterol light, spread	1500	9.3	362	E	E	E	E	NE	E	E	17
Oil, Canola (Include Rape Seed Oil)	3700	7.2	0	E	E	E	NE	NE	E	E	18
Lite canola spread	2046	11	320	E	E	E	E	NE	E	E	19
Table Spread, Olive-oil based, lite	2010	12.8	250	E	E	E	E	NE	E	NE	19
Frying oil, vegetable oil blend	3730	9.26	0.001	E	E	E	NE	NE	E	UC	20
Oil, Safflower	3700	9.4	0	E	E	E	NE	NE	E	E	20
Margarine Spread, Reduced Fat (~60%Fat), Polyunsaturated, Reduced Salt	2230	11	380	E	E	E	E	NE	E	E	20
Brand 'X' phytosterol with olive oil, spread	1798	11.1	362	E	E	E	E	NE	E	E	20
Oil, Sunflower	3700	10.7	0	E	E	E	NE	NE	E	E	21
Salad/cooking oil	3730	11.3	0.001	E	E	E	NE	NE	E	E	22
Canola spread salt reduced	2600	14	320	E	E	E	E	NE	E	E	23
Oil, Corn (Include Maize Oil)	3700	13.2	0	E	E	E	NE	NE	E	E	24
Margarine, Polyunsaturated, Salt Free	3105	15.3	0	E	E	E	E	NE	E	E	24
Margarine, Monounsaturated, Canola	3032	11.8	520	E	E	E	NE	NE	E	E	25
Table spread, polyunsaturated,65% fat	2430	12.5	549	E	E	E	NE	NE	E	NE	25
Margarine Spread, Polyunsaturated	2581	13.4	520	E	E	E	NE	NE	E	E	25
Oil, Olive	3700	14.1	0	E	E	E	NE	NE	E	E	25
Oil, Soybean	3700	14.7	0	E	E	E	NE	NE	E	E	25
Soy spread	2700	15	320	E	E	E	E	NE	E	UC	25
Olive spread	2700	15	320	E	E	E	E	NE	E	E	25
Brand 'Y' phytosterol spread	2375	15.5	362	E	E	E	E	NE	E	E	26
Salad oil, vegetable oil blend	3730	15.9	0.001	E	E	E	NE	NE	E	E	26

Key: NE = not eligible; E = eligible; UC = uncertain

Table 13. Selected fats, oils and spreads showing the range of possible scores of uncapped Baseline points (continued)

Product	Energy (kJ)	Saturated fat (g)	Na (mg)	Model							Uncapped baseline points
				1	2	3	4 & 5	6	7	8	
Cod liver oil	3770	18	0	E	E	E	NE	NE	E	E	26
Oil, Peanut	3700	18.1	0	E	E	E	NE	NE	E	E	26
Oil, peanut, groundnut & arachis	3750	16.3	0.11	E	E	E	NE	NE	E	E	27
Brand 'Z' phytosterol spread	2500	16.5	380	E	E	E	E	NE	E	E	27
Olive oil	3760	16.6	0.04	E	E	E	NE	NE	E	E	27
Margarine/Margarine Spread, Non Specific, Polyunsaturated	2924	14.2	629	E	E	E	NE	NE	NE	E	28
Margarine, Monounsaturated, Olive, Reduced Salt	3025	15.3	380	E	E	E	E	NE	NE	E	28
Shortening, hardened canola oil	3730	17.3	0.001	NE	E	NE	NE	NE	NE	E	28
Margarine, polyunsaturated	3090	14.9	776	E	E	E	NE	NE	NE	NE	31
Dairy Blend Spread, Reduced Fat, With Canola Oil, Reduced Salt	2158	23.8	232	E	E	E	NE	NE	NE	NE	31
Monounsaturated spread	2220	20	800	E	E	E	NE	NE	NE	NE	33
Cottonseed oil	3770	25.6	1	E	E	NE	NE	NE	NE	E	36
Butter Spread, Reduced Fat (60%Fat)	2261	39.3	350	NE	E	NE	NE	NE	NE	NE	48
Butter, unsalted	3160	53.1	10	E	E	E	NE	NE	NE	NE	49
Palm oil	3720	44.7	0.001	NE	E	NE	NE	NE	NE	NE	51
Prime beef dripping	3700	52	0	NE	E	NE	NE	NE	NE	NE	51
Coconut oil	3750	84.4	0.001	NE	E	NE	NE	NE	NE	NE	51

Key: NE = not eligible; E = eligible

4.1.5 Exclusion of potatoes and other starchy tubers from the definition of vegetables

These items were excluded in the UK model because the British '5 a Day' programme states that potatoes and other starchy vegetables such as yams and cassava do not count towards the target quantity of fruit and vegetables (Scarborough et al, 2005). Note that the British recommendation for consuming five serves per day refers to fruit and vegetables combined.

By contrast, the derivation of the recommended number of vegetable serves in the Core Food Groups in Australia was based on the assumption that half of all vegetables eaten are potatoes (Cashel and Jeffreson, 1994) and potatoes are classed as vegetables in the Australian Guide to Healthy Eating (Department of Health and Family Services). Sweet potato and taro are important foods for Pacific Islander residents of New Zealand and they contain a range of micronutrients. Therefore the impact of allowing potato, taro, sweet potato, cassava etc. to score for being vegetables was examined to see how this affected classification. There were 218 products that could be described as tubers in the database; most were forms of potato including raw, cooked, salad, hot chips and crisps. The percentage of potato in chips and crisps was estimated by subtracting the total fat content in g/100 g from 100 g and converting this to a percentage.

Allowing potatoes to score as vegetables changed the classification of ten potato products, mainly chips, from being ineligible to being eligible and six potato salads changed from being ineligible to becoming 'uncertain' owing to missing information about the percentage of potato in them. Potato crisps are ineligible in both Model 6 and 7 but a small number of crisps are eligible in Model 8. (Note that potato crisps were not classed as a dried vegetable for the purposes of this evaluation. Therefore the multiplier of two for dried vegetables (see subsection 2.4.1) was not applied.) By contrast, only a small number of 'hot chips' are ineligible in both models. Examples are shown in Table 14. It should be noted that canned beetroot, corn, relishes, tomatoes, uncooked chickpeas and various other vegetables score 4-9 baseline points but are eligible to carry health claims because they also score modifying points for being vegetables. Therefore it would not be logical to prohibit potatoes from scoring as a vegetable but to allow other vegetables with moderately high scores (resulting from their sodium content) to score as vegetables. Rather they should all score baseline and modifying points and be classified accordingly.

Given the above observations, there is no compelling reason for prohibiting potatoes and other tubers from being allowed to score as vegetables for the purposes of calculating their nutrient profiling criteria score to determine their eligibility to carry health claims. Therefore the FSANZ adaptation of the UK model allows potatoes and other tubers to be classified as vegetables and therefore to generate modifying points on this basis.

4.1.6 Calculation of % fruit/vegetables/nuts/legumes

The percentage of dried fruit, vegetables and legumes should be multiplied by 2 (in the numerator and denominator) when calculating the percentage of the dried fruit, vegetable or legume in the food. This two–fold factor is referred to as 'the multiplier' below.

It is intended that the percentage of fruit, vegetable, nuts and/or legumes will be declared on the label, where this is relied on for a product to be eligible to allow enforcement agencies to make their own assessment of the product. Because the nutrition information panel (NIP) values are used to calculate points for all of the components other than the fruit and vegetable content in the nutrient profile model, it would be logical to calculate this percentage on the same form of the food as that described in the NIP. The calculation of the percentage of characterising ingredients is specified in the Code in Standard 1.2.10 – Characterising Ingredients and Components of Food and this percentage may or may not be based on food in the same state as that used to generate the NIP. It would be confusing to have two different percentages on the label, and an extra impost on manufacturers to have to devote another area of the label to this information. Therefore, the suitability of basing the calculation of fruit and vegetable modifying points on the calculation methodology for characterising ingredients was considered, to determine whether the use of a common approach would cause any important differences in classification of products as eligible to carry health claims.

The foods which could be affected fall into several types. Firstly, there are foods such as fruit canned in syrup where the NIP is calculated on the assumption that the entire content of the can is consumed. In this case, the percentage of the fruit (the characterising ingredient) is calculated on the same form of the food as the NIP is based on, i.e. 'as consumed'. For example a can of peaches in syrup could have 60% peaches and this would be the value used directly in the calculation of modifying points.

Another type of food is that sold in a dehydrated form which is made up with liquid before being consumed, such as dried soups. Standard 1.2.10 allows the percentage of the characterising ingredient to be declared either before or after re-hydration, and some labels declare it in both modes e.g. dehydrated onion in an onion soup powder may be declared as "0.5% dehydrated onion which is equivalent to 15% raw onion after re-hydration". In this case, it would be reasonable to allow the two-fold multiplier to be applied to the percentage describing the dehydrated form but not to a percentage describing the re-hydrated form. Either percentage may be used in the derivation of modifying points and hence the classification of these products is not affected.

Related to the second type are canned vegetables and legumes where the NIP is for the drained product, but the percentage of characterising ingredient relates to the undrained can content. Therefore it could be argued that these products should receive 5 points for being virtually 100% vegetable/legume after being drained. If the calculation for characterising ingredients was used, which is based on the content as sold rather than as consumed, then the points allocated would be lower (e.g. around 1-2 points as many of these types of products are around 60% solids). However, examination of the points allocated to canned vegetables and legumes reveals that they

score very few baseline points and so can count their protein points. They also contain fibre and so are eligible, even if they are allocated 2 vegetable/legume points rather than 5 points (e.g. canned potato in Table 14). Therefore the classification of these products is not affected.

Another type of food is that which contains dried or concentrated fruits or vegetables and is not re-hydrated prior to consumption; for example various types of breakfast cereals and fruit and nut bars. In this case, the percentage of fruit or vegetable which is used to determine the modifying points is calculated on the same form of the food as the NIP. This percentage relates to the dehydrated form and may have the multiplier applied in order to determine the modifying points.

Finally, Clause 4 of Standard 1.2.10 sets out the method for calculating percentages of ingredients based on their final weight in the final food where moisture loss from ingredients occurs during processing. The percentage of the characterising ingredient is calculated as the final weight of the characterising ingredients expressed as a proportion of the total weight of the final food. Further details are given in the User Guide for Standard 1.2.10 at: FSANZ User Guides . In these types of foods, the characterising ingredient calculation would be based on the food in the same state as that used to determine the NIP and their classification is not affected.

Therefore it was concluded that requiring the percentage of fruit, vegetables, nuts and/or legumes to be calculated using the same methods that are specified for calculating the percentage of a characterising ingredient would not result in any anomalies and would simplify the presentation of the information on the label.

Only fruit and vegetables have been referred to in discussions of dried forms because nuts and legumes contain little water and so would be unlikely to be able to use the multiplier. Other sections of this document describe the form of fruit/vegetables/nuts/legumes that can score points (e.g. fruit juice) and those which cannot score points (e.g. deionised fruit juice).

To assist enforcement officers to determine whether a food carrying a health claim is actually eligible to carry that claim under the Schedule to the draft Standard, certain labelling requirements have been developed. If the percentage(s) of the fruit, vegetable, nut and/or legumes are relied upon to enable the food to qualify to carry the health claim, those percentages must be declared on the label, in the same manner as the percentage of characterising ingredients under Standard 1.2.10 are to be declared. The percentage of characterising ingredients are permitted to be declared anywhere on the label but are often declared within the ingredient list. This aligns with the approach that the percentage of fruit, vegetable, nut or legume that is used to determine the modifying points is calculated in line with the appropriate method prescribed in Standard 1.2.10. In many instances, the label will already include this information, if it has been determined that the ingredient is a characterising ingredient. However there may be instances where this information will need to be added to a label, for example, foods exempt from the requirements to declare characterising ingredients, and foods exempt from the general labelling requirements.

There will also be instances where the percentage characterising ingredient declaration will not provide complete details about the percentage of fruit, vegetables, nuts or legumes in the food

that the claim relates to. For example, for a health claim on a can of vegetable soup which relates to the soup plus more vegetables which the consumer adds according to instructions on the can, and the extra vegetables are relied upon for the food to carry the claim, the characterising ingredient declaration will only apply to the percentage of vegetables in the can. In this instance, the total percentage will need to be calculated using the percentage characterising ingredient declaration, the proportion of additional ingredients described in the instructions on the label, and the appropriate method prescribed in Standard 1.2.10.

An exception to the application of the multiplier applies to potato crisps and similar potato products. As noted above in Section 4.1.5, the percentage of potato in crisps was estimated in the modelling by subtracting the fat content from 100 g. That is, the percentage of potato in crisps is based on the as consumed product, not on the amount of potato that was the original ingredient, as outlined in Clause 4 of Standard 1.2.10. As noted above, the multiplier is not permitted to be used for crisps and similar potato products, to inflate the percentage of potato. That is, they are not considered as concentrated or dried vegetables and the points they are assigned are based on the final weight of the vegetable component of the product.

Table 14. Classification of selected products derived from potatoes and tubers assuming they can and cannot score as vegetables

Product	Total points excluding potato points	Points for % vegetable from potatoes	Total points including potato points	Model							
				1	2	3	4	5	6	7	8
Potato, Skin, Baked	-4	5	-9	E	E	E	E	E	E	E	E
Potato, Wedge, With Skin, From Frozen, Canola, Baked	-4	5	-9	E	E	E	NE	NE	E	E	E
Potato, Boiled, With Skin (Unpeeled),Fat Not Added	-3	5	-8	E	E	E	E	E	E	E	E
Potato, Boiled, With Skin (Unpeeled), Non Specific Added Fat	-3	5	-8	E	E	E	E	E	E	E	E
Potato, Chips, Hot, Regular, From Frozen, Canola, Baked	-3	5	-8	E	E	E	NE	NE	E	E	NE
Potato, Chips, Hot, Regular, From Frozen, Polyunsaturated, Baked	-3	5	-8	E	E	E	NE	NE	E	E	NE
Taro, common, corms, baked in traditional oven	-3	5	-8	E	E	E	E	E	E	E	E
Taro, Giant Swamp, corms, baked	-3	5	-8	E	E	E	E	E	E	E	E
Potato, fries, independent shops, plain cut	-2	5	-7	NE	NE	NE	NE	NE	E	E	NE
Sweet Potato, Orange, Boiled, Fat Not Added In Cooking	-2	5	-7	E	E	E	E	E	E	E	E
Potato, Boiled, Without Added Salt, Without Skin (Peeled), Fat Added	-1	5	-6	E	E	E	E	E	E	E	E
Potato, Wedge ,With Skin, From Frozen, Poly, Fried	-1	5	-6	NE	E	NE	NE	NE	E	E	NE
Sweet potato, flesh ,boiled, drained	-1	5	-6	NE	E	NE	E	E	E	E	E
Sweet Potato, Orange, Dry-Baked	-1	5	-6	E	E	E	E	E	E	E	E
Sweet Potato, Orange, Raw	-1	5	-6	E	E	E	E	E	E	E	E
Cassava, boiled	0	5	-5	E	E	E	E	E	E	E	E
Potato, Canned, Drained, Fat Not Added	1	5	-4	E	E	E	NE	NE	E	E	NE
Potato, Chips, Hot, Regular, From Frozen, With Animal Fat, Baked	1	5	-4	NE	E	NE	NE	NE	E	E	NE
Potato, fries, in peanut oil, salt added	1	5	-4	E	E	E	E	E	E	E	E
Potato, frozen wedges, coat, polyunsaturated, baked	1	5	-4	NE	E	NE	NE	NE	E	E	NE
Kumara, chips, deep fried	2	5	-3	E	E	NE	E	E	E	E	E
Potato (new),canned, drained	2	2	0	E	E	E	E	E	E	E	NE
Potato, Chips, Hot, Fries, From Frozen, With Animal Fat, Baked	2	5	-3	NE	E	NE	NE	NE	E	E	NE
Potato, Chips, Hot, Regular, From Frozen, With Animal Fat, Fried	2	5	-3	NE	E	NE	NE	NE	E	E	NE
Potato, fries, in beef drip, salt added	2	5	-3	E	E	E	E	E	E	E	E

Key: NE = not eligible; E = eligible; UC = uncertain

Table14. Classification of selected products derived from potatoes and tubers assuming they can and cannot score as vegetables (continued)

Product	Total points excluding tuber points	Points for % vegetable from potatoes or other tubers	Total points including potato or tuber points	Model							
				1	2	3	4	5	6	7	8
Potato, mashed, chain	2	5	-3	NE	E	NE	E	E	E	E	NE
Potato, Mashed, Made With Milk, From Dry Powder	2	5	-3	E	NE	NE	E	E	E	E	NE
Potato salad, chain	5	UC	UC	NE	NE	NE	NE	NE	NE	UC	NE
Potato, Hash Brown, Not Further Specified	6	5	1	NE	NE	NE	NE	NE	NE	E	NE
Potato, Chips, Hot, Fries, From Frozen, Non Specific Fat Type, Fried	6	2	4	NE	NE	NE	NE	NE	NE	NE	E
Potato, Chips, Hot, Fries, From Frozen, With Animal Fat, Fried	9	2	7	NE	NE	NE	NE	NE	NE	NE	NE
Crisp, Potato, Flavoured, Monounsaturated Vegetable Oil	10	2	8	E	E	E	NE	NE	NE	NE	E
Crisp, Potato, Plain, Vegetable Oil, No Added Salt	11	2	9	E	E	E	NE	NE	NE	NE	NE
Potato crisps, `Natural',	11	2	9	E	E	E	NE	NE	NE	NE	NE
Crisp, Potato, Plain, Monounsaturated Vegetable Oil, Salted	12	2	10	E	E	E	NE	NE	NE	NE	E
Potato crisps, low salt, flavoured	15	2	13	NE	E	NE	NE	NE	NE	NE	NE
Potato crisps, `Lites'	17	2	15	NE	NE	NE	NE	NE	NE	NE	NE
Potato crisps, salt & vinegar	17	2	15	E	NE	NE	NE	NE	NE	NE	E
Crisp, Potato, Plain, Restructured	18	2	16	E	E	E	NE	NE	NE	NE	NE
Crisp, Potato, Plain, Vegetable Oil, Salted	18	2	16	E	E	E	NE	NE	NE	NE	NE
Potato crisps, flavoured	18	2	16	NE	NE	NE	NE	NE	NE	NE	NE

Key: NE = not eligible; E = eligible; UC = uncertain

4.2 Classification of foods using each of the eight models

Table 15 illustrates how some foods within broad foods groupings were classified in each of the seven models. Examples of foods are shown here for illustrative purposes only.

As indicated above, Models 4/5 and 6 generally performed better than Models 1, 2 and 3. Further modifications would be required for both. These models perform well for fruit and vegetables although some canned tomatoes and dried fruit were ineligible in Model 4/5. In all of these models, unsaturated oils, many plain whole milks and much confectionery are ineligible, whilst low fat milk products, noodles, pasta and white and brown rice are eligible. More meats, seafood, breads, nuts, yoghurt, ice cream and crackers are ineligible in Models 4/5 than in Model 6, although more cheeses, unsaturated margarine, peanut butter, fruit spreads, cakes and biscuits are eligible in Models 4/5 than in Model 6. An important drawback of Models 4 and 5 is that they require the definition of food categories that will be mutually exclusive and exhaustive and not open to a variety of interpretations.

Model 8 does not prevent fruit, most raw vegetables, veal, low fat milk products or some ice creams from being eligible to carry claims. However, all types of bread except fruit-containing bread, raw spinach and celery, virtually all canned legumes and vegetables except some types of tomatoes, most trimmed beef and lamb, many cottage cheeses, all hard cheese and whole milk are ineligible. The reason why raw spinach and celery are ineligible is because they contain more than 130 mg sodium, but little energy and so do not meet either of the possible cut offs for sodium. An additional drawback is that this model includes added sugar as a classifying criterion, which has its own problems, and also trans fatty acids.

Model 6 was chosen for further work in preference to Models 4 and 5 owing to its more desirable enforcements properties. Model 7 was the result of this work.

Table 15. Classification of foods using each of the eight models, by broad food groupings

Food grouping	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Fruits	Critical 'NE's for raw fruit – banana, mango, pears, oranges (some); some dried fruit 'NE'; fruit rollups 'E'; variable for canned fruit; avocado 'NE'	Raw, canned, dried fruit all 'E'; avocado 'E'	More 'NE' than for Model 1 - grapes, cherries, some apples	Raw and all types of canned fruit 'E'; dried fruit 'NE'; avocado 'NE'	Raw and all types of canned fruit 'E'; most dried fruit 'NE'; avocado 'NE'	Raw and all types of canned fruit 'E'; most dried fruit 'E'; fruit roll-ups generally 'NE'; avocado 'E'	As for Model 6	Raw and dried 'E', canned difficult to assess due to much missing added sugar information but some 'NE' and some 'E'; avocado 'E'
Legumes	Baked beans: most 'NE' including some salt reduced; most other types of legume 'E'	As for Model 1	As for Model 1	Baked beans: most 'E'; a small number of raw legumes 'NE'; felafel 'NE'	As for Model 4	All 'E'	As for Model 6	Baked beans - only no added salt varieties 'E', low salt and regular 'NE'; raw legumes 'E', canned legumes 'NE'
Raw, canned and pickled vegetables	All raw veg 'E'; some canned tomatoes 'NE'; various pickled products 'NE'	All raw veg 'E'; some canned tomatoes 'NE'; pickled products 'E'	As for Model 1 except fewer pickled products 'E'	All raw and most canned vegetables 'E', pickled vegetables and pickled olives 'NE'; some canned tomatoes 'NE'	As for Model 4	All raw & canned vegetables 'E'; pickled vegetables and pickled olives generally 'NE'	As for Model 6	Raw vegetables 'E' except raw celery, spinach, kohlrabi 'NE', canned vegetables 'NE' unless no added salt varieties although many canned tomatoes 'E', pickled products 'NE'
Potato chips and crisps	Chips and crisps variable	As for Model 1	As for Model 1	A few chips 'E', crisps 'NE'	As for Model 4	Frozen chips variable, crisps 'NE'	More (hot) chips 'E' than Model 6; crisps 'NE'	Fewer frozen chips 'E' than Model 6, several varieties of crisps 'E'
Nuts & nut spreads	Many 'E' including roasted and salted varieties, some raw nuts 'NE'; chocolate hazelnut spread 'E'	Peanut butter, chocolate hazelnut and 100% nut spread 'E'	Peanut butter, chocolate hazelnut and 100% nut spread 'E'	Peanut butter, chocolate hazelnut and 100% nut spread 'E'	100% nut and chocolate hazelnut spread 'E' some peanut butters 'E'	Salted or roasted nuts variable; 100% nut and a few peanut butters 'E'; chocolate hazelnut spread 'NE'	As for Model 6	'E' including roasted and salted varieties, peanut butter 'E', chocolate hazelnut spread 'NE'

Key: E = eligible; NE = not eligible

Table 15. Classification of foods using each of the eight models, by broad food groupings (continued)

Food grouping	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Fish and seafood	Most raw seafood or cooked with low fat methods 'E'; fish dishes and fried fish variable; tuna canned in spring water variable	Most raw seafood or cooked with low fat methods 'E'; fish dishes and fried fish variable; tuna canned in spring water 'E'	Most raw seafood or cooked with low fat methods 'E'; fish dishes and fried fish variable; tuna canned in spring water variable	Most raw seafood or cooked with low fat method 'E'; fish dishes variable; most fried fish 'NE'; tuna canned in spring water variable;	As for Model 4	Raw seafood and cooked with low fat methods 'E'; smoked generally 'NE's; fish dishes and fried fish variable, tuna canned in spring water 'E'	As for Model 6	Some types of raw fish and seafood 'NE', more fish dishes and fried fish 'NE' than Model 6; many varieties of canned fish 'NE'
Non-milk beverages	Diet cordial and soft drinks 'E', regular cordial and soft drink 'NE's, most fruit drink 'NE's; many 100% fruit and vegetable juices 'NE'	Diet and regular cordials and soft drinks 'E', fruit drink 'E', most 100% fruit juices 'E', vegetable juices 'E'	Diet cordial and soft drinks 'E', regular cordial and soft drink 'NE's, most fruit drink 'E', many 100% fruit and vegetable juices 'NE'	Diet cordial and soft drinks 'E', some regular cordials, soft drink and fruit drink 'E'; many 100% fruit and vegetable juices 'NE'	As for Model 4	Diet cordial and soft drinks 'E'; regular cordial, soft drink and fruit drink 'NE'; 100% fruit and vegetable juice 'E'	As for Model 6	Similar to Model 6 except some 100% vegetable and tomato juice 'NE'
Breakfast cereals	Among the few failures are various types of rolled oats, bran cereal and some mueslis	More 'NE' than in Model 1, some high sugar cereals 'NE'	Some high sugar cereals 'E'	Similar to Model 6 but more 'NE' including some mueslis and types of rolled oats 'NE' and a small number of medium sugar types 'E'	Similar to Model 4 but there are some extra '"NE's', including various types of rolled oats	Many low sugar varieties 'NE' as they are high in sodium; all rolled oats 'E'; a number of products are 'uncertain' as % fruit information is needed to be classified (about half of these 'E' and half 'NE' in Model 4)	As for Model 6	Similar to Model 6 although a number uncertain due to missing added sugar content information

Key: E = eligible; NE = not eligible

Table 15. Classification of foods using each of the eight models, by broad food groupings (continued)

Food grouping	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Biscuits	About 75% of biscuits in the database 'E' including shortbreads, many chocolate covered biscuits; (various brands of chocolate covered biscuits also 'NE')	Slightly fewer 'NE' than Model 1	Little difference from Model 2	A very small number of biscuits 'E', (mostly containing some dried fruit)	Introduction of a fibre criterion makes many 'uncertain' at present because this information is not on the label (but probably the same as Model 4)	All 'NE'	As for Model 6	Plain sweet biscuits 'E', most other sweet biscuits 'NE', a number uncertain due to missing added sugar information
Crackers	The majority 'E'	About 75% 'E'	Little difference from Model 2	About 12% 'E'	As for Model 4	About 20% 'E'	As for Model 6	More 'E' than Model 6
Cakes	Most 'NE' but ~20-40% 'E' –cakes, muffins, scones, fruit pies, sweet buns	More 'NE' than Model 1	Similar to Model 2	More 'NE' than Model 1 but not always the same ones 'E'	As for Model 4	Few 'E' (pancakes, fruit pies, some sponge cakes); about 40 (<10% of products) uncertain owing to missing fibre information - of these about half 'E' and half 'NE' in Model 4	As for Model 6	Cake-style muffins variable, a small number 'E' (generally different products from Models 4 and 6)
Confectionery	Some sugar confectionery 'E', many chocolates 'E', sugary and sugar free chewing gum 'E'	Sugar confectionery 'E'(marshmallows, liquorice), many chocolates 'E'; sugary and sugar free chewing gum 'E'	Fewer 'E' than either Model 1 or 2	Only one type of plain liquorice and carbohydrate modified confectionery 'E'	As for Model 4	Only sugar free chewing gum and carbohydrate modified confectionery 'E'	As for Model 6	A small number of types 'E'; sugar-free chewing gum 'E'

Key: E = eligible; NE = not eligible

Table 15. Classification of foods using each of the eight models, by broad food groupings (continued)

Food grouping	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Cheeses	About 2/3 fat-reduced hard cheeses 'E'; about ¾ of full fat hard cheeses 'NE'	About the same number of fat-reduced hard cheeses 'E' as for Model 1 but not always the same one; more full fat cheeses 'E' than in Model 1	About 1/3 reduced fat hard cheeses 'E'; most full fat cheese 'NE's	About the same number of reduced fat hard cheeses 'E' as for Model 3 but not always the same ones; full fat hard cheeses 'NE'	As for Model 4	Only a small number of cottage and ricotta cheeses 'E'; all others 'NE'	A small number of cottage and ricotta cheeses 'E', lower fat hard cheeses with Calcium > 320mg/100g 'E'	Fewer cottage and ricotta cheeses 'E' than in Model 6; hard cheese 'NE'
Meats and alternatives except fish	Many lean meats 'E', many fatty meats 'NE' as for Model 6; the remainder are variable; ham 'E', eggs 'E'	As for Model 1	As for Model 1	'E' and 'NE' pattern similar to Model 6 except that various chops and chicken cuts also 'NE', hams 'NE'; eggs 'E'	As for Model 4	'E' about 1/3 of foods; veal, turkey 'E', beef and chicken mostly 'E', eggs 'E', lamb and pork variable, ham, bacon and sausages 'NE'	As for Model 6	Many lean beef cuts and most lean lamb cuts 'NE', chicken and veal 'E', ham and bacon 'NE', whole egg and egg yolk 'E', egg white 'NE'
Bread	About 1/3 'NE' including many wholegrain & wholemeal breads	Similar to Model 6	About half 'NE', more wholegrain and wholemeal breads 'NE' than in Model 1	Mixed grain and wholemeal breads mostly 'E', white bread and rolls mostly 'NE' (about half of bread products 'NE')	As for Model 4	Wholemeal, mixed grain and white bread 'E'; cheese-topped rolls and fruit buns variable; about 1/6 products 'NE', mostly croissants, crumpets, etc.	As for Model 6	Fruit bread 'E', most white, mixed grain and wholemeal bread 'NE'; salt-free bread 'E'

Key: E = eligible; NE = not eligible

Table 15. Classification of foods using each of the eight models, by broad food groupings (continued)

Food grouping	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Animal milk, yoghurt, ice cream	Full fat milk 'NE', reduced fat milk 'E'; full fat yoghurts and some reduced fat yoghurts 'NE', ice cream and dairy deserts variable	Only skim milk 'E'; fewer reduced fat milks, yoghurts, dairy deserts and ice creams 'E' than Model 1	Full fat milk 'NE'; reduced fat milk variable; yoghurt similar to Model 2; some difference in ice cream	Plain and flavoured reduced fat milk 'E', whole milk 'NE', more yoghurts 'NE' than Model 6; more ice creams 'NE' than Model 1	As for Model 4	Plain and flavoured reduced fat milk 'E'; whole milk generally 'NE', most yoghurts 'E'; more ice creams 'NE' than Model 1	As for Model 6 except that plain whole milk 'E'	Full fat milk 'NE', reduced fat milk 'E', full fat yoghurt 'NE', some ice cream 'E' but a number uncertain
Oils and yellow fat spread	Most butter, margarines and oils 'E',	All margarine, butter and oils 'E'	As for Model 1	Some margarines 'E', all oils and butter 'NE'	As for Model 4	All butter, margarine, fats and oils 'NE'	Many unsaturated oils and spreads 'E'	Some NZ margarines which are 'E' in Model 7 are 'NE' in Model 8 owing to trans fatty acid content; more unsaturated margarines are 'E' than Model 7, butter 'NE'
Cereal breakfast bars and similar snack foods	About 3/4 'E'	Fewer 'E' than Model 1, more than Model 3	About 1/2 'E'	More 'E' than in Model 6; those uncertain in Model 6 all 'NE' in this Model	Similar to Model 4 but some are uncertain owing to missing fibre information	A very small number 'E', an equal number need further information about fruit, vegetable and fibre ingredients to be classified	As for Model 6	Added sugar information missing but most are likely to be 'NE' given total sugar and fruit content
Pasta and rices	Dried pasta, noodles, white and brown rice 'E'; flavoured noodles mostly 'NE'	Dried pasta, noodles, white and brown rice 'E'; flavoured noodles mostly 'NE'	Dried pasta, noodles, white and brown rice 'E'; flavoured noodles mostly 'NE'	Dried pasta, noodles, white and brown rice 'E'; flavoured noodles mostly 'E'	As for Model 4	Dried pasta, noodles, white and brown rice 'E'; flavoured noodles mostly 'E'	As for Model 6	Similar to Model 6

Key: E = eligible; NE = not eligible

Food grouping	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Spreads and sweeteners	Yeast and meat-based spread variable; icing 'E'; jams and fruit spreads 'E'; diet jam 'E'; honey and sugar variable	As for Model 1	As for Model 1	Yeast and meat-based spreads 'NE'; icing 'E'; jams 'NE'; fruit spread 'E'; diet jam 'E'; honey 'NE'; sugar 'NE'	As for Model 4 except jams 'E'	Yeast and meat-based spreads 'NE'; icing 'NE'; jams and fruit spreads 'NE'; diet jam 'E'; honey 'NE'; sugar 'NE'	As for Model 6	Yeast and meat-based spreads 'NE'; icing 'NE'; jams and fruit spreads 'NE'; diet jams 'E'; honey 'NE'; sugar 'NE'

Key: E = eligible; NE = not eligible

4.3 'Unexpected' results in Models 6 & 7

One of the criteria of a good set of compositional criteria for determining eligibility is that is should contain as few 'unexpected' results as possible. However, some foods may be ineligible or not when it might be popularly supposed that they should be classified the other way because of misconceptions about their composition. Some of these misconceptions may arise because of changes in formulation over the years. In other cases, the 'unexpected' results might be real anomalies in the system. Specific cases are considered below.

4.3.1 Regular versions of some canned vegetables are eligible

In some cases, there is little difference in sodium content between the regular and reduced salt or no added salt versions (Table 16). In other cases, the foods score a large number of modifying points and so both forms are eligible.

Table 16. Sodium content of regular products and salt reduced or no added salt products

Product	Na (mg/100g)	Model 7 Total points
Tomato, Canned, In Tomato Juice	62	-6
Tomato, Canned, In Tomato Juice, No Added Salt	15	-6
Tomato Paste	630	-2
Tomato Paste, No Added Salt	46	-8
Corn kernels	270	-3*
Corn kernels; no added salt	3	-5*
Red Kidney Beans	240	-8*
Red Kidney Beans, reduced salt	170	-10*
Baked Beans Rich Tomato	334	-6
Baked Beans Rich Tomato (Salt Reduced)	250	-7

*assuming 60% vegetable in the can

4.3.2 Many hot potato chips are eligible

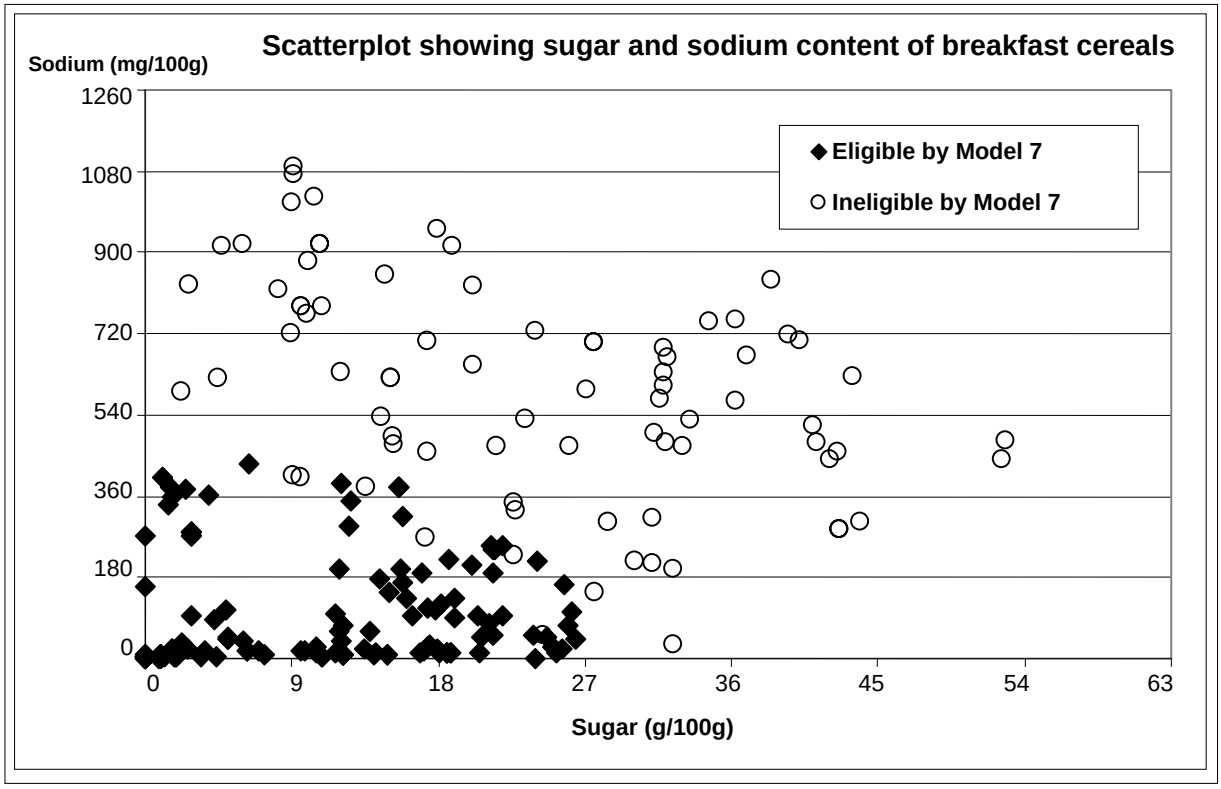
As shown in Table 14, some frozen 'hot chips', which can be cooked at home, have less saturated fat and/or sodium than might be expected and are considered eligible by the nutrient profile model. For example one product which was eligible contained 7.3g saturated fat but only 64mg sodium whereas another eligible type contained 1.2g saturated fat and 375mg sodium. The eligibility to make health claims on a food type which has not commonly been considered to be 'healthy' is due to product reformulation by some manufacturers: the total fat content of chips in

the database varies from 4 – 25 g/100 g. Whether hot chips sold as such through takeaway shops or similar outlets are ineligible or not, depends on the cooking practice of the outlet.

4.3.3 Breakfast cereals which are ineligible

Many breakfast cereals, including a number of low sugar varieties, are ineligible. Popularly, breakfast cereals are rated in terms of their sugar content but many contain large amounts of sodium (see Figure 3). Note the exact score, and whether the cereal is ineligible or not, also depends on its energy, saturated fat, protein and fibre content and so there is some overlap along the boundary of sugar and sodium.

Figure 3. Sugar and sodium content of breakfast cereals



4.3.4 White bread is eligible in Models 6 and 7

White and wholemeal breads, rolls and English muffins all score less than 11 baseline points and so can score their protein as well as their fibre content (Table 17). This means that both white and wholemeal types are classified as eligible to carry health claims. However, garlic bread which has higher saturated fat content is ineligible.

Table 17. Classification of bread and bakery goods, using Models 6 and 7.

Country	Product name	Composition per 100g						Baseline points	Modifying Points	Total Points	Model 6 & 7
		Energy (kJ)	Protein (g)	Saturated fat (g)	Sugars (g)	Fibre (g)	Na (mg)				
NZ	Bread, white, sliced, prepacked	1000	8.3	0.2	1.8	2.8	510	7	7	0	E
NZ	Bread, multi-grain, heavy, prepacked	862	9.2	0.2	2.7	4.3	366	6	9	-3	E
NZ	Bread, wheatmeal, sliced, prepacked	899	8.7	0.3	2.8	5.8	517	7	10	-3	E
Aust	Bread, White	1022	8.4	0.4	2.3	2.9	509	8	8	0	E
Aust	Multi-grain sandwich	993	8.9	1.0	2.3	4.0	492	7	9	-2	E
Aust	Wholemeal sandwich	967	8.9	1.0	2.3	6.1	489	7	10	-3	E
Aust	Bread, Wholemeal, Reduced Salt	971	10.3	0.3	1.5	6.5	235	4	10	-6	E
NZ	Bread roll, white, supermarket fresh	1090	9.2	0.2	2.0	3.0	480	8	8	0	E
NZ	Bread roll, mixed grain, supermarket fresh	1060	10.9	0.3	1.3	4.2	440	7	9	-2	E
Aust	Bread Roll, White	1221	9.0	0.5	4.0	3.7	570	9	8	1	E
Aust	Bread Roll, Wholemeal	1147	10.3	0.5	3.3	6.0	560	9	10	-1	E
Aust	Bread, Garlic, White	1430	7.9	3.6	3.5	3.3	566	13	3	10	NE
NZ	Bread, currant, sliced, prepacked	1130	8.9	0.3	18.4	3.3	344	10	8	2	E
Aust	Raisin thick bread	1140	7.8	1.0	15.0	3.2	250	8	7	1	E
Aust	Bun, Sweet, Cream-(&Jam) Filled	1152	6.5	1.2	18	2.7	226	9	6	3	E
Aust	Bun, Sweet, With Fruit (Not Apple), Coconut Iced	1377	9.6	5.7	14.7	3.9	191	14	4	10	NE
NZ	Bun, Bath/Chelsea	1500	7.8	7.9	19.7	1.9	283	18	1	17	NE
NZ	Bun, iced	1430	5.5	4.3	34.4	2.2	200	17	2	15	NE
Aust	Crumpet, White, Untoasted	793	5.0	0.1	1.5	2.7	945	12	2	10	NE
NZ	Croissant	1660	10.4	11.7	6.4	0.9	380	19	0	19	NE
Aust	Danish Pastry, With Fruit, No Custard	1496	4.8	10.3	14.3	1.2	371	21	1	20	NE
Aust	Bagel	1109	10.4	0.2	6.2	3.1	490	9	8	1	E
Aust	Muffin, English, Regular	860	9.8	0.3	1.6	3.0	418	6	8	-2	E
Aust	Muffin, English, With Fruit	847	9.3	0.3	0.9	3.4	465	7	8	-1	E
NZ	Muffin, sweet with fruit	1050	7.1	3.7	13.0	1.8	389	12	1	11	NE

Key: NE = not eligible; E = eligible

Many fruit breads score the same number of baseline points as white bread because although their sugar content (from the fruit) is higher, their sodium content is lower. The classification of fruit buns is variable. Some have a similar composition to fruit bread. Others have a higher sugar and/or saturated fat content. Therefore the variable content makes it impossible to make a blanket statement about whether buns are ineligible or not; each product must be evaluated based on its own composition.

Other bakery products with higher fat, sodium or sugar (such as croissants, crumpets, etc.) are ineligible at present owing to higher levels of saturated fat or sodium.

4.3.5 Sweet and savoury spreads

Most spreads are not eligible (Table 18). This occurs because the base of per 100 g for calculation discriminates against foods which have very small serving sizes. These products were considered eligible at Draft Assessment because Model 1 uses a per serve base which discriminates in favour of products with small serve sizes and against foods with large serve sizes.

4.3.6 Product reformulation to enable claims to be made

One criticism that has been levelled at the UK Profiling approach is that, because it allows modifying points for risk-reducing components, it encourages manufacturers to reformulate by adding these components rather than by subtracting risk-increasing components. This criticism is true, but only up to a certain point.

Protein cannot be scored as a modifying component for products which score 11 or more baseline points unless these products also score 5 for % fruit/vegetable/nuts/legumes. Therefore many products scoring 11 or more baseline points would need to reduce the content of risk increasing nutrients to get the baseline score below 10 to allow them to score for protein. For example, the typical energy content of breakfast cereals is about 1500 kJ which generates 4 baseline points. Many varieties contain more than 15 g sugar and 360 mg sodium (see Figure 3) which generates at least 3 and 4 baseline points respectively, leading to a total of at least 11 baseline points. As they do not contain much fruit, they cannot score their protein, and so would score at the most 5 points for fibre and 1-2 points for fruit content, leading to a total point score of 4, which would make them ineligible. They can only become eligible by reducing the baseline point score, which would then also allow their protein content to be scored. However, it is true that foods with a baseline score between 4-10 inclusive, could have their classification changed from ineligible to eligible by the addition of protein or fibre or fruit/vegetables/nuts/legumes rather than by reducing the risk-increasing components.

Table 18. Performance of models in classifying sweet and savoury spreads

Product	Composition per 100g							Baseline Points	Modifying points*	Total Points	Model						
	Energy (kJ)	Protein (g)	Saturated fat (g)	Sugars (g)	Fibre (g)	Na (mg)	% fruit or nut				1	2	3	4	5	6 & 7	8
Marmalade, artificially sweetened[#]	1150	0.1	0	3.2	0.6	18	<30	3	0	3	E	E	E	NE	E	E	E
Jam, artificially sweetened[#]	1010	0.7	0	7	1.1	38	40	4	1	3	E	E	E	E	E	E	E
100% Fruit Apricot Fruit Spread[#]	875	0.7	0	38.9	UC	57	50[##]	10	1	9	E	E	E	E	E	NE	E
Honey	1320	0.4	0	78.1	0	12	0	13	0	13	NE	E	NE	NE	NE	NE	NE
Chocolate Hazelnut spread	2600	12	6	3	UC	8	13	12	0	12	E	E	E	E	E	NE	NE
100% cashew spread	2400	18	9	0	UC	20	100	15	10	5**	E	E	E	E	E	UC	E
100% almond spread	2400	19	5	0	UC	30	100	11	10	1	E	E	E	E	E	E	E
Peanut butter smooth/crunchy, no added salt	2540	24.1	9	5	4.3	6	85	16	15	1	E	E	E	E	E	E	E
Peanut butter smooth/crunchy	2520	22.1	8.8	9.2	4.3	390	85	21	15	6	E	E	E	E	NE	NE	E
Lite peanut butter smooth	2340	17	7.5	30.4	UC	713	63	26	2	24	E	E	E	NE	NE	NE	UC
Peanut butter, smooth/crunchy, no sugar & salt added	2390	28.8	7.96	3.4	6.79	5	86	14	15	-1	E	E	E	E	E	E	E
Tuna fish spread	738	15.7	1.2	1.5	UC	510	0	8	5	3	NE	E	NE	NE	NE	E	NE
Ham paste	1191	15	10.1	0.1	UC	430	0	17	0	17	E	E	E	E	E	NE	NE
Yeast spread	811	25.6	0.9	1.7	UC	3380	0	12	0	12	E	E	E	NE	NE	NE	NE

* except fibre where fibre is missing

** the missing fibre information is critical to the decision as to whether it is eligible or not

[#] % fruit estimated from typical products

[##] Concentrated fruit juice derivative used as a sweetener; cannot contribute to % fruit score

Key: NE = not eligible; E = eligible; UC = uncertain

4.4 The possible addition of trans fatty acids to Model 7

Trans fatty acids are mono- or poly-unsaturated fatty acids in which at least one double bond is in the *trans* configuration rather than the more common *cis* configuration. They are formed by the bacteria in the gut of ruminant animals (and so are present in beef, lamb and dairy fats), during the deodorisation and hydrogenation of unsaturated fats and they are also present in a range other foods such as fish. In Australia and New Zealand, all forms of trans fatty acids, regardless of source, are included in the regulatory definition of trans fatty acids. In some other countries, certain sub-categories of trans fatty acids, such as conjugated linolenic acid, are excluded from the regulatory definition of trans fatty acids. The Food Standards Code defines trans fatty acids as: *trans fatty acids means the total number of unsaturated fatty acids where one or more of the double bonds are in the trans configuration acids and declared as trans fat*.

The NHMRC has recommended that the intake of saturated fat plus trans fatty acids should be no more than 8-10% of energy (NHMRC and Ministry of Health, 2006). Therefore the baseline points table in the Model 7 was modified by changing the saturated fat column to a column for both saturated fat and trans fat. All other steps in the calculation remained as described for Model 7.

This modification means that all products will have the same or more baseline points than if trans fats are not included (i.e. Model 7). Hence any food that is ineligible in Model 7 (see Table 15) will automatically be ineligible under this variation. Table 19 lists some of the foods which are already ineligible in Model 7, i.e. without including trans fatty acids in the model.

Only the classification of foods which are eligible in Model 7 can be affected (i.e. become ineligible) by the addition of trans fatty acids as a criterion. Of these, raw fruit, fruit juice, fruit canned in juice or syrup, raw vegetables and legumes, vegetables and legumes canned in brine and skim milk do not contain trans fatty acids and will not be affected. The remaining foods which might have their classification changed by the inclusion of trans fatty acids in the Model are margarines, oils, cheese, full and reduced fat milk, yoghurt, lean cuts of beef, lamb and pork, fish, chicken, bread, nuts and hot potato chips. The majority of these foods contain < 0.5g trans fatty acids/100g product. As the steps for Baseline points in Table 6 are in 1 g of saturated fat or 1 g of saturated plus trans fat, this means that only foods with 3 total points in Model 7 might have their total points increased to 4 and so become ineligible. The amounts of trans fats in Australian and New Zealand foods are so low that many of these would not move up one step. Hot chips have been discussed in the media in recent months as a source of trans fatty acids. The average content of trans fatty acids is <1 g/100 g, the exact amount depending on whether animal or vegetable fat is used for deep frying. As shown in Table 14, there is only one type of hot chip in the databases used in this assessment that has a total point score close to the boundary, the other types are well under the cut off of < 4 total points. In this regard, it is worth noting that Model 8, which has specific trans fatty acid criteria, does not make all hot chips ineligible, although the ones which are not eligible are not always the same as the ones that are ineligible in Model 7.

Table 19. Foods classified as ineligible by Model 7 without including trans fatty acids in the model

g trans fatty acids/100 g product	product
> 5	New Zealand buttered popcorn
> 3.0	butter, unsalted butter, dairy blend
> 1	doughnuts
< 1	cream, cream biscuits, chocolate biscuits, muffins, plain sweet biscuits, cake, croissants, sausages, meat pies, salami, chocolate bars, fruit pastries, fattier cuts of lamb, been and pork, plain sweet biscuits, scones, rock cakes, reduced fat cream, ice cream, savoury biscuits, bacon, ham, Australian popcorn, some peanut butters, potato crisps, muesli bars, various types of smoked and canned fish
0	fruit drinks, regular soft drink, cordials, boiled lollies, various types of breakfast cereal, jam, sugar, honey, pickled olives

A notable exception is New Zealand oils and margarine which contain, on average, > 3 g trans fatty acid/100 g product in contrast to the Australian equivalents which contain, on average, < 1 g/100 g (FSANZ, 2007, unreleased report). However the data in FOODfiles was collected before a recent move to reduce trans fatty acid content of margarines in New Zealand. There are other strategies in place in both countries to encourage manufacturers and food service outlets to reduce the trans fatty acid levels in their products.

Therefore it seems unnecessary to alter the scoring to identify the small, and probably decreasing, number of products which contain appreciable amounts of trans fatty acids but which are eligible by their other compositional characteristics. Further, it should be noted that because trans fatty acid content labelling is only mandatory for foods which make content claims related to fat or cholesterol, including trans fatty acids in the scoring system would mean that the foods with high trans fatty acid content that are ineligible would not have to declare this on the label, but the foods with lower amounts which are eligible would have to declare their trans fatty acid content.

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ANNEX TO ATTACHMENT 6

Brief summary of the development of the UK model

The following is a précis of the stages of development and testing of the UK Nutrient Profiling model that occurred between 2003-2005. The aim was to derive a classification of food for the purpose of 'tightening the rules for broadcast limiting advertising of foods that are high in fat, saturated fat, salt or sugar to children' (Rayner M et al., 2005a).

A review of classification schemes in use around the world was conducted. This revealed four different areas of choice that need to be considered with devising a scheme:

1. Choice of nutrients and other food components (possibly both favourable and unfavourable).
2. Choice of base (per 100 g, per 100 kJ, per serve, etc.).
3. Choice of model type (threshold, simple score, complex score) and whether this is an 'across-the-board' scheme or varies by food category.
4. Choice of cut offs for nutrients/food components.

It was also noted that:

1. Nutrients: almost always include total fat and sodium, often saturated fat, sometimes sugar, infrequently energy.
2. Base: per serve is the most common, per 100 g also common, energy base is rare.
3. Model: threshold is most common with an even split as to whether it is across-the-board or by food category; scoring schemes are rare.
4. Cut offs: based on public health recommendations, especially for vitamins and minerals; origin of cut offs not identifiable for many schemes.

It was decided to take a staged approach. Children aged 11-16 years were selected because this group has the highest nutrient need in relation to energy intake.

Stage 1: development of a set of models for preliminary assessment to select a smaller number for more intense work

A wide ranging approach was taken with 28 models, covering different combinations of nutrients, base, model type and cut offs being outlined as follows:

Nutrients:

- Simple definitions involving only energy, saturated fat, non-milk extrinsic (NME) sugar, sodium (referred to as 'A' nutrients).
- Also criteria for fruit and vegetables, long chain omega-3 fatty acids (referred to as 'B' nutrients).
- Also criteria for iron and calcium (referred to as 'C' nutrients).
- Models to use a cascade i.e. a 'B' model always contained the 'A' nutrients; a 'C' model always contained the 'B' and 'A' nutrients.
- Levels in food prior to any discretionary fortification to be used.

Bases: All of

- Per 100 g
- Per 100 kJ
- Per 100 g and/or per serve
- Per 100 kJ and/or per serve

Model:

- Threshold and scoring schemes to be investigated.
- Across-the-board only in the first instance.

Cut offs:

- It was agreed that numbers would bear a consistent and transparent relationship to public health recommendations

The database used for testing

A derivation of the McCance and Widdowson (6th edition) was used, with inedible foods (e.g. raw meat) and duplicates (different types of apples) removed. They applied additional data on adult serving sizes, calculated NME sugars, estimated the proportion of fruit/vegetables in five groupings (0 - < 20% etc.) and added in long chain omega-3 data. This resulted in a total of 1030 foods (Rayner M et al., 2004, p65).

Foods were divided into the six British food groups: dairy, fruit and vegetables, bread/cereals/potatoes, meat/fish/alternatives, food containing fat or sugar and composite foods. Eight foods which covered the range of nutrient profiles in each group were selected and the classification of each of these 48 foods for each of the 28 schemes was examined (Rayner M et al., 2004, p67).

The "Gold Standard"

It is only possible to say that one model performs 'better' than another if there is an external reference point.

From the database, foods were selected which two researchers agreed were generally accepted as either healthy or less healthy. The 124 'healthier' foods included a range of vegetables and legumes boiled without salt, fruit tinned in juice and raw fruit. The 84 'less healthy' foods included confectionery, chocolate, pastries, chain hamburger, various cakes and salty snack foods.

Sensitivity and specificity were calculated. These are standard epidemiological measures for describing the performance of a screening test. Sensitivity was defined as the percentage of the 124 'healthier' foods that were classified as 'healthier' by each scheme. Specificity was defined as the percentage of the 84 'less healthy' foods that were classified as 'less healthy' by each of the schemes. Note that unlike the usual situation of assessing medical tests, the sensitivity and specificity only relate to the designated foods and provide no information about how the schemes would perform on any other food (hence it was inappropriate to calculate confidence intervals).

However, this approach had the advantage of being set up ahead of time and so was not open to manipulation upon seeing the results.

Results

Assessment of the 28 models led to more detailed testing of eight models. This indicated that limiting the system to 'A' nutrients classified foods with very different micronutrient levels as 'less healthy' (e.g. chocolate and cheddar cheese; lollies and dried fruit). It also indicated that the choice of base – per serve/per 100 g/per 100 kJ – made little difference to the degree of misclassification among the models. However, models with scoring systems gave less misclassification than models with thresholds.

Stage 2: further refinements of selected models

From this work, 3 models were selected to proceed to further development:

- A threshold model based on A nutrients only (energy, saturated fat, NME sugar, sodium) per 100 g (included because of its simplicity).
- A threshold model with A, B and C nutrients (energy, saturated fat, NME sugar, sodium, % fruit/vegetables, long chain omega-3 fatty acids, calcium, iron) per 100 g.
- A scoring system with A, B, C nutrients per 100 g.

These models were then further explored, making one modification at a time, starting with the first model and using the previously defined amounts of 'a lot' and 'a little' in the first model as the first cut points for the nutrients (Rayner M et al., 2004). In the end, 12 different models were derived and how they classified foods was assessed as before. In addition, the use of total fat content, rather than energy content, was assessed.

Results

Choice of energy or total fat as a nutrient in the models made little difference to the classification of foods. Models using a scoring system and all nutrients were more accurate than models using a threshold system for all nutrients which were, in turn, more accurate than models using a threshold system for the 'A' nutrients.

At this stage, modifications were introduced to the classification of drinks (thresholds set at 50% that of non-drink thresholds) because drinks such as whole milk, orange juice and soft drink were all classified as 'intermediate' foods. Because some high fibre cereals were classified as 'less healthy', fibre modifications were also explored. From this, the model containing a scoring system of negative ('A') and positive ('B' and 'C') nutrients, per 100 g, with a modification for drinks and bands set at 3.8% of the Guideline Daily Amount (GDA) for 'A' nutrients and 12-15% of the GDA for the 'B' and 'C' nutrients and designated cut points for fruit and vegetables was recommended for further consideration – referred to as Model SSCg3d (Rayner M. et al., 2004). Further information about GDAs has been included in the following section.

Stage 3: examination of extension of model to other age groups

In 1998, the Institute of Grocery Distribution developed GDAs in collaboration with government, consumer organisations and the food industry.

GDAs are:

> "…guidelines for healthy adults and children about approximate amount of macronutrients (fat, saturated fat, total carbohydrate, non-milk extrinsic sugar, total sugars and protein) fibre, sodium and salt required for a healthy diet. Because people vary in many ways, such as size and activity levels, GDAs cannot be used as targets for individuals, but they provide a benchmark against which the contribution from macronutrients, fibre and salt per serving of a food can be roughly assessed. GDAs are different from Dietary Reference Values." (Working Group Report, 2005)

The modelling work was based on the GDAs for children aged 11-16 years because these groups had the highest needs in relation to energy. The bands for the nutrients had been set at specific percentages of the GDA, and so they would potentially need to be different for other age groups. The performance of Model SSCg3d was examined for other age groups (Rayner, M et al., 2005b).

After comparing the band widths using percent of the GDA for children aged 5-10 years or adults, and doing some remodelling of foods, it was concluded that the bands would not have been substantially different if the initial models (Rayner, M. et al., 2004) had been based on one of these other age groups rather than children aged 11-16 years. Therefore it was proposed that Model SSCg3d could be used generally, with the provision that specific targeting to children aged 5-10 years would need to use different sodium cut offs between the steps.

Stage 4: refinements following consultation

Model SSCg3d was released for public consultation in late 2004 and a workshop held with academics and policy makers from the UK and other countries (Rayner M. et al, 2005c). Comments received suggested modifications in the areas of:

- alternative approach to the carbohydrate aspect of the scheme was needed
- a need to take account of the nutrient density – a water criterion
- an alternative way of recognising the importance of the meat and alternatives and milk and alternatives groups
- further differentiation of fats and oils
- refinement to the fruit and vegetable weightings

Following this, Model WXY was developed. The major differences between this and Model SSCg3d are:

- use of protein instead of iron, calcium and long chain omega-3 fatty acids
- total sugar instead of NME sugar
- addition of fibre
- points for positive nutrients are capped at 5 (the bands are wider than for the negative nutrients)

- changed the modification for drinks

It was noted that changing from NME sugar to total sugar had little effect on classification (but is much easier to use because total sugar is given in food composition tables). This model is regarded as classifying wholegrain cereals better and is simpler because total sugars can be analysed for and three nutrients are replaced with one nutrient (Rayner, M. et al., 2005a). Using protein, rather than iron, calcium and long chain omega-3 fatty acids lead to useful reclassification of a number of foods. However it was using protein that lead to some high fat high sodium foods being classified as healthy.

To test this model further, a database of composition of real foods from takeaways etc was compiled. A questionnaire was sent to members of the Nutrition Society and British Dietetic Association asking respondents to rate 120 foods as healthy, intermediate and less healthy on a six point scale. These 120 foods were chosen with reference to the results of the UK national dietary survey to ensure that they reflected what was being eaten. The performance of Models SSCg3d and WXY were compared to the ratings for these foods received from more than 700 professionals. There was a high level of concordance between each model and the professional rating. As there was also variation among the professionals in rating, it was not possible to say which was 'better' and so Model WXY was chosen for its greater technical ease (Rayner, M. et al., 2005c). At this point, a decision was made to set the cut point for drinks to <1 rather than to use a multiplier in the calculations. UK whole milk scores zero points and therefore 'passes' (Rayner, M. et al., 2005c).

Further refinements were made following a second public consultation (Rayner, M. et al., 2005a, UK Food Standards Agency, 2006):

- including nuts in the definition of fruits and vegetables to acknowledge their role in a healthy diet
- restricting the ability to score for protein to foods which score less than 11 A (Baseline) points
- allowing foods which score 11 or more A points to score for protein if they are more than 80% fruit/vegetables/nuts/legumes (because the first two modifications work against each other).

A detailed description of the foods included in the definition of fruit/vegetables/nut was released, together with instructions regarding how dried and concentrated products, such as sultanas and tomato paste, should be included. Legumes are regarded as vegetables in this scheme (Scarborough P. et at., 2005).

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