

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

**HSR Technical Advisory Group (TAG)**

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**Snack bars**

## Contents

Summary.....	3
Problem Definition.....	4
Scope.....	4
Data on population consumption .....	7
Alignment with system objectives.....	9
Linkages with other TAG work.....	9
Dietary recommendations and advice.....	9
Other evidence to consider.....	9
Options to address identified issues .....	10
Options summary .....	10
Additional analysis undertaken .....	12
Conclusion .....	13
APPENDIX 1: Products from TAG database with HSR $\geq$ 3 stars .....	14
APPENDIX 2: Current distribution of Star Points by type of snack bar.....	17
APPENDIX 3: Scatter plots showing nutrient/food component drivers of HSR.....	20
APPENDIX 4: Modelling of removal of positive points from algorithm.....	24

## Summary

Snack/muesli bars have been identified in the TAG paper *Alignment of the HSR system with the Australian and New Zealand Dietary Guidelines* as an ostensibly “discretionary” product category (i.e. according to dietary guidelines not essential for a healthy diet) which may receive high HSRs. Although it is recommended that snack bars are to be limited, there are options with a higher nutritional quality within this category and the HSR system is intended to be used to discern these. The HSR algorithm differentiates between individual products on nutrition profiles, regardless of their a priori categorisation, and higher scoring products may be considered to be “more healthy” options.

Many snack bars have a HSR  $\geq 3$ , including a substantial proportion of products containing visible added confectionery and with moderately high saturated fat ( $>4$  g/100 g) and total sugars ( $>15$  g/100 g) content. There are also concerns that products containing added protein and/or fibre, potentially of limited health benefit, are advantaged relative to intrinsically healthier options (e.g. containing nuts, seeds and wholegrains). Products with 3 or more stars are generally seen as healthier options and ordinarily products with a HSR over 3 qualify to be able to make a health claim under the Australia New Zealand Food Standards Code (the Code).

TAG has considered these issues and investigated several options which may resolve any outstanding concerns:

1. No change to category
2. Remove eligibility to score positive points from protein, fibre and/or fruit, vegetable, nut and legume content (FVNL)
3. Include wholegrains in HSR algorithm or investigate definitions of fibre
4. Increase the impact of high sugar and/or use added sugar in the HSR system
5. Applying a cap to identified products.

HSRs can help direct consumers to more healthy options within product categories. The issue is whether snack bars should receive the full range of HSRs to allow for this discrimination, or whether consumption of these products in general should not be encouraged through receiving HSRs above 3.

If it is considered that snack bars should not receive high HSRs because of their classification as discretionary foods, then options have been presented to separate them and remove positive points and/or rescale with a cap on HSRs. This would have implications in other discretionary food categories and it is suggested that any possible changes be considered within the context of other TAG papers on discretionary product categories.

Other options suggested rely on decisions made regarding sugar, fibre, protein and wholegrains. Modelling is provided in each of the relevant TAG papers to support options which may address concerns with snack bars.

## Problem Definition

Snack bars is a large category of foods, primarily comprised of muesli bar type products, that has received some attention from the media and during the five year review of the HSR system. In particular, submissions to the five year review have claimed that some products, containing or akin to confectionery and/or with high levels of sugar, are receiving inappropriately high HSRs. Further concerns are raised that fibre and/or protein is being added to products, potentially without health benefit, inappropriately increasing HSRs and providing advantages to such products.

Dietary advice in both Australia and New Zealand recommends limiting the consumption of snacks bars. As such, snack bars may be considered on the whole as a “discretionary” product category (i.e. according to dietary guidelines not essential for a healthy diet). Although it is recommended that discretionary foods such as snack bars are to be limited, there are options with a higher nutritional quality within this category and the HSR system is intended to be used to discern these.

There is a discrepancy in analyses when assessing a product’s HSR against a binary and absolute classification (such as one that assess foods as being either FFG or discretionary), as the HSR system provides a continuum of ratings ranging from 0.5 to 5 stars, depending on levels and the balance between selected “negative” components (energy, saturated fat, sodium, total sugars) and “positive” components (protein, fibre and FVNL content).

This TAG paper investigates whether the HSR algorithm rates snack bars appropriately and encourages healthy choices when consumers are considering whether to consume snack bars, and which variety. Appropriate discrimination between more and less healthy products in this category may also encourage reformulation to improve star ratings.

## Scope

Products in the snack bar food category consist of various combinations of cereal, fruit, nuts and seeds and have various levels of saturated fat, fibre and sugar. Some products may also contain added protein from sources such as dairy products.

Monitoring of the implementation of the HSR system indicates that in Australia there are 199 snack bars (56% of total products in that category) displaying the HSR system as of 31<sup>st</sup> March 2018.<sup>1</sup> Note that categories for monitoring are different to, though largely approximate, AGHE and AHS categories. Table 1 displays the number of snack bar products and actual HSRs of products carrying the HSR system. Table 2 provides a count and indicative HSRs of products in the TAG database.

Many products within this category receive HSRs  $\geq 3$ . See Appendix 1 for a list of snack bars in the TAG database which receive a HSR of 3 or more.

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<sup>1</sup> National Heart Foundation of Australia, 2018, Report of products displaying the Health Star Rating (HSR) system (HSR products) in FoodTrackTM, over time, up to 31 March 2018 (Quarter Five)

Table 1: Distribution of HSRs displayed by cereal-based, fruit and nut and seed bars

HSR displayed	Cereal-based bars (n=172)		Fruit bars (n=85)		Nut and seed bars (n=95)		Total displaying HSR	
	n	%	n	%	n	%	n	%
kJ icon only	0	0.0	0	0.0	2	5.1	2	1.0
0.5	0	0.0	0	0.0	0	0.0	0	0.0
1.0	0	0.0	2	3.7	0	0.0	2	1.0
1.5	0	0.0	0	0.0	2	5.1	2	1.0
2.0	5	4.7	0	0.0	1	2.6	6	3.0
2.5	10	9.4	2	3.7	1	2.6	13	6.5
3.0	18	17.0	7	13.0	7	17.9	32	16.1
3.5	13	12.3	8	14.8	2	5.1	23	11.6
4.0	50	47.2	26	48.1	10	25.6	86	43.2
4.5	5	4.7	7	13.0	11	28.2	23	11.6
5.0	5	4.7	2	3.7	3	7.7	10	5.0
<b>Total displaying HSR</b>	<b>106</b>		<b>54</b>		<b>39</b>		<b>199</b>	

Table 2: Number and calculated HSR of snack bars, TAG database (n=138)

Australian Health Survey (AHS) 5 digit classification	Products (n)	Range of HSRs	Average HSR
Muesli and cereal style bars, no fruit	21	1 - 4.5	2
Muesli and cereal style bars, with fruit and/or nuts	45	1.5 - 5	4
Muesli and cereal style bars, added coatings or confectionery	54	0.5 - 5	3
Muesli bars, with fruit or fruit paste filling	14	2 - 4	3
Snack bars, other	4	1 - 2	2

Distributions of Star Points for snack bar products in the TAG database is at Figure 1. Predicted distributions, based on the available data, are represented by the curves. Note that the raw outputs of the HSR algorithm are called 'Star Points' and correspond 2:1 to HSRs. Distributions for individual categories are at Appendix 2. Appendix 3 shows the spread of products against HSR algorithm components, highlighting the wide range of values for sugar, sodium and saturated fat for each Star Point.

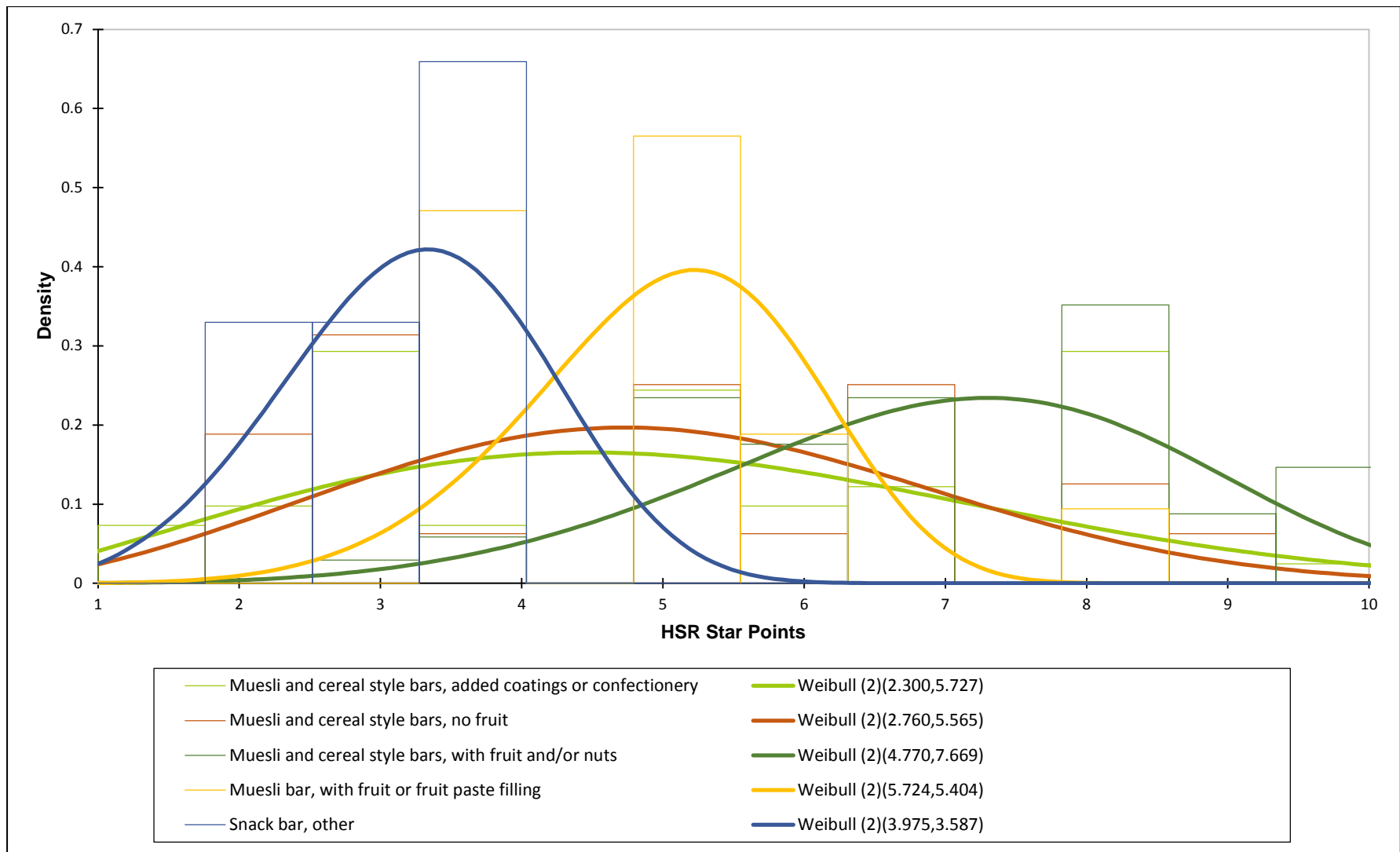


Figure 1: Distributions of HSR Star Points of snack bar products, TAG database (n=138)

Standardised coefficients highlight the influence of the various components of the HSR algorithm on this product category (illustrated as the impact of a one standard deviation shift). Figure 2 demonstrates that saturated fat and total sugars have a large negative effect on Star Points and fibre has a large positive effect.

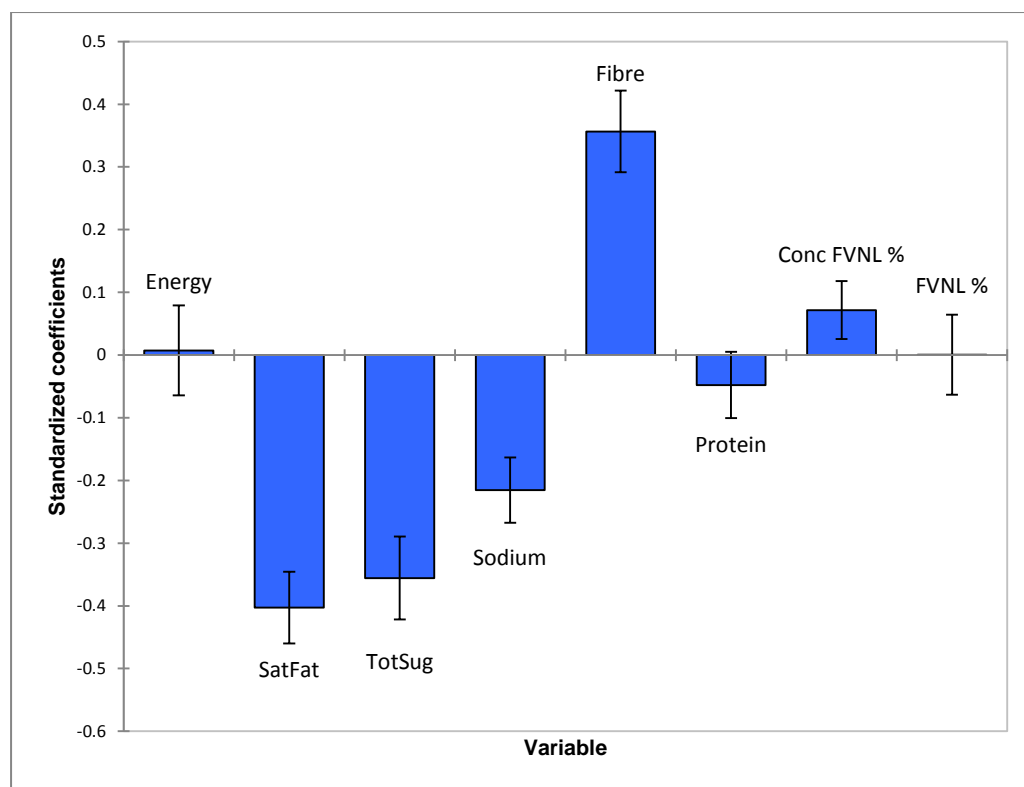


Figure 2: HSR algorithm component sensitivities with 95% confidence intervals, snack bars

## Data on population consumption

### Australia

The 2011-12 Australian Health Survey (AHS) reported snack bar consumption as both 'fruit, nut and seed bars' and 'muesli or cereal style bars'.

In 2011-12,<sup>2</sup> 7.5% of people aged two years and over consumed muesli style snack bars on the day before interview and 1.0% ate fruit/nut/seed style snack bars. This was higher for those aged between 2 and 18 years (16.6 and 2.2% for muesli and fruit/nut style bars respectively) than those 19 years and older (6.2 and 0.4% respectively). Across the population fewer people consumed fruit, nut and seed bars than muesli or cereal style bars. Within the muesli or cereal style bars category, more people ate muesli and cereal bars with fruit and/or nuts than without (5.5% and 0.8% respectively). Overall, snack bars contributed <1% of the energy, protein, fat, carbohydrate and fibre intake of Australians.

<sup>2</sup> ABS, 2014, Australian Health Survey: Nutrition First Results - Foods and Nutrients, 2011-12, available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4364.0.55.007Main+Features12011-12?OpenDocument>

Table 3: Proportion of energy and certain nutrients derived from snack bars, Australia, 2011-12<sup>3</sup>

	Contribution to intake (%)				
	Total 2 years +	Females 19 years +	Females 2-18 years	Males 19 years +	Males 2-18 years
Energy	0.6	0.6	1.1	0.5	1.2
Protein	0.3	0.3	0.4	0.3	0.4
Fat (total)	0.6	0.5	0.9	0.5	0.9
Saturated fat	0.5	0.9	0.5	0.4	1.0
Carbohydrates	0.9	0.7	1.4	0.7	1.7
Total sugars	0.8	0.6	1.2	0.6	1.4
Free sugars	0.9	0.8	1.5	0.7	1.8
Dietary fibre	0.8	0.6	1.5	0.8	1.6

### New Zealand

The 2008-09 NZ Adult Nutrition Survey<sup>4</sup> reported on the consumption of 'snack bars,' which included muesli bars, wholemeal fruit bars, puffed cereal bars, and nut and seed bars. The following data show the proportion of each macronutrient that comes from 'snack bars'.

Table 4: Proportion of energy and certain nutrients derived from snack bars, New Zealanders aged 15 years and older, 2008-09<sup>5</sup>

	Contribution to intake (%)		
	Total 15 years +	Females 15 years +	Males 15 years +
Energy	0.7	0.7	0.5
Protein	0.4	0.4	0.5
Fat (total)	0.9	0.8	0.9
Saturated fat	0.9	0.8	0.9
Carbohydrates	0.8	0.7	0.9
Total sugars	0.9	0.9	1.0
Dietary fibre	0.7	0.8	0.7

The snack bars category was not amongst the top 10 contributing categories for any nutrients in the 2002 National Children's Nutrition Survey for 5-14 year olds and as such was not reported.<sup>6</sup>

<sup>3</sup> ABS, 2014, Australian Health Survey: Nutrition First Results - Foods and Nutrients, 2011-12, available at: <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4364.0.55.007Main+Features12011-12?OpenDocument>

<sup>4</sup> Ministry of Health, 2011, A Focus on Nutrition: Key findings from the 2008/09 NZ Adult Nutrition Survey, available at: <https://www.health.govt.nz/publication/focus-nutrition-key-findings-2008-09-nz-adult-nutrition-survey>

<sup>5</sup> Ministry of Health, 2011, A Focus on Nutrition: Key findings from the 2008/09 NZ Adult Nutrition Survey

<sup>6</sup> Ministry of Health, 2003, NZ Food NZ Children: Key results of the 2002 National Children's Nutrition Survey, <https://www.health.govt.nz/system/files/documents/publications/nzfoodnzchildren.pdf>



## Alignment with system objectives

### Linkages with other TAG work

As indicated previously, work being undertaken by TAG to support the five year review may have significant implications for the treatment of snack bars in the HSR system. In brief:

#### Sugar

- Should total sugars content be more heavily penalised than currently, it is expected that snack bars would see a decrease in HSRs
- Should added sugars be included in the HSR algorithm in place of total sugars, snack bars will be relatively disadvantaged compared to other products with high levels of intrinsic sugars.

#### Protein

- Should protein be removed from the HSR algorithm, some snack bars with added protein will see a decrease in HSRs
- Should the 'tipping point' at which products become ineligible for positive protein points be lowered, some snack bars with higher levels of negative components will become ineligible for protein points.

#### Wholegrain

- Should wholegrain be added to the HSR algorithm, snack bars with wholegrain content will be advantaged within this category.

### Dietary recommendations and advice

The Australian Dietary Guidelines (ADG) recommend that the intake of products containing saturated fat, added salt and added sugars be limited. Snack bars are considered a "discretionary" product, and to be limited, for their added sugar and fat content.<sup>7</sup> The National Healthy School Canteens Guidelines categorises muesli bars as an 'amber' food (i.e. "select carefully").<sup>8</sup>

The New Zealand Eating and Activity Guidelines (NZEAG) also promote a diet rich in naturally occurring nutrients and the consumption of no or very little saturated fat, added sugar or salt. The NZEAG also advise an eating pattern based mostly on 'whole' or less processed foods. In line with this the NZEAG recommends swapping muesli bars and snack bars for healthier choices like fresh fruit or a small handful of unsalted nuts.<sup>9</sup>

### Other evidence to consider

A 2016 study by Talati et al<sup>10</sup> found consumers generally considered products with two or less stars as unhealthy, whereas those with 3 or more stars were seen as healthier options.

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<sup>7</sup> NHMRC & Australian Department of Health, 2017, Discretionary food and drink choices, <https://www.eatforhealth.gov.au/food-essentials/discretionary-food-and-drink-choices>

<sup>8</sup> Australian Department of Health, 2014, 2010 National Healthy School Canteens Guidelines, <http://www.health.gov.au/internet/main/publishing.nsf/content/phd-nutrition-canteens>

<sup>9</sup> Ministry of Health, 2015, Eating and Activity Guidelines for New Zealand Adults, p. 32, available at: <https://www.health.govt.nz/publication/eating-and-activity-guidelines-new-zealand-adults>

<sup>10</sup> Talati Z, Pettigrew S, Kelly B, Ball K, Dixon H, Shilton T, 2016, Consumers' responses to front-of-pack labels that vary by interpretive content. *Appetite*; 101:205–213

## **Options to address identified issues**

### **Options summary**

TAG has considered several options which may address any concerns:

1. No change to category
2. Remove eligibility to score positive points from protein and/or fibre and/or FVNL content
3. Include wholegrains in HSR algorithm or investigate definitions of fibre
4. Increase the impact of high sugar and/or use added sugar in the HSR system
5. Applying a cap to identified products.

A summary is at Table 5.

Table 5: Summary of options to address identified issues – snack bars

Option number	Option	Benefits	Disadvantages	Comments
1	No change to category	<ul style="list-style-type: none"> <li>No change to existing labels</li> </ul>	<ul style="list-style-type: none"> <li>Some of these products have been used in negative media</li> <li>Does not address issues raised in submissions</li> </ul>	
2	Remove eligibility to score positive points from protein and/or fibre and/or FVNL content	<ul style="list-style-type: none"> <li>Improves discernment of products with whole foods (nuts, seeds, fruit, wholegrains)</li> <li>Removes incentives to add fibre and/or protein to offset negative components</li> <li>May better reflect dietary guidance</li> </ul>	<ul style="list-style-type: none"> <li>Removal of differentiation between more and less healthy snack bars</li> <li>May be difficult to define</li> </ul>	<ul style="list-style-type: none"> <li>Moves further away from alignment with NPSC algorithm</li> </ul>
3	Include wholegrains in HSR algorithm or investigate definitions of fibre	<ul style="list-style-type: none"> <li>Discriminates between products with better 'whole food' profile</li> </ul>	<ul style="list-style-type: none"> <li>May be difficult to define and/or quantify</li> </ul>	<ul style="list-style-type: none"> <li>Moves further away from alignment with NPSC algorithm</li> <li>This is being addressed in TAG papers on wholegrain and fibre</li> </ul>
4	Increase the impact of high sugar and/or use added sugar in the HSR system	<ul style="list-style-type: none"> <li>Address concerns about high sugar products receiving high HSRs</li> <li>May better reflect dietary guidance</li> </ul>	<ul style="list-style-type: none"> <li>Added sugar may be difficult to define and/or quantify</li> </ul>	<ul style="list-style-type: none"> <li>This is being addressed in TAG paper on sugar</li> </ul>
5	Applying a cap to identified products	<ul style="list-style-type: none"> <li>May better reflect dietary guidance</li> </ul>	<ul style="list-style-type: none"> <li>Would have significant effects across HSR system and effect many products and food categories</li> </ul>	<ul style="list-style-type: none"> <li>Requires separation of HSR category 2 into separate categories for FFG and discretionary products</li> </ul>

\* Presently although there are ten scaling categories in the HSR, only six have separate algorithms because Category 2 has five scaling categories but all use the same algorithm. There is therefore an opportunity to separate Category 2 into the four FFG (fruit, vegetable, protein and cereal) plus one discretionary food categories already identified in the HSR Calculator. This would be a wider strategy to address anomalies, particularly where discretionary foods receive higher HSR.

## Additional analysis undertaken

Option 2, removing positive points, was modelled as options 3 and 4 are being addressed in other TAG papers. Option 5 has not been modelled as it would affect the entire Category 2 (all foods other than dairy, beverages, or oils and spreads), though it is relatively simple to conceptualise (i.e. a product with content beyond a specified threshold would be restricted to a pre-determined HSR). This option could be looked at as part of total HSR system enhancements work to occur later.

### Method

The initial database used in the development of the HSR system was expanded with data provided by the food industry in 2017. This revised TAG database includes product nutrient data for 5,885 food products across 42 food categories based on the 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 FVNL and fibre content data for all foods where applicable. The data are not independently verified.

### Results

Appendix 4 shows the effect on HSRs in this category after removal of protein, fibre or FVNL or a combination of these positive components. In brief:

- Removal of FVNL points has little effect on HSRs
- Removal of fibre points moves all products to HSR  $\leq 3$
- Removal of protein points results in fewer products with HSR  $\geq 3.5$  and very few with HSR  $\geq 4$ .
- Removal of both protein and fibre points results in no products with HSR  $> 2.5$ .

The table below shows the HSR range for each snack bar sub-category after the removal of positive points for some food components.

*Table 6: Range of HSRs for snack bars after removal of positive components.*

Australian Health Survey: Users' Guide, 2011-13 — Discretionary Food List	Status quo	No positive points	No fibre/protein points	No protein points	No fibre points
Muesli and cereal style bars, added coatings or confectionery	0.5-5	0.5-2.5	0.5-2.5	0.5-4	0.5-3
Muesli and cereal style bars, no fruit	1-4.5	0.5-2	0.5-2	0.5-3.5	0.5-3
Muesli and cereal style bars, with fruit and/or nuts	1.5-5	0.2-2.5	0.2-2.5	1.5-4.5	0.5-3.5
Muesli bar, with fruit or fruit paste filling	2-4	1-2.5	1-2.5	1.5-3	1-3
Snack bar, other	1-2	0.5-1.5	0.5-1.5	0.5-1.5	0.5-1.5

The scatter plots in Appendix 4 show the products plotted according to the % saturated fat and % sugar in the product and how the HSR is lowered by removal of fibre or removal of fibre and protein in each case.

## **Discussion**

Although classified as discretionary choices in Australia, some snack bars high in nuts and fruits and wholegrain cereals would be considered healthier choices than other products within this category. The HSR can be used to differentiate those better choices. There is a wide variation of nutrients/food components contributing to the HSR in this food category and it is important to determine that the HSR can differentiate appropriately. For example, snack bars with nuts and seeds less than 40% (which thus cannot qualify for FVNL points) and/or wholegrains may be disadvantaged compared to those with fibre that is not intrinsic. This could be explored further when looking at the definition of fibre for the algorithm. Changes to the algorithm for this food category may result in encouraging reformulation to increase star ratings, for example by reducing saturated fat, which has the highest negative impact on ratings in this category.

## **Conclusion**

Snack bars have been identified as a food category with outliers, that is, products with a HSR not aligned to the AHS Discretionary Food List. However while all snack bars are classified as discretionary, some would be considered better choices and the HSR can help direct consumers to these. The issue to consider is whether it is important for muesli bars to receive the full range of HSRs in order to direct to healthier choices, or it is important to discourage excess consumption. Some of the options to address seemingly high HSRs in the category also reduce differentiation of healthier options.

If it is considered that muesli bars shouldn't receive high HSRs because of their classification as discretionary foods, then options have been presented to separate them from Category 2 and either remove positive points or rescale with a HSR cap. Removing certain positive points (all, or both protein and fibre) effectively reduces the HSRs of these products to below 2.5, which would address the implied healthiness of HSRs over 3.

Other options suggested rely on modelling in other papers for sugar, fibre and wholegrains.

## APPENDIX 1: Products from TAG database with HSR ≥ 3 stars

5-digit classification name	Energy kJ/100 g	SatFat g/100 g	TotSug g/100 g	Sodium mg/100g	Fibre g/100 g	Protein g/100 g	Conc FVNL %	FVNL %	HSR
Muesli and cereal style bars, added coatings or confectionery	1690	4.8	24.2	100	9.0	6.3	0.0	0.0	★★★
Muesli and cereal style bars, added coatings or confectionery	2140	5.8	13.5	82	8.0	16.2	0.0	65.0	★★★
Muesli and cereal style bars, added coatings or confectionery	2100	6.9	11.4	160	8.6	16.7	0	0	★★★
Muesli and cereal style bars, added coatings or confectionery	1720	4.2	21.2	11	7.3	7.1	0	0.9	★★★
Muesli and cereal style bars, added coatings or confectionery	1570	1.7	22.6	100	7.3	6.1	0.0	0.0	★★★★◇
Muesli and cereal style bars, added coatings or confectionery	1620	3.2	16.8	68	8	6.2	0	0	★★★★◇
Muesli and cereal style bars, added coatings or confectionery	1700	3.7	19.7	66	9.4	7	0	0	★★★★◇
Muesli and cereal style bars, added coatings or confectionery	1630	3.5	17.4	34	8.1	6.3	3	0	★★★★◇
Muesli and cereal style bars, added coatings or confectionery	1640	4.3	18.1	62	9	7.4	0	2	★★★★◇
Muesli and cereal style bars, added coatings or confectionery	1630	4.3	18.5	20	10.5	7.0	1.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1550	2.6	15.3	160	12.3	8.9	0.0	5.6	★★★★
Muesli and cereal style bars, added coatings or confectionery	1630	4.2	17.2	40	10.9	6.9	0.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1590	1.5	21.8	110	10.0	5.9	0.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1650	4.5	17.7	15	10.9	6.6	0.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1630	4.3	18.5	20	10.5	7.0	0.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1650	4.7	16.3	20	11.0	7.0	0.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1630	4.3	18.0	22	10.5	7.1	2.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1640	4.3	18.4	20	10.5	7.0	1.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1650	4.5	19.0	15	10.5	6.6	1.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1620	4.1	17.0	30	11.1	7.3	0.0	0.0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1660	4.4	12.4	30	9.3	6.8	0	0	★★★★
Muesli and cereal style bars, added coatings or confectionery	1530	2	16.8	43	26.1	8.5	4.75	7.7	★★★★★
Muesli and cereal style bars, no fruit	1845	3.3	17.0	256	8.6	8.5	0.0	0.0	★★★

5-digit classification name	Energy kJ/100 g	SatFat g/100 g	TotSug g/100 g	Sodium mg/100g	Fibre g/100 g	Protein g/100 g	Conc FVNL %	FVNL %	HSR
Muesli and cereal style bars, no fruit	1445	3.7	18.0	128	5.8	5.6	21.0	0.0	★★★★◇
Muesli and cereal style bars, no fruit	1630	2.2	22.7	48	5.8	8.4	0.0	0.0	★★★★◇
Muesli and cereal style bars, no fruit	1870	2.5	17.7	250	7.9	8.3	0.0	3.9	★★★★◇
Muesli and cereal style bars, no fruit	1530	1.5	19.0	225	8.2	6.3	0.0	0.0	★★★★◇
Muesli and cereal style bars, no fruit	1630	4.0	18.4	24	10.6	6.9	1.5	0.0	★★★★
Muesli and cereal style bars, no fruit	1590	3.2	13.8	21	12.1	7.1	1.0	0.0	★★★★
Muesli and cereal style bars, no fruit	2080	3.0	12.1	260	10.0	15.5	0.0	70.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1870	3.1	23.3	180	6.5	13.6	20.0	27.8	★★★
Muesli and cereal style bars, with fruit and/or nuts	1940	3.1	34.9	40	5.0	12.5	28.0	44.4	★★★
Muesli and cereal style bars, with fruit and/or nuts	2230	4.3	20.2	15	7.1	20.0	0.0	71.3	★★★
Muesli and cereal style bars, with fruit and/or nuts	1730	2.4	23.5	10	6.1	5.8	0.0	0.0	★★★
Muesli and cereal style bars, with fruit and/or nuts	2130	3.2	20.5	120	8.7	20.4	2.5	2.7	★★★
Muesli and cereal style bars, with fruit and/or nuts	2230	4.3	21	15	7.1	20	0	71.3	★★★
Muesli and cereal style bars, with fruit and/or nuts	1735	1.6	20.5	235	8.2	7.6	2.0	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1470	1.2	28.0	110	10.4	4.7	11.5	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1735	1.6	20.5	235	8.2	7.6	0.0	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1562	1.5	24.9	140	5.8	6.5	0.0	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1740	2.8	15.7	30	5.5	9.5	0.0	26.9	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1630	2.1	21.7	45	6.7	7.9	10.2	4.4	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1520	1.5	22.2	230	8.2	6.7	4.0	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1330	0.5	33.1	185	8.9	6.9	0.0	10.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1510	1.7	14.9	180	12.2	7.9	0.0	6.0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1490	1.6	17.8	180	13.0	7.5	8.0	8.6	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1450	1.4	20.7	170	11.6	6.6	5.0	0.0	★★★★

5-digit classification name	Energy kJ/100 g	SatFat g/100 g	TotSug g/100 g	Sodium mg/100g	Fibre g/100 g	Protein g/100 g	Conc FVNL %	FVNL %	HSR
Muesli and cereal style bars, with fruit and/or nuts	1500	1.3	21.5	90	8.9	5.5	5.6	0.0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1510	1.3	23.2	15	10.9	6.8	0.0	0.0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1860	1.6	17.2	190	6.9	9.7	4.0	2.5	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1780	1.8	14.0	33	6.5	11.1	0.0	21.0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1690	1.3	22.3	42	7.4	9.1	9.0	12.0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1510	1.9	15.7	30	9.4	5.7	0	0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1510	2.1	14.3	30	9.7	6	0	0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1700	2.4	17.2	195	11.6	13.8	0	0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1960	2.8	20.3	130	9.1	15.2	0	0	★★★★
Muesli and cereal style bars, with fruit and/or nuts	1570	2.0	17.1	12	11.4	6.8	4.0	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1570	2.0	17.1	12	11.4	6.8	4.0	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1550	1.9	15.6	15	11.5	7.1	9.0	0.0	★★★★◇
Muesli and cereal style bars, with fruit and/or nuts	1330	0.9	16.2	90	25.4	6.5	8.0	0.0	★★★★★
Muesli and cereal style bars, with fruit and/or nuts	1460	1.1	13.1	125	23.3	7.9	6.0	0.0	★★★★★
Muesli and cereal style bars, with fruit and/or nuts	1560	1.4	12.7	31	25.4	9.8	4.2	14.4	★★★★★
Muesli and cereal style bars, with fruit and/or nuts	1460	1.2	16.7	36	24.5	8.3	13.97	7.3	★★★★★
Muesli and cereal style bars, with fruit and/or nuts	1560	1.6	7.5	33	25.6	10.2	0	19	★★★★★
Muesli bar, with fruit or fruit paste filling	1820	1.2	22.3	230	5.0	4.5	12.0	0.0	★★★
Muesli bar, with fruit or fruit paste filling	1830	1.3	21.1	230	4.7	4.7	12.0	0.0	★★★
Muesli bar, with fruit or fruit paste filling	1820	1.6	16.9	200	7.6	9.7	4.0	3.0	★★★★

Note: SatFat = saturated fat; TotSug = total sugars, Conc FVNL = concentrated FVNL



## APPENDIX 2: Current distribution of Star Points by type of snack bar

Note: Figures show the distribution of Star Points using TAG data shown using histograms, and the predicted product distribution using Weibull curves.

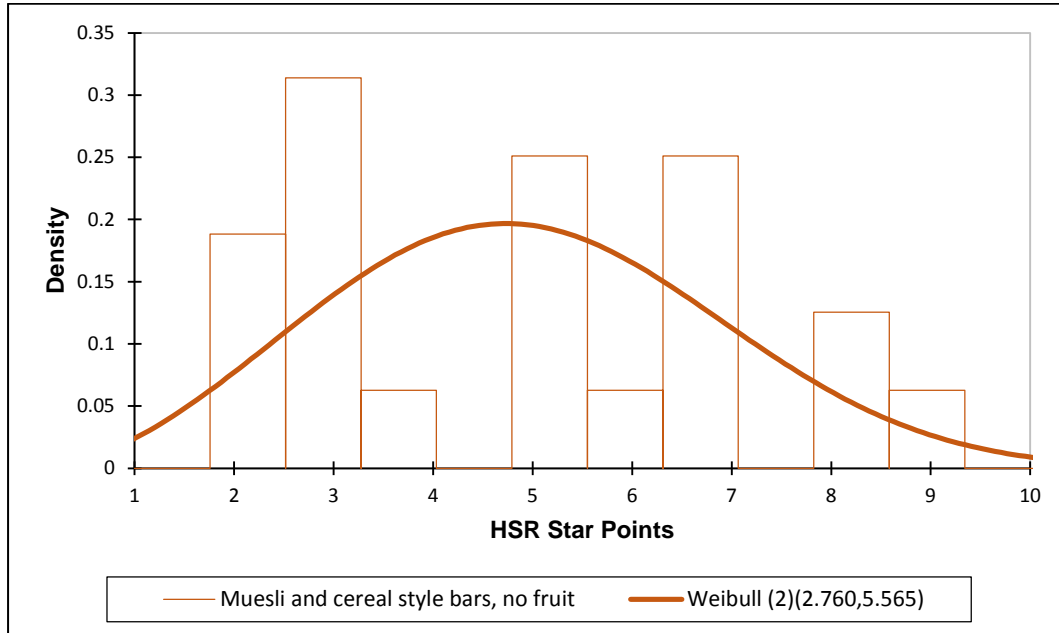


Figure 3: Distribution of Star Points for muesli and cereal style bars, no fruit, TAG database

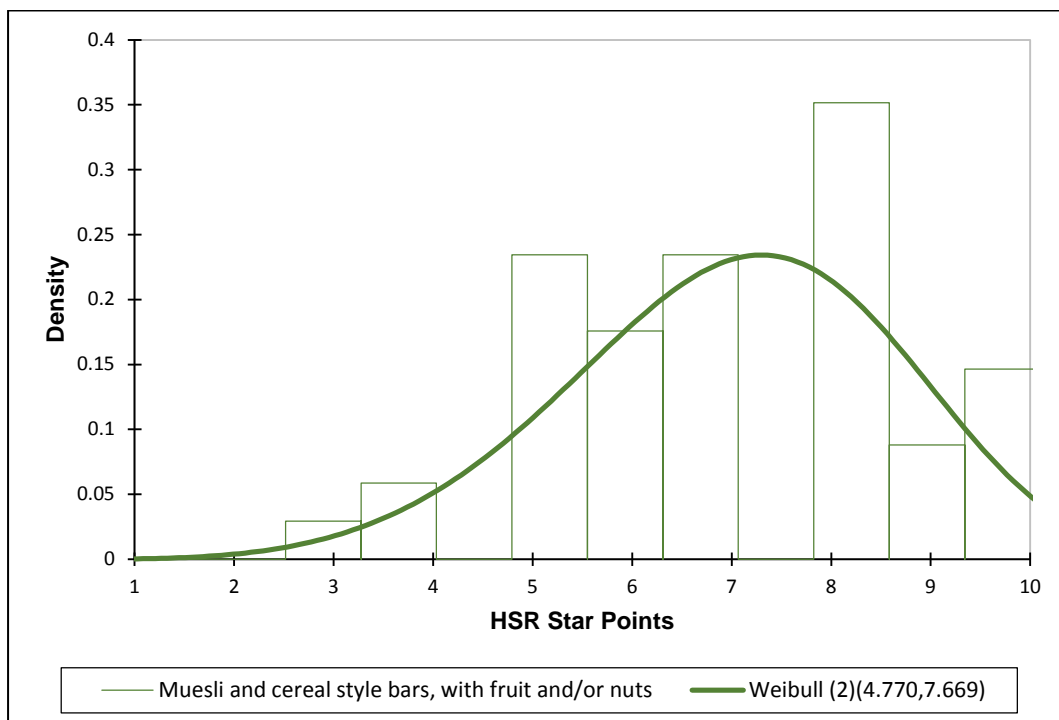


Figure 4: Distribution of Star Points for muesli and cereal style bars, with fruit and/or nuts, TAG database

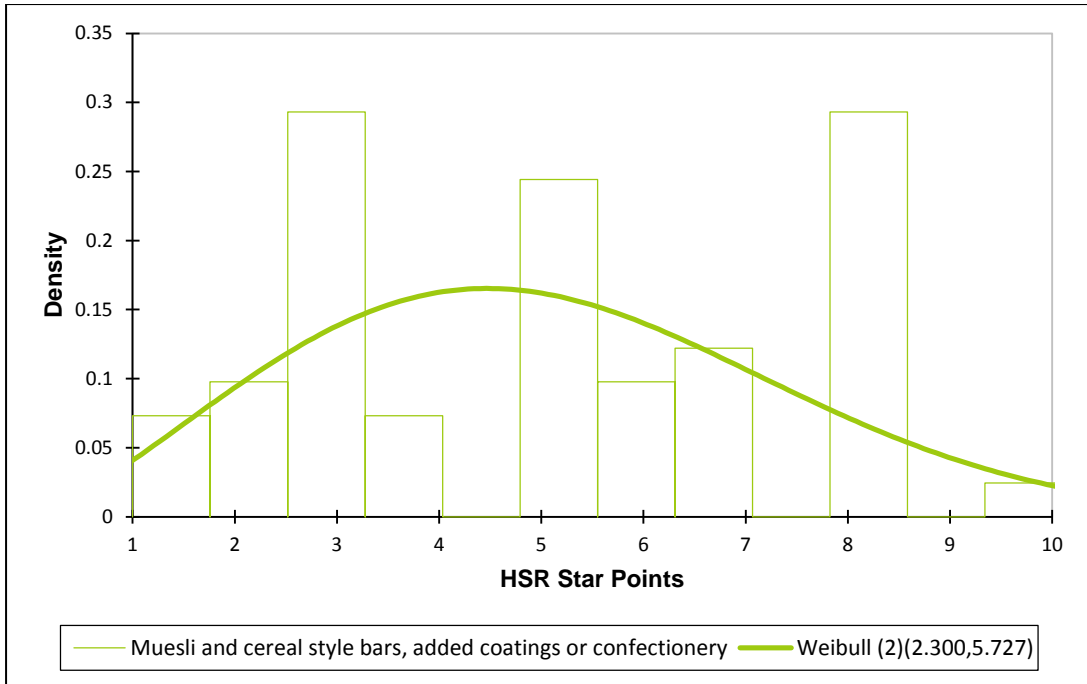


Figure 5: Distribution of Star Points for muesli and cereal style bars, added coatings or confectionery, TAG database

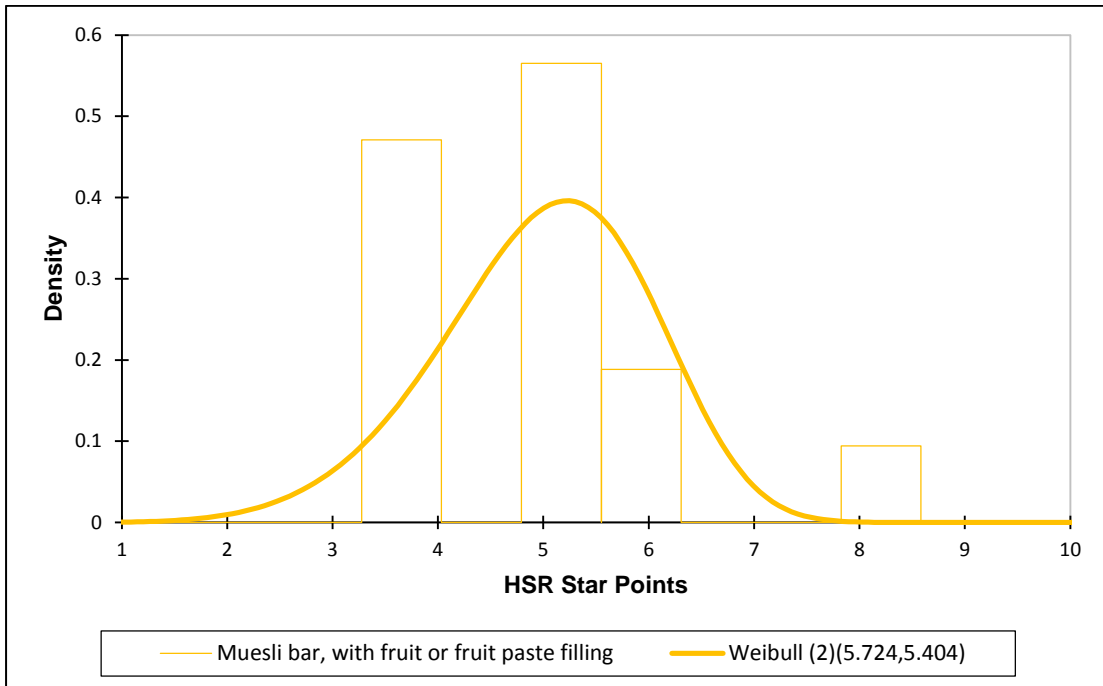


Figure 6: Distribution of Star Points for muesli and cereal style bars, with fruit or fruit paste filling, TAG database

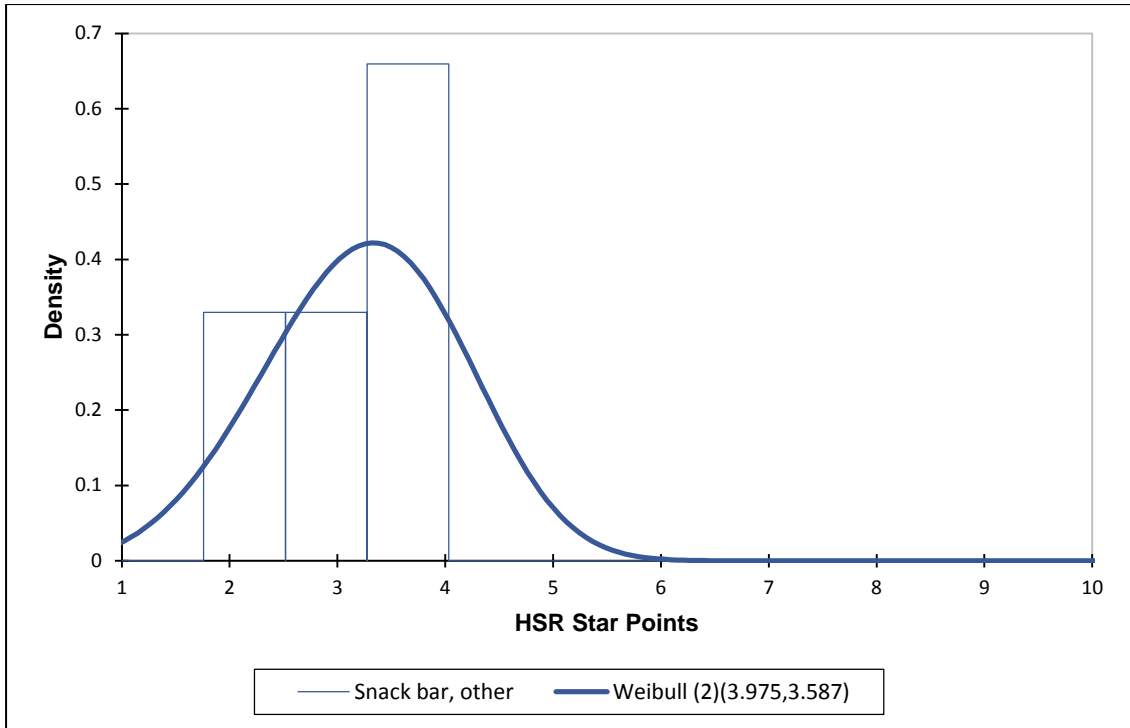


Figure 7: Distribution of Star Points for muesli and cereal style bars, added coatings or confectionery, TAG database

### APPENDIX 3: Scatter plots showing nutrient/food component drivers of HSR

Note: Lines on figures in this Appendix show the trend and ellipses show the 95% confidence interval.

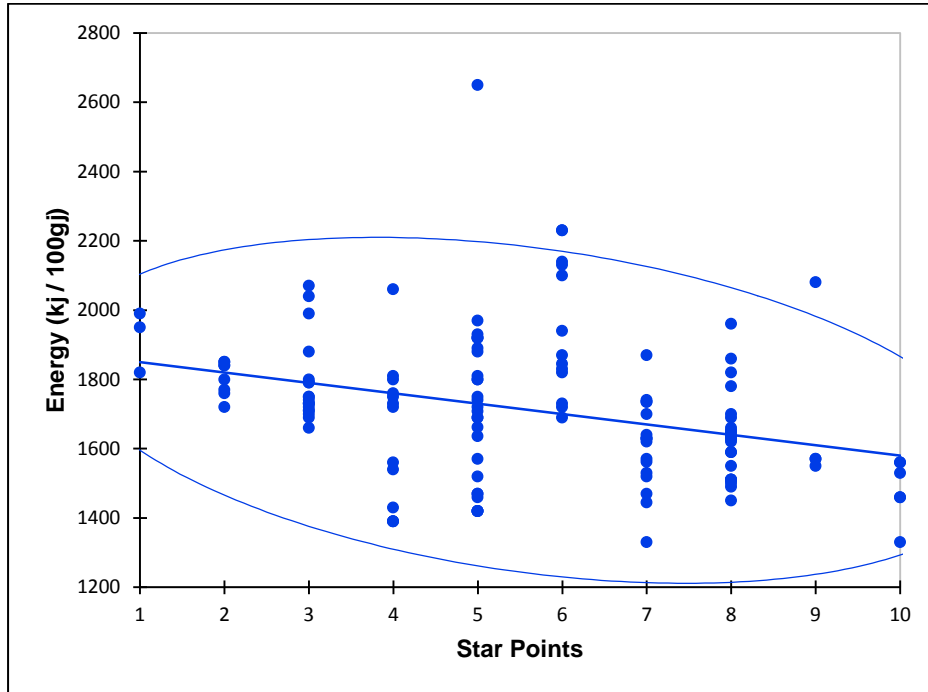


Figure 8: Distribution of Star Points for snack bars by energy content, TAG database

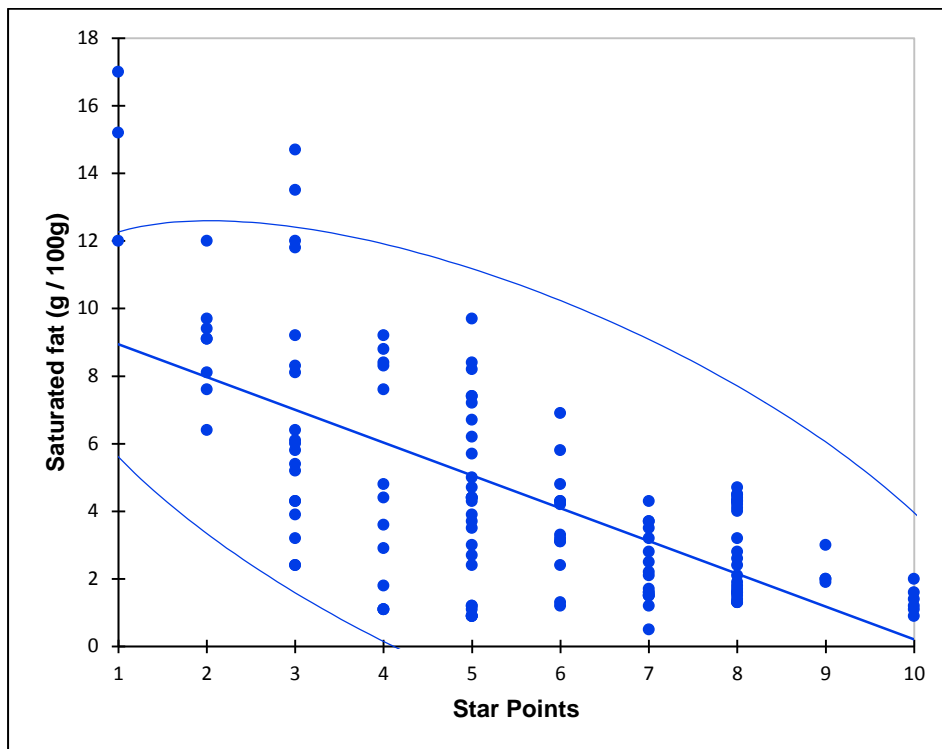


Figure 9: Distribution of Star Points for snack bars by saturated fat content, TAG database

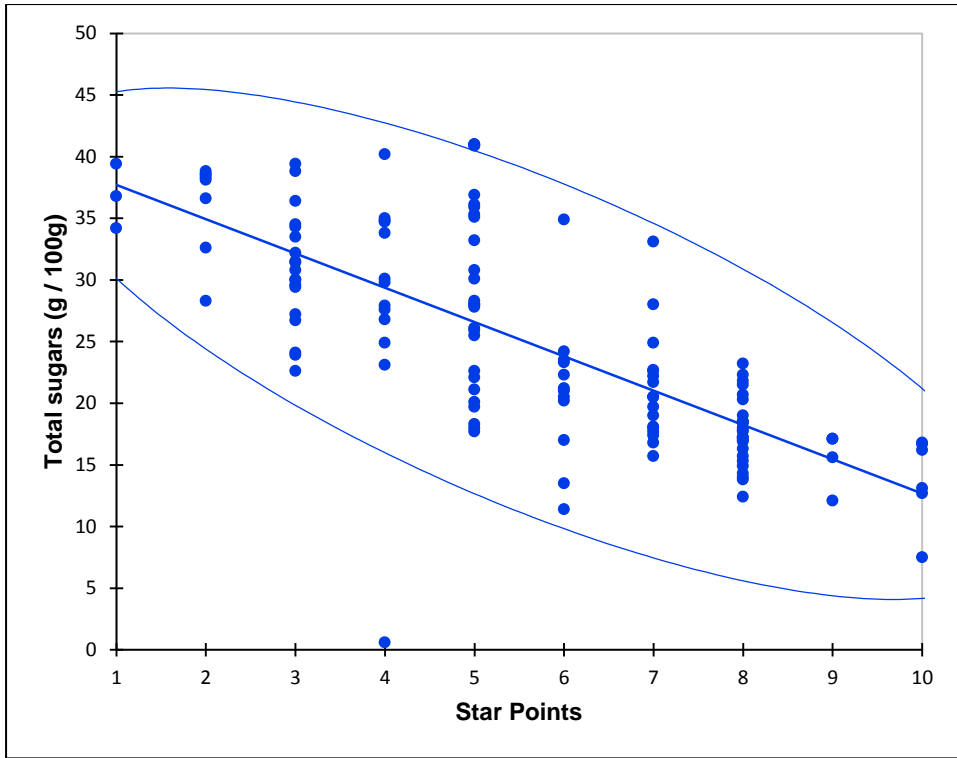


Figure 10: Distribution of Star Points for snack bars by total sugars content, TAG database

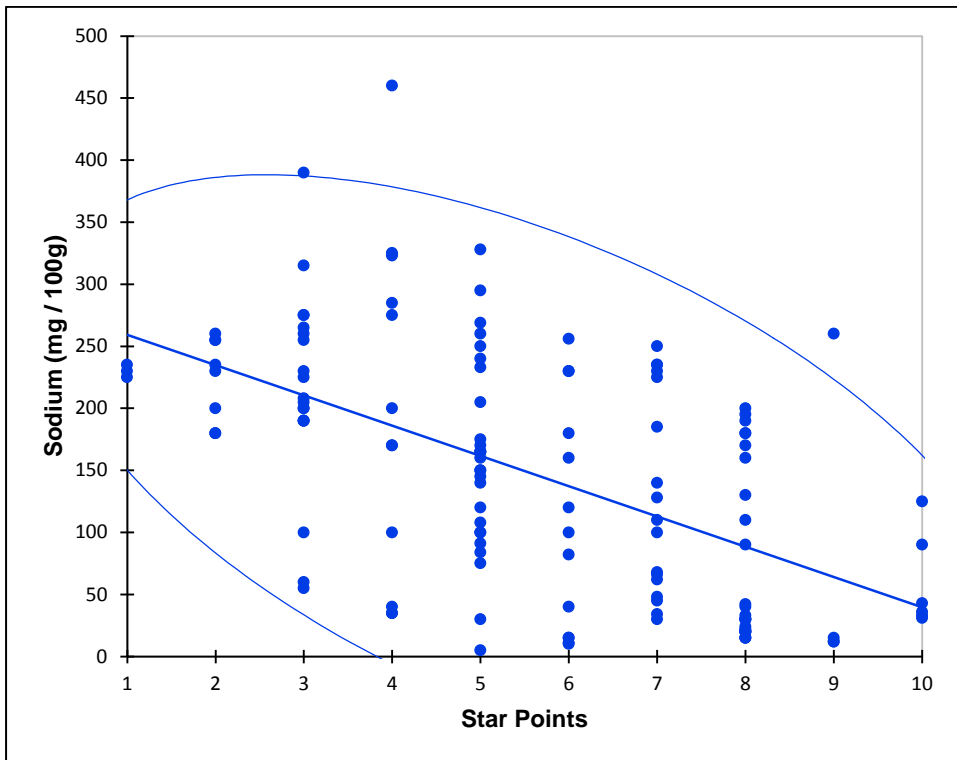


Figure 11: Distribution of Star Points for snack bars by sodium content, TAG database

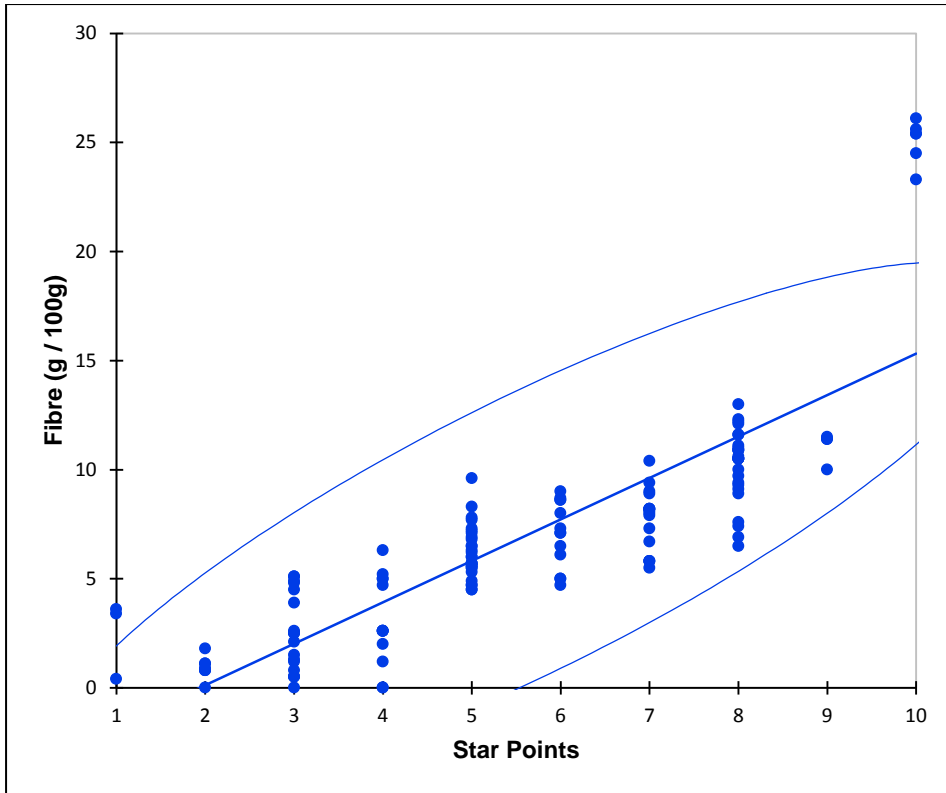


Figure 12: Distribution of Star Points for snack bars by fibre content, TAG database

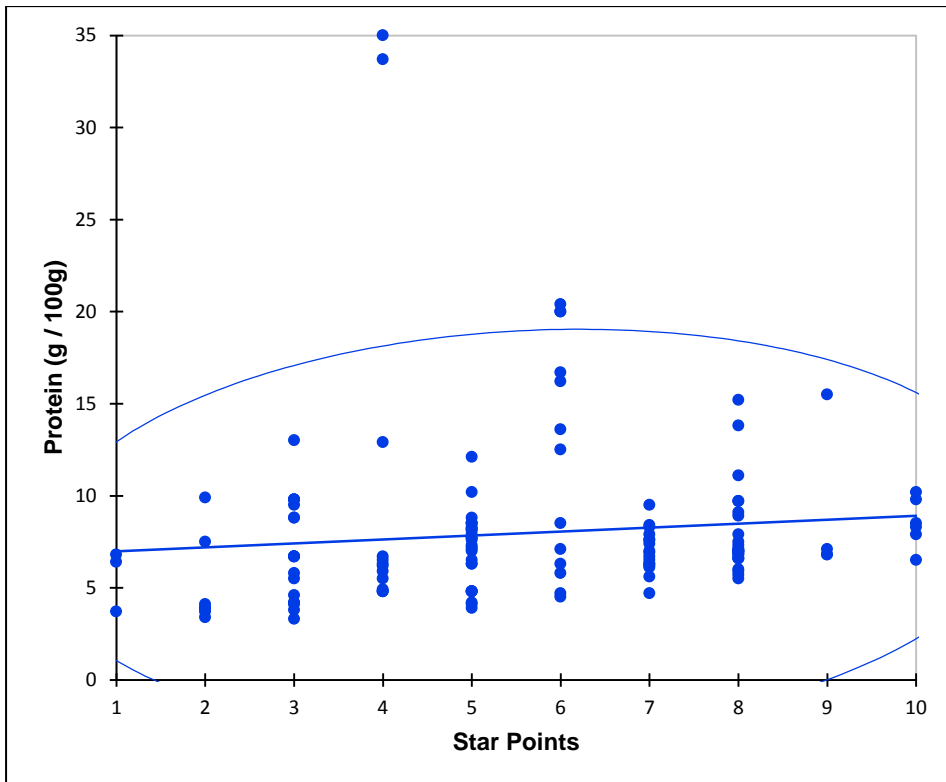


Figure 13: Distribution of Star Points for snack bars by protein content, TAG database

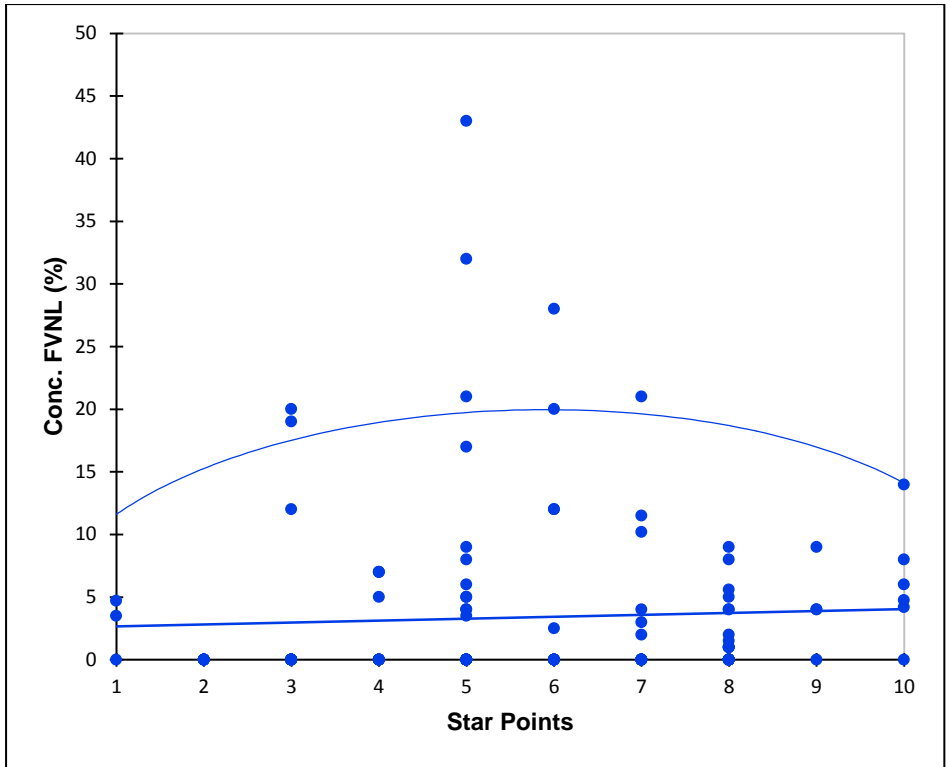


Figure 14: Distribution of Star Points for snack bars by concentrated FVNL content, TAG database

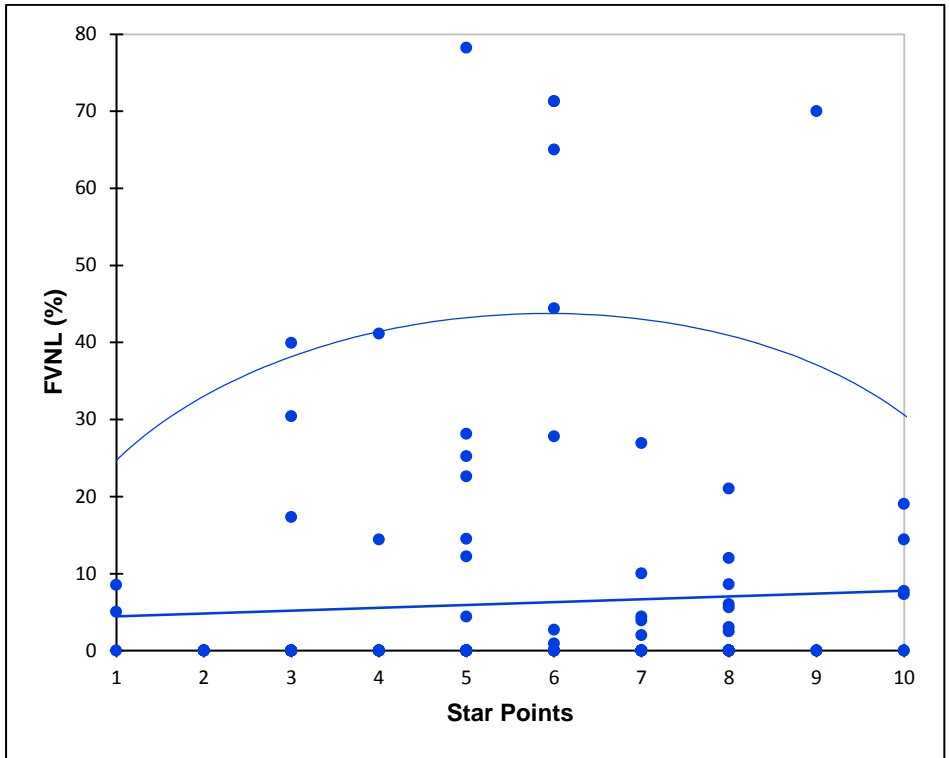


Figure 15: Distribution of Star Points for snack bars by FVNL content, TAG database

## APPENDIX 4: Modelling of removal of positive points from algorithm

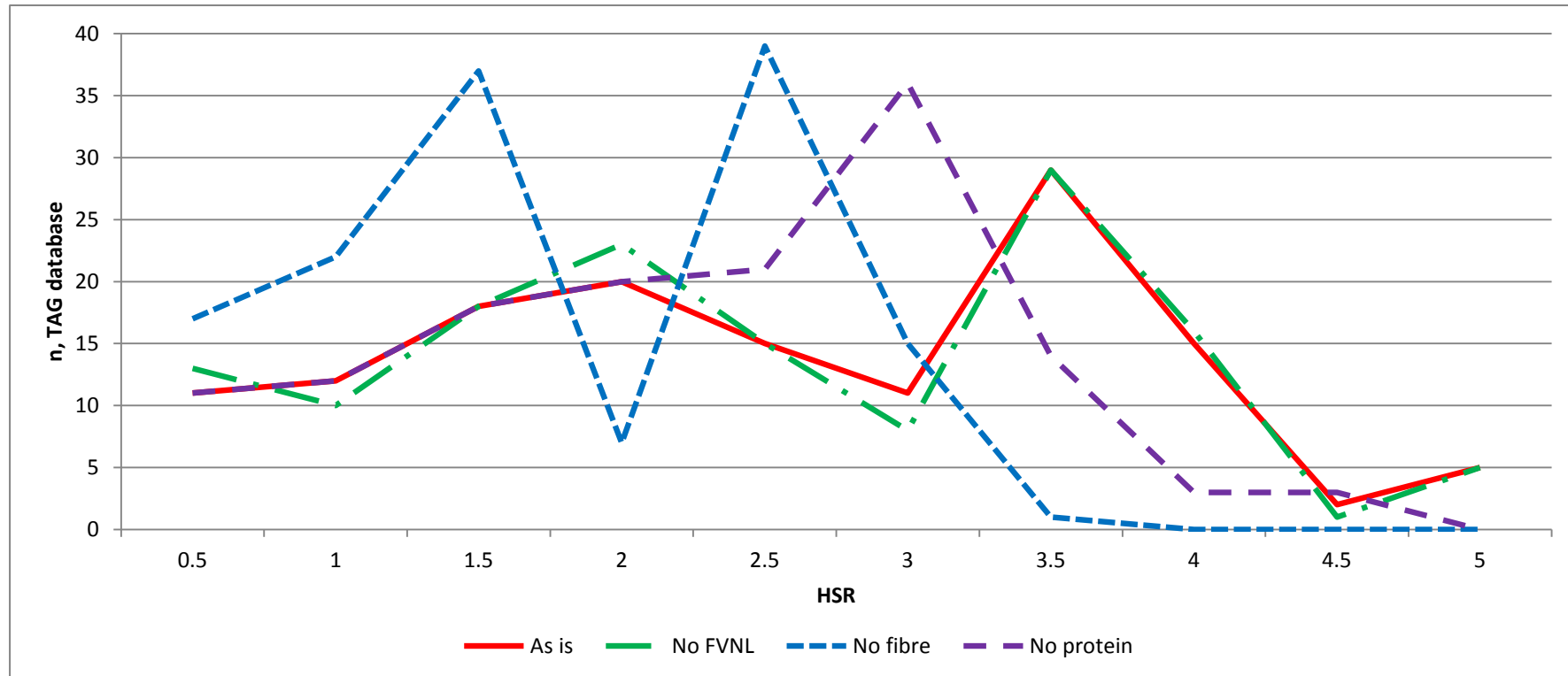


Figure 16: Distribution of Star Points for snack bars under different scenarios (removal of single positive components) by number of products in TAG database



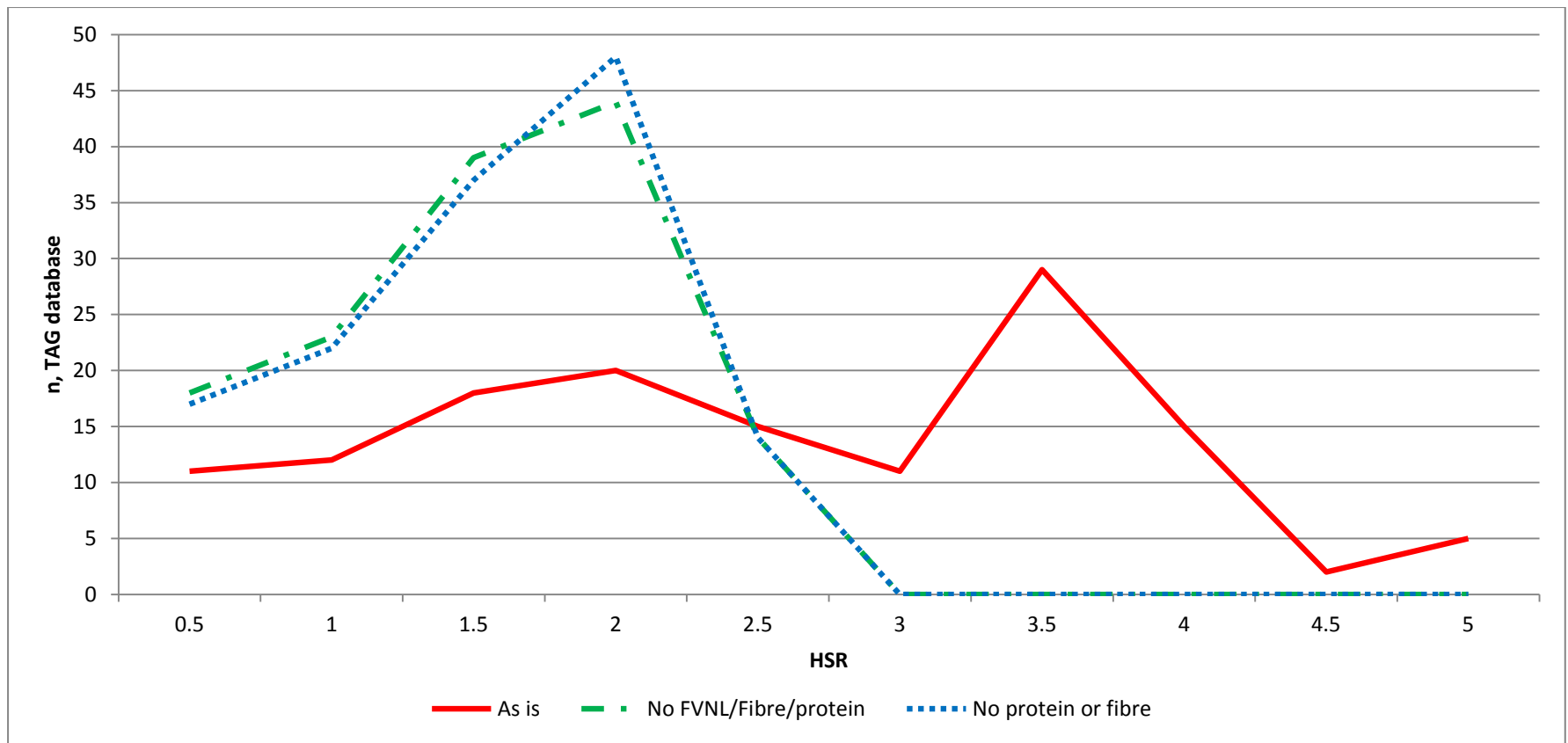


Figure 17: Distribution of Star Points for snack bars under different scenarios (removal of combined positive components) by number of products in TAG database

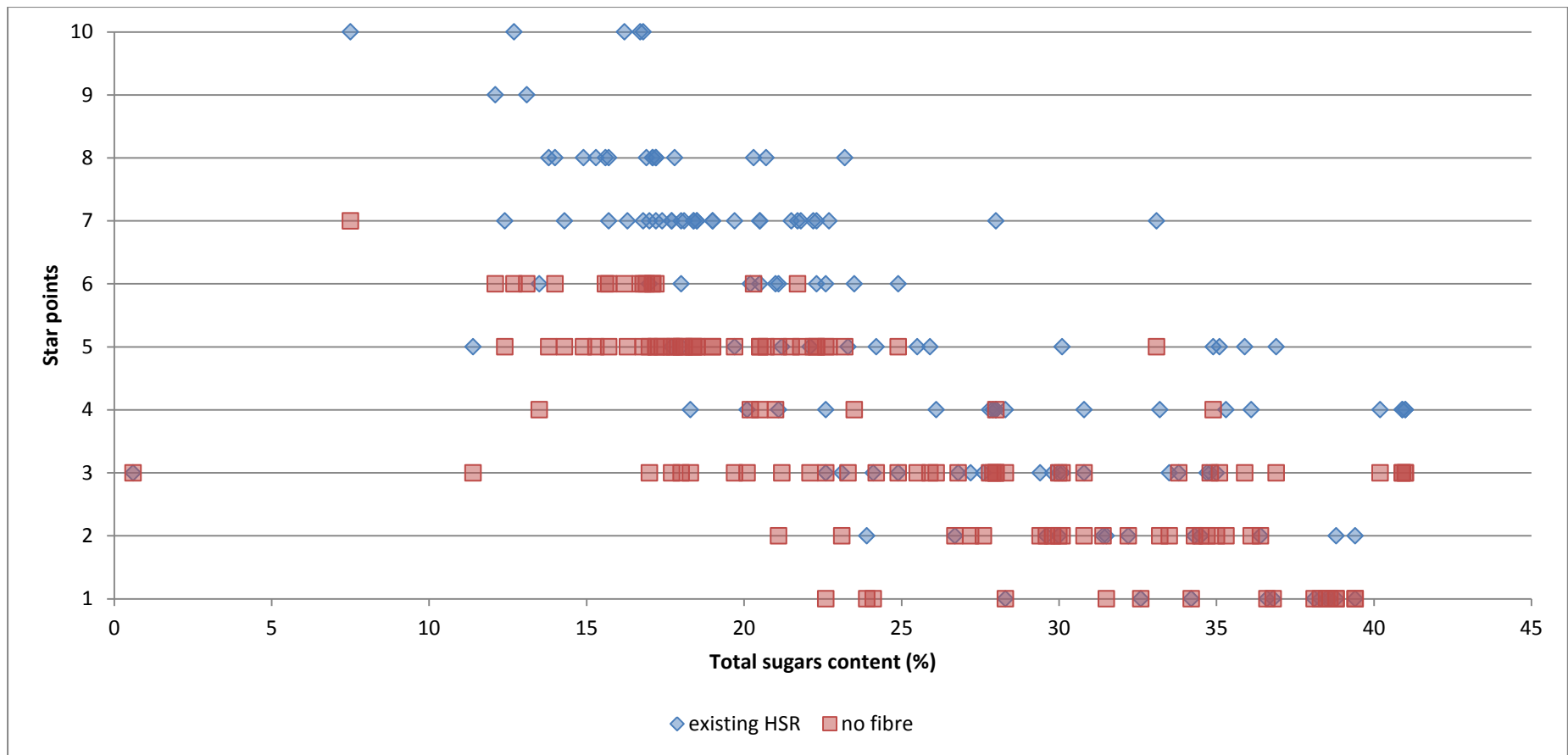


Figure 18: Distribution of Star Points for snack bars by total sugars content, with and without fibre points

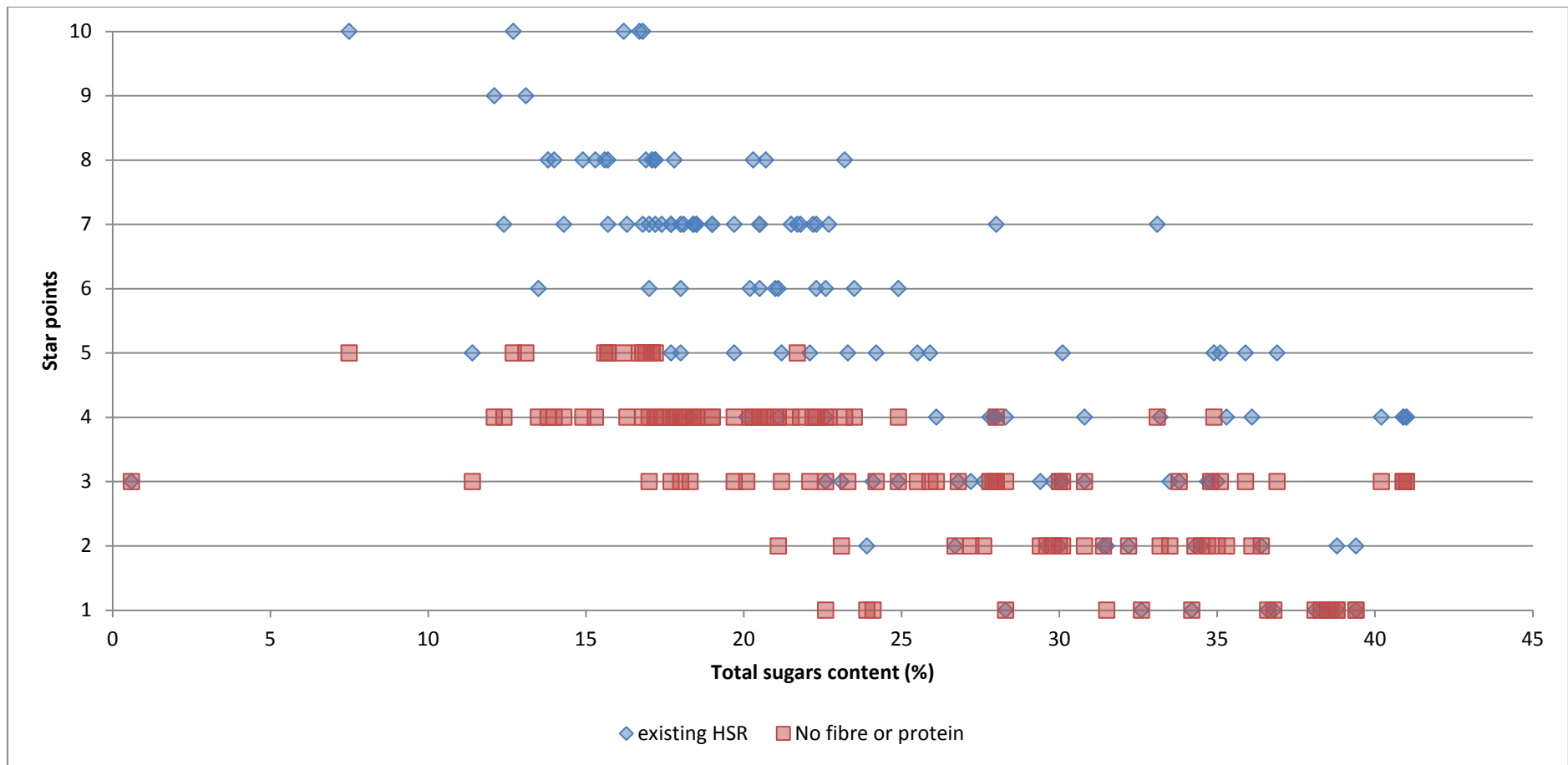


Figure 19: Distribution of Star Points for snack bars by total sugars content, with and without protein & fibre points

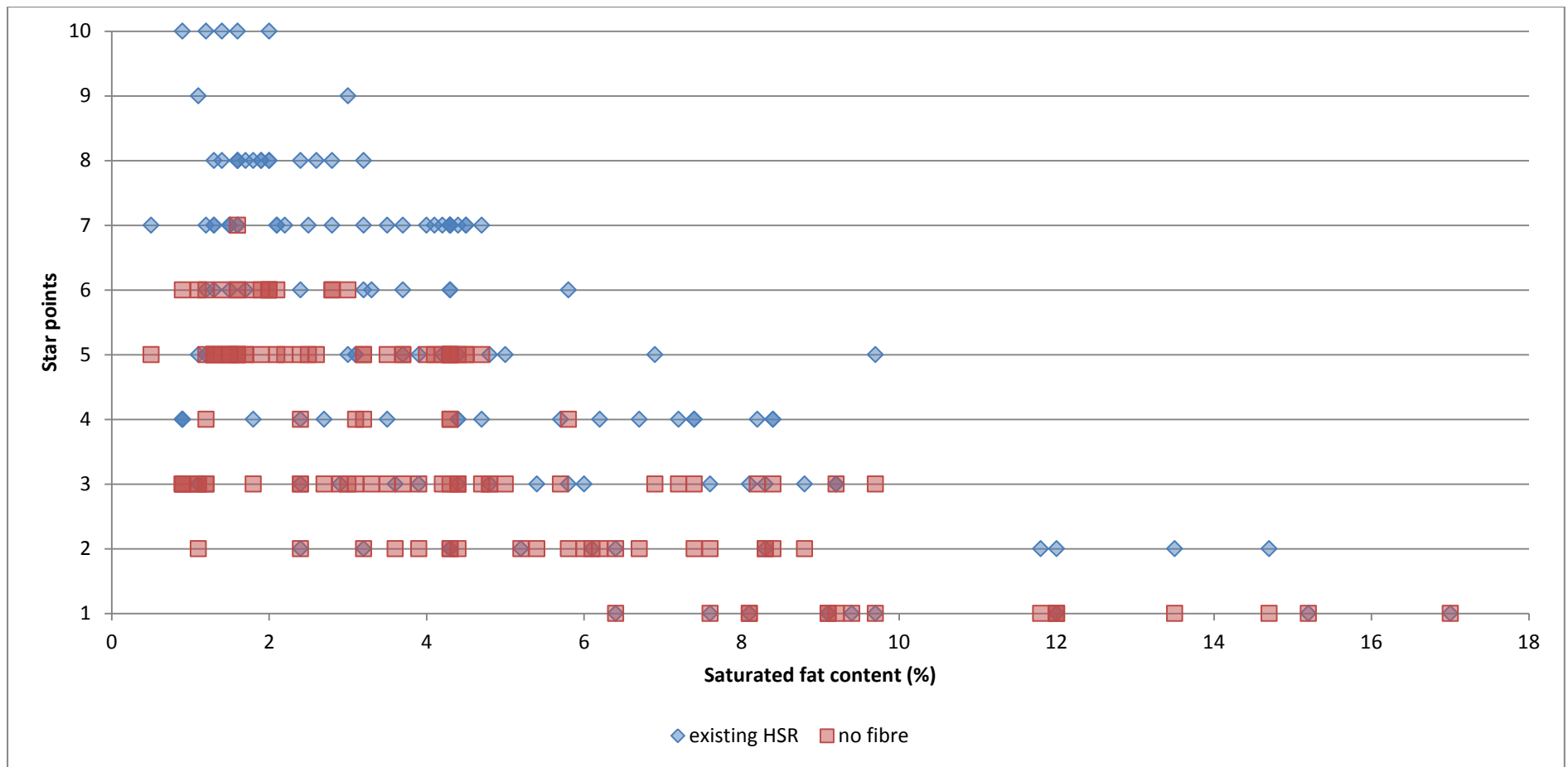


Figure 20: Distribution of Star Points for snack bars by saturated fat content, with and without fibre points

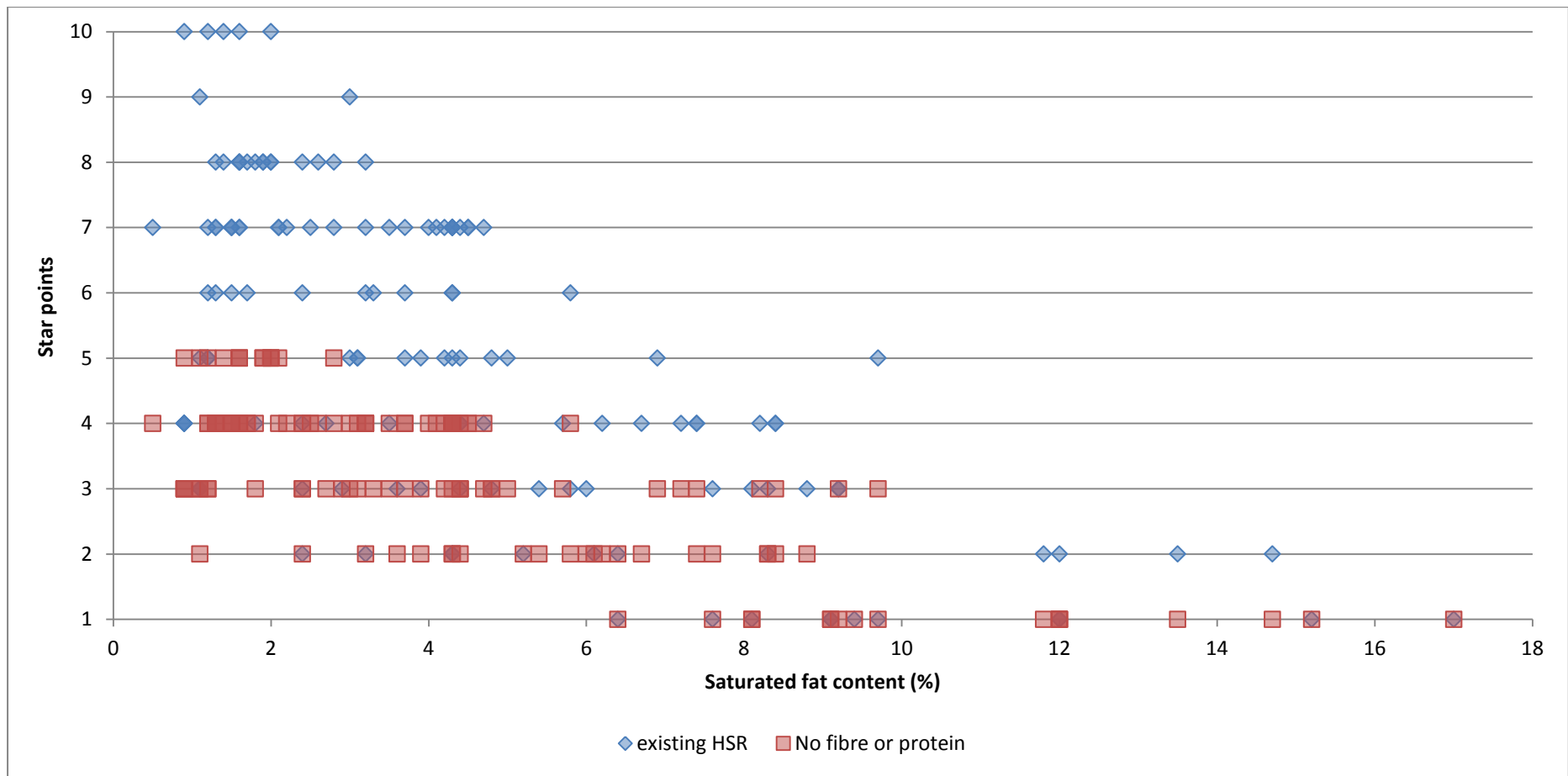


Figure 21: Distribution of Star Points for snack bars by saturated fat content, with and without protein & fibre points