

THE DAIRY MATRIX – SEE THE WHOLE HEALTH BENEFITS

Dr Rivkeh Haryono – Nutrition Scientist, Dairy Australia

When we pick up a food from the supermarket shelf, often we turn to the nutrition information to see what it contains, such as the sugar, sodium or fat content. But there is a lot more to foods than just the nutrients on the label.

In science circles, there is growing recognition that dietary guidance should be based on evaluation of the health impact of the whole food, rather than just the individual nutrients they contain. This is especially true of dairy foods. Despite containing sodium or saturated fat, milk, cheese and yoghurt are associated with numerous health benefits. A different picture is now emerging for dairy foods where the health impact of consuming these foods is not what might be predicted from their nutrient content – this has been characterised as the ‘food matrix effect’.

WHAT’S DOES THE TERM ‘FOOD MATRIX’ MEAN?

Foods consist of a large number of different nutrients and components that sit within complex physical structures.



THE ‘FOOD MATRIX’ DESCRIBES A FOOD IN TERMS OF BOTH ITS PHYSICAL STRUCTURE, ITS NUTRIENT CONTENT AND HOW THESE INTERACT TOGETHER.

It is important to consider the impact of the entire food matrix as these complex structures will ultimately affect nutrient bioavailability, absorption, digestion and health¹.

FOODS VERSUS SINGLE NUTRIENTS

In the past, nutrition research has focused on identifying specific mechanisms and health impacts of single components such as vitamins or macronutrients (for example vitamin C and scurvy). As a result, dietary guidelines have traditionally focused on encouraging or discouraging consumption of certain nutrients to maintain health and prevent chronic disease.

While these learnings have provided vital knowledge about the workings of single nutrients, this approach has limitations.

IT’S IMPORTANT TO REMEMBER THAT WE DON’T EAT NUTRIENTS IN ISOLATION.

For example, we don’t sit down to a dinner of saturated fat, or a breakfast of calcium – we consume them as part of foods, together with other foods and as part of dietary patterns.

In recent years nutrition science has shifted from examining individual nutrients to examining the association of the entire food matrix, whole foods and health^{2,3}. While we have known about many of the nutrients like fats and proteins for centuries, the complex makeup of different foods and how they interact to benefit our health are only just being discovered.

THE DAIRY FOOD MATRIX

Dairy foods are complex physical structures housing macronutrients, micronutrients and various other components.

Most of us know that milk, cheese and yoghurt are excellent sources of calcium, but dairy foods naturally contain a unique package of nutrients including B vitamins, high-quality protein, iodine, and also rich in magnesium, potassium, carbohydrate, various fatty acids and bioactive components.



MILK, CHEESE AND YOGHURT EACH HAVE DISTINCT FOOD MATRICES IN TERMS OF THEIR NUTRIENT COMPOSITION AND STRUCTURE⁴.

Cheese is more solid, whereas yoghurt has a semi-solid or gel like structure, and milk has a liquid structure. These distinctions are important as the different physical structures can also affect the bioavailability of nutrients, the way they are digested and absorbed by the body and consequent health effects after consumption⁵.

THE DAIRY FOOD MATRIX AND HEALTH EFFECTS

Consumption of milk, cheese and yoghurt are foods recommended by the Australian Dietary Guidelines⁶ due to their natural nutrient richness and the key role this plays in human nutrition, health and development throughout life.

Recently, nutritionists and scientists have increasingly begun to consider that the effects of milk and dairy foods on health extend beyond the benefits of the individual nutrients they contain. Rather, it is this unique combination of nutrients and bioactive factors and how they interact within the food matrix that leads to the health benefits of dairy foods.

EXAMPLES OF THE DAIRY FOOD MATRIX AND HEALTH



WHAT'S BETTER FOR HEALTH – REGULAR OR REDUCED FAT MILK?

It's commonly thought that we should limit our consumption of regular-fat milk, in favour of reduced-fat milk due to concerns around saturated fat, heart health and weight. However, research shows that regular-fat milk is not associated with increased cardiometabolic risk and doesn't lead to weight gain⁷.

The Heart Foundation of Australia have recently updated their guidelines on dairy and heart healthy eating and advise that for the general population, regular fat dairy products can be enjoyed every day⁸, so it's about picking which milk you prefer. The exact reasons for the benefits are still unclear but could be related to the complex fatty acid profile of milk, the milk fat globule membrane⁹ and the presence of calcium¹⁰.



IS CHEESE OK FOR HEART HEALTH?

Despite its sodium and saturated fat content, several studies have consistently shown that cheese has a favourable or neutral effect on a variety of different health outcomes. For example, cheese consumption has been associated with a reduced risk of stroke, hypertension and cardiovascular disease^{3,11,12}.

The explanation for the potential beneficial rather than harmful effects is likely due to the interactions between components of the cheese matrix, including calcium, phosphorus, the milk fat globule membrane, and starter cultures, which together modify saturated fatty acid-induced increases in blood lipids¹³.



YOGHURT – GOOD NEWS FOR LACTOSE MALDIGESTERS

Fermented dairy products, such as yoghurt can have a positive effect on gut health. For those with diagnosed lactose intolerance, it appears yoghurt is better tolerated when compared with milk. The unique yoghurt matrix results in a longer gastrointestinal transit time than that for milk, helping with the absorption of nutrients and reducing gastrointestinal upset. This is also a consequence of the live bacteria within the product as a result of the fermentation process¹⁴.

SUMMARY

Further research will continue to reveal more in-depth insights about the benefits of looking at dairy foods as a matrix, including the mechanisms and pathways through which the different components work together and their impact on health.

THE MATRIX CONCEPT EMBRACES THE IMPORTANCE OF CONSIDERING WHOLE FOODS, ALONGSIDE THE INDIVIDUAL COMPONENTS THEY CONTAIN.

The assessment of how healthy a food is should be based on an evaluation of the health effects of the entire dairy matrix, not just single nutrients.

REFERENCES

1. Thorning TK et al. Whole dairy matrix or single nutrients in assessment of health effects: current evidence and knowledge gaps. *Am J Clin Nutr* 2017;105:1–13.
2. Mozaffarian D, Rosenberg I and Uauy R. History of Modern Nutrition Science—Implications for Current Research, Dietary Guidelines, and Food Policy. *BMJ*; 2018 Jun 13;361:k2392.doi: 10.1136/bmj.k2392.
3. Mozaffarian D. Dairy foods, obesity, and metabolic health: The role of the food matrix compared with single nutrients. *Adv Nutr*. 2019 Sep; 10(5): 917S–923S.
4. Thorning TK et al. Whole dairy matrix or single nutrients in assessment of health effects: current evidence and knowledge gaps. *Am J Clin Nutr* 2017;105:1–13.
5. Fardet A et al. Influence of food structure on dairy protein, lipid and calcium bioavailability: A narrative review of evidence. *Crit Rev Food Sci Nutr*. 2019;59(13):1987–2010.
6. National Health and Medical Research Council. *Australian Dietary Guidelines* Canberra: Commonwealth of Australia; 2013.
7. Drouin-Chartier JP et al. Systematic review of the association between dairy product consumption and risk of cardiovascular-related clinical outcomes. *Adv Nutr*. 2016 Nov 15;7(6):1026–1040.
8. Heart Foundation of Australia. Dairy and Heart Healthy Eating. Available: https://www.heartfoundation.org.au/images/uploads/publications/Nutrition_Position_Statement_-_DAIRY.pdf.
9. Rosqvist F et al. 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.
10. Soerensen et al. Effect of dairy calcium from cheese and milk on fecal fat excretion, blood lipids and appetite in young men. *Am J Clin Nutr*. 2014;99:984–991.
11. De Goede et al. Dairy consumption and risk of stroke: a systematic review and updated dose-response meta-analysis of prospective cohort studies. *J Am Heart Assoc*. 2016 May 20;5(5). pii: e002787.
12. Chen GC et al. Cheese consumption and risk of cardiovascular disease: a meta-analysis of prospective studies. *Eur J Nutr*. 2017 Dec;56(8):2565–2575.
13. Drouin-Chartier JP et al. Differential impact of the cheese matrix on the postprandial lipid response: a randomized, crossover, controlled trial. *Am J Clin Nutr*. 2017 Dec;106(6):1358–1365.
14. Savaino and Hutkins. Yogurt, cultured fermented milk, and health: a systematic review. *Nutr Rev*. 2020; May 23;nuaa013.doi: 10.1093/nutrit/nuaa013. Online ahead of print.

The information provided in this resource is intended to be used as nutrition education only. Whilst all reasonable steps have been taken to ensure the accuracy of the information contained within, to the fullest extent permitted by Australian law Dairy Australia disclaims all liability for any inadvertent errors and for any losses or damages stemming from reliance upon the content. For further information, call 1800 004 377. Copyright Dairy Australia Limited (ACN 105227 987), Level 3, HWT Tower, 40 City Road Southbank, Victoria 3006, Australia. All rights reserved. 06/20