

# Yoghurt and dairy snacks presented for sale to an Australian consumer: are they becoming less healthy?

Karen Z Walker<sup>1,2,\*</sup>, Julie Woods<sup>2</sup>, Jamie Ross<sup>2</sup> and Rachel Hechtman<sup>2</sup>

<sup>1</sup>Preventative Health Unit, Baker IDI Heart and Diabetes Institute, PO Box 6492, St Kilda Road, Central VIC 8008, Australia: <sup>2</sup>Nutrition and Dietetics Unit, Monash University Department of Medicine, Clayton, Victoria, Australia

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## Abstract

**Objective:** To assess the nutrient profile of yoghurts and dairy desserts.

**Design:** Nutrition information panels and product labels on yoghurts and dairy desserts offered for sale were surveyed in 2005 and 2008 and nutrients analysed by two nutrient profiling systems.

**Setting:** A large supermarket in metropolitan Melbourne, Australia.

**Results:** In total, 248 and 140 dairy snacks (yoghurt, fromage frais or dairy desserts) were surveyed in 2005 and 2008, respectively. Over this time, median packet size rose significantly ( $P \leq 0.001$ ). In yoghurts, median energy and total fat content also increased while protein decreased (all  $P < 0.05$ ). The proportion of 'full-fat' products rose from 36% to 46%. Because of the addition of sugar, most 'reduced-fat' yoghurts had energy content similar to many 'full-fat' yoghurts. Overall, the proportion of yoghurts and dairy desserts that were 'less healthy' (i.e. displaying one or more 'red traffic lights' for high fat, saturated fat, salt and sugar content) rose from 12% in 2005 to 23% in 2008. Only 1–2% could be deemed 'healthy' by the most stringent criterion (displaying four 'green traffic lights'), while 21% (2005) or 28% (2008) were 'healthy' by a nutrient profiling system that included a score for protein. Sucrose, the most common sweetener, was found in levels up to 29 g/100 g. Claims on packaging mainly related to Ca, fat or protein content. Few labels referred to sugar content.

**Conclusions:** The deterioration in nutrient quality of yoghurts needs to be redressed.

**Keywords**  
Yoghurt  
Dessert  
Dairy foods  
Nutrient profiling  
Food label

Consumption of yoghurt and dairy desserts in Australia is rising steadily. In 2007, sales were \$AU 982 million<sup>(1)</sup>. Yoghurts for adult consumption held the largest market share (69%), a segment growing by 7.6% per annum<sup>(1)</sup>. Just under 40% of Australian adults now consume yoghurt at least once weekly<sup>(2)</sup>. Yoghurt, moreover, has been promoted in Australia as one of the healthiest convenience foods<sup>(3)</sup>. Certainly, traditional natural yoghurt manufactured with cultures of *Lactobacillus bulgaricus* and *Streptococcus thermophilus*<sup>(4)</sup> has many nutritional advantages. It is a source of high-quality, readily digested protein, contains many micronutrients, notably Ca, and may be better tolerated than milk by those with lactose maldigestion<sup>(4)</sup>. Yoghurt consumption may improve absorption of micronutrients such as Zn<sup>(5)</sup>, reduce the duration of diarrhoeal disease in children<sup>(6)</sup> and improve cellular immune function<sup>(7)</sup>. Mediterranean diets, well known for their health benefit, commonly include plain natural yoghurt daily<sup>(8)</sup>.

However, in Western societies yoghurt has changed markedly from the traditional semi-firm curd product made from milk with perhaps salt (*leben*) or water (*lassi*) added<sup>(9)</sup>. Manufacturers now alter texture through the addition of

milk solids, starch or gelatine<sup>(10)</sup>, alter taste with fruit and/or sweetening agents<sup>(9)</sup> and remove fat<sup>(9)</sup>. Health benefits are sought through fortification with vitamins and minerals<sup>(11)</sup> or addition of probiotic bacteria<sup>(12)</sup> or prebiotics such as inulin<sup>(13)</sup>. Manufacturers are also making more desserts and yoghurts targeted at children<sup>(1)</sup>.

We have previously reported on the nutrient content of Australian snack foods<sup>(14)</sup>, defining 'snacks' as portable foods readily consumed outside main meals (breakfast, lunch and dinner)<sup>(15)</sup>. We thus had excluded yoghurt as it required utensils to eat. Yet in Australia yoghurt is often eaten between main meals<sup>(2)</sup>. We therefore now report on Australian yoghurts, fromage frais and dairy desserts, having examined packet and serving size, nutrient content, additives and nutrient claims. As earlier<sup>(14)</sup>, we assess the proportion of these dairy foods that can be deemed 'healthy' using UK 'traffic light' criteria<sup>(16)</sup>, advocated for use in Australia<sup>(17)</sup> although it does not include a specific category for dairy foods. An alternative system (the 'Ofcom model')<sup>(18)</sup> was therefore also used with both positive and negative criteria and a score for protein content (as a proxy for essential nutrients).

\*Corresponding author: Email karen.walker@med.monash.edu.au

## Experimental methods

### Data collection

The Australian food supply is dominated by two super-market chains controlling around 80% of all food sales. In 2005 and 2008, surveys were undertaken to record information given on the nutrition information panel (NIP), and elsewhere on the packaging, of all yoghurts and dairy desserts presented for sale in a single large supermarket in metropolitan Melbourne. Data were collected and recorded on standardised entry sheets as described elsewhere<sup>(19)</sup>. In 2008, information in the ingredient list was also noted with codes translated according to the Australian Food Additives Code<sup>(20)</sup>. Yoghurt is defined by Standard 2.5.3 of the Australia New Zealand Food Standards Code (ANZFS) as a milk product fermented by lactic acid-producing micro-organisms to which other food (such as fruit) can be added<sup>(21)</sup>. Yoghurt drinks were not surveyed. Fromage frais comprised products marketed in Australia as Frûche<sup>TM</sup>, while dairy desserts included custards and crème caramel, mousse, dairy rice puddings and cheesecakes often consumed in Australia as snacks. In accordance with the Code of Practice on Nutrient Claims in Food Labels and in Advertising (CoPoNC), yoghurt described as 'full fat', 'reduced fat' or 'no fat' had >3 g fat/100 g, <3 g fat/100 g or <0.01 g fat/100 g, respectively<sup>(22)</sup>.

### Data analysis

Data were analysed using the SPSS for Windows statistical software package version 15.0.1 (SPSS Inc., Chicago, IL, USA). Items in each category were assessed as the sum of products and product varieties (flavour alternatives). Due to non-symmetrical distribution of data, aggregates are presented as the median and interquartile range (IQR). Dairy snacks were assessed using the green/amber (low/medium content) or amber/red (medium/high) boundaries of the UK 'traffic light' system<sup>(17)</sup>. As 'added sugar' was not listed on

the NIP, the amber/red boundary for sugar was determined as 'total sugars' minus 4.8 g/100 g, an average sugar content for natural yoghurt as reported by Australian Food Composition Tables. The Ofcom nutrient profiling system<sup>(18)</sup> was also used with foods assessed according to both positive criteria (% fruit, AOAC fibre, protein g/100 g) and negative criteria (kJ, saturated fat, total sugar and Na per 100 g).

## Results

In 2005, 248 dairy snacks were surveyed while 140 were surveyed in 2008. Yoghurts constituted about two-thirds of these foods (Table 1). Between 2005 and 2008, packet size rose from (median (IQR)) 200 (300) g to 350 (250) g ( $P < 0.001$ ). This reflected an increase in the size of individual tubs rather than an increase in the proportion of family-sized tubs of similar composition (sold as 1 kg or 6 × 200 g; data not shown).

Table 1 indicates the nutrient content of surveyed items. For yoghurt, median energy and total fat content increased significantly between 2005 and 2008 (both  $P < 0.05$ ) while median protein content decreased ( $P < 0.01$ ). For fromage frais, the median content of carbohydrate ( $P < 0.001$ ), sugars ( $P < 0.01$ ) and Na ( $P < 0.001$ ) rose over the same period. For dairy desserts the median levels of total and saturated fat also rose significantly (both  $P < 0.05$ ).

In 2005, 36% of yoghurts and dairy desserts were 'full fat' (>3 g fat/100 g). By 2008 this proportion had risen to 46% ( $P < 0.05$ ). The contribution of sugars to total energy content in 'reduced-fat' yoghurts was notable (Table 2). Indeed, of all 'reduced-fat' yoghurts surveyed in 2008, 7% had energy content above the median for 'full-fat' products (Fig. 1). The lowest energy content found among 'full-fat' products was in a European-style natural yoghurt (3.7 g fat/100 g). The majority (90%) of 'reduced-fat' yoghurts contained more energy than this 'full-fat' product.

**Table 1** Nutrient content of dairy snacks surveyed in a large supermarket in metropolitan Melbourne, Australia

	Yoghurts				Fromage frais				Dairy desserts			
	2005		2008		2005		2008		2005		2008	
Number of items	169		90		28		9		51		41	
Maximum varieties per product	14		15		9		3		9		8	
	Median	IQR	Median	IQR	Median	IQR	Median	IQR	Median	IQR	Median	IQR
Energy (kJ/100 g)	385	140	418*	151	384	204	458	227	463	145	444	197
Protein (g/100 g)	4.8	1.0	4.5**	1.0	5.3	0.5	5.4	1.8	3.2	1.7	4.0	1.6
Total fat (g/100 g)	1.0	3.0	2.6*	2.0	0.5	6.0†	1.7	3.0	2.8	3.0	3.0*	3.0
Saturated fat (g/100 g)	0.6	2.0	1.6	2.0	0.3	4.0	1.2**	2.0	1.6	2.0	1.9*	2.0
Carbohydrate (g/100 g)	14.9	6.3	15.3	7.3	14.6	0.7	17.4***	5.0	18.4	5.6	16.7	4.2
Sugars (g/100 g)	13.7	6.7	13.9	5.0	14.1	1.3	15.5**	4.0	13.2	4.2	13.5	3.8
Na (mg/100 g)	59	23	58	21	24†††	7	51***	26	68	63	65	27
Ca (mg/100 g)	157	41	150	27	203	98	174	58	111	41	122	48

IQR, interquartile range.

Median values were significantly different from those in 2005: \* $P \leq 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

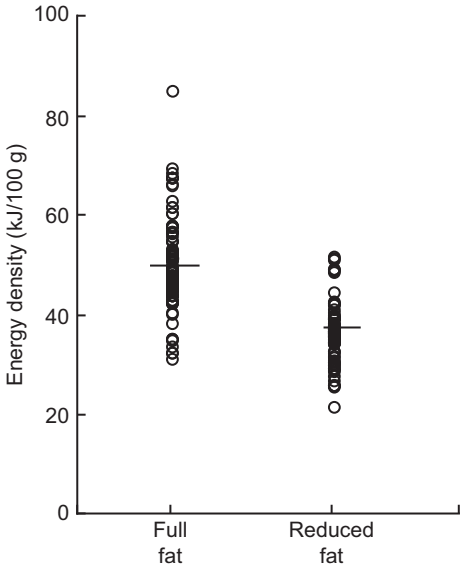
Median value was significantly different from that of yoghurt surveyed in the same year: ††† $P < 0.001$ .

†Large interquartile ranges for some nutrients reflect heterogeneity within the group with respect to fat content or fortification. Here, nine high-fat products (>6 g/100 g) are admixed with nineteen low-fat products.

**Table 2** Nutrient content of yoghurts surveyed in a large supermarket in metropolitan Melbourne, Australia

	Full fat				Reduced fat				No fat			
	2005		2008		2005		2008		2005		2008	
	Median	IQR	Median	IQR	Median	IQR	Median	IQR	Median	IQR	Median	IQR
Number of items	59		41		74		32		36		17	
Energy (kJ/100 g)	475	69	510	137	380	70	382	19	209	186	169***	8
Protein (g/100 g)	4.7	1.2	4.7	1.8	4.9	0.8	4.5***	0.2	4.9	1.1	3.7***	0.4
Total fat (g/100 g)	3.4	1.0	3.2	1.0	0.9	0.0	1.7***	0.0	0.1	0.0	0.1	0.0
Saturated fat (g/100 g)	2.2	1.0	2.2	0.0	0.6	0.0	1.2*	0.0	0.1	0.0	0.1	0.0
Carbohydrate (g/100 g)	14.9	4.8	16.2***	5.1	15.4	3.8	15.5	5.3	6.9	9.7	5.9*	0.6
Sugars (g/100 g)	13.8	5.1	14.7	2.9	14.2	2.1	14.9	4.1	5.8	8.9	5.4*	0.4
Na (mg/100 g)	63	19	57*	28	55	21	56	11	54	31	75*	20
Ca (mg/100 g)	160	46	138	66	160	38	150	13	135	48	161*	27

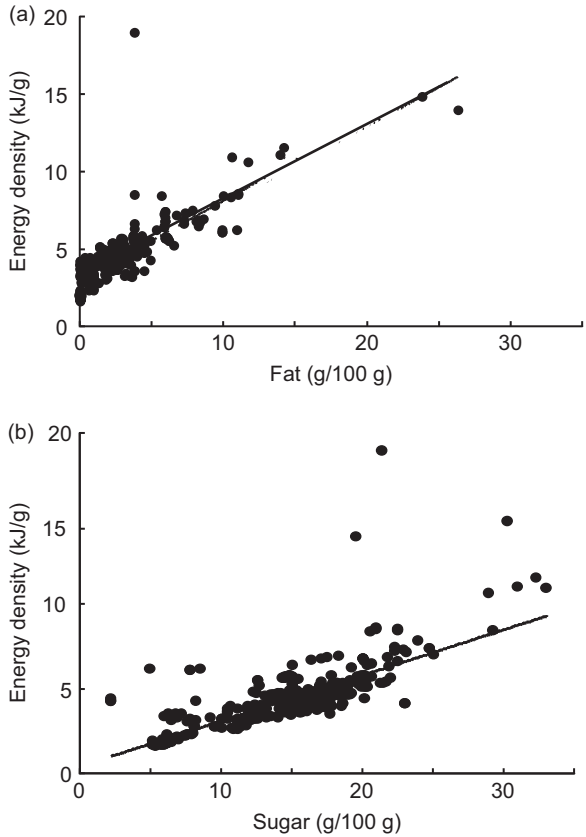
IQR, interquartile range.  
Median values were significantly different from those in 2005: \* $P \leq 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .



**Fig. 1** Energy content of 'full-fat' compared with 'reduced-fat' yoghurts offered for sale in a large supermarket in metropolitan Melbourne, Australia (combined data from 2005 and 2008; horizontal lines indicate the median)

As seen in Table 2, the median carbohydrate content of 'full-fat' yoghurt increased by 2008 ( $P < 0.001$ ) while median Na level decreased ( $P < 0.05$ ). In 'reduced-fat' yoghurt over the same time, total fat and saturated fat content increased ( $P < 0.001$  and  $P < 0.05$ , respectively) while protein content decreased ( $P < 0.001$ ). Figure 2 examines the energy density of dairy snacks in relation to fat and sugar content. There was not only a strong relationship between fat content and energy density ( $r = 0.820$ ,  $P < 0.001$ ) but also a strong relationship between sugar content and energy density ( $r = 0.690$ ,  $P < 0.001$ ).

Table 3 assesses yoghurts and dairy desserts against UK 'traffic light' criteria for the 'green' labels that indicate a low content of fat, saturated fat, total sugars and salt<sup>(16)</sup>. Although all yoghurts and dairy desserts met the relevant criterion for salt content, very few met either the criterion set for sugar or all four criteria. Moreover, the proportion



**Fig. 2** Energy density of dairy snacks offered for sale in a large supermarket in metropolitan Melbourne, Australia in 2008 as related to (a) fat content per 100 g ( $r = 0.690$ ) and (b) sugar content per 100 g ( $r = 0.820$ )

meeting four 'green' criteria declined between 2005 and 2008, while the proportion that would receive one or more 'red light' labels (indicating a high fat, saturated fat, sugar or salt content) increased significantly from 12% to 23% ( $P < 0.01$ ). When yoghurts and dairy desserts were categorised according to a nutrient profiling model that included a score for protein content<sup>(18)</sup>, only 21% (in 2005) or 28% (in 2008) were deemed 'healthy'.

**Table 3** Percentage of dairy snacks surveyed in a large supermarket in metropolitan Melbourne, Australia complying with the boundary criteria of UK signpost labelling<sup>(16)</sup> or the Ofcom nutrient profiling system<sup>(18)</sup>

	Yoghurts		Fromage frais		Dairy desserts		All dairy snacks	
	2005	2008	2005	2008	2005	2008	2005	2008
Complying with 'green' criteria								
Fat $\leq 3$ g/100 g	69	58*	68	78*	59	46**	65	56
Saturated fat $\leq 1.5$ g/100 g	64	46***	68	78*	39	24***	58	43**
Sugars $\leq 5$ g/100 g	5	2*	7	0***	4	0***	5	1***
Salt $\leq 0.3$ g/100 g	100	100	100	100	100	100	100	100
Meeting four 'green' criteria	2	1	0	0	4	0***	2	1
Meeting one or more 'red' criteria	11	16	4	22***	20	39***	12	23**
'Healthy' by nutrient profiling†	11	30***	32	22*	47	24***	21	28

Percentages were significantly different from those in 2005: \* $P \leq 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

†Using both positive and negative criteria<sup>(18)</sup>.

**Table 4** Proportion of dairy snacks surveyed in a large supermarket in metropolitan Melbourne, Australia in 2008 containing additives and/or sweeteners

	Code <sup>(20)</sup>	Percentage of total (2008)		
		Yoghurts	Fromage frais	Dairy desserts
Additives				
Hydroxypropyl distarch phosphate	1442	70	100	0
Halal gelatine		53	100	29
Pectins	440	45	100	0
Agar	406	31	0	0
Locust/carob bean gum	410	20	33	27
Carrageenan	407	0	0	63
Sodium citrate	332	57	78	17
Sorbic acid	200	45	0	0
Citric acid	330	43	67	12
Malic acid	296	12	56	5
Inulin		3	0	10
DHA algal oil		4	0	0
HIDA fish oil		3	0	0
Vitamins/minerals		3	0	17
Cochineal	120	28	33	17
Annatto extracts	160b	25	56	7
Sweeteners				
Sugar		76	100	95
Honey		13	0	0
Apple juice/fruit juice		9	44	0
Glucose		3	1	17
Corn syrup		0	11	0
Acesulphane K	950	18	0	10
Aspartame	951	17	0	10
Sucralose	955	1	0	0
Sorbitol	420	0	0	5

In 2008 ingredients for yoghurts and dairy desserts were also surveyed (Table 4). Products had up to fifteen separate additives, 50% had six or more added ingredients. In yoghurts, modified starch, gelatine, pectin, agar and locust or carob bean gum were common thickeners. Fromage frais were more often thickened with modified starch while dairy desserts were more often thickened with carrageenan. About half the yoghurts contained acidity regulators (sodium citrate and/or sorbic and citric acids). Few yoghurts were fortified with micronutrients, *n*-3 fatty acids or inulin, in contrast to dairy desserts where 17% contained added vitamins and/or minerals and 10% contained inulin. Fromage frais remained unfortified. Main colourings used were cochineal and annatto.

Sugar (sucrose) was the most common sweetener, found in levels up to 29 g/100 g. In yoghurt, the most common alternative/additional nutritive sweeteners were honey, fruit juice concentrate and glucose. In fromage frais, sweetening with apple/fruit juice was common while glucose was often added to dairy desserts. Nearly 20% of yoghurts and 10% of dairy desserts contained non-nutritive sweeteners (acesulphane K or aspartame). A few dairy desserts contained sorbitol. Sucralose was used rarely.

Although few dairy snacks could be described as 'healthy', a great many made nutrition-related claims (Table 5), many of these directed towards parents with children. The most common related to Ca, protein or fat

**Table 5** Claims made on packets for dairy snacks surveyed in a large supermarket in metropolitan Melbourne, Australia in 2008

Type of claim	Percentage of total (2008)		
	Yoghurts	Fromage frais	Dairy desserts
Ca claim	56	0	42
Fat-related claim	43	78	29
No artificial flavours	36	22	34
No artificial colours	36	0	34
Protein claim	25	11	17
Allergy warning	18	33	27
Sugar claim	11	0	5
'Contains real fruit' claim	11	0	2
'No lumps'/no bits'	11	0	0
Gut function claim	10	0	0
'Contains omega-3' claim	8	0	0
No preservatives	8	0	37
Gelatine-free	6	0	0
Dairy or milk claim	4	22	22
No artificial sweeteners	3	0	34
Gluten-free	1	22	34

content. Others related to the absence of artificial flavours or colours or to the presence of ingredients with potential to cause allergy. Few referred to sugar content.

## Discussion

The current survey of yoghurts and dairy desserts from an Australian supermarket has shown that between 2005 and 2008, change has largely been detrimental. Packet size as well as energy, total fat, saturated fat or sugar content increased. Many 'reduced-fat' products supplied more energy than 'full-fat' products due to the high level of added sugars. The energy density of yoghurts and dairy desserts was thus related strongly to both fat and sugar content. There is no evidence for compositional change or legislative change over this time to explain these results. Overall, observed changes in yoghurts and dairy desserts contribute to deterioration in the food environment facing the consumer, particularly given the known importance of high availability of energy-dense snacks in large portion sizes<sup>(23)</sup> in promoting increased body weight.

As with our previous survey of non-dairy snack foods<sup>(14)</sup>, it is evident that an Australian consumer entering a supermarket to select a yoghurt or dairy dessert is faced with a bewildering choice of available products, of which only a minority are 'healthy' despite numerous claims suggesting health or nutritional benefits. Numbers of products declined slightly from 2005 to 2008, most likely due to the introduction of supermarket 'home-brand' products (currently 15% of the market and increasing by 3–5% per annum). This strategy has been employed to increase margins, build customer loyalty and improve retailer buying power<sup>(24)</sup>. It also gives retailers more power to influence availability and nutritional composition<sup>(25)</sup>.

We previously reported that 91% of snack foods would carry at least one 'red' label indicating a high content of fat, saturated fat, salt or sugar as judged by UK traffic light criteria<sup>(14)</sup>. Yoghurts and dairy desserts compare favourably with non-dairy snacks: only 23% in 2008 passed one or more criteria for a 'red traffic light' label. Nevertheless, the proportion of 'less healthy' yoghurts and dairy desserts overall is substantial and appears to be growing. We have also applied the Ofcom model<sup>(18)</sup> that scores a wider range of nutrients although its primary focus is children's foods. Using this model, the proportion of 'less healthy' yoghurts and dairy desserts becomes even higher.

A clear interpretive front-of-pack nutrition label on dairy snacks can greatly help identify optimal choices and many Australians therefore support the introduction of a 'traffic light' system<sup>(17)</sup>. Yet while better selection of snacks has potential to improve diets, in making their choice, people often place taste and price above nutrition-related criteria<sup>(26)</sup> or are more concerned about additives than nutrients<sup>(27)</sup>. Regrettably, those with less healthy intakes are least likely to consult an NIP<sup>(28)</sup>. There is therefore a need for reformulation of many dairy foods so that healthy choices constitute a larger proportion of the snacks available and the healthy choice may be more probable<sup>(26)</sup>. Such change may occur when consumers become educated to demand more nutritious choices and when governments support and encourage food reformulation<sup>(26)</sup>. While some manufacturers may be willing to voluntarily self-regulate or change product formulation, market pressures and adverse retailer influence may make government legislation necessary to ensure that beneficial change is uniformly implemented. Governments can also legislate to restrict imprecise claims, to ensure optimal food labelling, to control food advertising to children, and to define school canteen policies. Taxation can also be used to improve consumer choice<sup>(18)</sup>. Taxes on high-fat and/or high-sugar foods have been proposed but not adopted in Australia<sup>(29)</sup>. Yet since reducing the price of healthier food options can increase their purchase<sup>(30)</sup>, taxes gained from 'less healthy' foods might also usefully subsidise healthy food choices and support health promotion.

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final manuscript. J.R. contributed to data collection and made comments on the final manuscript. R.H. made a large contribution to data collection.

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