

TALK DAIRY TO ME:

Facts, Fiction and FAQs





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This webinar was approved by CDR for 1 CEU and by AAFP for 1 CME
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Talk Dairy to Me:

Facts, Fiction, FAQs







Today's Speakers



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Disclosures

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This webinar has been sponsored and approved for continuing education through CDR by National Dairy Council
 Credentialed professionals can submit feedback about the quality of this activity directly to the Commission on Dietetic Registration: QualityCPE@cdregister.org

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Learning Objectives


At the end of this webinar attendees will be able to:


1. Describe the role of dairy foods in supporting healthy dietary patterns and sustainable food systems.
2. Identify farming and processing practices that ensure animal wellbeing and food safety.
3. Answer common questions and address misconceptions about dairy food and farming.
4. Communicate evidence-based, practical and cost-effective nutrition guidance.

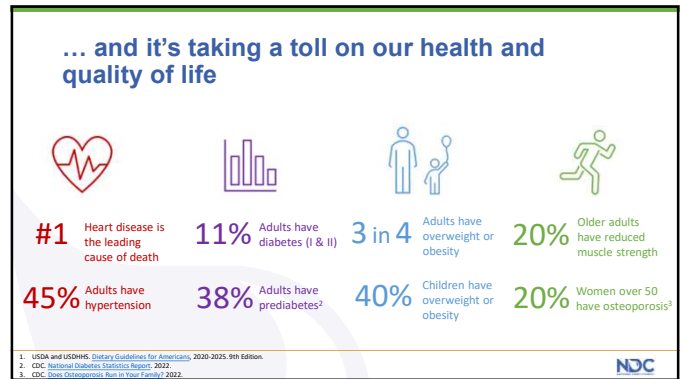
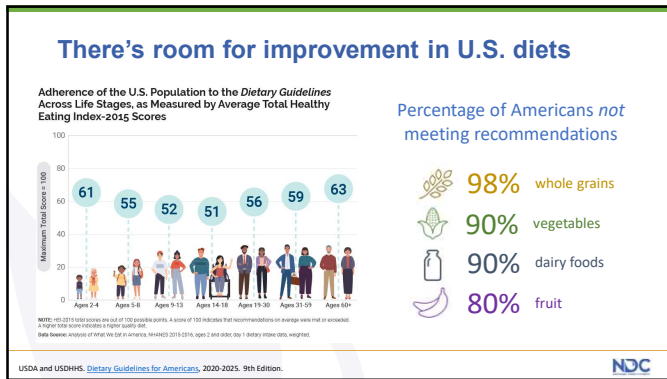
Suggested CDR Performance Indicators: 4.1.3, 11.2.11, 12.4.2

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Background







As a part of a healthy dietary pattern, dairy foods can help

DGAC Scientific Report
Lower risk for health outcomes of interest

- ✓ All-cause mortality (strong)
- ✓ Cardiovascular disease (strong)
- ✓ Overweight / Obesity (moderate)
- ✓ Bone health (moderate)
- ✓ Colorectal cancer (moderate)
- ✓ Lung cancer (limited)

Table D8.1 Low-fat dairy inclusion and strength of evidence for adults

USDA, ARS, Dietary Guidelines Advisory Committee, Scientific Report of the 2020 Dietary Guidelines Advisory Committee, 2020. NDC

But, people still have questions

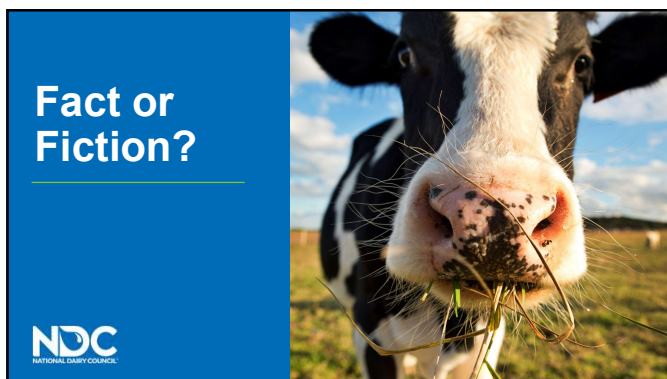
From health and nutrition to processing and environmental impact, how can we confidently advise patients, consumers and clients about the role of dairy foods?

You asked, we listened.

- Myth busting
- Animal welfare
- Antibiotic/hormone concerns
- Role in sustainable food systems
- Dairy's saturated fat

NDC Webinar Survey Feedback

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People with lactose intolerance need to avoid all dairy foods

← FACT or FICTION? →

Lactose intolerance (LI) is real and affects many Americans

36%
U.S. adults are affected by LI^{1,2}

- 20-30% white adults
- 70% Mexican descent
- 70% Ashkenazi Jews
- 80% African Americans
- 99% Chinese adults
- 100% Native Americans
- 100% Native Alaskans

1. Storhaug C, Fosse S, Fadnes L. *Lancet Gastroenterol Hepatol*. 2017;2(10):738-746.
2. Bayless T, Brown E, Page D. *Curr Gastroenterol Rep*. 2017;13(5):23.

LI doesn't have to mean "no more dairy"

Education around lactose content can help people with LI enjoy dairy foods with confidence

Amount of Lactose per Serving
From Lowest to Highest

Dairy Product	Serving Size	Lactose Content
Lactose-free Dairy Milk	1 CUP (8 OZ) SERVING	0g
Cottage Cheese	1/2 CUP SERVING	<1g
Natural Cheeses	1.5 OZ SERVING	3.2g
Ice Cream	2/5 CUP SERVING	3.9g
Greek Yogurt	3/4 CUP SERVING	4.2g
Kefir	1 CUP (8 OZ) SERVING	8.5g
Dairy Milk	1 CUP (8 OZ) SERVING	12.6g

1. USDA, ARS. FoodData Central, 2013.
2. Bailey et al. *Front Med*. 2023;10(12):127.

Tried-and-true tips can help with lactose digestion

- Try It**: Opt for lactose-free dairy milk products
- Stir It**: Mix milk with other foods to help slow lactose digestion
- Slice It**: Choose natural cheeses (e.g., Cheddar, Swiss)
- Shred It**: Top dishes with natural cheese
- Spoon It**: Yogurt's live and active cultures help digest lactose
- Sip It**: Start small and introduce dairy slowly

Bailey et al. *J Natl Med Assoc*. 2013;105(2):112-27.

Plant-based "milks" can be replacements for dairy milk

FACT or FICTION?

Dairy milk packs in a lot of nutrition at an affordable price

Excellent Source (>20%DV)
Calcium
Iodine
Riboflavin
Vitamin B12
Pantothenic Acid
Good Source (>10%DV)
Protein
Potassium*
Vitamin D
Phosphorous
Vitamin A
Niacin
Selenium
Zinc

13 essential nutrients¹

3 of 4 nutrients of public health concern²

- ✓ Calcium
- ✓ Potassium
- ✓ Vitamin D
- × Fiber

~20¢³

One 8-ounce glass of milk

1. USDA, ARS. FoodData Central, 2013.
2. <https://www.fda.gov/oc/ohrt/ohrt-report-2013-2014>
3. Based on \$1.50 average price of unflavored, conventional milk, 3.25% milkfat, 1.66% whey solids. Milk Market - Cowi 2022. FTD writing 7-8-22.

Dollar for dollar, dairy foods are one of the most economical sources of nutrition^{1,2}

Least Expensive Sources of Nutrients of Public Health Concern¹


Nutrient	Children 2-18	Adults 19-99
Calcium	1. Dairy milk (tie) 2. Cheese (tie) 3. OJ	1. Dairy milk 2. Cheese 3. OJ
Vitamin D	1. Dairy milk 2. Eggs 3. Fortified cereal	1. Dairy milk 2. Eggs 3. Soy beverage
Potassium	1. Potatoes 2. Juice 3. Dairy Milk	1. Potatoes 2. Juice 3. Dairy Milk
Fiber	1. Quinoa 2. Chickpea 3. Pearled Barley	1. Quinoa 2. Chickpea 3. Pearled Barley

A solution for many families³

- 13.5 million** U.S. households are food insecure
- 12.5%** U.S. households with children are food insecure

1. Hens, LM, Childs, C.J., Agnew, S. et al. *Appl Sci*. 2019;9(10):1806.
2. <https://www.fda.gov/oc/ohrt/ohrt-report-2013-2014>
3. USDA, ARS. FoodData Central, 2013.

Dairy foods help fill important nutritional gaps




Notable Contributions^{1,2}
For Americans (2+), milk, cheese and yogurt contribute:

- 52%** Calcium and Vitamin D
- 1/3** Vitamins A & B12, and Phosphorus
- ~15%** Protein, Zinc, and Potassium

Milk is the leading source of 3 nutrients of public health concern (Ca, Vit D, Potassium) for children 2-18¹

1. National Dairy Council. *Dairy*. 2015-2018. Hyattsville, MD: 2020.
2. Heuvelink AE et al. *Academy*. 2020;11(10):E1006.

... which is why authoritative health bodies and guidelines underscore dairy's nutritional benefits



Logos of endorsing organizations: USDA, American Academy of Pediatrics, Academy of Nutrition and Dietetics, American Heart Association, AAPD, Food and Agriculture Organization of the United Nations, American Diabetes Association.

Dairy alternatives are different

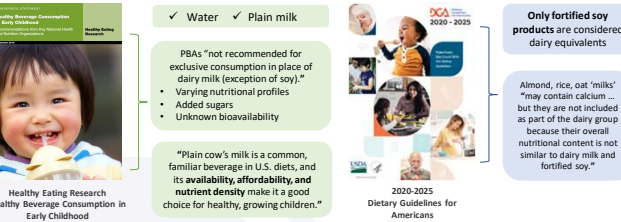
Plant-based beverages can fit in a healthy dietary pattern, but nutrition-wise they're not the same as dairy milk

Nutrition Facts		Plain Dairy Milk		Plant-based Beverage*	
Serving size 8 fl oz		Serving size 8 fl oz		Serving size 8 fl oz	
Amount Per Serving		Amount Per Serving		Amount Per Serving	
Calories 110		Calories 110		Calories 40	
Total Fat 5g	10%	Total Fat 5g	10%	Total Fat 5g	10%
Saturated Fat 1.4g	3%	Saturated Fat 1.4g	3%	Saturated Fat 1.4g	3%
Trans Fat 0g	0%	Trans Fat 0g	0%	Trans Fat 0g	0%
Polysaturated Fat 0.1g	0%	Polysaturated Fat 0.1g	0%	Polysaturated Fat 0.1g	0%
Monounsaturated Fat 0.5g	1%	Monounsaturated Fat 0.5g	1%	Monounsaturated Fat 0.5g	1%
Cholesterol 0mg	0%	Cholesterol 0mg	0%	Cholesterol 0mg	0%
Sodium 0mg	0%	Sodium 0mg	0%	Sodium 0mg	0%
Total Carbohydrate 12g	2%	Total Carbohydrate 12g	2%	Total Carbohydrate 12g	2%
Dietary Fiber 1g	2%	Dietary Fiber 1g	2%	Dietary Fiber 1g	2%
Total Sugars 12g	24%	Total Sugars 12g	24%	Total Sugars 12g	24%
Includes 0g Added Sugars	0%	Includes 0g Added Sugars	0%	Includes 0g Added Sugars	0%
Protein 8g	16%	Protein 8g	16%	Protein 8g	16%
Vitamin D 2.8mcg	56%	Vitamin D 2.8mcg	56%	Vitamin D 2.8mcg	56%
Calcium 270mg	27%	Calcium 270mg	27%	Calcium 270mg	27%
Iron 0.1mg	2%	Iron 0.1mg	2%	Iron 0.1mg	2%
Potassium 0mg	0%	Potassium 0mg	0%	Potassium 0mg	0%

- Plain Dairy Milk**
 - Minimal ingredients
 - Milk, vitamins D, A
 - 13 essential nutrients
 - Good source of high-quality protein
 - Higher in energy/fat
 - Bioactive compounds
 - Food matrix
 - Bioavailability
 - \$3.51/gal¹
- Plant-based Beverage***
 - More extensive ingredient list
 - Water + base (almond, etc.)
 - Micronutrients
 - Gums, salts, sugars, lecithin, protein, natural flavors, oils
 - Nutrition depends on fortification
 - Low in natural protein**
 - Lower in energy/fat
 - \$5.88-11.05/gal²

*Plant-based beverage nutrition and ingredients vary.
**Soy beverage is good source of protein.

Plant-based alternatives are generally not recommended for growing children



- Water
- Plain milk

PBAs "not recommended for exclusive consumption in place of dairy milk (exception of soy)."

- Varying nutritional profiles
- Added sugars
- Unknown bioavailability

"Plain cow's milk is a common, familiar beverage in U.S. diets, and its availability, affordability, and nutrient density make it a good choice for healthy, growing children."

Only fortified soy products are considered dairy equivalents

Almond, rice, oat 'milks' may contain calcium ... but they are not included as part of the dairy group because their overall nutritional content is not similar to dairy milk and fortified soy."

Swapping dairy milk with PB alternatives can have unintended nutritional consequences, especially for children

Nutrient	All (2 Years)	Population Group			
		Young Children (2-3 Years)	Young Men (19-30 Years)	Young Women (19-30 Years)	Older Adults (71+ Years)
Energy	-18	-18	-18	-18	-18
Protein	-2.6	-2.4	-1.9	-2.3	-3.2
Total fat	-6.1	-5.3	-0.2	0.0	0.7
Saturated fat	-6.5	-20.7	-6.3	-5.5	-6.4
Monounsaturated fat	1.3	1.5	0.9	1.2	2.3
n-3 long-chain fatty acids	-0.8	-8.0	-0.8	-0.9	-0.6
Vitamin A (ret. equiv)	-1.7	-7.2	-3.2	-1.1	-0.2
Riboflavin	-8.1	-8.7	-5.7	-3.6	-8.7
Niacin (ret. equiv)	-2.0	-5.6	-1.4	-1.8	-2.5
Vitamin B6	0.1	11.4	-1.4	-0.3	3.4
Vitamin B12	-11.7	-24.3	-30.8	-30.0	-11.6
Calcium	-54	-7.4	-4.9	-4.2	-4.5
Iodine	-3.4	-8.9	-15.7	-15.6	-9.1
Iron	3.4	9.2	3.2	2.9	3.6
Magnesium	2.1	7.0	2.3	1.9	2.0
Phosphorus	-3.2	-13.2	-4.4	-4.8	-6.3
Potassium	-2.4	-5.9	-2.2	-2.4	-3.1
Selenium	-6.7	-2.2	-0.5	-0.7	-0.8
Sodium	0.9	3.1	0.8	0.7	1.1
Zinc	-3.1	-8.5	-2.4	-2.9	-3.7

Estimated % Change in Mean Daily Intake of Key Nutrients if Dairy Milk is Replaced with Plant-based 'milk'

Undesirable Changes

- 5-10%
- 10-20%
- >20%

Implications

- Early childhood nutrition & growth
- Pregnancy/lactation and neurodevelopment (B12, iodine)
- Older adults (B12 deficiency)

Milk is just for kids and bones

FACT or FICTION?

The AAP, NIH and Dietary Guidelines recommend eating dairy foods daily to achieve peak bone mass

1. Golden N, Abrams C, Committee on Nutrition. *Pediatrics*. 2014;134(6):e1228-43.

2. USDA and IOM. *Dietary Guidelines for Americans, 2020-2025*. 9th Edition. NRC. National Academies Press; 2020.

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Beyond bones, dairy foods support early brain development

Dairy foods offer 7 of the 14 nutrients AAP notes as important for early cognitive development.

1. Schwaninger G, Georgel P, AAP Committee on Nutrition. *Pediatrics*. 2018;142(2):e203-219.

2. Georgel P, Bruneau M, Traub D. *Pediatrics*. 2015;135(4):411-423.

3. USDA. <https://www.fda.gov/food/food-labeling>.

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Beyond childhood, dairy is linked to functional benefits throughout the lifespan

Muscular Health & Body Composition¹⁻³

- High-quality protein and BCAAs
- May help mitigate sarcopenia
- Can support improved body composition and weight management

Digestive Health⁴⁻⁵

- Probiotic cultures from fermented dairy food
- Can support a healthy microbiome

Bone Health⁶⁻⁷

- Calcium, vitamin D, zinc, phosphorus, potassium, magnesium
- Can help children achieve peak bone mass
- Linked to reduced fracture risk

Brain Health and Sleep^{8,12}

- Milk linked to improved brain antioxidant (glutathione) levels
- Associated with cognitive function in adults
- Milk has 7 of 14 nutrients important for baby brain development
- Dairy's tryptophan, magnesium and zinc can contribute to improved sleep quality

Cardiometabolic Health⁹⁻¹⁶

- Linked to reduced risk of hypertension and type 2 diabetes
- Neutral to lower risk of CVD

Immune Health^{5,17}

- Vitamins A, D, B12, protein, zinc and selenium have immune-supporting roles
- Probiotics can benefit microbiome and improve mucosal immunity

1. Gombart AP et al. *Cell*. 2016;167(1):103-113.

2. Gombart AP et al. *Cell*. 2016;167(1):103-113.

3. Gombart AP et al. *Cell*. 2016;167(1):103-113.

4. Gombart AP et al. *Cell*. 2016;167(1):103-113.

5. Gombart AP et al. *Cell*. 2016;167(1):103-113.

6. Gombart AP et al. *Cell*. 2016;167(1):103-113.

7. Gombart AP et al. *Cell*. 2016;167(1):103-113.

8. Gombart AP et al. *Cell*. 2016;167(1):103-113.

9. Gombart AP et al. *Cell*. 2016;167(1):103-113.

10. Gombart AP et al. *Cell*. 2016;167(1):103-113.

11. Gombart AP et al. *Cell*. 2016;167(1):103-113.

12. Gombart AP et al. *Cell*. 2016;167(1):103-113.

13. Gombart AP et al. *Cell*. 2016;167(1):103-113.

14. Gombart AP et al. *Cell*. 2016;167(1):103-113.

15. Gombart AP et al. *Cell*. 2016;167(1):103-113.

16. Gombart AP et al. *Cell*. 2016;167(1):103-113.

17. Gombart AP et al. *Cell*. 2016;167(1):103-113.

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Dairy foods are not inflammatory, and may have beneficial anti-inflammatory effects

Dairy products and inflammation: A review of the clinical evidence

1. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

2. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

3. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

4. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

5. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

6. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

7. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

8. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

9. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

10. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

11. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

12. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

13. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

14. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

15. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

16. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

17. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

18. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

19. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

20. Benerjee S, et al. *Journal of Dairy Science*. 2013;96(12):3511-3522.

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Full-fat dairy should be avoided or limited

← **FACT** or **FICTION?** →

1. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

2. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

3. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

4. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

5. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

6. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

7. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

8. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

9. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

10. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

11. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

12. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

13. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

14. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

15. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

16. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

17. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

18. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

19. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

20. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

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Dairy's food matrix plays a role in how we look at saturated fat

We eat foods, not nutrients

"Food Matrix"
Relationships between nutrient and non-nutrient components
→ Impacts digestion, absorption and physiological functions

Bioactive Component	Potential Beneficial Mechanisms
Peptides ¹	Anti-oxidant, inflammatory, microbial, thrombotic, hypertensive, Glucose control
Lipids (400+ FAs) ^{2,4} Milk Fat Globule Membrane	Circulating cholesterol and TGs Gut inflammation
Carbohydrates ^{3,5} Oligosaccharides Lactose	Prebiotic effects Mineral balance Calcium absorption

1. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

2. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

3. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

4. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

5. NDC. *Journal of Dairy Science*. 2023;96(12):3511-3522.

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... which may explain the paradox with CV risk

Emerging research shows neutral to beneficial outcomes of full-fat dairy, highlighting the nuance and complexity of the dairy matrix

Full-fat dairy foods have shown protective effects on cardiometabolic risks/outcomes:

- CVD¹⁻⁵
- Type 2 DM^{2,3,5}
- Mortality^{2,3,5}
- CVD Mortality³
- Stroke^{3,5}
- Hypertension⁵
- Waist circumference and body comp.^{4,7}

The New York Times
Whole Milk May Be Better When It Comes to Children's Weight
Kids who drank whole milk were at a 39 percent reduced risk for being overweight than those who drank low-fat milk.

The Washington Post
Good news about cheese – it's much healthier than you thought

1. Treu et al. *JGIM* 2021;36(9):1003-1013. 4. Duarte et al. *Crit Rev Food Sci Nutr*. 2020;61(10):405-441. 7. Vanderhoof et al. *Clinical Nutrition*. 2019;38(2):266-273.
 2. Adrup et al. *Journal of the American College of Cardiology*. 2020;76(7):844-857. 5. Hirahatake et al. *Exp Gerontol*. 2020;111(5):533-547.
 3. Delshammar et al. *Stroke*. 2018;49(10):2328-2337. 6. Gong Y, Huang T. *Food Nutr Res*. 2018;61(21).

Organic dairy is better than conventional dairy

Both organic and conventional dairy foods offer the same nutrient package

Organic is a farming method and personal preference, not a health claim

Non-Organic

- 13 essential nutrients
- Committed farmers and cared for cows
- Sustainability depends on practices
- Regulated/inspected

USDA Organic

- 13 essential nutrients
- Committed farmers and cared for cows
- Sustainability depends on practices
- Regulated/inspected
- Strict USDA Organic standards
 - Organic fertilizers/pesticides
 - Pasture access ≥120 days/year
 - Organic feed
 - No antibiotic/hormone use
 - UHT pasteurization

1. ADANI. *What is the difference between organic and conventional milk?*
 2. USDA National Marketing Service. *National Organic Database*
 3. USDA. *Organic*. <https://www.usda.gov/organic>

Many factors affect milk's composition

Farm location and climate can affect the cow's diet and milk

What affects milk's nutrition?¹

- Diet
- Cow breed
- Genetic variability
- Season/weather
- Stage of lactation
- Interactions between these factors

What is "grass-fed"?²

- Not federally regulated
- Independent certifications
- Self-feeding/grazing
- Not necessarily same as "pasture-raised"

Is grass-fed or organic more nutritious?²⁻⁴

- Higher CLA and omega-3 fatty acids
- Not biologically significant

Unless milk is fortified it's best to get omega-3's from other sources^{3,4}

Salmon	1421
Organic Milk	55
Conventional Milk	37
N-3 FA per 100 Kcal (Mg)	

1. University of California. *2018/02/20/184*
 2. <https://www.usda.gov/organic>
 3. NDC. *Omega-3 Reference Guide*. 2022
 4. USDA. *Organic*. <https://www.usda.gov/organic>

Milk contains harmful hormones and antibiotics

Hormones can be misunderstood

It can be helpful to understand rbST and animal biology

Recombinant Bovine Somatotropin (rbST)¹⁻³

- Cows naturally produce BST
- rbST for cows developed in 1980s for sustainability purposes (↑milk, ↓ resources)
- Rigorously tested/scrutinized prior to approval in 1993, monitored today
- Consumer misconception → dwindled use
- Most milk today comes from rbST-free cows

Natural Hormones³⁻⁵

- All living things produce hormones
- Plant- and animal-foods both have hormones
- Inactivated during human digestion
- Evidence shows no adverse effects on humans

1. FDA. *Bovine Somatotropin (BST)*. 2023.
 2. NDC. *Omega-3 Reference Guide*. 2022.
 3. Cornell University. *Consumer Concerns about Hormones in Food*. 2000.
 4. Palacios et al. *Toxicology Research and Application*. 2020;4.
 5. <https://www.usda.gov/organic>

All dairy foods – labeled or not – are required by the FDA to be free of antibiotics

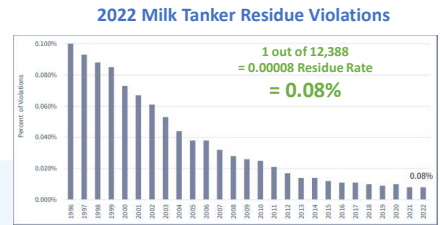


Antibiotics are not used lightly¹⁻³

- Cow care is the top priority for farmers
- Highly regulated, overseen by veterinarian
- FDA prohibits antibiotics in milk
- Numerous checkpoints in place as milk moves from farm to dairy case
- Any milk that tests positive is rejected and does not enter the food supply
- **Violations = \$\$\$** (fine, loss of milk, permit, suspension)

1. Cornell College of Veterinary Medicine, <https://www.cvm.cornell.edu/>
 2. FDA, <https://www.fda.gov/food/antibiotic-resistance/>
 3. IAHM, <https://www.iahm.org/antibiotic-resistance/>
 4. National Dairy Farm Program, <https://www.nationaldairyfarmprogram.com/>

Procedures are in place to ensure antibiotics never end up in our milk



National Dairy Farm Program, 2022 Year in Review

It's helpful to know the farm to table journey

Strict standard operating procedures ensure quality and safety every step of the process



1. NDC, <https://www.ndc.com/industry-table-raw-milk-goes-from-the-cow-to-your-home>, 2023.
 2. USDA, <https://www.usda.gov/industry-table-raw-milk-goes-from-the-cow-to-your-home>, 2023.
 3. FDA, <https://www.fda.gov/industry-table-raw-milk-goes-from-the-cow-to-your-home>, 2023.

From the farm → the milk truck



From the milk truck → the processing plant



The Milk Pickup Is Tested for Purity at the Farm



Positive Test
The entire milk pickup is discarded



Negative Test
The milk is taken to the processing plant



The Milk Pickup Is Tested for Purity at the Plant



Positive Test
The entire milk pickup is discarded



Negative Test
The milk moves on to processing

From the processing plant → your local store

The Milk Undergoes a 3-Step Process



Standardization
All the fat in the milk is removed and later re-added to make different fat percentage levels (This is how we get nonfat, 1%, 2% and whole milk options)



Pasteurization
The milk is quickly heated, killing potentially harmful bacteria



Homogenization
The fat in the milk is mixed under pressure so it doesn't separate and rise to the top

Optional Fortification
It's common for milk in the U.S. to be fortified with vitamins A and D, making it even more nutritious prior to bottling



~ 48 hours
From the farm to the store

Our food system is broken

“The food supply needs to provide foods that are **healthy** and **safe**, **affordable**, **culturally acceptable**, and with **low impact on the environment.**”

Dr. Adam Drewnowski

Drewnowski A, Ecosystem Inception Team. [Food. Nutr.](#) 2018;4(74).

Food systems are complex and multifaceted

Impact of the food system on land, water, air, energy use

Health: Nutrient-rich food production, food safety, accessibility, appeal

Environment

Economics: Food pricing, food equity, profitability, wages

Society: Cultural, social, regional and religious factors; norms, attitudes and behaviors; social justice

Drewnowski A, Ecosystem Inception Team. [Ecosyst. Nutr.](#) 2018;4(74).

Equality and equity are different
It's an important consideration from a public health lens

Inequality: Unequal access to opportunities

Equality?: Evenly distributed tools/assistance

Equity: Custom tools that ID and address inequality

Justice: Finding the system to offer equal access to both tools and opportunities

Design in Tech Report, 2019.

What makes a food system successful?

Successful Food System	Required Characteristic	Core Field(s)	Main Goal(s)
Successful Food System	Ability of the system to feed current and future population	Food Security	Close yield gaps
	Ability of the system to deliver a healthy diet	Nutrition Security and Health	Close nutrient gap and ensure quality of diet
	Ability of the system to produce equal and equitable benefits	Social Justice and Governance	Close access gap
	Sustainability of the system and its environmental impacts	Natural Resources, Agrobiodiversity, Energy-Water-Carbon Efficiency	Reduce footprint of system on environment

Mink et al. [World Development](#) 2019;113:116-130.

Dairy can play a role in each pillar

- Close yield gaps¹**
 - ✓ Affordable and accessible
 - ✓ Component of federal food and nutrition service programs
- Close nutrient gap and ensure quality of diet²**
 - ✓ Significant contributions to nutrients of public health concern
 - ✓ Part of healthy dietary pattern
- Close access gap^{3,4}**
 - ✓ Significant contributions to U.S. economy (local, state, federal) – 3.3M jobs
 - ✓ Supports livelihood of >1B people worldwide
- Reduce footprint of system on environment⁵**
 - ✓ Life Cycle Assessments highlight priority areas
 - ✓ Targets efficiencies in feed, enteric methane, manure, and energy

1. USDA, FNS, Nutrition Programs. 2. USDA and CDC. [Dietary Guidelines for Americans, 2020-2025](#). 9th Edition. 3. EPA. [U.S. Greenhouse Gas Emissions Report 2021](#). 4. FAO. [Contribution of terrestrial animal source food to healthy diets for improved nutrition and health outcomes](#). 2021. 5. U.S. Dairy Net Zero Initiative.

Dairy farmers are committed to their animals and the environment

Dairy farmers are dedicated stewards of the land: caring for their cows and the environment

A perspective from the 1% who feed 100%

USDA ERS. [Ag and Food Sectors and the Economy](#). 2021.

Dairy farming is a family business

Family farms remain a key part of U.S. agriculture

97% U.S. dairy farms are family-owned^{1,2}

90% U.S. farms are small family farms²

Farms are changing and consolidating, but often to other family farms or joint family farms¹

- NMPP. [Family Farms Drive Dairy](#). 2022.
- USDA. [A Look at America's Family Farms](#). 2015.

Cow care is a top priority for dairy farmers

Comfort leads to happy and healthy cows

Facility Design Features

- ✓ Housing (lighting, sleep space, bedding, ventilation, social groups)
- ✓ Nutrient management
- ✓ Diet, water supply/access
- ✓ Activity/space per cow
- ✓ Temperature control

It takes a dedicated team

- ✓ Farmer
- ✓ Veterinarian
- ✓ Nutritionist
- ✓ Environmental consultant
- ✓ State welfare

- Cornell University. [Civic Equities](#).
- [CAAA.com/Equities](#)

More than 99% of U.S. milk comes from farms participating in the FARM Program

Antibiotics
Producing Safe, Wholesome Milk

Environment
Protecting the Environment for Generations to Come

Workforce Development
Promoting Safe, Exceptional Work Environments

Animal Care
Demonstrating Excellent Cow Care

Biosecurity
Safeguarding Herd and Employee Health

FARM Animal Care.

Farmers are feeding more Americans with less

Agricultural technology and research improves efficiency and sustainability

As the U.S. population has grown, the number of farms has decreased¹

1935 → 2021
1 farm fed ~19 people¹ 1 farm feeds ~166 people²

Productivity continues to grow³

Even as the amount of land and labor used declined, total farm output nearly tripled between 1948 and 2019³

- USDA Census of Agriculture. 2015.
- American Farm Bureau Federation. [Fast Facts About Agriculture & Food](#).
- USDA. [Economic and Farm Income](#). 2021.



Cows are naturally great up-cyclers

30-40%
U.S. food supply is wasted¹

~80%
Cow's food is indigestible by humans²

39%
Cow's diet is byproducts → upcycled to nutritious dairy → kept out of landfills (<GHG)³

DRIED DISTILLERS GRAINS

Cows consume byproducts like almond hulls, distiller grains, cotton seeds, soybean meal and citrus pulp

1. USDA. Food Waste Facts. 2. UC Davis CLEAR Center. Dairy Cows - The Original Upcyclers. 2022. 3. O'Brien M.B., Tronzo L. Journal of Clean Production. 2021. 131:1318-1323.

Cows are the leading source of greenhouse gas emissions

FACT or FICTION?

GHGs are unique and require different mitigation strategies

Environmental solutions require progress in multiple sectors

Total U.S. GHG Emissions

- Carbon Dioxide: 79%
- Methane: 11%
- Fluorinated Gases: 3%
- HFCs, PFCs, SF6, and NF3: 3%

- CO2 makes up majority of GHG and comes from transportation, electricity and industry¹
- Methane makes up 11%, coming from natural gas, enteric fermentation and landfills¹

Carbon Dioxide vs. Methane

Gas	Atmospheric Life Span
Carbon Dioxide (CO2)	100-1,000 yrs
Methane (CH4)	~12 yrs

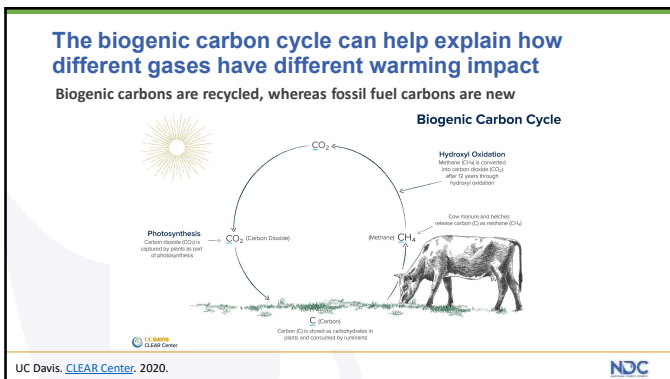
- Methane is initially more damaging, but short-lived^{1,2}
- CO2 lives in the atmosphere much longer^{1,2}

The Current Dilemma
Methane has 80x the warming power of CO2 over the first 100 years before it reaches the atmosphere¹

The Atmospheric Life Span
Carbon dioxide can linger around for 80x longer than methane¹

The Present Opportunity
By reducing methane emissions, we can slow global warming now.

1. EPA. Overview of Greenhouse Gas Emissions. 2021. 2. UC Davis. CLEAR Center. 2020. 3. Graphics from NDC show Dairy Farmers are Reducing Methane and Greenhouse Gas Emissions. 2022.



Dairy spearheaded ag Life Cycle Assessments (LCAs)

In 2008, the U.S. dairy industry was the first in the food agricultural sector to conduct a full LCA at a national scale¹

- Utilized 2007 data of >150 variables to assess GHG emissions of the fluid milk full value chain
- Survey responses from 500+ farms
- Calculated GHG emission intensity of fluid milk
- Estimated GHG emission of the entire dairy sector
- Identified opportunities for greatest impact and improvement

Farm to Table: The Dairy Value Chain

LCA measures impact throughout the entire product process²

1. Thoma et al. International Dairy Journal. 2013;31(5):53-514. 2. Innovation Center for U.S. Dairy. U.S. Dairy Life Cycle Assessment: From Grass to Glass. 2011.

It's estimated that ~2% of U.S. GHG come from the dairy industry

LCA highlights areas for improvement and opportunity, driving agricultural technology, innovation and research

Majority of emissions occur prior to the farm gate

Top GHG contributors

1. Enteric methane
2. Manure management
3. Feed production

Target areas for innovation

- Reduce enteric methane
- Improve manure management
- Increase feed efficiency

1. Thoma et al. *International Dairy Journal*, 2013;31(5):53-514.
 2. Innovation Center for U.S. Dairy. *U.S. Dairy Life Cycle Assessment: From Grass to Glass*, 2011.

What does innovation look like?

Estimated GHG contribution of each "print" to the total*

- Feed (26%)
- Enteric (35%)
- Manure (33%)
- Energy (6%)

FEED 26%

- No/low-till farming
- Cover crops
- Nutrient management
- Precision agriculture
- Water use efficiency

ENTERIC METHANE 35%

- Diet management
- Genetic improvement
- Herd management
- Cow comfort and well-being
- Feed additives

MANURE 33%

- Anaerobic digestion (manure & co-digestion of food waste)
- Renewable fertilizers
- Nutrient and water recovery
- Drying technology (elimination of lagoons)
- Manure storage (cover and fans)

ENERGY 6%

- Renewable energy:
 - Renewable electricity
 - Renewable natural gas
 - Renewable energy from wind and solar sources
- Energy efficiency:
 - LED lighting
 - Variable speed pumps
 - Milk pre-cooling technology
 - Soft start motors
- Replacement of fossil-fueled engines with electric motors

*Should not represent all possible practices, technologies or benefits. Data from our preliminary contribution from agricultural based on their individual operation.

U.S. Dairy Net Zero Initiative
 *Adapted from: Thoma et al. *International Dairy Journal*, 2013;31(5):53-514

What does progress look like?

Producing 1 gal of milk in the U.S.¹

- 279 operational anaerobic digesters in U.S. dairy farms²
- Cattle feeding innovation and technologies can reduce methane emissions³
- 4x one gallon of water recycled for other purposes (chilling, cow drinking water, cleaning stalls, irrigation)⁴

From 2007 to 2017¹

- 30% ↓ water
- 21% ↓ land
- 19% ↓ CH₄

1. [COWA 4th Annual Environmental Report](#), 2020/2021
 2. [CA, *California Dairy*](#), 2022
 3. [Renewable Energy Research Center](#), 2021
 4. [NDC, *U.S. Dairy Net Zero Initiative*](#), 2023

But there's still work to be done!

The dairy community is committed to sustainably feeding a growing population

2050 U.S. Dairy Environmental Stewardship Goals

- ☐ Achieve GHG neutrality
- ☐ Optimize water use while maximizing recycling
- ☐ Improve water quality by optimizing utilization of manure/nutrients

Innovation Center for US Dairy. *Vision: Dairy is an Environmental Solution.*

Teamwork and industry-wide collaboration will be essential to meeting the 2050 goals

FOR FIELD AND FARM

Net Zero Initiative

A collaboration of dairy organizations with the aim to knock down barriers and create incentives for farmers that will lead to economic viability and positive environmental impact, in the areas of feed production, enteric methane, energy efficiency and manure management.

FOR PROCESSORS

Processor Working Group

Led by the Innovation Center, a working group of more than 40 participants representing over 20 processing organizations convenes regularly and engages in facility-focused workstreams for waste, water, packaging, and GHG emissions to drive action and demonstrate progress towards the goals.

Core Tracks

- GROUNDWORK
- DAIRY SCALE FOR GOOD (DSFG)
- COLLECTIVE IMPACT

Sub-Teams

- GHG
- PACKAGING
- WASTE
- WATER

Partners: INNOVATION CENTER FOR U.S. DAIRY, IDFA, DMi, NEWTRIENT, STARBUCKS, NMPF, FFAR, Nestle.


U.S. Dairy. *U.S. Dairy Net Zero Initiative.*
 Innovation Center for US Dairy.

Removing dairy from our diet is the sustainable solution


← **FACT** or **FICTION?** →

Removing dairy probably isn't the solution

Health, diet quality and cost are considerable pillars of sustainability



2020 Modeling Study¹
Removing dairy cows from the US food system ...
→ Little impact on GHG emissions
→ Significant impact on American nutrient supply




2020 NHANES Programming Study²
Replacing dairy nutrients with non-dairy foods ...
→ Can fill protein & shortfall nutrient gaps
→ Considerable increase in cost, energy intake, and food volume

1. Liebe D, Hall M, White R. *J Dairy Sci*. 2020;103(11):10867-10881.
2. Cilibri C, Auerstedt M, Fulgoni V. *Public Health Nutrition*. 2020;23(2).

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Meeting DGA dairy recommendations can have positive health and economic impacts

Conformance with DGA dairy recommendations (2.5-3 servings a day)



→


Billions \$ in annual cost savings due to reduction in:

- CVD
- T2D
- Stroke
- HTN
- Colorectal cancer

Strafford et al. *Nutrients*. 2020;12(1):233.
Strafford et al. *JAND*. 2018;119(4):599-616.

NDC

Environmental impact should be considered in the context of nutritional provision



FAO 2023 Global Assessment

- 500+ scientific papers, 250 policy documents
- Animal foods contribute crucial nutrients
- Particularly during pregnancy, lactation, childhood, adolescence and older age

Milk's nutritional contributions should be considered when evaluating tradeoffs^{2,3}

- Satisfies large % of global requirements for protein and micronutrients
- Particularly vitamin B12, riboflavin, calcium, phosphorous, and zinc

1. FAO, 2023.
2. White R, Gibson C. *J Dairy Sci*. 2023;106(5):3287-3300.
3. Lawrence et al. *Nutrients*. 2023;15(8):1825.


NDC

Takeaways

- Dairy foods are an affordable and accessible source of nutrition for many American families
- Dairy farmers are innovative and passionate stewards of the land and its resources
- Dairy foods play an important role in sustainable food systems, contributing essential nutrients, reducing the burden of chronic disease, and supporting local and global economies
- The dairy community remains committed to environmental progress through technological advances, research and initiatives

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Thank you!



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Dairy Nutrition and Bone Health



Protein: Plant? Animal? Health? Planet?



Dairy Innovations for Sustainable Future Webinar



The Ethics of Hunger: Nourishing Communities in Need



Taming The Flame—Dairy And Inflammation



The Dairy Matrix: More Than the Sum of Its Nutrients



Prenatal Nutrition: Dairy's Building Blocks for Baby's Brain Development


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Questions?

Please enter your questions into the Q&A window.

Continuing education certificates will be sent via email within 24 hours of this webinar.

The full webinar recording will be available next week on [USDairy.com](https://usdairy.com).

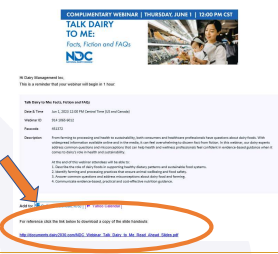


Backup Slides

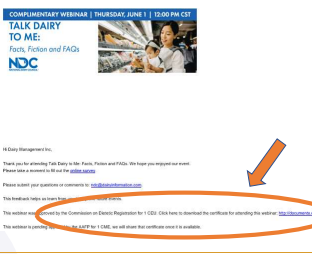


Access to Slides and Continuing Ed Certificates

Reminder email



Post webinar email (next 24 hours)



USDairy.com | @NDC | #DairyNewsAndLife

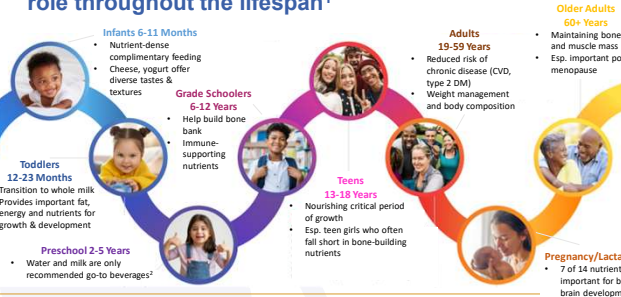
LI doesn't have to mean "no more dairy"

Education around lactose content can help people with LI enjoy dairy foods with confidence



Lactose content based on the Reference Amount Customarily Consumed (RACC) and data from FoodData Central (accessed October 2022). Ricotta is raw content based on FoodNet et al. 2020. Di. Couvreur et al. 2020 and Food Standards Australia New Zealand.

Beyond child nutrition, dairy foods have an important role throughout the lifespan¹



Infants 6-11 Months

- Nutrient-dense complementary feeding
- Cheese, yogurt offer diverse tastes & textures

Toddlers 12-23 Months

- Transition to whole milk
- Provides important fat, energy and nutrients for growth & development

Preschool 2-5 Years

- Water and milk are only recommended go-to beverages²

Grade Schoolers 6-12 Years

- Help build bone bank
- Immune-supporting nutrients

Teens 13-18 Years

- Nourishing critical period of growth
- Esp. teen girls who often fall short in bone-building nutrients

Adults 19-59 Years

- Reduced risk of chronic disease (CVD, type 2 DM)
- Weight management and body composition

Older Adults 60+ Years

- Maintaining bone and muscle mass
- Esp. important post-menopause

Pregnancy/Lactation

- 7 of 14 nutrients important for baby brain development³
- Post-partum weight management⁴

¹ USDA and USDHHS. Dietary Guidelines for Americans, 2020-2025, 9th Edition. ² Healthy Eating Research. Healthy Schooler Consumption Study (HES). ³ Schwensen et al. *Development*. 2018;145(2). ⁴ Nwanji et al. *Maternal & Child Nutrition*. 2022;17(1):140.

Dairy food is an OG nutrient-dense option

Humans have consumed dairy foods for thousands of years¹⁻⁵

- 5,700 BC: milk fat residue found on ceramic strainers for cheese making²
- 4,000 - 2,500 BC: evidence of dairy farming in Ireland for butter, cheese and yogurt³
- 3,000 - 3,800 BC: dairy-protein residue on tooth samples in Britain, Europe and northern SW Asia^{4,5}



Archaeologists have found evidence of milk consumption on dental samples

¹ US Dairy. *History of Humans Drinking Milk*. 2019. ² McChesney et al. *Food Microbiology*. 2013;35(2):112-21. ³ Smith & Eganhouse. *Journal of Archaeological Science*. 2015;52:1011-14. ⁴ Charbon et al. *Archaeological Anthropology*. 2010; 116:183-87. ⁵ Waples et al. *Scientific Reports*. 2016.