



# Presence of gluten in foods labelled 'gluten-free'



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## Executive summary

The NSW Food Authority purchased 222 products labelled 'gluten free' from retail outlets across Sydney. These included sauces, flours, breads, chips, biscuits, cakes, infant foods, soups and spreads.

These products were submitted to the General Chemistry laboratory at DAL and tested for gluten.

Levels less than 20 ppm may be attributed to cross contamination of gluten-free products and/or ingredients with gluten during their manufacture. Levels equal to or greater than 20 ppm and less than 100 ppm are likely to affect some people with coeliac disease. Levels equal to or greater than 100 ppm presents a health and safety issue for people with coeliac disease.

Of the samples tested 95.0% contained no detectable gluten. No sample contained gluten over 100 ppm. Eleven samples contained gluten ranging from 3 ppm to 46 ppm. These were:

- four samples of bread and bread mix
- five samples of cereal and cereal products
- one biscuit sample
- one ready-to-eat mixed meal

For these products where gluten was detected, regulatory action was taken commensurate to the risk presented by the amount of gluten present. The results from this survey are similar to the results from the 2008 survey where 95.3% of samples tested contained no detectable gluten, although the category results where gluten was detected differed slightly.

## Background

Gluten is a protein found in wheat, oats, barley and rye. Wheat flour and gluten are commonly used in foodstuffs to improve product texture, moisture retention and flavour, and can be found in a variety of products including pasta, bread and chips.

A proportion of the population is known to be intolerant to gluten causing a condition known as coeliac disease. Coeliac disease is an immune reaction causing inflammation and damage to the lining of the small intestine (Swain, Soutter and Loblay, 2005). This adversely affects the ability of the small intestine to absorb nutrients resulting in fatigue, bloating, cramps and diarrhoea. If left untreated the resulting malnutrition can lead to chronic poor health (Coeliac Society of Australia, 2010).

The Coeliac Society of Australia (2010) reports that approximately 1 in 100 Australians are affected by coeliac disease with many in the population unaware they may be suffering from the condition. The main risk management strategy for people with coeliac disease is to avoid foods containing gluten, by either referring to an ingredient list or purchasing foods claiming to be gluten free.

To ensure people with coeliac disease can buy food with confidence, the Australia New Zealand Food Standards Code (Food Standards Code) has requirements regarding a product's ingredient listing and a product claiming to be gluten free. Standard 1.2.3 – *Mandatory Warning and Advisory Statements and Declaration of the Food Standards Code* requires a declaration of the presence of cereals containing gluten and their products in foods (Food Standards Australia New Zealand, 2008a).

Standard 1.2.8 – *Nutrition Information Requirements of the Food Standards Code* requires that for a food to claim it is gluten free there must be no detectable gluten in the food. Foods claiming to be low in gluten must have gluten detected at levels less than 20 mg of gluten per 100 g of food (200 ppm) (Food Standards Australia New Zealand, 2008b).

There is a wide variety of foods available for sale in the marketplace claiming that they are gluten free. These include biscuits, snack bars, cakes, confectionery, breakfast cereals, bread and bread products, pasta, chips and sauces.

In 2007 the NSW Food Authority conducted a survey to determine the level of compliance of foods sold in NSW claiming to be gluten free. A total of 211 foods labelled 'gluten-free' were purchased from retail outlets such as supermarkets and health food stores. Foods were sampled from the following food categories: beverages, biscuits, bread and bread products, cakes, chips (eg corn, vegetable, prawn), confectionery, dairy, flour and bakery premixes, infant foods, meat products, pasta, rice and corn cakes, snack bars, sauces and gravy, soups and spreads. Results of all tests conducted indicated that of the 211 'gluten-free' products analysed 95.3% contained no detectable gluten. Since this survey the number of foods claiming to be gluten free has continued to increase.

In 2010 the Authority conducted a follow up survey to determine current compliance with food standards for gluten claims.

## Method

### Analytical

Between July 2010 and October 2010, 222 products claiming to 'gluten free' were purchased from retail outlets across Sydney.

Samples were analysed by the Division of Analytical Laboratories (DAL) using the Biokits Gluten Assay Kit catalogue No.: 802002Y manufactured by Tepnel BioSystems. This kit, which measures gluten both qualitatively and quantitatively, is an accredited AOAC Official Method 991.19 (gliadin as a measure of gluten in foods). The limit of reporting for this kit is 3 ppm. The tests were conducted as per the manufacturer's instructions.

### Risk management strategy

Prior to the survey commencing a risk management strategy was developed based on consultation with the Coeliac Society of Australia and the reported threshold for coeliac sensitivity of 20 to 100 ppm gluten (US Food and Drug Administration, 2006). (Table 1).

Table 1: Risk management strategy

Gluten level (ppm)	Response
less than 20	This may be attributed to cross contamination of gluten-free products and/or ingredients with gluten during their manufacture. Inform manufacturer and/or relevant State /Territory food regulatory jurisdiction of the results.
equal to or greater than 20 and less than 100	Gluten at these levels is likely to affect some people with coeliac disease. If appropriate (dependent on type of product) product withdrawal requested together with a review of procedures and/or labelling and an investigation into the origin of the gluten.
equal to or greater than 100	Product recall is required for health and safety reasons

## Results

Eleven samples contained detectable traces of gluten between 3 and 46 ppm. Results are outlined in Table 2.

Table 2: Gluten detected in food products

Product category	No. of samples tested	not detected	No. of samples with detection of		
			less than 20 ppm	between 20 and 100 ppm	100 ppm or greater
biscuit and biscuit mix	17	16 94.1%	1	0	0
bread and bread mix	23	19 82.6%	3 13.0%	1 4.3%	0
cake and cake mix	21	21 100%	0	0	0
cereal and cereal products	24	19 79.2%	4 16.6%	1 4.2%	0
confectionary	9	9 100%	0	0	0
dairy	9	9 100%	0	0	0
flour	12	12 100%	0	0	0
fruit based products	5	5 100%	0	0	0
infant food	13	13 100%	0	0	0
meats	3	3 100%	0	0	0
pasta	10	10 100%	0	0	0
pizza and pizza bases	7	7 100%	0	0	0
ready to eat mixed meals	15	14 93.3%	0	1 6.7%	0
sauces and gravies	13	13 100%	0	0	0
savoury snacks eg chips	16	16 100%	0	0	0
snack bars	9	9 100%	0	0	0
soup and soup mix	8	8 100%	0	0	0
spreads and dips	8	8 100%	0	0	0
<b>Grand total</b>	<b>222</b>	<b>211 (95.0%)</b>	<b>8 (3.6%)</b>	<b>3 (1.4%)</b>	<b>0 (0.0%)</b>

## Discussion

Of the products tested, 95.0% contained no detectable gluten. No sample contained gluten above 100 ppm. Eleven samples contained detectable traces of gluten between 3 and 46 ppm. Three of these contained gluten at levels greater than 20 but less than 100.

A threshold for coeliac sensitivity has been reported in the range 20–100 ppm gluten (US Food and Drug Administration, 2006). This has been based on reported gastrointestinal effects related to coeliac disease. This range was used in the determination of action levels for products in this survey that were found to contain detectable gluten.

Levels of less than 20 ppm of gluten may be attributed to cross contact of gluten with gluten free ingredients during manufacture and as such while the ingredients used by the manufacturer may contain no gluten, the final manufactured product may contain occasional traces of gluten. There has been considerable discussion internationally concerning 'gluten free' claims and the presence of low levels of gluten. Codex standard for foods for special dietary use for persons intolerant to gluten, Standard 118-1979, defines gluten free food as 'the gluten level does not exceed 20 mg/kg' (Codex Alimentarius Commission, 2008). If this standard was applied to the foods included in this survey, 98.6% of samples would comply.

Manufacturers and/or the appropriate State/Territory jurisdiction were informed of results for samples with detected gluten. To determine the source of contamination further investigation is required. It could be expected that the presence of gluten may be due to either unintentional contamination during manufacture, or low levels of gluten in the raw materials.

### *2010 survey results compared to the 2008 survey*

Overall, the results from the 2010 survey are comparable to the levels detected in the 2008 survey, except for the 2008 sample which contained gluten at 160 ppm and resulted in a recall (Table 3). A category by category comparison between the two surveys is outlined in Figures 1a and 1b. Three categories had samples that contained gluten in both years: biscuit & biscuit mix, bread & bread mix and cake & cake mix. These categories all use a variety of gluten free flours such as buckwheat, rice, soy, potato and cassava. This suggests scope for further gluten testing in ingredients that are commonly used as a replacement for gluten-containing ingredients but not necessarily labelled 'gluten free', such as rice flour and buckwheat flour.

Table 3: Gluten levels in food products tested in 2008 and 2010

gluten level (ppm)	2010 (n=223)	2008 (n=211)
<3	95.0%	95.3%
3-19	3.6%	1.9%
20-99	1.4%	2.4%
>100	0%	0.5%

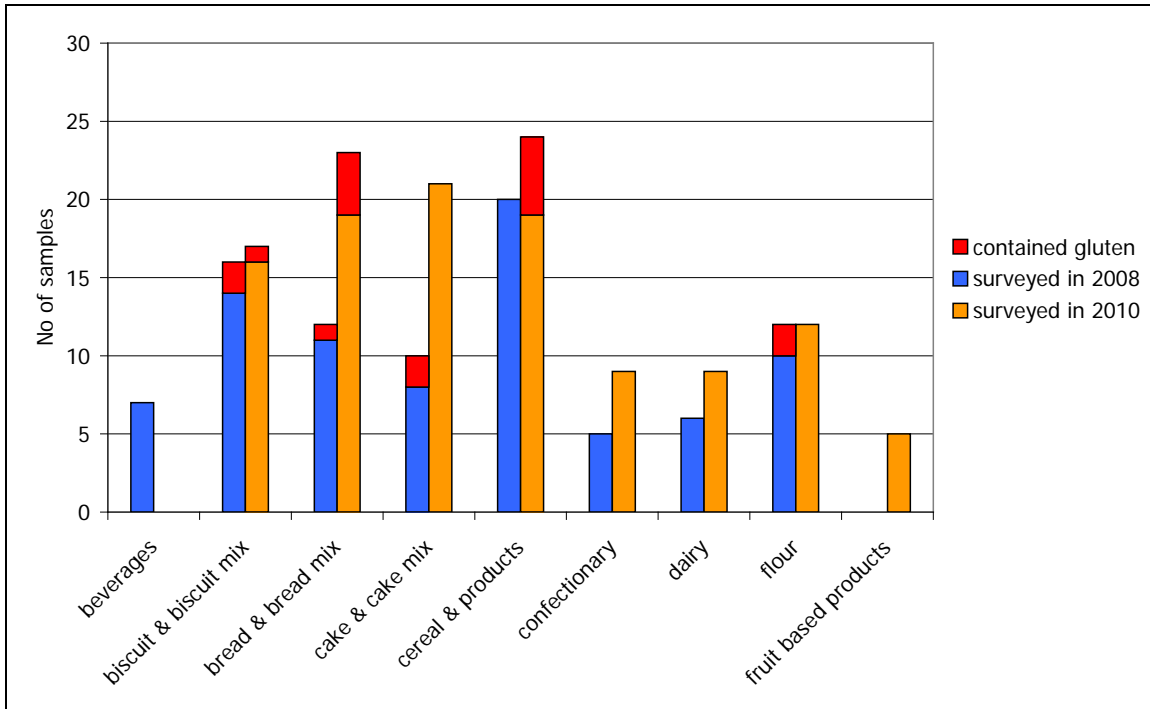


Figure 1a: Category comparison between 2008 and 2010

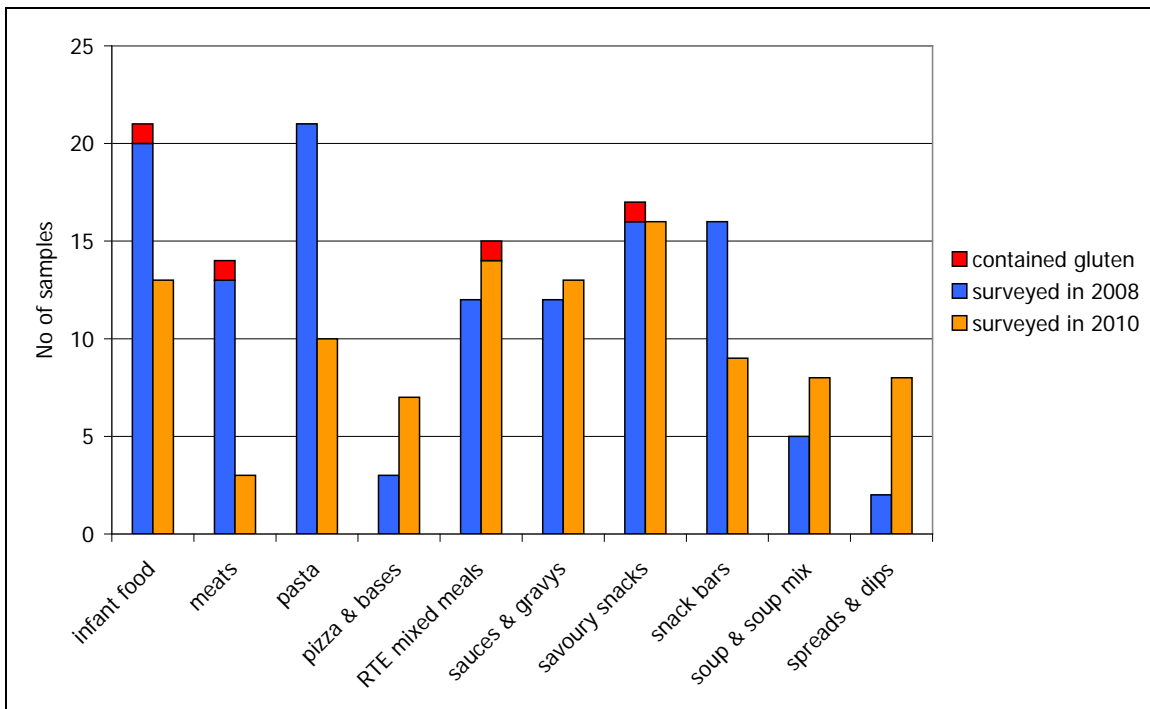


Figure 1b: Category comparison between 2008 and 2010





## Conclusion

This survey illustrates that the majority of foods labelled 'gluten-free' do not contain gluten. Only 5.0% of samples contained gluten, and only 1.4% exceeded internationally recognised levels for 'gluten free' (>20 ppm). No sample exceeded 100 ppm. Where gluten was detected, follow-up activities by regulatory agencies occurred. While only a small number of samples were positive for gluten, additional testing of 'gluten free' labelled products and ingredients will be undertaken in the future in the interest of consumer safety.



## References

Codex Alimentarius Commission. (2008). Codex standard for foods for special dietary use for persons intolerant to gluten, codex stan 118-1979. Retrieved 6 December 2010 from Codex Alimentarius Commission website:

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<http://www.foodauthority.nsw.gov.au/aboutus/science-and-research/market-analysis/gluten-free-products>

Swain, A.R., Soutter, V.L. and Loblay, R.H. (1991). *Friendly food: the essential guide to avoiding allergies, additives and problem chemicals*. London: Murdoch Books Pty. Ltd.

The Coeliac Society of Australia website. [www.coeliac.org.au](http://www.coeliac.org.au)

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## Appendix

### Raw data

	product	gluten result (ppm)
1	biscuit and biscuit mix	<3
2	biscuit and biscuit mix	<3
3	biscuit and biscuit mix	<3
4	biscuit and biscuit mix	<3
5	biscuit and biscuit mix	3
6	biscuit and biscuit mix	<3
7	biscuit and biscuit mix	<3
8	biscuit and biscuit mix	<3
9	biscuit and biscuit mix	<3
10	biscuit and biscuit mix	<3
11	biscuit and biscuit mix	<3
12	biscuit and biscuit mix	<3
13	biscuit and biscuit mix	<3
14	biscuit and biscuit mix	<3
15	biscuit and biscuit mix	<3
16	biscuit and biscuit mix	<3
17	biscuit and biscuit mix	<3
18	bread and bread mix	9
19	bread and bread mix	<3
20	bread and bread mix	10
21	bread and bread mix	<3
22	bread and bread mix	<3
23	bread and bread mix	<3
24	bread and bread mix	<3
25	bread and bread mix	<3
26	bread and bread mix	<3
27	bread and bread mix	<3
28	bread and bread mix	<3
29	bread and bread mix	<3
30	bread and bread mix	<3
31	bread and bread mix	<3
32	bread and bread mix	<3
33	bread and bread mix	<3
34	bread and bread mix	<3
35	bread and bread mix	<3
36	bread and bread mix	<3

	product	gluten result (ppm)
37	bread and bread mix	<3
38	bread and bread mix	43
39	bread and bread mix	6
40	bread and bread mix	<3
41	cake and cake mix	<3
42	cake and cake mix	<3
43	cake and cake mix	<3
44	cake and cake mix	<3
45	cake and cake mix	<3
46	cake and cake mix	<3
47	cake and cake mix	<3
48	cake and cake mix	<3
49	cake and cake mix	<3
50	cake and cake mix	<3
51	cake and cake mix	<3
52	cake and cake mix	<3
53	cake and cake mix	<3
54	cake and cake mix	<3
55	cake and cake mix	<3
56	cake and cake mix	<3
57	cake and cake mix	<3
58	cake and cake mix	<3
59	cake and cake mix	<3
60	cake and cake mix	<3
61	cake and cake mix	<3
62	cereal and cereal products	7
63	cereal and cereal products	4
64	cereal and cereal products	<3
65	cereal and cereal products	<3
66	cereal and cereal products	<3
67	cereal and cereal products	<3
68	cereal and cereal products	<3
69	cereal and cereal products	<3
70	cereal and cereal products	<3
71	cereal and cereal products	<3
72	cereal and cereal products	<3
73	cereal and cereal products	<3
74	cereal and cereal products	<3
75	cereal and cereal products	8

	product	gluten result (ppm)
76	cereal and cereal products	7
77	cereal and cereal products	<3
78	cereal and cereal products	<3
79	cereal and cereal products	<3
80	cereal and cereal products	<3
81	cereal and cereal products	<3
82	cereal and cereal products	<3
83	cereal and cereal products	<3
84	cereal and cereal products	<3
85	cereal and cereal products	46
86	confectionary	<3
87	confectionary	<3
88	confectionary	<3
89	confectionary	<3
90	confectionary	<3
91	confectionary	<3
92	confectionary	<3
93	confectionary	<3
94	confectionary	<3
95	dairy	<3
96	dairy	<3
97	dairy	<3
98	dairy	<3
99	dairy	<3
100	dairy	<3
101	dairy	<3
102	dairy	<3
103	dairy	<3
104	flour	<3
105	flour	<3
106	flour	<3
107	flour	<3
108	flour	<3
109	flour	<3
110	flour	<3
111	flour	<3
112	flour	<3
113	flour	<3
114	flour	<3

	product	gluten result (ppm)
115	flour	<3
116	fruit based products	<3
117	fruit based products	<3
118	fruit based products	<3
119	fruit based products	<3
120	fruit based products	<3
121	infant food	<3
122	infant food	<3
123	infant food	<3
124	infant food	<3
125	infant food	<3
126	infant food	<3
127	infant food	<3
128	infant food	<3
129	infant food	<3
130	infant food	<3
131	infant food	<3
132	infant food	<3
133	infant food	<3
134	meats	<3
135	meats	<3
136	meats	<3
137	pasta	<3
138	pasta	<3
139	pasta	<3
140	pasta	<3
141	pasta	<3
142	pasta	<3
143	pasta	<3
144	pasta	<3
145	pasta	<3
146	pasta	<3
147	pizza and pizza bases	<3
148	pizza and pizza bases	<3
149	pizza and pizza bases	<3
150	pizza and pizza bases	<3
151	pizza and pizza bases	<3
152	pizza and pizza bases	<3
153	pizza and pizza bases	<3

	product	gluten result (ppm)
154	ready to eat mixed meals	<3
155	ready to eat mixed meals	<3
156	ready to eat mixed meals	<3
157	ready to eat mixed meals	<3
158	ready to eat mixed meals	<3
159	ready to eat mixed meals	<3
160	ready to eat mixed meals	<3
161	ready to eat mixed meals	<3
162	ready to eat mixed meals	<3
163	ready to eat mixed meals	<3
164	ready to eat mixed meals	<3
165	ready to eat mixed meals	<3
166	ready to eat mixed meals	28
167	ready to eat mixed meals	<3
168	ready to eat mixed meals	<3
169	sauces and gravy	<3
170	sauces and gravy	<3
171	sauces and gravy	<3
172	sauces and gravy	<3
173	sauces and gravy	<3
174	sauces and gravy	<3
175	sauces and gravy	<3
176	sauces and gravy	<3
177	sauces and gravy	<3
178	sauces and gravy	<3
179	sauces and gravy	<3
180	sauces and gravy	<3
181	sauces and gravy	<3
182	savoury snacks eg chips	<3
183	savoury snacks eg chips	<3
184	savoury snacks eg chips	<3
185	savoury snacks eg chips	<3
186	savoury snacks eg chips	<3
187	savoury snacks eg chips	<3
188	savoury snacks eg chips	<3
189	savoury snacks eg chips	<3
190	savoury snacks eg chips	<3
191	savoury snacks eg chips	<3
192	savoury snacks eg chips	<3

	product	gluten result (ppm)
193	savoury snacks eg chips	<3
194	savoury snacks eg chips	<3
195	savoury snacks eg chips	<3
196	savoury snacks eg chips	<3
197	savoury snacks eg chips	<3
198	snack bars	<3
199	snack bars	<3
200	snack bars	<3
201	snack bars	<3
202	snack bars	<3
203	snack bars	<3
204	snack bars	<3
205	snack bars	<3
206	snack bars	<3
207	soup and soup mix	<3
208	soup and soup mix	<3
209	soup and soup mix	<3
210	soup and soup mix	<3
211	soup and soup mix	<3
212	soup and soup mix	<3
213	soup and soup mix	<3
214	soup and soup mix	<3
215	spreads and dips	<3
216	spreads and dips	<3
217	spreads and dips	<3
218	spreads and dips	<3
219	spreads and dips	<3
220	spreads and dips	<3
221	spreads and dips	<3
222	spreads and dips	<3



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