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

HSR Technical Advisory Group (TAG)

Sugars (added and total)

Contents

Summary

Australian and New Zealand dietary guidance advises limiting the intake of foods and drinks containing added sugars. Despite this, over half of Australians and New Zealanders exceed World Health Organisation (WHO) recommendations on sugars intake.

The treatment of sugars in the HSR system has been a topic of considerable interest throughout the development and implementation of the system and during the current independent five year review. Attention has been frequently drawn to specific products considered to receive inappropriately high HSRs for their sugars content.

By and large, the HSR system tends to advantage products containing lower levels of total sugars relative to products containing higher levels. However, as a function of the algorithm underpinning the system, some products with "high" content (and little other negative components and/or substantial positive components) may receive "high" HSRs.

This paper addresses the two broad themes identified by stakeholders regarding sugars in the HSR system:

- Whether the HSR algorithm should include added sugars rather than total sugars; and
- Whether the algorithm appropriately penalises sugars content.

TAG has considered several options for the treatment of sugars in the HSR system within its remit:

1. Status quo
2. Inclusion of added sugars in the HSR algorithm, instead of total sugars
3. Increasing the impact of total sugars within the algorithm ("upweighting")
4. Increasing the impact of total sugars within the algorithm only if added sugars are present ("hybrid approach")
5. Restriction of products with high sugars content to a maximum HSR ("capping").

It should be noted throughout that current, projected and hypothetical results/distributions may change once final system rescaling is undertaken.

Option 2 will impact relative scores within categories, depending on the makeup of added and intrinsic sugars. Products lower in added sugars would be advantaged over otherwise similar products higher in added sugar. On average, products and product categories with relatively higher amounts of intrinsic sugars (e.g. fruit, dairy) would be most advantaged, though overall there may only be a marginal effect on the distribution of HSRs across categories. This option provides alignment with dietary guidance to reduce added sugars consumption and may encourage reformulation to reduce added sugars content. However, this would necessitate adoption of a definition of 'added sugar' and production of technical guidance on how added sugars are quantified.

Option 3 more heavily penalises products with high levels of total sugars, whether intrinsic or added. Modelling suggests that any real effect may be marginal at best and disadvantage products with high intrinsic sugars and low added sugars content (such as fruit and dairy) at worst. Rescaling may mitigate or even reverse the broad effects of upweighting sugars across product categories, although relative scores within categories may persist. This option may encourage some reformulation by industry and would be simple to implement and communicate.

Option 4 targets added sugars by more heavily penalising total sugars content when added sugars are present, thereby potentially improving differentiation between products with high and low added sugars content without significant impact on the entire HSR system. Some products, particularly energy dense and nutrient poor products (e.g. some confectionery or non-dairy beverages), products with high levels of added sugars or products near thresholds for protein points (e.g. some breakfast cereals), would see a decrease in HSRs. This option supports dietary advice to reduce added sugars intake and encourages reformulation to reduce added sugars while existing component sensitivities

are largely maintained. Ease of application and impact upon industry is dependent upon the parameters adopted to capture products with added sugars content.

Option 5 caps HSRs for products with “high” sugars content that would otherwise receive “high” HSRs, clearly addressing much of the negative perceptions of the system regarding sugars. However, incentives to reformulate are limited, products with high levels of intrinsic sugars may be punished and thresholds and caps would need to be determined. This option also deviates from the intention of the algorithm to provide an overall assessment of the combination of nutrient content.

Problem definition

The treatment of sugars in the HSR system is being considered by TAG as it has been a topic of considerable interest throughout both the development and implementation of the system. Sugars has also proven to be the highest profile issue for the current independent five year review of the system, as demonstrated through multiple submissions to, and workshops on, the five year review. This has also been highlighted through various media and third party research on the HSR system. The attention drawn to the treatment of sugars in the HSR system has the potential to undermine confidence in and use of the system.

Attention has frequently been drawn to specific products considered to receive inappropriately high HSRs for their sugars content and/or contribution to sugars intake in the population. There are concerns that the HSR system may be unwittingly encouraging the consumption of such products.

Commentary revolves around two key themes:

- The HSR algorithm should consider added sugars rather than total sugars
- The HSR algorithm does not appropriately penalise total sugars content.

Particular reference is often drawn to HSRs displayed on specific products as evidence for both themes. Current distribution of HSRs is outlined later in this report.

Terminology

In this report, the term *sugars table* is used to refer to the relationship between sugars content and allocated baseline points in the HSR algorithm. This relationship is set out in table form in HSR system guidance documents and implemented in the HSR calculator. There are currently two sugars tables:

- For HSR categories 1, 1D, 2 and 2D, a maximum of 22 baseline points is available across the range of total sugars contents from 0 to >99%
- For HSR categories 3 and 3D, a maximum of 10 baseline points is available, up to 45% sugars content.

See Appendix 2 for further information on the current treatment of sugars in the HSR system. Other sugars tables are presented as potential options in later sections of this report.

Definitions of sugars

There is a distinction between what can be considered technical and common definitions of sugars.

Standard 1.1.2 of the Australia New Zealand Food Standards Code (the Code) defines 'sugars'[1] as:

(a) in Standard 1.2.7, Standard 1.2.8 and Schedule 4 (except where it appears with an asterisk as 'sugars*')—means monosaccharides and disaccharides; and

(b) otherwise—means any of the following products, derived from any source:
  (i) hexose monosaccharides and disaccharides, including dextrose, fructose, sucrose and lactose;
  (ii) starch hydrolysate;
  (iii) glucose syrups, maltodextrin and similar products;
  (iv) products derived at a sugars refinery, including brown sugar and molasses;
  (v) icing sugar;
  (vi) invert sugar;
  (vii) fruit sugar syrup;

but does not include:

  (i) malt or malt extracts; or
  (ii) sorbitol, mannitol, glycerol, xylitol, polydextrose, isomalt, maltitol, maltitol syrup, erythritol or lactitol.

Sugars naturally present in the structure of products such as whole or intact fruit or milk, which may be defined as 'intrinsic sugars', are encompassed in the above definitions as monosaccharides and disaccharides.

There is currently no definition of 'added sugars' in the Code, however in outlining the conditions for a nutrition content claim about no added sugar,[2] it is stated that products making such a claim must not contain "added sugars [as listed at (b) above], honey, malt, or malt extracts" or "added concentrated fruit juice or deionised fruit juice"; several beverage categories are specifically exempt from the latter.

The United States Food and Drug Administration (FDA) definition of 'added sugars' includes "sugars (free, mono- and disaccharides), sugars from syrups and honey, and [most] sugars from concentrated fruit or vegetable juices".[3] Public Health England (PHE) also defines 'added sugars' as "all monosaccharides and disaccharides added to foods," and explicitly includes honey, malt extract and fruit and vegetable juices, concentrates and purees.[4]

The separate but related concept of 'free sugars' is often used in domestic research and internationally. 'Free sugars' is defined by the World Health Organisation (the WHO) as "monosaccharides and disaccharides added to foods and beverages… and

[1] FSANZ, 2017, Australia New Zealand Food Standards Code – Standard 1.1.2 – Definitions used throughout the Code, available at https://www.legislation.gov.au/Series/F2015L00385
[2] FSANZ, 2017, Australia New Zealand Food Standards Code – Schedule 4 – Nutrition, health and related claims, available at https://www.legislation.gov.au/Series/F2015L00474
[3] FDA, 2018, Changes to the Nutrition Facts Label, available at https://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/LabelingNutrition/ucm385663.htm?utm_source=msn
[4] Swan GE, Powell NA, Knowles BL, Bush MT, Levy LB, 2018, A definition of free sugars for the UK, Public Health Nutrition, 21(9), pp. 1636-1638, available at https://dx.doi.org/10.1017%2FS136898001800085X

sugars naturally present in honey, syrups, fruit juices and fruit juice concentrates."[5] Note that this definition broadly encompasses those additional components described in the FDA and PHE definition of added sugars and inferred from the Code.

PHE has also recently published a definition of 'free sugars'[6]:

> …all added sugars in any form; all sugars naturally present in fruit and vegetable juices, purées and pastes and similar products in which the structure has been broken down; all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients. The sugars naturally present in milk and dairy products, fresh and most types of processed fruit and vegetables and in cereal grains, nuts and seeds are excluded from the definition.

Quantification

In Australia and New Zealand there is currently no requirement to display added sugars content on pack in the Nutrition Information Panel (NIP).[7]

For products with no intrinsic sugar, total sugars content is entirely added and therefore simple to quantify. However, for products containing both intrinsic and added sugars and/or multiple ingredients containing sugars there is currently no analytical method for measuring only the added sugars content of a product, i.e. added and intrinsic sugars are indistinguishable when conducting nutrient analysis.

Therefore, added sugars content may be estimated from either recipes/ingredients or from analysed data using a set of assumptions, noting that what is considered added sugars will depend upon the definition applied. Several groups have produced methods to estimate added or free sugars contents of foods including:

- Louie et al[8] 10-step methodology to estimate added or free sugars values across total dietary intake on the basis of analytical data for total sugars and ingredients in food
- Free sugars decision tree,[9] proposed by PHE during the 2018 review of the UK Nutrient Profiling Model
- Pan American Health Organization nutrient profiling model[10] method for calculating free sugars content.

The Australian food composition database AUSNUT 2011-13[11] already includes free and added sugars data, while the New Zealand Food Composition Database[12] is currently intended to contain free and added sugars data by the end of 2019.

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[5] WHO, 2015, Guideline: Sugars intake for adults and children, p. 16, available at http://apps.who.int/iris/bitstream/10665/149782/1/9789241549028_eng.pdf

[6] Swan et al, 2018, A definition of free sugars for the UK

[7] FSANZ, 2017, Australia New Zealand Food Standards Code – Standard 1.2.8 – Nutrition information requirements, available at https://www.legislation.gov.au/Series/F2015L00395

[8] Louie JC, Moshtaghian H, Boylan S, Flood VM, Rangan AM, Barclay AW, Brand-Miller JC, Gill TP, 2015, A systematic methodology to estimate added sugars content of foods, European Journal of Clinical Nutrition, 69(2), pp. 154-161, available at http://dx.doi.org/10.1038/ejcn.2014.256

[9] PHE, 2018, Annex A – The 2018 review of the UK Nutrient Profiling Model, p. 122, available at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/694145/Annex__A_the_2018_review_of_the_UK_nutrient_profiling_model.pdf

[10] Pan American Health Organization, 2016, Pan American Health Organization Nutrient Profile Model, available at http://iris.paho.org/xmlui/bitstream/handle/123456789/18621/9789275118733_eng.pdf?sequence=9&isAllowed=y

[11] FSANZ, 2017, Determining the amount of added sugars and free sugars in foods listed in the AUSNUT 2011-13 dataset, available at

The validity of any estimates may depend upon compiler expertise, ingredient information available and/or assumptions and interpretations.

In addition, for some products, the seasonal variation of natural sugars content of some ingredients may require variable compensation using added sugar, such that the added quantity may not be consistent.

Current treatment of sugars in the HSR system

The algorithm which underpins the HSR system is based on the Nutrient Profiling Scoring Criterion (NPSC), which is itself derived from the UK Nutrient Profiling Model (NPM). However, the purposes of the HSR system are quite different from that of the NPM and NPSC. The NPSC and NPM provide a binary and discrete outcome, while the HSR aims to provide a comparison across and between scores. As the original NPM and the NPSC consider total sugars content (the sum of intrinsic plus added sugar), so does the current HSR algorithm.

In the HSR system, total sugars is "penalised" at >5% content; in other words, once total sugars content exceeds 5%, the product begins to accrue baseline points. The relationship between content and penalty thereafter is roughly linear and continues up to 100% content and 22 points, at 4-5% sugars content increments, for all food and beverages other than fats and oils and FFG (or 'core') dairy (cheese).

This point scale has been extended from the top end of the original NPSC sugars tables (which continued to 45% content and 10 points). The intention of extending the NPSC to cover 100% sugars content was to capture all possible products, however in practice few products in the food supply come close to this limit. This means that at lower levels of content there is a reduced ability to differentiate between sugars content of products as the highest points are rarely awarded.

Sugars content is double-counted to some extent through energy content and total sugars content and offset in some products by fruit, vegetable, nut and legume (FVNL), fibre and protein contents. This latter point is relevant for product categories such as fruit (whole and juice), cereals and dairy. As noted previously, for many of the main discretionary sources of added sugars intake, such as soft drinks and confectionery, total sugars is equal to added sugars content.

The multi-nutrient approach of the HSR system supports the classification of products displaying a range of nutrient/ingredient contents. As such, it is the combination of the nutrients/components in the product that is the prime consideration. A summary score is produced based upon this balance, with scores then scaled according to a relevant category to produce a HSR.

To illustrate the above points, unsweetened yoghurt with approximately 50% fruit content would receive baseline points for sugar, energy and saturated fat content and modifying points for FVNL, fibre and protein content, the balance of which determines the final score and subsequently the HSR received.

It should be noted that negative components are weighted more heavily in the HSR algorithm than positive components, e.g. sugars has a greater negative effect on HSR than the positive effect of FVNL (which itself is only applicable for products with >40% FVNL or ≥25% concentrated FVNL).

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http://www.foodstandards.gov.au/science/monitoringnutrients/ausnut/foodnutrient/Pages/Determining-the-amount-of-added-sugars-and-free-sugars-in-foods-listed-in-the-AUSNUT-201113-dataset.aspx

[12] Plant and Food Research, Ministry of Health, 2018, New Zealand Food Composition Database, available at https://www.foodcomposition.co.nz/

As it is the combination of components that is the key determinant of scores, no single component has the inherent ability to fully decide the absolute and/or relative scores received by most products, i.e. a product with ‘high’ sugars content but ‘low’ saturated fat, sodium and energy content will not necessarily receive a ‘low’ or lower HSR (e.g. ice blocks), but a product with a combination of these will tend to receive a lower score (e.g. chocolates). In addition, positive components may offset penalties incurred by products with “high” sugars content (e.g. fruit juices).

Further detail on how the HSR system considers sugars is at Appendix 2. This also includes an outline of HSR categories, as referred to in results and analysis.

Current product HSRs

Indicative HSRs for products, displayed according to total sugars content, are provided in Figures 1-6. These indicate that products higher in total sugars tend to receive lower HSRs, though some products with total sugars content ≥ 20 g/100 g may receive a maximum HSR. Product data for figures 1-2 are from the added sugars subset of the TAG database and data for figure 3-6 are from the full TAG database; detail provided later in this paper.

Please note that the raw outputs of the HSR algorithm are called ‘Star Points’ and correspond 2:1 to HSRs.

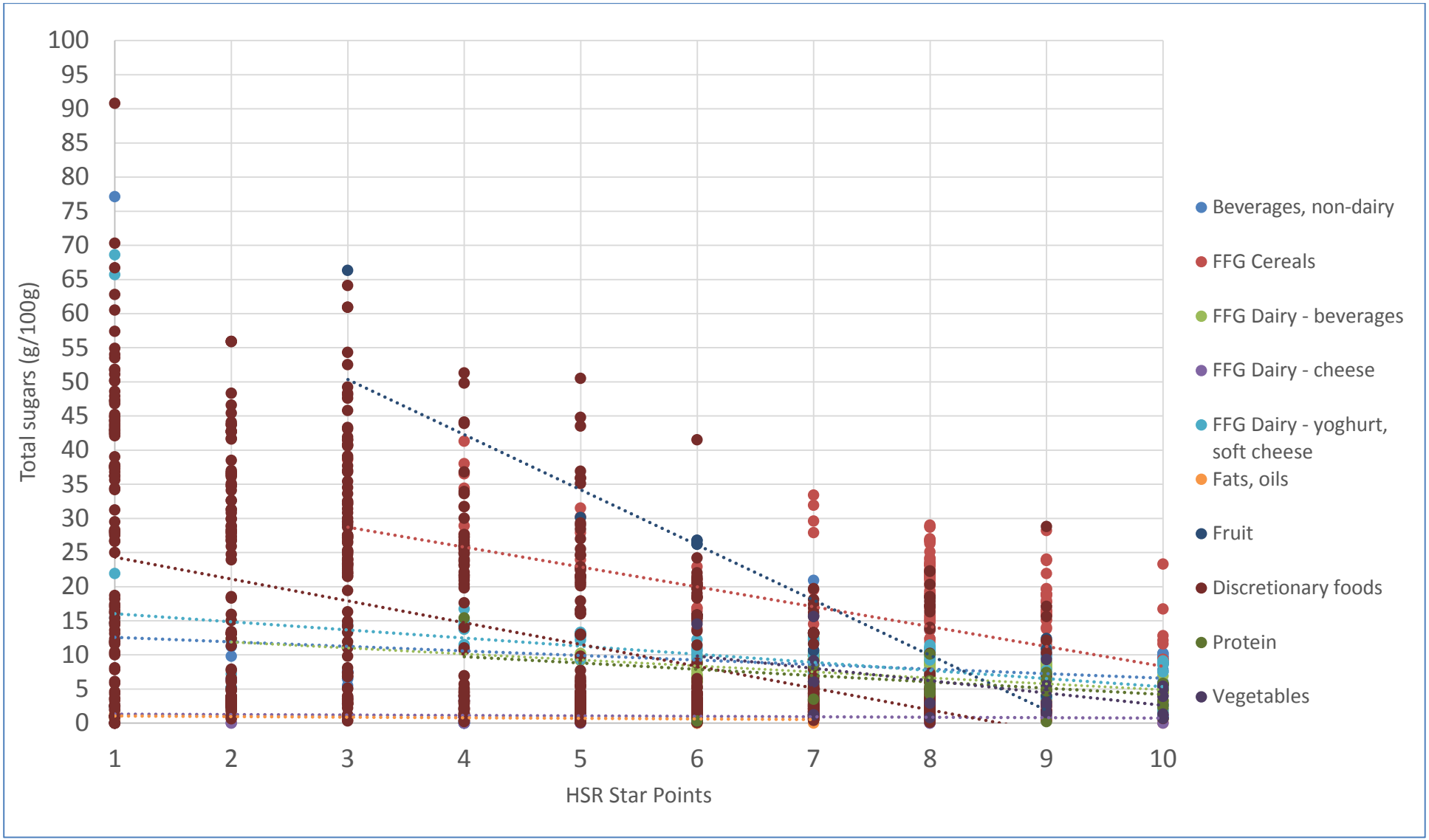

Figure 1: Products in HSR categories, displayed by Star Points and total sugars content, with trend line showing the relationship between total sugars content and Star Points by HSR category, added sugars subset of TAG database (n=1,875)

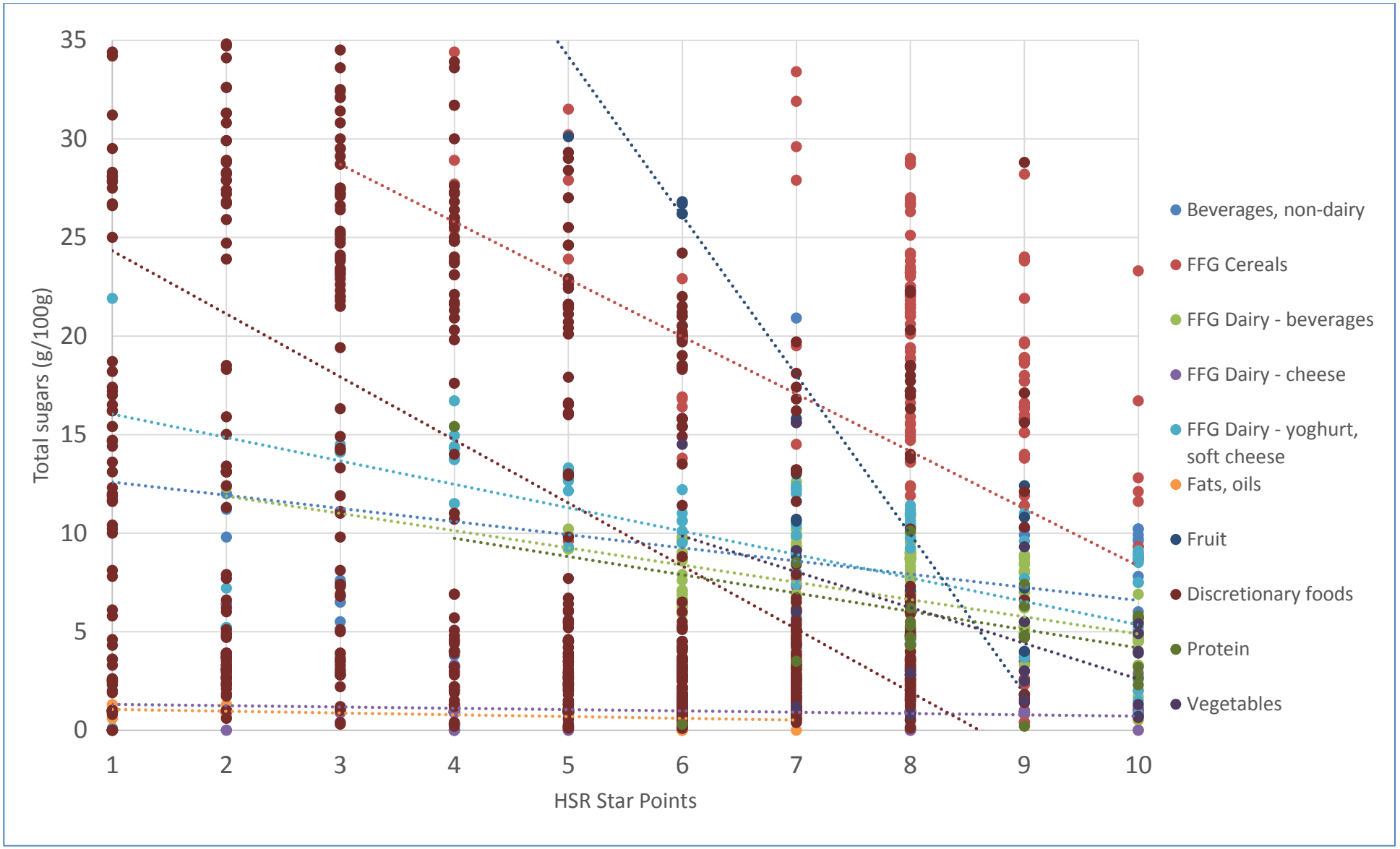

Figure 2: Detail - products in HSR categories, displayed by Star Points and total sugars content, with trend line showing the relationship between total sugars content and Star Points by HSR category, added sugars subset of TAG database (n=1,757)

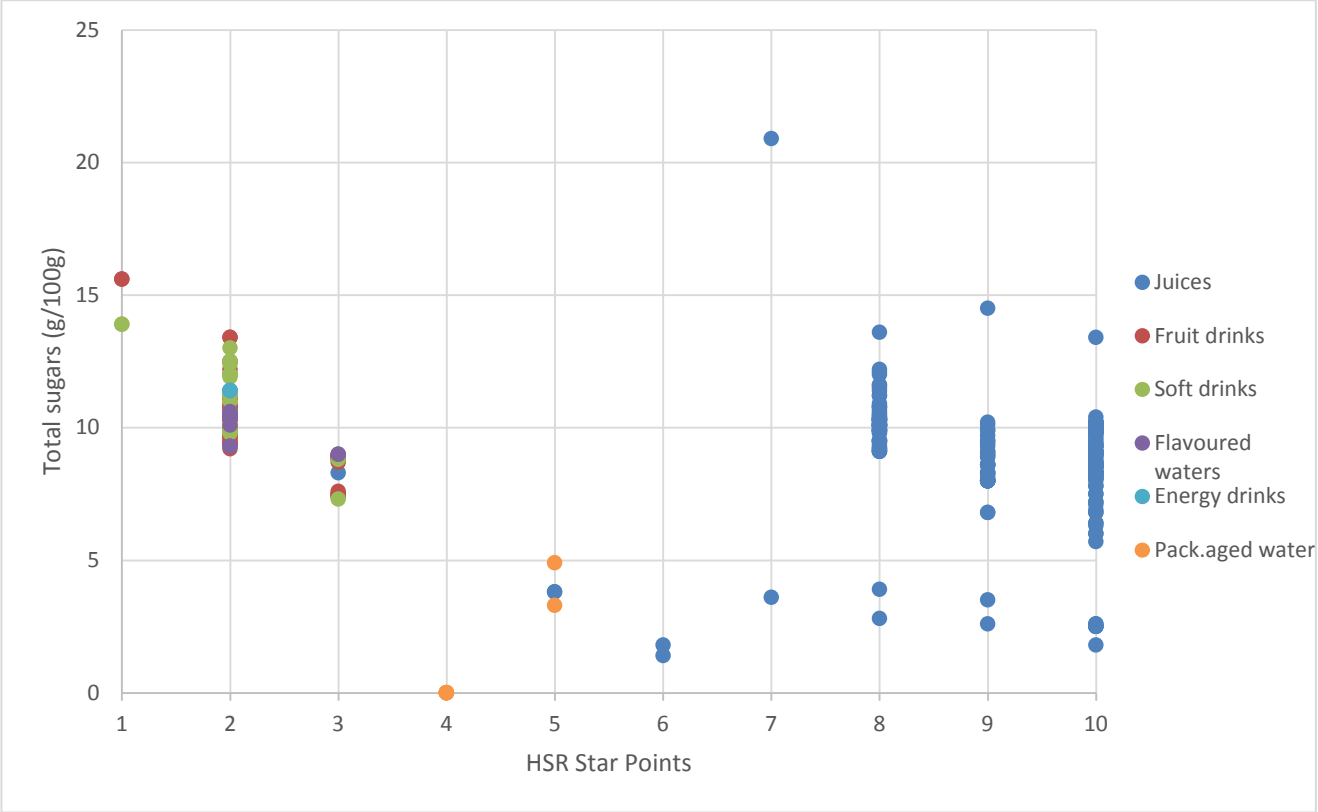

Figure 3: Non-dairy beverages, displayed by Star Points and total sugars content, TAG database (n=352)

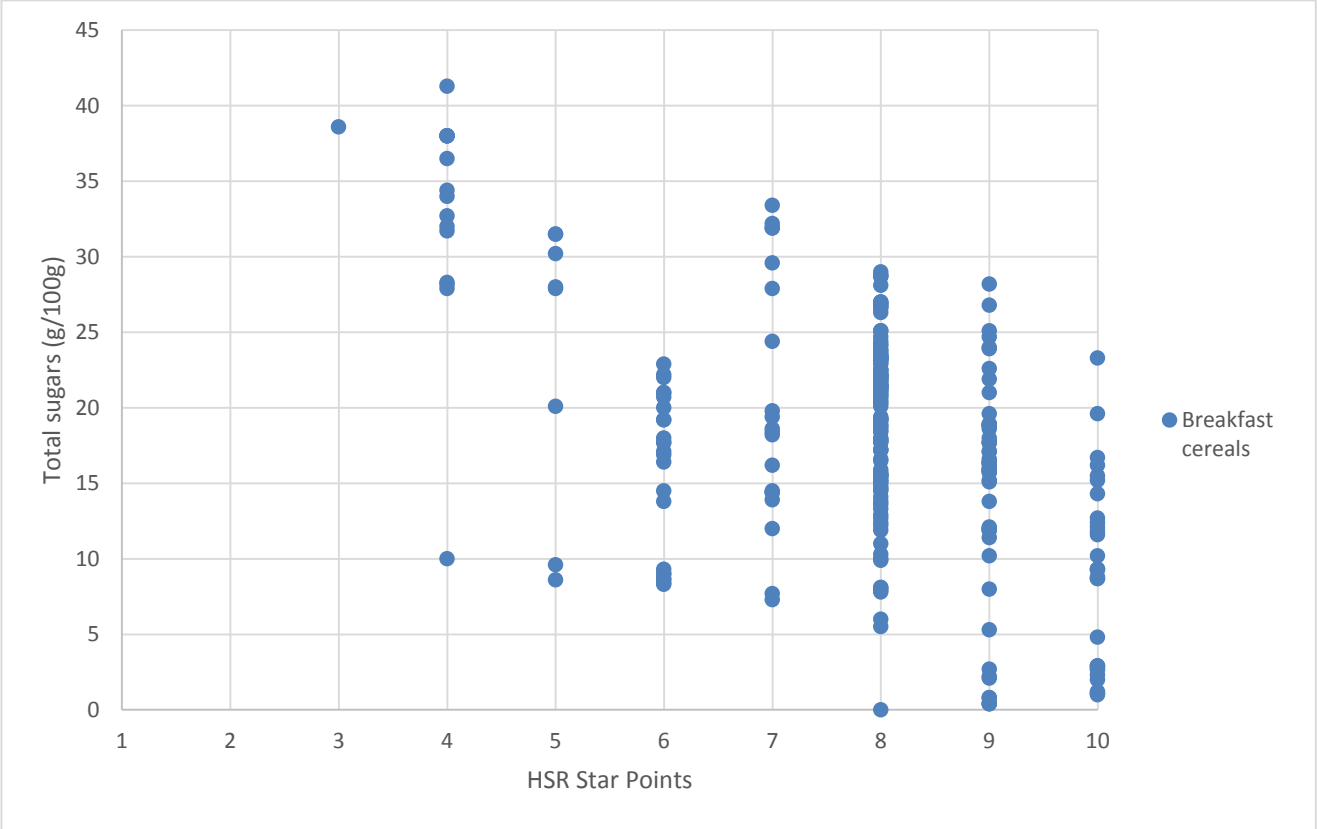

Figure 4: Breakfast cereals, displayed by Star Points and total sugars content, TAG database (n=271)

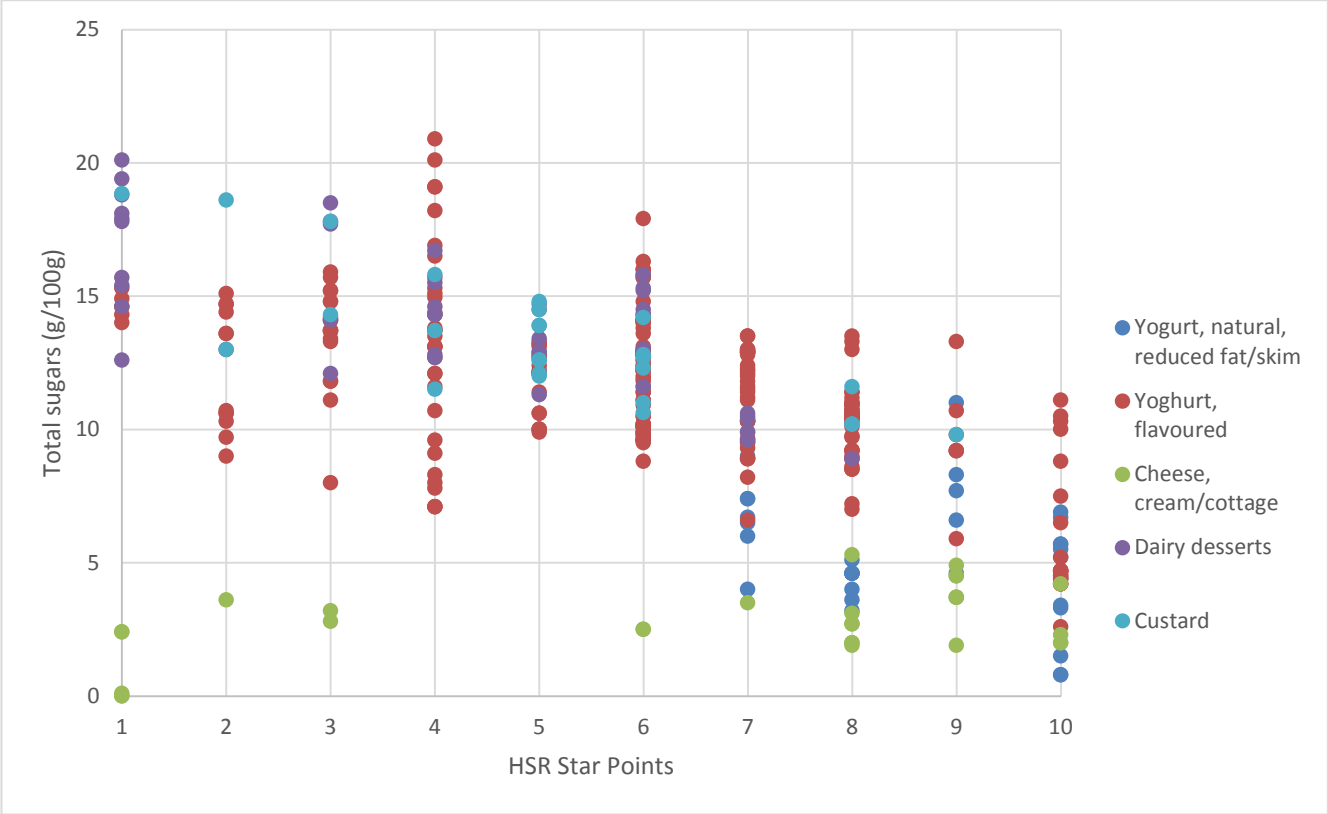

Figure 5: Yoghurt and soft cheeses, displayed by Star Points and total sugars content, TAG database (n=420)

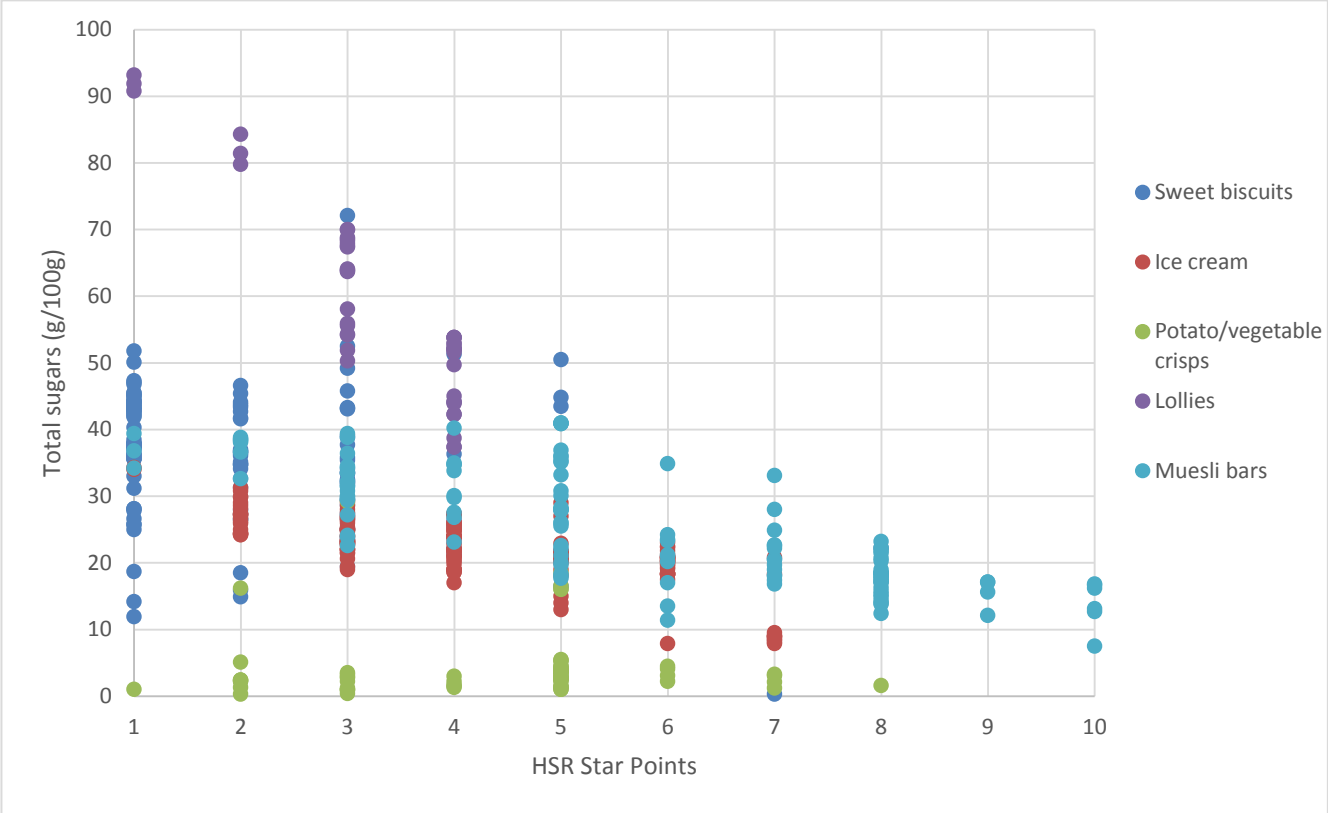

Figure 6: Select product ranges in HSR category 2, displayed by Star Points and total sugars content, TAG database (n=531)

Sugars consumption

Over half of Australians (52%)[13] and New Zealanders (58%)[14] exceed the WHO recommendation to limit free sugars intake to less than 10% of total energy intake.

Australia

The ABS and Food Standards Australia New Zealand (FSANZ) assessed Australian added and free sugars intake[15] using the AUSNUT 2011-13 nutrient database[16] and Australian Health Survey 2011-13 (AHS) consumption data. Content was estimated utilising parts of the Louie et al[17] methodology and the FSANZ recipe database. In this analysis, 'added sugar' was defined using the definition of sugars in the Code, and 'free sugar' was defined using the WHO definition. Figure 7 provides an overview of sugars consumption in Australia.

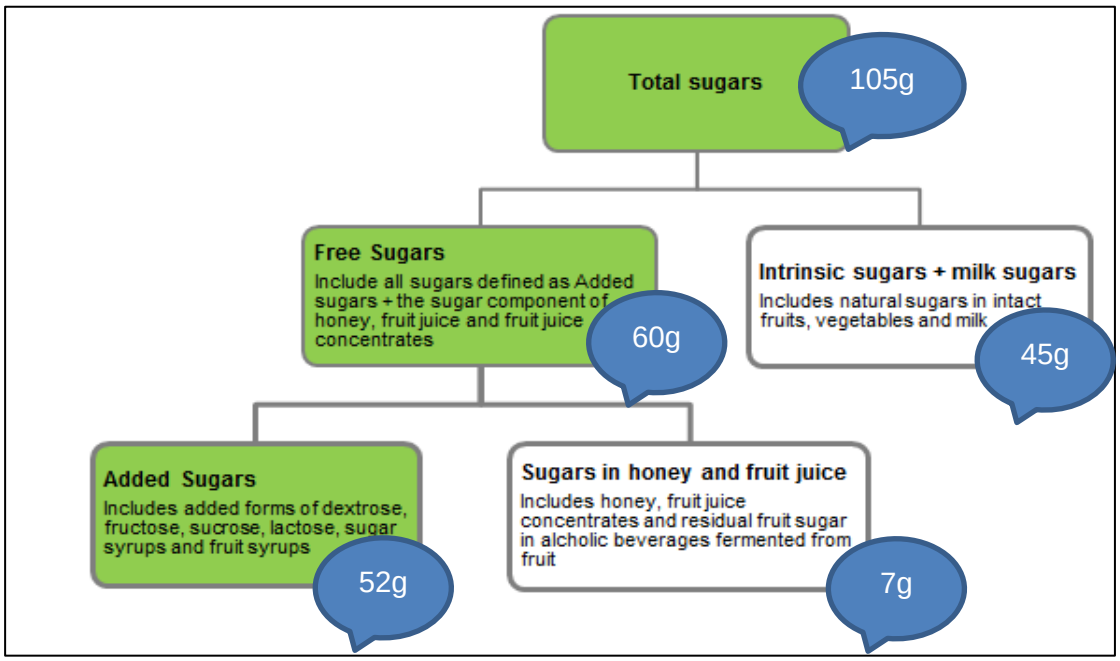

Figure 7: Mean sugars intake in Australia, 2011-12, population 2 years and older[18]

In 2011-12, Australians (aged 2 years and over) consumed a mean of 105 g of total sugars per day. More than half of this was free sugars (60 g, equivalent to approximately 14 teaspoons of white sugar), with the balance of 45 g being intrinsic sugars. The majority of free sugars consumed were from added sugars (52 g, or 12 teaspoons), with the remaining 7 g of free sugars coming from honey and fruit juice. The highest average intake of free sugars was amongst males aged 14-18 years (90 g, or approximately 22 teaspoons), with usual daily intake for the top 10% of this group over 160 g (38 teaspoons).

As noted above, more than half of Australians (52%) exceeded the WHO recommendation to limit free sugars to less than 10% of energy intakes, with the average intake being 10.9%.

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[13] ABS, 2016, Australian Health Survey: Consumption of added sugars, 2011-12, available at http://www.abs.gov.au/ausstats/abs@.nsf/mf/4364.0.55.011
[14] Kibblewhite R, Nettleton A, McLean R, Haszard J, Fleming E, et al., 2017, Estimating Free and Added Sugars Intakes in New Zealand, Nutrients 9(12), available at https://doi.org/10.3390/nu9121292
[15] FSANZ, 2017, Determining the amount of added sugars and free sugars in foods listed in the AUSNUT 2011-13 dataset, available at http://www.foodstandards.gov.au/science/monitoringnutrients/ausnut/foodnutrient/Pages/Determining-the-amount-of-added-sugars-and-free-sugars-in-foods-listed-in-the-AUSNUT-201113-dataset.aspx
[16] FSANZ, 2016, AUSNUT 2011-13, available at http://www.foodstandards.gov.au/science/monitoringnutrients/ausnut/pages/default.aspx
[17] Louie et al, 2015
[18] ABS, 2016, Australian Health Survey: Consumption of added sugars, 2011-12

Children and adolescents were most likely to exceed the recommendation, with almost three-quarters of 9-18 year olds consuming free sugars in excess.

However, free sugars consumption decreased between 1995 and 2011-12, from 12.5% to 10.9% of total energy.[19] The largest declines in free sugars were seen amongst children. For children aged 2-18 years, average daily consumption of free sugars decreased by 24 g per 10,000 kJ (from 105 to 81 g per 10,000 kJ between 1995 and 2011-12). This was largely driven by a reduction in children's consumption of sugars sweetened beverages (including soft drinks, cordial and fruit juice/drinks). Adult (19 years and older) consumption decreased by 4 g, from 69 to 65 g per 10,000 kJ.

New Zealand

New Zealand free and added sugars intake has been estimated using Adult Nutrition Survey 2008-09 data and the Louie et al[20] methodology. For the purposes of this research, 'added sugar' was defined using the FDA definition and 'free sugars' relies on the WHO definition. Table 1 provides an overview of sugars consumption in New Zealand.

Table 1: Median sugars intake in New Zealand, 2008-09, population 15 years and older[21, 22]

	Sugars intake (g/day)
Added sugars	49
Free sugars	57
Intrinsic sugars	50
Total sugars	**107**

In 2008-09, more than half of New Zealand adults' total sugars intake (107 g) came from free sugars, consuming a median of 57 g/day (14 teaspoons). Males consumed significantly more free sugars than females (median intake of 66 g and 49 g respectively). Younger age groups had significantly higher intakes of free sugars, with males aged 15-18 years consuming 86 g of free sugars per day and females of this age group consuming 69 g/day.

Over half (58%) of New Zealand adults exceeded the WHO recommendation to limit energy from free sugars to less than 10% of energy intake, with the median intake being 11%.

[19] ABS, 2016, Australian Health Survey: Consumption of added sugars, 2011-12
[20] Louie et al, 2015
[21] Kibblewhite R, Nettleton A, McLean R, Haszard J, Fleming E, et al., 2017, Estimating Free and Added Sugars Intakes in New Zealand, Nutrients 9(12), available at https://doi.org/10.3390/nu9121292
[22] University of Otago and Ministry of Health, 2011, A Focus on Nutrition - Key Findings of the 2008/09 New Zealand Adult Nutrition Survey, available at https://www.health.govt.nz/system/files/documents/publications/a-focus-on-nutrition-v2.pdf

Sources of sugar

Australia

Table 2 provides a breakdown of sources of free sugars intake in Australia.

Table 2: Leading sources of free sugars intake, Australia, 2011-12, population 2 years and older[23]

Product	Proportion of free sugars intake	Classification[24]
Beverages, of which:	**52 %**	
Soft drinks and flavoured mineral waters	17 %	Discretionary
Fruit and vegetable juices and drinks (total)	13 %	-
Fruit and vegetable drinks	6.6 %	Discretionary
Fruit and vegetable juice	6.4 %	FFG
Sugars added to beverages e.g. tea, coffee	7.3 %	Discretionary
Cordials	4.9 %	Discretionary
Alcoholic beverages	3.2 %	Discretionary
Flavoured milk & milkshakes	2.3 %	FFG
Electrolyte, energy and fortified drinks	2 %	Discretionary
Other[1]	2.2 %	-
Foods, of which:	**48 %**	
Cakes, muffins, scones, cake-type desserts	8.7 %	Discretionary
Confectionery and cereal/nut/fruit/seed bars (total)	8.7 %	-
Chocolate and chocolate-based confectionery	5 %	Discretionary
Other confectionery	2.7 %	Discretionary
Muesli or cereal style bars	0.8 %	Discretionary
Fruit, nut and seed bars	0.1 %	Discretionary
Sugars products and dishes e.g. sugars (excluding added to beverages), jam	7.6 %	Discretionary
Sweet biscuits	4 %	Discretionary
Frozen milk products	4 %	Discretionary
Breakfast cereals, ready to eat (total)	2.9 %	-
Breakfast cereals	2.5 %	FFG
Breakfast cereals	0.4 %	Discretionary
Yoghurts	1.8 %	FFG
Gravies and savoury sauces	1.8 %	Discretionary
Other[2]	8.8 %	-

Note 1: includes other non-alcoholic beverages (e.g. tea, coffee and coffee substitutes), dairy milk and dairy milk substitutes

Note 2: includes other cereals and cereal products (e.g. English-style muffins, porridge), other cereal based products and dishes (e.g. pastries, savoury biscuits), fats and oils, fish and seafood products and dishes, fruit products and dishes, meat, poultry and game products and dishes, other milk products and dishes (e.g. custards), other dairy and meat substitutes (e.g. cheese substitutes, soy-based yoghurts), soup, seed and nut products and dishes, other sauces, dips and condiments (e.g. salad dressings), vegetable products and dishes, legume and pulse products and dishes, snack foods, special dietary foods, miscellaneous (e.g. yeast, vegetable and meat extracts, herbs, spices, seasonings and stock cubes) and infant formulae and foods

[23] ABS, 2016, Australian Health Survey: Consumption of added sugars, 2011-12
[24] ABS, 2014, Australian Health Survey - Discretionary Food List, available at http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/4363.0.55.0012011-13?OpenDocument

In 2011-12 discretionary foods and drinks accounted for 81% of free sugars consumed in Australia.

Just over half (52%) of all free sugars consumed were from beverages, led by soft drinks, sports and energy drinks (19%) and fruit juice and fruit drinks (13%), with the sugars added to beverages such as tea and coffee contributing 7.3% and cordials 4.9%. The highest non-beverage contributors were cakes, muffins, scones and cake-type desserts (8.7%), confectionery and cereal/nut/fruit/seed bars (8.7%) and sugars products and dishes (e.g. sugars (excluding where added to a beverage), jams, water ice confection) (7.6%).

Of FFG products which contributed to free sugars intake, fruit and vegetable juice was the leading contributor (6.4%), followed by breakfast cereals (2.5%), flavoured milks and milkshakes (2.3%) and yoghurt (1.8%).

These data indicate that many of the key categories of interest to stakeholders (e.g. breakfast cereals, flavoured milks, yoghurts) are minor contributors to population free sugars intake. In addition, for many of the discretionary sources of free sugars intakes (e.g. soft drinks, confectionery), free/added sugars is equal to total sugars content.

New Zealand

New Zealand data on the food group contributors to free and/or added sugars intakes are not available. In addition, sources of total sugars are not sufficiently disaggregated to permit an analysis of FFG and discretionary sources, noting that the 2015 Eating and Activity Guidelines for New Zealand Adults (NZEAG) do not use this classification.

Those limitations notwithstanding, amongst people aged 15 years and older the second and third highest contributors to total sugars intake (after fruit, 17.8%) are non-alcoholic beverages (16.7%) and sugars and sweets (14.6%).[25] It may be assumed that much of the sugars content of “sugars and sweets” is added sugar. A separate analysis of non-alcoholic beverages has estimated that “sweetened beverages” contribute 16.4% to daily added sugars intake (soft drinks 6.6%, fruit juice 2.8%).[26]

Alignment with system objectives and priorities

Dietary advice

WHO guidelines on sugars intake[27] provide strong recommendations to reduce free sugars intake over the lifetime and limit free sugars intake to less than 10% of total daily energy intake (approximately 50 grams or 12 teaspoons). The recommendations are based on analysis of scientific evidence that shows that consumption of free sugars leads to unhealthy body weight gain and higher rates of dental caries. A further reduction to below 5% of total energy intake or roughly 25 grams (6 teaspoons) per day is recommended to provide additional health benefits.

The 2013 Australian Dietary Guidelines (ADG) and the NZEAG recommend limiting intakes of foods and drinks containing added sugars.[28,29] Both provide examples of foods and drinks high in added sugars (e.g. confectionery, sugar-sweetened beverages, cordials, sports drinks, cakes, biscuits, chocolate), however neither provides a specific definition of added sugars nor recommends a quantified limit on the maximum amount of added sugars the population should consume.

[25] University of Otago and Ministry of Health, 2011
[26] University of Otago, 2015, Beverages as sources of sugars in the New Zealand Diet: 2008/09 New Zealand Adult Nutrition Survey, Technical Report No. 2015.139
[27] WHO, 2015, Guideline: Sugars intake for adults and children, p. 4
[28] NHMRC, 2013, Australian Dietary Guidelines, p. v
[29] Ministry of Health, 2015, Eating and Activity Guidelines for New Zealand Adults, p. 6

Neither the ADG nor NZEAG provide a definitive list of, or criteria to identify and classify, 'discretionary' products. This is particularly problematic for products such as dairy beverages (considered FFG) with added sugars (to be avoided) and most mixed products.

For the purposes of the 2011-12 National Nutrition and Physical Activity Survey (as part of the AHS), and in conjunction with a group of expert individuals and organisations, the Australian Bureau of Statistics (ABS) developed a list of discretionary products (the AHS Discretionary Foods List).[30] Some discretionary flags reference threshold levels for a specific nutrient, though these differ according to product category.

The ABS notes that this list was proposed for a specific purpose and may not be suitable for other applications.[31] Since publication, the classification of some product types has been questioned (e.g. breakfast cereals with sugars content >20 g but ≤ 30 g/100 g and sweetened and flavoured milk products are not considered discretionary). It may also be inappropriate to classify all products with an absolute label that places products into two discrete categories. However, the ABS work is the only attempt at a definitive list of discretionary (and by inference FFG) foods and beverages readily available. In sum, though the AHS Discretionary Foods List may be used to assess alignment with dietary guidelines or changes to the HSR system, any results referring to the list should be interpreted with caution as this binary analysis may be inappropriate for application to the HSR system (which is a scale).

Australia New Zealand Food Standards Code

As noted previously, the Code[32] does not currently require the display of added sugars data in the NIP, though reporting total sugars content (per serving and per 100 g/mL) is mandatory. Sugars are defined as monosaccharides and disaccharides for the purposes of the NIP, encompassing sugars naturally present, such as those found in fruit or milk, as well as added sugars. Total sugars content can be measured by analytical methods, estimated by recipe calculations or determined through a FSANZ NIP online tool or similar.

Percentage daily intake (%DI) may be voluntarily provided in the NIP[33] and expresses the percentage of the daily intake for selected nutrients, including sugar, obtained from consuming one serving of the food (as established by the manufacturer/supplier/retailer). The %DI values are based on a single set of average reference values for adults and are not directly applicable to individual needs or specific sub-groups of the population such as children. For total sugar, the reference value for calculating the %DI is 90 g (17.5% of the reference value for energy intake).

Food labels must include a statement of ingredients.[34] Ingredients must be listed in descending order by ingoing weight (i.e. at production); generally the first ingredient listed contributes the largest amount to the food and the last ingredient listed contributes the smallest amount. Ingredients must be described by a name by which it is commonly known, a name that describes the true nature of the ingredient, or a generic name specified in the Code. 'Sugars' is not a permissible ingredient name, however the generic term 'sugar' is permitted for various forms of sucrose (e.g. white sugar, raw sugar).[35]

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[30] ABS, 2014, Australian Health Survey - Discretionary Food List
[31] ABS, 2014, Australian Health Survey: Users' Guide, 2011-13, available at http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4363.0.55.001Chapter65062011-13
[32] FSANZ, 2017, Australia New Zealand Food Standards Code – Standard 1.2.8 – Nutrition information requirements
[33] FSANZ, 2017, Australia New Zealand Food Standards Code – Standard 1.2.8 – Nutrition information requirements
[34] FSANZ, 2015, Australia New Zealand Food Standards Code – Standard 1.2.4 – Information requirements – statement of ingredients, available at https://www.legislation.gov.au/Series/F2015L00392
[35] FSANZ, 2017, Australia New Zealand Food Standards Code – Schedule 10 – Generic names of ingredients and conditions for their use, available at https://www.legislation.gov.au/Series/F2015L00480

As noted previously, voluntary claims that a product contains “no added sugar” are permitted[36] if the product does not contain certain “added sugars, honey, malt, or malt extracts” or “added concentrated fruit juice or deionised fruit juice” (with exemptions for certain beverages).

The NPSC[37] is a nutrient profiling system developed by FSANZ for the regulation of health claims in Australia and New Zealand. The NPSC provides a binary outcome and products must meet the NPSC to be eligible to make a health claim (in addition to other conditions). The system uses total sugars content (in addition to other nutrients and components of a product) to calculate an outcome.

Australia and New Zealand Ministerial Forum on Food Regulation

The Australia and New Zealand Ministerial Forum on Food Regulation (the Forum) is currently investigating sugars labelling.[38] Several papers, including a literature review of consumer knowledge, attitudes and behaviours and a report on international approaches to sugars labelling, have been prepared for the Forum’s consideration.

In light of findings of the reports, the Forum agreed that the current information provided on food labels about sugars does not provide adequate contextual information to enable consumers to make informed choices in support of dietary guidelines. The Forum further agreed to consider examining regulatory and non-regulatory options to address this issue. Work on sugars labelling is progressing in response.

International approaches to sugars labelling

A summary of international approaches to sugars labelling has been prepared by FSANZ[39] as part of the aforementioned policy development work overseen by the Forum. In brief, with regards to added sugars this report found that:

- The USA was the only nation requiring the reporting of added sugars content on pack. To align with dietary guidance, the FDA mandates reporting added sugars in the NIP equivalent, using the definition outlined previously.[40]
- The front-of-pack labelling (FoPL) system used by Chile, which mandates warning labels being placed on products exceeding content thresholds, was the only FoPL scheme that referenced added sugars. Threshold values do not explicitly relate to added sugars content, however sugars warnings only apply when certain types of sugars are added to a product. Thresholds are being phased in over three years to encourage reformulation.

The Nutri-Score system,[41] a front-of-pack labelling scheme in France, does not consider added sugar. It does, however, recognise that certain fruit and vegetable products may be used as sweeteners and therefore it may be inappropriate to permit the unfettered offsetting of negative total sugars content scores with positive scores received from fruit and vegetable content. Only whole and minimally processed fruits and vegetables are eligible for positive fruit and vegetable points, with “ingredients such as concentrated fruit juice sugars that are added to foods to increase sweetness” ineligible.

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[36] FSANZ, 2017, Australia New Zealand Food Standards Code – Schedule 4 – Nutrition, health and related claims

[37] FSANZ, 2017, Australia New Zealand Food Standards Code – Standard 1.2.7 – Nutrition, health and related claims, available at https://www.legislation.gov.au/Series/F2015L00394

[38] Food Regulation Secretariat, 2018, Sugars labelling, available at http://www.health.gov.au/internet/fr/publishing.nsf/Content/sugar-labelling

[39] FSANZ, 2017, International sugars labelling approaches, available at http://www.health.gov.au/internet/fr/publishing.nsf/Content/sugar-labelling

[40] FDA, 2018, Changes to the Nutrition Facts Label

[41] Santé Publique France, 2018, Nutri-Score Frequently Asked Questions – Scientific & Technical, available at https://www.santepubliquefrance.fr/Media/Files/NUTRISCORE/Questions_reponses_EN

The UK Nutrient Profiling Model (NPM), developed to allow the identification of products subject to television programming restrictions, is currently being reviewed.[42] An explicit justification of this review is to better reflect updated UK dietary guidance, particularly with reference to free sugars. As such, the review is proposing the inclusion of free sugars in place of total sugars in the NPM. Guidance documents to support this proposed adjustment are being developed. Further to this, a normative reference value for free sugars content was developed to assess performance of the revised NPM, with 'high' free sugars content calculated as 25% of the derived reference intake, based on UK dietary recommendations ('high' free sugars content is >6.25 g/100 g for foods, >3.13 g/100 mL for beverages).

Relevant research

Sugars labelling

As part of the Forum work on sugars labelling, a literature review on consumer knowledge, attitudes and behaviours relating to sugars and food labelling was undertaken, incorporating both domestic and international studies.[43] This report highlighted that consumers are concerned about the sugars content of food and beverages and believe that consumption is associated with negative health outcomes. Consumers report negative attitudes towards 'added sugars', however are unable to differentiate between 'added' or 'natural' sugars, with the classification and assessment of 'healthiness' related to refinement rather than source (e.g. honey is perceived as more 'natural' therefore not an 'added' sugar).

The review found mixed evidence regarding whether consumers use current labelling to make informed choices with respect to sugar. When given a comparison task, consumers generally identify products lower in sugar. However, international research suggested that consumers generally are not able to use abstract information such as grams of sugars to evaluate whether a food is high or low in sugar.

A review commissioned by the National Health and Medical Research Council (NHMRC) during the development of the HSR system examined the effect of on-pack statements of total and added sugars content on diet quality and food choices.[44] Results indicated that the availability of information on added sugars may result in an improvement in food choice and that information on total sugars on food labels may reduce total sugars intake. Based on evidence available, the report concluded that use of nutrition labels including information on added sugars and energy was associated with lower intakes of energy and 'negative' nutrients and higher intakes of 'positive' nutrients.

Added sugars and the HSR system

Researchers have examined whether the HSR algorithm could better discriminate between FFG and discretionary foods, as categorised by the AHS Discretionary Foods List,[45] by substituting added sugars for total sugars in the algorithm.[46] 34,135 products from the FoodSwitch database[47] were assessed, with added sugars content for products containing a mix of added and intrinsic sugars derived from the AUSNUT 2011-13 database.[48] This work found that 52% of FFG and 87% of discretionary foods contained added sugar. FFG foods had a median added sugars content of 3.3 g/100 g and discretionary foods 14.6 g/100 g.

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[42] PHE, 2018, Annex A – The 2018 review of the UK Nutrient Profiling Model
[43] FSANZ, 2017, Literature review on consumer knowledge, attitudes and behaviours relating to sugars and food labelling, available at http://www.health.gov.au/internet/fr/publishing.nsf/Content/sugar-labelling
[44] NHMRC, 2015, Evaluation of Scientific Evidence Relating to Front of Pack Labelling, currently unpublished
[45] ABS, 2014, Australian Health Survey - Discretionary Food List
[46] Peters SAE, Dunford E, Jones A, Ni Mhurchu C, Crino M, Taylor F, Woodward M, Neal B, 2017, Incorporating Added Sugars Improves the Performance of the Health Star Rating Front-of-Pack Labelling System in Australia, Nutrients, 9(7), available at https://doi.org/10.3390/nu9070701
[47] The George Institute for Global Health, FoodSwitch database, available at https://www.foodswitch.com.au
[48] FSANZ, 2017, Determining the amount of added sugars and free sugars in foods listed in the AUSNUT 2011-13 dataset

The researchers used area under the curve (AUC), which measures predictive power of a variable/s within a binary classification system, to assess the ability to discriminate between FFG and discretionary foods. An AUC of 1 represents a perfect test. Total sugars alone was identified as the nutrient in the current algorithm that had the single greatest capacity to discriminate between FFG and discretionary (AUC 0.692), however added sugars alone had a greater discriminatory power (AUC 0.777). The current algorithm (i.e. all nutrients, including total sugars) delivered an AUC of 0.825, increasing to 0.843 when added sugars replaced total sugars in the algorithm. Using a logistic regression model, the current algorithm achieved an AUC of 0.817, which increased to 0.871 with the substitution of added sugars for total sugars.

The authors conclude that the HSR currently discriminates well between FFG and discretionary products, but that this could be improved by the inclusion of added sugar. The need to estimate added sugars content for some products may lead to discrepancies between HSRs calculated using actual and imputed values. Furthermore, the points for total sugars were directly transposed to added sugar, with results not recalibrated/rescaled across the HSR system. In both instances, the authors claim that this is likely to have resulted in an underestimation of the ability of added sugars to discriminate between FFG and discretionary. As already noted, the AHS Discretionary Foods List may not be the most appropriate analytical tool for the purposes of assessing the real or hypothetical performance of the HSR system, but does provide an objective variable which may assist in analyses.

Building on this research, a related group conducted a further examination of the effect of substituting added sugars for total sugars in specific categories using more detailed estimates.[49] This study considered 3,610 products from specific categories (breakfast cereals, selected for the high uptake by manufacturers of the HSR system; fruit, milk, vegetables and yoghurt, selected for their high proportion of intrinsic sugars; and non-alcoholic beverages, selected for its status as the greatest source of added sugars in the Australian diet). The FDA definition of 'added sugar'[50] was utilised and added sugars content was estimated using the Louie et al method.[51] Products were categorised as FFG or discretionary using the AHS Discretionary Foods List.[52] In this study, a HSR of ≥3.5 indicates an 'appropriate' classification of FFG products and a HSR <3.5 indicates an 'appropriate' classification of discretionary products.

To investigate whether the use of added sugars improved the distinction between FFG and discretionary, the proportion of FFG foods that received an appropriate HSR and the proportion of discretionary products that received an appropriate HSR was determined for the algorithm based on total and added sugars.

The use of added sugars resulted in a net improvement in the classification of products, with the odds of FFG products receiving HSRs ≥3.5 and discretionary HSRs <3.5 increased by 61% (OR 1.61, 95% CI 1.26 to 2.06; p<0.001). Added sugars also improved classifications of breakfast cereals, fruit, milk and yoghurt (all p<0.001). There was no improvement for beverages and a slight worsening for vegetables.

The authors conclude that the use of added sugars in the HSR algorithm would improve the ability to correctly identify FFG and discretionary foods, while noting that some modification would be required (i.e. through rescaling). This would potentially impact upon the results of the research. Furthermore, a limited selection of product categories was assessed and results may not be representative of the wider food supply. The use of estimates of added

[49] Menday H, Neal B, Wu JHY, Crino M, Baines S, Petersen KS, 2017, Use of Added Sugars Instead of Total Sugars May Improve the Capacity of the Health Star Rating System to Discriminate between Core and Discretionary Foods, Journal of the Academy of Nutrition and Dietetics, 117(12), pp. 1921-1930, available at https://doi.org/10.1016/j.jand.2017.08.013
[50] FDA, 2018, Changes to the Nutrition Facts Label
[51] Louie et al, 201
[52] ABS, 2014, Australian Health Survey - Discretionary Food List

sugars content is another potential limitation, however two individuals independently estimated added sugars content to minimise the impact of any assumptions made.

Linkages to other TAG work

Any action taken on sugars may have implications across the HSR system. In particular, there are significant linkages to the following TAG work being conducted:

Non-dairy beverages

- Includes sugar-sweetened beverages (e.g. soft drinks, sports drinks) and fruit and vegetable juices and drinks
- Sugars is a key determinant of HSRs for this category
- Products within this category range from 100% added sugars to 100% intrinsic sugars content (which may be offset by FVNL)

Discretionary products

- Including confectionery, ice confectionery and ice cream, jelly, biscuits, snack bars
- Tend to contain high added sugars content, though intrinsic sugars may also be present through fruit or dairy content

Dairy products

- Including yoghurt, custard and dairy desserts, dairy beverages
- Products within this category will always have some intrinsic sugars content, however added sugars may also have an impact on ratings

FVNL

- FVNL and concentrated FVNL tend to offset intrinsic sugars content from fruit and vegetables

Alignment of dietary guidelines with the HSR system

- Australian and New Zealand dietary advice recommends limiting intake of products containing added sugars

Options to address issues raised

Submissions to the five year review proposed a range of options for considering sugars in the HSR system. See Appendix 1 for a summary of these options. A further option has been developed and considered by TAG.

TAG has considered only those options which propose technical modifications to the HSR system and/or algorithm (in addition to no change):

1. Status quo
2. The inclusion of added sugars in the HSR algorithm, instead of total sugars
3. Increasing the impact of total sugars within the algorithm (“upweighting”)
4. Increasing the impact of total sugars within the algorithm only if added sugars are present (“hybrid approach”)
5. Restriction of products with high total sugars content to a maximum HSR (“capping”).

A summary of the above options is at Table 3. Table 4 presents a summary of the effect of each option on a sample of products.

Options summary

Table 3: Summary of options considered by TAG to address issues identified for sugars

Option number	Option	Benefits	Disadvantages	Comments
1	Status quo	Minimises disruption for industry.	Would not resolve or be seen to address issues raised regarding sugar.	No change to current HSRs. Final system rescale would likely change existing HSRs. Outcomes of Forum work on sugars labelling may inform deliberations at a later point, however postponing a decision regarding the HSR system may not leave appropriate time to consider and implement modifications (should any be proposed at that time).
2	The inclusion of added sugars in the HSR algorithm, instead of total sugars	Aligns with dietary guidance recommending limiting intake of added sugars. Encourages reformulation to reduce added sugars content. Removes penalties incurred by products with high intrinsic sugars content. May resolve and be seen to address issues raised regarding sugar.	Quantification and/or verification of added sugars content may be difficult for some products containing a mix of added/intrinsic sugars, particularly for small and medium enterprises. Will require changes to current HSRs displayed for some products.	Provides some differentiation between products based on added sugars content. Requires explicit definition of 'added sugar'. Weakens association between sugars content and energy in algorithm. Display of added sugars content is not currently mandated by the Code. Some methods of estimating added sugars content have been proposed and/or implemented elsewhere.
3	Increasing the impact of total sugars within the algorithm ("upweighting")	May align with dietary guidance recommending limiting intake of added sugars. May encourage reformulation to reduce added sugars content. Simple to implement and communicate.	Increases penalty on products with high levels of intrinsic and/or added sugars equally. Products with added sugars content that is able to be reduced may be advantaged over products with high intrinsic sugar.	May have unforeseen consequences on other components in the algorithm and HSRs, particularly after rescaling. Requires determination on strength of sugars table in the algorithm.

Option number	Option	Benefits	Disadvantages	Comments
		May resolve and be seen to address issues raised regarding sugar.	Will require changes to current HSRs displayed for some products.	
4	Increasing the impact of total sugars within the algorithm only if added sugars are present (“hybrid approach”)	Aligns with dietary guidance recommending limiting intake of added sugars. Encourages reformulation to reduce added sugars content. Products with intrinsic sugars only are not affected. May resolve and be seen to address issues raised regarding sugar. Does not significantly change nutrient relativities across the HSR system.	Depending on approach, quantification and/or verification of added sugars content may be difficult for some products containing a mix of added/intrinsic sugars, particularly for small and medium enterprises. Will require changes to current HSRs displayed for some products.	Targeted approach. May improve differentiation between products with high and low added sugars content. Does not entirely remove penalty for intrinsic sugar. May require definition of ‘added sugar’. Requires determination on strength of contingent sugars table in the algorithm and threshold for application. Some methods of estimating added sugars content have been proposed and/or implemented elsewhere.
5	Restrict products with high total sugars content to a maximum HSR (“capping”)	May align with dietary guidance recommending limiting intake of added sugars. Disadvantages products with high sugars content. May encourage reformulation to reduce added sugars content. May resolve and be seen to address issues raised regarding sugar.	Would affect products with high levels of intrinsic and/or added sugars equally. May reduce incentives to reformulate, particularly incremental. Products with added sugars content that is able to be reduced may be advantaged over products with high intrinsic sugar. Will require changes to current HSRs displayed for some products.	Deviates from the intention of the algorithm to provide a summary of the balance of nutrient content, displayed as a continuum. Requires determination on maximum HSR available and sugars content threshold.

Table 4: Summary of the effect of each option modelled on the HSR of a sample of products

AGHE category	AHS 5 digit classification name	Total sugars (g/100g)	Added sugars (g/100g)	Added as prop'n total (%)	HSR									
					Current	Option 2, current scaling	Option 2, rescaled	Option 3, 22pt table, rescaled	Option 3, 25pt table, current scaling	Option 3, 25pt table, rescaled	Option 3, 30pt table, current scaling	Option 3, 30pt table, rescaled	Option 4, 25pt table	Option 4, 30pt table
Carbonated beverages	Soft drink, intense sweetened	0	0	0	2	2	1.5	1.5	2	1.5	2	1.5	2	2
Dairy - cheese	Cheese, hard cheese ripened styles, reduced fat	1	0	n/a	5	5	5	5	5	5	5	5	5	5
Vegetables – unprocessed	Other fruiting vegetables	2.5	0	n/a	4.5	4.5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Dairy - cheese	Cheese, unripened styles, including cream and cottage cheese, reduced fat	3.1	0	n/a	4	4	4.5	4.5	4	4.5	4	5	4	4
Dairy – milk beverages	Milk, cow, fluid, regular whole, full fat	5.1	0	n/a	3.5	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Cereals - breakfast	Breakfast cereal, mixed grain, with fruit and/or nuts	5.3	0	n/a	4.5	5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Dairy - cheese	Cheese, processed	6.4	0	n/a	1	1.5	1	1.5	1	1.5	1	1.5	1	1
Cordials	Cordial, made from concentrate (25% fruit juice, recommended dilution)	8.7	8.4	96	2	2	1.5	1.5	2	1.5	1.5	1	2	1.5
Cordials	Cordial, made from concentrate (40% fruit juice, recommended dilution)	9.1	8.5	93	1.5	2	1.5	1	1.5	1	1.5	1	1.5	1.5
Carbonated beverages	Soft drinks, non-cola	9.8	9.8	100	1	1	0.5	0.5	1	0.5	1	0.5	1	1
Dairy – milk beverages	Milk, coffee/chocolate flavoured and milk-based drinks, full fat	10.2	5.58	55	2.5	3	3	2.5	2.5	2.5	2.5	2.5	2.5	2.5

AGHE category	AHS 5 digit classification name	Total sugars (g/100g)	Added sugars (g/100g)	Added as prop'n total (%)	HSR									
					Current	Option 2, current scaling	Option 2, rescaled	Option 3, 22pt table, rescaled	Option 3, 25pt table, current scaling	Option 3, 25pt table, rescaled	Option 3, 30pt table, current scaling	Option 3, 30pt table, rescaled	Option 4, 25pt table	Option 4, 30pt table
Fruit - other juices	Fruit drinks (ready to drink or made from concentrate)	11.2	11.2	100	1	1	0.5	0.5	1	0.5	1	0.5	1	1
Lifestyle	Energy drinks	11.6	11.6	100	1	1	0.5	0.5	1	0.5	0.5	0.5	1	0.5
Fruit - unprocessed	Apples	12.4	0	n/a	4.5	4.5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Dairy - yoghurt, soft cheese	Yoghurt, flavoured or added fruit and/or cereal, high fat (>4 g/100g fat)	13.3	9	68	2.5	3	4.5	4	2	3.5	2	4	2	2
Fruit - whole juices	Fruit juices, commercially prepared	13.6	13.6	100	4	4	3.5	3.5	4	3.5	4	3.5	4	4
Cereals - breakfast	Breakfast cereal, mixed grain, with fruit and/or nuts	15.1	4.3	28	4.5	5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Cereals - breakfast	Porridge style, oat based	17.7	0.2	0.1	4.5	5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Fruit - whole juices	Fruit juices, commercially prepared	20.9	7.2	34	3.5	5	4.5	3	3	2.5	3	2.5	3	3
Ice confections	Water ice confection, gelato, sorbet	21.6	20.1	93	2.5	2.5	3	3	2.5	3	2.5	3	2.5	2.5
Ice confections	Water ice confection, gelato, sorbet	22	11.9	54	3	3	3.5	3	3	3	2.5	3	3	2.5
Snacks	Muesli and cereal style bars, with fruit and/or nuts	22.3	11.9	53	3	4	4	3	3	3	3	3	3	3
Cereals - breakfast	Breakfast cereal, mixed grain, fortified, sugars >20 g/100g	26.7	25.2	94	4	4	4	4	2.5	3	2.5	3	2.5	2.5
Cereals - breakfast	Breakfast cereal, mixed grain, fortified, sugars >20 g/100g	26.9	23.8	88	4	4	4	4	3.5	4	3	3	3.5	3

AGHE category	AHS 5 digit classification name	Total sugars (g/100g)	Added sugars (g/100g)	Added as prop'n total (%)	HSR									
					Current	Option 2, current scaling	Option 2, rescaled	Option 3, 22pt table, rescaled	Option 3, 25pt table, current scaling	Option 3, 25pt table, rescaled	Option 3, 30pt table, current scaling	Option 3, 30pt table, rescaled	Option 4, 25pt table	Option 4, 30pt table
Snacks	Dried fruit and nut mixes	28.8	0	n/a	4.5	5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Snacks	Muesli and cereal style bars, no fruit	29	24.8	86	2	2	2	2	2	2	1.5	2	2	1.5
Cereals - breakfast	Breakfast cereal, corn based, fortified	41.3	40.2	97	2	2	2	2	2	2	1.5	2	2	1.5
Snacks	Sweet biscuits, chocolate-coated, chocolate or cream filled	45.4	37.8	83	0.5	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Confectionery	Lollies and other confectionery, sugars sweetened	54.3	54.3	100	1.5	1.5	2	2	1.5	2	1.5	1.5	1.5	1.5
Confectionery	Chocolate-based confectionery with other fillings or additions	70.3	59.7	85	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5

Key:

Cells shaded in shades of **pink** indicate products whose HSR decreases under the relevant option; the darker the pink shade, the greater the decrease, up to a maximum of 1.5 HSR.

Cells shaded in shades of **green** indicate products whose HSR increases under the relevant option; the darker the green shade, the greater the increase, up to a maximum of 2.0 HSR.

Summary of results and analysis of modelling

It should be noted throughout that current, projected and hypothetical results/distributions may change once final system rescaling is undertaken.

Database

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 Australian Guide to Health Eating (AGHE) food groups (e.g. fats and oils, FFG cereals, dairy, processed and unprocessed fruits and vegetables, animal protein etc.). Data cover the range of HSR nutrients found in Australian and New Zealand foods, including fruit, vegetable, nut and legume (FVNL) and fibre content data for all foods where applicable. The data are not independently verified.

To undertake the added sugars modelling the TAG database was supplemented with additional information provided by food manufacturers and retailers on the added sugars content of foods and beverages (using the WHO definition for 'free sugars'). Added sugars data was provided by industry for 1,875 products. Almost all 42 AGHE categories are represented, with good coverage of most key categories of interest. However, non-dairy beverages data is limited and therefore results should be interpreted with caution and/or the capacity to conduct further analysis is restricted. A summary of the 'added sugars subset' of the TAG database is provided at Appendix 3.

Comparing the databases using current scaling, the ability of the added sugars subset to discriminate between FFG and discretionary products, as per the ABS classification,[53] was similar to that of the full TAG database (AUC 0.831 cf. AUC 0.824).

Modelling methods

All data analysis appearing as results in this report was conducted on the most recent active database of HSR foods compiled as set out above. All HSR parameters (profiler and scaling parameters) are as per the current version of the algorithm obtainable from the HSR website,[54] or otherwise as defined in the current Guide for Industry to the HSR Calculator.[55]

The analysis was undertaken using the most recent version of Microsoft Excel for Mac (version 16.11.1) and the Microsoft software partner add-in application XLSTAT 2017: Data Analysis and Statistical Solution for Microsoft Excel.[56] XLSTAT provides a wide range of data analysis and charting capabilities.

Most results are simple bar charts or scatter plots, however some more advanced modelling tools may have been applied so as to predict general trends from limited data. This includes:

- Quantile/percentile methods for setting end-points so as to roll outliers into the ½ or 5-star categories during scaling
- Use of Weibull curves (a graphical method of portraying a distribution of malleable shape determined by the underlying data) for predicting the "maximum likelihood" distribution of expected ratings from limited data
- Standard food modelling techniques for predicting dilution effects on nutrient content
- Standardised residuals from linear regression to predict the sensitivity of star ratings to the different nutrients, for example within food categories.

[53] ABS, 2014, Australian Health Survey - Discretionary Food List
[54] http://www.healthstarrating.gov.au
[55] HSR Advisory Committee, 2018, Guide for Industry to the HSR Calculator, v. 6, available at http://www.healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/Content/guide-for-industry-document
[56] Addinsoft, 2017, XLSTAT 2017: Data Analysis and Statistical Solution for Microsoft Excel

Note that when regression is used, such as in the case of standardised residuals and scatterplots where trends are indicated, 95% confidence intervals or ellipses are used to provide an estimate of the predictive reliability of the underlying data.

Further details of all analysis types and techniques may be obtained from TAG.

Note that results are often reported by 'Star Points.' These are the raw outputs of the HSR algorithm, corresponding approximately 2:1 to HSRs e.g. 6 Star Points = HSR 3, 5 Star Points = HSR 2.5.

Option 1 – Status quo

The AUC of the current HSR system (current sugars scaling) for discrimination between FFG and discretionary products is 0.824. This indicates the combined capacity of all components considered by the HSR algorithm to differentiate between the status of products, as defined by the ABS list.

Following the five year review process, the HSR system may be rescaled to adjust for changes to the food supply and/or the HSR algorithm and system. This may affect the AUC of the "status quo" for the purposes of this paper. A definitive rescaling of the HSR system and assessment of impact on the distributions of HSRs may take place once all modifications are considered. Results may change once final rescaling is undertaken.

Option 2 – Added sugars

The replacement of total sugars with added sugars in the HSR algorithm produces marginal changes to distributions across categories and AUC for the added sugars subset of the TAG database. However, the relative ranking of products within categories is likely to change (i.e. based on added sugars content). See Appendix 4 for full results and analysis.

As added sugars content is equal to or less than total sugars content, without rescaling Star Points will generally be the same or somewhat higher than current, unless the scaling is changed. Assessed against distributions of products, the use of added sugars tends to slightly increase mean Star Points for both FFG products and discretionary products as a whole (FFG: +0.314; discretionary: +0.137). There are increases in Star Points across all relevant AGHE categories (i.e. those approximating the leading sources of free sugars intake in Australia) and all HSR categories (aside from FFG dairy – cheese). Categories with relatively higher amounts of intrinsic sugars and low added sugars (e.g. fruit and dairy based categories) will see the largest increases.

Rescaling of the HSR system using added sugars will reassert nutrient/component relativities across the range of scores available. This will tend to mitigate the changes to overall category distributions, though the realignment of products within categories would remain.

Using AUC, in isolation added sugars has a greater ability to differentiate between FFG and discretionary products than total sugars (AUC 0.72 cf. AUC 0.66). Across the system, when combined with all other components and assessed by Star Points, added sugars receives an AUC of 0.84, compared to 0.82 for total sugar. Discriminatory power is greater for Star Points derived from added sugars for non-dairy beverages, greater for Star Points derived from total sugars for several HSR categories (FFG dairy – yoghurt, soft cheese, FFG cereals) and equivalent for others (discretionary foods).

Option 3 – Increase the impact of total sugars ("upweighting")

This option has been modelled using a 25 and a 30 point sugars table, with comparisons made against the current 22 point sugars table. Increasing the points available for sugars content means that products incur baseline points at lower sugars contents than currently and the maximum baseline points available are increased (e.g. currently a product with 26 g/100 g total sugars receives 5 baseline points; under a 25 point table this would increase to 6 baseline points and for a 30 point table 7 baseline points). In effect, this increases the

impact of sugars within the algorithm, relative to other nutrients/components. See Appendix 5 for full results and analysis.

Using a 25 or 30 point sugars table commencing at 0% total sugars with current scaling, mean star points are reduced for all categories with effects greater using the 30 point table. Products with higher levels of sugar, regardless of source (e.g. intrinsic – fruit, dairy; added – non-dairy beverages), are most affected.

Rescaling has the effect of restoring nutrient/components relativities, which reduces the relative impact of sugar, though its position as the component exerting the greatest downward influence in sugar-susceptible categories would remain. This tends to reassert the original distribution of products, though some products (both FFG and discretionary) may even be advantaged relative to their current scores. Note that results may change once final rescaling of the HSR system is undertaken.

An approach that employs an upweighted sugars table must deal with products which tend to have sugars content near the original 5% scoring threshold for sugar, such as dairy beverages. If an upweighted table were to commence at 0%, for a 30 point table products with sugars content between 3.4% and 5% may receive a lower HSR.

The hybrid approach of Option 4 below obviates this problem by starting the upweighted sugars table at the lower scoring threshold of 5%. The hybrid option also upweights the total sugars table only for those foods that have a threshold level of added sugars as a percentage of total sugar.

Option 4 – Increase the impact of total sugars within the algorithm only if added sugars are present ("hybrid approach")

This option selectively applies a higher sugars points table for total sugars content (as per option 3) instead of the current 22 point sugars table, but only to products containing added sugars (as per option 2). Products that contain only intrinsic sugars would continue to use the current sugars table. This option targets and penalises products which contain added sugars without increasing sugars penalties on products containing only intrinsic sugars. Products with a mix of added and intrinsic sugars may be captured depending upon the thresholds applied.

Eligibility criteria would need to be determined, but for the purposes of testing is assessed here via added sugars as a proportion of total sugars, set at various thresholds. Similarly, the cut points or "strength" of the contingent sugars table introduced would require agreement; here, 25 point and 30 point tables are tested. If a very low threshold were set, such as approximately ≥0.1% added sugars as proportion of total sugars (in practice, capturing any added sugar), there may be no need for quantification of added sugars content. Should thresholds be set higher, the calculation of added sugars content would pose the same issues as discussed previously. See Appendix 6 for full results and analysis.

Testing of this option indicates that some products will experience a decrease in HSR of 0.5, with more products affected using the 30 point table. This will impact both energy dense and nutrient poor products (e.g. confectionery) and FFG products with high levels of added sugars (e.g. breakfast cereals, yoghurts). Few of these products contain low levels of added sugars (i.e. <20% added as proportion of total). Some products may see a greater reduction in HSRs (e.g. up to 1.5 HSR) should the increase in sugars points render them ineligible for protein points.

Option 5 – Restrict products to a maximum HSR ("capping")

This option restricts products with certain total sugars contents to a maximum HSR (not a compulsory HSR). This would require the development of sugars content thresholds (in addition to considerations around total or added sugars) and determination of the maximum HSRs applicable. The algorithm would consider all components, as is current practice. However, should a product with total sugars content exceeding the relevant threshold

receive a HSR higher than the pre-determined maximum, the HSR would be scaled back to that upper limit regardless of the balance of other components.

This option has not been modelled by TAG, though it is relatively simple to conceptualise.

Discussion

As highlighted through various submission processes, open workshops, public enquiries, media reports and advocacy campaigns, the HSR system currently produces outcomes that are perceived as inappropriate with regards to product sugars content, i.e. products with "high" sugars content may receive "high" HSRs. This is a function of the HSR algorithm itself, whereby the combination of positive and negative components produces a summary score that is not necessarily significantly impacted by the presence of "high" levels of one component and/or which is offset by positive components.

By and large, the HSR system currently produces results that advantage foods and beverages recommended by dietary guidelines and disadvantage products which are advised against. Few products classified as 'discretionary' which receive HSRs ≥3.5 have high levels of total sugars, and many 'FFG' products which receive HSRs ≤2 have high levels of total sugars.[57] These products may therefore be considered "more healthy" and "less healthy," respectively, than alternative products within the same category (with respect to sugars content). However, some discretionary 'outliers' (products with high HSRs and high levels of total sugar) remain.

From a technical perspective, there are a few options available to address the above issues, in addition to retaining the status quo (option 1). Again, current, projected and hypothetical results/distributions may change once final system rescaling is undertaken.

Added sugars may be included in the HSR algorithm, replacing total sugars (option 2). This should (all other things being equal) relatively advantage products lower in added sugars over products higher in added sugar, however may only have a marginal effect on the overall distribution of product categories. This option would remove the disadvantage experienced by products high in intrinsic sugars, particularly those which are not eligible for offset points.

Option 2 provides better alignment with dietary guidance to reduce added sugars consumption, as based on significant, established scientific evidence. It may also encourage reformulation to reduce added sugars content and thereby improve the food supply. Third party research on the HSR system also suggests that this option would improve the ability of the HSR system to differentiate between FFG and discretionary products.[58, 59] However, this option would require the adoption of an explicit definition of 'added sugar' and calculation of added sugars content may prove problematic for industry, particularly small and medium enterprises.

The impact of total sugars within the algorithm could be increased (option 3), though the cutoffs/ "strength" of the new sugars table would need to be determined. Without rescaling, this option would more heavily penalise those products with high levels of intrinsic and/or added sugars. However, any effect may be marginal at best and disadvantage FFG products with high intrinsic sugars and low added sugars content at worst. Rescaling would reassert relativities between nutrients, which may mitigate effects on product categories.

Option 3 may support the intention of dietary guidance to reduce added sugars intake by reducing total sugars intake. It may also encourage some reformulation by industry and is simple to implement and communicate. As noted, products with high levels of intrinsic sugars would also be impacted by the higher points and potential for reformulation may be

[57] Jones A, Rådholm K, Neal B, 2018, Defining 'Unhealthy': A Systematic Analysis of Alignment between the Australian Dietary Guidelines and the Health Star Rating System, Nutrients, 10(4), available at https://doi.org/10.3390/nu10040501
[58] Peters et al, 2017
[59] Menday et al, 2017

limited for these products. This may in turn further advantage products with added sugars content (that is able to be reduced).

A hybrid approach that more heavily penalises total sugars content when added sugars are present is also proposed (option 4). This requires a determination on both the “strength” of the sugars table used and of the threshold for the requirement to use the ‘stronger’ sugars table. This option penalises products high in total sugars content, however this is restricted to products that are energy dense and nutrient poor and/or which have significant added sugar, while products with intrinsic sugars only are unaffected (though remaining subject to the current sugars points). This option may improve differentiation between products with high and low added sugars content, targeting added sugars without significant impact on the entire HSR system.

Option 4 does provide better alignment with dietary advice to reduce added sugars intake, while not entirely removing the impact of intrinsic sugars from the system. This approach could also in effect improve the food supply itself through encouraging reformulation to reduce added sugars content, rather than making adjustments to the existing nutrient relativities in the system. Ease of implementation and communication and impact upon industry is variable. Should the threshold be set at ≥0.1% added sugars as proportion of total sugars (in practice, capturing any added sugar) there is no need for quantification of added sugars content, however there would be limited scope for products to remove added sugars in order to maintain existing HSRs. Should added sugars content thresholds be set higher, the calculation of added sugars content would pose the same issues as discussed previously. A definition of ‘added sugar’ would be required regardless, though this may again prove relatively simple should a minimum threshold of added sugars content apply.

A final technical option is to restrict products with high total (or added) sugars content to a maximum HSR (option 5), which would require the development of content thresholds and determination of maximum HSRs. This option effectively removes products from the algorithm at a pre-determined sugars content threshold and assigns a HSR, though the output of the algorithm still applies should the maximum HSR not be reached. Note that this option may be implemented across all (or some) components of the HSR algorithm, with cross-effects on both capacity to reformulate and differentiation between “more healthy” and “less healthy” products.

Option 5 would address much of the negative perception that products with “high” sugars content are receiving “high” HSRs, clearly improving differentiation between those and products low in sugars content, though it also deviates from the intention of the algorithm to provide a summary of the balance of nutrient content. This option can also be readily implemented and communicated. For products that would receive a HSR close to the maximum reformulation may be encouraged, though there would necessarily need to be a significant reduction in added sugars content. For products that would currently receive a much higher HSR there may be limited incentive to reduce added sugars content. Furthermore, this option may penalise products with high levels of intrinsic sugar, which are unlikely to have capacity to reformulate in any case.

Conclusions

This paper provides an outline of various technical options to address concerns raised regarding the treatment of sugars in the HSR system. It is incumbent upon the HSR Advisory Committee and the independent reviewers of the HSR system to consider whether the current treatment of sugars in the HSR system is appropriate from both a technical and a policy perspective, with some respect given to public perceptions of the system. As with any potential adjustments to the HSR system, including status quo, possible negative effects (such as continued adverse attention and reduced industry uptake) must be balanced against possible positive effects (e.g. improved credibility, trust in and use of the system and broader support).

APPENDIX 1: Options proposed by submissions to the five year review

Table 5: Summary and assessment of options proposed by submissions

Issue	Option	Assessment against TAG principles	Comments/next steps
Include added sugars	Differentiate between & define "added/free" sugars vs "intrinsic/natural" sugars	• Aligns with dietary guidance • Not aligned with NPSC • Requires definition (may use Code definitions of sugars) • Encourages reformulation • No analytical test for added sugar	• Added sugars data obtained • Progressed to modelling (option 2)
Algorithm changes – selective application	Only apply total sugars algorithm if food has added sugars (no penalties for natural/intrinsic sugars)	• Aligns with dietary guidance • May use Code definitions of sugar/"no added sugar" claims • Removes sugars • Encourages reformulation • Little evidence for added sugars being metabolised differently, some evidence for health effects	• Expanded upon by TAG • Modelled as "hybrid" option (option 4)
	Adjust algorithm to reflect evidence base (<50 g total/ added/free sugars per day based on adult diet 8,700 kJ at less than 10% energy)	• Aligns with dietary guidance • Not aligned with NPSC and Code provisions on sugar • Unable to reconcile portion sizes with HSRs, with complications for reformulation	• Substantial deviation from algorithm • Not modelled by TAG
Algorithm changes – points/penalties	Products with high sugars or added sugars ineligible for positive points	• Aligns with dietary guidance • No guidance on or definition of "high sugar" • Requires definition of "added sugar" (may use Code definitions of sugars) • Changes basis of algorithm to consider nutrient balance • Encourages reformulation	• Limited scope • Not modelled by TAG
	Apply penalty points for added sugars	• Aligns with dietary guidance • Requires definition (may use Code definitions of sugars) • Not aligned with NPSC • Encourages reformulation • Little evidence for added sugars being metabolised differently, some evidence for health effects	Modelled by TAG (incorporated in option 2)
Algorithm changes – threshold graduation	Change weighting sensitivity of total sugars as a negative nutrient vs positive nutrients	• Aligns with dietary guidance • Extension of NPSC • Aligns with the Code • Encourages reformulation • Little evidence on "extra" impact of sugars cf. other negative components	• Expanded upon by TAG • Modelled as "upweighting" option (option 3)

	Apply grading system for increases in total sugars above a threshold	• Aligns with dietary guidance • Aligns with NPSC • Aligns with the Code • Encourages reformulation	• Current algorithm already does this • Potential modifications modelled by TAG (incorporated in option 3)
Algorithm changes – capping	Cap HSRs for high/added sugars foods	• Aligns with dietary guidance • May encourage reformulation • Not aligned with NPSC • Deviation from intent of algorithm to provide comparisons based on total nutrient balance • No evidence of threshold effects of sugar	Considered by TAG (incorporated in option 5)
	Apply a cap on discretionary foods with added sugar	• Aligns with dietary guidance • May encourage reformulation • Not aligned with NPSC • Deviation from intent of algorithm to provide comparisons based on total nutrient balance • Requires definitions of “added sugar” and “discretionary”	Incorporated in option 5
System exclusions	Exclude high sugars products from system	• Aligns with dietary guidance • Does not encourage reformulation • Deviation from intent of algorithm to provide comparisons based on total nutrient balance • Requires definitions of “high sugar”	• Out of scope for TAG • Requires a policy decision, i.e. not technical solution • Not modelled by TAG
	Implement sugars tax	• Out of scope of HSR system	• Out of scope of HSR system • Not modelled by TAG

APPENDIX 2: How the HSR system currently treats sugar

HSR baseline points for total sugars

Baseline points are the “penalties” imposed by the HSR algorithm on risk-associated (‘negative’) components (energy, total sugars, sodium, saturated fat). The more baseline points, the lower the HSR (following consideration of modifying points, which come from positive components, and scaling according to HSR category).

In the current HSR algorithm, products in categories 1/1D (beverages/dairy beverages) and 2/2D (non-dairy foods/FFG dairy (yoghurt and soft cheese)) receive up to 22 baseline points for sugars content up to 100%, commencing at 5% sugars content. As noted previously, in practice few products in the food supply contain a total sugars content close to 100 g/100 g and at lower levels of content there is a reduced ability to differentiate between sugars content of products as the highest points are rarely awarded.

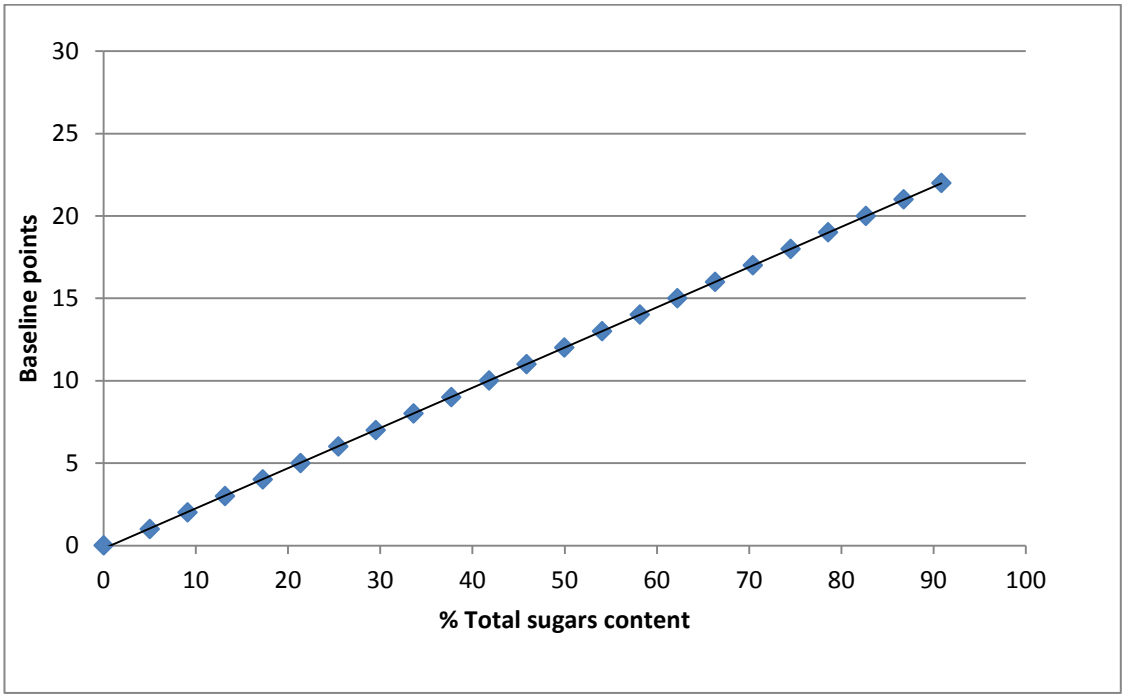

Figure 8: Current total sugars baseline points, categories 1, 1D, 2, 2D

Products in categories 3/3D (fats and oils/FFG dairy (hard cheese)) receive up to 10 points for sugars content up to 45% (which captures all products within the categories), commencing at 5% sugars content.

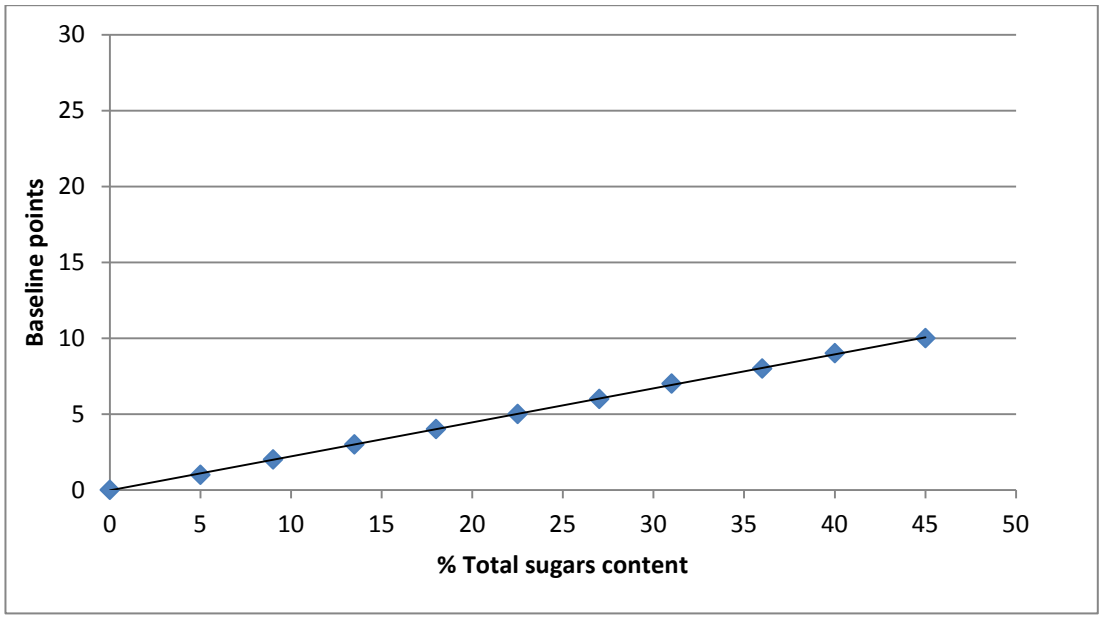

Figure 9: Current total sugars baseline points, categories 3, 3D

Table 6: Current total sugars baseline points against sugars content levels

Sugars content (g per 100 g/mL)	Baseline points
≤5.00	0
>5.00	1
>9.00	2
>13.5	3
>18.00	4
>22.50	5
>27.00	6
>31.00	7
>36.00	8
>40.00	9
>45.00	10
>49.00	11
>54.00	12
>58.00	13
>63.00	14
>67.00	15
>71.00	16
>76.00	17
>81.00	18
>85.00	19
>90.00	20
>94.00	21
>99.00	22

It should be noted that for all HSR categories the maximum baseline points for energy is 11 and for saturated fat and sodium 30.

Nutrient sensitivity

Currently, total sugars is the equal most sensitive component across all categories within the HSR algorithm. Figure 10 below demonstrates the effect of a one standard deviation (SD) change to all HSR components. A one SD increase in sugars would lower the HSR by the equivalent of approximately 0.3 Star Points. Note that HSR points (i.e. baseline and modifying points within the HSR calculator) are converted to HSR Star Points, which are then scaled to HSRs themselves.

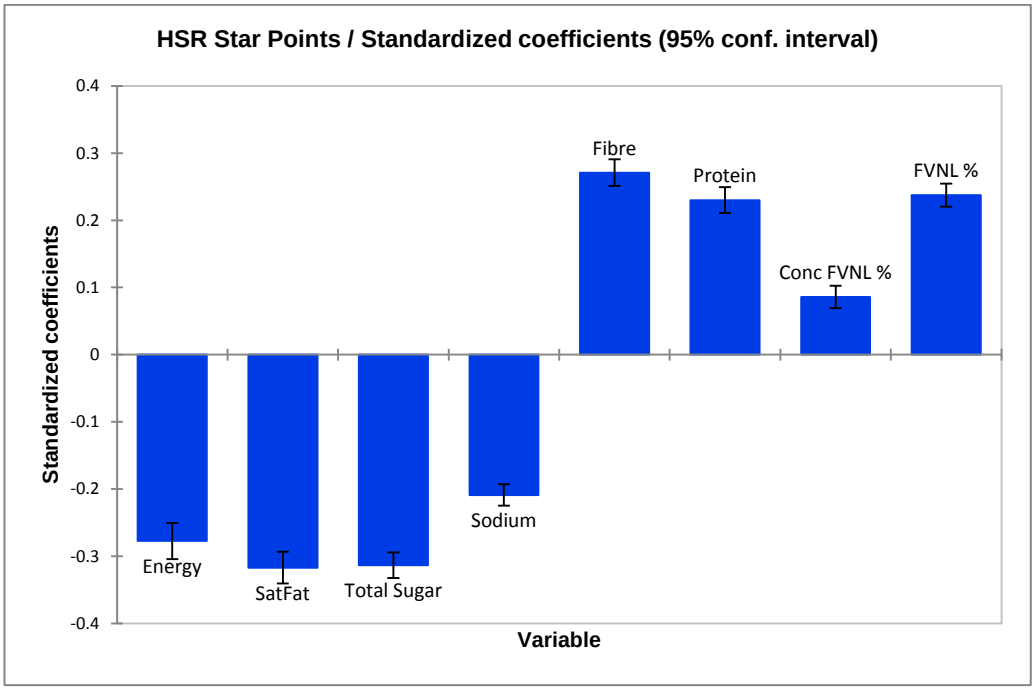

Figure 10: Current HSR algorithm component sensitivities, entire system

For confectionery, total sugars has less of an effect than energy (noting the linkages between total sugars and energy content).

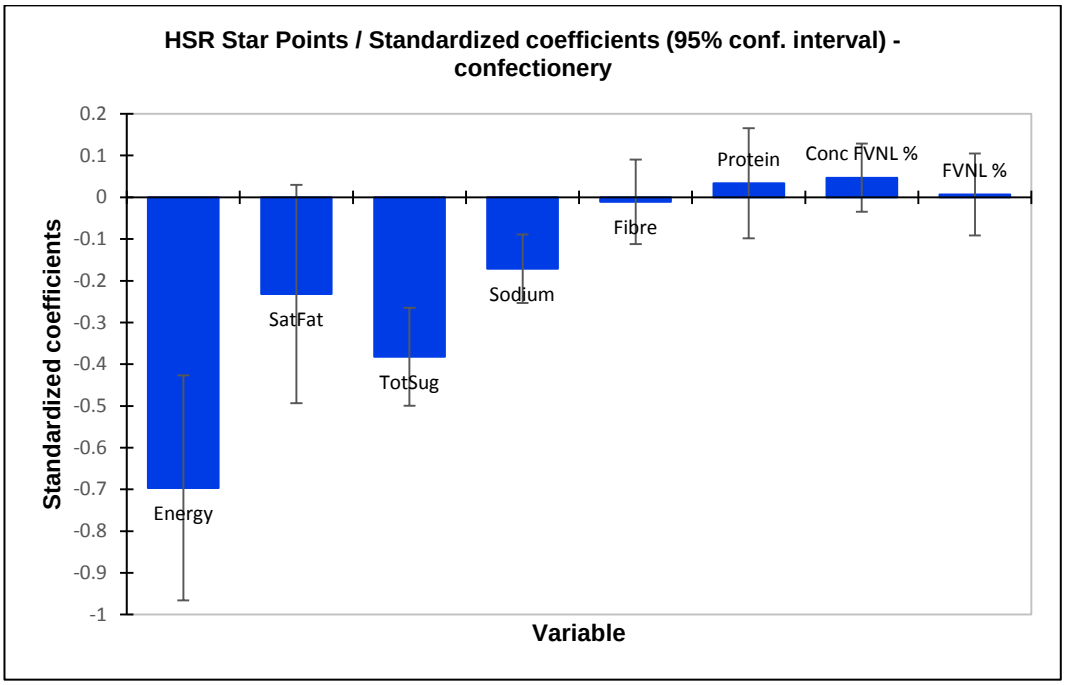

Figure 11: Current HSR algorithm component sensitivities, confectionery (note the different scale of the y-axis)

For non-dairy beverages, total sugars has the greatest negative impact, though this is offset by the large improvements in scores due to FVNL content. However, FVNL content is only relevant for fruit and vegetable juices with content >40% FVNL or ≥25% concentrated FVNL.

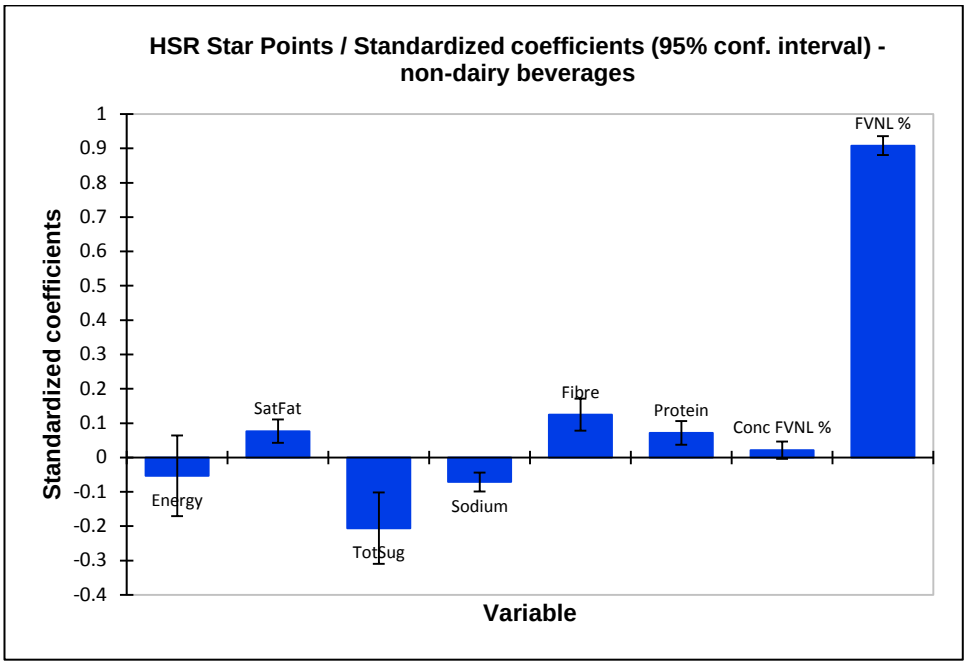

Figure 12: Current HSR algorithm component sensitivities, non-dairy beverages (note the different scale of the y-axis)

Total sugars has little effect on salty snacks and hot potato products.

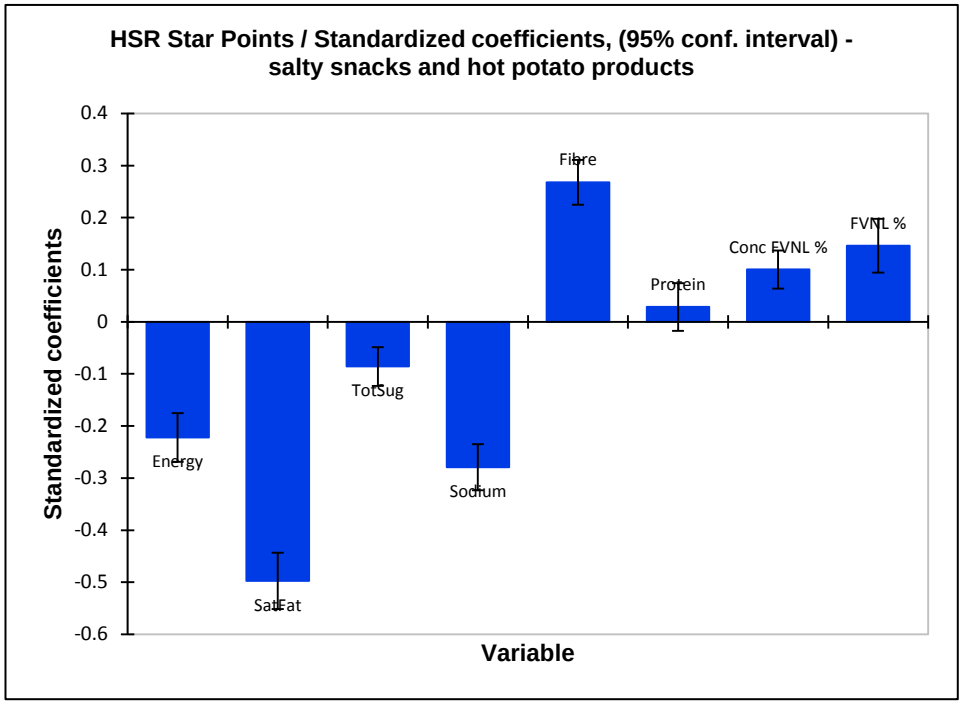

Figure 13: Current HSR algorithm component sensitivities, salty snacks and hot potato products (note the different scale of the y-axis)

Rescaling

Current scaling of the HSR system is based on the outputs produced by the algorithm across products, within HSR categories, using the original HSR database used to develop and test the system. The intention of scaling is to distribute all products across the range of HSRs available, thereby providing greater differentiation between rankings.

The updated TAG database, which may more accurately reflect the changed food supply, could be rescaled to redistribute products according to their relative nutrient content. As a hypothetical (extreme) example, if all sugar-sweetened dairy beverages reformulated to remove added sugars entirely there would be one less negative variable, and therefore fewer baseline points, available to distinguish between products (differentiation would be provided primarily on saturated fat and protein content). As a result, HSRs for products within HSR category 1D would tend to increase (on average) and congregate around higher HSRs. To better highlight differences between these products on other available algorithm components, the way in which HSR points are scaled to HSRs for this category could be reset so that the new distribution of HSR points within the category is appropriately spread across the entire HSR scale. In a similar manner, rescaling may also occur if HSR algorithm components are significantly altered.

An indicative rescaling of the HSR system, according to the new TAG database, produces a new, though substantially similar, set of nutrient sensitivities. Figure 14 highlights that this would increase the impact of energy content relative to total sugar.

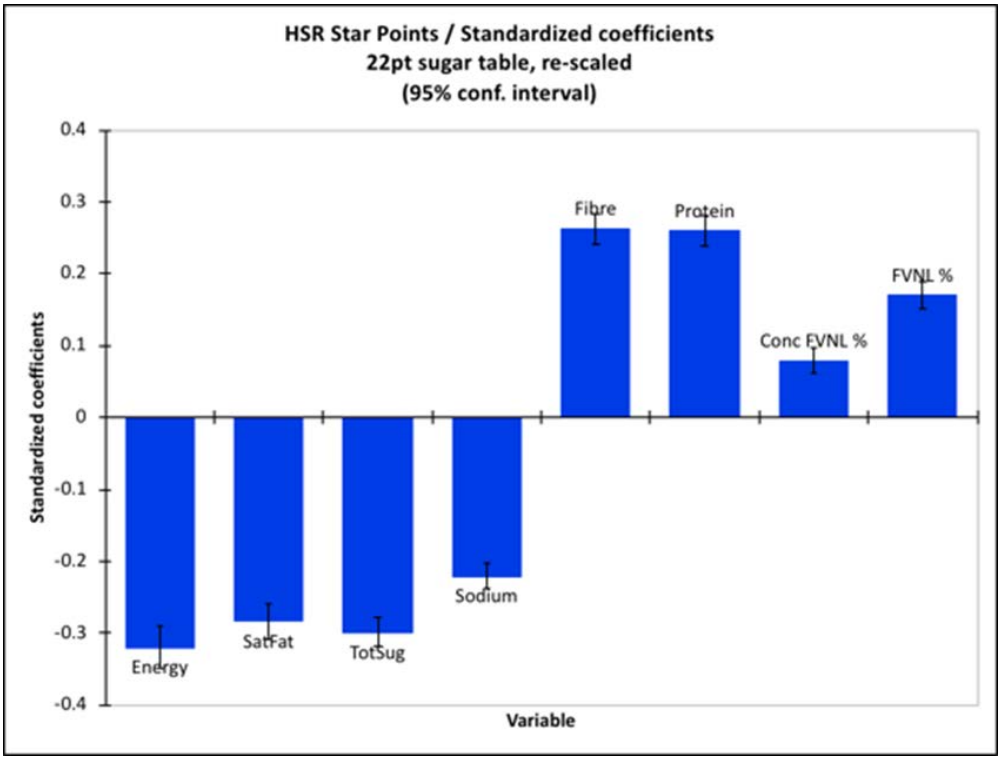

Figure 14: HSR algorithm component sensitivities, entire system, rescaled

HSR categories

For the purpose of determining a HSR, the HSR system classifies all foods and beverages into six categories.

Table 7: HSR categories

Non-dairy	Dairy
1 - Beverages other than dairy beverages	1D - Dairy beverages
2 - All foods other than those included in Category 1, 1D, 2D, 3 or 3D	2D - Dairy foods other than those included in Category 1D or 3D
3 - Oils and spreads, defined as follows • edible oil as defined in Standard 2.4.1 • edible oil spreads as defined in Standard 2.4.2 • margarine as defined in Standard 2.4.2 • butter as defined in Standard 2.5.5	3D - Cheese and processed cheese as defined in Standard 2.5.4 (with calcium content >320 mg/100 g)

However, within category 2 there are five separate groups of products:

- Vegetables (processed and unprocessed, combinations thereof)
- Fruit (processed and unprocessed, combinations thereof)
- FFG cereals (e.g. bread, rice, pasta, breakfast cereals, grains etc., processed and unprocessed, combinations thereof)
- Protein (e.g. meat, fish, poultry, nuts, tofu, legumes, eggs etc., processed and unprocessed, combinations thereof)
- Discretionary foods (e.g. chips, confectionery, biscuits, sauces, dressings, ice cream).

These groups are all currently included and scaled together for the purposes of determining HSRs for category 2 products.

APPENDIX 3: Data used in modelling of total and added sugars

Table 8: Summary of total sugars and added sugars data, by AGHE category

AGHE category	Total sugars data (n)	Added sugars data (n)	Coverage (%)
FFG Cereals - bread	226	33	15
FFG Cereals - breakfast	300	156	52
FFG Cereals - pasta/flour/grains	185	13	7
FFG Dairy alternative beverages	64	10	16
FFG Dairy - beverages	485	311	64
FFG Dairy - beverages dry mix/milk powder	2	0	0
FFG Dairy - cheese	443	217	49
FFG Dairy - yoghurt, soft cheese	415	80	19
Discretionary Dairy foods - cream	68	45	66
Discretionary Dairy foods - cream cheese	67	29	43
Fats, oils & oil based spreads	94	29	31
Flavoured water	9	0	0
Fruit - other juices	69	7	10
Fruit - processed	125	16	13
Fruit - unprocessed	33	1	3
Fruit - whole juices	240	21	9
Discretionary foods - bakery/cake mixes	122	16	13
Discretionary foods - beverage dry mixes	3	3	100
Discretionary foods - biscuits	258	168	65
Discretionary foods - carbonated beverages	26	1	4
Discretionary foods - confectionery	93	20	22
Discretionary foods - cordial	6	2	33
Discretionary foods - custard/desserts	82	19	23
Discretionary foods - dips	28	14	50
Discretionary foods - dressings	95	15	16
Discretionary foods - ice confectionery	46	14	30
Discretionary foods - ice cream	179	66	37
Discretionary foods - jelly	20	13	65
Discretionary foods - lifestyle	4	0	0
Discretionary foods - meals/meal bases	292	74	25
Discretionary foods - miscellaneous	25	18	72
Discretionary foods - pizza	3	0	0
Discretionary foods - sauces/condiments	344	146	42
Discretionary foods - snacks	310	161	52
Discretionary foods - soups/stocks	245	107	44
Discretionary foods - yeast spread	4	2	50
Protein - meats/fish	328	2	1
Protein - nuts	76	16	21
Protein - plant	104	7	7
Vegetables - processed	299	17	6
Vegetables - unprocessed	62	1	2
Water	6	5	83
Total	**5885**	**1875**	**32**

Due to the limited data available for non-dairy beverages (other than juices) and snack bars, data from AUSNUT 2011-13[60] has been used to indicate the effects of various options explored within this paper for such products. Products have been aggregated and average values derived. Table 9 lists the 8 digit codes that have been included.

Table 9: AUSNUT 2011-13 data used in modelling options

Aggregate used in analysis (based on AHS 5 digit classification)	**AHS 8 digit code**	**AHS 8 digit classification**
Cordial, made from concentrate (25% fruit juice, recommended dilution)	11401019	Cordial, 25% citrus fruit juice, regular, recommended dilution
	11401021	Cordial, 25% non-citrus fruit juice, regular, recommended dilution
Cordial, made from concentrate (40% fruit juice, recommended dilution)	11401022	Cordial, 40% non-citrus fruit juice, regular, recommended dilution
	11401020	Cordial, 40% citrus fruit juice, regular, recommended dilution
Soft drink, intense sweetened	11504001	Soft drink, cola flavour, intense sweetened or diet
	11502001	Soft drink, creaming soda, intense sweetened or diet
	11502002	Soft drink, dry ginger ale or ginger beer, intense sweetened or diet
	11502003	Soft drink, lemon flavour, intense sweetened or diet
	11502004	Soft drink, lemonade, intense sweetened or diet
	11502005	Soft drink, orange flavour, intense sweetened or diet
	11502006	Soft drink, passionfruit flavour, intense sweetened or diet
	11502007	Soft drink, raspberry flavour, intense sweetened or diet
	11502009	Soft drink, tonic water, intense sweetened or diet
Energy drinks	11603001	Soft drink, energy drink, Hype
	11603002	Soft drink, energy drink, Monster
	11603003	Soft drink, energy drink, Mother
	11603004	Soft drink, energy drink, Red Bull
	11603005	Soft drink, energy drink, Red Eye
	11603006	Soft drink, energy drink, Rockstar
	11603007	Soft drink, energy drink, V

[60] FSANZ, 2016, AUSNUT 2011-13, available at http://www.foodstandards.gov.au/science/monitoringnutrients/ausnut/pages/default.aspx

Aggregate used in analysis (based on AHS 5 digit classification)	AHS 8 digit code	AHS 8 digit classification
	11603008	Soft drink, energy drink, not further defined
Muesli and cereal style bars, no fruit	28301001	Bar, muesli or snack, made from breakfast cereal
	28301002	Bar, muesli or snack, made from breakfast cereal with milk solids
	28301003	Bar, muesli or snack, made from breakfast cereal, with chocolate coating, added vitamins B1, B2, B3, B6 & folate, Ca, Fe & Zn
	28301004	Bar, muesli or snack, made from puffed rice, added vitamins B1, B2, B3, C & folate, Fe, & Zn
	28301005	Bar, muesli or snack, made from puffed rice, with chocolate flavour, chips or coating
	28301006	Bar, snack style, chocolate fortified cereal, milk solids
Muesli and cereal style bars, with fruit and/or nuts	28302001	Bar, muesli or snack, plain or with 10% dried fruit
	28302002	Bar, muesli or snack, plain or with 10% dried fruit, added vitamins B1, B2, B3, folate & Fe
	28302003	Bar, muesli or snack, plain or with 10% dried fruit, high fibre, added vitamins B1, B2, B3, B6, E, & folate, Fe & Zn
	28302004	Bar, muesli or snack, with 10% dried fruit & 5% nuts
	28302005	Bar, muesli or snack, with 10% dried fruit & 10% nuts
	28302006	Bar, muesli or snack, with 10% dried fruit & 45% nuts, chocolate-coated
	28302007	Bar, muesli or snack, with 10% dried fruit & 60% nuts
	28302008	Bar, muesli or snack, with 10% dried fruit & 60% nuts, yoghurt-coated
	28302009	Bar, muesli or snack, with 15% dried fruit & 25% nuts, added vitamins B1, B2, B3, C & folate, Fe, & Zn
	28302011	Bar, muesli or snack, with 20% dried fruit & 20% nuts, chocolate base
	28302010	Bar, muesli or snack, with 20% dried fruit & 5% nuts
	28302012	Bar, muesli or snack, with 30% dried fruit & 30% nuts
	28302013	Bar, muesli or snack, with 10% nuts
	28302014	Bar, muesli or snack, with 10% nuts, added flaxseeds
	28302015	Bar, muesli or snack, with 70% nuts
	28302016	Bar, muesli or snack, with 70% nuts, added vitamins B1, B2, B3, C & folate, Fe, & Zn
	28302017	Bar, muesli or snack, gluten free, with 20% dried fruit & 20% seeds

Figure 15 provides the modelled distribution of added sugars as % of total sugars by HSR category. The second Weibull number in brackets indicates the relative weighting of each category, that is, the proportion of total sugars that is added e.g. non-dairy beverages 0.938, or ~94%. Fats and oils and FFG dairy (hard and processed cheeses) are excluded as they contain no added sugar. Note that these are modelled estimates due to a lack of very large numbers of products in the added sugars database.

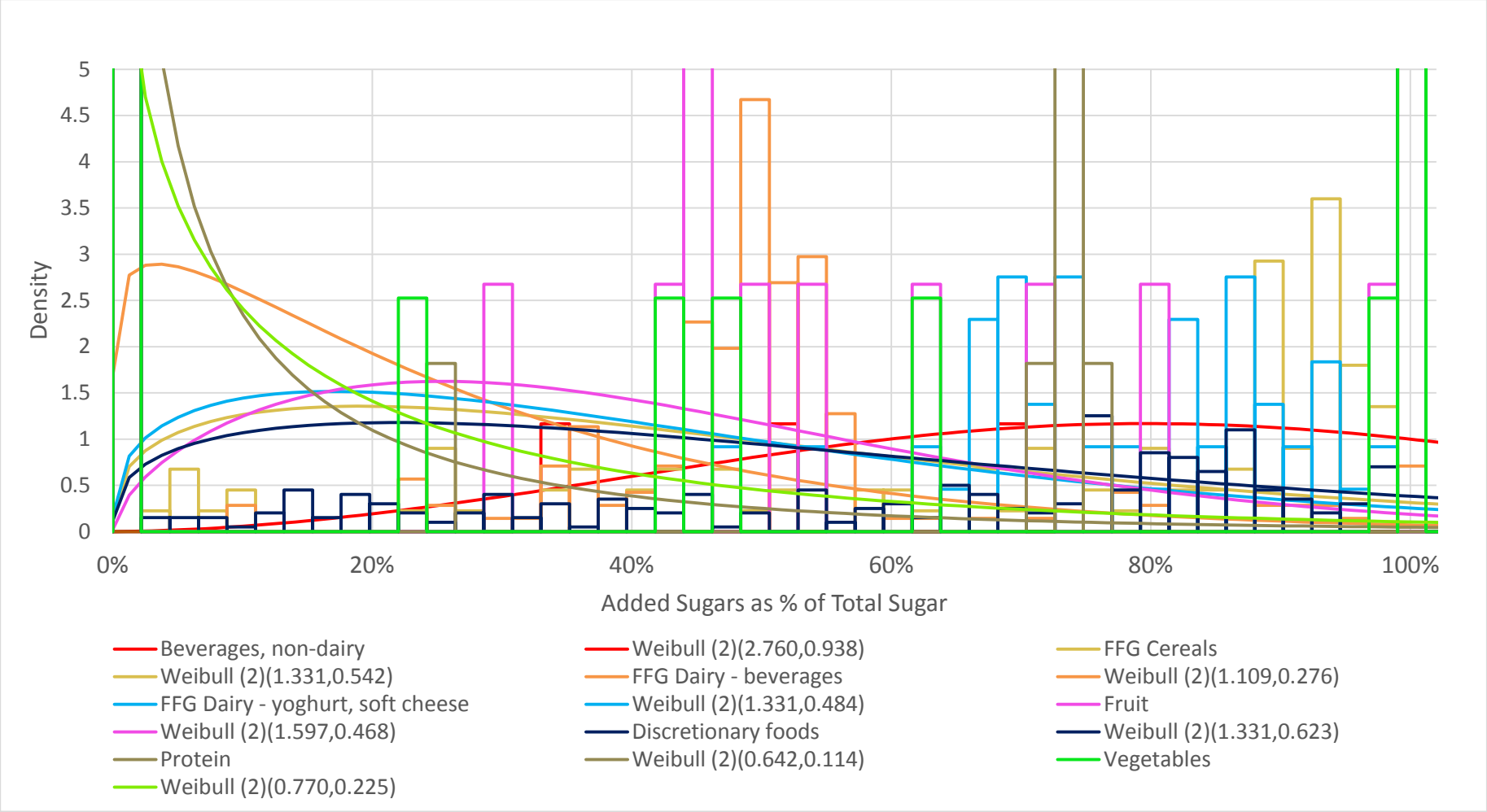

Figure 15: Added as % of total sugars content, by HSR category, added sugars subset of TAG database

APPENDIX 4: Option 2 (added sugars) - full results and analysis

This option proposes replacing total sugars with added sugars in the HSR algorithm. This option would incentivise reformulation of products to reduce added sugars content, which would enable the maintenance of existing, or improvement of potential, HSRs. Modelling undertaken here assumes a 22 point sugars table, as is current.

Indicative HSRs for products, displayed according to added sugars content, are provided in Figures 16-17. As with total sugars, products with higher levels of added sugars content tend to receive lower HSRs; some products, particularly breakfast cereals, do receive high HSRs despite high added sugars content.

Current and predicted distributions of products, shown by total sugars and added sugars content, with current scaling, are shown in Figures 18-19 below. Products are classified according to relevant AGHE categories that approximate the leading sources of free sugars intake in Australia.

Results of modelling using current system scaling indicate that all AGHE categories investigated see an increase in mean Star Points when added sugars replaces total sugars in the algorithm, with increases largest in custards/dairy desserts (+1.016 Star Points, discretionary), yoghurts/soft cheeses (+0.599, FFG) and breakfast cereals (+0.343, FFG).

Overall, all but one HSR categories see an increase in mean Star Points. FFG categories (typically lower in added sugars and/or higher in intrinsic sugar) will tend to experience a greater increase than the discretionary category, for which total sugars is generally closer to added sugar. Those FFG categories with high levels of intrinsic sugars (e.g. dairy beverages, fruit) will receive the greatest increase. However, any changes in aggregate distribution (whether by FFG/discretionary or by HSR category) are marginal, with the greatest increase in 2D (FFG dairy - yoghurt, soft cheese) products (+0.681 Star Points, or approximately just over one third of a HSR).

As noted previously, added sugars can only ever be ≤100% total sugars content. As such, replacing total sugars content with added sugars content in the current HSR algorithm, without rescaling, cannot result in a decrease in HSRs. There may, however, be better differentiation within categories between products with low and high levels of added sugar.

An indicative rescaling of the HSR system using added sugars is at Figure 20. Rescaling will tend to reverse or mitigate the changes to overall category distributions, though the realignment of products within categories (i.e. based on added sugars content) would remain. Custards/dairy desserts (+3.856 on current, or approximately 1.93 HSRs) and yoghurts/soft cheeses (+1.887 on current, or approximately 0.95 HSRs) still see large increases in mean Star Points. Note that some HSR categories were unable to be rescaled due to a lack of data (category 1, non-dairy beverages) or absence of sugars content (category 3, fats and oils; category 3D, FFG dairy – hard cheeses).

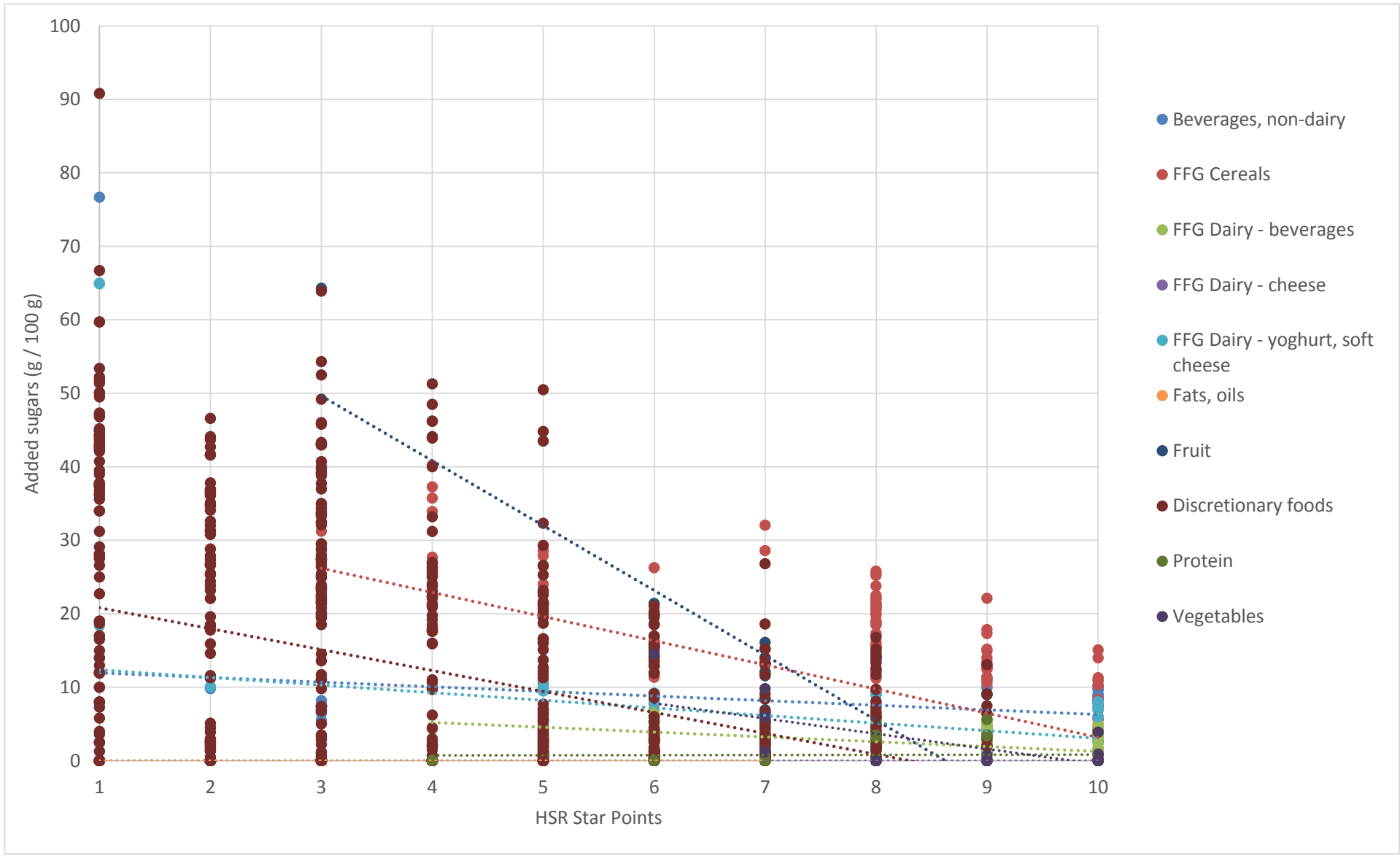

Figure 16: Products in HSR categories, displayed by Star Points and added sugars content, with trend line showing the relationship between total sugars content and Star Points by HSR category, added sugars subset of TAG database (n=1,875)

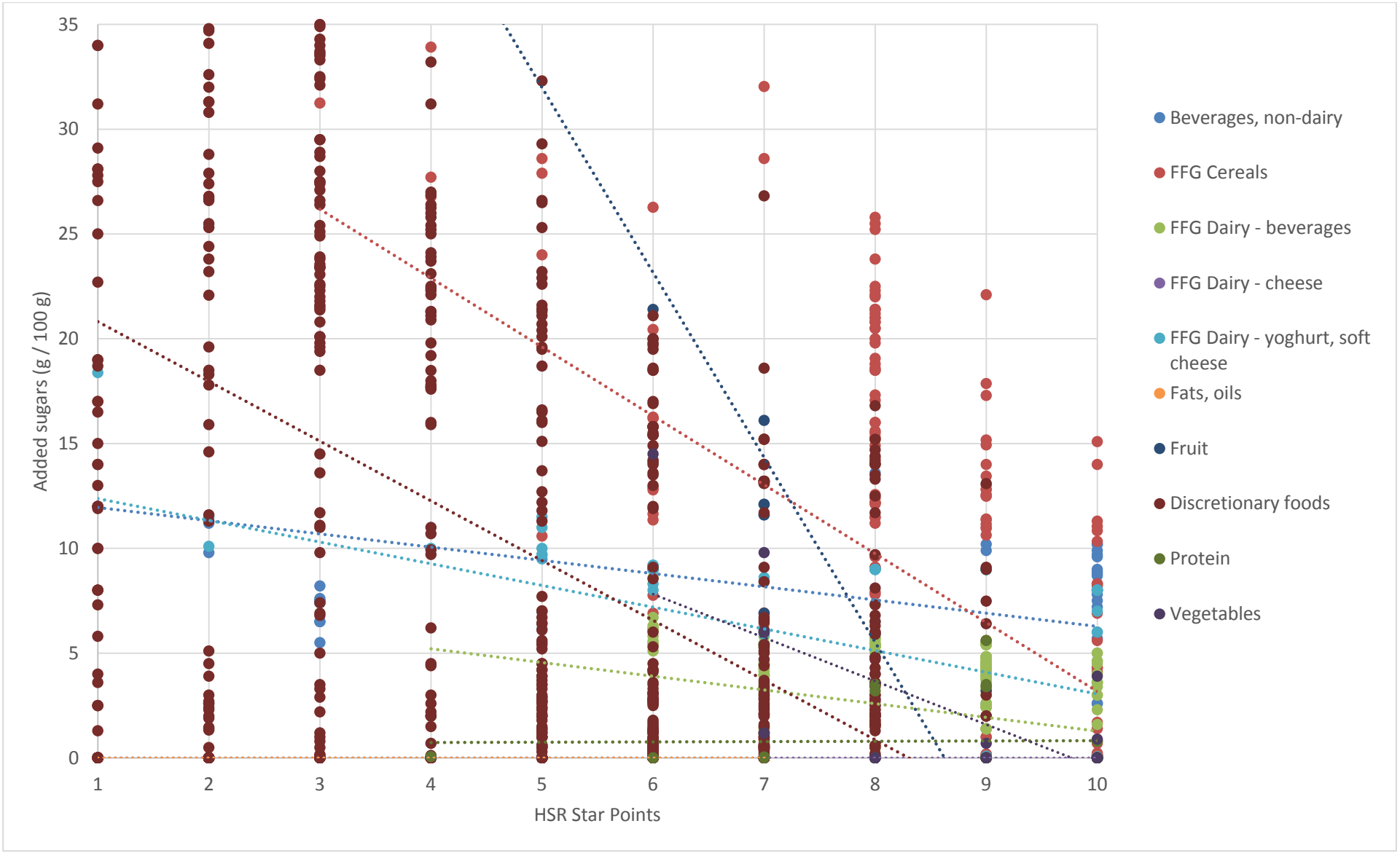

Figure 17: Detail - products in HSR categories, displayed by Star Points and total sugars content, with trend line showing the relationship between total sugars content and Star Points by HSR category, added sugars subset of TAG database (n=1,781)

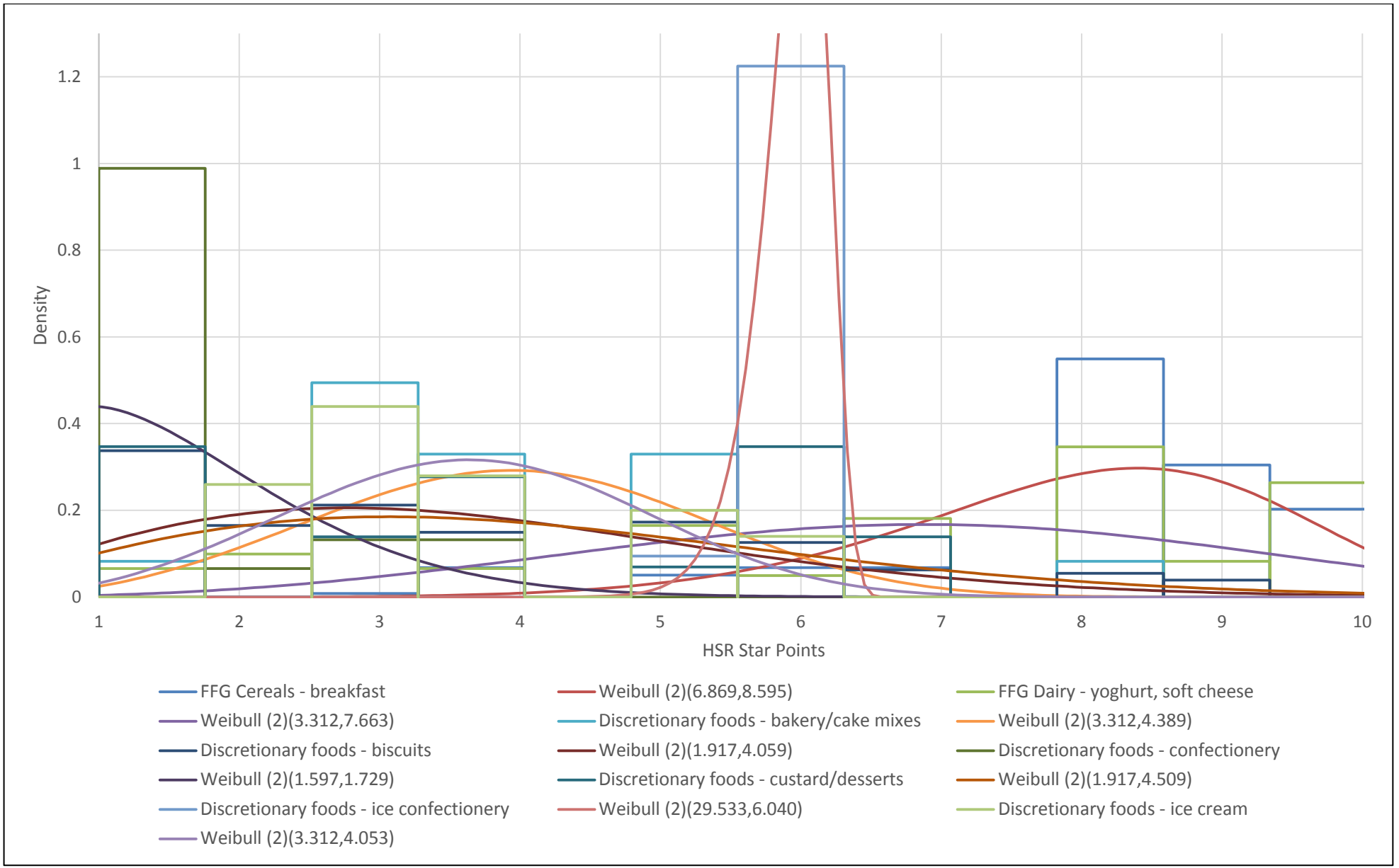

Figure 18: Distribution of products by key AGHE category, using total sugars, current scaling

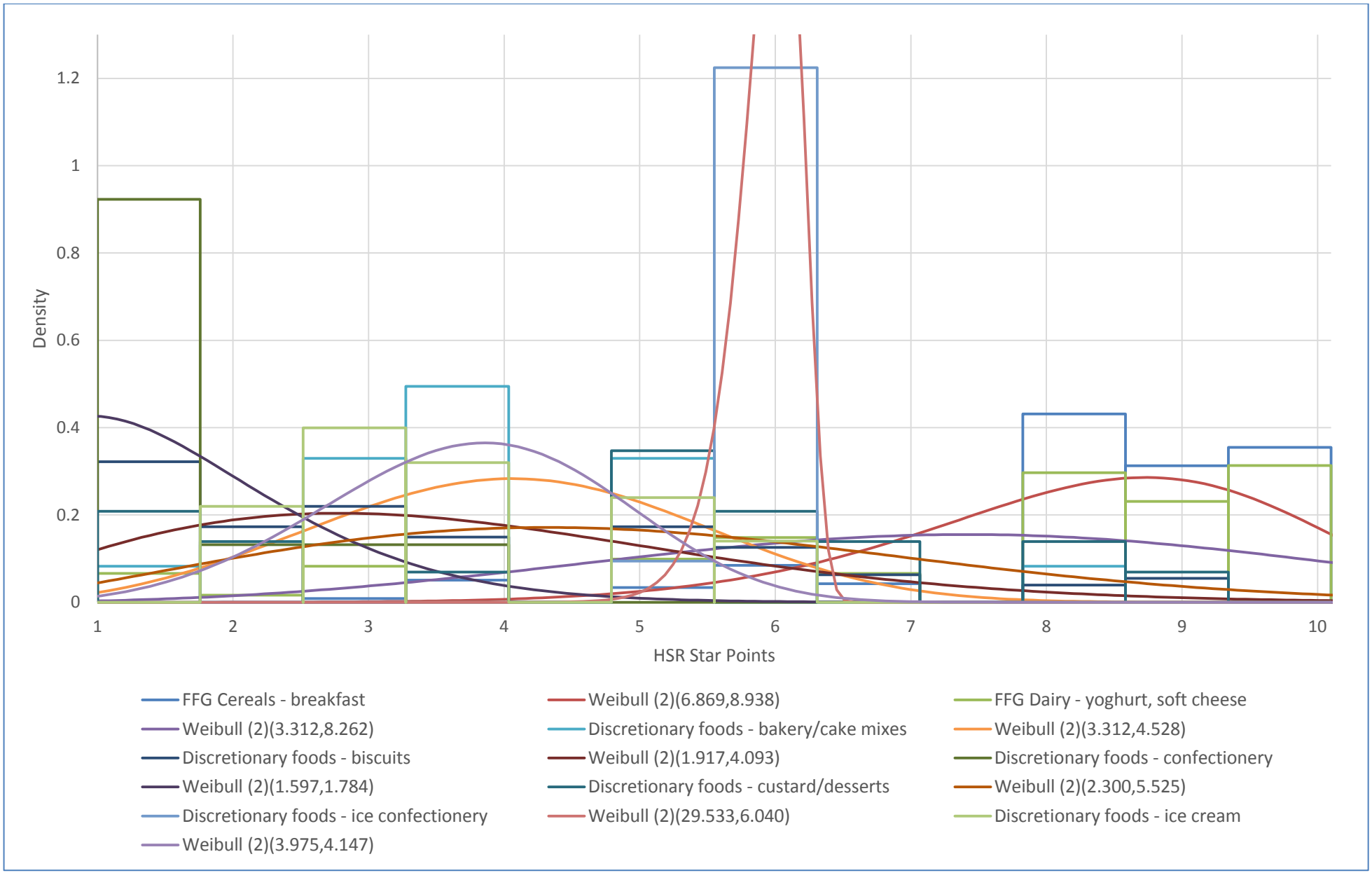

Figure 19: Distribution of products by key AGHE category, using added sugars, current scaling

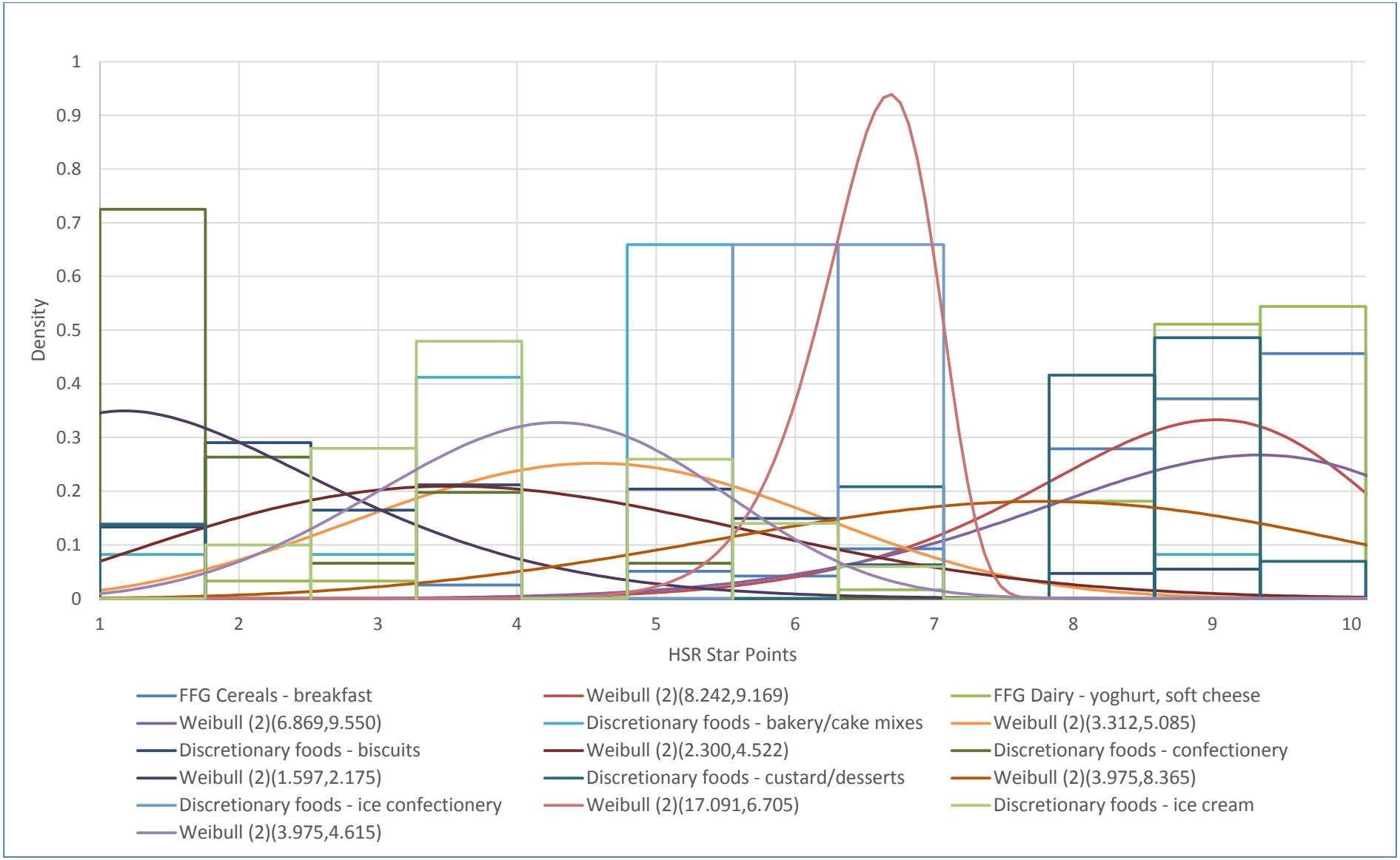

Figure 20: Distribution of products by key AGHE category, using added sugars, rescaled (note the different scale of the y-axis to the previous)

APPENDIX 5: Option 3 (“upweighting”) - full results and analysis

A range of options for upweighting is available within the HSR algorithm. The higher the end-point value the greater the number of points accumulated for equivalent sugars content, with a theoretical effect of lowering Star Points received, though this may not make a practical difference at lower content levels. This option allows for reformulation to remove sugars content in order to maintain existing ratings, though this is restricted to products with added sugars content.

Figures 21-23 plot the relationships between content and points for a range of tables, though the mid-range has been omitted for brevity. Note that the current 22 point table is not strictly linear (inherited from the NPSC) and at lower levels of sugars content (<18%), 23 and 24 point tables provide less of a penalty than a 22 point table, i.e. products could have higher sugars content but receive lower baseline points, though the real effect of this may be minimal.

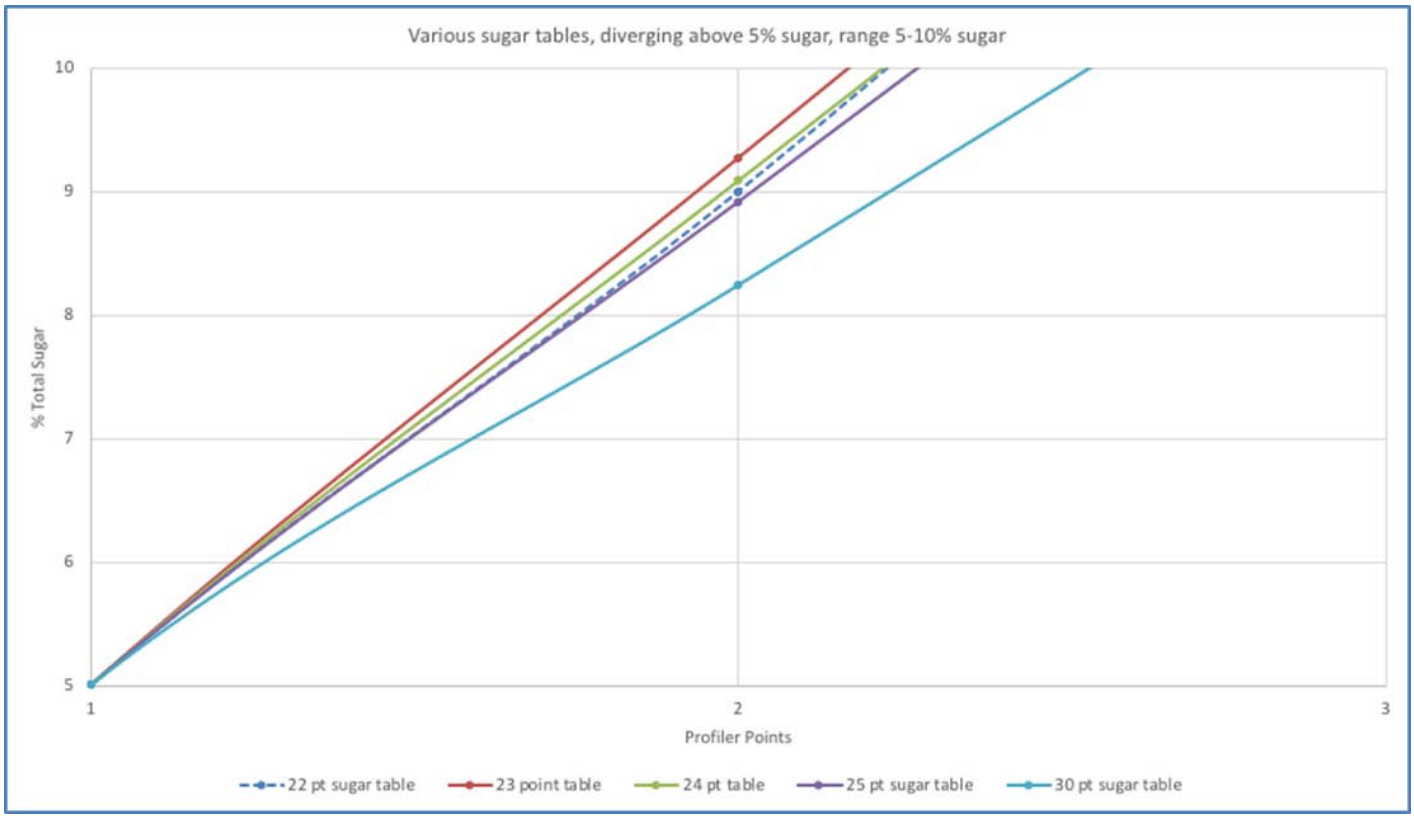

Figure 21: The influence of different sugars tables, current and prospective, on baseline points, for products with 5-10% total sugars content

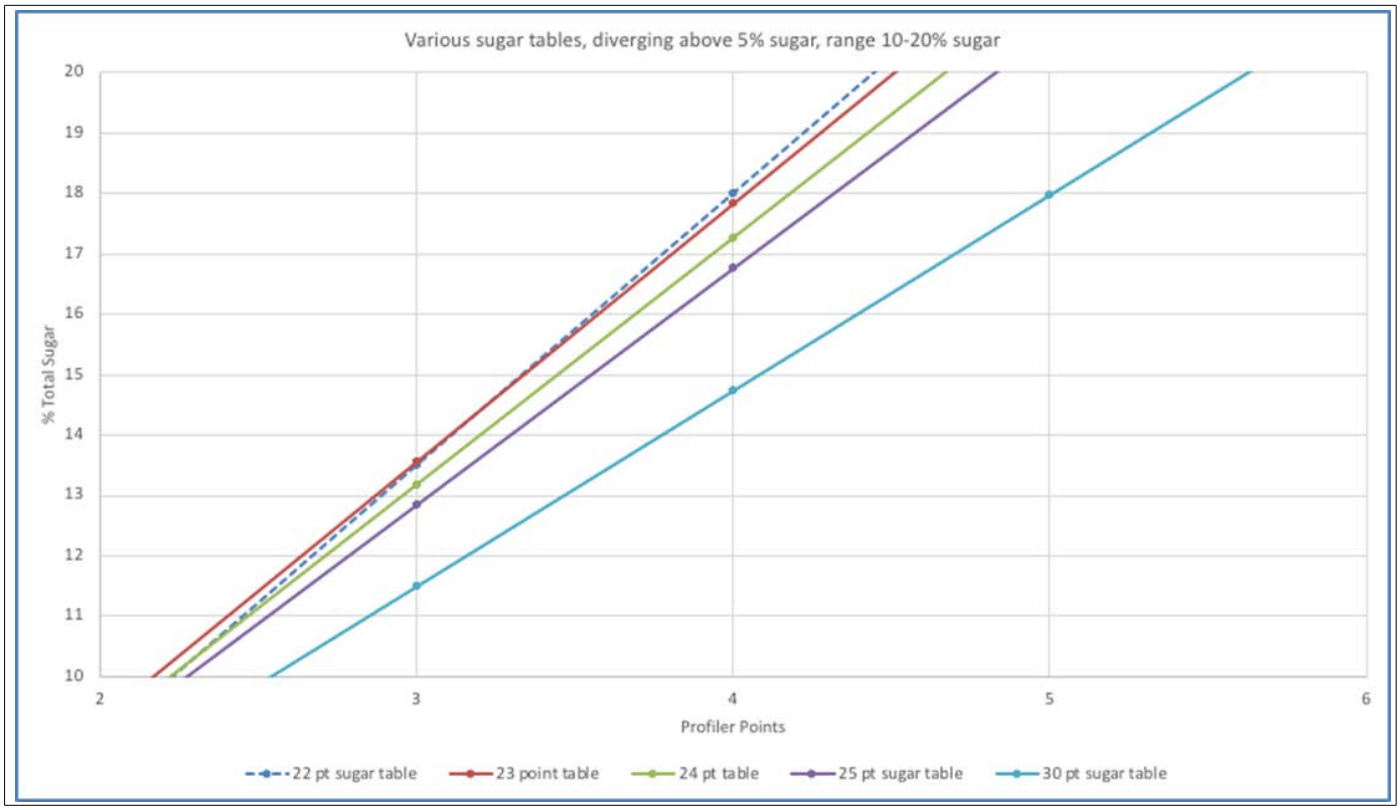

Figure 22: The influence of different sugars tables, current and prospective, on baseline points, for products with 10-20% total sugars content

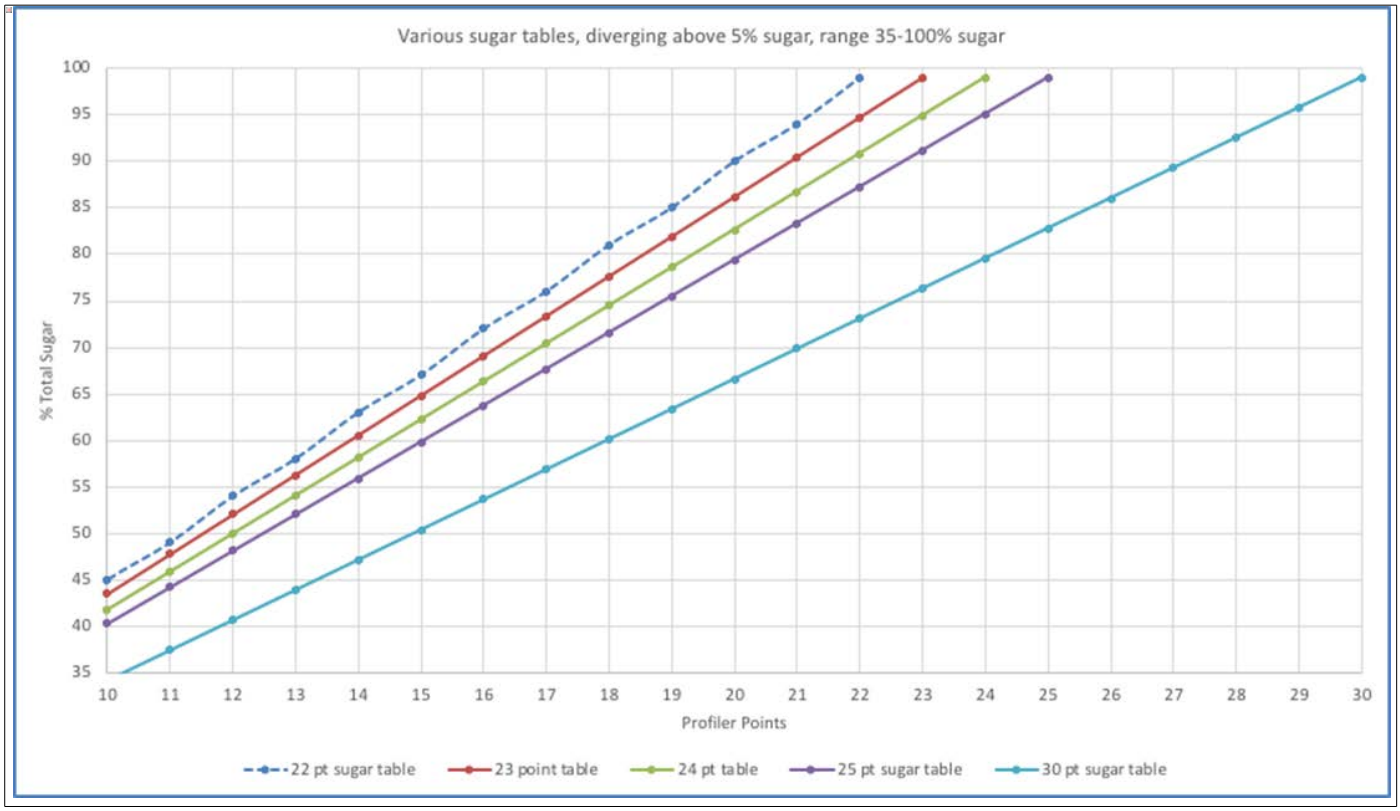

Figure 23: The influence of different sugars tables, current and prospective, on baseline points, for products with 35-100% total sugars content

Table 10 provides comparisons of 25 and 30 point sugars tables, against the current 22 points, and includes an indication of the reduction in sugars content required to maintain existing points under these sugars tables.

Table 10: 'Sugars tables' showing total sugars baseline points against sugars content levels and reduction required to maintain points

Total sugars content (g per 100 g/mL)			Baseline points	Reduction required (g per 100 g/mL) to maintain points	
22 point table	**25 point table**	**30 point table**		**25 point table**	**30 point table**
≤5.00	≤5.00	≤5.00	**0**	0.00	0.00
>5.00	>5.00	>5.00	**1**	0.00	0.00
>9.00	>8.92	>8.24	**2**	0.08	0.76
>13.5	>12.83	>11.48	**3**	0.67	2.02
>18.00	>16.75	>14.72	**4**	1.25	3.28
>22.50	>20.67	>17.97	**5**	1.83	4.53
>27.00	>24.58	>21.21	**6**	2.42	5.79
>31.00	>28.50	>24.45	**7**	2.50	6.55
>36.00	>32.42	>27.69	**8**	3.58	8.31
>40.00	>36.33	>30.93	**9**	3.67	9.07
>45.00	>40.25	>34.17	**10**	4.75	10.83
>49.00	>44.17	>37.41	**11**	4.83	11.59
>54.00	>48.08	>40.66	**12**	5.92	13.34
>58.00	>52.00	>43.90	**13**	6.00	14.10
>63.00	>55.92	>47.14	**14**	7.08	15.86
>67.00	>59.83	>50.38	**15**	7.17	16.62
>71.00	>63.75	>53.62	**16**	8.25	18.38
>76.00	>67.67	>56.86	**17**	8.33	19.14
>81.00	>71.58	>60.10	**18**	9.42	20.90
>85.00	>75.50	>63.34	**19**	9.50	21.66
>90.00	>79.42	>66.59	**20**	10.58	23.41
>94.00	>83.33	>69.83	**21**	10.67	24.17
>99.00	>87.25	>73.07	**22**	11.75	25.93
	>91.17	>76.31	**23**	>11.75	>25.93
	>95.08	>79.55	**24**	>11.76	>25.93
	>99.00	>82.79	**25**	>11.77	>25.93
		>86.03	**26**		>25.93
		>89.28	**27**		>25.93
		>92.52	**28**		>25.93
		>95.76	**29**		>25.93
		>99.00	**30**		>25.93

TAG has modelled the effect of applying a 25 and 30 point table for total sugars content, with and without rescaling, and a rescaled 22 point table. As noted previously, rescaling has the effect of restoring nutrient/components relativities, which reduces the relative power of sugars despite its impact being increased. This may mitigate or even reverse the broad effects of upweighting sugars across product categories. Current and predicted distributions of products using 22, 25 and 30 point tables and with current scaling and rescaling are at Figures 24-29; nutrient sensitivities for a 30 point table without rescaling and a 30 point table with rescaling are at Figures 30-31 (current nutrient sensitivities are at Figure 10 and indicative nutrient sensitivities following rescaling using a 22 point table are at Figure 14).

Results of modelling the 25 and 30 point tables without rescaling, compared to the current 22 point table, indicate that mean Star Points will be reduced for susceptible categories, i.e. those with high sugars content (regardless of source). Fruit, all dairy products and non-dairy beverages are most heavily impacted. Effects are greater through application of the 30 point table compared to the 25 table.

Rescaled 25 and 30 point tables, compared to the current 22 point table, decrease scores for some susceptible categories (fruit, non-dairy beverages) but increases scores for others (dairy, non-FFG foods). A rescaled 22 point table, compared to the current 22 point table, decreases scores for dairy and non-dairy beverages only.

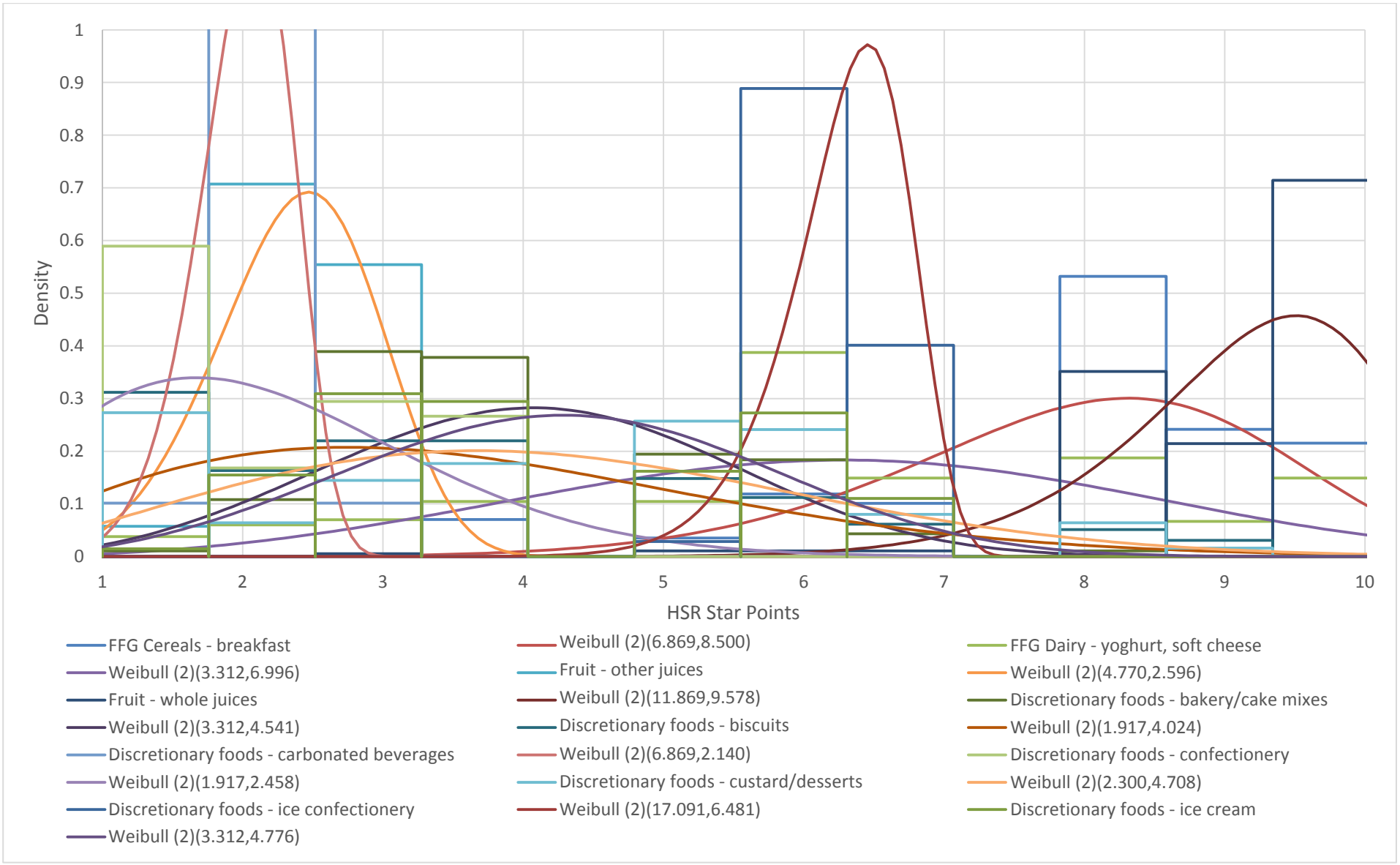

Figure 24: Distribution of products by key AGHE category, 22 point sugars table, current scaling

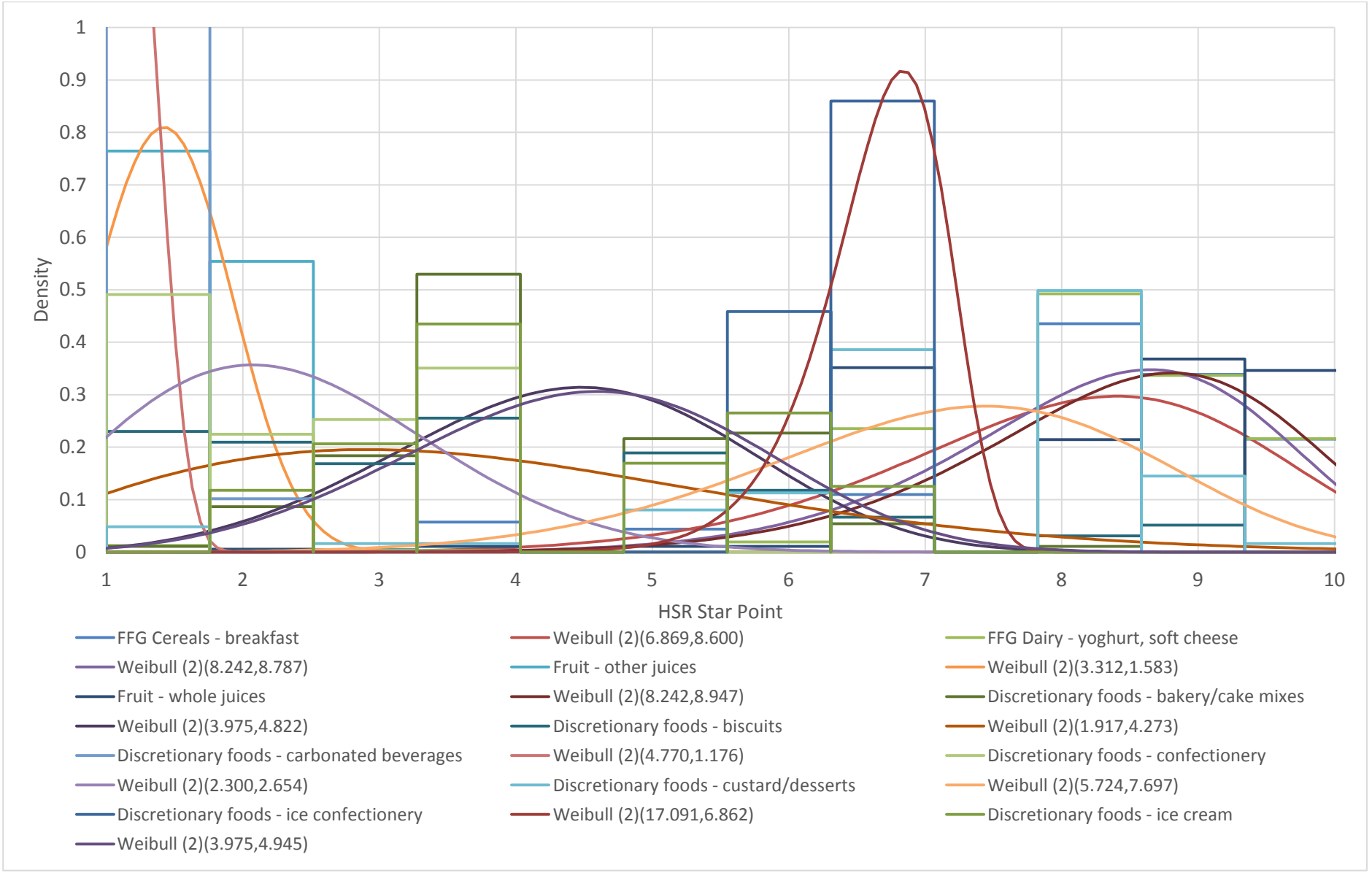

Figure 25: Distribution of products by key AGHE category, 22 point table, rescaled

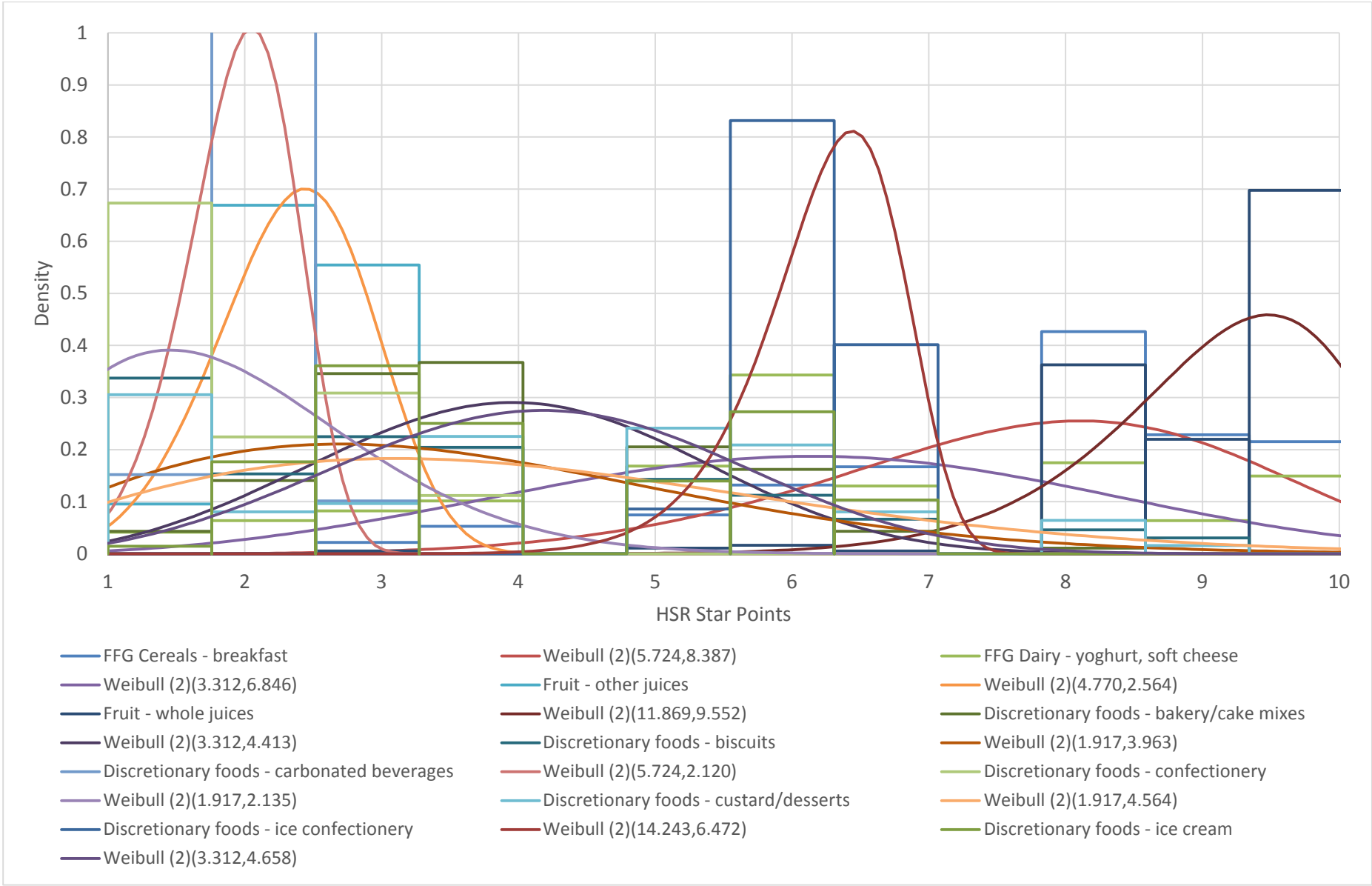

Figure 26: Distribution of products by key AGHE category, 25 point table, current scaling

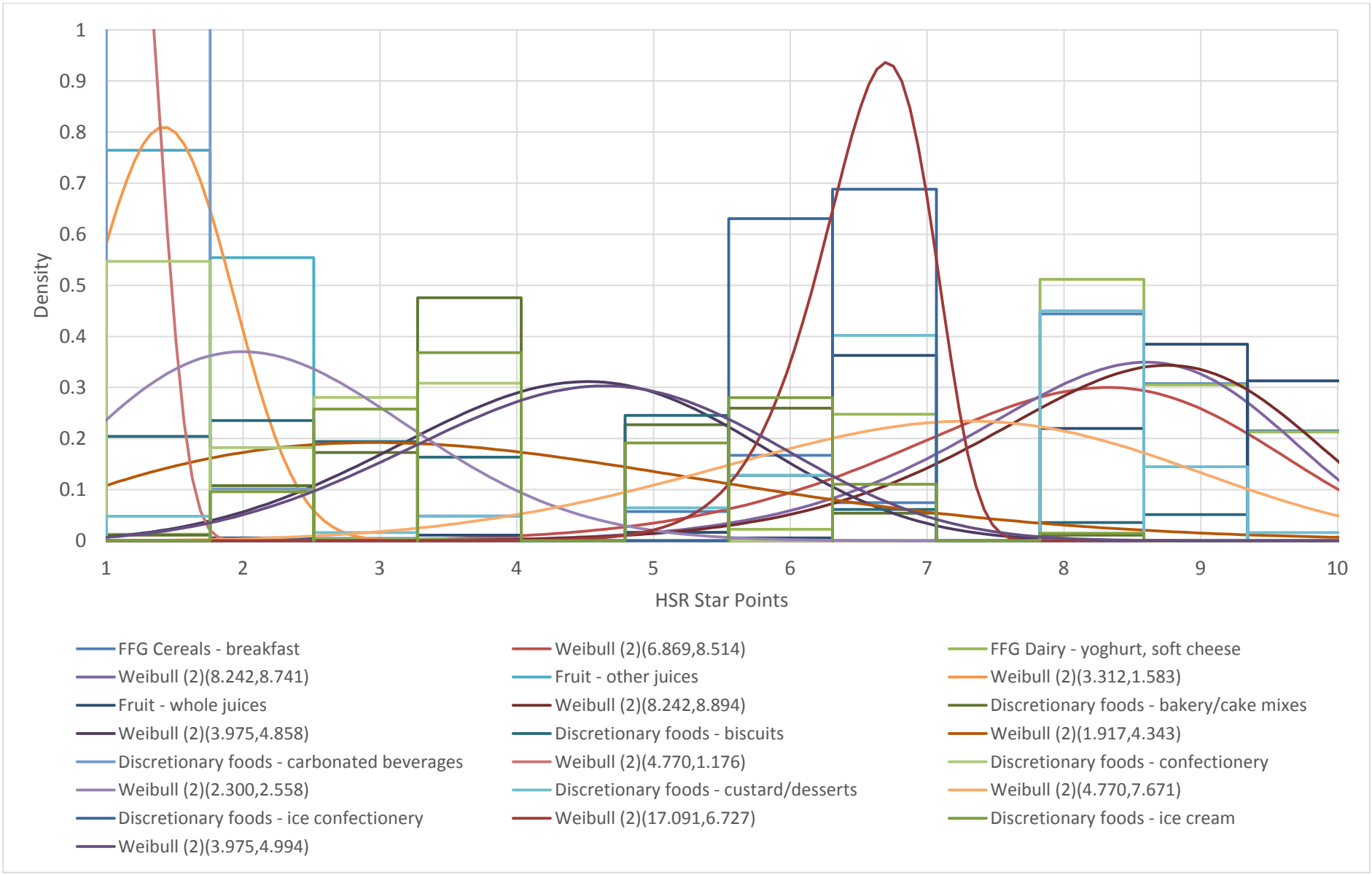

Figure 27: Distribution of products by key AGHE category, 25 point table, rescaled

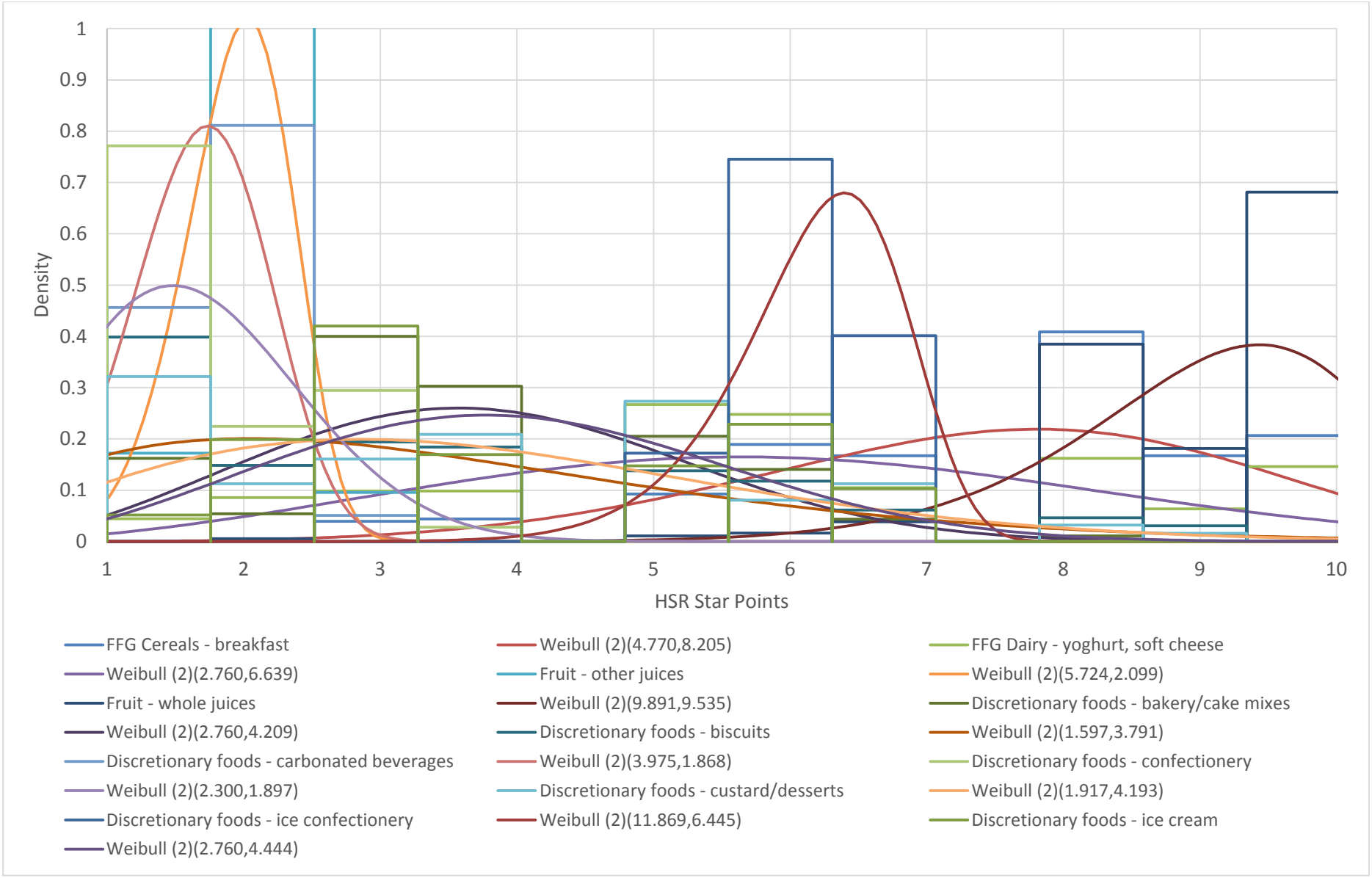

Figure 28: Distribution of products by key AGHE category, 30 point table, current scaling

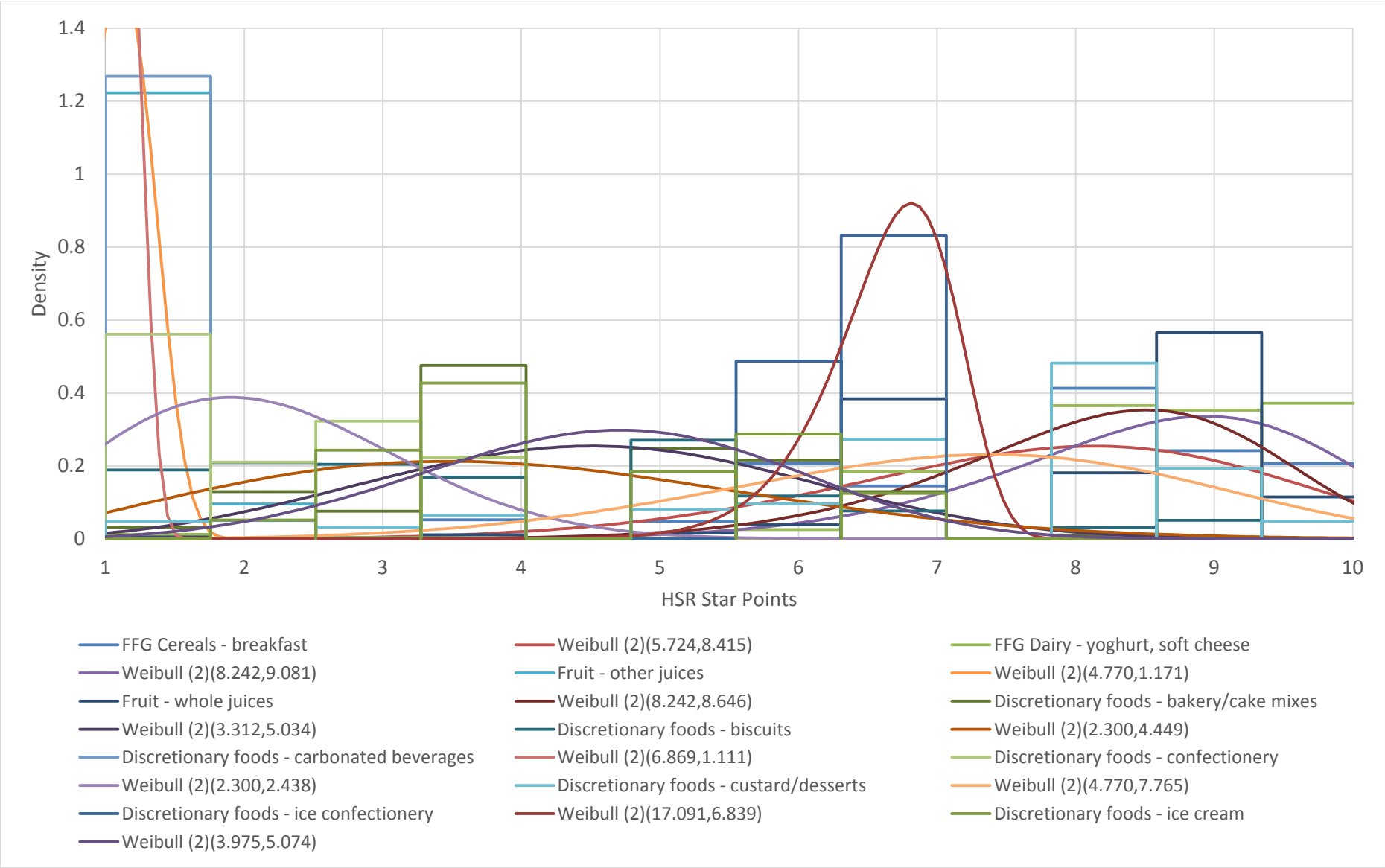

Figure 29: Distribution of products by key AGHE category, 30 point table, current scaling (note the different scale of the y-axis to the previous)

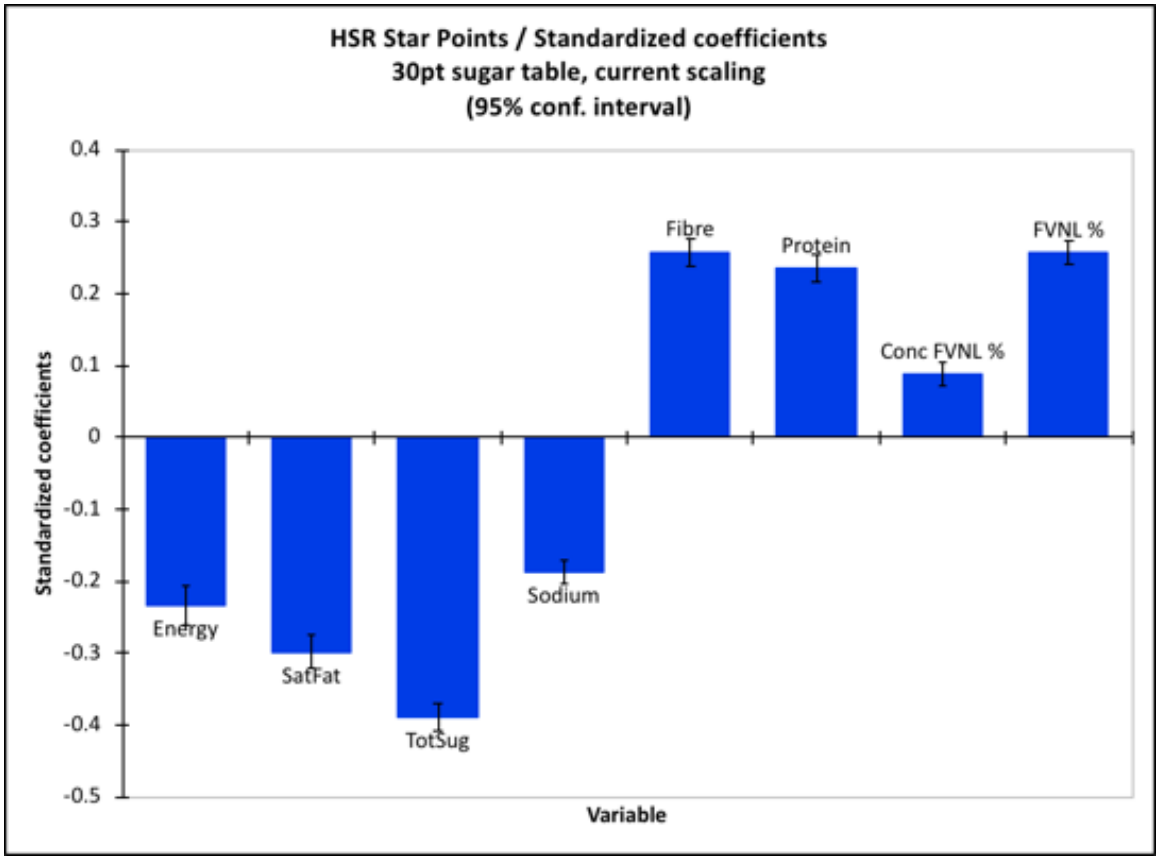

Figure 30: HSR algorithm component sensitivities, entire system, 30 point table using current scaling

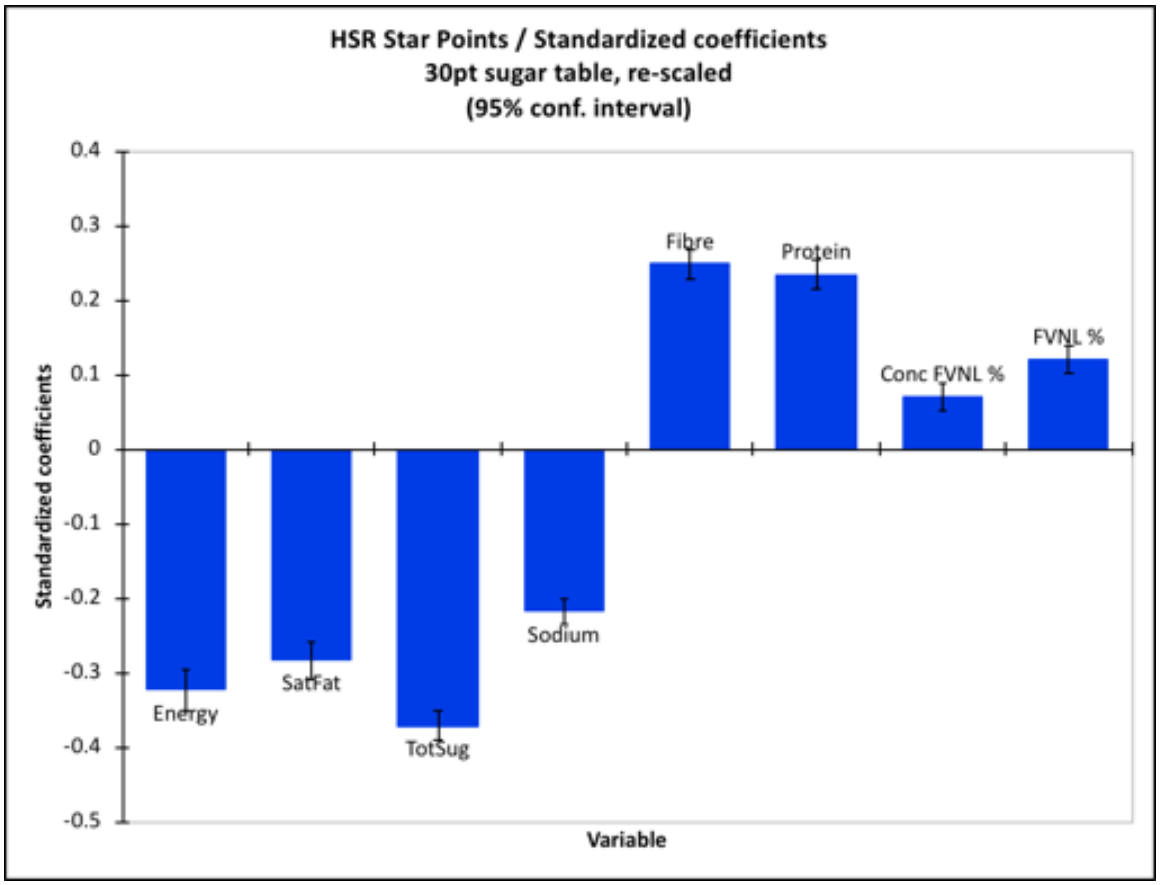

Figure 31: HSR algorithm component sensitivities, entire system, 30 point table rescaled

APPENDIX 6: Option 4 (“hybrid approach”) - full results and analysis

A hybrid option that penalises added sugars content while maintaining existing nutrient relativities, and which may be simpler to implement than option 2, is to selectively apply a stronger sugars table (as per option 3) to products that contain certain levels of added sugars content. This option targets added sugars and encourages reformulation without significant impact on the entire HSR system.

Hypothetically, this would lower scores for products containing added sugar, particularly at high content levels. Products with only intrinsic sugars would remain unaffected yet still subject to the existing nutrient relationships of the HSR algorithm. Products with a combination of added and intrinsic sugars would be captured depending on thresholds applied.

Different content thresholds may be applied as the criterion for the application of the stronger table. These may involve considerations around, for example:

- Including products with any added sugars content (for practical purposes, ≥0.1% added sugars as a proportion of total sugar)
- Allowing some room for sugars added for functionality and/or due to seasonal variability (e.g. products captured at added sugars levels ≥5% added as proportion of total)
- Providing allowance for the maximum adjustment in total sugars content required to maintain existing ratings (e.g. for 25 point table, products with 100% sugars content would need to reduce sugars content by >13.5% to maintain baseline points as per the 22 point table; for 30 point table, products with 100% sugars content would need to reduce content by >35.5% to maintain baseline points as per the 22 point table).

The capture threshold has been set using added sugars as a proportion of total sugars as this links the upweighted penalty for added sugars to total sugar, rather than some other combination of nutrients not necessarily related. As such, the existing component sensitivities are largely maintained, therefore the need to re-scale the system is lessened.

The effect of applying a 25 point table and a 30 point table, at various content qualifiers, to a sample of products from the added sugars subset is at Tables 11-12. Note that the AGHE/AHS 5 digit food classification categories displayed represent a broad range of products for which added sugars data was available. Furthermore, the hypothetical HSRs displayed do not take into consideration other system enhancements proposed by TAG and being considered in the five year review.

In a similar manner to options 2 and 3 above, option 4 allows for reformulation of added sugars content in order to maintain existing ratings (as indicated in Table 10 previously; Table 13 expands on this to demonstrate the percentage reduction of total sugar, via added sugar, required to maintain points as per the current 22 point sugars table). This is determined by the thresholds applied to capture products with added sugars content, with higher thresholds providing more lenient conditions i.e. less sugars would need to be removed in order to maintain a HSR.

Table 14 provides an indication of the proportion of products in the added sugars subset captured at various added sugars content thresholds.

Table 11: Effect of selectively applying 25 point sugars table at various content thresholds, sample of individual products from added sugars subset of TAG database and AUSNUT 2011-13 (as described in Appendix 3)

AGHE category	AHS 5 digit classification name	Total sugars (g/100 g)	Added sugars (g/100 g)	Added as proportion total (%)	Current HSR	HSR, ≥0.1% threshold[a]	HSR, ≥5% threshold[b]	HSR, ≥20% threshold[c]
Cereals - breakfast	Breakfast cereal, mixed grain, fortified, sugars >20 g/100g	26.9	23.8	94	4	2.5	2.5	2.5
	Breakfast cereal, mixed grain, fortified, sugars >20 g/100g	26.7	25.2	88	4	3.5	3.5	3.5
	Breakfast cereal, corn based, fortified	41.3	40.2	97	2	2	2	2
	Porridge style, oat based	17.7	0.153	1	4.5	4.5	4.5	4.5
	Breakfast cereal, mixed grain, with fruit and/or nuts	5.3	0	n/a	4.5	4.5	4.5	4.5
	Breakfast cereal, mixed grain, with fruit and/or nuts	15.1	4.3	28	4.5	4.5	4.5	4.5
Confectionery	Chocolate-based confectionery with other fillings or additions	70.3	59.7	85	0.5	0.5	0.5	0.5
	Lollies and other confectionery, sugars sweetened	54.3	54.3	100	2	1.5	1.5	1.5
Snacks	Sweet biscuits, chocolate-coated, chocolate or cream filled	45.4	37.8	83	1	0.5	0.5	0.5
	Muesli and cereal style bars, no fruit	29	24.8	86	2	2	2	2
	Muesli and cereal style bars, with fruit and/or nuts	22.3	11.9	53	3	3	3	3
	Dried fruit and nut mixes	28.8	0	n/a	4.5	4.5	4.5	4.5
Dairy - yoghurt, soft cheese	Yoghurt, flavoured or added fruit and/or cereal, high fat (>4 g/100g fat)	13.3	9	68	2.5	2	2	2
	Cheese, unripened styles, including cream and cottage cheese, reduced fat	3.1	0	n/a	4	4	4	4

Dairy - cheese	Cheese, processed	6.4	0	n/a	1	1	1	1
	Cheese, hard cheese ripened styles, reduced fat	1	0	n/a	4	4	4	4
Fruit - other juices	Fruit drinks (ready to drink or made from concentrate)	11.2	11.2	100	1	1	1	1
Fruit - whole juices	Fruit juices, commercially prepared	13.6	13.6	100	4	4	4	4
	Fruit juices, commercially prepared	20.9	7.2	34	3.5	3	3	3
Carbonated beverages	Soft drinks, non-cola	9.8	9.8	100	1	1	1	1
	Soft drink, intense sweetened or diet	0	0	0	2	2	2	2
Ice confectionery	Water ice confection, gelato, sorbet	21.6	20.1	93	2.5	2.5	2.5	2.5
	Water ice confection, gelato, sorbet	22	11.9	54	3	3	3	3
Vegetables – unprocessed	Other fruiting vegetables	2.5	0	n/a	4	4	4	4
Dairy - beverages	Milk, coffee/chocolate flavoured and milk-based drinks, full fat	10.2	5.58	55	2.5	2.5	2.5	2.5
	Milk, cow, fluid, regular whole, full fat	5.1	0	n/a	3.5	3.5	3.5	3.5
Fruit - unprocessed	Apples	12.4	0	n/a	4.5	4.5	4.5	4.5
Cordials	Cordial (25% fruit juice, regular, recommended dilution)	8.7	8.4	96	2	2	2	2
	Cordial (40% fruit juice, regular, recommended dilution)	9.1	8.5	93	1.5	1.5	1.5	1.5
Lifestyle	Energy drinks	11.6	11.6	100	1	1	1	1

Note a: threshold at which contingent table applies set at ≥0.1% added sugars as a proportion of total sugar
Note b: threshold set at ≥5% added sugars as a proportion of total sugars
Note c: threshold set at ≥20% added sugars as a proportion of total sugars

Table 12: Effect of selectively applying 30 point sugars table at various content thresholds, sample of individual products from added sugars subset of TAG database and AUSNUT 2011-13 (as described in Appendix 3)

AGHE category	AHS 5 digit classification	Total sugars (g/100 g)	Added sugars (g/100 g)	Added as proportion total (%)	Current HSR	HSR, ≥0.1% threshold[a]	HSR, ≥5% threshold[b]	HSR, ≥40% threshold[c]
Cereals - breakfast	Breakfast cereal, mixed grain, fortified, sugars >20 g/100g	26.9	23.8	94	4	2.5	2.5	2.5
	Breakfast cereal, mixed grain, fortified, sugars >20 g/100g	26.7	25.2	88	4	3	3	3
	Breakfast cereal, corn based, fortified	41.3	40.2	97	2	1.5	1.5	1.5
	Porridge style, oat based	17.7	0.153	1	4.5	4.5	4.5	4.5
	Breakfast cereal, mixed grain, with fruit and/or nuts	5.3	0	n/a	4.5	4.5	4.5	4.5
	Breakfast cereal, mixed grain, with fruit and/or nuts	15.1	4.3	28	4.5	4.5	4.5	4.5
Confectionery	Chocolate-based confectionery with other fillings or additions	70.3	59.7	85	0.5	0.5	0.5	0.5
	Lollies and other confectionery, sugars sweetened	54.3	54.3	100	2	1.5	1.5	1.5
Snacks	Sweet biscuits, chocolate-coated, chocolate or cream filled	45.4	37.8	83	1	0.5	0.5	0.5
	Muesli and cereal style bars, no fruit	29	24.8	86	2	1.5	1.5	1.5
	Muesli and cereal style bars, with fruit and/or nuts	22.3	11.9	53	3	3	3	3
	Dried fruit and nut mixes	28.8	0	n/a	4.5	4.5	4.5	4.5
Dairy - yoghurt, soft cheese	Yoghurt, flavoured or added fruit and/or cereal, high fat (>4 g/100g fat)	13.3	9	68	2.5	2.5	2.5	2.5
	Cheese, unripened styles, including cream and cottage cheese, reduced fat	3.1	0	n/a	4	4	4	4

AGHE category	AHS 5 digit classification	Total sugars (g/100 g)	Added sugars (g/100 g)	Added as proportion total (%)	Current HSR	HSR, ≥0.1% threshold[a]	HSR, ≥5% threshold[b]	HSR, ≥40% threshold[c]
Dairy - cheese	Cheese, processed	6.4	0	n/a	1	1	1	1
	Cheese, hard cheese ripened styles, reduced fat	1	0	n/a	4	4	4	4
Fruit - other juices	Fruit drinks (ready to drink or made from concentrate)	11.2	11.2	100	1	1	1	1
Fruit - whole juices	Fruit juices, commercially prepared	13.6	13.6	100	4	4	4	4
	Fruit juices, commercially prepared	20.9	7.2	34	3.5	3	3	3.5
Carbonated beverages	Soft drinks, non-cola	9.8	9.8	100	2	1.5	1.5	1.5
	Soft drink, intense sweetened or diet	0	0	0	2	2	2	2
Ice confectionery	Water ice confection, gelato, sorbet	21.6	20.1	93	2.5	2.5	2.5	2.5
	Water ice confection, gelato, sorbet	22	11.9	54	3	2.5	2.5	2.5
Vegetables – unprocessed	Other fruiting vegetables	2.5	0	n/a	4	4	4	4
Dairy - beverages	Milk, coffee/chocolate flavoured and milk-based drinks, full fat	10.2	5.58	55	2.5	2.5	2.5	2.5
	Milk, cow, fluid, regular whole, full fat	5.1	0	n/a	3.5	3.5	3.5	3.5
Fruit - unprocessed	Apples	12.4	0	n/a	4.5	4.5	4.5	4.5
Cordials	Cordial (25% fruit juice, regular, recommended dilution)	8.7	8.4	96	2	1.5	1.5	1.5
	Cordial (40% fruit juice, regular, recommended dilution)	9.1	8.5	93	1.5	1.5	1.5	1.5
Lifestyle	Energy drinks	11.6	11.6	100	1	0.5	0.5	0.5

Note a: threshold at which contingent table applies set at ≥0.1% added sugars as a proportion of total sugar
Note b: threshold set at ≥5% added sugars as a proportion of total sugars
Note c: threshold set at ≥20% added sugars as a proportion of total sugar

Table 13: Baseline points against sugars content levels, reduction required to maintain points

Total sugars content (g per 100 g/mL)			Baseline points	Reduction required (g per 100 g/ml) to maintain points		Reduction required (%) to maintain points	
22 point table	25 point table	30 point table		25 point table	30 point table	25 point table	30 point table
≤5.00	≤5.00	≤5.00	**0**	0.00	0.00	0.0	0.0
>5.00	>5.00	>5.00	**1**	0.00	0.00	0.0	0.0
>9.00	>8.92	>8.24	**2**	0.08	0.76	0.9	9.2
>13.5	>12.83	>11.48	**3**	0.67	2.02	5.2	17.6
>18.00	>16.75	>14.72	**4**	1.25	3.28	7.5	22.2
>22.50	>20.67	>17.97	**5**	1.83	4.53	8.9	25.2
>27.00	>24.58	>21.21	**6**	2.42	5.79	9.8	27.3
>31.00	>28.50	>24.45	**7**	2.50	6.55	8.8	26.8
>36.00	>32.42	>27.69	**8**	3.58	8.31	11.1	30.0
>40.00	>36.33	>30.93	**9**	3.67	9.07	10.1	29.3
>45.00	>40.25	>34.17	**10**	4.75	10.83	11.8	31.7
>49.00	>44.17	>37.41	**11**	4.83	11.59	10.9	31.0
>54.00	>48.08	>40.66	**12**	5.92	13.34	12.3	32.8
>58.00	>52.00	>43.90	**13**	6.00	14.10	11.5	32.1
>63.00	>55.92	>47.14	**14**	7.08	15.86	12.7	33.6
>67.00	>59.83	>50.38	**15**	7.17	16.62	12.0	33.0
>71.00	>63.75	>53.62	**16**	8.25	18.38	12.9	34.3
>76.00	>67.67	>56.86	**17**	8.33	19.14	12.3	33.7
>81.00	>71.58	>60.10	**18**	9.42	20.90	13.2	34.8
>85.00	>75.50	>63.34	**19**	9.50	21.66	12.6	34.2
>90.00	>79.42	>66.59	**20**	10.58	23.41	13.3	35.2
>94.00	>83.33	>69.83	**21**	10.67	24.17	12.8	34.6
>99.00	>87.25	>73.07	**22**	11.75	25.93	13.5	35.5
	>91.17	>76.31	**23**	>11.75	>25.93	>13.5	>35.5
	>95.08	>79.55	**24**	>11.76	>25.93	>13.5	>35.5
	>99.00	>82.79	**25**	>11.77	>25.93	>13.5	>35.5
		>86.03	**26**		>25.93		>35.5
		>89.28	**27**		>25.93		>35.5
		>92.52	**28**		>25.93		>35.5
		>95.76	**29**		>25.93		>35.5
		>99.00	**30**		>25.93		>35.5

Table 14: Products in added sugars subset captured at various added sugars content thresholds

AGHE category	Captured by ≥0.1% threshold	Captured by ≥5% threshold	Captured by ≥20% threshold	Captured by ≥40% threshold
FFG Cereals - bread	3%	3%	0%	0%
FFG Cereals - breakfast	83%	76%	72%	66%
FFG Cereals - pasta/flour/grains	77%	77%	77%	77%
FFG Dairy alternative beverages	10%	10%	10%	10%
FFG Dairy - beverages	54%	53%	52%	45%
FFG Dairy - beverages dry mix/milk powder	-	-	-	-
FFG Dairy - cheese	0%	0%	0%	0%
FFG Dairy - yoghurt, soft cheese	51%	49%	49%	49%
Discretionary Dairy foods - cream	4%	4%	2%	2%
Discretionary Dairy foods - cream cheese	10%	10%	3%	3%
Fats, oils & oil based spreads	0%	0%	0%	0%
Flavoured water	-	-	-	-
Fruit - other juices	100%	100%	0%	0%
Fruit - processed	81%	81%	81%	75%
Fruit - unprocessed	0%	0%	0%	0%
Fruit - whole juices	100%	100%	100%	95%
Discretionary foods - bakery/cake mixes	44%	44%	44%	44%
Discretionary foods - beverage dry mixes	100%	100%	100%	100%
Discretionary foods - biscuits	72%	72%	72%	66%
Discretionary foods - carbonated beverages	100%	100%	100%	100%
Discretionary foods - confectionery	100%	100%	100%	100%
Discretionary foods - cordial	100%	100%	100%	100%
Discretionary foods - custard/desserts	100%	95%	95%	95%
Discretionary foods - dips	71%	71%	71%	64%
Discretionary foods - dressings	100%	100%	53%	53%
Discretionary foods - ice confectionery	100%	100%	100%	100%
Discretionary foods - ice cream	100%	100%	100%	100%
Discretionary foods - jelly	100%	100%	100%	100%
Discretionary foods - lifestyle	-	-	-	-
Discretionary foods - meals/meal bases	91%	86%	76%	69%
Discretionary foods - miscellaneous	44%	44%	44%	44%
Discretionary foods - pizza	-	-	-	-
Discretionary foods - sauces/condiments	86%	82%	72%	60%
Discretionary foods - snacks	87%	87%	87%	84%
Discretionary foods - soups/stocks	30%	30%	27%	24%
Discretionary foods - yeast spread	0%	0%	0%	0%
Protein - meats/fish	0%	0%	0%	0%
Protein - nuts	0%	0%	0%	0%
Protein - plant	86%	86%	86%	71%
Vegetables - processed	41%	41%	41%	35%
Vegetables - unprocessed	0%	0%	0%	0%
Water	0%	0%	0%	0%
Total	**57%**	**56%**	**53%**	**49%**