NUTRITIONAL BENEFITS OF YOGHURT

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Yoghurt has been eaten around the world for centuries, but is a relatively recent addition to the UK diet, only appearing as a mainstream dietary component in the 1960s. The most recent *Mintel Marketing Report* on yoghurt and desserts (UK) reported that 84 percent of households purchased yoghurt in 2013 (1).

Yoghurt is defined in the Code of Practice (2) as an 'acidified coagulated milk product made from milk or any combination of milk and/or products obtained from milk, in which, after pasteurisation, lactic acid has been produced within the product by the bacterial cultures *Lactobacillus bulgaricus* and/or *Streptococcus thermophilus* with which may be used other suitable bacteria. The appropriate live organisms should be viable and abundant'.

Yoghurts are now available with a range of additional ingredients, using various production methods, leading to a vast choice from thick, strained or Greek style yoghurts to flavoured drinking yoghurts, offering products to suit different age groups and needs.

Yoghurt can provide useful amounts of several nutrients which may help to ensure that micronutrient recommendations are met in vulnerable groups

NUTRITIONAL PROFILE

Yoghurt is considered a nutrient-dense food, but any added ingredients and production methods will dictate the final nutritional content. Being made from milk, yoghurt is typically a good source of high-quality protein and contains a highly bioavailable source of calcium. It can also be a source of iodine, phosphorus and potassium, as well as riboflavin (B2) and vitamin B12.

Although not naturally a source, some yoghurt products are fortified with vitamin D, or may be enriched with extra calcium qualifying them for bone health claims (3). The fat content of yoghurt varies widely, ranging from 'fat free' varieties with less than 0.5% fat, through to low-fat yoghurts containing less than three percent fat and up to 10 percent for some Greek style types. Table 1 presents the macronutrient content of a selection of yoghurts showing large variations in the energy, fat and carbohydrate contents.

Several yoghurt types are officially a 'source' or 'high in' key micronutrients, representing 15 percent and 30 percent respectively of the EU Recommended Daily Allowance. For example, all yoghurts are a source of calcium, all except full fat fruit yoghurt are a source of phosphorus, low fat and thick and creamy yoghurts are a source of riboflavin, and all yoghurts except thick and creamy are a source, or high in iodine.

Yoghurt can provide useful amounts of several nutrients which may help to ensure that micronutrient recommendations are met in vulnerable groups. The National Diet and Nutrition Survey(4) (NDNS) reveals that riboflavin, vitamin D, calcium, magnesium and potassium are low in the diets of children, adolescents, women and older adults, with significant numbers in these groups failing

Table 1: Nutrient content of yoghurts per 100g

	Full fat fruit yoghurt	Low fat fruit yoghurt	Low fat plain yoghurt	Fat free fruit yoghurt	Plain Greek style yoghurt	Fruit Greek style yoghurt	Thick & creamy / twinpot yoghurt
Energy (kcal)	109	78	56	47	133	137	124
Protein (g)	4.0	4.2	4.8	4.8	5.7	4.8	4.8
Carbohydrate (g)	17.7	13.7	7.5	7.0	4.8	11.2	16.2
Total sugars (g)	16.6	12.7	7.5	6.3	4.5	10.5	15.6
Fat (g)	3.0	1.1	1.0	0.2	10.2	8.4	3.7
Saturates (g)	2.0	0.8	0.7	0.1	6.8	5.6	-

Source: McCance and Widdowson's The Composition of Foods (2002)

to reach lower reference nutrient intakes for these essential nutrients.

Table 2 summarises the contribution that yoghurt and fromage frais make to energy, macronutrient and micronutrient intakes in adults and children, using data extracted from the most recent NDNS (4).

Table 2: Percentage contribution to nutrient intakes

	4-18 years n=1687	19-64 years n=1655
Energy	1.4	1.1
Total fat	1.1	0.8
Saturates	1.9	1.3
Carbohydrate	1.5	1.4
Total sugars	3.1	2.9
NMES	3.1	3.0
Protein	1.8	1.5
Vitamin A	1.5	0.8
Thiamin	1.8	1.9
Riboflavin	3.6	3.2
Vitamin B6	2.4	0.3
Vitamin B12	2.9	1.7
Vitamin D	1.9	0.7
Calcium	3.8	4.2
Magnesium	1.6	1.4
Phosphorus	2.7	2.5
Zinc	1.7	1.5
Iodine	4.7	4.7

Key: NMES, non-milk extrinsic sugars

Interestingly, despite contributing less than two percent to daily energy intakes and modest amounts of fat and sugar, yoghurt provides three to four percent of certain B vitamins, calcium and iodine. A recent review of the contribution of yoghurt to the diets of UK children and adults (3) showed that children up to age three consumed the most yoghurt (mean intakes 43.8g/day to 46.7g/day), whilst adolescents consumed the least (21g/day). In adults, the highest mean consumption was 35.7g/day in 50 to 64 year olds. Low-fat yoghurt was the most commonly consumed type. This review also reported the findings of a simple modelling analysis which determined whether daily inclusion of a pot of low-fat fruit yoghurt daily could improve adolescents' nutritional intakes. The results showed that eating 125g of yoghurt daily could potentially increase mean intakes of calcium and iodine above Reference Nutrient Intake, as well as boosting zinc intakes.

YOGHURT AND HEALTH

There is a wealth of evidence about the relationship between dairy foods and health. Several studies now show that yoghurt consumption in particular is associated with benefits relating to bone health, cardiovascular health, diabetes and obesity.

Bone health

Yoghurt provides many of the nutrients needed for optimal bone health such as calcium, protein, magnesium, zinc and phosphorus. The calcium present in yoghurt is bioavailable as the low pH ionises calcium, facilitating intestinal calcium uptake.

An Italian study (5) suggested that yoghurt was an independent predictor of bone mineral density, whilst data from a prospective cohort study of 3,212 subjects (6) from the Framingham Offspring Study showed that consuming one 125g pot of yoghurt daily was positively associated with bone mineral density. In addition, yoghurt showed a weak but protective trend for hip fracture. Another randomised, double-blind trial (7) found that eating a 125g pot of yoghurt fortified with calcium (800mg) and vitamin D (10μg) led to reduced parathyroid hormone and bone resorption markers.

Cardiovascular

Observational studies and meta-analyses have reported beneficial associations between yoghurt intake and cardiovascular disease risk factors. Analyses from the US Framingham cohort found that regular consumers of low-fat yoghurt were 31 percent less likely to develop high blood pressure than those who ate it infrequently. A high yoghurt intake was thought to support blood pressure control and may even help prevent hypertension (8). A meta-analysis (9) of 14 studies showed a clinically significant reduction in blood pressure (3.1 mmHg systolic; 1.09 mmHg diastolic) when yoghurt was consumed regularly with the greatest benefits seen in those with hypertension. The population-based MONA LISA Study in France (10) found that adults who consumed more low-fat dairy products had the lowest risk for cardiovascular mortality and the most favourable lipid profiles. In a recent review, Astrup (11) reported that fermented yoghurt products produced a four percent and five percent decrease in total and LDL-cholesterol respectively, whilst an eight-week randomised controlled trial of overweight adults revealed an 8.4% reduction in LDL-cholesterol after consumption of yoghurt fermented with Enterococcus faecium and Streptococcus thermophilus.

Type 2 diabetes

Data from cohort studies (9) and meta-analyses (12, 13, 14) have associated yoghurt consumption with a lower risk of Type 2 diabetes (up to 22 percent), as well as improved insulin resistance, lower circulating levels of glucose and

lower triglycerides. An analysis of the longitudinal EPIC survey (15) found a 28 percent reduced risk of developing Type 2 diabetes when yoghurt was consumed regularly, particularly when it replaced less healthy snacks. The authors suggested that the benefits of yoghurt could be exerted via probiotic bacteria and a special form of vitamin K associated with fermentation.

Yoghurt and weight management

Low-fat yoghurt has been a cornerstone of weight management advice for decades. Evidence from large observational studies suggests that yoghurt is one of a group of foods repeatedly associated with healthier weight changes. In a pooled adjusted analysis of dietary habits and weight change in over 120,000 healthy, non-obese US adults, consumption of low-fat yoghurt was associated with a decrease in weight (1.0-2.0kg) over a four-year period - a greater effect than that seen for vegetables, fruit and wholegrains (16).

Other epidemiological studies (17), as well as large systematic reviews (18), suggest that there is a modest but significant inverse association between dairy consumption and body weight. In addition, dairy consumption does not seem to contribute to increased risk of weight gain, metabolic syndrome or cardiovascular disease (19, 20, 21, 22). This is further supported by small clinical studies (23, 24) which have found reductions in weight (1.4-1.6kg) associated with eating around three daily servings of fat-free yoghurt. Yoghurt may also have a suppressive effect on appetite (25).

Lactose intolerance

Yoghurt naturally contains less lactose than milk (typically 3.4% compared with 6.0%)(26), suggesting that it may be better tolerated than milk in people with lactose intolerance, possibly due to slower gastric emptying and gut transit (27). An opinion by the European Food Safety Authority (28) confirmed that live yoghurt can be included in the diets of people with lactose maldigestion because, within the gut, the cultures in live yoghurt improve the digestion of lactose, breaking it down to lactic acid. This led to an authorised EU health claim of 'improved lactose digestion' for yoghurts and fermented milks containing minimum levels of live cultures. Dietitians can now feel confident in giving advice on this to patients with lactose intolerance or those choosing to avoid lactose.

CONCLUSION

Yoghurt is a unique and historic food which provides useful amounts of several key vitamins and minerals, as well as high quality protein. Its versatility makes yoghurt suitable for all ages as well as a beneficial addition to therapeutic diets such as those aimed at improving cardiovascular risk factors, bone health and weight management.

YOGHURT FACTS AND MYTHS

- The sugar content in yoghurt varies widely with many products containing no added sugar. Yoghurt provides only three percent of NME sugars on average in the UK diet.
- Yoghurt is an official source of calcium, phosphorus, iodine and riboflavin.
- Live yoghurt can often be tolerated by people with lactose maldigestion due to the lower lactose level and the gut effects of the yoghurt cultures.
- Regular yoghurt consumption is associated with a lower risk of Type 2 diabetes and cardiovascular disease.
- Yoghurt may help to support bone health and weight management.

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