Cheese, salt and nutrition

# Factsheet

The Dairy Council

Cheese is a tasty, versatile and convenient food that can fit into a healthy balanced diet.

This factsheet will provide you with information about cheese including: the function of salt in cheese, the contribution of cheese to salt intake and the nutrients in cheese. This information is provided to help the reader develop an understanding of how cheese can play a role in the UK diet.

This factsheet also reviews the scientific literature on the association between cheese intake and hypertension.

## Cheese

**Natural cheese is a complex food made from just a few basic ingredients; milk, a starter culture (good bacteria), salt and rennet (mostly non-animal).**

From these simple ingredients, cheesemakers around the world have developed thousands of different varieties of cheese, with over seven hundred in the UK alone. Each variety of cheese has its own unique taste, texture and nutritional composition.

**Table 1 – Categories and examples of UK cheese**

| Cheese Categories | Examples |
|---|---|
| Hard | Cheddar, Double Gloucester |
| Semi-Hard | Cheshire, Wensleydale |
| Soft ripened or bloomy rind | Somerset Brie, British Camembert |
| Blue | Blue Stilton, Shropshire Blue |
| Washed rind | Stinking Bishop |
| Fresh | Mozzarella, Cottage Cheese |
| Blended | Stilton with Cranberries, Double Gloucester with Chives |

## **How cheese** is made

**There are some basic steps typically involved in cheesemaking with variations in the process giving each cheese its own unique flavour and texture.**

1. Milk is pasteurised and a starter culture added to ‘sour’ and thicken
2. Rennet (usually non-animal) is added to form curds, which are left to set
3. Curds are cut so that whey is released. For hard cheeses, the curds are cut finely whereas they are lightly cut in soft cheeses
4. Curds are either ‘cooked’ or piled on top of each other to further release whey
5. The curd is milled, salt added, and the curd is pressed into moulds
6. Cheese is then stored and ripened with temperature and humidity tightly controlled

## **Function of salt** in cheese

Salt is an integral part of the cheesemaking process. It is added for technological purposes; it controls moisture, texture, functionality and food safety through the inhibition of growth of undesirable microorganisms.

**Salt is added to:**

1. Reduce water activity
2. Control microbial growth
3. Preserve
4. Add texture and improve functional quality

Salt controls the growth of special bacteria added to the milk at the beginning of the cheesemaking process. The addition of salt also accelerates the expulsion of whey from the curd.

Salt has the capacity to reduce water activity and controlling this inhibits the growth of undesirable pathogenic and spoilage bacteria. This is especially important in the production of aged cheeses such as Cheddar.

Salt modifies the water binding capacity of casein within the cheese matrix, which affects structural and textural properties. Salt also controls enzyme activities in the cheese. A greater susceptibility to enzymatic hydrolysis will add to the softening of the cheese. Reducing salt in cheese can result therefore in problems with shape maintenance.

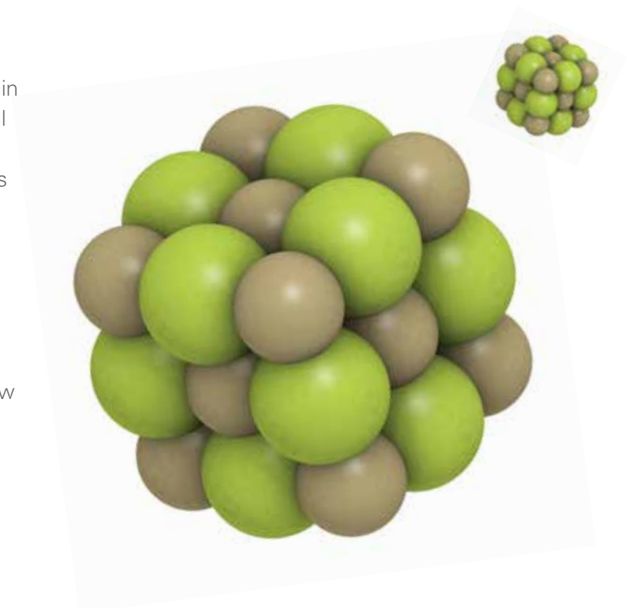
Salt levels may also be impacted by the fat level in the cheese. It has been demonstrated that reducing salt levels has an impact on aroma release particularly in low fat products. Therefore formulating cheese with both reduced salt and reduced fat may play an even greater challenge than reducing salt alone.

## **Level of salt** in cheese

Variation in microbial composition and textures, as well as the quantity and method of addition of salting (for example dry curd salting or brining) will help to impart the unique and traditional characteristic of a cheese.

Soft and fresh cheeses have a relatively short shelf life due to their higher moisture content and thus require less salt than hard cheese. Many of the continental type hard cheeses use brine baths to add the salt and they tend to have a higher salt and sodium content. It is also important to understand that the same category of cheese like Cheddar can have different salt contents. A mild Cheddar is only ripened and stored for a few months whereas a mature aged Cheddar is stored for years, requiring a higher salt content to control pathogenic and spoilage bacteria.

Cheese manufacturers have worked constructively and positively with government agencies to overcome technical barriers and reduce salt levels in their products, whilst producing products which are nutritious, safe and acceptable to the public's tastes.



Nutrition labelling typically declares sodium per 100g of food on the back of the pack but it may also appear on front of pack. The sodium/100g needs to be multiplied by 2.5 to convert it to salt/100g, which can then be appropriately scaled down according to the portion size of cheese eaten.

## **Level of salt** in a portion of cheese

In the UK, there is no defined size for a portion of cheese. However, the dairy industry, and nutritional organisations such as the British Dietetic Association suggest a 30g ('small matchbox' size). More recently 20g individual portion sizes of cheese have become available.

UK Public health recommendations for adults and children over 11 years are currently to consume no more than 6g of salt per day. Table 2 below shows the amount of salt in a 30g portion of cheese and the percentage contribution to the recommended maximum salt intake. Current UK intakes of cheese are less than 30g per day.

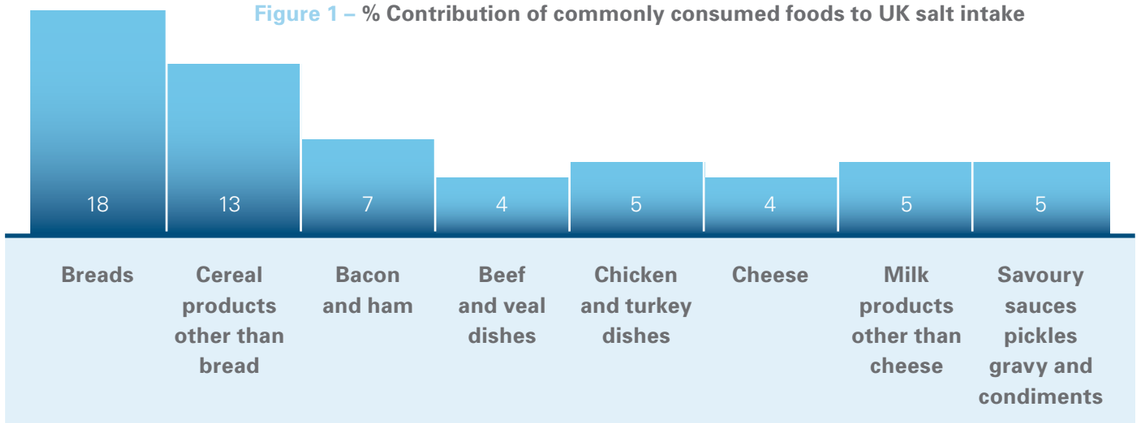
**Table 2 – The amount of salt in (g) found in a 30g portion of commonly consumed cheeses**

| Cheese | Salt per 30g portion | % Contribution to UK recommended maximum 6g a day |
|---|---|---|
| Cheddar (regular) | 0.54 | 9 |
| Cheddar-type (half fat) | 0.50 | 8 |
| Stilton | 0.59 | 10 |
| Red Leicester | 0.52 | 9 |
| Double Gloucester | 0.52 | 9 |
| Wensleydale | 0.38 | 6 |
| Cottage cheese | 0.23 | 4 |
| Cream cheese | 0.23 | 4 |

## **How much salt in the UK diet** is contributed from cheese?

According to the National Diet and Nutrition Survey, cheese contributes 4% to overall adult salt intake in the UK.

**Figure 1 – % Contribution of commonly consumed foods to UK salt intake**



# Looking at the evidence:
## Cheese intake, hypertension and stroke

### Introduction

**It has been hypothesised that because cheese contains sodium, high cheese consumers will be at risk of elevated blood pressure and its associated diseases, cardiovascular disease (CVD) and stroke. However the scientific literature does not provide an evidence base to support this hypothesis and it has been put forward that other beneficial nutrients present in dairy products may explain this.**

**Cheese and hypertension (elevated blood pressure)**

- Hypertension is complex. Although there are a spectrum of mechanisms that may contribute to the development of hypertension, it is evident that increases in nutrients found in dairy products (e.g. calcium, potassium and magnesium) are beneficial for lowering blood pressure[2,3].

- A review by Kris – Etherton *et al*[1]., investigating dairy and blood pressure reported that most prospective trials have observed an inverse association between dairy product consumption and changes in blood pressure or developing hypertension, and in relation specifically to cheese, no associations were found.

**Studies and Reviews**

- Prospective cohort studies on the association of dairy food consumption and hypertension have typically looked at intake of total milk, low fat and whole milk and/or total dairy, with some such studies reporting an inverse relationship, whilst others have shown no relationship at all[4]. The inconsistencies may be in part due to the different methods used to collect information on dietary intake and confounding by other healthy lifestyle choices or dietary patterns amongst dairy eaters[5].

- Fewer studies have investigated the association of other individual dairy items like cheese with elevated blood pressure, but those that have typically found no significant association between cheese consumption and hypertension[4].

- For example, two Dutch studies looked at the risk of hypertension between the lowest and highest cheese consumers in the cohort. The MORGEN study[6] of 3454 20-65 years old and cheese intakes of 62 vs 12g per day, and the ROTTERDAM study[7] of 2245 over 55 year olds and cheese intakes of 58 vs 15g, found no association between intake and risk of hypertension. A study looking at 1750 British men and women from a 1946 birth cohort that looked at the association between dairy products and blood pressure and hypertension over 10 years, similarly showed no association between cheese intake and elevated blood pressure[8].

- The US 2010 Dietary Guidelines Advice Committee conducted an evidence based review of recent literature and concluded there was moderate evidence of an inverse relationship between milk and dairy and blood pressure[3]. A focus of the review was a closer look  at the potential impact of dairy micronutrients and dairy peptides on blood pressure, as well as dairy fat i.e. low fat vs high fat dairy. From a review of the studies including a systematic review, a randomised clinical trial and 6 prospective studies, the authors' conclusions were that some types of low fat dairy consumption were associated with lower blood pressure, and no significant relationship was found between high fat dairy and blood pressure

- A systematic review and meta analysis to examine the association between dairy food intake and elevated blood pressure in adults was published in 2011[4]. Five cohort studies were included involving around 45 000 subjects and 11 500 cases of elevated blood pressure. Meta analysis showed an inverse association between total dairy food consumption and elevated blood pressure; RR 0.87 (95% CI 0.84-0.94). Separation of dairy foods into categories showed a significant inverse association with low fat dairy foods and milk and yogurt and no association between cheese and elevated blood pressure; RR 1.00 (95% CI 0.89 – 1.12).

- In a more recent systematic review and meta analysis associations with cheese intake were assessed in 8 studies[6-13], which included 51 000 individuals and 15 000 cases of hypertension. All of the studies showed no association between cheese intake and hypertension incidence. The pooled relative risk association for cheese with hypertension was RR 1.00 (95% CI 0.99-1.05) per increment of 30g/d. The review included the Women's Health Study[10] which assessed cottage cheese only. When this study was removed from analysis, the result was still insignificant; RR 1.02 (95% CI 0.99 – 1.05).

**Cheese and stroke**

- As with many of the studies looking at associations between dairy and elevated blood pressure, studies investigating the role of individual dairy products and the risk of stroke are limited. Studies investigating the role of of milk or total dairy and/or dietary calcium are more common than for other individual dairy foods[14].

**Studies and reviews**

- The relationship between dairy and CVD has been investigated more in relation to saturated fat content. While dairy products contribute to saturated fat intake, there is no clear evidence that eating dairy foods is consistently associated with CVD. In fact, the weight of evidence from reviews suggest that certain dairy products may be protective against CVD and that other components in dairy may counteract the presence of saturated fat[15,16].

- In a large prospective cohort study that followed 74 691 Swedish men and women, with a mean follow up of 10.2 years, no association was observed between consumption of cheese and stroke risk[17].

- The association between dairy food intake and risk of stroke was also investigated within the Alpha-Tocopherol, Beta-Carotene Cancer Prevention Study[18]. Between 1985 and 1988, 26,556 Finnish male smokers aged 50–69 years who had no history of stroke completed a food frequency questionnaire. During  a mean follow up of 13.6 years, no significant associations were reported  between intakes of total dairy, low fat milk, sour milk, cheese, ice cream, or butter and risk of any stroke subtype.

- The relationship between specific food sources of dairy calcium and the risk of ischemic stroke was explored in 85 764 women (number of strokes = 690) in the Nurses' Health Study cohort[19]. Inverse trends were observed for hard cheese; the relative risk comparing women who almost never ate cheese with women who ate cheese ≥ 1 times per day was 0.63 (95% CI 0.40-0.99).

- Other studies on cheese include a follow-up of study of around 25 000 seventh-day Adventists over 20 years (1960-1980) in which the authors stated that cheese consumption was not related to death from stroke[20].

## **Beyond salt** - cheese nutrition

Like milk and yogurt, cheese provides a number of important nutrients to the UK diet. The amount of individual nutrients cheese contains differs according to variety. As a general rule, hard cheeses, such as Cheddar, have the highest concentration of nutrients.

In fact, hard cheese can make a significant contribution to recommended intakes for protein, calcium, phosphorus and vitamin B12 for young people.

**Table 3 – Contribution of 30 grams (small matchbox size) of Cheddar cheese to the nutrient requirements of young people aged 7 to 18 years**

| Nutrients | 30 grams of Cheddar cheese contains: | Percentage of Reference Nutrient intake (RNI)* provided by 30 grams of Cheddar cheese | | | | | |
|---|---|---|---|---|---|---|---|
| | | Male 7 to 10 years | Male 11 to 14 years | Male 15 to 18 years | Female 7 to 10 years | Female 11 to 14 years | Female 15 to 18 years |
| Protein (grams) | 7.6 | 26.9 | 18.1 | 13.8 | 26.9 | 18.4 | 16.7 |
| Calcium (milligrams) | 222 | 40 | 22 | 22 | 40 | 28 | 28 |
| Phosphorus (milligrams) | 152 | 28 | 15 | 15 | 28 | 19 | 19 |
| Vitamin B12 (micrograms) | 0.7 | 70.0 | 58.3 | 46.7 | 70.0 | 58.3 | 46.7 |

* The RNI is a figure set by the Department of Health which describes the amount of a nutrient that is enough to meet the dietary needs of most people in a group (97.5%).

## **The key nutrients** provided by hard cheese

Cheese is a source of protein, calcium, phosphorus, vitamin B12 and also provides vitamin A, iodine and zinc. Although these nutrients can individually be found in a number of foods, they come as a nutrient package within cheese.

**Table 4 – The role of protein, calcium, phosphorus and vitamin B12 in the body**

| Nutrient | Function within the body |
|---|---|
| Protein | • Needed for growth, development and maintenance of bones<br>• Needed for growth and maintenance of muscles |
| Calcium | • Essential for normal bones and teeth<br>• Important for normal blood clotting<br>• Important for muscle and nerve function<br>• Important for normal digestion |
| Phosphorus | • Essential for normal bones and teeth<br>• Important for the normal release of energy from foods |
| Vitamin B12 | • Helps to make red blood cells, which carry oxygen around the body<br>• Important for the normal functioning of the immune system<br>• Important for normal nerve function |

## **Calories, fat** and saturated fat

Cheese can fit into the dietary guidelines for fat and calories.

**Total fat**
Dietary guidelines suggest around 70g of fat a day is a healthy upper limit for an average woman and 95g for a man. A matchbox-size piece of Cheddar cheese contains approximately 10g of fat; about 14% of the maximum for a woman and about 10% for a man.

**Saturated Fat**
Dietary guidelines suggest around 20g of saturated fat a day is a healthy upper limit for an average woman and 30g for a man. A piece of Cheddar-style cheese contains 6.5g of saturated fat; about 32% of the maximum for a woman and about 22% for a man.

**Calories**
Government guidelines suggest that the average women should consume around 2000 calories a day, while the average man should consume around 2500 calories; a 30g piece of Cheddar contributes about 6% of this figure for a woman and about 5% for a man.

Table 5 – **Calories, fat and saturated fat content from a 30g portion of a variety of popular cheeses**

| Type of cheese | Calories in 30g | Fat in 30g | Saturated fat in 30g |
|---|---|---|---|
| Cheddar (regular) | 125 | 10 | 6.5 |
| Cheddar-type (half fat) | 82 | 5 | 3.0 |
| Red Leicester | 123 | 10 | 6.5 |
| Double Gloucester | 123 | 10 | 6.5 |
| Wensleydale | 114 | 10 | 6.3 |
| Stilton | 123 | 11 | 6.9 |
| Cottage cheese | 30 | 1 | 0.7 |

Despite the contribution of cheese to saturated fat intake, there is no conclusive scientific evidence of an association between higher cheese intake and cardiovascular disease.

**If the information above** on fat and saturated fat is of interest to you, please watch out for future factsheets which look more in depth at fat, saturated fat, heart disease and metabolic syndrome.

In the meantime, if you have any queries on the themes or information in this factsheet on cheese, salt and nutrition please contact us on info@dairycouncil.org.uk

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