

FIVE YEAR REVIEW OF THE HEALTH STAR RATING (HSR) SYSTEM

HSR Technical Advisory Group (TAG)

Fibre

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Summary

This paper assesses whether the HSR system deals appropriately with dietary fibre with respect to starting hurdle, weighting and definition of dietary fibre.

The different impact of fibre content on HSR by HSR food category is highlighted, noting that some HSR categories are not important sources of dietary fibre.

Three options, in addition to option 1 (status quo), are discussed. Relatively simple options are available to change the benchmark fibre content at which a product's HSR begins to benefit. Option 2 could be implemented should it be determined that low fibre foods (i.e. those with a fibre content of 0.9 g/100 g to 3.7 g/100 g) should not have any HSR benefit for their fibre content.

Option 3 has the same starting benchmark as option 2 but results in a decreased HSR benefit from fibre for most foods, including those higher in fibre, than at present (i.e. down weighted). This would reduce the HSR benefit that foods with a fibre content above 0.9 g/100 g would derive from their fibre content.

Under option 4, the type of fibre included in the algorithm can be operationally defined to exclude refined fibre, although the definition of refined fibre could be difficult, and would be a departure from the Australia New Zealand Food Standards Code definition.

Problem Definition

An assessment is required of whether the HSR algorithm deals appropriately with dietary fibre, and specifically whether the definition of fibre for inclusion in the algorithm should be altered to remove the benefit achieved by food products from the addition of refined fibre ingredients.

Definition

The Australia New Zealand Food Standards Code (the Code) definition (Standard 1.2.8)¹ of dietary fibre is as follows:

Dietary fibre means that fraction of the edible part of plants or their extracts, or synthetic analogues that:

(a) are resistant to digestion and absorption in the small intestine, usually with complete or partial fermentation in the large intestine; and

(b) promote one or more of the following beneficial physiological effects:

(i) laxation;

(ii) reduction in blood cholesterol;

(iii) modulation of blood glucose;

and includes:

(c) polysaccharides or oligosaccharides that have a degree of polymerisation greater than 2; and

(d) lignins.

¹ FSANZ (2017) Australia New Zealand Food Standards Code – Standard 1.2.8 – Nutrition information requirements [ONLINE]. Available at <https://www.legislation.gov.au/Series/F2015L00395> [accessed 7 September 2018]

Intake of dietary fibre

The 2011-13 Australian Health Survey (AHS)² found that the mean daily intake of dietary fibre was 24.8 g for men (19 years and over) and 21.1 g for women (19 years and over). In the survey, total dietary fibre includes naturally occurring fibre and added refined fibre. The mean daily intake for all persons 19 years and over was 22.9 g and the mean daily intake for persons aged 2-18 years was 19.7 g.

The average dietary fibre intake for New Zealand adults (19-64 years) is 20 g a day³. The 2002 NZ Food NZ Children Survey⁴ found that the median usual daily intake of dietary fibre increased with age in New Zealand males from 16.7 g (at 5-6 years) to 21.4 g (at 11-14 years), and in females from 14.5 g (at 5-6 years) to 17.2 g (at 11-14 years).

Key food sources for fibre

The AHS⁴ and the New Zealand Nutrition Survey (2008-09)⁵ indicated that the majority of dietary fibre is sourced by consuming cereal and cereal products (cereals, bread, pasta, barley, quinoa etc.); cereal based products (biscuits, cakes, pastries etc.); fruit; and vegetables.

Table 1: The main sources of fibre reported in the AHS (ABS, 2011-12)⁴ for children and adults.

Food Group	Fibre (% of daily intake)	
	2-18 years	19 years and over
Cereals and cereal products	29.3	28.9
- Flours and other cereal grains and starches	1.6	2.3
- Regular breads and bread rolls	13.3	12.7
- English-style muffins, flat breads and savoury and sweet breads	2.0	1.5
- Pasta and pasta products (no sauce)	2.9	1.4
- Breakfast cereals, ready to eat	8.2	9.3
- Breakfast cereals, hot porridge style	1.2	1.6
Vegetables	14.4	19.9
Cereal based products	19.0	14.6
- Sweet biscuits	1.2	0.7
- Savoury biscuits	1.5	0.8
- Cakes, muffins, scones, cake-type desserts	2.3	1.6
- Pastries	2.2	2.1
- Mixed dishes where cereal is major ingredient	11.4	9.0
- Batter-based products	0.4	0.3
Fruit	17.7	14.4

² ABS (2014) Australian Health Survey: Nutrition First Results - Foods and Nutrients, 2011-12 [ONLINE] Available at www.abs.gov.au [Accessed 16 January 2018].

³ Ministry of Health (2008-09) New Zealand Adult Nutrition Survey data tables [ONLINE] Available at <https://www.health.govt.nz/publication/2008-09-new-zealand-adult-nutrition-survey-data-tables> [Accessed 15 January 2018]

⁴ Ministry of Health (2003) NZ Food NZ Children: Key Results of the 2002 National Children's Nutrition Survey [ONLINE] Available at <https://www.health.govt.nz/system/files/documents/publications/nzfoodnzchildren.pdf> [Accessed 22 January 2018].

⁵ Ministry of Health (2008-09) New Zealand Adult Nutrition Survey data tables [ONLINE] Available at <https://www.health.govt.nz/publication/2008-09-new-zealand-adult-nutrition-survey-data-tables> [Accessed 15 January 2018]

The New Zealand Adult Nutrition Survey⁶ reported that the major food sources of dietary fibre for adults (15 years and over) were:

- Bread (17.1%)
- Vegetables (16.4%)
- Potatoes, kumara and taro (11.7%)
- Fruit (11.5%)
- Grains and pasta (8.3%)
- Breakfast cereals (7.2%)
- Bread based dishes (5.1%)
- Cakes and muffins (2.3%).

The main sources of fibre reported in the 2002 New Zealand Food NZ Children Survey (Ministry of Health, 2003)⁵ (5-14 years) were:

- Bread (20%)
- Potatoes, kumara and taro (14%)
- Fruit (14%)
- Breakfast cereals (11%)
- Vegetables (11%).

Burden of disease associated with fibre

According to the Australian Institute of Health and Welfare (AIHW) *Australian Burden of Disease – Impact and Cause of Illness and Death in Australia* (2011)⁷, 1% of the total disease burden in Australia is attributable to a diet low in fibre, and a diet low in fibre was responsible for 10% of the disease burden due to bowel cancer and 10% of the disease burden from coronary heart disease. The burden of disease associated with a low fibre diet is estimated to be higher than other nutrient dietary risk factors such as a diet high in saturated fat (0.7% of total disease burden), a diet high in sodium (0.3% of total disease burden) and a diet low in calcium (0.1% of the total disease burden).

Current treatment of dietary fibre in the Health Star Rating system

The amount of dietary fibre in a food is a positive component that is used to calculate the Health Star Rating (HSR) of that food for all categories except for the beverage categories, Category 1 and Category 1D. Category 2, 2D, 3 and 3D food products score F points for the amount of dietary fibre present in the food. F points contribute to HSR modifying points.

The amount of dietary fibre in a food can score up to a maximum of 15 modifying points (the same as protein content, but more than fruits, vegetables, nuts and legumes (FVNL) content which can only score up to 8 points). As with the other nutrients or factors, the amount of dietary fibre is expressed as grams per 100 g/100 mL of the food product. The scale for dietary fibre is curvilinear, starting at 1 point for >0.9 g/100 g to 15 points at >20 g/100 g (see Table 2).

Dietary fibre content accrues modifying points for any food in Category 2, 2D, 3 or 3D containing at least 1 g fibre/100g. This is unlike protein, that requires baseline points to be less than 13 **or** for V points (from FVNL) to be at least 5.

⁶ Ministry of Health (2008-09) New Zealand Adult Nutrition Survey data tables [ONLINE] Available at <https://www.health.govt.nz/publication/2008-09-new-zealand-adult-nutrition-survey-data-tables> [Accessed 15 January 2018]

⁷ AIHW (2011) Australian Burden of Disease – Impact and Cause of Illness and Death in Australia [ONLINE] Available at <https://www.aihw.gov.au/reports/burden-of-disease/abds-impact-and-causes-of-illness-death-2011/contents/highlights> [Accessed 10 January 2018].

Table 2: HSR Fibre (F) Points

Points	Dietary fibre (g) Per 100 g or 100 mL	Points	Dietary fibre (g) Per 100 g or 100 mL
0	≤0.9	8	>7.3
1	>0.9	9	>8.4
2	>1.9	10	>9.7
3	>2.8	11	>11.2
4	>3.7	12	>13.0
5	>4.7	13	>15.0
6	>5.4	14	>17.3
7	>6.3	15	>20.0

Issues raised

The following questions in relation to fibre have been posed by the HSR Advisory Committee:

- Is the starting hurdle to achieve these modifying points correct?
- What are the implications of modifying the baseline requirements (hurdle) before fibre points are achieved?
- Is the weighting of this nutrient appropriate according to dietary guidelines?

Open consultation on the HSR system raised a concern that dietary fibre, particularly 'refined' dietary fibre components such as inulin, could be added to a food to derive HSR benefit. The concern was that the addition of refined fibre was of little health benefit, and/or that the addition of fibre could be used to offset the content of risk-associated components such as sugar, saturated fat, and salt.

Alignment with system objectives and priorities

Nutrient Reference Values

The 2006 Nutrient Reference Values for Australia and New Zealand (NRVs)⁸ state that the adequate intake (AI) of dietary fibre is 30 g per day for men and 25 g per day for women. An adequate intake is described when there is insufficient evidence to set a dietary requirement. To prevent non-communicable disease, the NRVs include a suggested dietary target (SDT) for fibre for men of 38 g per day and for women, 28 g per day.

Dietary recommendation and daily requirements

The Australian Dietary Guidelines (ADG)⁹ and the New Zealand Eating and Activity Guidelines (NZEAG)¹⁰ both provide guidance to enjoy a wide variety of foods that includes grain (cereal) foods that are mostly wholegrain and/or high in fibre, fruit and vegetables. Foods from these food groups contain dietary fibre and other vitamins and minerals.

⁸ NHMRC (2006) Nutrient Reference Values for Australia and New [ONLINE] Available at www.nrv.gov.au [Accessed 10 January 2018].

⁹ NHMRC (2013) Australian Dietary Guidelines (2013) [ONLINE] Available at: www.eatforhealth.gov.au [Accessed 10 January 2018]

¹⁰ Ministry of Health (2015) Eating and Activity Guidelines for New Zealand Adults [ONLINE] Available at: <https://www.health.govt.nz/> [Accessed 15 January 2018]

High dietary fibre intakes have been linked to lower rates of overweight and obesity, Type 2 Diabetes, risk of cardiovascular disease and some cancers.^{11,12} The slower rate of absorption created by the presence of dietary fibre from some grain (cereal) foods can also influence appetite.

Declaration of dietary fibre on food labels

The Code defines dietary fibre in Standard 1.2.8 – Nutrition Information Requirements. Under the Code, it is not necessary to declare the dietary fibre content of food in the Nutrition Information Panel unless certain claims are made about fibre or carbohydrates content. Under Schedule 4 of the Code, a food can claim to be a source of dietary fibre if it contains at least 2 g of fibre and a good source if it contains at least 4 g fibre per serve.

Nutrient Profiling Scoring Criterion (NPSC)

A food is given a score that has included the amount of dietary fibre in order to determine whether or not it can make a health claim.¹³ The scoring criteria for the NPSC allows a maximum of 5 points, with the same cut points as the first 5 F points in the HSR scale (i.e. the HSR scale is extended to allow for a further 10 levels of fibre content). The NPSC does not allow fibre to be taken into account for Category 1 foods.

Linkages with other TAG work

Dietary fibre is usually sourced from cereals, fruits and vegetables, so TAG work on food groups that contain these components may be relevant to issues relating to fibre.

Dietary fibre is an element of the HSR algorithm, and may also be linked to other elements of the algorithm. Dietary fibre generally dilutes overall energy content, and is often an integral part of FVNL that can contribute to a positive score component for HSR if present in a food in sufficient amount.

Dietary fibre content, if not added to a food, can represent the degree of processing of a food, or 'intactness' of its components. This topic is explored in part in the TAG paper on wholegrains. However, the edible portion of different foods vary in their fibre content with a large number of minimally processed foods containing no fibre.

Options to address identified issues

Table 3 summarises the four options considered in this paper in order to address identified issues. These options were investigated in a set of additional analyses.

¹¹ NHMRC (2006) Nutrient Reference Values for Australia and New [ONLINE] Available at www.nrv.gov.au [Accessed 10 January 2018]

¹² NHMRC (2013) Australian Dietary Guidelines (2013) [ONLINE] Available at: www.eatforhealth.gov.au [Accessed 10 January 2018]

¹³ FSANZ (2016) Nutrient Profiling Scoring Criterion [ONLINE] Available at <http://www.foodstandards.gov.au/industry/labelling/Pages/Consumer-guide-to-NPSC.aspx> [Accessed 15 January 2018].

Table 3: Summary of options to improve the consistency of this category with the Australian Guide to Healthy Eating (AGHE)

Option number	Option	Benefits	Disadvantages
1.	No change to category	Fibre scale is an extension of the NPSC scale.	No distinction is made on fibre type, source or degree of refinement or whether it is 'added' or not.
2.	Change F point scale to start at a fibre content benchmark of 3.7 g/100 g with F point value of 4, then continue in 1 point increments according to the current scale.	Low fibre foods would not derive any benefit from their low fibre content. Relatively small change to algorithm.	Less consistent with the NPSC fibre scale.
3.	Change F point scale to start at a fibre content benchmark of 3.7 g/100 g with F point value of 1, then continue in 1 point increments according to the current scale.	Low fibre foods would not derive any benefit from their low fibre content.	Less consistent with the NPSC fibre scale. Less HSR point benefit for fibre overall.
4.	Only allow 'intact' fibre and/or mechanically separated fibre to be scored for F points. <i>Note: Would require change to algorithm and user guide</i>	May facilitate fibre point benefit to go to fibre in whole foods.	Difficult to define intact fibre. Disadvantages added fibre with beneficial physiological properties.

Additional analysis undertaken

Method

The initial database used in the development of the HSR system was expanded with data provided by the food industry in 2017. This revised TAG database includes product nutrient data for 5,885 food products across 42 food categories based on the AGHE food groups (e.g. fats and oils, cereals, dairy, processed and unprocessed fruits and vegetables, animal protein etc.). Data cover the range of HSR components found in Australian and New Zealand foods, including FVNL and fibre content data for all foods where applicable. The data are not independently verified.

Selected AGHE food categories were examined to determine the range of fibre content, and the mean fibre content for the category. The resulting range of F-points available to each AGHE category under the current algorithm was also determined.

The components of the HSR algorithm are totalled to give a 'final score' for foods, and this final score is translated to HSR points according to the HSR category of the food. The translation of 'final score' to HSR points was examined for each HSR category to assess how the impact of dietary fibre differs by category.

A comparison of 'final score' points was made by category to assess the relative weighting of different nutrients used in the algorithm.

Results

Table 4: Fibre content of selected food categories

Category	n	Mean fibre content (g/100 g)	Fibre content (range) (g/100 g)	F points range
Bread	226	5.0	1.8 - 10.8	1 - 10
Breakfast cereals	300	9.17	0 - 40.0	1 - 15
Biscuits	258	3.4	0 - 14.4	0 - 12
Snacks (incl. muesli bars)	310	5.13	0 - 26.1	1 - 15
Muesli bars only	134	7.2	0.4 - 26.1	0 - 15
Yoghurts	381	0.31	0 - 3.2	0 - 3

Comparison of modifying points:

- For a food that is two thirds FVNL, 3 modifying points are assigned (V points)
- For protein content, 3 points are assigned when a food passes 4.8 g protein/100 g (subject to baseline points being less than 13 or V points being above 5) (P points)
- For fibre content, 3 points are assigned when a food passes 2.8 g/100 g (F points).

Figure 1 shows that modifying points have a different impact according to which category a food is in. For Category 3D (cheeses with a minimum level of calcium) the slope is 2 final score points for a single Health Star Point (therefore 2 final score points is worth a half star). Similarly, the slope for 2D (Dairy Foods) is 1, the slope for Category 3 (Oils and spreads) is 3.5, and for Category 2 (Non-dairy foods) is 4.5. The 'value' of an extra modifying point from fibre is 4.5 times greater for Category 2D than it is for Category 2.

Category 2 contains most foods overall, and all foods that are expected to make an appreciable contribution to total fibre intake. If a food were to change its composition from very low fibre to very high fibre (from 0 to 15.1 g/100 g for argument's sake), the maximum health star benefit the food would accrue would be 1.5 stars.

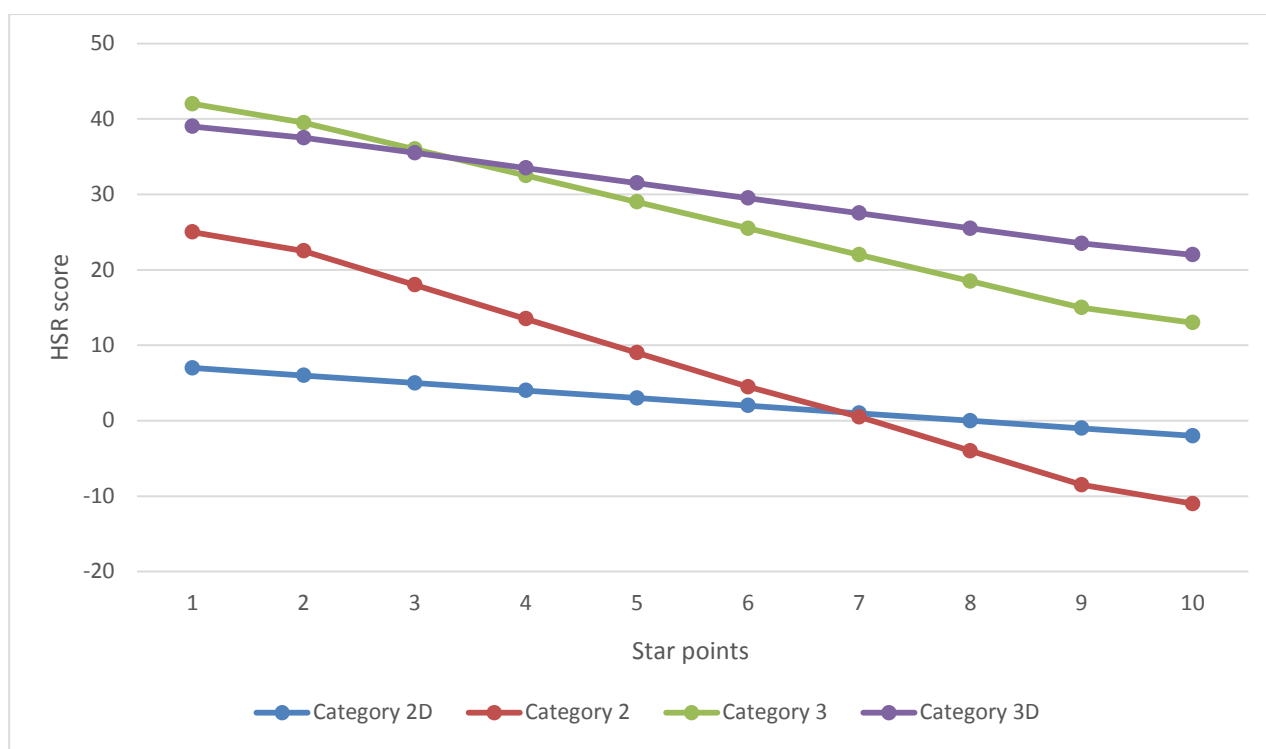


Figure 1: Final score plotted against Star Points* for 4 HSR categories

*Note: The actual Health Star Rating is calculated by dividing Health Star points by two, for example 7 star points means a HSR of 3.5, 1 star point means a HSR of 0.5.

Table 5: Modelled change of specific foods under selected options (no re-scaling)

AHS 5 digit classification	Fibre (g/100g)	Star points, current algorithm	Star points using option 2	Star points using option 3
Breads, and bread rolls, white, mandatorily fortified	3.2	7	7	7
Breads, and bread rolls, wholemeal and brown, mandatorily fortified	6.5	8	8	8
Breakfast cereal, mixed grain, with fruit and/or nuts	11.4	9	9	8
Breakfast cereal, mixed grain, fortified, sugars >20 g/100g	5.2	5	5	4
Savoury biscuits, wheat based, plain, energy >1800 kJ per 100 g	3.1	5	4	4
Savoury biscuits, wheat based, plain, energy ≤1800 kJ per 100 g	8.6	8	8	7
Muesli and cereal style bars, added coatings or confectionery	26.1	10	10	9
Muesli and cereal style bars, added coatings or confectionery	6.8	5	5	4

The modelled impact of options 2 and 3 on HSR points for specific food examples are shown in Table 5, above.

Option 2 would have no impact on food with a moderate amount of fibre (i.e. above 3.7 g/100 g) and a modest impact on some foods that are lower in fibre. Option 3 would have a modest impact (i.e. half a star) on most, but not all foods. The point value details of the options can be 'dialled up' to have a greater impact, but the principle is demonstrated – option 2 removes the small benefit of fibre for low fibre foods, option 3 decreases the benefit from fibre overall.

Discussion

Is the starting hurdle to achieve modifying points for fibre (F points) correct?

At present, the starting hurdle for including dietary content is permissive – it is possible for any food (but not any beverage) to accrue F points starting at a low level of fibre content (a third of the fibre content of a refined white bread, for example). Bread is an important source of dietary fibre in the diet of New Zealanders and Australians. Lower fibre breads accrue 3 F points while the higher fibre breads accrue 10 F points. For breads, this provides a half to one health star difference (all other components being the same).

What are the implications of modifying the baseline requirements (hurdle) before fibre points are achieved?

Increasing the hurdle before F points can be accrued will decrease the number of foods deriving Health Star benefit from fibre. However, multiple F points are required to move the HSR of a food and the rate of accrual is dependent on the scale relating fibre content to F points. Option 2 is to maintain the current scale but to start the F points at the current 3rd step (i.e. 0 points for fibre \leq 3.7 g/100 g; 4 pts for fibre $>$ 3.7 g/100 g, and maintain the current scale thereafter). This option could be tuned to start at any fibre content – the third step of the current scale is used for the purpose of demonstration. Raising the F point starting hurdle will decrease the number of foods getting small HSR benefit from fibre content, and may increase the reformulation incentive to reach the hurdle. However, the higher fibre content may be achieved by adding refined fibre which may not deliver the same health benefits as intrinsic fibre and may not be a desired outcome.

Option 3 is to restart the points count at a higher starting hurdle (i.e. 0 points for fibre \leq 3.7 g/100 g; 1 point for fibre $>$ 3.7 g/100 g and increase by 1 point for each cut-point thereafter). This change would decrease the number of foods achieving F points, and reduce the total number of F points that foods currently achieve by 3 points.

Modifying the hurdle disconnects the fibre scale from the NPSC, however this decrease in consistency with the NPSC may also reduce the rationale to retain the point scale for fibre content in the algorithm to the scale used for the NPSC.

Is the weighting of this nutrient appropriate according to dietary guidelines?

The dietary guidelines do not provide a basis for weighting of nutrients beyond a direction for intake for those nutrients that are specified. Therefore increased intake of high fibre foods is recommended, as is decreased intake of saturated fat, sugar and salt. The relative weighting of these nutrients differ according to which HSR category they are in. In the case of fibre, the best HSR value for fibre is if it is added to a food in Category 2D (dairy foods). The F point scale is the same for all the categories to which it applies, but the conversion scales for final points to HSR points is different between most categories (as shown above). Fibre has the best impact in Category 2D, half the impact in Category 3D, about 29% of the impact in Category 3 and about 22% of the impact in Category 2. The final score conversion scales apply to all sources of points that contribute to the final score.

One 'final score' point is 0.9 g fibre/100 g (at the low end of scale) and 2.7 g fibre/100 g (at the high end of the scale). By way of comparison, one 'final score' point for other algorithm

elements is 335 kJ/100 g, about 1 g saturated fat/100 g (low end of scale), about 4.5 g sugar/100 g, about 90 mg sodium/100 g (low end of scale), 10% content of FVNL above 40% of weight (varies across scale), and 1.6 g protein/100 g (low end of scale). It is a long-standing difficulty in nutrition science to determine a sensible weighting between different nutrients.

Should refined fibre be counted the same as intact fibre (i.e. fibre as an intact part of its edible source)?

Dietary fibre is mixture of substances, mainly (but not entirely) carbohydrates. Fibre can be extracted from cereals, fruit, and vegetables to become a more purified compound mixture. Fibre in an intact food may be associated with a range of bioactive compounds that are not retained in the extracted refined product. Option 4 would address this issue. However, there are definitional problems with what is a refined fibre compared to an intact fibre, although it might be possible to distinguish, by definition, fibre extracted by chemical methods from fibre extracted by mechanical methods (such as bran removed from a grain). Some elements of the refined fibre are indistinguishable from the same elements in the source product. Beneficial physiological properties may also still be present in fibre extracted by chemical methods.

Refined fibre such as inulin (a soluble fibre) may be sourced from chicory, and be sold to food manufacturers as an ingredient. Manufacturers may add inulin to foods such as low fat yogurt primarily to improve technical properties such as to increase creaminess and improve mouth feel. Inulin meets the Code definition of a fibre and therefore this added content may be relevant for issues such as content claims and health claims.

The fibre content of a food is limited by functional issues and consumer preference.

The fibre content of a food can be modified by refining and by addition. It is at least analogous to the modifications possible for the saturated fat, sugar salt, protein, fruit, vegetable, nut and legume content of food.

To address concern that fibre might be added to a food to 'mask' its content of negative nutrients, a baseline point criteria could be pursued – setting a baseline criteria (as with protein) to disallow fibre points for foods where the combination of energy, saturated fat, sugar and sodium were too high.

Conclusion

Relatively simple options are available to change the fibre content point at which HSR benefit begins to be accrued by a food. This option can be implemented should it be determined that low fibre foods should not have any HSR benefit for their fibre content.

The modifying points available for fibre content can simply be changed so that fibre content has relatively less impact on HSR overall than at present (i.e. down weighted).

The type of fibre included in the algorithm can be operationally defined to exclude refined fibre, although the definition of refined fibre could be difficult, and would be a departure from the Food Standards Code definition.