

# Cutting out gluten -

the nutrient profile of gluten-free snack foods on the island of Ireland



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# Foreword

As the gluten-free diet has increased in popularity amongst consumers, the market for gluten-free products has also expanded. This is due to a number of reasons: advocacy of the gluten-free diet, and other so-called 'elimination' diets, by celebrities and health gurus, which is taking place against a backdrop of increasing public awareness of the link between diet and health.

This report sets out to assess the nutritional contribution to the diet of consumers on the island of Ireland of foods that typically contain gluten. It also surveys the nutritional profile of gluten-free snack foods found in supermarkets. Research was also carried out to assess consumers' perceptions of gluten-free products and diets, and their reasons for choosing gluten-free products.

The results will provide an increased awareness of the nutritional issues associated with the gluten-free diet for "lifestyle consumers" – i.e., those consumers who do not need to avoid gluten for medical reasons.

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# 1 Introduction

## The gluten-free diet

The gluten-free diet has recently increased in popularity among those without coeliac disease or other gluten-related disorders, partly due to celebrity promotion and increased media awareness (1, 2).

Many foods that contribute essential nutrients to the diet, especially those in the starchy carbohydrate food group, are eliminated when following a gluten-free diet (3). These foods include wholemeal breads, pasta, and cereals. Gluten-free alternatives to these foods are often produced differently to the “original” product and contain different ingredients, which could potentially impact on nutrient intake (4). Compared to the general population, those on a gluten-free diet have been reported to have a higher proportion of carbohydrates obtained from added sugars, and less from fibre (5). This is an important consideration, as fibre intakes for the general population are already on average 33% below the recommendation of 30g per day, at 23.2g in men and 17.4g in women (6). Gluten-free products also tend to be higher in sugar, salt, fat and saturated fat. This is because, during reformulation, ingredients with high levels of these components can be added to maintain or improve taste and/or texture (4, 7-9). An American study found that 88% of the packaged gluten-free foods aimed at children could be classified as unhealthy due to high levels of sugar, salt and/or fat (10).

“**Lifestyle consumers**” is the term that will be used in this report to describe anyone who follows a gluten-free diet but has not been formally diagnosed with a gluten-related disorder. It should be noted that this group of the population may not follow as strict a gluten-free diet as those who have a gluten-related disorder are obliged to do, as failure to do so will not necessarily have any negative consequences on their health.

## What is gluten?

Gluten is a mixture of proteins (gliadins and glutelins) that is found in wheat, barley, rye, oats, triticale, kamut and spelt (11). Gluten is used for many different technological purposes in the processing of food such as:

- ✓ A viscoelasticity function which makes it a popular ingredient in helping to improve texture in baked goods such as cakes and breads,
- ✓ To increase the protein content of foods such as vegetable-based meat alternatives, and
- ✓ To help bind fat and water in products such as canned meat products e.g., tinned ham (12).

### **What foods are eliminated from a gluten-free diet?**

The gluten-free diet is the only known treatment for those diagnosed with a gluten-related disorder. The gluten-free diet requires the elimination of all foods containing gluten, including grains such as wheat, barley, rye, oats, spelt and their products, e.g., breads, pasta, biscuits, cakes and pastries (11). Wholegrain and wholemeal alternatives to these foods, which are recommended by dietary guidelines for increasing fibre intake, cannot be consumed by those following a gluten-free diet. Gluten can also be an ingredient in processed foods such as sausages, soups and sauces, gravy, salad dressings, crisps, chocolate and ready meals (11).

### **Legislation surrounding gluten**

The use of the terms “gluten-free” and “very-low gluten” on product packaging is regulated by the European Commission. Regulation 828 of 2014 deals with the provision of information to consumers on the absence or reduced presence of gluten in food, and sets out the conditions under which food may be labelled as “gluten-free” or “very low gluten”:

- ✓ Foods labelled **“very low gluten”** must be prepared so as to reduce the gluten content of an ingredient, e.g., wheat, and have less than 100mg of gluten per kg of food.
- ✓ Foods labelled **“gluten-free”** can only refer to foods that contain 20mg or less of gluten per kg of food (13).

It is important to note that Regulation 828 does not distinguish between prepacked and non-prepacked foods. Food businesses, whether manufacturing or catering, must adhere to these labelling rules. They can choose to include gluten-free logos or labelling on their products (Figure 1). However, labelling is only permitted when it is unlikely to be misleading. For example, to label a naturally gluten-free food which consists of a single ingredient (e.g., milk) as gluten-free would be considered misleading. Labelling becomes more complicated for products that contain multiple ingredients, and labels must be assessed on a case-by-case basis (13).

**Figure 1: Example of a logo' used on certified gluten-free products (14).**



Image source: coeliac.org.uk

## **Coeliac disease and other gluten disorders**

There are a number of disorders associated with a negative response to the consumption of gluten:

1. **Coeliac disease** is an inflammatory disease of the small intestine caused by the ingestion of foods containing gluten (15). When a person with coeliac disease ingests gluten, this damages the intestinal wall, i.e. villi. This drastically reduces the absorptive area of the intestinal wall, leading to malabsorption of nutrients from ingested food (16). The intestinal wall can take up to ten days to recover after a gluten 'insult'. Common symptoms include bloating, weight loss and changes in bowel movement. Untreated coeliac disease can lead to future malnourishment due to the inability to digest food in the normal way (17). **Coeliac disease affects roughly 1 in 122 (or just under 1%) of people on the island of Ireland (IOI) (18).** Currently, coeliac disease is diagnosed by a blood test. A gut biopsy taken by a gastroenterologist can then be used to confirm a positive diagnosis (17). Coeliac disease can be diagnosed at any age, although it is more prevalent in children (19).
2. **Wheat allergy** is associated with the production of the antibody Immunoglobulin E. Wheat allergy is reported to be more prevalent in children, with most growing out of it by the time they begin school (20, 21). Common symptoms include the swelling of the lips or face, an itchy rash, and nausea or abdominal pain (22). Those who have a wheat allergy must also avoid albumin and globulin (23). Therefore, foods that are labelled gluten-free may not always be suitable for those with a wheat allergy.

3. **Non-coeliac gluten sensitivity (NCGS)** is a recently recognised condition. NCGS is reported to affect more of the population than either coeliac disease or wheat allergy, although prevalence varies greatly between populations as many patients are self-diagnosed (24, 25). The condition typically presents as a combination symptoms similar to those of Irritable Bowel Syndrome (IBS) and headache, joint and muscle pain, chronic fatigue, ‘foggy mind’, poor attention span or depression (24). Symptoms usually occur after gluten ingestion and disappear when gluten is eliminated from the diet. Currently, a NCGS diagnosis can only be differentially diagnosed by eliminating coeliac disease and wheat allergy (24).

Gluten-free diets are sometimes recommended for people with other conditions, such as IBS, psoriasis, rheumatoid arthritis, and type 1 diabetes, although the evidence is inconclusive as to whether there is any clinical benefit (26).

## **The gluten-free market**

The global market for gluten-free food products, which is increasing at an annual growth rate of 9.1%, is predicted to grow to €29.12 billion by 2025 (27). This increase is driven in part by the perception that gluten-free products are healthier than products containing gluten (2), and despite the premium price of gluten-free products compared to their gluten-containing counterparts (9).

In 2017 the gluten-free market in the Republic of Ireland (ROI) was estimated to be worth €66 million, a 36 % increase from 2016 (28). In the UK the gluten-free market was worth £438 million in 2016, up by 36% from the previous year (29). Recent research conducted by Bord Bia found that 1 in 5 consumers in the ROI now buys gluten-free food regularly. This report also found that a gluten-free diet was more popular with upper- and middle-class earners and older families (28). The report estimated that some 78 % of people in the ROI who follow a gluten-free diet have not been medically diagnosed with a gluten-related disorder, but perceive gluten-free diets as a healthier alternative (28). Bread products, cookies and snacks had the largest gluten-free market share in 2013, at 23.9 % (30)

## **Snacking trends**

Bord Bia states that there is considerable scope to expand the snacking and convenience lines for gluten-free products (28). The Bord Bia Insight Centre reported Mintel research on the rise of snacking in Ireland, which concluded that 70 % of consumers in Ireland now snack daily (31). Today there is a steady rise in “healthy” snack options that emphasise fewer ingredients and place more emphasis on “purity”. Three in 4 of the consumers surveyed reported that they are “trying to be good” and pick healthier options for their snacking (31). Consumer research in the UK showed that over half (54 %) of consumers would stop buying certain “free-from” foods if they thought those products were less healthy than their counterpart products, which are higher in fat, sugar or salt (32).



## **Drivers of the gluten-free market**

Those who advocate a gluten-free lifestyle make claims for weight loss, increased energy and improved overall health (33). However, there is no clear evidence that products with “gluten-free” labelling are healthier than their counterparts, or that they contribute to improved health outcomes in “lifestyle consumers” (34) (7).

Over the past few years, the food market on the IOI has seen a growth in “clean labels” or “free from” food products, ranging from essentials such as bread, milk and cheese to convenience or snack foods, such as ready meals and confectionery. Broadly, a “clean label” can be defined as a packaging visual or text which claims the product is “natural”, “organic” or “free-from”. This increase in clean label food products in the market reflects a greater level of health awareness among consumers, which is driven by increased affluence (35). This is then reflected in the increasing number of lifestyle consumers following a gluten-free diet (35).

It has been suggested that the rise of the gluten-free diet is partly due to an increase in media interest and the promotion of elimination diets by health and wellness influencers (33). The increasing popularity of bloggers and authors who claim that following a gluten-free diet will lead to improved health has contributed to gluten becoming a hot topic of discussion in the media (33).

## **Consumer knowledge and perception**

### **Knowledge and perceptions**

According to small studies carried out in the United States (US) (n=40) and Canada (n=82), consumers are unclear about what gluten is, or foods in which it can be found (36, 37). The study conducted in the US found that none of its 82 participants were able to identify whether or not a selection of 17 foods contained gluten (36). The most recent Nielsen Global Health and Wellness Report surveyed 30,000 adults worldwide and found that 21 % of respondents think gluten-free products are important (38). While it is unclear if these respondents followed a gluten-free diet, it is clear that foods that are gluten-free are perceived as healthy food items. The respondents also ranked foods low in cholesterol (38 %), salt (33 %), sugar (32 %) and fat (30 %) as important. This suggests that foods containing gluten are perceived to be as unhealthy as foods containing excess cholesterol, salt, sugar and fat. There is concern that there may be a “health halo” effect around gluten-free products, given that so many people value the gluten-free attribute. Consumers may think that gluten-free products are also low in fat, sugar and salt as well, and therefore healthy (9).

### **Celebrity endorsement**

An increasing number of celebrities and athletes endorse gluten-free diets:

- Novak Djokovic, a tennis player, has adopted a gluten-free diet and is vocal in crediting his success with the diet. It has also been reported that most professional cyclists now follow a “gluten-moderate” diet (39).
- Miley Cyrus, a popular singer, has suggested everyone should try a gluten-free diet (39).
- Victoria Beckham, a fashion designer, has stated that she follows a gluten-free diet to prevent weight gain (39).
- Gwyneth Paltrow, an actor and now a prominent figure in the “health and wellness” industry, published a book, *It's All Good*, in which she writes that, “[Gluten] is tough on the system and many of us are at best intolerant of it and at worst allergic to it.” (39).

While it is possible that some celebrities have been diagnosed with coeliac disease, they rarely suggest that their fans or followers should seek a medical diagnosis. Instead they advocate that the general population should follow a gluten-free diet.

## 2 Objectives

The specific objectives of this research were to:

- Investigate the nutritional contribution of foods containing gluten to the diet of consumers on the IOI,
- Understand consumers' attitudes and behaviours relating to the gluten-free diet, and
- Review the nutritional value of gluten-free snack foods available in retail outlets on the IOI.

# 3 Methods

## Secondary analysis of dietary data

Two national surveys on diet and nutrition were reviewed to investigate the contribution of gluten-containing foods to dietary nutrient intakes - the ROI National Adult Nutrition Survey 2008 - 2010 (NANS) and the Northern Ireland (NI) National Diet and Nutrition Survey 2008/9 – 2016/17 (NDNS). The contribution of these foods to dietary intakes of energy, protein, fat, carbohydrates and fibre was determined. Intakes were expressed as “percentage energy from food” (%). Foods that naturally contain gluten included:

- White, brown and wholemeal breads and rolls,
- Pasta, flours, grains and starches,
- Other savoury foods, e.g., pizza,
- Breakfast cereals,
- Biscuits, and
- Cakes, pastries, and buns (40, 41).

## Consumer survey

A survey of 2,018 consumers on the IOI was conducted by Ipsos in January (ROI) and March (NI) 2019 to gather data on consumers of gluten-free products and to determine their attitudes, behaviours and perceptions of gluten-free diets. This was carried out in the ROI through Ipsos telephone omnibus service, while a face-to-face omnibus service was carried out in NI. Survey respondents were asked:

- How often, if at all, do you buy “free from” food products?
- What types of allergens do you avoid when purchasing “free from” food products?
- How often, if at all, do you select the gluten-free option when shopping for yourself?
- If you purchase gluten-free products, do you also follow a gluten-free diet?
- Which types of gluten-free foods do you purchase?
- For what reasons, if any, are you following a gluten-free diet?
- When making the decision to move to a gluten-free diet, where did you source information about this diet from? Or, did you make the decision without receiving any information?

Respondents were also asked to rate to how much or how little they agreed or disagreed with a set of statements relating to their perception of gluten-free foods, e.g., “A gluten-free diet is a healthy way to lose weight”.

## **Snapshot survey**

### **Product selection**

A snapshot survey of a range of gluten-free “snack” and “on the go” food products available in retail outlets in the ROI was undertaken in October 2018. In each store, the “free-from” aisle was also visited. The survey did not include products such as gluten-free white bread, white and wholegrain flour and pizza bases, as these did not fit into the “snack” or “on-the-go” food categories.

Snack products with “gluten-free” labelling on the front or back of the pack were purchased. To be considered a snack, products had to be:

- Individually packed for convenience, or
- Have “on the go” or “snack” on the front or back of the label.

The products purchased were grouped into categories based on the EU classification of food:

- Nut-based products and savoury snacks,
- Cereal and bakery products, and
- Confectionery (42).

### **Supermarket selection**

Four supermarkets were selected to represent the top market shareholders in the ROI on October 7 2018:

- Dunnes Stores (22 %),
- Tesco (22 %),
- SuperValu (21 %), and
- Aldi (12 %).

Market share data was used to identify the top stores (43).

## Data analysis

Front and back package labelling for each product was photographed and saved electronically. Receipts were also saved electronically. The nutritional profiles of products were recorded, including values for energy, fat, saturated fat, sugar, salt and fibre content per 100g (Appendix 1 – 3).

Median, maximum and minimum values for each nutrient per product category were calculated (Table 4). Ingredients were also recorded (Appendix 4).

The products were categorised as “low” (green label), “medium” (amber label) or “high” (red label) for fat, saturated fat, sugar and salt. The green, amber and red labels are those employed in the Food Standard Agency ‘traffic light’ labelling system (Table 1).

Fibre content was evaluated using the European Food Safety Authority (EFSA) nutritional standard for labelling. This states that a product must contain at least 3 g of fibre per 100g to be considered a source of fibre and at least 6 g per 100 g to be considered high in fibre (44).

**Table 1. Food Standards Agency Traffic Light System (45)**

	Green (low) per 100 g	Amber (medium) per 100 g	Red (high) per 100 g
Fat	Less than 3 g	between 3 g and 17.5 g	more than 17.5 g
Saturated fat	Less than 1.5 g	between 1.5 g and 5 g	more than 5 g
Sugar	Less than 5 g	between 5 g and 22.5 g	more than 22.5 g
Salt	Less than 0.3 g	between 0.3 g and 1.5 g	more than 1.5 g

# 4 Results

## Secondary analysis of dietary data

Results from the NDNS and NANS survey showed that the contribution of gluten-containing foods to the nutrient intakes of adults on the island of Ireland is significant (Table 2). Adults on the IOI get a large percentage of their nutrients from foods that contain gluten, especially energy (31 – 32 %); carbohydrates (46 – 48 %), and fibre (40 – 45 %). When a gluten-free diet is followed, many of these foods are eliminated or substituted.

**Table 2: Contribution of gluten-containing foods to the diet of adults on the Island of Ireland**

Nutrient	NANS (18-64y) (41)	NDNS (19-64y) (40)
Energy	32 %	31 %
Protein	23 %	23 %
Fat	17 %	20 %
Carbohydrate	48 %	46 %
Fibre	45 %	40 %

## Consumer Survey

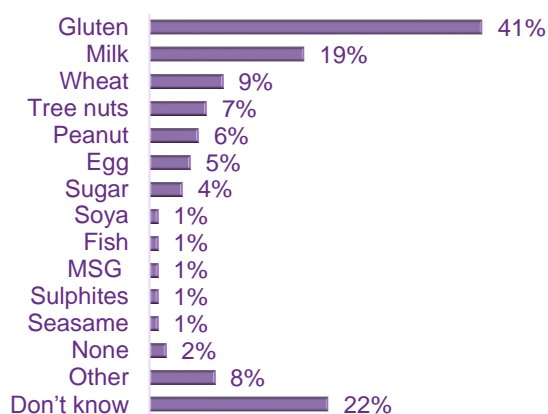
### “How often, if at all, do you buy “free from” food products?”

Results from the consumer survey showed that of the 2,018 respondents on the IOI, 13 % either regularly or always purchase “free from” food products and 21 % do so occasionally.

### What types of allergens do you avoid when purchasing “free from” food products?

Of those who purchased “free from” regularly, always, or occasionally (n=693), gluten was by far the most avoided allergen (41 %), followed by milk (19 %) (Figure 2).

**Figure 2: Types of allergens avoided when purchasing “free from” foods**



Question: What types of allergens do you avoid by purchasing “free from” food products? Base: All respondents who answered always, regularly or occasionally when buying “free from” food products: IOI: 693.

**“How often, if at all, do you select the gluten-free option when shopping for yourself?”**

Seven percent of the 2,018 total respondents on the IOI reported that they always or regularly selected gluten-free products, while 15 % reported that they occasionally did so. This translates to about one in five people purchasing gluten-free products always, regularly or occasionally.

**“If you purchase gluten-free products, do you also follow a gluten-free diet?”**

Of the 22 % of respondents (n=453) who purchase gluten-free products always, regularly or occasionally, 16 % reported following a gluten-free diet. This means that 3.5 % (n=68) of the total survey population follows a gluten-free diet.

**“For what reasons, if any, are you following a gluten-free diet?”**

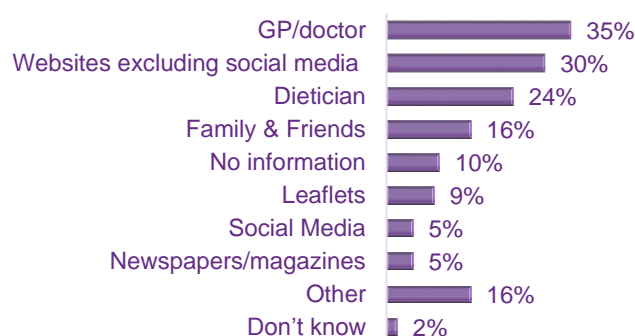
Of the respondents following a gluten-free diet (16 % of those buying gluten-free products), 48 % reported being diagnosed with coeliac disease. This translates to only 8 % of those buying gluten-free products being coeliac. Another 34 % reported other intolerances to gluten. Four percent reported following a gluten-free diet “To lose weight or look good”, 13 % for “Other” reasons, and 8 % responded with “Don’t know”.

**“When making the decision to move to a gluten-free diet, where did you source information about this diet from? Or, did you make the decision without receiving any information?”**



While 35 % of respondents following a gluten-free diet (n=68) reported sourcing their information from doctors and 24 % from dietitians, others cited websites, family and friends, and social media as information sources (Figure 3).

**Figure 3: Where information on gluten-free diets was sourced by respondents following a gluten-free diet**



Question: When making the decision to move to a gluten-free diet, where did you source information about this diet from? Or, did you make the decision without receiving any information? Base: All respondents who follow a gluten-free diet: IOI: 68.

**“Which types of gluten-free foods do you purchase?”**

The most common types of products purchased by respondents following gluten-free diets (n=68) were staples such as breads, pittas and wraps (87 %), pastas, noodles and couscous (79 %), and breakfast cereals including porridge oats (76 %). Gluten-free biscuits (69 %), gluten-free baked goods and cakes (64 %), and gluten-free cereal and protein bars (50 %) were also popular categories.

**Table 3: Types of gluten-free foods purchased by respondents following a gluten-free diet**

Product type	IOI	ROI	NI
	Yes, %		
Breads, including wraps/pittas and packaged rolls	87	84	93
Pastas, noodles, couscous	79	77	82
Breakfast cereals including porridge oats	76	78	71
Baking ingredients such as chickpea, rice, potato, tapioca, maize, buckwheat flours	73	77	67
Crackers, including crisp breads	69	68	73
Biscuits	69	67	72
Baked goods and cakes	64	64	64
Cereal bars including protein bars and granola bars	50	53	46
Ready meals, including noodle pots, pasta pots and frozen meals	28	23	37

### **“To what extent do you agree or disagree with each of the following statements?”**

Of the respondents who always or regularly purchase gluten-free options (n=144), 69% agreed with the statement “I feel healthier eating gluten-free products”, while 63 % agreed with “Eating gluten-free food has improved my life”.

When all respondents (n=2,018) were asked to what extent they agreed with a list of statements relating to the gluten-free diet and products:

- 26 % agreed that a gluten-free diet is a fad,
- 23 % agreed that gluten-free products were lower in fat,
- 21 % agreed that gluten-free products were lower in sugar,
- 17 % agreed that gluten-free products are a better source of fibre, and
- 19 % agreed that a gluten-free diet is a healthy way to lose weight.

### **Snapshot survey results**

The survey identified 66 gluten-free “on the go” snack products, including:

- 29 nut-based products and savoury snacks (appendix 1),
- 17 cereal and bakery products (appendix 2), and
- 20 confectionery products (appendix 3).

In Table 5, the median, minimum and maximum nutritional content of each group of gluten-free snack products surveyed is presented per serving and per 100 grams. The nutritional content of the individual products from each group is presented in the appendices.

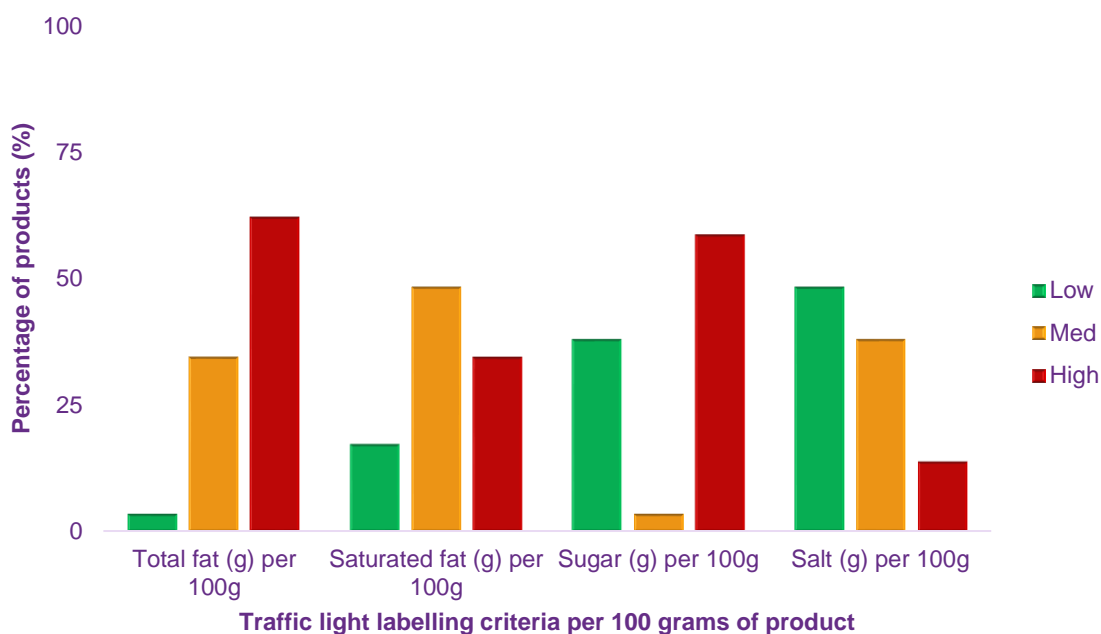
### **Gluten-free nut-based products and savoury snacks (n=29)**

This category included gluten-free products such as raw fruit and nut bars, pretzels, corn chips, energy balls, and sprouted cookies (Appendix 1).

When the traffic light labelling criteria was applied to the products (Figure 4; Table 4):

- 97 % were either high or medium in total fat,
- 83 % were high or medium in saturated fat,
- 59 % were high in sugar, and
- 79 % were either a source of fibre or high in fibre.

**Figure 4. Percentage of gluten-free nut-based products and savoury snacks (n=29) low, medium and high in total fat, saturated fat, sugar and salt per 100g**



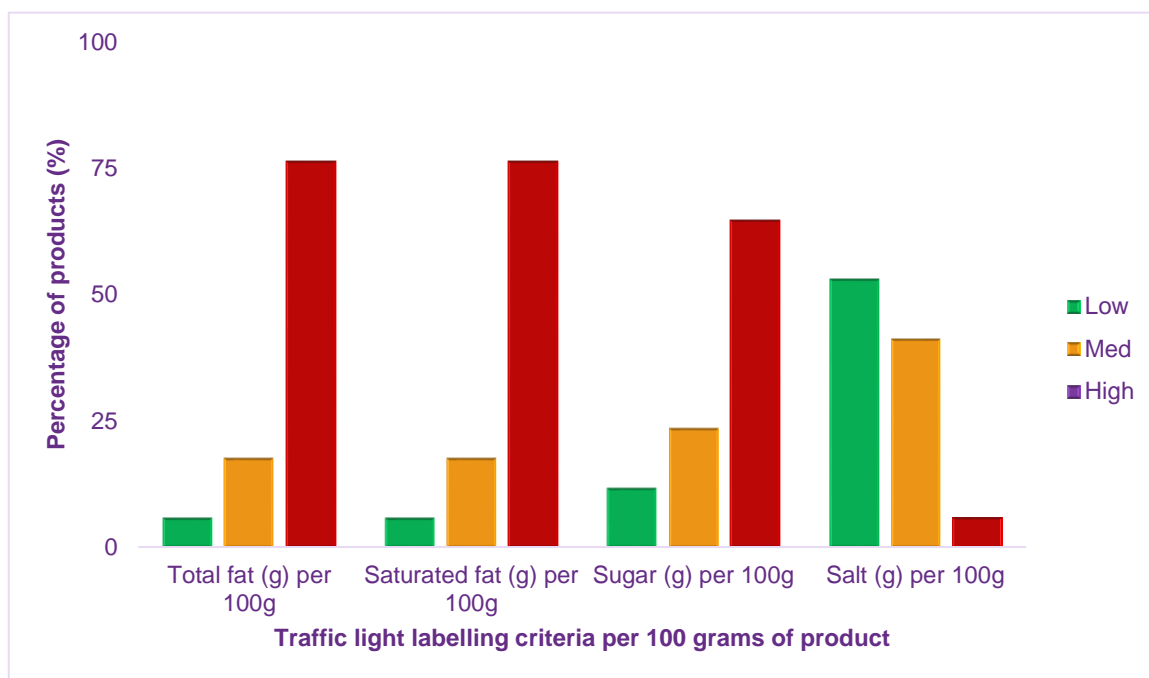
A review of the ingredients shows that many of the nut-based products contain ingredients that are naturally high in fats, such as nuts and seeds. Fifty-seven percent of these products contain sources of added fats such as oils (coconut, sunflower, palm, vegetable and almond), cocoa butter and/or margarine. Many of the nut-based products contain ingredients that are naturally high in sugars, such as raisins and dates. Forty-three percent of these products contain added sugars (sugar, raw cane sugar) and/or syrups (brown rice, coconut blossom nectar, glucose syrup). A full list of ingredients for all the products surveyed is provided in Appendix 4.

#### **Gluten-free cereal and bakery products (n=17)**

This category included gluten-free products such as brownies, rice cakes, muffins, crispbreads and biscuits (Appendix 2). When the traffic light labelling criteria was applied to the products (Figure 5; Table 4):

- 77 % were high in total fat,
- 77 % were high in saturated fats,
- 65 % were high in sugar, and
- 47 % were either sources of fibre or high in fibre.

**Figure 5. Percentage of gluten-free cereal and bakery products (n=17) low, medium and high in total fat, saturated fat, sugar and salt per 100g.**



A review of the ingredients shows that

- 59 % of these products contain chocolate or cocoa (excluding cocoa butter and cacao);
- 76 % of these products contain sources of fats such as oils (coconut, sunflower, palm, vegetable and rapeseed), cocoa butter and margarine;
- 94 % of these products contain sugar, caramel and syrups (coconut blossom nectar, glucose syrup, golden syrup); and
- 53 % of these products list sugar within the first 2 ingredients.

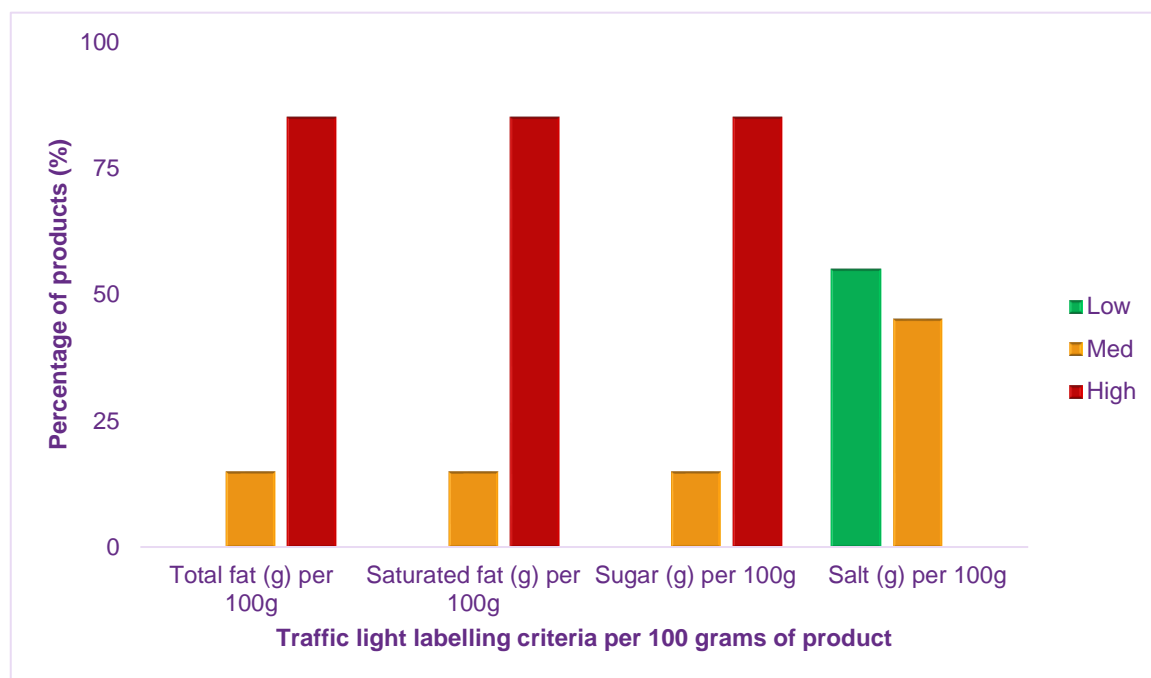
A full list of ingredients for all the products surveyed is provided in Appendix 4.

#### **Gluten-free confectionery products (n=20)**

This category included gluten-free products such as granola bars, macaroon bars, chocolate bars and flapjacks (Appendix 3). When characterised using the traffic light labelling criteria (Figure 6; Table 4), all products were either high or medium for total fat, saturated fat and sugar:

- 85% were high in total fat,
- 85% were high in saturated fats,
- 85% were high in sugar, and
- 70% were either sources of or high in fibre.

**Figure 6. Percentage of gluten-free confectionery products (n=20) low, medium and high in total fat, saturated fat, sugar and salt per 100 g**



A review of the ingredients shows that:

- 55 % of these products contain chocolate or cocoa (excluding cocoa butter and cacao);
- 90 % of these products contain sources of fats such as oils (coconut, sunflower, palm, orange rind and rapeseed), palm fat, cocoa butter and margarine;
- 100 % of these products contain sugar and syrups (brown rice syrup, agave nectar, glucose syrup, golden syrup); and
- 75 % of these products list sugar within the first 2 ingredients.

These products typically contain a number of ingredients which contribute to fibre, including gluten-free oats, nuts, corn fibre and inulin.

A full list of ingredients for all the products surveyed is provided in Appendix 4.

### Comparison of 3 different gluten-free product categories

#### Total fat, saturated fat, sugar

Foods high in fat, sugar and salt are not needed for good health. They should not be consumed every day but at most once or twice a week (46, 47).

Gluten-free snack foods were found to be highly processed products (Table 4; Table 5):

- 75 % of all products were high in total fat, and 69 % high in sugar.
- Confectionery had the highest percentage of high fat and sugar products at 85 % each.
- Bakery and cereal products had the highest median energy per 100g (475 kcal per 100g) while confectionery had the highest median energy per serving (184 kcal per serving).
- Confectionery had the highest sugar content per 100g (27.8 g per 100 g) and per serving (10.5 g per serving).

#### Dietary fibre

Of the gluten-free products sampled (Table 4; Table 5):

- 32 % were found to be sources of fibre, meaning they contained 3 g or more of fibre per 100 g, and 34 % were found to be high in fibre, containing 6 g or more of fibre per 100 g.
- 66 % were then either a source of fibre or high in fibre.
- At 79 %, nut-based products and savoury snacks had the most products that were either sources of fibre or high in fibre, with a median amount of 6.4 g per 100 g or 2.7 g per serving.
- Cereal and bakery products had the least amount of fibre at 47 %, with a median of 3.3 g per 100 g or 0.45 g per serving.

**Table 4: A comparison of the % products high in fat, saturated fats, sugar, salt and fibre per 100 g for three different product categories**

	Nut-based products and savoury snacks (n=29)	Cereal and bakery products (n=17)	Confectionery (n=20)	All products (n=66)
High in total fat (%)	62	77	85	75
High in saturated fat (%)	34	77	85	65
High in sugar (%)	59	65	85	69
High in salt (%)	14	6	0	7
*Source of fibre (%)	79	47	70	65

\*includes any product with fibre content over 3g per 100g (encompassing products which are sources of fibre and high in fibre)

**Table 5: Nutrient content (median, minimum and maximum) of “gluten-free” snack food products surveyed, per 100g and per serving, and using the Food Standard Agency’s traffic light labelling system**

Product category	Serving size range (g)	Nutrient	Per 100g			Per serving		
			Median	Minimum	Maximum	Median	Minimum	Maximum
Nut-based products and savoury snacks (n=29)	22 - 100	Energy (kcal)	451.0	20.0	502.0	160.0	20.0	502.0
		Total fat (g)	21.5	1.4	35.7	7.0	0.3	26.0
		Saturated fat (g)	2.6	0.3	17.9	1.1	0.1	7.4
		Sugar (g)	23.0	0.7	44.5	8.8	0.1	21.1
		Salt (g)	0.3	0.0	3.0	0.2	0.0	3.9
		Fibre (g)	6.4	0.0	17.0	2.7	0.1	9.4
Cereal and bakery products (n=17)	4* - 90	Energy (kcal)	475	262	506	76	11	495
		Total fat (g)	23	1.7	32	3.4	0	16
		Saturated fat (g)	9.3	0.3	18	1.845	0	9
		Sugar (g)	27.3	4	44.2	4.6	0	18.1
		Salt (g)	0.29	0.04	1.8	0.1	0.01	0.4
		Fibre (g)	3.3	0.8	9.2	0.45	0	4.6
Confectionery (n=20)	18 - 60	Energy (kcal)	464	268	562	184	89	276
		Total fat (g)	21.45	7	42	9.05	2.6	14
		Saturated fat (g)	11.15	2.1	30	4.15	0.6	12.1
		Sugar (g)	27.8	13	54.9	10.5	4.8	32.9
		Salt (g)	0.26	0.009	1.11	0.1	0.003	0.52
		Fibre (g)	4.35	0	17.4	2	0	10.4

\*refers to the size of a single mini cookie or soda bread toast, which is not necessarily a regular serving.



# 5 Limitations

## **Consumer survey**

While the IPSOS consumer survey had a high number of respondents (n=2,018), only 3 %, or 68 respondents, reported following a strict gluten-free diet. As coeliac disease affects around 1 % of the Irish population, this result is not surprising. However, it makes for a small sample size for such questions as “For what reasons, if any, are you following a gluten-free diet?” and “When making the decision to move to a gluten-free diet, where did you source information about this diet from? Or, did you make the decision without receiving any information?”

## **Snapshot survey**

Data on supermarket shares was available only for the ROI in the Kantar Worldwide Panel. As a result, the snapshot survey was carried out only in supermarkets in the ROI. Although Tesco and Dunnes Stores are also represented in NI, and Supervalu has a presence in the form of smaller convenience stores, there may some variation in product availability.

# 6 Key findings

## What is the contribution of foods naturally high in gluten to dietary intakes on the IOI?

- These foods, which include breads, pasta, breakfast cereals and cakes, contribute significantly to dietary intakes for key nutrients (protein, fat, carbohydrate and fibre) and these foods contribute approximately one third of energy intake in the ROI and 30 % in NI.
- Foods that naturally contain gluten contribute 45 % of dietary fibre to consumers in the ROI and 38 % in NI. Both the ROI and NI populations are already consuming dietary fibre below the recommended amount even before they begin eliminating these sources of fibre from their diet.

## Who buys gluten-free products?

- 22 % of the survey participants, or 1 in 5, buy gluten-free products. Of that 22 %, 16 % follow a gluten-free diet.
- Of those that follow a gluten-free diet (16 % of those who buy gluten-free products), only half had a medical diagnosis of coeliac disease. This means that 92 % of those that buy gluten-free products don't have a medical reason to do so.

## What do consumers on the IOI think of gluten-free foods?

- There is a perception amongst some consumers that gluten-free products are lower in fat (23 %) and sugar (21 %), and better sources of fibre (17 %).
- 1 in 5 consumers consider a gluten-free diet to be a healthy way to lose weight.

## What is the nutritional profile of a range of snack foods?

- The range of snack foods includes nut-based products and savoury snacks (e.g., pretzels, raw fruit and nut bars), cereal bakery products (e.g., rice cakes, biscuits and crispbreads) and confectionery (e.g., chocolate bars and granola bars).
- Gluten-free snack foods surveyed were generally classified as high in fat (75 %), saturated fat (65 %) and sugar (69 %).
- One third of the products surveyed were not sources of fibre.
- Nearly 100 % of gluten-free snack products surveyed were high energy-dense foods that could potentially contribute to weight gain, with an average calorie content of 445 kcal per 100 g.

# 7 Recommendations

- Don't assume that gluten-free products are healthy by default. Make sure to read the front and back-of-pack nutrition information on product labels to identify options lower in fat and sugar.
- Select snacks that are naturally lower in fat, sugar and salt, and are a better source of fibre, such as fruit and vegetables, rather than heavily processed snack foods.
- If you believe you have a gluten-related disorder you should consult with a medical professional before starting a gluten-free diet. Avoiding gluten before the blood test is done could lead to an inaccurate result.

**Table 5. Examples of healthy snacks**

Hummus with raw carrot and celery sticks	A handful of peanuts/ almonds
A triangle of cheese	Sliced fruit and vegetables
A small bowl of homemade popcorn	Low fat, low sugar yoghurt *

**\*read the label**

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# 9 Appendices

- ✓ Appendix 1: List of gluten-free nut-based products purchased and their nutritional value
- ✓ Appendix 2: List of gluten-free cereal and bakery products purchased and their nutritional value
- ✓ Appendix 3: List of gluten-free confectionery products purchased and their nutritional value
- ✓ Appendix 4: Ingredient lists of gluten-free snack food products surveyed

**Appendix 1: List of gluten-free nut-based products and savoury snacks purchased and their nutritional value**

Brand	Product Name	Energy (Kcal) per 100g	Total fat (g) per 100g	Saturated fat (g) per 100g	Sugar (g) per 100g	Salt (g) per 100g	Fibre (g) per 100g
The Foodie Market	Crispy Olive Oil Corn Snacks	443	12	1.5	4.3	0.98	1.8
The Foodie Market	Crunchy Chilli Rice Snacks	454	15	1.8	3.8	0.84	2
The Foodie Market	Paleo Bar Hazelnut + Cacao Bar	436	23	2.2	38	0.02	11
The Foodie Market	Peanut & Choc Chip Cacao Brownie Bars	456	25	8.3	23	0.17	10
The Foodie Market	Orange & Choc Chip Cacao Brownie Bars	451	24	8.3	23	0.14	9.3
The Foodie Market	Paleo Bar Macadamia + Coconut Bar	470	27	13	35	0.03	11
The Foodie Market	Cashew Crush Raw Fruit and Nut Bar	451	23	4.7	34	0.02	7.6
The Foodie Market	Cacao & Cashew Quinoa Bar	402	15	2.3	26	0.22	11
The Foodie Market	Raw Pecan Pie Fruit and Nut Bar	490	31	3.1	37	0.02	9.3
The Foodie Market	Berry Hike Bar	306	1.4	0.3	30	0.32	17
Amaizin	Natural Corn Chips	480	21.5	2.2	1.5	0.8	0.01
Amaizin	Tomato Corn Rolls	502	26	2.6	3	1.8	0.01
Schar	Gluten Free Pretzels	482	21	9.9	2	3	0.7
Schar	Gluten Free Grissini	408	5.7	2.3	1.5	2.1	1.2
Love Corn	Sea Salt	435	13.3	1.3	0.7	1.5	7
Eat Natural	Protein Packed Crunchy Nut Bar with peanuts and chocolate	510	30.5	9.1	18.8	0.32	7.3
Caveman Grub	No Grain Ola Cranberry and Cashew	529	35.7	12.7	29	0.18	9.5
Roo'Biotic	Choc Chip Matcha	481	28	8	23	0.19	6.6
Go Raw	Choco Crunch Sprouted Cookies	571	32	17.9	39.3	0.4	14.2
Tesco Free From	Mini Cheesiers	474	22.1	6.9	4.2	1.4	5
Tesco Free From	*Cheese & Onion Tortilla Chips	484	21.3	1.6	1.1	0.7	5.6
Tesco Free From	*Salt and Vinegar Popped Chips	399	7.4	0.5	1.1	1.7	3.5
Tesco Free From	*Sour Cream and Onion Popped Chips	404	8.7	0.6	0.9	1	5
Trek	Peanut Power	369	10.9	1.8	38.4	0.8	5.5
Nakd	Carrot Cake Raw Fruit and Nut Bar	422	21.8	2.1	44.5	0.01	4.5
Nakd	Cocoa Oranges Raw Fruit and Nut bar	415	20	4.2	38.9	0.1	6.4
Deliciously Ella	Hazelnut and Raisin Energy Ball	383	17.5	1.3	43	0.03	7.4
Livity	Plum and Goji Berry Revive	311	10	2.9	34	0	6.2
Meridian	Peanut and Cocoa	467	26.8	5.9	26.3	0.07	5.9



**Appendix 2: List of gluten-free cereal and bakery products purchased and their nutritional value**

Brand	Product Name	Energy (Kcal) per 100g	Total fat (g) per 100g	Saturated fat (g) per 100g	Sugar (g) per 100g	Salt (g) per 100g	Fibre (g) per 100g
Kookie Cat	Vanilla Choc Chip Cashew & Oat Cookie	500	32	18	19	0.04	9.2
Mrs Crimbles	Big Belgian Choc Brownies	432	23	5.3	32	0.5	
Supervalu	Milk Chocolate Rice Cakes	499	25	16	31	0.13	3.7
Bunalun Organic	Mini Yoghurt and Orange Rice Cakes	506	25	15	32	0.04	1.4
Nairn's	Biscuit Breaks Oats and Chocolate Chip	475	20.5	9.3	20.5	1.08	5.4
The Gluten Free Pantry	Chocolate Biscuit Cake Pieces	476	26.3	17.8	44.2	0.5	
Tesco free from	Double Chocolate Mini Muffins	407	19.3	4.8	27.3	0.4	2
Tesco free from	Bramley Apple Pies	376	12.5	5.9	27.9	0.2	0.8
Tesco free from	Millionaire Crispy Mini Bites	455	26	13	35.9	0.2	3.3
Schar	Gluten Free Crispbread	380	1.7	0.3	6	1.4	2.3
The Foods of Athenry	Gourmet Soda Bread Toasts multi-seed	262	13	2	4.7	0.29	4
Kelkin	Ancient Grain Sea Salt & Pepper Cracker Thins	412	8	2.9	4	1.8	4
Bunalun Organic	Milk Chocolate Thins	495	23	14.3	27	0.1	3.5
Kelkin	Yogurt Flavoured Snack Pack	504	24	15	32	0.06	1.4
Kelkin	Milk Chocolate Snack Pack	495	24	14	30	0.09	2.7
Tesco Free From	Chocolate Chip Breakfast Biscuits	484	20.5	8.6	19.6	0.7	4.8
The Foods of Athenry	Cookie Shots Brownie Biscuit	451	22.5	8.2	25	0.3	2.5

### Appendix 3: List of gluten-free confectionery products purchased and their nutritional value

Brand	Product Name	Energy (Kcal) per 100g	Total fat (g) per 100g	Saturated fat (g) per 100g	Sugar (g) per 100g	Salt (g) per 100g	Fibre (g) per 100g
Made Good	Chocolate Chip Granola Minis	409	19	9	22	0.03	7
Dr Coy's	Cranberry-Pistachio Nutritional Chocolate Bar	476	28.9	16.4	41.1	0.009	12.6
The Foods of Athenry	Belgian Chocolate Biscuit Bar Orange	346	21	12	29	0.3	2
Protein World	The Slender Bar	345	7	5	13	0.86	17.4
Mrs Crumbles	Big Choc Macaroon Bar	460	21.9	20.1	54.9	0.1	0
Deliciously Ella	Apple Raisin and Cinnamon Oat Bars	406	13.8	6.2	26	0.26	5.6
Made Good	Chocolate Banana Granola Bars	371	11	2.6	27	0.11	9.8
Rocky Rice	Dark Chocolate and Orange	514	27.8	17.5	31.7	0.2	4.1
Schar	Chocolix	468	18	10	32	0.44	4.2
Rhythm 108	Super Coconut	562	42	30	27	0.06	16
The Foods of Athenry	Belgian Chocolate Biscuit Bar	344	21	11	27	0.3	2.4
Trek	Cocoa Coconut Protein Flapjack	268	25.3	13.2	27.2	0.8	4.5
Trek	Cocoa Oat Protein Flapjack	454	22	10.3	27.9	0.9	3.9
Tesco Free From	Choc 'n' Crispy Bar	541	33.7	21	37.7	0.2	12
Tesco Free From	White Choc Bar	522	31.3	19.2	40.5	0.1	15
Tesco Free From	Twin packs of Oaty Crunch Granola Bars	474	19	2.1	27.7	0.3	2.8
Tesco Free From	Flapjack Slices	442	19.3	6.8	28.5	0.3	4
Kelkin	Finger Bars	520	30	19	49	0.19	2.5
Kelkin	Hazelnut and Chocolate Flavoured Rice Cake Bar	474	18	7.1	24	0.2	2.2
Nature Valley	Protein Coconut and Almond	491	30.4	11.3	13	1.11	13.3

#### Appendix 4: Ingredients lists of gluten-free snack food products surveyed

##### Nut-based products and savoury snacks (n=29)

Product	Ingredients List
Crispy Olive Oil Corn Snacks	Corn grits, sunflower oil, extra virgin olive oil, whey powder, lactose, dextrose, salt, corn starch, yeast extract, natural flavouring, rosemary, curry leaves, anticaking agent: silicon dioxide
Crunchy Chilli Rice Snacks	Wholegrain brown rice, white rice, sunflower oil, sweet chilli seasoning
Paleo Bar Hazelnut + Cacao Bar	Dates, hazelnuts, almonds, cacao powder, almond oil
Peanut & Choc Chip Cacao Brownie Bars	Peanuts, date paste, chicory root fibre, cocoa-flavoured drops (cacao solids, xylitol, lecithins), peanut paste, rice syrup, cacao powder, rice bran, cocoa butter, rice starch, concentrated grape juice, sea salt, green tea extract
Orange & Choc Chip Cacao Brownie Bars	Peanuts, date paste, chicory root fibre, cocoa-flavoured drops (cacao solids, xylitol, lecithins), peanut paste, rice syrup, cacao powder, rice bran, cocoa butter, rice starch, concentrated grape juice, orange extract, sea salt, green tea extract
Paleo Bar Macadamia + Coconut Bar	Dates, cashew nuts, coconut, macadamia nut, almond oil
Cashew Crush Raw Fruit and Nut Bar	Cashew nuts, date
Cacao & Cashew Quinoa Bar	Raisins, rice syrup, ground cashew nuts, dried date pieces, pea crispies, sunflower kernels, puffed quinoa, chicory fibre, linseeds, date juice concentrate, pumpkin seeds, cacao powder, hemp seed, sunflower oil
Raw Pecan Pie Fruit and Nut Bar	Dates, crushed pecan nuts, almond pieces
Berry Hike Bar	Dried date pieces, chicory root fibre, soy crispies, raisins, gluten-free wholegrain oat flakes, soya flakes, pear juice concentrate, freeze dried raspberry pieces, citrus fibre, natural flavouring
Natural Corn Chips	Corn flour, sunflower oil, sea salt

<b>Tomato Corn Rolls</b>	Corn flour, sunflower oil, tomatoes, salt, sugar, yeast extract, paprika, black pepper, garlic, chilli pepper, tomato paste, paprika extract
<b>Gluten Free Pretzels</b>	Maize starch, palm oil, potato starch, sea salt, invert sugar syrup, dry yeast, carboxyl methyl cellulose, soya lecithin, sodium acid pyrophosphate, sodium bicarbonate
<b>Gluten Free Grissini</b>	Potato starch, rice flour, modified maize starch, buckwheat flour, vegetable margarine [vegetable oil and fat in varying proportion (high oleic sunflower oil, shea fat), water, salt, lemon juice, emulsifier: mono- and diglycerides of fatty acids (E-471)], yeast, glucose-fructose syrup, sugar, salt, thickener: hydroxypropyl methyl cellulose, emulsifier: mono- and diacetyl tartaric acid esters of mono- and diglycerides of fatty acids, raising agents: ammonium hydrogen carbonate, natural flavouring
<b>Sea Salt</b>	Corn, sea salt, sunflower oil
<b>Protein Packed Crunchy Nut Bar with peanuts and chocolate</b>	Peanuts, glucose syrup, dark chocolate, soya protein crispies, shredded coconut, honey, crisped rice, cocoa powder, salt
<b>No Grain Ola Cranberry and Cashew</b>	Sunflower seed, honey, coconut oil, cashew nut, linseed, organic coconut palm sugar, cranberries, shredded coconut, cinnamon, Himalayan pink salt
<b>Choc Chip Matcha</b>	Cashew, dates, chocolate chips (cacao mass, coconut sugar, cocoa butter), rice protein, cacao butter, coconut blossom nectar, matcha, mint, Lactobacillus acidophilus
<b>Choco Crunch Sprouted Cookies</b>	Coconut, sprouted sesame seeds, dates, cacao
<b>Mini Cheesiers</b>	Maize flour, soya flour, palm oil, gluten-free oat flour, glucose syrup, sunflower oil, potato starch, cornflour, icing sugar, salt, thickener (xanthan gum), yeast extract, raising agents (ammonium bicarbonate, sodium bicarbonate), onion powder, flavouring
<b>*Cheese &amp; Onion Tortilla Chips</b>	Maize flour, sunflower oil, chickpea flour, red lentils, white rice, maltrodextrin, tapioca starch, sugar, salt, dried onion, coriander, dried garlic, dried balsamic vinegar, yeast extract powder, spirit vinegar powder, chilli powder, acidity regulator (citric acid), caramelised sugar powder, flavouring, paprika extract
<b>*Salt and Vinegar Popped Chips</b>	Dried potato, rice flour, potato starch, sunflower oil, spirit vinegar powder, flavouring, salt sugar, citric acid, maltrodextrin, yeast extract powder
<b>*Sour Cream and Onion Popped Chips</b>	Dried potato, rice flour, potato starch, sunflower oil, maltrodextrin, tapioca starch, dried onion, sugar, salt, yeast extract, powder, dried garlic, acidity regulator (lactic acid, calcium lactate), citric acid, flavouring

<b>Peanut Power</b>	Dates, soya protein crunchies (soya protein, tapioca starch, salt), fruit juice concentrate (apple, grape), peanut butter, raisins, peanut, gluten-free oats, soya flour, natural flavourings, rice starch, salt
<b>Carrot Cake Raw Fruit and Nut Bar</b>	Dates, walnuts, raisins, almonds, cashews, carrots, cinnamon, natural flavouring
<b>Cocoa Oranges Raw Fruit and Nut Bar</b>	Dates, cashews, raisins, cacao, natural flavourings
<b>Hazelnut and Raisin Energy Ball</b>	Dates, hazelnuts, raisins, cacao, cinnamon, cardamom
<b>Plum and Goji Berry Revive</b>	Organic dates, organic plums, organic cashews, organic dark 5 (cocoa solids, coconut palm sugar, cocoa butter, cocoa powder, vanilla), lactic acid bacteria, Lb acidophilus, Lb rhamnosus, Bb longum, E. faecium: organic flax seed, organic goji berry, organic ginger
<b>Peanut and Cocoa</b>	Peanuts, brown rice malt, raisins, cocoa powder, grape juice concentrate, rice starch, cocoa butter, sunflower lecithin

## Cereal and bakery products (n=17)

Product	Ingredients List
Vanilla Choc Chip Cashew & Oat Cookie	Gluten-free oat flakes, cashew, coconut blossom nectar, desiccated coconut, chocolate chip, coconut oil, coconut chips, bourbon vanilla, salt
Big Belgian Choc Brownies	Sugar, eggs, vegetable oil: rapeseed, milk chocolate 8% [sugar, whole milk powder, cocoa butter, cocoa mass, lactose (milk), emulsifier: soya lecithin, natural vanilla flavouring], chocolate chunks 8% (cocoa mass, sugar, cocoa butter), rice flour, potato starch, humectant: vegetable glycerol, fat-reduced cocoa powder, glucose syrup, invert sugar syrup, rice starch, raising agents: sodium pyrophosphate, sodium bicarbonate; acidity regulator: citric acid; preservative: potassium sorbate; stabiliser: xanthan gum
Milk Chocolate Rice Cakes	Milk chocolate, cocoa mass, soya lecithin, natural vanilla flavouring, rice
Mini Yoghurt and Orange Rice Cakes	Cane sugar, cocoa butter, skimmed yogurt powder, full cream milk powder, rape seed lecithin, natural orange flavour, rice
Biscuit Breaks Oats and Chocolate Chip	Gluten-free wholegrain oats, dark chocolate chips (sugar, cocoa mass, cocoa butter, soya lecithin, natural vanilla flavouring), sustainable palm fruit oil, demerara sugar, dietary fibre, partially inverted refiner syrup, Lyles Golden Syrup, dark chocolate powder, tapioca starch, raising agents, natural cocoa flavouring, sea salt
Chocolate Biscuit Cake Pieces	Milk chocolate, whey powder, fat-reduced cocoa powder, whole milk powder, sunflower lecithin, biscuit, caster sugar, margarine, vegetable oil, water, salt, polyglycerol esters of fatty acids, flavouring, wholegrain maize flour, egg powder, thickener, golden syrup, condensed milk
Double Chocolate Mini Muffins	Sugar, egg, chocolate chips (13%), rice flour, rice starch, tapioca starch, fat-reduced cocoa powder, humectant (glycerine), maltodextrin, vegetable margarine, whey powder (milk), modified maize starch, modified tapioca starch, raising agent (diphosphates, potassium carbonate, calcium phosphates), milk proteins, salt, emulsifier (polyglycerol esters of fatty acids, mono- and diglycerides of fatty acids), preservative (potassium sorbate), acidity regulator (citric acid), stabiliser (xanthan gum), soya flour, flavouring
Bramley Apple Pies	Sugar, apple (13%), palm oil, maize starch, rice flour, potato starch, water, glucose syrup, humectant (glycerine), dextrose, maize flour, egg, acidity regulators (malic acid, sodium citrate, stearic acid, potassium hydroxide), preservative (potassium sorbate), salt, flavouring, sugar beet fibre, stabiliser (xanthan gum), raising agents (disodium diphosphate, potassium bicarbonate), carrier (calcium carbonate), processing aid (propylene glycol, silicon dioxide, calcium salts of fatty acids, rapeseed oil), emulsifiers (polyglycerol esters of fatty acids, mono- and diglycerides of fatty acids)
Millionaire Crispy Mini Bites	Milk chocolate (36%), caramel, crisped rice, white chocolate (16%)

<b>Gluten Free Crispbread</b>	Rice flour, maize flour, sugar, salt
<b>Gourmet Soda Bread Toasts multi-seed</b>	Buttermilk, gluten- and wheat-free flour (maize, rice, potato, tapioca, buckwheat), multiseeds (sunflower, pumpkin, linseeds), brown sugar, treacle, raising agents (mono calcium phosphate, sodium bicarbonate), xanthan gum, Irish mineral sea salt
<b>Ancient Grain Sea Salt &amp; Pepper Flavour Cracker Thins</b>	Potato starch, rice flour, potato flakes, modified starch, corn flour, lentil flour, sustainable palm oil, salt and pepper flavour seasoning (5%) (rice flour, yeast extract, sugar, dextrose, black pepper, salt, onion powder, natural flavourings, sea salt), ancient grain (5%) (amaranth flour, buckwheat flour, quinoa flour, chia seeds), sugar, poppy seeds, milk proteins, salt, rice fibres, emulsifier: sunflower lecithin, raising agents: (sodium bicarbonate, monocalcium phosphate, sodium acid pyrophosphate), garlic powder, onion powder, natural flavouring, antioxidant: rosemary extract
<b>Milk Chocolate Thins</b>	Milk chocolate (cane sugar, cocoa butter, whole milk powder, cocoa mass), wholegrain brown rice
<b>Yogurt Flavoured Snack Pack</b>	Sugar, cocoa butter, skimmed milk yogurt powder, full cream milk powder, soya lecithin, wholegrain rice
<b>Milk Chocolate Snack Pack</b>	sugar, cocoa butter, whole milk powder, cocoa mass, soya lecithin, natural vanilla flavour, wholegrain rice
<b>Chocolate Chip Breakfast Biscuit</b>	Gluten-free oat flour (oat flour), gluten-free oats (oats), milk-free chocolate chips (13%) (sugar, cocoa mass, cocoa butter, emulsifier (soya lecithins), flavouring), palm oil, soya protein, sugar, tapioca flour, oligofructose, rice flour, golden syrup, sunflower oil, cocoa powder, glucose syrup, flavouring, raising agent (sodium bicarbonate)
<b>Cookie Shots Brownie Biscuit</b>	Gluten- and wheat-free flour (maize, rice, potato, tapioca, buckwheat), 100% vegetable non-hydrogenated margarine, sugar, cocoa, concentrated fruit juice (grape, apple, pear), natural vanilla, raising agents (mono calcium phosphate, sodium bicarbonate), stabiliser: xanthan gum, margarine contains: vegetable oil (sustainable palm oil, rapeseed oil), water, salt, emulsifier: E475, natural colours: curcumin, annatto, natural flavouring

## Confectionery (n=20)

Product	Ingredients List
Chocolate Chip Granola Minis	Pure rolled oats, chocolate chips, sunflower oil, cane sugar, agave nectar, apples, whole grain crisp brown rice, agave inulin, tapioca flour, vegetable powder (spinach, broccoli, carrots, tomatoes, beets), shiitake mushroom powder, chocolate flavour, vanilla flavour
Cranberry-Pistachio Nutritional Chocolate Bar	Isomaltulose, cocoa mass, cocoa butter, fibre (inulin), galactose, pistachios, cranberries, crisped rice, vitamin e, soya lecithin
Belgian Chocolate Biscuit Bar Orange	Gluten-free biscuits, chocolate, butter, 100% vegetable non-hydrogenated margarine, golden syrup, orange rind oil
The Slender Bar	Corn fibre, whey protein concentrate, humectant, gluten-free oats, honey, glucose syrup, whey crisp, rice flour, soya lecithin, protein world vitamin and mineral blend, coconut oil, toffee pieces, palm oil, butter oil, glazing agent (E903), sea salt, colour, natural flavouring
Big Choc Macaroon Bar	Sugar, coconut, glucose syrup, egg white, dextrose, palm kernel fat, fat-reduced cocoa powder, rice flour, palm fat, stabiliser, sorbitan tristearate, soya lecithin
Apple Raisin and Cinnamon Oat Bars	Gluten-free oats, brown rice syrup, raisins, coconut oil, sunflower oil, coconut blossom nectar, dried apple pieces, ground cinnamon
Chocolate Banana Granola Bars	Pure oats, agave nectar, brown rice syrup, bananas, chocolate chips (cane sugar, cocoa mass, cocoa butter, vanilla), sunflower oil, crisp brown rice, inulin molasses, vegetable extract powder (spinach, broccoli, carrots, tomatoes and beets), shiitake mushroom powder, banana flavour
Dark Chocolate and Orange	Dark chocolate coating (sugar, cocoa butter, cocoa powder), emulsifiers (soya lecithins, polyglycerol polyricinoleate), orange powder, flavourings, puffed brown rice
Chocolix	Milk chocolate, cocoa butter, whole milk powder, cocoa mass, skimmed milk powder, emulsifier, caramel filling (glucose syrup, humectant, sugar, water, modified tapioca starch, skimmed milk powder, stabilizer: butter fat, caramelized sugar syrup, salt, natural flavour), maize flour, palm fat, maize starch, sugar, glucose syrup, soya flour, modified tapioca starch, modified maize starch, natural flavour, salt, raising agents (sodium hydrogen carbonate, ammonium hydrogen carbonate), rice starch
Super Coconut	Coconut flakes, raw cane sugar, cacao butter, cacao mass, gluten-free oat flour, agave fibre, sunflower lecithin



<b>Belgian Chocolate Biscuit Bar</b>	Gluten-free biscuits, chocolate, 100% vegetable non-hydrogenated margarine, golden syrup, marshmallows, natural caramel flavour
<b>Cocoa Coconut Protein Flapjack</b>	Gluten-free oats, rice syrup, soya protein crunchies (soya protein, tapioca starch, salt), dark chocolate flavour coating (sugar palm oil, cocoa powder, sunflower lecithin) palm oil, sunflower oil, rapeseed oil, coconut chips, soya flour, raw cane sugar, salt, natural flavouring
<b>Cocoa Oat Protein Flapjack</b>	Gluten-free oats, rice syrup, soya protein crunchies (soya protein, tapioca starch, salt), palm oil, sunflower oil, rapeseed oil, dark chocolate flavour coating (sugar palm oil, cocoa powder, sunflower lecithin), soya flour, raw cane sugar, salt, natural flavourings
<b>Choc 'n' Crispy Bar</b>	Sugar, cocoa butter, cocoa mass, rice syrup, inulin, crisped rice, coconut oil, rice flour, flavourings, emulsifier (soya lecithins), crisped rice
<b>White Choc Bar</b>	Sugar, cocoa butter, inulin, maltodextrin, maize flour, coconut oil, emulsifier (soya lecithins), flavourings
<b>Twin packs of Oaty Crunch Granola Bars</b>	Gluten-free oats, sugar, sunflower oil, honey, molasses, raising agent (sodium bicarbonate)
<b>Flapjack Slices</b>	Gluten-free oats, golden syrup, margarine, sugar, gluten-free oat flour
<b>Finger Bars</b>	Milk chocolate (sugar, cocoa butter, whole milk powder cocoa mass, soya lecithin, natural vanilla flavour), rice flour, potato starch, teff flour, soya flour, soya lecithin, coconut oil, free range egg yolk, salt, raising agent, sodium carbonate
<b>Hazelnut and Chocolate Flavoured Rice Cake Bar</b>	Rice, sugar, vegetable fat (sustainable palm oil), hazelnut, rice syrup powder, fat reduced cocoa powder, vanilla flavouring, sea salt
<b>Protein Coconut and Almond</b>	Roasted peanuts, soy protein, chicory root extract, almonds, dried coconut, glucose syrup, vegetable fats: palm and shea, whey solids (milk), sugar, fructose, maltodextrin, sunflower oil, humectant: glycerol, tapioca starch, salt, coconut cream powder, emulsifiers: sunflower and soy lecithin, natural flavourings, flavour enhancer: sodium bicarbonate

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