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

HSR Technical Advisory Group (TAG)

Calcium

Contents

Summary

Calcium intake is generally insufficient in Australia and New Zealand, with levels of adequate intake particularly low for specific ages and sexes. Calcium is predominantly found in dairy products; around 40% of the adult and 50% of the child daily calcium intake in Australia and New Zealand is through the consumption of dairy products. Smaller amounts are contributed by bony fish, legumes, certain nuts, fortified dairy substitutes and cereal products.

The HSR algorithm currently does not directly account for calcium per se, however protein (included in the algorithm) is regarded as a proxy for calcium content, particularly for dairy categories. In addition, the three separate dairy categories in the HSR system have qualifying criteria based on calcium content, providing additional advantages to eligible products.

This paper will primarily discuss the potential to include calcium as an explicit component of the HSR algorithm. It will also consider the calcium criterion for HSR category 1D (dairy beverages), currently set at 80 mg/100 mL, with particular reference to dairy substitutes. Calcium criteria for categories 2D (FFG dairy – soft cheeses, yoghurts) and 3D (FFG dairy – hard cheeses) are being investigated through separate work being undertaken by the HSR Advisory Committee.

The inclusion of calcium as a distinct component of the HSR algorithm would essentially be redundant. To effectively promote calcium intake in whole foods, dairy products are important because they are a rich source of calcium compared to non-dairy sources which generally contain much less calcium and make a lower contribution to intake. Calcium is largely, though indirectly, already accounted for in dairy categories by the inclusion of protein in the HSR algorithm and their advantage relative to non-dairy products on scaling. Furthermore, much of the advantage to be gained by additionally scoring calcium would go to dairy products (and substitutes). Adding calcium and removing protein in the algorithm may also lead to perverse outcomes whereby dairy substitutes are actually advantaged relative to dairy products themselves.

Changing the calcium criterion for category 1D to 100 mg or 120 mg/100 mL would largely not affect eligibility to this category for dairy substitute beverages. Some additional dairy beverages may be excluded, however, with a considerable proportion of dairy beverages affected should the threshold be set at 120 mg/100 mL. An option may be to provide differential calcium qualifiers for dairy and dairy substitute beverages or remove the calcium criterion for dairy beverages.

Problem definition

The treatment of calcium in the HSR system has been a topic of interest to some stakeholders throughout both the development and implementation of the system, with calls generally made for calcium to be explicitly included in the HSR algorithm in order to advantage dairy products. In addition, the Australia and New Zealand Ministerial Forum on Food Regulation (the Forum) has specifically requested that the HSR Advisory Committee consider the treatment of dairy substitute beverages in the HSR system.

This paper will therefore investigate the following issues:

- Whether calcium should be included in the HSR algorithm; and
- Whether the calcium criterion for eligibility to HSR category 1D is appropriate.

Background

Calcium is required for the development and maintenance of the skeleton throughout the lifespan, as well as cellular function and proper neuromuscular and cardiac function. It is predominantly found in dairy products, with generally smaller amounts present in bony fish, legumes, certain nuts, fortified dairy substitutes and cereal products. Bioavailability (the level of calcium intake actually absorbed by the body) varies, with some vegetables, legumes and nuts proving less efficient than dairy and fortified dairy substitutes at providing calcium.[1] Low intakes of calcium are associated with osteoporosis which often results in bone fracture and is one of the major causes of morbidity amongst older Australians and new Zealanders (particularly post-menopausal women).[2]

Dietary recommendations

Australia and New Zealand Nutrient Reference Values (NRVs) are a set of recommendations for nutritional intake based on currently available scientific knowledge. The estimated average requirement (EAR) is the daily nutrient level estimated to meet the requirements of half the healthy individuals in a specified population and the recommended dietary intake (RDI) is the amount considered sufficient to meet the nutrient requirements of nearly all individuals. The adequate intake (AI) is a target used when an RDI cannot be determined due to insufficient evidence.

Calcium intake recommendations vary by age, life stage and sex, with increased need for calcium intake during periods of growth and increased risk of developing osteoporosis.[3] EAR and RDI for children and adults are at Table 1; there is no evidence that pregnant and/or lactating adults require higher calcium intakes. The AI for infants aged 0-6 months is 210 mg/day and for those aged 7-12 months it is 270 mg/day.

[1] NHMRC: Nutrient Reference Values: Calcium, available at https://www.nrv.gov.au/nutrients/calcium
[2] NHMRC: Nutrient Reference Values: Calcium
[3] NHMRC: Nutrient Reference Values: Calcium

Table 1: Calcium Nutrient Reference Values (NRVs), children and adults

Age (years)	EAR (mg/day)	RDI (mg/day)
1-3	360	500
4-8	520	700
9-11	800	1,000
12-13	1,050	1,300
14-18	1,050	1,300
19-30	840	1,000
31-50	840	1,000
51-70 (male)	840	1,000
51-70 (female)	1,100	1,300
70+	1,100	1,300

Population-level calcium intake

Patterns of calcium intake are similar for Australia and New Zealand and it is clear that calcium intake is insufficient across both populations. Younger age groups were more likely to meet calcium requirements, while up to nine in ten at certain age/sex groups, common across both countries, did not have sufficient calcium intakes. For all age groups, females were less likely to meet calcium recommendations.

Australia

In 2011-12, nearly three quarters of females (73%) and half of all males (51%) aged two years and over did not meet the calcium EAR from food consumption.

Table 2: Calcium intake, Australia[4], 2011-12

Age (years)	EAR (mg/day)	Mean intake (mg/day)		Prevalence of inadequate intake (%)	
		Male	Female	Male	Female
2-3	360	775	768	0.7	2.4
4-8	520	805	675	11.0	20.8
9-11	800	846	800	45.5*	54.1*
12-13	1,050	946	786	67.0*	84.4*
14-18	1,050	925	740	71.0	90.3
19-30	840	954	765	44.2	71.3
31-50	840	910	758	43.2	67.2
51-70	840 (m) 1,100 (f)	781	741	63.0	91.2
70+	1,100	726	674	89.5	94.3

* indicates a margin of error >10%, results should be interpreted with caution

Note that this data does not include calcium supplements, with 21% of females and 14% of males consuming supplemental calcium.[5]

For both those aged 19 and over and 2-18 years of age, milk products and dishes were the leading source of calcium intake (19+: 39.1%, 2-18: 49.9%), followed by cereals and

[4] ABS, 2015, Australian Health Survey: Usual Nutrient Intakes, 2011-12, http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4364.0.55.008Main+Features12011-12?OpenDocument
[5] ABS, 2015, Australian Health Survey: Usual Nutrient Intakes, 2011-12

cereal products, such as flour, bread and pasta (19+: 12.2%, 2-18: 13.3%), and cereal based products and sweets, such as biscuits, cakes and pastries (19+: 12%, 2-18: 14.1%).[6]

New Zealand

In 2008-09, the estimated prevalence of inadequate calcium intake amongst New Zealand males aged 15 years was 45% and for females 73%. 18.2% of females and 12.2% of males aged between two and fourteen years did not meet calcium EARs in 2002.

Table 3: Calcium intake, New Zealand,[7,8] 2003 and 2008-09

Age (years)	EAR (mg/day)	Mean intake (mg/day)		Prevalence of inadequate intake (%)	
		Male	Female	Male	Female
5-6	520	698	651	1.4	6.6
7-10	520 (4-8 y) 800 (9-11 y)	806	653	1.4	12.4
11-14	800 (9-11 y) 1,050 (12-13 y) 1,050 (14-18 y)	921	757	28.7	29.6
15-18	1,050	1,035	724	57.7	87.8
19-30	840	1,006	742	33.6	68.4
31-50	840	1,044	847	31.9	55.5
51-70	840 (m) 1,100 (f)	868	775	51.6	88.2
70+	1,100	785	710	86.0	92.8

For New Zealand adults (15 years and older), milk was the single largest contributor to calcium intake (27%), followed by bread (10%), non-alcoholic beverages (10%), cheese (8%), vegetables (6%) and dairy products (e.g. yoghurt, cream, ice-cream) (6%). For New Zealanders aged between 2 and 14 years, milk was the largest contributor to calcium intake (34%), followed by bread (11%), dairy products (9%) and cheese (8%).

[6] ABS, 2014, Australian Health Survey: Nutrition First Results - Foods and Nutrients, 2011-12 , http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4364.0.55.007Main+Features12011-12?OpenDocument
[7] Ministry of Health, 2011, A Focus on Nutrition: Key findings from the 2008/09 NZ Adult Nutrition Survey, https://www.health.govt.nz/publication/focus-nutrition-key-findings-2008-09-nz-adult-nutrition-survey
[8] 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

Dairy substitutes

The Australia New Zealand Food Standards Code (the Code) classifies the following as a "food group" (emphasis added):

> milk, skim milk, cream, fermented milk, yoghurt, cheese, processed cheese, butter, ice cream, condensed milk, dried milk, evaporated milk, and *dairy analogues derived from legumes, cereals, nuts, seeds, or a combination of these ingredients*…[9]

The Australian Dietary Guidelines (ADG) suggest that "calcium-enriched legume/bean/cereal milk products" (fortified with calcium to a minimum of 100 mg/100g) are acceptable substitutes for dairy products, and include these amongst the FFG. However, they also note that protein and vitamin B_{12} will need to be sourced from elsewhere in the diet and dairy substitutes are inappropriate for children up to one year old.[10] Similarly, the New Zealand Eating and Activity Guidelines (NZEAG) provide for dairy substitutes with fortifications, particularly calcium.[11]

Consumption of dairy substitutes

In 2011-12 in Australia, dairy substitutes contributed 2.2% of the total serves of the milk, yoghurt, cheese and alternatives food group for adults (19 years and older) and 0.7% of dairy servings for children (aged between 2 and 18 years).[12] 3.3% of the population (aged 2 years and older) consumed milk substitutes (soy, cereal, nut or unspecified) and cheese substitutes; soy-based ice confection and soy-based yoghurts were each consumed by 0.1% of the people.[13] Milk substitutes provided 0.8% of the calcium intake for Australians 2 years and older and 0.2% of protein intake.[14,15] Equivalent data for New Zealand are not available.

The consumption of dairy substitutes has increased considerably since the Australian data were collected. Australian industry report releases indicate that between March 2015 and March 2016 nearly 6% of people aged 14 years and over consumed at least one soy drink in a seven day period[16] and that the value of almond milk sales tripled between January 2014 and January 2016.[17] New Zealand releases highlight that the volume and value of almond milks sales doubled between January 2015 and January 2017, though soy milk remains the most preferred dairy substitute in terms of value.[18]

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[9] 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
[10] NHMRC, 2013, Australian Dietary Guidelines, p. 56
[11] Ministry of Health, 2015, Eating and Activity Guidelines for New Zealand Adults, p. 18
[12] ABS, 2016, Australian Health Survey: Consumption of food groups from the Australian Dietary Guidelines, 2011–12, available at http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/4364.0.55.012main+features12011-12
[13] ABS, 2014, Australian Health Survey: Nutrition First Results - Foods and Nutrients, 2011-12
[14] ABS, 2014, Australian Health Survey: Nutrition First Results - Foods and Nutrients, 2011-12
[15] ABS, 2014, Australian Health Survey: Nutrition First Results - Foods and Nutrients, 2011-12
[16] Roy Morgan, 2016, Soy drinks: dairy alternative or health elixir?, available at http://www.roymorgan.com/findings/6875-soy-drinks-dairy-alternative-or-health-elixir-201607061011
[17] Nielsen, 2016, Milking It: Surge In Lactose-Free Dairy Milk Sales, available athttp://www.nielsen.com/au/en/insights/news/2016/milking-it.html
[18] Nielsen, 2017, Kiwis are Nuts for Almond Milk, available at http://www.nielsen.com/nz/en/insights/news/2017/kiwis-are-nuts-for-almond-milk.html

Calcium in the HSR system

The algorithm underpinning the HSR system is based on the Nutrient Profiling Scoring Criterion (NPSC), a nutrient profiling system developed by Food Standards Australia New Zealand (FSANZ) for the regulation of health claims in Australia and New Zealand. The NPSC is itself derived from the UK Nutrient Profiling Model (NPM).

Protein as a proxy for calcium

Early prototypes of the NPM included calcium as an input. However, additional work produced by Rayner et al[19] during the development of the NPM indicated that protein was a good proxy for several micronutrients, including for calcium in dairy products. Protein was also found to offset the lactose content of dairy products, captured as total sugars. As such, calcium was not included in the final NPM, a decision which has been replicated by the NPSC and HSR algorithm.

Creation of dairy categories

A key point of difference between the HSR algorithm and the NPSC/NPM is the inclusion of additional product categories specifically for FFG dairy products. During the development of the HSR system initial testing highlighted that dairy products tended to rate poorly, mainly due to saturated fat content. This was identified as conflicting with dietary guidance promoting the regular consumption of dairy products.

Following a review of the literature on the health benefits of dairy consumption, including that which supported the development of the ADG on dairy, three additional categories (dairy beverages, soft cheeses and yoghurts, hard cheeses) were added to the HSR algorithm. Criteria for eligibility to these dairy categories were set (with reference to existing provisions in the Food Standards Code) and permitted the inclusion of dairy substitutes. Of note is the explicit inclusion of calcium criteria:[20]

- Category 1D: Dairy beverages
    - Dairy beverages with calcium ≥80 mg/100g
    - Alternatives derived from legumes, cereals, nuts or seeds with calcium ≥80 mg/100g
- Category 2D: Dairy foods – soft cheeses, yoghurts
    - Cheeses with a calcium ≤320 mg/100g, yoghurt and other fermented milk products
    - Alternatives derived from legumes with calcium ≤320 mg/100g
- Category 3D: Dairy – hard and processed cheeses
    - Cheeses and processed cheeses, as defined in Standard 2.5.4, with a calcium content >320 mg/100g
    - Alternatives derived from legumes with calcium >320 mg/100g

Dairy products with >25% non-dairy content (e.g. fruit cheeses) and discretionary dairy products (custards, desserts, cream cheeses, ice creams, creams) are excluded from the dairy categories.

In acknowledgement of their different nutrient profile and role in a healthy diet, scoring for these additional categories was adjusted so that dairy products may be advantaged relative to non-dairy products, i.e. a dairy product may be “less healthy”, as calculated purely according to the inputs included in the HSR algorithm, and receive a higher HSR

[19] Rayner M, Scarborough P, Lobstein T, 2009, The UK Ofcom Nutrient Profiling Model - Defining ‘healthy’ and ‘unhealthy’ foods and drinks for TV advertising to children, available at https://www.ndph.ox.ac.uk/cpnp/files/about/uk-ofcom-nutrient-profile-model.pdf

[20] FoPL Secretariat, 2018, Guide for Industry to the Health Star Rating Calculator, v. 6, p. 7, available at http://www.healthstarrating.gov.au/internet/healthstarrating/publishing.nsf/Content/guide-for-industry-document

compared to a non-dairy product with a similar nutrient content. Note that this may also be true for eligible dairy substitutes. As dairy products tend to fall within a narrow range of nutrient values, the raw scores available to dairy products were also distributed across the full HSR scale to provide better differentiation between “more healthy” and “less healthy” dairy options.

Alignment with system objectives and priorities

Previous consideration

Dairy substitute beverages

In November 2016 the Forum considered the treatment of dairy substitute beverages in the HSR system. Ministers noted that currently a dairy substitute beverage can be categorised as a dairy beverage (category 1D) for the purposes of the HSR system if its calcium content is ≥80 mg/100 mL. Ministers nominated a preferred option, to be considered through the five year review of the HSR system, that only dairy substitute beverages with a calcium content ≥100 mg/100 mL be eligible for category 1D, in line with the recommendation contained within the ADG.

Dairy categories

In December 2016 a submission to the HSR Advisory Committee outlined and provided supporting evidence that some products included in category 2D receive a lower HSR than nutritionally similar dairy-based products specifically excluded from that category which fall into the general non-dairy food category (category 2). TAG provided technical advice to the HSR Advisory Committee on this issue and options to resolve this anomaly were presented to the dairy industry for feedback. Work to resolve this anomaly is ongoing and will encompass a review of the criteria for dairy category eligibility.

As this work is separate from the five year review of the HSR system and being undertaken by the HSR Advisory Committee this issue is not discussed here. However, should any changes to definitions for categories 2D and 3D be proposed and adopted, implementation will take place in line with the timeframes for the five year review.

Linkages to other TAG work

Work being undertaken by TAG to support the five year review may have implications for the treatment of calcium and dairy products in the HSR system. In particular:

Sugar

- Should total sugars content be more heavily penalised than currently, the intrinsic sugars present within dairy products will also be captured
- Should added sugars be included in the HSR algorithm in place of total sugars, dairy products can expect to experience an increase in HSRs as intrinsic sugars will no longer be penalised.

Protein

- Should protein be removed from the HSR algorithm:
    - Calcium will not have a proxy indicator in the HSR system
    - Some dairy products will experience a decrease in HSRs, particularly ice creams, creams, custards and cream cheeses, though some cheeses and yoghurts may also be affected. However, the impact this may have on FFG dairy products may be mitigated through rescaling (wherein the raw HSR scores are redistributed across the full HSR scale)
- Should the ‘tipping point’ at which products become ineligible for positive protein points be lowered, the only dairy products that may experience a decrease in HSRs would be ice creams and creams

Analysis of issues

Calcium intake

It may be considered that calcium intake is best promoted through the consumption of FFG dairy products and fortified dairy substitutes, based on the high calcium content and the bioavailability of calcium for these products and their current contribution to intake in Australia and New Zealand. This is illustrated by the TAG product database (see Table 4, Appendix 1). All non-dairy product categories (with the exception of dairy substitutes) have a mean and median calcium content <100 mg/100 g and all FFG dairy product categories (including dairy substitutes) have a mean and median calcium content ≥100 mg/100 g, with a maximum value of 1,100 mg/100 g. As non-dairy sources of calcium contain substantially lower levels of calcium, almost all of any advantage to be gained by scoring calcium would go to dairy products.

The consumption of calcium in dairy products is effectively, if indirectly, promoted in the current HSR system in two ways:

- Through the inclusion of protein as a proxy for calcium content (see Figures 1 and 2, Appendix 1):
    - The inclusion of protein in the HSR algorithm by and large reflects calcium content for dairy products (protein and calcium being largely inseparable in dairy products); for all dairy products the relationship between protein and calcium content is generally linear and consistent across product categories.
    - The calcium present in fortified dairy substitute beverages is not matched by protein content (i.e. protein does not represent calcium content for these products), further benefitting dairy products; were protein to be removed from the algorithm and calcium added, some dairy substitute beverages would actually benefit on calcium content and be advantaged relative to dairy beverages at lower protein levels.
- Through the creation of dairy categories with calcium qualifying criteria:
    - Eligible products are advantaged relative to other options as they may receive equivalent “negative” points yet be awarded a higher HSR than products with similar nutrient profiles

Dairy substitute beverages

A detailed comparison of the calcium content of dairy beverages and dairy substitute beverages is at Table 5, Appendix 1.

Though the available calcium data on dairy substitute beverages are limited, of note is that such products are generally fortified with calcium to levels ≥120 mg/100 mL. As such, few dairy substitute products would be affected by raising the calcium criterion for category 1D to or above the ADG recommendation on the consumption of “calcium-enriched” non-dairy milks.

Some dairy beverages may be impacted by raising the calcium content criterion. Affected products would likely experience a significant decrease in HSRs as these ineligible products would be included in category 1 (non-dairy beverages), which, as referred to previously, is treated more harshly than category 1D. The available data suggests that raising the threshold to 100 mg/100 mL would affect few products, however a considerable proportion of dairy beverages would be affected were the calcium content threshold raised to 120 mg/100 mL.

If a decision is made to increase the calcium threshold in an attempt to restrict eligibility to category 1D for dairy substitutes, options to resolve the issue this causes for dairy beverages may be to:

- Provide differential calcium qualifiers for dairy and dairy substitute beverages (e.g. 80 mg and 100 mg/100 mL or 100 mg and 120 mg/100 mL, respectively)
- Remove the calcium criterion for dairy (i.e. mammalian milk based) beverages, which would likely not affect eligibility of such products to category 1D in any case.

Conclusions

The inclusion of calcium as a distinct component of the HSR algorithm would essentially be redundant. To effectively promote calcium intake from whole foods, dairy products are important because they are a rich source of calcium compared to non-dairy sources which generally contain much less calcium and make a lower contribution to intake. Calcium is largely, though indirectly, already accounted for in dairy categories by the inclusion of protein in the HSR algorithm and their advantage relative to non-dairy products on scaling. Furthermore, much of the advantage to be gained by additionally scoring calcium would go to dairy products (and substitutes). Adding calcium and removing protein in the algorithm may also lead to perverse outcomes whereby dairy substitutes are actually advantaged relative to dairy products themselves.

Changing the calcium criterion for category 1D to 100 mg/100 mL, as per the ADG recommendation, or 120 mg/100 mL would largely not affect eligibility to this category for dairy substitute beverages. Some additional dairy beverages may be excluded, however, with a considerable proportion of dairy beverages affected should the threshold be set at 120 mg/100 mL. An option may be to provide differential calcium qualifiers for dairy and dairy substitute beverages or remove the calcium criterion for dairy beverages.

APPENDIX 1: TAG 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 components 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.

The TAG database was supplemented with additional information provided by food manufacturers and retailers on the calcium content of foods and beverages. Calcium data was provided by industry for 967 products in 29 AGHE categories. Most key categories of interest (i.e. dairy categories) are well represented, though data is limited for non-dairy categories.

Table 4 provides an overview of the calcium data in the TAG database. Means and medians ≥100 mg/100 g are highlighted in red. All FFG dairy categories have both means and medians ≥100 mg/100 g and the only remaining categories with a mean and/or median ≥100 mg/100 g are “discretionary” dairy products (ice cream, cream, cream cheese, condensed milk, cheese and cracker snacks). Note that 15 dry beverage powders/mixes, for which calcium content was provided ‘as sold’ or ‘as prepared’, are excluded from FFG dairy – beverages for the purposes of this paper as ‘as sold’ calcium values are abnormally low (<20 mg/100 g) and ‘as prepared’ calcium values may be abnormally high (>1000 mg/100 g).

Figure 1 demonstrates the relationship between protein and calcium content for dairy foods. This relationship is linear and generally consistent across product categories, though a few outliers are present.

Figure 2 highlights the relationship between protein and calcium content for dairy beverages and dairy substitutes. Some dairy substitutes have higher calcium content than dairy beverages while most dairy beverages have higher protein content.

Table 5 provides calcium content data for dairy beverages and dairy substitutes beverages in the TAG database by AHS classification. Most dairy substitutes have ≥120 mg/100 mL calcium, whereas almost half of all dairy beverages have calcium content between 100-120 mg/100 mL.

Table 4: Summary of calcium data in TAG database, by AGHE category

AGHE category	Number	Calcium content (mg/100 g)			
		Min. value	Max. value	Mean	Median
FFG Cereals - bread	26	0.9	47.1	4.6	1.3
FFG Cereals - breakfast	0	-	-	-	-
FFG Cereals - pasta/flour/grains	0	-	-	-	-
FFG Dairy - alternative beverages	43	30	160	119.4	120
FFG Dairy - beverages	296	67	738	126.8	120
FFG Dairy - beverages dry mix/milk powder	0	-	-	-	
FFG Dairy - cheese	166	180	1110	675.4	735
FFG Dairy - yoghurt, soft cheese	220	82	814	184.6	162
Dairy Discretionary foods - cream	11	44	112	75	75
Dairy Discretionary foods - cream cheese	21	63	800	191.1	90
Fats, oils & oil based spreads	2	0.3	0.3	0.3	0.3
Flavoured water	0	-	-	-	-
Fruit - other juices	2	0	0	0	0
Fruit - processed	13	0	0	0	0
Fruit - unprocessed	0	-	-	-	-
Fruit - whole juices	5	0	0	0	0
Discretionary foods - bakery/cake mixes	10	0	10.9	1.8	0.1
Discretionary foods - beverage dry mixes	1	0	0	0	0
Discretionary foods - biscuits	3	11	171	66.7	18
Discretionary foods - carbonated beverages	0	-	-	-	-
Discretionary foods - confectionery	10	0	212	65.1	60.5
Discretionary foods - cordial	1	0	0	0	0
Discretionary foods - custard/deserts	26	0	216	120.6	122
Discretionary foods - dips	1	0	0	0	0
Discretionary foods - dressings	17	0	0	0	0
Discretionary foods - ice confectionery	0	-	-	-	-
Discretionary foods - ice cream	4	132	175	157.3	161
Discretionary foods - lifestyle	0	-	-	-	-
Discretionary foods - meals/meal bases	21	0	17.15	1.92	0
Discretionary foods - miscellaneous[1]	7	198.4	334.5	285.9	268.1
Discretionary foods - pizza	0	-	-	-	-
Discretionary foods - sauces/condiments	7	0	0	0	0
Discretionary foods - snacks[2]	5	44	880	559.2	582
Discretionary foods - soups/stocks	5	0	0	0	0
Discretionary foods - yeast spread	2	68	68	68	68
Protein - meats/fish	0	-	-	-	-
Protein - nuts	8	0	64	48	64
Protein - plant	7	0	39	33.4	39
Vegetables - processed	0	-	-	-	-
Vegetables - unprocessed	12	0	0	0	0
Water	0	-	-	-	-
Total	**960**				

Note 1: condensed milks
Note 2: cheese and cracker type products

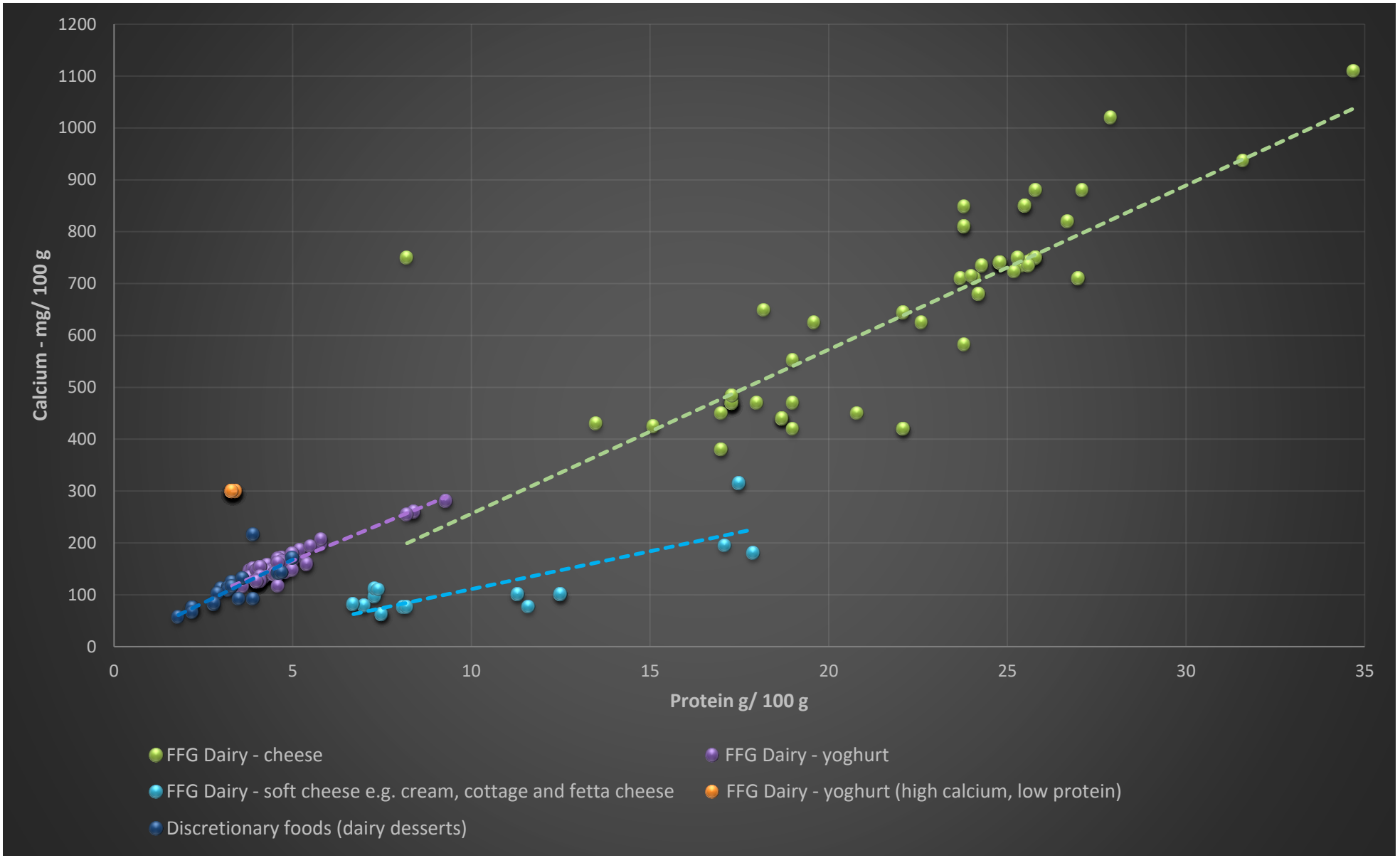
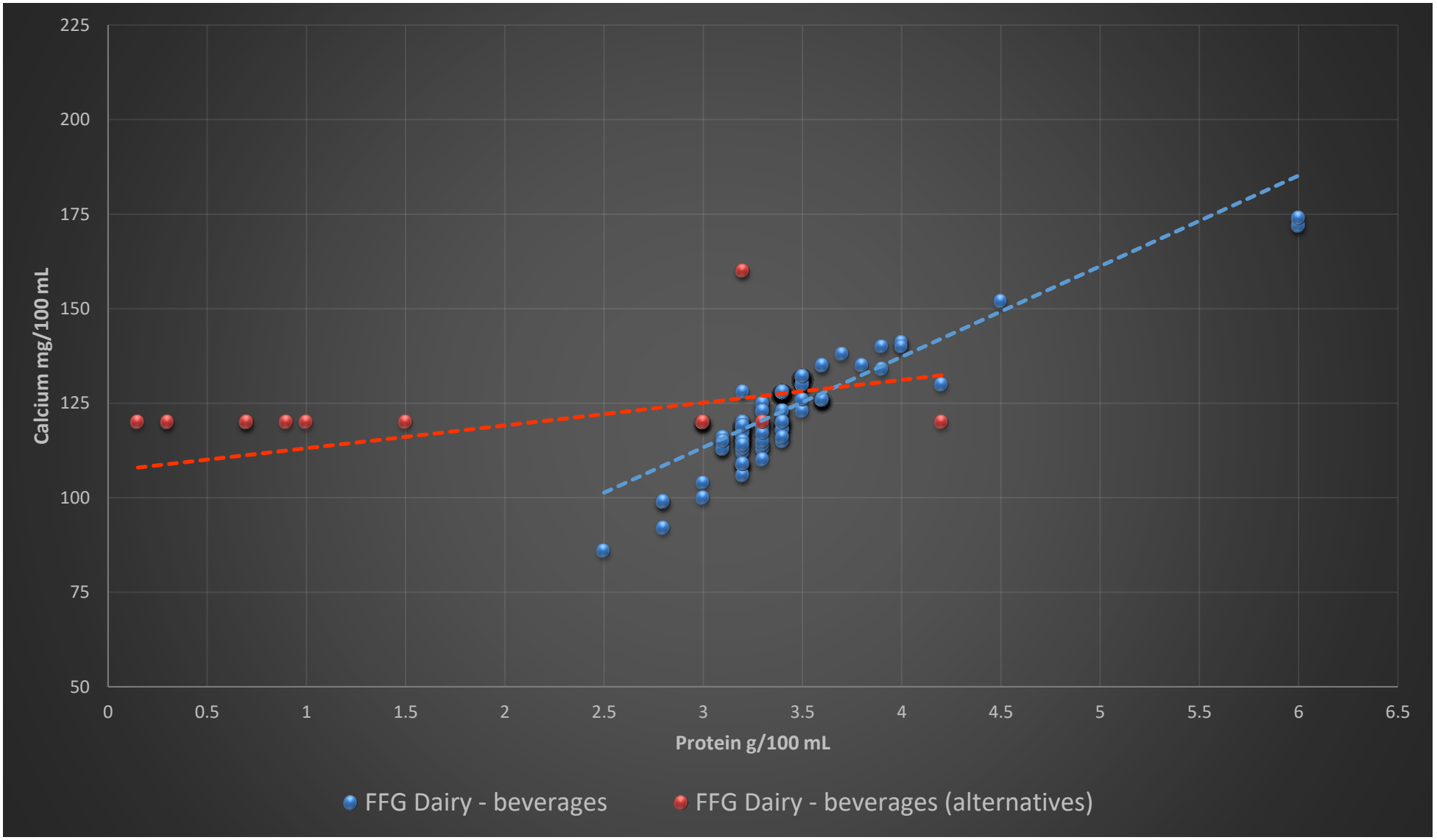


Figure 1: Calcium vs protein content, dairy foods, TAG database, n=324



Note: one unfortified dairy substitute with calcium content 30 mg/100 g excluded from chart

Figure 2: Calcium vs protein content, dairy beverages and substitutes, TAG database, n=294

Table 5: Calcium content for dairy beverages and dairy substitutes beverages, by AHS classification, TAG database

AHS 5 digit product category	Number of products	Ca content (mg/100 mL)	Products with <80 mg/100 mL Ca		Products with 80-99 mg/100 mL Ca		Products with 100-119 mg/100 mL Ca		Products with ≥120 mg/100 mL Ca	
			n	%	n	%	n	%	n	%
Soy-based beverage, plain, fortified	15	110 – 160	0	0%	0	0%	1	7%	14	93%
Soy-based beverage, plain, reduced fat, fortified	7	120 –160	0	0%	0	0%	0	0%	7	100%
Soy-based beverage, plain, skim, fortified	1	120	0	0%	0	0%	0	0%	1	100%
Cereal- or nut-based milk substitute	31	30 – 120	3	10%	0	0%	0	0%	28	90%
Soy-based beverage, regular fat, flavoured	6	120	0	0%	0	0%	0	0%	6	100%
Soy-based beverage, reduced fat, flavoured	4	120	0	0%	0	0%	0	0%	4	100%
Total	**64**	**75 – 160**	**3**	**5%**	**0**	**0%**	**1**	**2%**	**60**	**94%**
Milk, coffee/chocolate flavoured and milk-based drinks, full fat	83	92 – 200	0	0%	4	5%	57	69%	22	27%
Milk, coffee/chocolate flavoured and milk-based drinks, reduced fat	18	67 – 565	1	6%	1	6%	9	50%	7	39%
Milk, cow, fluid, reduced fat, <2 g/100g	45	86 – 174	0	0%	1	2%	4	9%	40	89%
Milk, cow, fluid, reduced fat, <2 g/100g, fortified	3	123 – 134	0	0%	0	0%	0	0%	3	100%
Milk, cow, fluid, regular whole, full fat	65	109 – 172	0	0%	0	0%	16	25%	49	75%
Milk, cow, fluid, skim, non-fat	26	115 – 140	0	0%	0	0%	2	8%	24	92%
Milk, other flavoured and milk-based drinks, full fat	35	108 – 152	0	0%	0	0%	34	97%	1	3%
Milk, other flavoured and milk-based drinks, reduced fat	3	114 – 738	0	0%	0	0%	1	33%	2	67%
Total	**278**	**67 – 738**	**1**	**0.4%**	**6**	**2%**	**123**	**44%**	**148**	**53%**

Note 1: totals may not equal 100% due to rounding

Note 2: numbers may not equal those in table 4 and figures 2-3. Some additional dairy substitutes have had values assigned from other sources and some ‘as prepared’ values for dairy beverages have been removed