Dairy Australia

Cheese

It's okay to recommend cheese: here's why

AUSSIE DAIRY MATTERS

Opinions differ on the health effects of dairy foods, including cheese. Some people have concerns around cheese and its saturated fat, sodium and energy content. This may lead to unfounded concerns around heart health, blood pressure and waistlines. However, the 2013 Australian Dietary Guidelines classifies all cheese as a Five Food Group food rather than a discretionary food.

Health professionals play an important role in educating consumers about good nutrition and providing accurate, evidence-based information.

The purpose of this paper is to provide a summary of the latest science on cheese. It can help educate consumers on cheese's role in reducing the risk of conditions like cardiovascular disease (CVD), blood pressure, and obesity.

Dairy Australia is the national services body for the dairy industry. This report was prepared by Dairy Australia's dietitians and nutritionists. It aims to bring together the most recent and emerging research around the health benefits of cheese. It draws from the latest evidence worldwide to help health professionals and policymakers understand the unique health benefits of cheese. This report empowers health professionals to encourage all Australians to enjoy cheese as part of a balanced diet. For further information please visit **dairy.com.au**.

How much cheese do Australians eat?

Almost one third of Australians eat cheese every day. While some people believe Australians are consuming more than enough cheese, the opposite is true. According to the 2011/2012 National Nutrition and Physical Activity Survey (NNPAS) the average daily intake was only 12g. This is less than a third of what's recommended in the Australian Dietary Guidelines (40g).[1]

Hard cheese was the most consumed type of cheese, accounting for 67% of consumption. This was followed by processed cheese (10%) and cream or cottage cheese (10%).[1]

Most cheese was consumed in sandwiches, rolls and on toast (41%). A further 28% was eaten in mixed dishes, 18% was consumed alone and 14% was consumed on pizza.[1] Surface ripened cheese (e.g. camembert or brie) made up only 3% of the total cheese consumed.[2]

What nutrients does cheese provide?

Cheese intake accounted for 7.2% of saturated fat intake and 3.9% sodium intake. However, it was the second largest provider of dietary calcium, contributing 9.6%.[1]

Other nutrients provided by cheese included protein vitamin A, riboflavin, niacin, vitamin B12, vitamin K2, iodine, phosphorus, selenium and zinc.

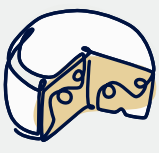
Cheese is part of the dairy food group, one of the Five Food Groups recommended for consumption every day

32%
of Australians
eat cheese every day
but
the average intake is
less than a third
of what's recommended

How cheese is consumed[4]

sandwiches, rolls and on toast
41%

mixed dishes
28%



on its own
18%

pizza
14%

Insights on the impacts of cheese consumption on health

Evidence from prospective cohort studies

In recent years a number of papers have provided new insights on the impacts of cheese consumption on health. The following is a summary of systematic reviews and meta-analyses from prospective cohort studies.

Cardiovascular disease (CVD)	A meta-analysis of prospective studies by Chen at al. included 15 prospective cohort studies, most with a duration of over 10 years.[3] • There was an inverse association between cheese consumption and risk of CVD. • Compared to lower cheese consumption, higher intakes were associated with a 10% lower risk of CVD. • These relationships were most pronounced at intakes of approximately 40g/day cheese. Guo *et al.* published a meta-analysis of 29 cohort studies (this included 938,465 participants and 25,416 cases of CVD).[4] • The authors observed inverse associations of total fermented dairy consumption with risk of CVD. • Every 10g/day of cheese consumption reduced CVD risk by approximately 2%.
Coronary heart disease (CHD)	Drouin-Chartier *et al.* published a systematic review and meta-analyses of prospective cohort studies on the associations between dairy food consumption and the risk of cardiovascular-related clinical outcomes.[5] • This study concluded there is no evidence that the consumption of any form of dairy is detrimentally associated with any cardiovascular-related clinical outcome. • Consumption of cheese was not associated with CHD. A systematic review and meta-analysis by Alexander *et al.* included data from five studies (194,911 individuals were followed for 10–23 years).[6] • Consumption of cheese was inversely associated with risk of CHD. • Cheese intake of at least 52.6g/day was associated with a 14% lower risk of CHD.
Stroke	A meta-analysis of 11 prospective cohort studies, published by Gholami *et al.* in 2017, evaluated the association of the consumption of dairy products on the risk of stroke.[7] • Cheese consumption was associated with a 7% reduced risk of stroke. A systematic review and meta-analysis by Goede *et al.* included data from seven studies (272,368 individuals were followed for 10–17 years; there were 11,126 cases of stroke).[8] • Consumption of cheese was marginally inversely associated with risk of stroke. This relationship was most pronounced at intakes above 25g/day. These results are also consistent with the 2016 systematic review and meta-analysis by Alexander *et al.*[8]
Elevated blood pressure	Soedamah-Muthu *et al.* published a systematic review and meta-analysis in 2012. This included data from eight studies (51,007 individuals were followed for five to 10 years; there were 15,066 cases of hypertension).[9] • Results indicated no association between cheese consumption and hypertension.
Type 2 diabetes	In a recent meta-analysis of prospective cohort studies, Alvarez Bueno *et al.* looked at dairy consumption and the relationship with type 2 diabetes incidence.[10] This study examined data from 12 systematic reviews and meta-analyses, four of which looked at cheese specifically. • There was a moderate association between cheese consumption and reduced risk of type 2 diabetes risk in adults. A previous study by Gijsbers *et al.* examined the relationship between dairy consumption and type 2 diabetes, using data from 12 studies (369,697 individuals were followed for four to 30 years; there were 32,936 cases of diabetes).[11] • There was no association between cheese consumption and type 2 diabetes.
Mortality	A 2019 overview of systematic review and meta analyses by Cavero-Redondo *et al.* looked at dairy consumption and risk of mortality.[12] • This included two studies that looked at cheese, one by Tong *et al.* who examined the long-term association of cheese consumption with all-cause mortality.[13] This included data from nine prospective studies (177,65 individuals were followed for five to 15 years; there were 21,365 cases of mortality). • There was no significant association between cheese consumption and all-cause mortality.
Body weight – adults	The pooled analysis of prospective cohort studies with the longest follow up was conducted by Smith *et al.* in 2015.[14] Data on cheese consumption and body weight was collected every four years (120,784 individuals were followed for 16–24 years). • There was no association between cheese consumption and weight gain. • An extra serve of cheese consumed in place of refined carbohydrates was associated with long term weight loss of around 85g per year.
Obesity risk – children	In a systematic review and meta-analysis, Lu *et al.* looked at dairy and the risk of childhood obesity (not just cheese).[15] • Data from four prospective cohort studies were pooled (22,505 children) with results showing children in the highest dairy intake group were 38% less likely to be overweight or obese. • Risk of childhood overweight/obesity was 13% lower with each serving/day increment in dairy intake. • One prospective cohort study considered cheese and showed no association between cheese consumption and risk of overweight/obesity.

Long-term studies have also provided insights into cheese and health. For example, data from the European Investigation into Cancer and Nutrition (EPIC) followed over 15,000 individuals over 3.7 years. The studies from this data have shown:

- A lower risk of ischaemic stroke with higher consumption of dairy foods, including cheese (per 30 g/day).
- An increase in consumption of fermented dairy products, including low-fat cheese was associated with a lower increase in body weight and body mass index (BMI).[16]
- No association with dairy food consumption (including cheese) on mortality.[17]

Evidence from randomised controlled trials

While evidence from observational research is informative, it cannot establish cause and effect. A number of randomised controlled trials (RCTs) have provided additional insights into cheese and health.

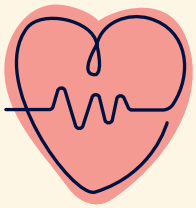
- A systematic reviews and meta-analysis by Goede *et al.* analysed the results of five different studies with a mean cheese intake of three to five servings per day. The analysis demonstrated that cheese has different effects on blood lipids to what is usually predicted.[18]
- Additional RCTs investigating the effects of cheese on blood lipids have been published.[19-22] They consistently indicate that high cheese intake (60–120g/day) does not cause detrimental changes in blood lipid concentrations. This is true even in people with risk factors for CVD.
  - Three of these lasted between five and 12 weeks and monitored blood pressure and body weight. Results showed eating large quantities of cheese for one to three months did not negatively affect blood pressure, body weight or waist circumference.
  - In one study, 60g/day Camembert compared to 250g regular-fat yoghurt did not modify lipids or blood pressure over three weeks.[22]
  - A study by Brassard *et al.* showed consuming butter induces a significantly greater increase in LDL cholesterol compared with cheese.[23]
- In another study, an amended DASH diet including regular-fat dairy was as effective for lowering blood pressure as one with reduced-fat.[24]
- Alba *et al.* found eating four serves of cheese for eight days protects against microvascular dysfunction. In this study, participants consumed a variety of different cheeses including Cheddar, Swiss, parmesan, mozzarella and provolone.[25]
- A recent study observed the effects of 200g or five daily serves of cheese on individuals with metabolic syndrome. The intervention formed part of a low-carbohydrate, high-fat diet. The study found metabolic health improvements in more than half of participants, independent of weight loss.[26]

Cheese consumption and health

Systematic reviews and meta-analyses show that consumption of cheese is associated with a

Reduced risk of

- **Stroke**
- **Type 2 diabetes**
- **Childhood overweight and obesity**



and had no association with....

- **Hypertension**
- **Overweight and obesity in adults**

Perceived barriers to cheese consumption

About two thirds of the fat in cheese is composed of saturated fatty acids. Concerns that consumption might be linked to negative health effects is therefore understandable.[27] Excess consumption of saturated fat has traditionally been linked to high low-density lipoprotein cholesterol. This explains why national and international dietary guidelines often recommend reduced-fat dairy over regular-fat varieties. However, these recommendations miss the nuance of the matrix in which the nutrients are housed. Read on to find out more.

Sodium and heart health

Coronary heart disease (CHD) is a major cause of death in Australia. A high-sodium diet is one dietary risk factor for developing CHD. Consumers are often advised to reduce cheese consumption due to concerns around its sodium content.[28]

The 2011-2012 Australian Health Survey revealed that only 4% of the total sodium consumed in the diet comes from cheese. The highest sources of sodium were cereal products and dishes, followed by meat and poultry.[1] Cheese also supplies significant amounts of calcium (9.6%), as well as magnesium and potassium – minerals known to reduce blood pressure.[29]

Salt plays an important role in the cheese making process. It helps develop deep flavours, inhibits the growth of undesirable microorganisms and impacts on texture, stability and ripening. Even small reductions in salt can result in poor quality cheese and noticeable off flavours.[30]

As studies over leaf show, cheese consumption is not associated with a higher risk of cardiometabolic disease. Its consumption should not be discouraged due to concerns around sodium.[31]

Saturated fat: not all fats are equal

There is now substantial evidence demonstrating saturated fat from dairy foods, including cheese, is not associated with cardiovascular risk. Unlike the saturated fat from other animal products, dairy (including cheese) can actually be attributed to health benefits.[32-34] One meta-analysis revealed that participants with the highest levels of dairy-related fatty acids in their blood had a 30% lower risk of developing type 2 diabetes.[35] It is important to note that dairy fat has the most complex of all the fats. This includes more than 400 different fatty acids including short, medium and long-chained fatty acids.[36]

Just as not all types of carbohydrate have the same impact on health, not all types of saturated fat are associated with the same health effects.

Regular or reduced-fat cheese?

A randomised controlled trial looked at the effect of regular versus reduced-fat cheese on cholesterol levels and metabolic syndrome risk factors.[37] Subjects recruited for this study were required to have a large waist circumference and one or more metabolic syndrome risk factors. Subjects were randomised to one of three 12-week intervention diets; regular-fat or reduced-fat cheese (approximately 80g per day), or a non-cheese, carbohydrate control (90g of bread and jam). Subjects were asked to live as they normally would, but were asked to replace normal foods in their diet with the test foods. They found no differences in health outcomes between the three diets, as shown in Figure 1.

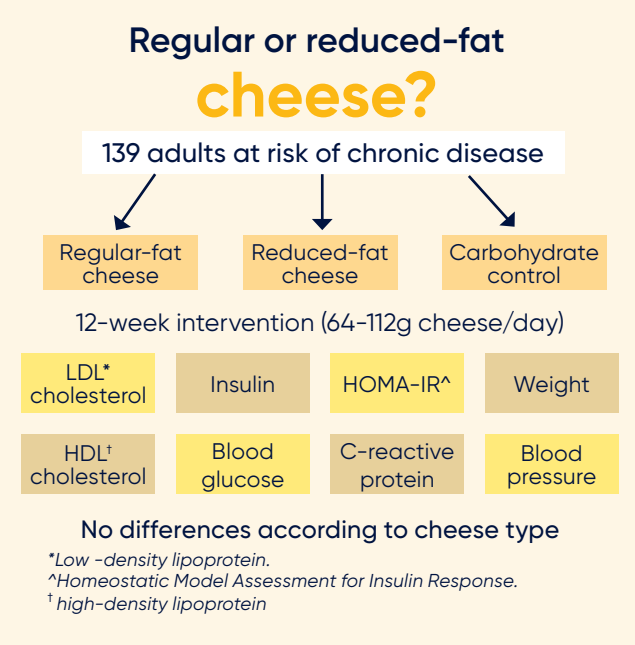


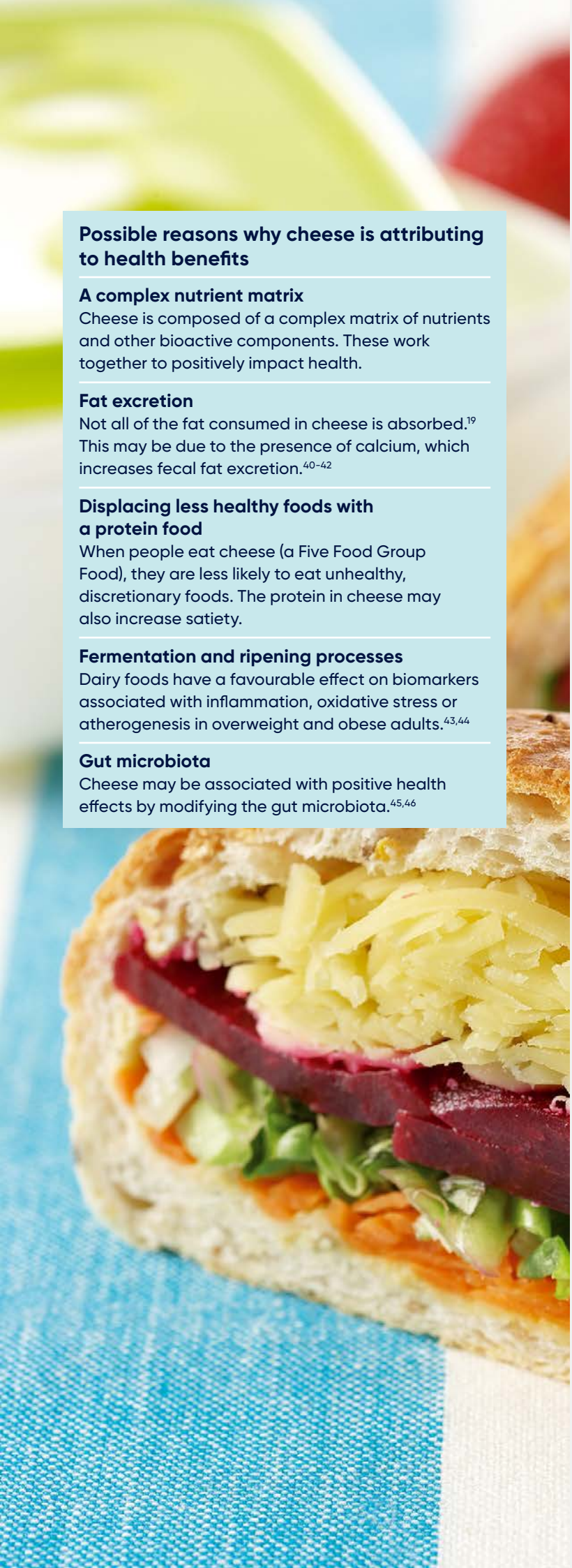
Figure 1: A randomised controlled trial comparing high daily consumption of cheese varieties to carbohydrate control group and cardiometabolic effects.

Foods versus nutrients

When nutrients such as saturated fat and sodium are consumed, they are consumed with other essential nutrients and bioactive components.

These nutrients and bioactive components work synergistically to affect health differently than how you would expect them to act on their own.

An example of this is cheese, which is composed of a highly complex matrix of nutrients.[38] Cheese is recognised as a Five Food Group Food in the Australian Dietary Guidelines which means it can be enjoyed everyday. These guidelines make recommendations based on whole foods, as opposed to single nutrients.[39]



Possible reasons why cheese is attributing to health benefits

A complex nutrient matrix

Cheese is composed of a complex matrix of nutrients and other bioactive components. These work together to positively impact health.

Fat excretion

Not all of the fat consumed in cheese is absorbed.[19] This may be due to the presence of calcium, which increases fecal fat excretion.[40-42]

Displacing less healthy foods with a protein food

When people eat cheese (a Five Food Group Food), they are less likely to eat unhealthy, discretionary foods. The protein in cheese may also increase satiety.

Fermentation and ripening processes

Dairy foods have a favourable effect on biomarkers associated with inflammation, oxidative stress or atherogenesis in overweight and obese adults.[43,44]

Gut microbiota

Cheese may be associated with positive health effects by modifying the gut microbiota.[45,46]

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