



The Food Matrix: More Than The Sum of its Nutrients

Although it is widely recognized that we eat foods, not nutrients, nutrition science has historically focused on nutrients in isolation. Emerging research is taking a broader focus by exploring the role of the whole food package when it comes to health and wellness. Enter the food matrix.

Food Matrix

The nutrient and non-nutrient components of foods and their molecular relationships, (i.e. chemical bonds) to each other. - USDA¹

The food matrix comprises both a nutritional matrix and a physical matrix, which work in concert to affect nutrient digestion, absorption and metabolism. It's this comprehensive context that may more fully reflect a food's true nutritional value and health benefits.



Nutritional Matrix Components:

- o Simple and complex carbohydrates
- o Amino acids
- o Fatty acids
- o Vitamins
- o Minerals
- o Bioactives

Physical Matrix Structures:

- o Solid
- o Semi-solid or gel
- o Liquid

The complex interplay between physical and chemical properties may help explain why nutrient supplements don't always impart the same benefits as the foods in which they're found and why even different physical forms of the same food may affect the body differently.



Dairy Bioactives

"Bioactives are constituents in foods, other than those to meet basic nutritional needs, that are responsible for a change in human health."

- Office of Disease Prevention & Health Promotion, National Institutes of Health²

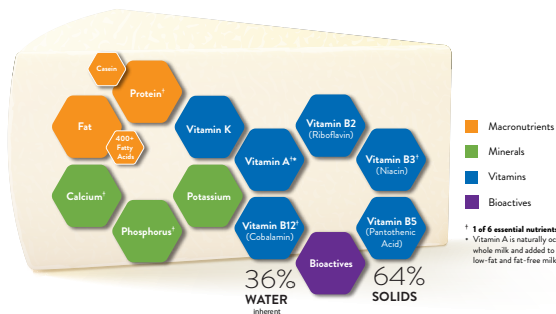
Milk and dairy foods like cheese and yogurt contain potentially **bioactive peptides, lipids and carbohydrates**. Ongoing research is exploring the role of bioactive food components in the prevention of disease.

The Unique Matrix of Dairy Foods

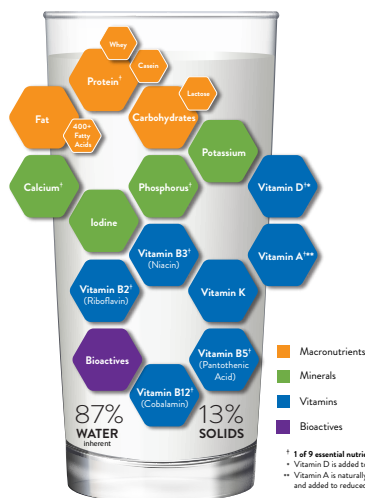
Transformation of the physical milk matrix through fermentation, heat and/or ripening processes occurs when cheese and yogurt are created. These foods have their own unique nutritional and physical matrices. Cheese and yogurt are fermented foods that can contain live microbes and active cultures which have the potential to naturally produce additional bioactives such as peptides and short chain fatty acids.³



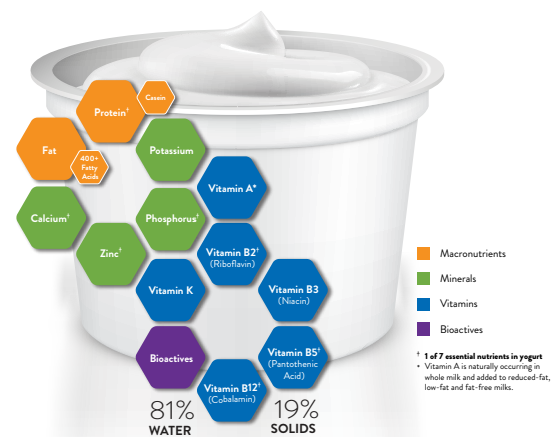
The Dairy Matrix



The Cheese Matrix⁴



The Milk Matrix⁵



The Yogurt Matrix⁶

Because of its unique nutrient package, dairy foods have been linked with reduced risk of cardiovascular disease, type 2 diabetes and hypertension.⁽⁷⁻¹²⁾ Dairy foods provide numerous nutrients – but their health benefits go beyond strong nutrition credentials. It may be the unique matrix (nutritional & physical) of dairy foods – and interactions therein – that plays a role in the health outcomes associated with eating dairy foods.

The dairy food matrix and its unique interaction between nutritive and non-nutritive components may help explain why dairy foods are associated with positive health outcomes.

References:

- United States Department of Agriculture. Glossary of agricultural terms [Internet]. <https://agclass.nal.usda.gov/mtdwd.exe?k=glossary&l=60&w=6026&s=5&t=2>
- Proposed Definition. NIH, Office of Dietary Supplements. Federal Register Vol. 69 No. 179 FR Dec 04-20892, Sept. 16, 2004
- Ebringer L, Ferencik M, Krajcovic J. Beneficial health effects of milk and fermented dairy products - review. Folia Microbiol (Praha). 2008;53(5):378-394. doi:10.1007/s12223-008-0059-1
- USDA FoodData Central: 170899
- USDA FoodData Central: 602770
- USDA FoodData Central: 171304
- Engel, S. et al. Effect of whole milk compared with skimmed milk on fasting blood lipids in healthy adults: a 3-week randomized crossover study. European Journal of Clinical Nutrition (2018) 72:249-254. <https://doi.org/10.1038/s41430-017-0042-5>;
- Drouin-Chartier, JP et al. Systematic review of the association between dairy product consumption and risk of cardiovascular lar-related clinical outcomes. Adv Nutr 2016;7:1026-40. \
- Chen GC, Wang Y, Tong X, Szeto IMY, Smit G, Li ZN, Qin LQ. Cheese consumption and risk of cardiovascular disease: a meta-analysis of prospective studies. Eur J Nutr. 2017;56(8):2565-2575
- Stanhevcz AE, et al. Dairy cheese consumption ameliorates single-meal sodium-induced cutaneous microvascular dysfunction by reducing ascorbate-sensitive oxidants in healthy older adults. Br J Nutr [Internet]. NIH Public Access; 2016 [cited 2019 Sep 9];116:658-65.
- Pei R et al. Low-fat yogurt consumption reduces biomarkers of chronic inflammation and inhibits markers of endothelin exposure in healthy premenopausal women: a randomized controlled trial. Br J of Nutrition. 2017; 118:1043-51.
- Weaver CM, Gordon CM, Janz KF, Kalkwarf HJ, Lappe JM, Lewis R, Karm MO, Wallace TC, Zemel BS. The National Osteoporosis Foundation's position statement on peak bone mass development and lifestyle factors: a systematic review and implementation recommendations. Osteoporosis Int. Published online February 8, 2016

Recipe: Labneh



Labneh is a soft, creamy cheese made from strained yogurt.

Ingredients:

- 1 (32 ounce) container of yogurt (works best with whole or 2%)
- 1/2 teaspoon salt

Garnish:

- 1 tablespoon olive oil
- 1 to 2 teaspoons za'atar seasoning

- In a small bowl, add salt to yogurt and mix. Line a fine-mesh strainer with cheesecloth and place over the top of a medium-sized bowl.
- Spoon the yogurt into the strainer with cheesecloth and wrap the sides of the cheesecloth over the yogurt to protect it. Store in the refrigerator for 24 to 48 hours (the liquid whey will drain into the bowl).
- Discard the liquid and move cheese into a serving dish. Drizzle with olive oil and sprinkle with za'atar seasoning.



National Dairy Council's (NDC) mission it to bring to life the dairy community's shared vision of a healthy, happy, sustainable world with science as our foundation. On behalf of America's dairy community, NDC strives to help people thrive at every age through science-based information on dairy's contributions to nutrition, health and sustainable food systems. For more information visit USDairy.com