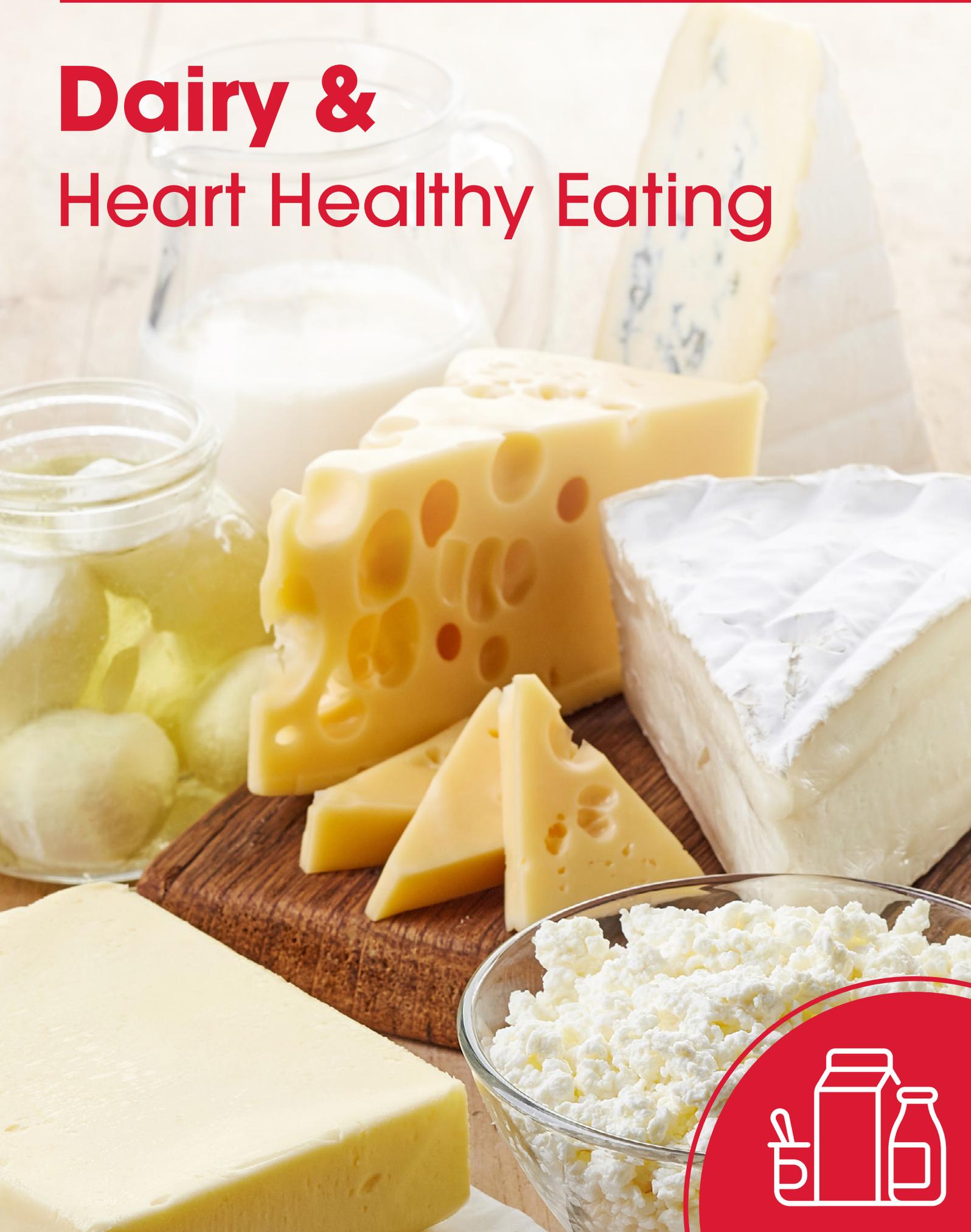


# Dairy & Heart Healthy Eating



## Position Statement

This position statement summarises contemporary evidence on the association between the consumption of dairy foods and cardiovascular health and makes recommendations on the role of dairy in heart healthy eating. The Heart Foundation's *Summary of Evidence for Dairy and Cardiovascular Health*<sup>1</sup> informs the Heart Foundation position on dairy, outlined here and the Heart Foundation's broader position on heart healthy eating patterns.<sup>2</sup> This position statement is complementary to the Heart Foundation's suite of food and nutrition position statements.

The Heart Foundation's position on food and nutrition recognises that healthy eating patterns do not rely on one type of food or nutrient to promote heart health.<sup>2</sup> Heart healthy eating patterns are based on a combination of foods, chosen regularly, over time. This optimal combination is outlined in the Heart Foundation's Heart Healthy Eating Principles which encourage people to eat:

1. Plenty of vegetables, fruits and wholegrains
2. A variety of healthy protein sources especially fish and seafood, legumes (such as beans and lentils), nuts and seeds. Smaller amounts of eggs and lean poultry can also be included in a heart healthy diet. If choosing red meat, make sure the meat is lean and limit to 1-3 times a week.
3. Unflavoured milk, yoghurt and cheese. Those with high blood cholesterol should choose reduced fat varieties.
4. Healthy fat choices with nuts, seeds, avocados, olives and their oils for cooking
5. Herbs and spices to flavour foods, instead of adding salt

This style of eating is naturally low in saturated and trans fats, salt and added sugar and rich in unsaturated fats (MUFA, omega-3 PUFA, and omega-6 PUFA), along with wholegrains, fibre, and antioxidants. Eating this way can help improve the heart health of all Australians by reducing CVD risk factors such as high blood pressure and blood lipids and decreasing the risk of CVD events and mortality.

## Summary

Milk, yoghurt, and cheese are healthy snack options in preference to discretionary foods and can contribute to healthy meals when eaten with vegetables, wholegrains or fruit. Milk, yoghurt and cheese can feature in a healthy eating pattern; as long as the primary sources of fat are foods such as fish, olives, seeds, nuts and oils made from them.

Based on current evidence, there is not enough evidence to recommend full fat over reduced fat products or reduced fat over full fat products for the general population. For people with elevated cholesterol and those with existing coronary heart disease, reduced fat products are recommended. The evidence for milk, cheese and yoghurt does not necessarily apply for cream, butter, ice-cream and dairy based desserts; these products are not part of a heart healthy eating pattern.

## Background

Dairy foods provide a source of calcium, protein, vitamin A, vitamin B12, magnesium, phosphorus, potassium, riboflavin and zinc. The nutritional composition of dairy products varies depending on type (milk, cheese, yoghurt, cream, butter) and fat modification (full fat, reduced, low or no fat and skimmed products).<sup>3</sup> Of dairy fat, approximately 70% is saturated fat; 56% of which are longer-chain saturated fatty acids (C12:0–18:0) that raise low density lipoproteins (LDL-C). Around 3% of dairy fat is naturally occurring ruminant-trans fat.<sup>4-7</sup>

The community, health professionals and researchers are all interested in any connection between dairy consumption and cardiovascular health. Currently, most national guidelines recommend the consumption of between 2-4 serves of reduced fat milk, cheese and yoghurt per day.<sup>8-10</sup> A serve is generally 1 cup (250ml) milk, 1-2 slices of cheese (40g) or ½ cup ricotta/cottage cheese, and 1 tub of yoghurt (200g).<sup>8</sup>

In Australia, dairy intake has not remarkably changed between the 1995 and 2011/12 national nutrition survey. Younger age groups generally consume the recommended number of serves (1.5 to 3.5 depending on age) of dairy, as outlined in the Australian Dietary Guidelines. However, the proportion of people meeting these guidelines decreases with age. For older men (>70 years) and women (>50 years), the average intake is well below the recommended 3.5-4 serves.<sup>11</sup>

The Heart Foundation's *Summary of Evidence for Dairy and Cardiovascular Health*<sup>1</sup> reviewed the evidence for dairy products and cardiovascular health outcomes. This evidence informs the Heart Foundation's position on dairy, and the Heart Foundation's broader position on heart healthy eating patterns.



## Evidence for dairy foods and heart health

The evidence base is made up of mainly observational studies, primarily prospective cohorts, with a small number of randomised controlled trials (RCT). These studies cover outcomes including weight gain, blood pressure and blood lipids. A review of meta-analyses of cohorts and RCTs and pooled analyses of cohorts published between January 2009 and August 2018 was completed. The Heart Foundation's *Summary of Evidence for Dairy and Cardiovascular Health* includes a more detailed overview.<sup>1</sup>

### Dairy foods and cardiovascular risk factors and outcomes

According to the evidence base, the relationship between dairy foods and cardiovascular outcomes is mixed. However, on balance current evidence suggests a 'neutral'\* relationship between dairy foods and cardiovascular risk, and a possible 'protective'^ relationship between dairy foods and hypertension,<sup>13-15</sup> stroke<sup>16-19</sup> and type 2 diabetes risk,<sup>20-23</sup> and between yoghurt and type 2 diabetes risk.<sup>20,22-24</sup> The reported increased risk with heart failure and total dairy intake is of note,<sup>17</sup> as is the mixed evidence on cheese, with studies reporting inverse,<sup>18,19,21,22,25</sup> no,<sup>25</sup> and increased risk<sup>24,26,27</sup> with various cardiovascular outcomes.

Some of the cohorts suggest inverse associations between reduced fat dairy, but not full fat, and hypertension, stroke and diabetes.<sup>14,15,17,22</sup> Others have suggested neutral or inverse relationships with dairy, regardless of fat modification.<sup>13,16,17</sup> Given this inconsistency in the evidence base, there is not enough evidence to recommend fat modification (i.e. full fat over reduced fat products, or reduced fat over full fat products) for the general population.

The role of fermented dairy products in eating patterns is an emerging area of research. It is important to note that these foods have long been part of some traditional eating patterns.<sup>28</sup> There is some evidence, highlighted in observational studies, for a protective relationship between the consumption of yoghurt and the risk of diabetes and cardiovascular disease.<sup>20,29,30</sup> This relationship is unlikely to apply to yoghurts with added sugars.

It appears the consumption of milk, yoghurt and cheese (regardless of fat modification), at currently recommended amounts, in the context of a dietary pattern rich in vegetables, fruit, legumes, nuts, seeds, wholegrains, healthy oils and low in discretionary food and drinks (i.e. sugary drinks, alcohol and heavily processed foods), may not affect cardiometabolic risk.

\* Neutral: no association in observational studies

^ Protective: inverse association in observational studies



## Dairy fat and cardiovascular risk

Dairy products, and dishes made from them, are leading contributors to saturated and trans fat intake.<sup>31</sup> There are established relationships between saturated fat (lauristic C12:0, myristic C14:0 and palmitic C16:0) and ruminant trans fat and elevated LDL-C;<sup>32,33</sup> elevated LDL-C and heart disease<sup>34,35</sup>. Further, there is a relationship between replacing saturated fat with unsaturated fat and a reduced risk of heart disease.<sup>36</sup> For this reason, reducing dairy fat intake is one recommended strategy to limit saturated fat intake for those who would benefit from LDL-C lowering dietary interventions.

The relationship between dairy fat and cardiovascular health appears to be similar to the findings of studies into total saturated fat intake. These studies found that cardiovascular risk is reduced when dairy fat is replaced with unsaturated fat and wholegrain carbohydrates (but not refined carbohydrates or trans-fat).<sup>24,26,27,36-38</sup>

In trials, the consumption of dairy fat increases LDL-C. However, the effect of dairy fat in the diet on other lipid markers, and thus overall cardiovascular risk, is mixed.<sup>39</sup> Further, the impact of dairy fat on LDL-C depends on the type of product consumed and the person. Dairy fat in cheese and in cream does not raise LDL-C to the same extent as dairy fat in butter.<sup>27,37</sup> There are several possible ways in which dairy fat may have differing impacts on cardiovascular risk factors, depending on the food source. These include the degree of processing - for example, cream, in which the Milk Fat Globule Membrane (MFGM) is intact, raises LDL-C but not to the extent that butter, without an intact MFGM, raises LDL-C levels.<sup>37</sup> Calcium in cheese may also increase faecal fat excretion, and probiotic bacteria may also play a role.<sup>28,40,41</sup> The LDL-C response to butter is greater for people with a higher baseline LDL-C.<sup>27</sup>

This evidence indicates caution for dairy fat consumption for people with elevated LDL-C; and that milk, cheese and yoghurt should remain separately classified to butter when advising the inclusion of dairy products in a heart healthy eating pattern.

## The role of dairy fat and cardiovascular risk

The influence of dairy foods on cardiovascular health depends on the broader eating pattern and the nature of foods which replace, or are replaced by, a change in dairy food intake. A systematic review of dietary patterns and cardiovascular outcomes found that dairy foods feature in some, but not all healthy eating patterns.<sup>42</sup> This indicates that a heart healthy eating pattern can exist with or without dairy foods.

A pooled analysis of two US prospective cohorts observed that replacing dairy with plant-based protein sources reduced the risk of cardiovascular mortality.<sup>43</sup> In this analysis there appeared to be a 'hierarchy' of animal-based products, with processed meat associated with highest cardiovascular risk, followed by unprocessed meat and poultry, then dairy, then fish, then eggs.

In high quality eating patterns, the role of dairy products is mixed. In an analysis of the sources of fat in the Mediterranean diet, the consumption of butter and cheese was associated with a higher risk of type 2 diabetes, while whole-fat yoghurt intake was associated with a lower risk and whole milk had no association.<sup>44</sup> In the DASH eating pattern, the addition of 'low fat' dairy products to an eating pattern rich in vegetables, fruit, wholegrains and low in salt reduced blood pressure in both normotensive and hypertensive subjects, more than the control.<sup>45</sup> In a recent trial, the inclusion of 'full fat' dairy in a DASH eating pattern resulted in similar blood pressure reduction to 'low fat' dairy, with no adverse impacts on lipid profile.<sup>46</sup> Both the Mediterranean and DASH diets have good evidence of reduced cardiovascular risk.<sup>42</sup> The Portfolio diet is another eating pattern with an established evidence base of reduced cardiovascular risk.<sup>42</sup> It does not include dairy products.

In the absence of dairy consumption, other foods can be emphasised in a heart healthy eating pattern, while ensuring adequate calcium intake. Calcium is an important nutrient for development and maintenance of bone, neuromuscular and cardiac function.<sup>47</sup> Non-dairy food sources of calcium include bony fish, legumes, nuts, such as brazil nuts, almonds and hazelnuts, and fortified food products, including plant-based milk and dairy product alternatives.<sup>47,48</sup> Plant-based milk and dairy product alternatives are a growing product category in supermarkets, and the overall nutrient profile is variable.<sup>49,50</sup> Calcium fortified options should be chosen, aiming for at least 100 mg of added calcium per 100ml.<sup>51</sup> Unsweetened options should be chosen to limit added sugar intake. Plant-based beverages with less protein than dairy milk are not suitable as a complete milk replacement for children under 5 years old.<sup>48</sup>

In summary, this evidence suggests milk, yoghurt and cheese can be included in, but are not a defining feature of, a heart healthy eating pattern.

## Limitations to the evidence base

Studying the relationship between a food or nutrient and health outcomes is complex. Further, the evidence base is mainly observational studies, which bring inherent limitations to understanding the relationships between a food and health outcomes.<sup>52</sup> A food cannot be studied in isolation, without considering the effect of the food replacing it; and observational studies are not able to determine causation. As such, only the observed relationship can be reported on. For example, in the case of dairy products, the fact that dairy intake may be a 'marker' for a higher quality diet can't be ruled out. Several papers refer to the 'dairy effect', where the consumption of dairy products is associated with the characteristics of a generally accepted healthy lifestyle.<sup>14,39,53-57</sup> Further, different types of dairy products are consumed in different ways by different populations. For example, 'cheese consumption' in European cohorts is more likely to include the consumption of cheese on its own, while in US cohorts cheese is more likely to be consumed as part of ready meals including pizza, pasta and burgers.<sup>58</sup> While many studies attempted to adjust analyses for these confounders, the association with these behaviours means that controlling for such confounders may not fully capture the difference in determinants of health and/or socioeconomic status. Additionally, there is no standard classification for dairy products or standard volumes for measurement. This makes it difficult when pooling data in meta-analyses and reviews to fully understand the relationship between amounts and types of dairy products and specific health outcomes.

## Conclusions

The combined evidence suggests that improving the entire eating pattern, not altering one nutrient (i.e. saturated fat) or one food (i.e. milk) in isolation, contributes to cardiovascular health. Milk, yoghurt and cheese can be consumed as part of a heart-healthy eating pattern that includes vegetables, fruits, legumes, wholegrains, fish, olives, seeds, nuts and oils made from them.

There is mixed evidence, but on balance it appears that milk, yoghurt and cheese have a neutral relationship with cardiovascular health. Therefore, less processed products (i.e. no added sugar, limited sodium) can be included in a healthy eating pattern. There is evidence that dairy foods and yoghurt have an inverse association with hypertension, stroke and type 2 diabetes risk. There is mixed evidence for cheese consumption, with some studies reporting reduced, no or increased risk.

Given the inconsistencies in the evidence for fat modified dairy products, there is not enough evidence to recommend fat modification (i.e. full fat over reduced fat products, or reduced fat over full fat products) for the general population.

The evidence suggests that while adding dairy fat will not improve an eating pattern (i.e. by choosing full fat products), removing dairy fat (i.e. by choosing reduced fat products) to make room for fat from plant sources such as olives, nuts and seeds aligns with existing evidence to lower cardiovascular risk and improve lipid profiles. There is evidence that dairy fat from cheese and yoghurt does not raise LDL-C in the same way that dairy fat from butter does; and evidence that LDL-C response to dairy fat is higher for those with elevated LDL-C. This suggests caution for the inclusion of butter, and higher fat dairy products, for people who would benefit from LDL-C lowering dietary interventions.

The evidence for milk, cheese and yoghurt does not necessarily apply for cream, butter, ice-cream and dairy based desserts; products which are not a part of a heart-healthy eating pattern.



## Recommendations

Based on the evidence for dietary patterns, dairy foods and cardiovascular health outcomes, the Heart Foundation recommends:

1. Rather than focusing on individual nutrients or foods, we encourage Australians to follow the Heart Foundation's Heart Healthy Eating Principles which includes eating:
  1. Plenty of vegetables, fruits and wholegrains
  2. A variety of healthy protein sources especially fish and seafood, legumes (such as beans and lentils), nuts and seeds. Smaller amounts of eggs and lean poultry can also be included in a heart healthy diet. If choosing red meat, make sure the meat is lean and limit to 1-3 times a week.
  3. Unflavoured milk, yoghurt and cheese. Those with high blood cholesterol should choose reduced fat varieties
  4. Healthy fat choices with nuts, seeds, avocados, olives and their oils for cooking
  5. Herbs and spices to flavour foods, instead of adding salt

*Water as the drink of choice*

2. Unflavoured milk, yoghurt and cheese (regardless of fat modification) can feature in a healthy eating pattern, as long as foods such as fish, olives, seeds, nuts and oils made from them are the primary sources of fat.
3. Unflavoured milk, yoghurt and cheese are healthy snack options in preference to discretionary foods and can contribute to healthy meals when eaten with vegetables, wholegrains or fruit.
4. For people who would benefit from LDL-C lowering dietary interventions, including those with elevated LDL-C and those with existing coronary heart disease, reduced fat and unflavoured products are the preferred choices, due to the LDL-C increasing nature of dairy fat and the need to limit added sugar intake. Unflavoured reduced fat milks, cheese and yoghurts are also lower in kilojoules.
5. The evidence for milk, yoghurt and cheese does not extend to butter, cream, ice-cream and dairy-based desserts; these products should be avoided in a heart healthy eating pattern. Butter intake should be limited, in preference to oils rich in mono-unsaturated fats (i.e. olive oil), especially for those with dyslipidaemia.





## Acknowledgements

The Heart Foundation would like to acknowledge the following people who played a vital role in the development of this position statement:

- Members of the Expert Reference Group on Animal Proteins of the National Heart Foundation of Australia: Dr Jason Wu, Professor Sarah McNaughton, Professor Peter Clifton, Dr Tim Crowe, Professor Trevor Mori, Professor Garry Jennings
- Members of the Heart Health Advisory Committee of the Heart Foundation
- Members of the Heart Foundation's Nutrition Technical Expert Group

## Related documents

Heart Foundation (2019) Summary of Evidence: Dairy and Cardiovascular Health. NHFA: Melbourne.

---

Heart Foundation (2019) Eating for Heart Health: Position Statement. NHFA: Melbourne

---

Collins C, Burrows T, Rollo M. (2017) Dietary patterns and cardiovascular disease outcomes. University of Newcastle (for the National Heart Foundation of Australia). 2017.

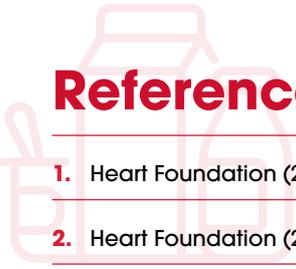
---

Heart Foundation (2019) Dietary Fat and Heart Healthy Eating Position Statement. NHFA: Melbourne

---

Clifton P and Keogh J. (2017) Dietary fats and cardiovascular disease: an evidence check rapid review brokered by the Sax Institute for the National Heart Foundation of Australia. 2017.

---



# References

1. Heart Foundation (2019) Summary of Evidence: Dairy and Cardiovascular Health. NHFA: Melbourne.
2. Heart Foundation (2017) Heart Healthy Eating Patterns Position Statement. NHFA: Melbourne
3. Dairy Australia. Proximate composition of Australian dairy foods. 2012. Available from <http://www.legendairy.com.au/~media/Legendairy/Documents/Health/Fact%20sheets/2012%20Proximate%20Composition%20Booklet.ashx>. Accessed 31 October 2018.
4. Mansson HL. Fatty acids in bovine milk fat. *Food Nutr Res* 2008; 52.
5. Ohlsson L. Dairy products and plasma cholesterol levels. *Food Nutr Res* 2010; 54
6. Food and Agricultural Organization of the United Nations. Fats and fatty acids in human nutrition. Report of an expert consultation. 10–14 November 2008. Rome: 2010.
7. Brouwer IA, Wanders AJ, Katan MB. Effect of animal and industrial trans fatty acids on HDL and LDL cholesterol levels in humans – a quantitative review. *PLoS One* 2010; 5(3):e9434.
8. NHMRC (2013) Australia Dietary Guidelines. Canberra: NHMRC
9. Eckel et al (2014) 2013 AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation*. 2014;129(suppl 2):S76-S99
10. Heart Foundation New Zealand (2017) Dairy and the Heart: Position Statement. HFNZ:Auckland
11. Australian Institute of Health and Welfare (2018) Nutrition across the life stages. Cat. no. PHE 227. Canberra: AIHW.
12. NHFA (2017) Dietary Fat and Heart Healthy Eating. Position Statement. NHFA: Melbourne.
13. Schwingshackl et al 2017 Food Groups and Risk of Hypertension: A Systematic Review and Dose-Response Meta-Analysis of Prospective Studies. *Adv Nutr* 2017;8:793–803; doi: <https://doi.org/10.3945/an.117.017178>
14. Ralston RA, Lee JH, Truby H, Palermo CE, Walker KZ. A systematic review and meta-analysis of elevated blood pressure and consumption of dairy foods. *J Hum Hypertens*. 2012;26(1):3- 13.
15. Soedamath-Muthu SS et al 2012. Dairy consumption and incidence of hypertension: a dose-response meta-analysis of prospective cohort studies. *Hypertension*,60(5):1131-1137
16. Gholami F, Khoramdad M, Esmailnasab N, Moradi G, Nouri B, Safiri S, Alimohamadi Y. The effect of dairy consumption on the prevention of cardiovascular diseases: A meta-analysis of prospective studies. *J Cardiovasc Thorac Res* 2017;9(1):1-11. doi: 10.15171/jcvtr.2017.01.
17. Bechthold et al (2017): Food groups and risk of coronary heart disease, stroke and heart failure: A systematic review and dose-response meta-analysis of prospective studies, *Critical Reviews in Food Science and Nutrition*, DOI: 10.1080/10408398.2017.1392288
18. Qin et al 2015 Dairy consumption and risk of cardiovascular disease: an updated meta-analysis of prospective cohort studies. *Asia Pac J Clin Nutr* 2015;24(1):90-100
19. Alexander, D. D., L. C. Bylsma, A. J. Vargas, S. S. Cohen, A. Doucette, M. Mohamed, S. R. Irvin, P. E. Miller, H. Watson, and J. P. Fryzek. 2016. Dairy consumption and CVD: A systematic review and meta-analysis. *Br J Nutr* 115:737–750. doi:10.1017/S0007114515005000.
20. Gijsbers L, Ding EL, Malik VS, de Goede J, Geleijnse JM, Soedamah-Muthu SS. Consumption of dairy foods and diabetes incidence: a dose-response meta-analysis of observational studies. *The American Journal of Clinical Nutrition*. 2016;103(4):1111-1124
21. Aune D, Norat T, Romundstad P, Vatten LJ. Dairy products and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis of cohort studies. *The American Journal of Clinical Nutrition*. 2013;98(4):1066-1083.
22. Gao D, Ning N, Wang C, et al. Dairy Products Consumption and Risk of Type 2 Diabetes: Systematic Review and Dose-Response Meta-Analysis. *PLoS ONE*. 2013;8(9):e73965.
23. Tong X, Dong JY, Wu ZW, Li W, Qin LQ. Dairy consumption and risk of type 2 diabetes mellitus: a meta-analysis of cohort studies. *Eur J Clin Nutr*. 2011;65(9):1027-1031.

24. Chen et al (2016) Dairy fat and risk of cardiovascular disease in 3 cohorts of US adults *Am J Clin Nutr* 2016;104:1209–17.
25. Gholami F, Khoramdad M, Shakiba E, Alimohamadi Y, Shafiei J, Firouzi A. Subgroup dairy products consumption on the risk of stroke and CHD: a systematic review and meta-analysis. *Med J Islam Repub Iran*. 2017 (27 Mar); 31:25. <https://doi.org/10.18869/mjiri.31.25>
26. de Goede J., et al (2015) Effect of cheese consumption on blood lipids: a systematic review and meta-analysis of randomized controlled trials. *Nutr Rev* 73:259–275.
27. Brassard D, Tessier-Grenier M, Allaire J, Rajendiran E, She Y et al (2017) Comparison of the impact of SFAs from cheese and butter on cardiometabolic risk factors: a randomized controlled trial. *Am J Clin Nutr* 2017;105:800–9.
28. Mozaffarian D & Wu J (2018) Flavonoids, Dairy Foods, and Cardiovascular and Metabolic Health: A Review of Emerging Biologic Pathways. *Circulation research* DOI: 10.1161/CIRCRESAHA.117.309008
29. Wu & Sun (2017) Consumption of Yogurt and the Incident Risk of Cardiovascular Disease: A Meta-Analysis of Nine Cohort Studies. *Nutrients* 2017, 9, 315;
30. Chen M, Sun Q, Giovannucci E, et al. Dairy consumption and risk of type 2 diabetes: 3 cohorts of US adults and an updated meta-analysis. *BMC Medicine*. 2014;12:215.
31. Australian Bureau of Statistics (2013) 4364.0.55.007 - Australian Health Survey: Nutrition First Results - Food and Nutrients.
32. Mensink RP, Zock PL, Kester AD, Katan MB: Effects of dietary fatty acids and carbohydrates on the ratio of serum total to HDL cholesterol and on serum lipids and apolipoproteins: a meta-analysis of 60 controlled trials. *Am J Clin Nutr* 2003;77:1146– 1155
33. Mensink, RP. Effects of saturated fatty acids on serum lipids and lipoproteins: a systematic review and regression analysis. Geneva: World Health Organization; 2016.
34. Lewington S, Whitlock G, Clarke R, Sherliker P, Emberson J, Halsey J, et al. Blood cholesterol and vascular mortality by age, sex, and blood pressure: a meta-analysis of individual data from 61 prospective studies with 55,000 vascular deaths. *Lancet*. 2007;370(9602):1829–39.
35. Grundy et al 2018 AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2018
36. Clifton P and Keogh J. Dietary fats and cardiovascular disease: an evidence check rapid review brokered by the Sax Institute for the National Heart Foundation of Australia. 2017.
37. Rosqvist F, Smedman A, Lindmark-Mansson H, Paulsson M, Petrus P, Straniero S, Rudling M, Dahlman I & Risérus U. (2015) Potential role of milk fat globule membrane in modulating plasma lipoproteins, gene expression, and cholesterol metabolism in humans: a randomized study. *Am J Clin Nutr* 2015;102:20–30.
38. Engel S & Tholstrup T (2015) Butter increased total and LDL cholesterol compared with olive oil but resulted in higher HDL cholesterol compared with a habitual diet. *Am J Clin Nutr* 2015;102:309–15.
39. Bonthuis M, Hughes MC, Ibiebele TI, et al. Dairy consumption and patterns of mortality of Australian adults. *Eur J Clin Nutr* 2010; 64(6):569–577.
40. Soerensen KV, Thorning TK, Astrup A, Kristensen M, & Lorenzen JK (2014) Effect of dairy calcium from cheese and milk on fecal fat excretion, blood lipids, and appetite in young men. *Am J Clin Nutr* 2014;99:984–91.
41. Ataie-Jarfari A, Larijani B, Alavi Majd H & Tahbaz F (2009) Cholesterol-Lowering Effect of Probiotic Yogurt in Comparison with Ordinary Yogurt in Mildly to Moderately Hypercholesterolemic Subjects. *Ann Nutr Metab* 2009;54:22–27
42. Collins et al (2017) Dietary Patterns and Cardiovascular Disease Outcomes. n evidence check rapid review brokered by the Sax Institute for the National Heart Foundation of Australia. 2017.
43. Song M., et al. (2016) Association of animal and plant protein intake with all-cause and cause-specific mortality. *JAMA Intern Med* 176:1453–1463
44. Guasch-Ferre M, Becerra-Tomas N, Ruiz-Canela M, Corella D et al, (2017) Total and subtypes of dietary fat intake and risk of type 2 diabetes mellitus in the Prevencio ´ n con Dieta Mediterra ´ nea (PREDIMED) study. *Am J Clin Nutr* 2017;105:723–35.

45. Appel L, Moore T, Obarzanek E, et al. A clinical trial of the effects of dietary patterns on blood pressure. DASH Collaborative Research Group. *N Engl J Med* 1997; 336(16):1117-1124.
46. Chiu, S., Bergeron, N., Williams, P.T., Bray, G.A., Sutherland, B., and Krauss, R.M.(2016) Comparison of the DASH (Dietary Approaches to Stop Hypertension) diet and a higher-fat DASH diet on blood pressure and lipids and lipoproteins: a randomized controlled trial. *Am J Clin Nutr.* 103(2): 341–347.
47. Australian Government National Health and Medical Research Council and New Zealand Ministry of Health (2014) Nutrient Reference Value: Calcium. <https://www.nrv.gov.au/nutrients/calcium>
48. Suliburska J, Krejpcio Z. Evaluation of the content and bioaccessibility of iron, zinc, calcium and magnesium from groats, rice, leguminous grains and nuts. *J Food Sci Technol.* 2014 Mar;51(3):589-94.
49. FSANZ (2018) Plant-based milk alternatives. Webpage <http://www.foodstandards.gov.au/consumer/nutrition/milkaltern/Pages/default.aspx> Accessed 14 November 2018.
50. Sethi S, Tyagi SK and Anurag RK (2016) Plant based milk alternatives an emerging segment of functional beverages: a review. *J Food Sci Technology.* 53(9); 3408-3423
51. NHMRC (2013) Milk, yoghurt, cheese and/or their alternatives (mostly reduced fat). Webpage Accessed 14 November 2018. <https://www.eatforhealth.gov.au/food-essentials/five-food-groups/milk-yoghurt-cheese-and-or-their-alternatives-mostly-reduced-fat>
52. Barnard N.D., Willett W.C., Ding E.L. (2017) The misuse of meta-analysis in nutrition research. *JAMA* 318:1435–1436
53. Elwood PC, Pickering JE, Givens DI, Gallacher JE. The consumption of milk and dairy foods and the incidence of vascular disease and diabetes: an overview of the evidence. *Lipids.* 2010;45(10):925-939.
54. Toledo E, Delgado-Rodriguez M, Estruch R, et al. Low-fat dairy products and blood pressure: follow-up of 2290 older persons at high cardiovascular risk participating in the PREDIMED study. *Br J Nutr* 2009; 101(1):59-67.
55. Engberink MF, Hendriksen MA, Schouten EG, et al. Inverse association between dairy intake and hypertension: the Rotterdam Study. *Am J Clin Nutr* 2009; 89(6):1877-1883.
56. Alonso A, Beunza JJ, Delgado-Rodriguez M, et al. Low-fat dairy consumption and reduced risk of hypertension: the Seguimiento Universidad de Navarra (SUN) cohort. *Am J Clin Nutr* 2005; 82(5):972-979.
57. Wang L, Manson JE, Buring JE, et al. Dietary intake of dairy products, calcium, and vitamin D and the risk of hypertension in middle-aged and older women. *Hypertension* 2008; 51(4):1073-1079.
58. Hu F (2018) Interview response in "Whole-fat or Nonfat Dairy?" *Medical News and Perspectives.* JAMA 5 December 2018



For heart health information and support, call our Helpline on 13 11 12 or visit [heartfoundation.org.au](http://heartfoundation.org.au)

**Terms of use:** This material has been produced by the National Heart Foundation of Australia (Heart Foundation) for the information of health professionals. The Heart Foundation does not accept any liability, including for any loss or damage, resulting from the reliance on the content, or its accuracy, currency or completeness. Please refer to the Heart Foundation website at [www.heartfoundation.org.au](http://www.heartfoundation.org.au) for Terms of Use.

©2019 National Heart Foundation of Australia ABN 98 008 419 761

