


Understanding the Power of Plant and Animal-Source Foods in Sustainable Healthy Diets

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1

Disclosures


Katie Brown, EdD, RDN

AFFILIATION/FINANCIAL INTERESTS	ENTITIES
Employee	National Dairy Council
Board of Advocates	School of Allied Health Professions, University of Kansas
Committee on Advocacy and Science Policy	American Society for Nutrition



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AFFILIATION/FINANCIAL INTERESTS	ENTITIES
Employee	International Food Information Council
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2

Learning Objectives

At the end of this session, attendees will be able to:

- Discuss key aspects of a sustainable food system and the complementary contributions that plant- and animal- source foods can play in achieving nutritionally adequate diets and reducing risk of non-communicable diseases within sustainable food production.
- Describe various food based dietary guidelines and the importance of providing choices to support personalized nutrition, cultural and personal preferences and traditions.
- Evaluate current challenges and best practices moving forward in communicating the complex and emerging science on the trade-offs and synergies of dietary patterns to achieve sustainable diets and to minimize unintended consequences for public health.

3

Suggested Performance Indicators

- 1.8.2 Demonstrates an awareness of the impact of sustainability on the health and well-being of individuals and populations.
- 1.8.5 Recommends sustainable diets and meal plans that are healthy, culturally relevant, accessible, economically fair and affordable, and respectful of their impact on land, water, air and energy use.
- 4.1.2 Interprets and integrates evidence-based research and literature in decision-making.
- 12.2.10 Examines the impact of global food supply and sustainability in order to identify target population needs and barriers.

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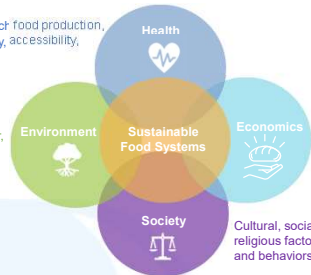
Personalized Nutrition Plays a Key Role in Food Based Dietary Guidelines




U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. December 2020. Available at [DietaryGuidelines.gov](https://www.dietaryguidelines.gov).

5

Food Systems are Complex and Multifaceted



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

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

Food pricing, food equity, profitability, wages

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

Dranovecki A. Ecosystem Inception Team. The Chicago Consensus on Sustainable Food Systems. Science. Front Nutr. 2018;4:74. Published 2018 Apr 25. doi: 10.3389/fnut.2017.00274

6

Evidence for Both Plant and Animal-Source Foods

7

Plant and Animal Foods Make a Perfect Pair in Healthy Sustainable Diets

- Animal-source foods tend to be higher in protein, branch chain amino acids, iodine, iron, zinc, vitamin B12 and choline.
- Plant-source foods tend to be higher in carbohydrates, fiber, vitamin A, vitamin C and other antioxidants.
- Bioactive compounds and the food matrix influence how we digest and absorb nutrients.
- Both plant and animal-source foods play roles in planetary health.

nutrients

Source: **The Complementary Roles for Plant-Source and Animal-Source Foods in Sustainable Healthy Diets**
Kevin B. Caserford^{1,2,3,4}, Gregory D. Miller⁵, Mandy Rainsworth Kopyak⁶ and Katie A. Brown⁷

Copyright ©3, Mike GD, Reinhardt Kopyak, W. Bowen KA. The Complementary Roles for Plant-Source and Animal-Source Foods in Sustainable Healthy Diets. Nutrients. 2021; 13(12):3463. <https://doi.org/10.3390/nu13123463>

8

Plant and Animal Foods are Better Together

Both plant and animal-source foods are recommended in DGA healthy eating patterns and other health-supporting diets.

Healthy U.S.-Style

Healthy Vegetarian

Mediterranean-Style

DASH

U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025, 9th Edition, 2020. Images: Microsoft PowerPoint (Shutterstock.com)

9



10

The 1,000-Day Window Between Conception & 24 Months Can Determine a Child's Future

- The brain grows more rapidly during this period than at any other time in their life
- Good nutrition supports cognitive growth, motor skills and socio-emotional development
- This developmental phase can impact future success in school and economic opportunities later in life

"How well or how poorly mothers and children are nourished and cared for during this time has a profound impact on a child's ability to grow, learn and thrive."

TheBrainDietary.org | 2019_1,000_Days

11

Dairy Foods Deliver 7 of 14 Brain-Building Nutrients

AAP's 14 Building Blocks for Early Brain Development

Macronutrients	Glucose	Protein*	LC-PUFAs*
Minerals	Iron*	Copper*	
Vitamins & Vitamin-like Nutrients	Zinc*	Selenium	Iodine*
	Choline*	Vitamin K	Folate*
	Vitamin B6	Vitamin B12	Vitamin A

Dairy-Specific Nutrients

* Demonstrate a critical or sensitive period during development
Schwarzberg SJ, Georgoff MK. AAP COMMITTEE ON NUTRITION. Pediatrics. 2018;141(2):e20173716. Georgoff MK, Swartzel KE. *See VJ. Dev Psychol*. 2015;51(1):14-23.

12

Iodine deficiency is the most preventable cause of intellectual disability in the world.

- The World Health Organization

Centers for Disease Control. Second Nutrition Report Dashboard. Iodine Levels in Young Women: Borderline on Insufficiency. 2012.

13

Dairy Delivers Iodine

Average Daily Value Contributions to Iodine

- Milk 60%
- Yogurt 45%
- Cheese 15%

FOOD	SERVING SIZE	MICROGRAMS PER SERVING	PERCENT DAILY VALUE DV*
Cook, baked	3 ounces	150	100%
Low-fat milk (1%)	1 cup	88	59%
Yogurt, Greek, plain, fat-free	6 ounces	87	58%
iodized table salt	1/2 tsp	76	51%
Fish sticks	3 sticks	58	39%
Cottage cheese (reduced fat)	1/2 cup	39	26%
Beats, cooked in iodized salt	1/2 cup	38	26%
Swiss cheese	3 slices**	36	24%
Crab, canned and cooked	3 ounces	32	21%
Egg, hardboiled	1 egg	26	17%
American cheese	3 slices**	18	12%
Cheddar cheese	3 slices**	15	10%
Shrimp, precooked	3 ounces	13	9%
Salmon, baked	3 ounces	14	9%
Soy beverage	1 cup	15	1%
Almond beverage	1 cup	<1	1%
Non-iodized sea salt	1/2 tsp	<1	1%


*The DV for iodine is 150 mcg for healthy adults and children over 4.
**Cracker sized slice of cheese.

USDA, FDA and ODS-NRI Database for the Inshore Content of Common Foods per serving. Release 2, January 2022.
National Dairy Council. The Importance of Iodine in Pregnancy. Brain Development. 2022.

14

Dairy Foods Benefit Brains, Bones & Bodies

- Eating dairy foods during pregnancy is linked with better calcium, vitamin D, potassium, B12, choline and iodine consumption.
- Dairy foods continue to provide essential nutrients to support a child's growth and development, including brain development and also musculoskeletal health for a strong start to a lifetime of health.



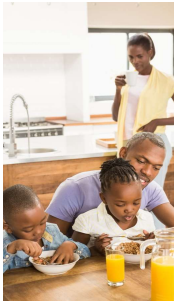
Higgins K et al. Adequacy of fetal iodine and micronutrient intake among pregnant women in the United States by level of dairy consumption. NUTRACE 2023-2019. Nutrition and Health. 2023. <https://www.nhs.uk/01649026/016829/016829/016829>

15

Bones Crave the Nutrients in Dairy Foods

Impact of Dairy Nutrients on Bone Strength


- Calcium** plays a structural role in bone.
- Vitamin D** is required for calcium absorption.
- Protein** provides the structural matrix of the bone.
- Phosphorus** promotes bone strength and the body's acid base balance.
- Potassium** promotes an alkaline environment helping to preserve calcium in bones.
- Zinc** stimulates collagen production, a key component for strong bones.



American Academy of Pediatrics. (2014). Guidelines: Bone Health in Children and Adolescents. https://pediatrics.aappublications.org/lookup/suppl/doi:10.1542/2014-0234/2014-0234/Suppl_1/100-106.
Wolcott TC, Bailey RL, Lupton JR, Lappe R, Orwoll ES, Wang D, Bailey D, Weaver CM. (2020). Dairy intake and bone health across the lifespan: a systematic review and expert opinion. Critical Reviews in Food Science and Nutrition. DOI: [10.1080/10407914.2020.1820000](https://doi.org/10.1080/10407914.2020.1820000).

16

Systems Supercharge



Dairy Foods Help Active Adults Thrive


17

Fermented Dairy & Gut Health

Fermented dairy foods like yogurt with live cultures, hard cheeses and kefir benefit gut health which is connected to our overall health - from mental to physical.

Fermented foods:

- Provide nutrition and unique bioactives like peptides and essential fatty acids
- Support digestion, absorption and metabolism which likely helps reduce inflammation



Bone WP, Lupton JR. Active adults, probiotics and the gut-brain axis - back to the future? Gut Pathog. 2013;3(3):1. PubMed 2011 Jan 31; doi:10.1186/1747-7426-3-1
Koca H, Koca H, Koca H, et al. Is there a 'gut-brain axis' link? Gut Gutman. 2015;10(2):141-146. doi:10.1111/1365-2095.12414
Garcia-Bonilla M, et al. New perspectives in fermented dairy products and their health relevance. Journal of Functional Foods. 2020; 72:104655.

18

Systematic Review Shows Fermented Dairy Foods Provide Favorable Health Benefits

Special Article
Yogurt, cultured fermented milk, and health: a systematic review
 Dennis A. Savolano and Robert W. Hutkins

Consumption of yogurt and other fermented products is associated with improved health outcomes. Although dairy consumption is included in most dietary guidelines, there have been few specific recommendations for yogurt and cultured dairy products. A qualitative systematic review was conducted to determine the effect of consumption of fermented milk products on gastrointestinal and cardiovascular health, cancer risk, weight management, diabetes and metabolic health, and bone health using PRISMA guidelines. English language papers in PubMed were densely mined. In total, 1027 abstracts were screened, of which 102 were included in the final review.

A direct, casual link exists between yogurt consumption and improved lactose digestion and tolerance.

Consistent, beneficial associations were observed between fermented dairy foods and type 2 diabetes, cardiovascular health, weight maintenance, bone and GI health, and certain cancers like breast and colon.

Frontiers and Public Health, Nutrition Reviews, 2021, 19(2), 559-614

19

Yogurt Linked to Blood Pressure Benefits

Journal of Hypertension

Long-term yogurt consumption and risk of incident hypertension in adults

Anders B. Sundler^{1,2}, Frank B. Hu¹, Howard C. Koh¹, M. Loring Reid^{1,3}, Paula A. Quaresima¹, Marika B. Enger¹, Gary C. Curhan¹, and Lars L. Moore^{1,4}

3 Cohort Studies (NHS I & II, HPFS)
 ~185,000 participants

Higher dairy consumption, especially in the form of yogurt (at least 5 servings/week), linked to better blood pressure.




Stroke, 2018, 49(1), 107-115

20

FDA Announces a Qualified Health Claim for Yogurt and Type 2 Diabetes

On March 1st, the U.S. Food and Drug Administration (FDA) announced the **first-ever qualified health claim for yogurt**. The claim identifies a potential link between yogurt consumption and a **reduced risk of type 2 diabetes**.



Type 2 diabetes affects the lives of more than 38 million American adults and accounts for 90% to 95% of all diagnosed cases of diabetes.

Yogurt is a nutrient-dense food, providing 9 essential nutrients. Yogurt has a unique food matrix which may play a role in its protective effects on cardiometabolic health, regardless of fat content.

1. FDA. (2023, March 1st). Qualified Health Claim for Yogurt and Reduced Risk of Type 2 Diabetes. March 2023.
 2. American Diabetes Association. Statistics About Diabetes. November 2022.
 3. CDC. Type 2 Diabetes. April 2023.
 4. National Center for Dairy Safety. 100 Versatile Dairy Recipes. National Dairy Council. Available Online at: <https://www.nationaldairy.org/100-versatile-dairy-recipes>. Accessed: March 10th, 2023. See 10/10/2023 10:57.

21

Getting to the Heart of the Matter with Dairy

Landmark PURE study finds dairy foods, including whole milk dairy foods, can be part of diets to benefit cardiometabolic health.


245,000 people from 80 countries across 5 continents

Diets with 2 daily servings of dairy foods linked to:

- Lower risk of heart disease and related events like heart attack and stroke
- Lower risk of all-cause mortality

The healthiest PURE diet score included:

- ✓ Fruits
- ✓ Vegetables
- ✓ Legumes
- ✓ Nuts
- ✓ Fish
- ✓ Dairy foods




Andrew Mente et al. Diet, cardiovascular disease, and mortality in 80 countries. European Heart Journal, Volume 44, Issue 28, 21 July 2023, Pages 2660-2678. <https://doi.org/10.1093/eurheartj/ehad259>

22

Staying Strong Sixty-plus

Landmark Study Suggests Dairy Foods Can Decrease Fracture and Fall Risk

↑ Increase of 1.5 servings per day of dairy foods among older adults led to...



33%

Reduction in risk of fractures of any type

46%

Reduction in risk of hip fractures


11%

Reduction in risk of falls

Waters, S., Prior, G., Robinson, J., et al. Effect of dietary intake of calcium and protein on hip fractures and falls in older adults in residential care: cluster randomized controlled trial. BMJ, 2021, 375, n2364.
 Centers for Disease Control and Prevention. Falls Among Falls. 2021.
<https://www.cdc.gov/falls/prevention/2021/02/2021-cdc-falls-prevention-older-adults/index.html>. Accessed: March 10th, 2023. See 10/10/2023 10:57.

23

Drinking Milk May Improve Brain Health



Milk intake enhances cerebral antioxidant (glutathione) concentration in older adults: A randomized controlled intervention study

By Young Chul Lim^{1,2}, Matthew A. Hillier^{1,3}, Paul Lee^{1,4,5}, Sohee Baek^{1,6}, Hyeonji Kim^{1,7}, Jihyeon Kim^{1,8}, Eunhye Kim^{1,9}, Jeehae Kim^{1,10}, Jeehae Kim^{1,11}, Jeehae Kim^{1,12}, Jeehae Kim^{1,13}, Jeehae Kim^{1,14}, Jeehae Kim^{1,15}, Jeehae Kim^{1,16}, Jeehae Kim^{1,17}, Jeehae Kim^{1,18}, Jeehae Kim^{1,19}, Jeehae Kim^{1,20}

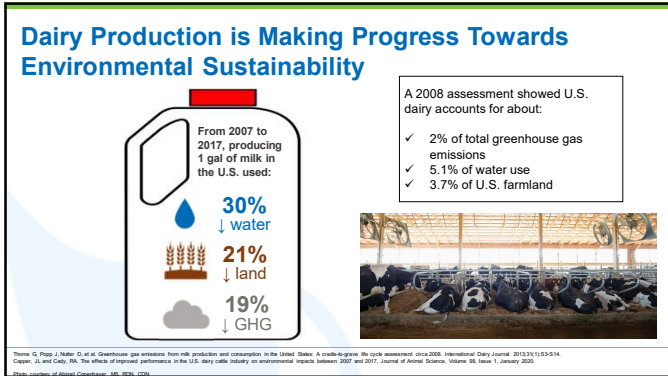
--Recent clinical trial shows drinking more milk may improve brain health in older adults.

--The results showed that older adults who drank three cups of milk a day increased their brain's level of the powerful antioxidant glutathione that helps protect the brain from damage.

--This is promising emerging evidence on the role milk can play in brain health for healthy aging.

Choi, Y., Taylor, M.K., Lee, P., et al. Milk intake enhances cerebral antioxidant (glutathione) concentration in older adults: A randomized controlled intervention study. Front Nutr, 2022;9:11659. Published 2022 Aug 15. <https://doi.org/10.3389/fnut.2022.911659>

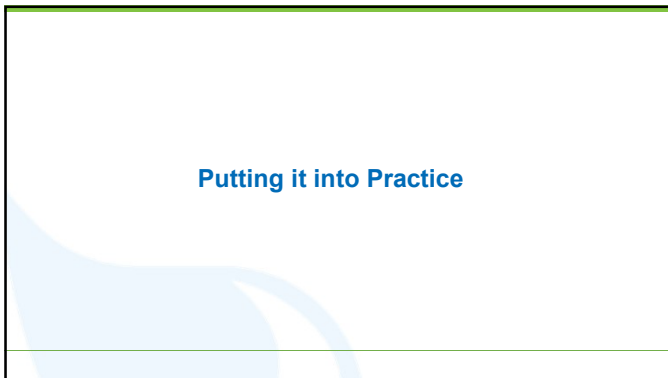
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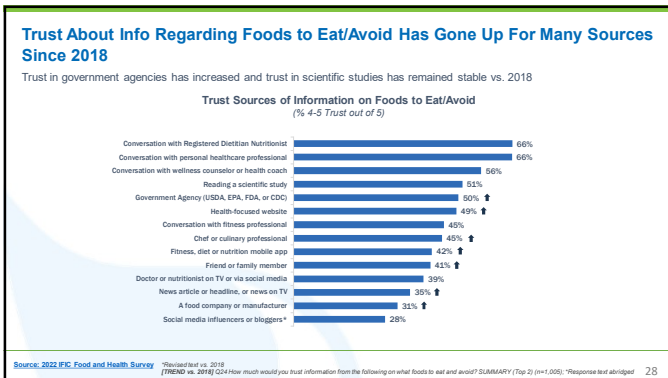
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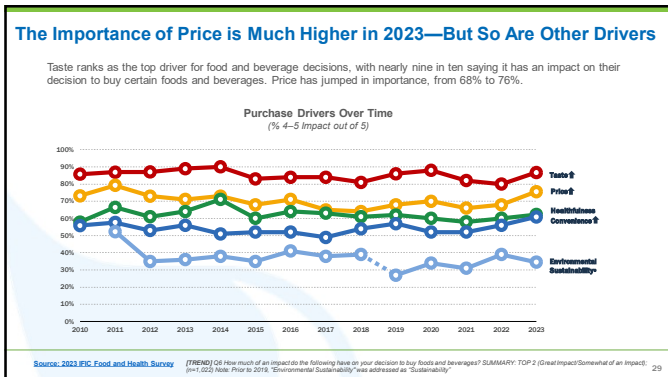
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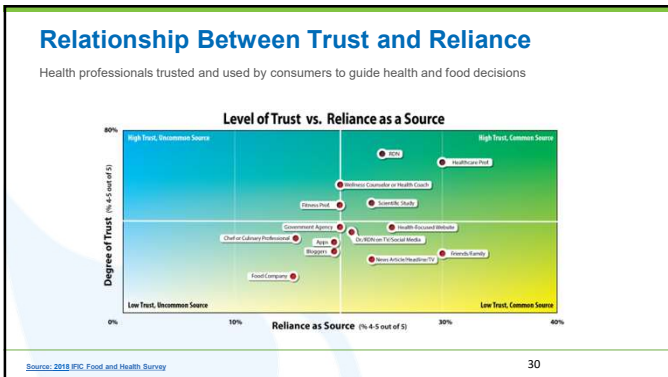
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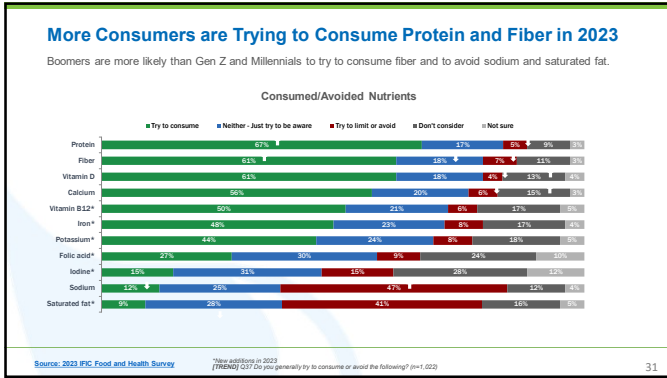
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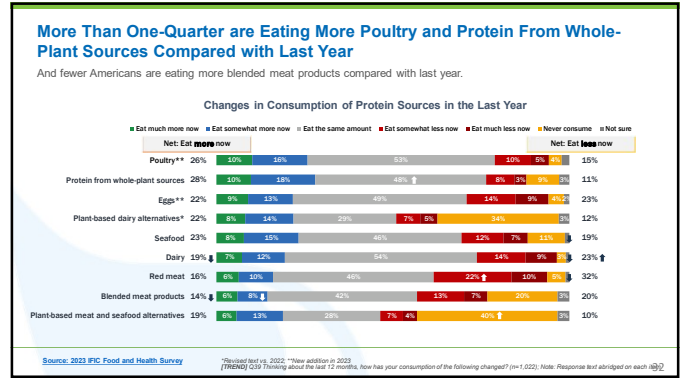
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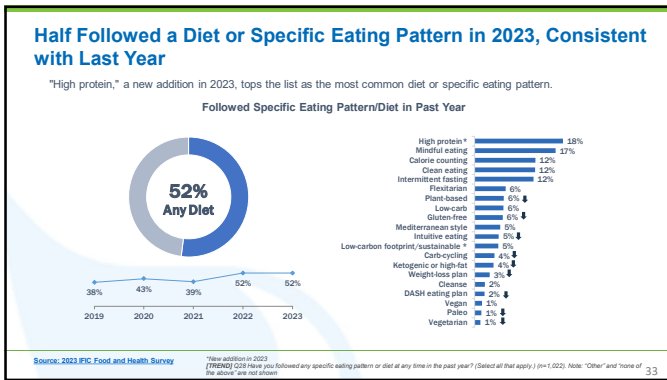
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31



32



33

Plant and Animal Foods Complement Each Other in Sustainable Food Systems

- ✓ No single food group can contribute adequate amounts or ideal ratios of the nutrients essential to human health, so pair plant and animal-source foods for a true power couple.
- ✓ Both plant and animal agricultural sectors are working toward improving production efficiencies and reducing their environmental impacts as the science of sustainability progresses.
- ✓ Personalization is key and dairy foods can enhance plant-packed plates.

Image: Microsoft PowerPoint

34

Practitioners Play a Vital Role in Personalizing Plant and Animal Food Recommendations

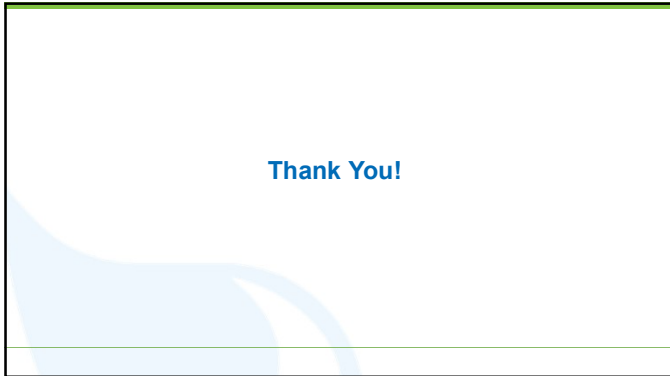
- 1 Use a Dietary Guidelines approach with the 3 recommended healthy eating patterns
- 2 Make it an "And" – Plant and Animal Foods
- 3 Personalize to meet cultural, taste, health and benefit needs

Images: U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 19th Edition, December 2020. Available at DietaryGuidelines.gov. Getty Images

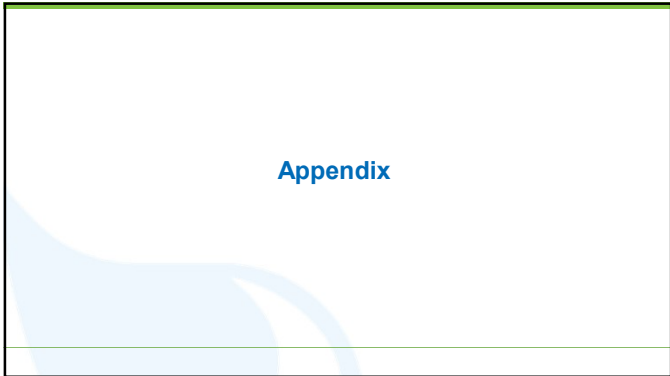
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Q&A

36



37



38

Nutritional Tradeoffs Must Be Considered When Examining Environmental Impact

THE LANCET Planetary Health | Estimated micronutrient shortfalls of the EAT–Lancet planetary health diet

npj | science of food | Unacceptable use of substandard metrics in policy decisions which mandate large reductions in animal source foods

Figure 1 Quantities of foods recommended by the EAT–Lancet Planetary Health Diet and the Adequate Diet for Adults. Comparison of the percentages of calories provided by various food groups in the EAT–Lancet planetary health reference diet (panel a), and in a diet which provides sufficient micronutrients, the adequate diet for adults (panel b).

Reid T, Okoro F, Fanzo J. Estimated micronutrient shortfalls of the EAT–Lancet planetary health diet. *Lancet Planetary Health*. 2023;3(6):703–713. doi: 10.1016/S2542-0196(23)00050-2. Epub 2023 Jul 7(7):e454. Berlin, AV. Unacceptable use of substandard metrics in policy decisions which mandate large reductions in animal-source foods. *npj Sci Food*. 10 (2024).

39

Dairy Plays a Unique Role in Supporting Global Sustainable Food Systems

Global contributions of milk to nutrient supplies and greenhouse gas emissions

Nutritional and greenhouse gas impacts of removing animals from US agriculture

What's the Trade-off?

- Replacing milk production with fruits & vegetables or nuts & legume
- Minimal reduction in GHGE
- Drastically reduces the supply of calcium, vitamin D, B12, B2 and alpha-linolenic acid

Milk provides over 10% of the vitamin B12, vitamin A, riboflavin, and calcium available for human consumption globally.

White RR, Gleason CB. Global contributions of milk to nutrient supplies and greenhouse gas emissions. *J Dairy Sci*. 2023;106(5):3287–3300. White RR, Hall MB. Nutritional and Greenhouse Gas Impacts of Removing Animals from US Agriculture. *Proc Natl Acad Sci U S A*. 2017;114(46):E10301–E10306.

40

Dairy Foods Provide a Powerful Nutrient Package

Milk's Unique Nutrient Package

- Calcium
- Iodine
- Phosphorus
- Potassium*
- Protein
- Selenium
- Vitamin A
- Vitamin D
- Vitamin B3
- Vitamin B2
- Vitamin B12
- Vitamin B5
- Zinc

87% WATER | **13% SOLIDS**

36% WATER | **64% SOLIDS**

*YDA's Daily Value (DV) for potassium of 4700 mg is based on a 2000 DRI recommendation, or 50% (NCE) updated to DRI in 2005 mg. Based on the 2010 DRI, a serving of milk provides 10% of the DRI. FDA labeling is <https://www.fda.gov/food/label-claims-requirements>

Milk - Food Data Central. 1277. Check Today! Food Data Central. 17126. Cheddar Cheese - Food Data Central. 17889.

41