Nutrient analysis of a range of processed foods with particular reference to *trans* fatty acids

Composite sample number	Sample description	Water g/100g	Protein g/100g	Total fat g/100g	Ash g/100g	Carbohydrate g/100g	Energy (kcal)/100g	Energy (kJ)/100g	Englyst fibre g/100g	AOAC fibre g/100g	Starch g/100g	Total sugars g/100g	Glucose g/100g	Fructose g/100g	Sucrose g/100g	Maltose g/100g	Lactose g/100g	Galactose g/100g	Oligosaccharides g/100g	Saturated fatty acids g/100g	*Cis*-monounsaturated fatty acids g/100g	*Cis*-n3 fatty acids g/100g	*Cis*-n6 fatty acids g/100g	*Cis*-polyunsaturated fatty acids g/100g	*Trans* fatty acids g/100g	Cholesterol milligrams/100g
66	Coleslaw, purchased, economy products only	80.8	0.9	9.1	0.9	6.5	110	456	1.8	1.6	<0.1	6.5	1.6	1.3	3.7	<0.1	<0.1	<0.1	N/A	0.73	5.51	0.73	1.63	2.36	0.01	12

Micronutrients

Composite sample number	Sample description	Vitamin A micrograms/100g*	Vitamin D micrograms/100g	Thiamin milligrams/100g	Riboflavin milligrams/100g	Niacin milligrams/100g	Tryptophan/60 milligrams/100g	Vitamin C milligrams/100g	Vitamin E milligrams/100g	Vitamin B_6 milligrams/100g	Vitamin B_{12} micrograms/100g	Folate micrograms/100g	Pantothenic acid milligrams/100g	Biotin micrograms/100g	Sodium milligrams/100g	Potassium milligrams/100g	Calcium milligrams/100g	Magnesium milligrams/100g	Phosphorus milligrams/100g	Iron milligrams/100g	Copper milligrams/100g	Zinc milligrams/100g	Chloride milligrams/100g	Iodine micrograms/100g	Manganese milligrams/100g	Selenium micrograms/100g
1	Cheese and tomato pizza, retail, all bases, not stuffed crust	134 [œ]	<0.1	0.15	0.15	1.0	2.8	2	1.68	<0.02	0.4	4	0.20	4.1	397	223	217	24	179	1.1	0.10	1.3	630	17	0.4	4
2	Garlic and herb baguette, baked	188 [œ]	<0.1	0.23	0.13	1.1	1.7	N/A	1.79	0.14	0.1	11	0.20	0.6	476	149	126	21	88	1.6	0.08	0.7	730	3	0.6	1
3	Crunchy clusters type breakfast cereal without nuts	<5 [¥]	N/A	1.02	1.06	4.0	2.8	N/A	1.38	0.17	N/A	90	0.32	8.9	41	310	40	72	232	2.7	0.30	1.6	100	2	2.1	6
4	Crunchy/crispy muesli type cereal with nuts	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.26	N/A	N/A	N/A	N/A	9.5	138	290	46	83	245	4.0 [@]	0.34	1.8	240	N/A	2.3	19
5	Quiche Lorraine with shortcrust pastry, retail	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	339	155	147	15	177	0.6	0.03	1.0	450	N/A	0.1	7
6	Low fat spread (26-39%), not polyunsaturated (including dairy type)	893	3.0	N/A	N/A	N/A	N/A	N/A	12.50	N/A	N/A	N/A	N/A	N/A	692	61	12	2	9	0.02	<0.001	0.02	970	15	<0.0001	<0.012
7	Low fat spread (26-39%), not polyunsaturated, with olive oil	892	4.5	N/A	N/A	N/A	N/A	N/A	13.00	N/A	N/A	N/A	N/A	N/A	488	48	9	1	6	0.04	<0.001	0.03	690	N/A	0.01	<1

Composite sample number	Sample description	Vitamin A micrograms/100g*	Vitamin D micrograms/100g	Thiamin milligrams/100g	Riboflavin milligrams/100g	Niacin milligrams/100g	Tryptophan/60 milligrams/100g	Vitamin C milligrams/100g	Vitamin E milligrams/100g	Vitamin B_6 milligrams/100g	Vitamin B_{12} micrograms/100g	Folate micrograms/100g	Pantothenic acid milligrams/100g	Biotin micrograms/100g	Sodium milligrams/100g	Potassium milligrams/100g	Calcium milligrams/100g	Magnesium milligrams/100g	Phosphorus milligrams/100g	Iron milligrams/100g	Copper milligrams/100g	Zinc milligrams/100g	Chloride milligrams/100g	Iodine micrograms/100g	Manganese milligrams/100g	Selenium micrograms/100g
8	Low fat spread (26-39%), polyunsaturated	962	8.4	N/A	N/A	N/A	N/A	N/A	10.10	N/A	N/A	N/A	N/A	N/A	482	31	4	0.39	4	0.01	0.01	<0.001	770	N/A	<0.0001	<0.012
9	Hard block margarine	905	8.8	N/A	N/A	N/A	N/A	N/A	12.20	N/A	N/A	N/A	N/A	N/A	878	<0.032	1	0.04	<0.013	0.1	<0.001	0.04	1220	N/A	<0.0001	<0.012
10	Compound cooking fat, not polyunsaturated	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11	Ghee made from vegetable oil	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8.70	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
12	Reduced fat spread (41-62%), polyunsaturated	683	5.8	N/A	N/A	N/A	N/A	N/A	26.3	N/A	N/A	N/A	N/A	N/A	600	21	3	0.22	1	0.02	0.01	0.02	870	N/A	<0.0001	1
13	Reduced fat spread (41-62%), not polyunsaturated	940	9.9	N/A	N/A	N/A	N/A	N/A	12.40	N/A	N/A	N/A	N/A	N/A	689	43	14	2	12	0.03	0.01	0.1	990	N/A	<0.0001	0.22
14	Reduced fat spread (41-62%), not polyunsaturated, with olive oil	817	4.2	N/A	N/A	N/A	N/A	N/A	12.50	N/A	N/A	N/A	N/A	N/A	551	46	7	1	7	0.04	<0.001	0.01	800	N/A	<0.0001	0.19
15	Reduced fat spread (62-75%), not polyunsaturated	920	8.4	<0.001	0.07	<0.1	<0.1	N/A	15.90	<0.02	0.1	1	0.02	0.3	747	17	10	1	9	0.02	<0.001	0.03	1070	N/A	<0.0001	0.43
16	Takeaway chicken pieces, coated, deep fried	N/A	<0.1	0.09	0.25	8.4	5.9	N/A	1.65	0.42	0.2	4	1.25	1.2	477	338	20	28	204	0.9	0.06	1.4	660	3	0.1	15

Composite sample number	Sample description	Vitamin A micrograms/100g*	Vitamin D micrograms/100g	Thiamin milligrams/100g	Riboflavin milligrams/100g	Niacin milligrams/100g	Tryptophan/60 milligrams/100g	Vitamin C milligrams/100g	Vitamin E milligrams/100g	Vitamin B_6 milligrams/100g	Vitamin B_{12} micrograms/100g	Folate micrograms/100g	Pantothenic acid milligrams/100g	Biotin micrograms/100g	Sodium milligrams/100g	Potassium milligrams/100g	Calcium milligrams/100g	Magnesium milligrams/100g	Phosphorus milligrams/100g	Iron milligrams/100g	Copper milligrams/100g	Zinc milligrams/100g	Chloride milligrams/100g	Iodine micrograms/100g	Manganese milligrams/100g	Selenium micrograms/100g
17	Coated chicken pieces, takeaway	<0.1[ce]	<0.1	0.09	0.12	7.4	4.9	N/A	2.70	0.45	1.7	8	1.15	0.9	535	350	28	27	218	0.7	0.07	0.6	700	N/A	0.2	8
18	Chicken/turkey burger, coated, baked	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	383	337	41	23	160	1.0	0.09	0.8	610	N/A	0.2	9
19	Breaded/battered chicken/turkey pieces, cooked	N/A	<0.1	0.07	0.17	7.1	3.1	N/A	2.75	0.39	0.2	27	0.61	2.9	360	278	31	24	169	1.1	0.08	0.8	510	N/A	0.2	7
20	Chicken breast/steak, coated, baked	N/A	<0.1	0.10	0.11	7.2	4.2	N/A	2.47	0.42	2.8	21	1.23	0.6	466	300	30	26	203	0.7	0.07	0.6	580	N/A	0.2	7
21	Beef pie, purchased, puff or shortcrust pastry, family size	N/A[¢]	<0.1	0.04	0.14	1.1	1.5	N/A	0.77	0.04	0.4	3	0.15	1.4	332	150	41	12	91	1.1	0.07	1.7	510	N/A	0.2	3
22	Beef pie, purchased, individual, puff or shortcrust pastry	N/A[¢]	<0.1	0.08	0.15	2.1	1.8	N/A	1.50	0.20	1.2	2	0.16	1.5	346	163	49	15	83	1.2	0.07	1.5	560	N/A	0.3	4
23	Cornish pasty, purchased	4	<0.1	N/A	N/A	N/A	N/A	N/A	0.85	N/A	N/A	N/A	N/A	N/A	470	200	47	16	69	1.0	0.08	1.0	720	N/A	0.3	3
24	Pork pie, individual	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	542	153	53	7	23	2.9	0.04	0.5	830	2	0.1	1
25	Sausage roll, purchased, ready-to-eat, flaky pastry	N/A	<0.1	0.08	0.11	1.7	1.7	N/A	2.11	0.18	0.2	2	0.24	0.7	577	129	61	14	89	1.2	<0.001	0.7	880	2	0.3	5
26	Chicken/turkey pasties/slices, puff pastry	N/A	<0.1	0.08	0.15	1.8	1.1	N/A	1.38	0.07	N/A	3	0.34	0.9	360	169	36	15	81	0.7	0.07	0.5	570	6	0.2	4

Nutrient analysis of a range of processed foods with particular reference to *trans* fatty acids

Composite sample number	Sample description	Vitamin A micrograms/100g*	Vitamin D micrograms/100g	Thiamin milligrams/100g	Riboflavin milligrams/100g	Niacin milligrams/100g	Tryptophan/60 milligrams/100g	Vitamin C milligrams/100g	Vitamin E milligrams/100g	Vitamin B_6 milligrams/100g	Vitamin B_{12} micrograms/100g	Folate micrograms/100g	Pantothenic acid milligrams/100g	Biotin micrograms/100g	Sodium milligrams/100g	Potassium milligrams/100g	Calcium milligrams/100g	Magnesium milligrams/100g	Phosphorus milligrams/100g	Iron milligrams/100g	Copper milligrams/100g	Zinc milligrams/100g	Chloride milligrams/100g	Iodine micrograms/100g	Manganese milligrams/100g	Selenium micrograms/100g
27	Cod in batter, fried in commercial oil, from takeaway fish and chip shops	<0.1[§]	N/A	0.07	0.12	2.1	3.6	N/A	1.48	0.24	2.1	16	0.18	1.4	175[¨]	326	79	26	208	0.4	0.04	0.5	220[¨]	214	0.1	22
28	Cod in batter, frozen/chilled, baked	<0.1[§]	N/A	0.07	0.07	0.9	2.7	N/A	2.38	0.20	1.7	12	0.09	1.4	424	230	32	21	158	0.5	0.04	0.4	530	99	0.1	17
29	Cod in breadcrumbs, oven baked	N/A	N/A	0.08	0.11	1.6	2.9	N/A	1.84	0.19	1.0	7	0.17	3.0	330	245	41	22	137	0.5	0.05	0.4	480	N/A	0.2	21
30	Fish fingers, pollock, grilled	N/A	N/A	0.09	0.12	0.8	3.3	N/A	2.70	0.18	0.3	32	0.16	0.4	401	263	23	26	143	0.5	0.08	0.5	580	47	0.2	15
31	Coleslaw, purchased, not low calorie	153	<0.1	0.02	0.42	0.2	0.3	1	3.93	0.13	0.1	56	0.12	0.6	296	156	36	8	21	0.3	<0.001	0.1	450	3	0.1	1
32	Chips, fried in commercial oil, from takeaway fish and chip shops	N/A	N/A	0.10	0.10	0.6	0.5	2	0.32	0.05	N/A	46	0.51	0.3	16”	804	16	32	63	0.7	0.14	0.4	120”	N/A	0.2	<0.012
33	Chips, fine cut, from fast food outlets	N/A	N/A	0.07	0.09	0.6	0.4	2	3.28	0.04	N/A	38	0.49	0.2	193[ž]	544	18	29	143	0.7	0.08	0.4	260[ž]	N/A	0.2	<0.012
34	Potato chips, oven ready, baked	N/A	N/A	0.05	0.12	1.4	0.7	1	1.37	0.20	N/A	22	0.25	0.3	31	641	14	31	95	0.7	0.12	0.4	100	N/A	0.2	0.10
35	Potato chips, oven ready, with batter, baked	N/A	N/A	0.09	0.11	3.2	0.7	1	1.84	0.20	N/A	13	0.22	0.5	193	602	17	32	111	0.7	0.15	0.4	320	N/A	0.2	<0.012

Composite sample number	Sample description	Vitamin A micrograms/100g*	Vitamin D micrograms/100g	Thiamin milligrams/100g	Riboflavin milligrams/100g	Niacin milligrams/100g	Tryptophan/60 milligrams/100g	Vitamin C milligrams/100g	Vitamin E milligrams/100g	Vitamin B_6 milligrams/100g	Vitamin B_{12} micrograms/100g	Folate micrograms/100g	Pantothenic acid milligrams/100g	Biotin micrograms/100g	Sodium milligrams/100g	Potassium milligrams/100g	Calcium milligrams/100g	Magnesium milligrams/100g	Phosphorus milligrams/100g	Iron milligrams/100g	Copper milligrams/100g	Zinc milligrams/100g	Chloride milligrams/100g	Iodine micrograms/100g	Manganese milligrams/100g	Selenium micrograms/100g
36	Potato crisps, fried in vegetable oil, not Walkers, not premium crisps, not fried in sunflower oil	N/A	N/A	N/A	N/A	N/A	N/A	N/A	10.80	N/A	N/A	N/A	N/A	N/A	599	706	35	40	103	1.1	0.17	0.7	850	N/A	0.3	0.19
37	Potato crisps fried in sunflower oil, including premium, not Walkers[3]	N/A	N/A	0.09	0.16	3.9	0.9	17	9.79	0.31	N/A	62	0.78	0.6	451	1249	35	65	128	1.3	0.20	0.9	820	N/A	0.4	2
38	Potato crisps fried in high oleic sunflower oil	5[¥]	N/A	N/A	N/A	N/A	N/A	N/A	9.05	N/A	N/A	N/A	N/A	N/A	604	1328	48	63	135	1.5	0.20	0.9	1000	2	0.4	1
39	Potato rings, e.g. Hula Hoops	N/A	N/A	0.05	0.27	1.1	0.8	3	7.64	0.40	N/A	5	0.28	0.2	845	781	26	34	108	0.8	0.16	0.6	1490	N/A	0.2	1
41	Tortilla chips in sunseed or high oleic sunflower oil (eg Doritos)	35[f]	N/A	0.11	0.18	0.5	0.9	N/A	7.11	0.15	N/A	10	0.28	0.8	636	285	103	78	234	1.5	0.10	1.2	900	N/A	0.4	5
42	Corn snacks (eg Monster Munch, Wotsits)	39[f]	N/A	0.23	0.31	0.3	0.5	N/A	8.43	<0.02	N/A	5	0.30	1.3	909	329	71	20	96	0.3	0.05	0.4	1120	N/A	0.2	9
43	Mixed toffees (including liquorice toffees), not premium	N/A	N/A	N/A	<0.01	N/A	0.7	N/A	<0.01	N/A	0.2	1	0.21	0.2	312	132	85	11	65	0.3	0.04	0.3	460	20	0.03	1

[3] Composite was analysed, and re-analysed to confirm data. This data does not reflect that expected for potato crisps fried in sunflower oil (levels of polyunsaturated fatty acids are very low, levels of monounsaturated fatty acids are very high). The data is published here for completeness, but will not be incorporated into the Department of Health's nutrient databanks which support the National Diet and Nutrition Survey and other national dietary surveys.

Composite sample number	Sample description	Vitamin A micrograms/100g*	Vitamin D micrograms/100g	Thiamin milligrams/100g	Riboflavin milligrams/100g	Niacin milligrams/100g	Tryptophan/60 milligrams/100g	Vitamin C milligrams/100g	Vitamin E milligrams/100g	Vitamin B_6 milligrams/100g	Vitamin B_{12} micrograms/100g	Folate micrograms/100g	Pantothenic acid milligrams/100g	Biotin micrograms/100g	Sodium milligrams/100g	Potassium milligrams/100g	Calcium milligrams/100g	Magnesium milligrams/100g	Phosphorus milligrams/100g	Iron milligrams/100g	Copper milligrams/100g	Zinc milligrams/100g	Chloride milligrams/100g	Iodine micrograms/100g	Manganese milligrams/100g	Selenium micrograms/100g
44	Chew sweets (eg Starburst, Chewits, Blackjacks)	25[f]	N/A	N/A	N/A	N/A	N/A	N/A	1.20	N/A	N/A	N/A	N/A	N/A	30	10	3	2	4	0.1	<0.01	0.02	30	N/A	0.01	<0.012
45	Milk chocolate bar	70[œ]	N/A	0.12	0.53	0.3	2.4	N/A	0.40	0.21	2.1	9	0.73	2.4	89	451	226	57	224	2.1	0.31	1.1	190	51	0.3	3
46	Chocolate covered caramels (eg Cadburys caramel)	93[œ]	<0.1	0.02	0.30	0.2	1.1	N/A	1.46	<0.02	N/A	4	0.55	1.7	160	297	154	37	156	1.3	0.17	0.8	280	40	0.2	2
47	Dark chocolate with crème or mint fondant centres	77[œ]	<0.1	0.16	0.01	0.5	0.6	N/A	1.52	0.35	N/A	1	0.04	1.6	6	389	49	13	104	0.7	0.06	0.6	30	8	0.1	3
48	Mars bars (and own brand equivalents)	35	0.1	0.17	0.20	0.40	1.0	N/A	2.00	0.03	N/A	5	0.54	1.5	174	269	118	35	125	1.66	0.18	0.64	346	N/A	0.22	1
49	Maltesers (and similar products)	48 [œ]	N/A	0.04	0.47	0.6	1.4	N/A	0.84	0.02	1.3	14	0.78	4.6	156	565	266	50	269	2.0	0.20	1.0	270	53	0.2	5
50	Milk chocolate covered caramel and biscuit fingers	35[œ]	N/A	0.03	0.23	0.2	1.0	N/A	1.28	<0.02	0.5	4	0.40	1.8	191	242	100	30	118	1.6	0.13	0.6	310	16	0.3	1
51	Chocolate-covered bar with caramel and cereal	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.94	N/A	N/A	N/A	1.31	1.8	161	329	140	40	158	4.6[@]	0.24	0.8	230	N/A	0.4	4
52	Milky Way bars (and own brand equivalents)	24	0.20	0.18	0.21	0.4	1.0	N/A	1.96	0.03	N/A	5	0.56	1.7	220	240	117	25	114	2.0	0.13	0.5	354	N/A	0.13	1

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53	Snickers bars (and own brand equivalents)	11	1.5	0.12	0.16	2.1	1.7	N/A	4.28	0.04	N/A	11	0.69	1.7	187	388	101	80	210	1.9	0.35	1.4	385	N/A	0.60	6
54	Chocolate spread	N/A	N/A	0.17	<0.05	0.3	0.6	N/A	7.70	0.19	N/A	10	0.26	0.8	58	362	91	51	128	4.9	0.32	0.7	160	15	0.4	1
55	Cream of tomato soup, canned	25[œ]	N/A	<0.001	0.11	0.6	0.1	1	1.42	0.06	N/A	14	0.04	1.2	245	179	14	8	19	0.2	0.04	0.1	420	2	0.1	0.33
56	Instant soup, as purchased	118[f]	N/A	N/A	N/A	N/A	N/A	N/A	1.79	0.06	N/A	6	0.29	2.5	2376	782	99	28	211	1.3	0.12	0.7	3570	N/A	0.3	2
57	Mayonnaise, (retail), standard	78[œ]	<0.1	<0.001	0.1	<0.1	0.1	N/A	22.10	0.09	0.3	9	0.15	0.7	131	4	2	0.3	5	0.2	<0.001	0.1	330	7	<0.0001	0.41
58	Baby rusks	N/A	N/A	N/A	N/A	7.4	N/A	N/A	1.38	<0.02	N/A	22	0.24	0.5	88	240	336[@]	29	108	6.5[@]	0.11	0.7	150	2	0.6	6
59	Ice cream, non dairy, vanilla, soft scoop	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	76	178	80	12	68	0.4	<0.001	0.2	130	22	<0.0001	1
60	Ice cream, dairy, vanilla, soft scoop	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63	163	104	13	85	0.1	0.02	0.3	110	30	<0.0001	1
61	Chocolate/choc mint and nut cone (eg Cornetto)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	90	212	62	33	88	1.5	0.13	0.4	140	17	0.3	1
62	Ice cream, luxury, dairy, with chocolate/ caramel	148	<0.1	0.02	0.80	0.3	0.9	N/A	0.49	<0.02	0.2	4	0.36	1.3	75	249	108	27	110	1.4	0.15	0.6	160	17	0.2	3
63	Luxury choc ices (eg Walls Dream, Bounty, Magnum)	502	<0.1	0.10	0.17	0.1	0.7	N/A	0.71	0.13	0.3	7	0.5	1.9	64	250	121	27	119	1.2	0.15	0.5	140	23	0.1	3
64	Butter, spreadable (75-80% fat)	562[œ]	N/A	N/A	N/A	N/A	N/A	N/A	10.5	N/A	0.1	N/A	N/A	N/A	484	16	11	1	12	0.04	<0.001	0.1	720	4	<0.0001	<0.012
65	Butter, spreadable, light (60% fat)	437[œ]	N/A	N/A	N/A	N/A	N/A	N/A	8.27	N/A	N/A	N/A	N/A	N/A	467	26	17	0.06	15	0.3	<0.001	0.1	680	8	<0.0001	1

Composite sample number	Sample description	Vitamin A micrograms/100g*	Vitamin D micrograms/100g	Thiamin milligrams/100g	Riboflavin milligrams/100g	Niacin milligrams/100g	Tryptophan/60 milligrams/100g	Vitamin C milligrams/100g	Vitamin E milligrams/100g	Vitamin B_6 milligrams/100g	Vitamin B_{12} micrograms/100g	Folate micrograms/100g	Pantothenic acid milligrams/100g	Biotin micrograms/100g	Sodium milligrams/100g	Potassium milligrams/100g	Calcium milligrams/100g	Magnesium milligrams/100g	Phosphorus milligrams/100g	Iron milligrams/100g	Copper milligrams/100g	Zinc milligrams/100g	Chloride milligrams/100g	Iodine micrograms/100g	Manganese milligrams/100g	Selenium micrograms/100g
66	Coleslaw, purchased, economy products only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.41	N/A	N/A	N/A	N/A	N/A	197	175	40	8	20	0.2	0.02	0.1	320	N/A	0.1	1

N/A = Not Analysed

< = Result was below the analytical limit of quantification (LOQ) or limit of detection (LOD). There is no distinction between '<' and 'not detected'

Tr = Trace

* = Energy values have not been calculated because carbohydrate was not measured in this sample. Based on sub-sample ingredients and product information, small quantities of starch and sugars are likely to be present

§ = Energy values have not been calculated because carbohydrate was not measured in this sample. Based on sub-sample ingredients and product information, small quantities of sugars are likely to be present

^ = Energy values and available carbohydrate have not been calculated because sugars were not measured in this sample. Based on sub-sample ingredients and product information, small quantities of sugars are likely to be present

† = Energy values have been calculated on the assumption (based on sub-sample ingredients and product information) that carbohydrates are not present

= Available carbohydrate calculated on the assumption (based on sub-sample ingredients and product information) that no starch is present

‡ = Available carbohydrate calculated on the assumption (based on sub-sample ingredients and product information) that sugars are not present

$ = Available carbohydrate calculated on the assumption (based on sub-sample ingredients and product information) that sugars are present in trace amounts

" = No salt or vinegar added at point of purchase

@ = Samples within composite fortified with calcium and/or iron

œ= Total vitamin A calculated from retinol and beta-carotene assuming no alpha-carotene or cryptoxanthins present

¥= Total vitamin A calculated assuming (based on sub-sample ingredients and product information) that retinol, alpha-carotene or cryptoxanthins are not present

¢= Total vitamin A has not been calculated because retinol was not measured in this sample and small quantities of retinol may be present (based on sub-sample ingredients and product information)

š = Total vitamin A calculated assuming (based on sub-sample ingredients and product information) that carotenoids are not present

ƒ= Total vitamin A calculated assuming (based on sub-sample ingredients and product information) that retinol is not present

ž= Sample contains sub-samples with and without added salt

Note: Composite numbers do not run sequentially as one composite was withdrawn at the project planning stage (see Annex A)

Annex D: Analytical methods used

Moisture:
A homogenised portion of the sample is mixed with sand and heated to 102°C. The moisture loss is determined gravimetrically.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
Ref: BS 4401 pt3:1997
LOQ 0.1 g/100g

Ash:
A homogenised portion of the sample is ashed in a muffle furnace at 550°C. The ash is determined gravimetrically.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
Ref: BS 4401 pt11:1998
LOQ 0.1 g/100g

Protein:
The sample is analysed using Leco instrumentation following the Dumas procedure: The sample is combusted in an oxygen atmosphere, the gaseous product is cleaned and nitrogen compounds converted to nitrogen which is measured by a thermal conductivity cell. The crude protein is calculated by multiplying by the appropriate conversion factor.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
LOQ 0.1 g/100g

Fat:
The sample is acid hydrolysed with hydrochloric acid, cooled, filtered and dried. The fat is extract from the residue with petroleum ether and the dried fat determined gravimetrically.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
Ref: BS 4401 pt4:1970 (Weibull Stoldt)
LOQ 0.1 g/100g

Fatty acids:
The lipid fractions of the sample are solvent extracted. The isolated fat is transesterified with methanolic sodium methoxide to form fatty acid methyl esters (FAMES). The FAME profile is determined using capillary gas chromatography (GC). Quantification and identification of individual FAMEs in the test material is achieved with reference to calibration standards.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
LOQ 0.01 mg/100g

Sugars:
The sugars are extracted with water, clarified and chromatographically separated on an amine column with an acetonitrile/water mobile phase. The sugars are detected using an evaporative light scattering detector and quantified with reference to calibration standards.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
LOQ 0.1 g/100g

Starch:
The method consists of two separate determinations. The sample is treated with warm diluted hydrochloric acid, clarified and filtered; the optical rotation of the resulting solution is determined. In the second determination, the sample is extracted with 40% ethanol and filtered. The filtrate is acidified with hydrochloric acid, clarified and filtered again; the optical rotation of the resulting solution is determined at 20 ±2ºC.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
Ref: The Feeding Stuffs (Sampling and Analysis) Regulations 1982 Method 30a.
LOQ 2 g/100g

Oligosaccharides:
Malto-oligosaccharides (DP1-7) are determined individually by High Performance Anion

Exchange Chromatography with Pulsed Amperometric Detection. In-house method

LOQ 0.1 g/100g

Dietary Fibre:
AOAC
The sample is weighed and de-fatted if necessary. It is then gelatinised and treated with α-amylase and further digested enzymatically with protease and amyloglucosidase to remove the starch and protein. The dietary fibre is precipitated with IMS, filtered, washed, dried and weighed. Total dietary fibre is then determined gravimetrically and corrected for protein and ash.
Accredited to BS/EN ISO/IEC 17025:2005. UKAS 0680
Ref: AOAC 985.29/45.4.07 (2007)
LOQ 0.5 g/100g

Englyst (Non-starch polysaccharides)
Englyst Fibrezym kit with colorimetric end point
LOQ 0.2 g/100g

Cholesterol:
Method Lipid in sample is saponified at high temperature with ethanolic KOH solution. Unsaponifiable fraction containing cholesterol and other sterols is extracted with toluene. Sterols are derivatized to trimethylsilyl (TMS) ethers and then quantified by GC.
LOQ 0.7 mg/100 g
Reproducibility 20%
Reference Method ISO 6799: 1992

Inorganics:
Sodium, Potassium, Calcium, Magnesium, Copper, Iron, Manganese, Zinc, Phosphorus, Selenium
Samples are digested in acid under oxidising conditions, using sealed ‘bombs’ in automated microwave digestors, to prevent losses of volatile metals/inorganics, Metals (and some inorganics) are then determined by Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES) or by Inductively Coupled Plasma Mass Spectrometry (ICP-MS). These techniques allow the sensitive and accurate (true and precise) determination of metals in foods and allow matrix interferences to be overcome.
In house methods - UKAS accredited.

Iodide:
Concentrations are determined by high resolution ICP-MS after extraction with tetra methyl ammonium hydroxide.
UKAS accredited.

Chloride:
Concentrations are determined using a Corning Chloride Analyser after extraction with nitric acid.
In house method FFF/B1-2104 - UKAS accredited.

Vitamins – Water Soluble:
Thiamin, Riboflavin & Vitamin B6
Thiamin, riboflavin and Vitamin B6 are determined by HPLC after appropriate and controlled acid and enzymatic hydrolysis. The methods are based on published CEN Standards. The selected method enables determination of total B6 as pyridoxine and is most appropriate to samples of this type where pyridoxine or its phosphate will form the major vitamin B6 component.
UKAS accredited.

Niacin, Total Folate, Biotin, Pantothenic acid
Determined using microbiological assay (MBA) procedures with detection carried out using VitaFast® MBA test kits.
UKAS accredited.

Tryptophan
Determined by HPLC using fluorescence detection after alkaline hydrolysis. Tryptophan contributes to the available Niacin on the basis that Niacin = Tryptophan/60.

Vitamin B12
Vitamin B12 is extracted from food by autoclaving in acetate buffer in the presence of cyanide. Vitamin B12 is determined by microbiological assay using *L.Delbrueckii.Lactis.*
UKAS accredited.

The B-vitamin results are expressed as follows:

Thiamin:	thiamin chloride hydrochloride
Riboflavin:	free riboflavin
Niacin:	nicotinic acid
Vitamin B6:	pyridoxine hydrochloride
Pantothenate:	pantothenic acid
Biotin:	d-biotin
B12:	cyanocobalamin
Total folate:	pteroyglutamic acid

Vitamin C
Vitamin C is determined by HPLC using fluorescence detection.

Oil Soluble Vitamins:
Vitamins A, D, E and the carotenoids are determined using an in house procedure involving saponification of the sample, solvent extraction and HPLC determination - UKAS accredited methods based on:

- Vitamin A – Retinol: BS EN 12823-1:2000. Foodstuffs-Determination of Vitamin A by High Performance Liquid Chromatography-Part 1: Measurement of Retinol.
- Vitamin A – β-Carotene: BS EN 12823-2:2000. Foodstuffs-Determination of Vitamin A by High Performance Liquid Chromatography-Part 2: Measurement of β-Carotene.
- Vitamin D: BS EN 12821:2000. Foodstuffs-Determination of Vitamin D by High Performance Liquid Chromatography-Measurement of Cholecalciferol (D3) and Ergocalciferol (D2).
- Vitamin E: BS EN 12822:2000. Foodstuffs-Determination of Vitamin E by High Performance Liquid Chromatography-Measurement of α-, β-, γ- and δ-tocopherols.

The total vitamin E figure takes into account the relative biological activities of the different isomers. Vitamin E is given as mg/100g of α - tocopherol equivalent. The activities used for these calculations are as shown below:

α - tocopherol	1.0
β - tocopherol	0.4
γ - tocopherol	0.1
δ - tocopherol	0.01

Total vitamin A is expressed as ug/100g all-trans retinol equivalent (ATRE) and is calculated as follows:

All-trans retinol + (0.75*13-cis retinol) +(β-carotene/6) +(other active carotenoids/12)

UKAS accredited.

Details of the quality control measures employed are given in the analytical report associated with this project, available at www.dh.gov.uk/publications.

References

[1] Responsibility for nutrition policy in England transferred from the Food Standards Agency to the Department of Health (DH) on 1st October 2010. Management of the rolling programme of nutrient analysis has also transferred to DH

[2]Food Standards Agency. *Management of the Food Standards Agency programme of nutrient analysis and associated work* http://collections.europarchive.org/tna/20100907111047/http://food.gov.uk/science/dietarysurveys/analyticalsurveys/n10040/ (accessed 1 February 2013)

[3]Food Standards Agency. *McCance & Widdowson's The Composition of Foods integrated dataset* http://tna.europarchive.org/20110116113217/http://www.food.gov.uk/science/dietarysurveys/dietsurveys/ (accessed 1 February 2013)

[4]Food Standards Agency. *Re-estimate of trans fat intake in adults* http://collections.europarchive.org/tna/20100907111047/http://food.gov.uk/science/dietarysurveys/ndnsdocuments/ndnspreviousurveyreports/reestimatetransfats (accessed 1 February 2013)

[5]Food Standards Agency. *National Diet and Nutrition Survey: headline results from year 1 (2008/2009)* http://collections.europarchive.org/tna/20100907111047/http://food.gov.uk/science/dietarysurveys/ndnsdocuments/ndns0809year1 (accessed 1 February 2013)

[6] Report on the nutrient analysis survey of biscuits, buns, cakes and pastries is available at www.dh.gov.uk/publications