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# Are foods with fat-related claims useful for weight management?☆



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## ABSTRACT

Many consumers believe that foods labelled with fat claims (e.g. low fat) are lower in calories than comparable regular foods and are therefore helpful for weight management. However, it is unknown whether such foods are actually lower in calories. Our aims were to determine 1) the relative proportion of foods carrying fat claims among various food categories within the Canadian marketplace; and 2) whether foods with fat claims are actually lower in calories than comparable foods without claims. The Food Label Information Program 2010, a database of Canadian foods developed at the University of Toronto, was used to compare the calorie content of products with and without fat claims within a given food subcategory, as defined by Schedule M of the *Food and Drug Regulations*. Median differences of 25% or greater were deemed nutritionally significant, as that is the minimum difference required for comparative claims such as “reduced” and “lower” in the *Food and Drug Regulations*. Fat claims were present on up to 68% of products in a given food subcategory. Products with fat claims were not significantly lower in both fat and calories compared to comparable products without fat claims in more than half of the subcategories (24 out of 40) analyzed. Conversely, in 16 subcategories, foods with fat claims were at least 25% lower in calories; however, for many of these foods, the absolute difference in calories was small, i.e., for 9 of the 16 subcategories, the absolute difference between foods with and without fat claims was <50 calories, even though the relative percent difference was high. This research suggests that foods with fat claims may be misleading consumers and undermining their efforts to manage body weight or prevent obesity.

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## 1. Introduction

The recommendation to choose low fat foods has been a cornerstone of healthy eating nutrition recommendations for many years; however, limiting total dietary fat for weight management remains a controversial topic. A number of past studies have suggested that the consumption of lower fat foods is associated with various health benefits including lower intakes of calories, thereby having the potential to reduce the prevalence of obesity (Bray & Popkin, 1998; Peterson, Sigman-Grant, Eissenstat, & Kris-Etherton, 1999; Sigman-Grant, Warland, & Hsieh, 2003; Wirfalt & Jeffery, 1997). Meanwhile, other studies have shown no link

between dietary fat and obesity (Austin, Ogden, & Hill, 2011; Langlois, Garriguet, & Findlay, 2009; Lichtenstein et al., 1998; Willett, 2003). For example, results from the 2004 Canadian Community Health Survey found that the relative amounts of fats, carbohydrates and protein did not increase the odds of obesity for adults (Langlois et al., 2009). Rather, higher total calorie intake in both sexes and lower fibre intake in men were the main risk factors for obesity. Similarly, longitudinal analysis of the National Health and Nutrition Examination Surveys (NHANES), from 1971–4 to 2005–6, showed that while the percentage of calorie intake from fat had decreased over time, calorie intake increased overall, as did obesity rates (Austin et al., 2011). Regardless, since the 1980s, there has been a plethora of messages from various sources advising consumers to choose lower fat foods, from government (e.g. Canada's Food Guide and MyPlate in the United States) (Health Canada, 2002; United States Department of Agriculture, 2015), and advice from health professionals (Dietitians of Canada, 2013), to messages from media and industry. Thus, it is not surprising that with this focus on dietary fat, fat information on nutrition labels is used by Canadian consumers more often than any other nutrient (Canadian

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Council of Food and Nutrition, 2008; The Strategic Counsel, 2011).

In the Canadian *Food and Drug Regulations*, there are 10 types of nutrient content claims about total fat allowed on food packages – free of fat, low in fat, reduced in fat, lower in fat, 100% fat free, (percentage) fat free, no added fat, light in fat, lean and extra lean – along with a number of permitted wording variations for each type of claim (e.g. variations for “free of fat” include “fat-free” and “no fat”) (Government of Canada, 2003). Nutrient content claims are included on food packages voluntarily by food manufacturers, but conditions governing their use are regulated by Health Canada (Government of Canada, 2003; Health Canada, 2010) and the US FDA (U.S. Food and Drug Administration, 2009). A recent study by Schermel, Emrich, Arcand, Wong, and L’Abbe (2013) showed that fat claims were the most prevalent nutrient content claim in Canada, found on 16% of food and beverage products (2010–2011). Similarly, in the US, claims about total fat were also the most prevalent type of nutrient content claim and were found on 22% of products (2006–2007) (Brandt, Moss, & Ferguson, 2009). This percentage rose from 17%, as reported in 2000–2001 (Legault et al., 2004).

The mandatory Nutrition Facts table, which provides information about calories and the 13 core nutrients calculated from the serving size, is important for allowing consumers to track the nutrient amounts they are consuming and compare foods. Studies have shown that although sceptical of claims, consumers often rely on them alone without considering the Nutrition Facts Table in order to accelerate their search for nutritional information (Chan, Patch, & Williams, 2005; Roe, Levy, & Derby, 1999). This can lead to more favourable and potentially misleading evaluations of the overall nutritional quality of products (Roe et al., 1999). In regard to fat claims, some consumers believe that foods that are lower in fat are beneficial for weight management (Chan et al., 2005; Roy Morgan Research, 2008). This belief has led consumers, particularly overweight consumers, to increase their food intake of products labelled with a fat claim (Ebnetter, Latner, & Nigg, 2013; Wansink & Chandon, 2006). In a study by Wansink and Chandon (2006), “low fat” labelling led participants to eat 28.4% more (54 calories) M&M candies and 50.1% more (84 calories) more granola than when they were labelled as regular. Furthermore, low fat labelling of the M&Ms led to greater consumption among overweight compared to normal weight participants. A similar recent study by Ebnetter et al. (2013) showed that participants underestimated the calorie content of “low fat” M&Ms by 71 calories and overestimated the calorie content of regular M&Ms by 38 calories; however, differences in food consumption were not significantly different. Similarly, other studies have shown that marketing foods as “healthy” has led consumers to underestimate caloric content or to consume more of the product (Chandon & Wansink, 2007; Finkelstein & Fishbach, 2010; Provencher, Polivy, & Herman, 2009). The *Food and Drug Regulations*, however, allows fat claims on foods without considering the amount of calories in the food.

Considering the strong evidence that low fat claims are associated with weight management by consumers, it is unknown the extent to which foods with fat claims are also lower in calories. Thus, in the present study our aims were to determine: 1) the relative proportion of fat claims among various food categories in the Canadian marketplace; and 2) whether foods with fat claims are lower in calories than comparable foods without fat claims.

## 2. Methods

### 2.1. Food Label Information Program

The Food Label Information Program, a database of Canadian food package label information that was developed at the

University of Toronto, was used to compare the fat and calorie levels in products with and without fat claims. The Food Label Information Program 2010 database contains nutrition information for a total of 10487 unique products, representing 75.4% of the grocery retail market share (Canadian Grocer, 2012). Information collected for each product included the Universal Product Code, company, brand, price, container size, nutrient content claims, disease risk reduction claims, front of pack symbols, Nutrition Facts table information, and date and location of purchase.

Food products were collected from 23 distinct predefined food categories (e.g., bakery products) and 153 subcategories (e.g., “crackers, hard bread sticks and melba toast”) as described in Schedule M of the *Food and Drug Regulations* [B.01.001] (Government of Canada, 2015). Schedule M was created in order to define reference amounts (i.e. serving sizes) that must be used as the basis for making a nutrient content claim or a disease risk reduction claim on foods.

Detailed methods regarding data collection, categorization of claims and front-of-pack information, and data validation are described elsewhere (Schermel et al., 2013).

### 2.2. Fat claim definitions

Only claims authorized by Health Canada and appearing in the Canadian Food Inspection Agency Guide to Food Labelling and Advertising were considered (Canadian Food Inspection Agency, 2014a; Government of Canada, 2003). Fat claims included all those found on food packages in the Food Label Information Program: fat free, reduced in fat, low in fat, lean and extra lean. All of the authorized variations in the wording of these claims were also included (e.g. variations of “fat free” include “0g fat” and “free of fat”).

### 2.3. Analysis

All food Schedule M categories where 5% or more products carried a fat claim were included in this study ( $n = 16$  of 22 categories; 8819 products). Foods were then organized further by Schedule M subcategories to allow comparisons between comparable foods (113 subcategories were identified within the 16 major categories included in this study). Subcategories were excluded from the analysis if less than 10% of products or less than 6 products carried a fat claim ( $n = 73$  of 113 subcategories; 3029 products); thus, 40 subcategories and 5790 foods were included in the final analysis. Each subcategory was then checked for outliers by displaying the distribution of calories as a histogram; none were excluded. Calorie calculations based on Atwater factors were used to identify data entry errors, and any differences between calculated and recorded calories of 20% or greater were checked manually against the product label information. Within each subcategory, median, lower quartile and upper quartile calorie (kcal) and fat levels (g) per reference amount (a standard serving size established for each food subcategory, expressed in g or mL, as defined in Schedule M of the *Food and Drug Regulations* (Government of Canada, 2003) were calculated for products with and without fat claims (Appendix 1).

### 2.4. Nutritional significance

Differences that were both statistically and nutritionally significant are reported in this study. Differences in medians equal to or greater than 25% were used to determine nutritional significance, as that is the minimum difference required for comparative claims such as “reduced” and “lower” in the *Food and Drug Regulations* (Government of Canada, 2003) and is greater than the 20%

tolerance limit used by the Canadian Food Inspection Agency for assessing the accuracy of nutrient values on food labels and in advertising (Canadian Food Inspection Agency, 2014b).

### 2.5. Statistics

Data were analyzed using SAS Version 9.3 (Statistical Analysis Software Co, Cary NC). The data were nonparametric; therefore, the Wilcoxon Rank Sum test was used to determine statistical significance differences ( $P < 0.05$ ) in the median calorie and fat content between foods with and without fat claims.

## 3. Results

### 3.1. Subcategories with the highest proportion of fat claims

As shown in Appendix 1, the subcategories with the highest proportion of products with fat claims included ready-to-eat breakfast cereals without fruits and nuts (68%;  $n = 85$ ), cottage cheese (65%;  $n = 23$ ), luncheon meats (55%,  $n = 108$ ), soups (53%;  $n = 334$ ), vegetable sauce or puree (50%,  $n = 16$ ) and sour cream (50%,  $n = 16$ ).

### 3.2. Fat and calorie levels in products with and without fat claims

For the purposes of this section, “significance” will refer to both statistical significance and nutritional significance. Nutritional significance represents a percent reduction of at least 25% in the median levels of fat (g/g- or mL-reference amount) or calories (kcal/g- or mL-reference amount), between products with and without claims, within each subcategory.

#### 3.2.1. Fat levels

For 32 of the 40 subcategories analyzed (80% of subcategories), products with fat claims were significantly lower in fat compared to products without total fat claims (Table 1; see Appendix 1 for absolute and relative differences in median calorie and fat levels). For the other 8 subcategories, products with fat claims were not significantly lower in fat than comparable products without fat claims.

#### 3.2.2. Calorie levels

For 16 of the 40 subcategories (40% of subcategories; 2227 products), products with fat claims were significantly lower in both fat and calories compared to products without total fat claims (Table 1 and Appendix 1). For only 4 of these subcategories (dairy desserts, marine and fresh water animals, cuts of meat and poultry without sauce, and meat and poultry with sauce), the absolute difference between median levels of calories was greater than 100 (kcal/g- or mL-reference amount; Appendix 1). For the other 12 subcategories, the absolute difference between median amounts of calories ranged between 17 (dips) and 70 (dressings for salad). In all cases, the percentage reduction in fat was markedly greater than the percentage reduction in calories (Table 1 and Appendix 1).

However, for the other 24 subcategories (60% of subcategories; 3563 products), products with fat claims were not significantly lower in calories compared to products without total fat claims. For 16 of these 24 subcategories (2461 products), products with fat claims were significantly lower in fat compared to products without fat claims; however, for the other 8 subcategories (1102 products), products with fat claims were not lower in fat.

We have divided the food subcategories into the following three groups: *products with fat claims that are lower in both calories and fat*, *products with fat claims that are not lower in fat*, and *products with fat claims that are lower in fat but not lower in calories* (Table 1).

## 4. Discussion

The present study examined whether foods with fat claims are lower in calories than comparable foods without fat claims; this is a particularly relevant research question, as consumers believe that foods with fat claims should be lower in calories.

For nearly half of the products examined ( $n = 2461$ ; 16 of 40 subcategories), products with fat claims were lower in fat but not lower in calories, compared to products without fat claims. Even in the foods with fat claims where calories were reduced ( $n = 2227$ ; 16 of 40 subcategories), the level of fat reduction was considerably greater than the level of calorie reduction. Additionally, the nutritional significance of this calorie reduction was negligible for most of these subcategories, as the absolute difference in calories was small. Some of these subcategories were already relatively low in calories (e.g., dips, luncheon meats and sour cream had overall medians of 40, 60, and 60 calories per reference amount, respectively) and hence there was little absolute difference between these medians for foods with and without fat claims (e.g. 17, 23, and 27 calories per reference amount, respectively). This suggests that even in those subcategories with fat related claims that are lower in calories, the calorie reductions are unlikely to be meaningful for weight management.

Furthermore, in showing that calorie reductions are indeed minimal to nil in most food categories, this research highlights the difference in the actual food composition compared to consumer perceptions. Behavioural studies which offer participants the same food product with two different labelling conditions (“low fat” vs. “regular”) have shown that consumers, and particularly overweight consumers, have a tendency to underestimate calorie content in foods with fat claims leading to overconsumption of these “low fat” foods (Ebnetter et al., 2013; Wansink & Chandon, 2006). Thus, rather than low fat claims leading consumers to eat less calories as they are intended to do, these claims are actually leading consumers to eat more in serving themselves larger portions and increasing their calorie intakes. Importantly, not only can calorie underestimation lead to the overconsumption of calories, but it can also lead to an overconsumption of other nutrients to limit, including sodium. Indeed, the top sources of sodium in the Canadian diet are also those with a large percentage carrying fat claims, including breads and bread-like products; processed meats; vegetable-based dishes, tomato and vegetable juice; soups; pasta-based dishes (part of the category “combination dishes measurable with a cup” as seen in Table 1); and cheese (Fischer, Vigneault, Huang, Arvaniti, & Roach, 2009).

To our knowledge, no study has examined the relationship between fat claims on packages and calorie content on a large scale. However, our findings are consistent with a small US study by Schwartz, Vartanian, Wharton, and Brownell (2008) which found that breakfast cereals with low fat claims did have a lower fat content than those without low fat claims, but did not differ in the amount of calories, sugar, or sodium. Similarly, we found that ready-to-eat breakfast cereals with fat claims were not nutritionally significantly lower in calories compared to those without fat claims: median calorie levels were only 6 calories/reference amount lower (5% reduction) for cereals without fruits and nuts, and 18 calories/reference amount lower (8% reduction) for cereals with fruits and nuts. Even though this latter reduction is statistically significant, the absolute reduction was small (<1% of daily calories). It should also be noted that compared to all other subcategories, breakfast cereals without fruits and nuts had the highest proportion of products with fat claims (68%).

Most importantly, in only 4 of the 40 subcategories (dairy desserts, marine and fresh water animals, cuts of meat and poultry without sauce, and meat and poultry with sauce), was the absolute

**Table 1**  
Schedule M subcategories<sup>a</sup> grouped by nutritional significance<sup>b</sup> of calorie and fat level decreases between products with and without fat claims.

Subcategories where products with fat claims are lower <sup>b</sup> in both calories and fat (n = 16 of 40 subcategories; 2227 products) (% change in median fat/% change in median calories)	Subcategories where products with fat claims are not lower <sup>b</sup> in fat (n = 8 of 40 subcategories; 1102 products) (% change in median fat/% change in median calories)	Subcategories where products with fat claims are lower <sup>b</sup> in fat but not lower in calories (n = 16 of 40 subcategories; 2461 products) (% change in median fat/% change in median calories)
<ul style="list-style-type: none"> <li>Cheese, including cream cheese and cheese spread, except those listed as a separate item (–47%/–36%)</li> <li>Sour cream (–84%/–54%)</li> <li>Ice cream, ice milk, frozen yogurt, sherbet (–64%/–27%)</li> <li>Dairy desserts, frozen, such as cakes, bars, sandwiches or cones (–85%/–46%)</li> <li>Custard, gelatin and pudding (–100%/–43%)</li> <li>Eggs (–100%/–64%)</li> <li>Dressing for salad (–95%/–70%)</li> <li>Mayonnaise, sandwich spread and mayonnaise-type dressing (–60%/–50%)</li> <li>Marine and fresh water animals without sauce (–90%/–56%)</li> <li>Luncheon meats (–70%/–29%)</li> <li>Cuts of meat and poultry without sauce (–82%/–43%)</li> <li>Patties, cutlettes, chopettes, steakettes, meatballs, sausage meat and ground meat (–50%/–27%)</li> <li>Cured meat products (–71%/–40%)</li> <li>Meat and poultry with sauce (–89%/–50%)</li> <li>Dips, such as legume or dairy-based (–40%/–27%)</li> <li>Soups (–60%/–33%)</li> </ul>	<ul style="list-style-type: none"> <li>Bread, excluding sweet quick-type rolls (–7%/–4%)</li> <li>Hot breakfast cereals (–5%/–3%)</li> <li>Ready-to-eat breakfast cereals, puffed and coated, flaked, extruded, without fruit or nuts (20 g–42 g per 250 mL) (–9%/–5%)</li> <li>Pastas without sauce (+40%/0%)</li> <li>Beans, peas and lentils (–9%/–33%)</li> <li>Minor main entree sauce (0%/–33%)</li> <li>Pickles and pickled vegetables (0%/–64%)</li> <li>Vegetable sauce or puree (0%/+12%)</li> </ul>	<ul style="list-style-type: none"> <li>Bagels, tea biscuits, scones, rolls, buns, croissants, tortillas, soft bread sticks, soft pretzels and corn bread (–45%/+1%)</li> <li>Crackers, hard bread sticks and melba toast (–47%/–7%)</li> <li>Dry breads, matzo, and rusks (–74%/–15%)</li> <li>French toast, pancakes, and waffles (–67%/–16%)</li> <li>Grain-based bars, without filling or coating (–56%/–13%)</li> <li>Rice cakes and corn cakes (–76%/–6%)</li> <li>Ready-to-eat breakfast cereals, fruit and nut type, granola (weighing 43 g or more per 250 mL) and biscuit type cereals (–65%/–8%)</li> <li>Cottage cheese (–52%/–7%)</li> <li>Quark, fresh cheese and fresh dairy desserts (–28%/–22%)</li> <li>Plant-based beverages, milk, buttermilk and milk-based drinks (–38%/–18%)</li> <li>Yogurt (–93%/–22%)</li> <li>Canned meat and poultry (–98%/–7%)</li> <li>Bread crumbs and batter mixes (–81%/–7%)</li> <li>Combination dishes measureable with a cup (–33%/+3%)</li> <li>Major main entree sauce (–40%/–13%)</li> <li>Chips, pretzels, popcorn, extruded snacks, grain-based snack mixes and fruit-based snacks (–79%/–24%)</li> </ul>

**Note:** Full details of absolute and relative median calorie and fat levels for foods with and without fat claims for each of the food categories and subcategories are provided in [Appendix 1](#).

<sup>a</sup> The number of Schedule M subcategories included in the final analysis was 40 (5790 products). Overall categories were excluded if less than 5% of products carried a fat claim. Subcategories were excluded if less than 10% or less than 6 products carried a fat claim.

<sup>b</sup> Lower from a nutritionally significant standpoint: the difference in median levels between products with and without fat claims per subcategory is  $\geq 25\%$ .

difference between median amounts of calories greater than 100 (equivalent to 5% of the average adult's daily energy intake based on a 2000 calorie diet). However, for these subcategories as well as certain others, there was a clear distinction between foods with fat claims and foods without fat claims. Contrary to what one might assume, foods with fat claims were not lower fat versions of the same food (e.g. "light" ice cream instead of regular ice cream). Rather, foods with fat claims were actually lower fat alternatives, while foods without fat claims were the "regular" versions (e.g. frozen yogurt vs. ice cream). In the dairy desserts subcategory, products without fat claims were mostly ice cream bars, whereas products with fat claims were mostly ice milk bars. For the marine and fresh water animals subcategories, products without fat claims were mostly battered or breaded fish or seafood while products with fat claims were mostly skinless versions with no batter or bread. Similarly, for meats with no sauce, products without fat claims included mainly red meats, chicken wings, and breaded chicken, while products with fat claims included mainly chicken breasts without skin, breading or batter. Therefore, in certain food categories, fat claims may actually help to identify lower fat, lower calorie alternative products rather than lower fat, lower calorie versions of a particular product (reformulations). Based on this finding, it may be more effective to focus educational programs on techniques or tips to help consumers identify healthy, lower calorie alternatives rather than having consumers rely solely on fat claims.

Manufacturers are allowed to use nutrient content claims at their discretion if certain criteria are met. Thus, one manufacturer might choose to label a product that is already low in fat with such a claim, while another might not. Indeed, our results showed that in certain subcategories, such as pickles, vegetable sauces or purées, and minor main entrée sauces, many products met the criteria for a

low fat claim, though not all of the products in that subcategory actually carried a claim. Thus, the voluntary nature of fat claims, particularly in categories that are already low in fat, may mislead consumers to believe that a particular product with such a claim has less fat (and potentially less calories) than a similar product without a claim, if they do not look to the Nutrition Facts table on the back of pack.

Given these results that show the large number of products with fat claims, one labelling alternative might be to require front-of-pack nutrition rating systems and symbols across all prepackaged food and beverage products, an approach that has been supported by multiple health committees, organizations, and agencies as a means to prevent chronic disease and weight gain ([Committee on the Examination of Front-of-Package Nutrition Rating Systems and Symbols, 2011](#); [Department of Health \(Australian Government\), 2014](#); [Department of Health \(UK Government\), 2013](#); [Silverglade and Ringel Heller, 2010](#); [The Standing Committee on Health, 2007](#)). Contrary to fat claims, a front-of-pack system would display a consumer friendly nutritional rating of a food based on its overall nutritional profile, and not just the fat content. In 2011, the Institute of Medicine recommended implementation of a single, standardized front-of-pack system on all food and beverage packages. In addition, a recent Canadian study by [Emrich et al. \(2014\)](#) supported the Institute of Medicine's recommendation and from their data concluded that "[Canadian] consumers would prefer a front-of-pack system that builds upon the well-liked, helpful, credible, and influential Nutrition Facts table, providing nutrient-specific information in the form of a traffic light or Nutrition Facts [front-of-pack system]".

Some limitations to this research need to be considered. First, the definition of "nutritional significance" was subjective as no true



definition exists. However, it was necessary to establish a definition for nutritional significance, as many of the subcategories showed statistical significance given the large number of foods examined, yet the relative differences would not be deemed physiologically or nutritionally meaningful. Therefore, we used the established nutrition regulatory criteria of  $\geq 25\%$  reductions that manufacturers must meet in order to label a product “reduced,” to define nutritional significance (Government of Canada, 2003). This is also consistent with the Canadian Food Inspection Agency’s nutrition labelling compliance test tolerance limit of 20%, which is used for assessing the accuracy of nutrition labelling and claims, i.e., the analyzed nutrient content of a food has to be within 20% of the declared value for calories and fat (Canadian Food Inspection Agency, 2014b). Second, this study was limited to the nutrition information provided on food and beverage package labels, and did not measure the actual nutrient levels in the foods, although an earlier Canadian study showed a high level of agreement between fat levels on the Nutrition Facts table and analyzed values (Pantazopoulos et al., 2011). Thirdly, we did not measure the amount of those foods that individuals actually consume, nor did we adjust our data for the relative market-share sales figures for each product. Future research could adjust the results for actual amounts consumed in order to quantify the impact of the consumption of low fat products on mean fat and calorie intakes; however, the findings were so consistent across a wide range of foods that it would be unlikely to change the conclusion that lower fat foods are not necessarily lower in calories. Lastly, these results may not reflect the entire Canadian marketplace as food purchasing was limited to the Toronto and Calgary regions, but did cover all national and private label branded foods sold by the four largest national food retailers, accounting for 75.4% of the grocery retail market share (Canadian Grocer, 2012).

## 5. Conclusions

The results of this research indicate that overall, the vast majority of products with fat claims are not significantly lower in calories than products without claims. As many consumers believe that foods that are lower in fat are beneficial for weight management, fat claims may in fact be misleading consumers and undermining their efforts to manage body weight or prevent obesity. A more effective nutrition labelling approach to help consumers find healthier alternatives may include implementing a single, standardized front-of-pack system on all prepackaged products to clearly show the overall nutrient profile rather than nutrient content claims that focus on a single nutrient such as fat. Future studies should explore the effects of fat claims on consumer perceptions and behaviours regarding these foods, and the most effective approach to support identifying healthier food choices.

## Conflicts of interest

The authors have no conflicts of interest to declare.

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## Appendix A. Supplementary data

Supplementary data related to this article can be found at <http://dx.doi.org/10.1016/j.appet.2015.09.003>

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