

# DAIRY NOURISHES LIFE

Helping people thrive at every age

WEBINAR SERIES

Reminders for today's webinar:

- Please test your computer by using the link provided in the chat window to ensure that you can hear the speakers via streaming audio
- We recommend downloading and/or updating to the latest version of **Google Chrome** or **Firefox** to minimize the chance of system issues during the live webinar
- Continuing education certificates and handouts will be emailed within 24 hours

#DairyNourishesLife

1




# NDC NATIONAL DAIRY COUNCIL

Bringing to life the dairy community's shared vision of a healthy, happy, sustainable world, with science as our foundation

USDairy.com @NIDairyCouncil #DairyNourishesLife

4



# NDC NATIONAL DAIRY COUNCIL

## Protein: Plant? Animal? Health? Planet?

Suggested Learning Needs Codes:

- 2070: Macronutrients: carbohydrate, fat, protein, fiber water
- 8018: Environmental, agricultural & technologic influences on food systems
- 8030: Culinary skills & techniques
- 8090: Menu planning and development, nutrient analysis

2



## DID YOU KNOW?

PRODUCING A GALLON OF MILK IS GETTING GREENER

America's dairy farmers are committed to feeding people while taking care of the planet.

- 19% less GHG emissions
- 21% less land used (LEP)
- 30% less water used

From 2007-2017

Source: USDA, NDC, and Dairy Farmers of America. Data based on 2007 and 2017 National Dairy Survey. For more information, visit [www.usdairy.com](http://www.usdairy.com).

5

### Webinar Reminders

**During the webinar**

- Preferred browsers for optimal viewing and audio: Google Chrome or Firefox
- Please type questions into the chat window
- Follow along with #DairyNourishesLife

**After the webinar**

- Continuing education certificates and handouts will be emailed within 24 hours
- Webinar recording will be available next week on [www.USDairy.com](http://www.USDairy.com)

USDairy.com @NIDairyCouncil #DairyNourishesLife

3

## U.S. Dairy is an environmental solution

Set environmental stewardship goals for air, land and water

- Become **carbon neutral or better**
- Optimize **water** use while maximizing recycling
- Improve **water** quality by optimizing utilization of manure and nutrients



USDairy.com @NIDairyCouncil #DairyNourishesLife

6

**FROM THE ACADEMY**

### Cultivating Sustainable, Resilient, and Healthy Food and Water Systems: A Nutrition-Focused Framework for Action

US Dairy Council | #NDairyCouncil | #DairyNourishesLife

Spiller ML, JAND, June 2020 Volume 120 Number 6. **NDC**

**ENTRY POINTS** that leverage the strengths of complementary disciplines (RDNs and nutrition educators, NCTEs) to cultivate sustainable food and water systems:

1. Shape and deliver dietary guidance
2. Improve food and nutrition security and water security
3. Align food production and nutrition
4. Optimize supply chains and food environments

**Education & Training**

- Developing knowledge and skills to cultivate food and water systems
- Bring food system knowledge to the many who work in the industry
- Clearly integrate and translate findings from research to the industry
- Develop food system policy solutions to human health and water security

**Research**

- Address fundamental research needs, RDNs and NCTEs can
- Develop the science of food systems, addressing and linking to current water and food security issues
- Research needs on the emerging food and water security issues
- Research and medical research to track and monitor progress

**Practice**

- RDNs and NCTEs can address the nutrition, environmental and public policy, including
- Communication and marketing solutions related to food and water systems
- Develop evidence-based and evidence-informed educational and training
- Research practice and evidence within organizational goals or legislative requirements
- Develop that allow the daily activities of practitioners of settings, including teaching of programs

**Policy**

- RDNs and NCTEs can address the nutrition, environmental and public policy, including
- Communication and marketing solutions related to food and water systems
- Develop evidence-based and evidence-informed educational and training
- Research practice and evidence within organizational goals or legislative requirements
- Develop that allow the daily activities of practitioners of settings, including teaching of programs

7

# Protein: Plant? Animal? Health? Planet?

Donald K. Layman, Ph.D.  
Professor Emeritus  
Department of Food Science & Human Nutrition  
University of Illinois at Urbana-Champaign

Email: [dlayman@illinois.edu](mailto:dlayman@illinois.edu)  
Twitter: @donlayman

10

**GENYOUth INSIGHTS | SPRING 2020**

## Youth and the Future of Food

What youth know, care about, and do might make or break the future for healthy, sustainable food and food systems.

**HOW FAMILIAR AND INTERESTED ARE YOU IN THE IDEA OF SUSTAINABLE FOODS?**  
("Food that's good for me and good for the planet")

56% of youth are familiar and interested in the idea of sustainable foods.

- 15% I already know about it and it influences my food and beverage choices
- 31% I heard about it and want to know more
- 25% I never thought of it before, but want to know more
- 15% I heard about it, but I don't really want to know more
- 17% I never thought of it before, and I don't really want to know more

**US Dairy Council | #NDairyCouncil | #DairyNourishesLife**

<https://www.genyouthnow.org/reports/genyouth-insights-spring-2020-youth-and-future-of-food>

**NDC**

8

## Disclosures

- National Dairy Council, Speaker Honoraria
- National Cattleman's Beef Assoc. (NCBA), Speaker Honoraria
- Agropur Foods, Consulting
- NCBA, Consulting
- Herbalife, Scientific Advisory Board

11

## Today's Speakers

**Sally Cummins, MS, RDN, LDN**  
Vice President,  
Sustainable Nutrition Affairs  
National Dairy Council

[sally.cummins@dairy.org](mailto:sally.cummins@dairy.org)  
@SallyCumminsRD

**Don Layman, PhD**  
Professor Emeritus,  
Dept. of Food Science &  
Human Nutrition,  
University of Illinois  
at Urbana-Champaign

[dlayman@illinois.edu](mailto:dlayman@illinois.edu)  
@donlayman

**Toby Amidor, MS, RD, CDN, FAND**  
Founder of Toby Amidor Nutrition  
Wall Street Journal best-selling author

[Toby@namsko.com](mailto:Toby@namsko.com)  
@tobiamidor

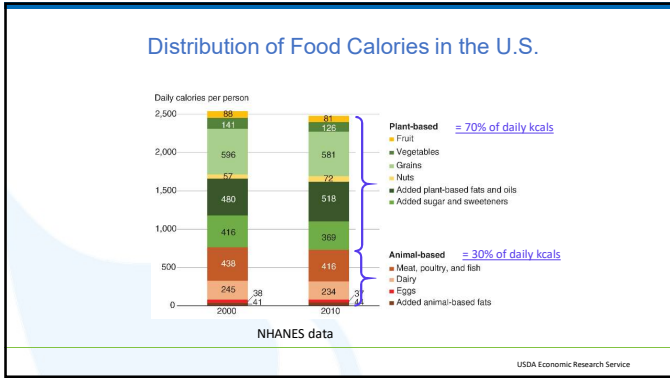
**US Dairy Council | #NDairyCouncil | #DairyNourishesLife**

**NDC**

9

## Dietary Guidelines have emphasized a plant-based diet since the 1970s

12

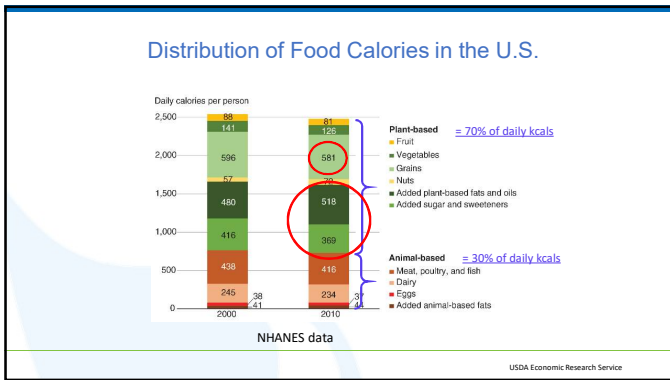


13

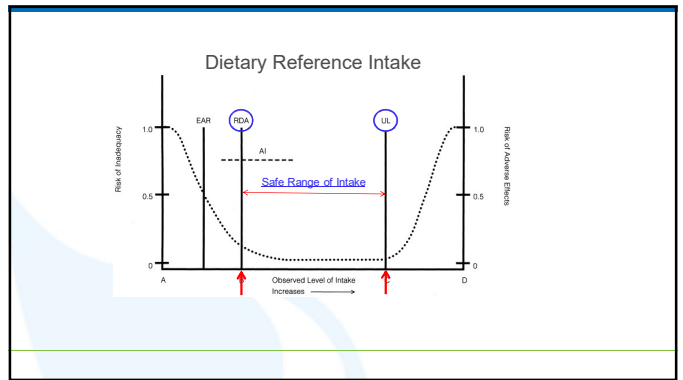
## Putting Protein into Perspective

Quantity, Quality and Bioavailability

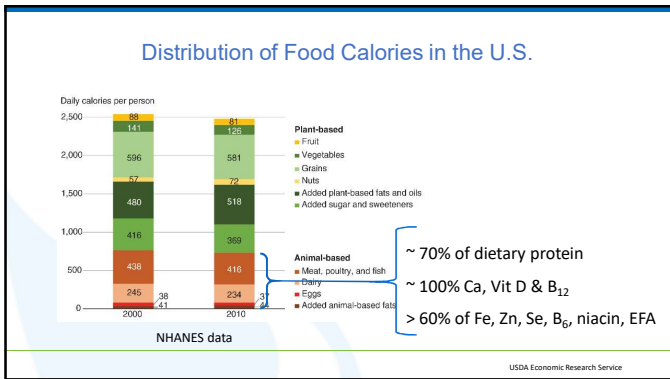
16



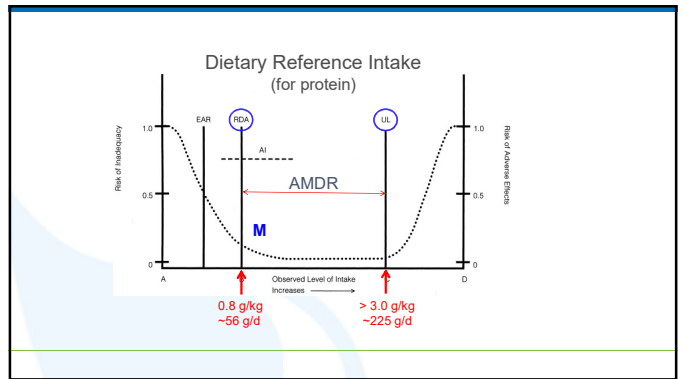
14



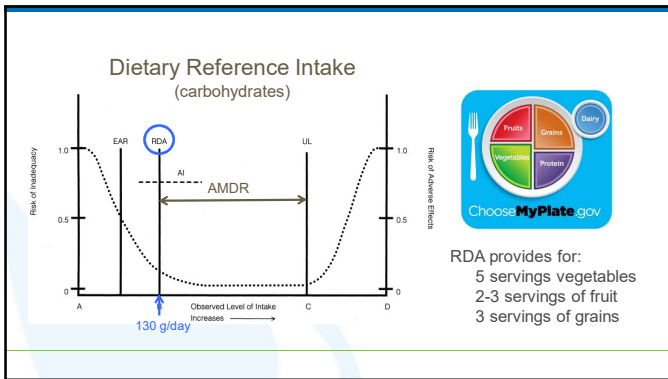
17



15



18



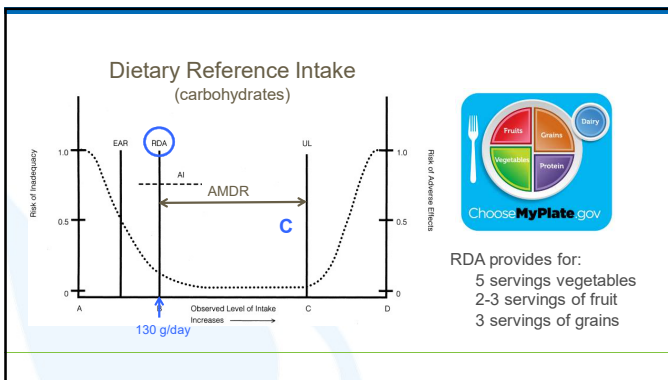
19

What's new in protein research:  
 ✓ aging reduces efficiency of protein use

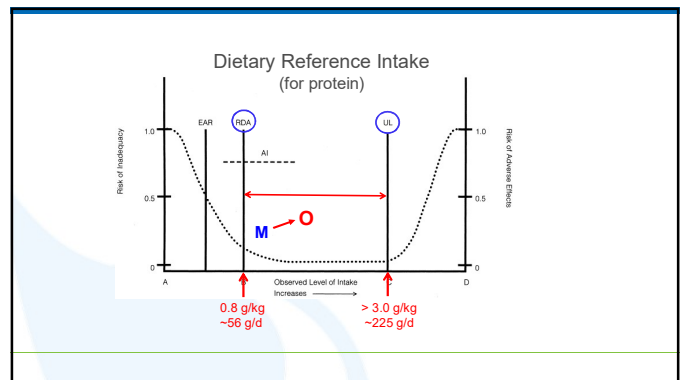
**"Anabolic Resistance"**

Muscle-centric Protein Needs

22



20



23

What's new in protein research:  
 ✓ aging reduces efficiency of protein use

**"Anabolic Resistance"**

21

**JAMDA**  
 Journal homepage: www.jamda.com

Special Article  
**Evidence-based Recommendations for Optimal Dietary Protein Intake in Older People: A Position Paper From the PROT-AGE Study Group**

Jürgen Bauer MD<sup>1,2</sup>, Gianni Biolo MD, PhD<sup>3</sup>, Tommy Cederholm MD, PhD<sup>4</sup>, Matteo Cesari MD, PhD<sup>5</sup>, Alfonso J. Cruz-Jentoft MD<sup>6</sup>, John E. Morley MB, BCh<sup>7</sup>, Stuart Phillips PhD<sup>8</sup>, Cornel Sieber MD, PhD<sup>9</sup>, Peter Siethe MD, PhD<sup>10</sup>, Daniel Teta MD, PhD<sup>11</sup>, Renuka Viswanathan MBS, PhD<sup>12</sup>, Elena Volpi MD, PhD<sup>13</sup>, Yves Boirie MD, PhD<sup>14</sup>

**Recommendations:**

- 30 g of protein per meal
- 1.0 - 1.7 g protein/kg/day

**ABSTRACT**

New evidence shows that older adults need more dietary protein than do younger adults to support good health, promote recovery from illness, and maintain functionality. Older people need to make up for age-related changes in protein metabolism, such as high substrate oxidation and declining anabolic responses to ingested protein. They also need more protein to offset inflammatory and catabolic conditions associated with chronic and acute disease that occur commonly with aging. With the goal of developing updated, evidence-based recommendations for optimal protein intake by older people, the European Society Geriatric Medicine Society (ESGM), in cooperation with other scientific organizations, appointed an international study group to review dietary protein needs with aging (PROT-AGE Study Group). In this older people (≥ 65 years) research and review have body mass and function, the PROT-AGE study group recommends average daily intake of at least in the range of 1.0 to 1.7 g protein per kilogram of body weight per day. Such maintenance and improvement of muscle mass and

JAMDA 14:542, 2013

24

### 2015 Dietary Guideline Advisory Committee Report

Table D1.33. Nutrients in the three USDA Food Patterns (Healthy US-Style, Healthy Vegetarian, and Healthy Mediterranean-style) at the 2000 calorie level as a percent of the goal or limit for a 19 to 30 year old woman.

Nutrient	Healthy US-style Pattern % goal/limit	Healthy Vegetarian Pattern % goal/limit	Healthy Med-style Pattern % goal/limit
Protein-%RDA	198	155	194
Protein-%calorie	18	14	18
Fat-%calorie	33	34	32
Saturated fat-%calorie	8	8	8
CHO-%RDA	197	211	199
CHO-%calorie	51	55	52

Healthy Food Patterns have protein intake = 1.2 to 1.6 g/kg

25

### Protein provides Amino Acids

**Non-essential amino acids**

- Arg
- Ala
- Asn
- Asp
- Cys
- Glu
- Gln
- Gly
- Pro
- Tyr

**Essential Amino Acids**

- Lysine
- Methionine
- Trp
- Leu
- Thr
- Phe
- His
- Val
- Ile

} Limiting AA's

28

### Plant-based Diets Reduce Protein & Increase Carbohydrates

Table 3. Macronutrient profile of diet scenarios

Scenario name	Scenario symbol	Total energy (kcal day <sup>-1</sup> )	Protein (g day <sup>-1</sup> )	Fat (g day <sup>-1</sup> )	Carbohydrate (g day <sup>-1</sup> )
Positive control	POS	2,153	91.9	80.9	272.6
100% healthy omnivorous	OMNI 100	2,153	88.7	73.0	296.8
80% healthy omnivorous	OMNI 80	2,153	86.5	72.5	301.4
60% healthy omnivorous	OMNI 60	2,153	84.2	72.0	306.1
40% healthy omnivorous	OMNI 40	2,153	82.0	71.5	310.8
20% healthy omnivorous	OMNI 20	2,153	78.9	71.0	315.4
Ovovacto-vegetarian	OVO	2,153	77.5	70.5	320.1
Lacto-vegetarian	LAC	2,154	75.7	69.7	325.6
Vegan	VEG	2,154	74.0	65.8	336.2

doi:10.12952/journal.elementa.000116.e003

Peters et al, *Elementa*, 2016. doi:10.12952/journal.elementa.000116

26

**Lysine**  
Limiting in grains

**Methionine**  
Limiting in beans, legumes, nuts and lentils

Griffioen et al. *Amino Acids* doi: 10.1007/s00726-018-2640-5

29

## Putting Protein into Perspective

Quantity, Quality and Bioavailability

27

**TABLE 4** Untruncated digestible indispensable amino acid reference ratios calculated using true ileal amino acid digestibility values and lowest untruncated PDCAAS calculated using true fecal nitrogen digestibility values determined in growing male rats for the 14 protein sources<sup>1</sup>

	Amino acid reference ratio													
	MPC	WPI	WPC	SPI B	SPI A	PPC	Cooked peas	Cooked kidney beans	Cooked rice	Cooked rolled oats	Wheat bran	Roasted peanuts	RPC	Corn-based breakfast cereal
Thr	1.56	1.80	2.53	1.13	1.30	1.28	1.12	0.936	0.757	0.894	0.595	0.574	1.01	0.652
Met + Cys	1.18	2.29	1.71	0.906	0.898	0.822	0.579	0.588	1.04	1.95	0.888	0.833	1.22	0.975
Val	1.95	1.21	1.29	1.02	1.11	1.24	0.870	0.791	0.927	0.872	0.542	0.560	1.12	0.707
Ile	1.81	2.22	2.35	1.38	1.59	1.63	1.25	1.20	1.10	1.13	0.689	0.788	1.16	0.881
Leu	1.77	2.57	1.80	1.13	1.29	1.37	1.04	1.01	0.989	1.10	0.664	0.766	1.11	2.05
Tyr + Phe	2.29	1.71	1.43	1.85	1.85	1.89	1.38	1.43	1.53	1.68	0.927	1.31	1.83	1.75
His	1.60	1.09	0.973	1.18	1.37	1.34	1.01	1.25	1.08	1.11	1.04	1.07	1.03	1.07
Trp	1.94	3.35	2.74	1.69	1.67	1.12	1.47	1.50	1.85	1.75	1.74	1.28	1.38	0.228
Lys <sup>2</sup>	1.77	2.51	2.03	0.987	1.16	1.50	0.992	1.07	0.585	0.542	0.411	0.434	0.371	0.012
Lowest digestible indispensable amino acid reference ratio, DIAAS	1.18	1.09	0.973	0.906	0.898	0.822	0.579	0.588	0.585	0.542	0.411	0.434	0.371	0.012
Lowest protein digestibility-corrected amino acid reference ratio <sup>3</sup> , PDCAAS	1.25	1.12	0.989	0.974	0.943	0.860	0.575	0.624	0.562	0.611	0.479	0.464	0.382	0.071

<sup>1</sup> The digestible indispensable amino acid reference ratio was calculated using the amino acid requirement pattern for the 0.5-5-year-old child (grams per kilogram protein) (12). DIAAS, digestible indispensable amino acid score; MPC, milk protein concentrate; PDCAAS, protein digestibility-corrected amino acid score; PPC, pea protein concentrate; RPC, rice protein concentrate; SPI A, soy protein isolate A (Supro XF, Solae); SPI B, soy protein isolate B (Supro 670, Solae); WPC, whey protein concentrate; WPI, whey protein isolate.

<sup>2</sup> Based on reactive Lys content and Lys availability determined by using the guanidination method (16).

<sup>3</sup> The lowest PDCAAS ratio was calculated using the amino acid requirement pattern for the 0.5-3-year-old child (grams per kilogram protein) (12). For nonsoy sources for which Lys was the limiting amino acid, the ratio was based on total Lys content determined by using conventional amino acid analysis.

Rutherford et al. *J Nutr* 2015;145:372

30

**TABLE 4** Untruncated digestible indispensable amino acid reference ratios calculated using true ileal amino acid digestibility values and lowest untruncated PDCAAS calculated using true fecal nitrogen digestibility values determined in growing male rats for the 14 protein sources<sup>1</sup>

	Amino acid reference ratio						Corn-based breakfast cereal							
	MPC	WPI	WPC	SPI B	SPI A	PPC	Cooked peas	Cooked kidney beans	Cooked rice	Cooked rolled oats	Wheat bran	Roasted peanuts	RPC	
Thr	1.56	1.80	2.53	1.13	1.30	1.28	1.12	0.936	0.757	0.884	0.595	0.574	1.01	0.652
Met + Cys	1.18	2.29	1.71	0.906	0.898	0.822	0.579	0.588	1.04	1.95	0.888	0.833	1.22	0.975
Val	1.55	1.21	1.29	1.02	1.11	1.24	0.870	0.791	0.927	0.872	0.542	0.560	1.12	0.707
Ile	1.81	2.22	2.35	1.38	1.59	1.63	1.25	1.20	1.10	1.13	0.689	0.788	1.16	0.881
Leu	1.77	2.57	1.83	1.13	1.29	1.37	1.04	1.01	0.989	1.10	0.664	0.766	1.11	2.05
Tyr + Phe	2.39	1.71	1.43	1.65	1.85	1.99	1.38	1.43	1.63	1.66	0.927	1.31	1.83	1.75
His	1.60	1.09	0.973	1.18	1.37	1.34	1.01	1.25	1.09	1.11	1.04	1.07	1.63	1.07
Trp	1.94	3.35	2.74	1.89	1.67	1.12	1.47	1.50	1.85	1.75	1.74	1.28	1.38	0.228
Lys <sup>2</sup>	1.77	2.51	2.03	0.987	1.16	1.50	0.992	1.07	0.595	0.542	0.411	0.434	0.371	0.012
Lowest digestible indispensable amino acid reference ratio, DIAAS	1.18	1.09	0.973	0.906	0.898	0.822	0.579	0.588	0.595	0.542	0.411	0.434	0.371	0.012
Lowest protein digestibility-corrected amino acid reference ratio, <sup>3</sup> PDCAAS	1.25	1.12	0.990	0.974	0.943	0.869	0.575	0.624	0.562	0.611	0.479	0.464	0.382	0.071

<sup>1</sup> The digestible indispensable amino acid reference ratio was calculated using the amino acid requirement pattern for the 0.5-3-y-old child (grams per kilogram protein) (12). DIAAS, digestible indispensable amino acid score; MPC, milk protein concentrate; PDCAAS, protein digestibility-corrected amino acid score; PPC, pea protein concentrate; RPC, rice protein concentrate; SPI A, soy protein isolate A (Supro XF; Solae); SPI B, soy protein isolate B (Supro 670; Solae); WPC, whey protein concentrate; WPI, whey protein isolate.

<sup>2</sup> Based on reactive Lys content and Lys availability determined by using the guanidination method (16).

<sup>3</sup> The lowest PDCAAS ratio was calculated using the amino acid requirement pattern for the 0.5-3-y-old child (grams per kilogram protein) (12). For protein sources for which Lys was the limiting amino acid, the ratio was based on total Lys content determined by using conventional amino acid analysis. Rutherfurd et al. J Nutr 2015;145:372

31

**Lysine (Lys) contents of food proteins and calories required to meet daily amino acid need (3.4 g/day)**

	Lys content (% w/w)	Protein required (g/day)	g protein / 100 kcal	Kcals consumed
beef	9.0	38	16.7	228
milk	8.4	40	9.6	416
soy	5.1	69	7.5	920
maize	4.0	88	2.5	3,500
wheat	2.6	131	3.5	3,700

FAO/WHO amino acid score for lysine is 45 mg/g protein = 4.5%  
- translates into RDA for Lys of only 2.1 g/day

34

**TABLE 4** Untruncated digestible indispensable amino acid reference ratios calculated using true ileal amino acid digestibility values and lowest untruncated PDCAAS calculated using true fecal nitrogen digestibility values determined in growing male rats for the 14 protein sources<sup>1</sup>

	Amino acid reference ratio						Corn-based breakfast cereal							
	MPC	WPI	WPC	SPI B	SPI A	PPC	Cooked peas	Cooked kidney beans	Cooked rice	Cooked rolled oats	Wheat bran	Roasted peanuts	RPC	
Thr	1.56	1.80	2.53	1.13	1.30	1.28	1.12	0.936	0.757	0.884	0.595	0.574	1.01	0.652
Met + Cys	1.18	2.29	1.71	0.906	0.898	0.822	0.579	0.588	1.04	1.95	0.888	0.833	1.22	0.975
Val	1.55	1.21	1.29	1.02	1.11	1.24	0.870	0.791	0.927	0.872	0.542	0.560	1.12	0.707
Ile	1.81	2.22	2.35	1.38	1.59	1.63	1.25	1.20	1.10	1.13	0.689	0.788	1.16	0.881
Leu	1.77	2.57	1.83	1.13	1.29	1.37	1.04	1.01	0.989	1.10	0.664	0.766	1.11	2.05
Tyr + Phe	2.39	1.71	1.43	1.65	1.85	1.99	1.38	1.43	1.63	1.66	0.927	1.31	1.83	1.75
His	1.60	1.09	0.973	1.18	1.37	1.34	1.01	1.25	1.09	1.11	1.04	1.07	1.63	1.07
Trp	1.94	3.35	2.74	1.89	1.67	1.12	1.47	1.50	1.85	1.75	1.74	1.28	1.38	0.228
Lys <sup>2</sup>	1.77	2.51	2.03	0.987	1.16	1.50	0.992	1.07	0.595	0.542	0.411	0.434	0.371	0.012
Lowest digestible indispensable amino acid reference ratio, DIAAS	1.18	1.09	0.973	0.906	0.898	0.822	0.579	0.588	0.595	0.542	0.411	0.434	0.371	0.012
Lowest protein digestibility-corrected amino acid reference ratio, <sup>3</sup> PDCAAS	1.25	1.12	0.990	0.974	0.943	0.869	0.575	0.624	0.562	0.611	0.479	0.464	0.382	0.071

<sup>1</sup> The digestible indispensable amino acid reference ratio was calculated using the amino acid requirement pattern for the 0.5-3-y-old child (grams per kilogram protein) (12). DIAAS, digestible indispensable amino acid score; MPC, milk protein concentrate; PDCAAS, protein digestibility-corrected amino acid score; PPC, pea protein concentrate; RPC, rice protein concentrate; SPI A, soy protein isolate A (Supro XF; Solae); SPI B, soy protein isolate B (Supro 670; Solae); WPC, whey protein concentrate; WPI, whey protein isolate.

<sup>2</sup> Based on reactive Lys content and Lys availability determined by using the guanidination method (16).

<sup>3</sup> The lowest PDCAAS ratio was calculated using the amino acid requirement pattern for the 0.5-3-y-old child (grams per kilogram protein) (12). For protein sources for which Lys was the limiting amino acid, the ratio was based on total Lys content determined by using conventional amino acid analysis. Rutherfurd et al. J Nutr 2015;145:372

32

**Blending Proteins for Complementary Amino Acids**

Protein	Protein supplement needed
Blend of wheat gluten +	g
Beef	1.0
Cow's milk	1.6
Egg	2.6
Soy	6.2

Amount of protein needed to upgrade 1 g of wheat protein to obtain the preschool-age child's lysine requirement level of 58 mg/g mixed crude protein

J Nutr 130: 1865S, 2000

35

**TABLE 4** Untruncated digestible indispensable amino acid reference ratios calculated using true ileal amino acid digestibility values and lowest untruncated PDCAAS calculated using true fecal nitrogen digestibility values determined in growing male rats for the 14 protein sources<sup>1</sup>

	Amino acid reference ratio						Corn-based breakfast cereal							
	MPC	WPI	WPC	SPI B	SPI A	PPC	Cooked peas	Cooked kidney beans	Cooked rice	Cooked rolled oats	Wheat bran	Roasted peanuts	RPC	
Thr	1.56	1.80	2.53	1.13	1.30	1.28	1.12	0.936	0.757	0.884	0.595	0.574	1.01	0.652
Met + Cys	1.18	2.29	1.71	0.906	0.898	0.822	0.579	0.588	1.04	1.95	0.888	0.833	1.22	0.975
Val	1.55	1.21	1.29	1.02	1.11	1.24	0.870	0.791	0.927	0.872	0.542	0.560	1.12	0.707
Ile	1.81	2.22	2.35	1.38	1.59	1.63	1.25	1.20	1.10	1.13	0.689	0.788	1.16	0.881
Leu	1.77	2.57	1.83	1.13	1.29	1.37	1.04	1.01	0.989	1.10	0.664	0.766	1.11	2.05
Tyr + Phe	2.39	1.71	1.43	1.65	1.85	1.99	1.38	1.43	1.63	1.66	0.927	1.31	1.83	1.75
His	1.60	1.09	0.973	1.18	1.37	1.34	1.01	1.25	1.09	1.11	1.04	1.07	1.63	1.07
Trp	1.94	3.35	2.74	1.89	1.67	1.12	1.47	1.50	1.85	1.75	1.74	1.28	1.38	0.228
Lys <sup>2</sup>	1.77	2.51	2.03	0.987	1.16	1.50	0.992	1.07	0.595	0.542	0.411	0.434	0.371	0.012
Lowest digestible indispensable amino acid reference ratio, DIAAS	1.18	1.09	0.973	0.906	0.898	0.822	0.579	0.588	0.595	0.542	0.411	0.434	0.371	0.012
Lowest protein digestibility-corrected amino acid reference ratio, <sup>3</sup> PDCAAS	1.25	1.12	0.990	0.974	0.943	0.869	0.575	0.624	0.562	0.611	0.479	0.464	0.382	0.071

<sup>1</sup> The digestible indispensable amino acid reference ratio was calculated using the amino acid requirement pattern for the 0.5-3-y-old child (grams per kilogram protein) (12). DIAAS, digestible indispensable amino acid score; MPC, milk protein concentrate; PDCAAS, protein digestibility-corrected amino acid score; PPC, pea protein concentrate; RPC, rice protein concentrate; SPI A, soy protein isolate A (Supro XF; Solae); SPI B, soy protein isolate B (Supro 670; Solae); WPC, whey protein concentrate; WPI, whey protein isolate.

<sup>2</sup> Based on reactive Lys content and Lys availability determined by using the guanidination method (16).

<sup>3</sup> The lowest PDCAAS ratio was calculated using the amino acid requirement pattern for the 0.5-3-y-old child (grams per kilogram protein) (12). For protein sources for which Lys was the limiting amino acid, the ratio was based on total Lys content determined by using conventional amino acid analysis. Rutherfurd et al. J Nutr 2015;145:372

33

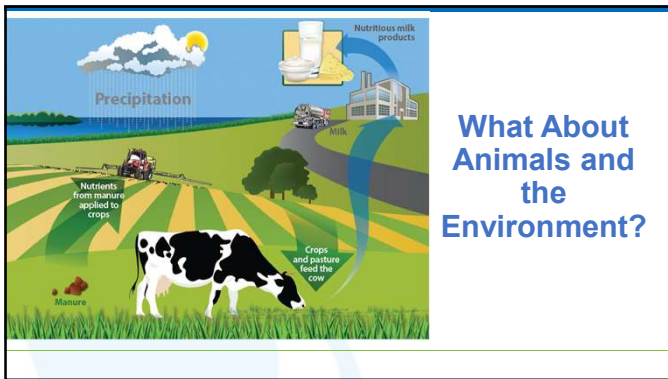
**Blending Proteins for Complementary Amino Acids**

Protein	Protein supplement needed
Blend of wheat gluten +	g
Beef	1.0
Cow's milk	1.6
Egg	2.6
Soy	6.2

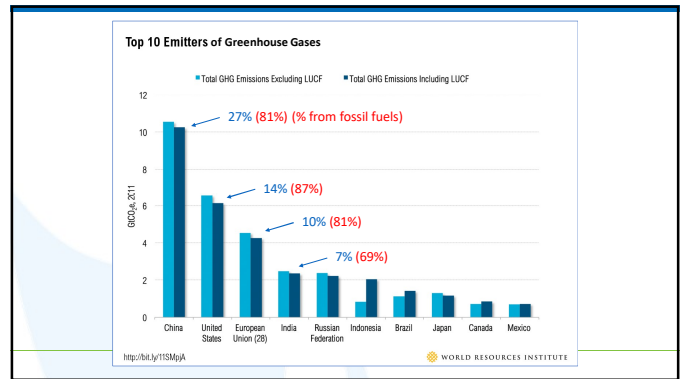
Amount of protein needed to upgrade 1 g of wheat protein to obtain the preschool-age child's lysine requirement level of 58 mg/g mixed crude protein

J Nutr 130: 1865S, 2000

36



37



40

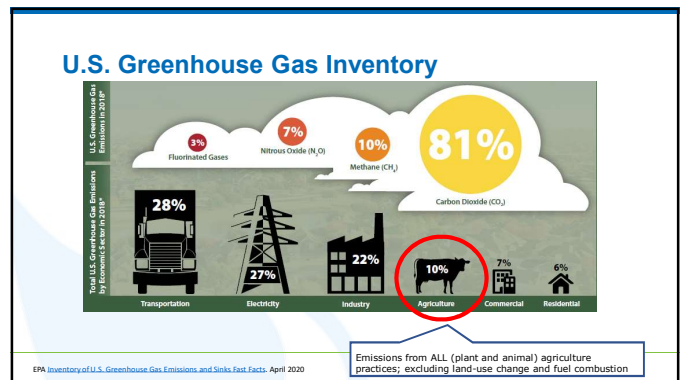
### Defining a Sustainable Diet is Complex and Multifactorial

**FAO Definition of Sustainable Diets**

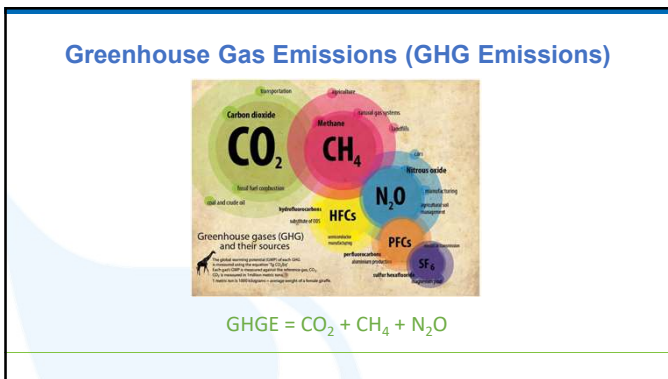
- Low environmental impacts
- Contribute to food and nutrition security and to a healthy life
- Protective and respectful of biodiversity and ecosystems
- Culturally acceptable
- Accessible
- Economically fair and affordable
- Nutritionally adequate
- Safe and healthy
- Optimizing natural and human resources

FAO, 2010 - <http://www.fao.org/docrep/016/i304e/i304e.pdf>

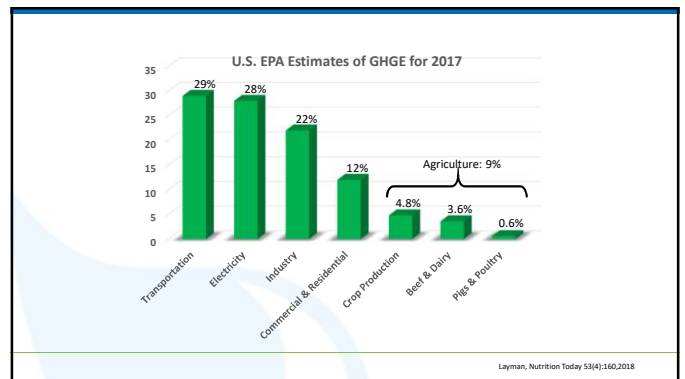
38




41



39



42



### The unique role of cattle in the food chain

- Cows' diets are primarily made up of foods people can't eat
- Cattle produce CO<sub>2</sub> and CH<sub>4</sub> "enteric fermentation"

43

Global Food Security (2020) 11: 11

Contents lists available at ScienceDirect

Global Food Security

journal homepage: www.elsevier.com/locate/foodsec

Livestock: On our plates or eating at our table? A new analysis of the feed/food debate

Anne Mottel<sup>a,\*</sup>, Cees de Haan<sup>b</sup>, Alessandra Falucci<sup>c</sup>, Giuseppe Tenopir<sup>d</sup>, Carolyn Opio<sup>e</sup>, Pierre Gerber<sup>f,g</sup>

<sup>a</sup> Food and Agriculture Organization of the United Nations, Animal Production and Health Division, Viale delle Terme di Caracalla, 00153 Rome, Italy

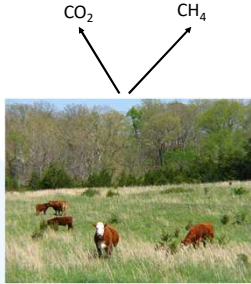
<sup>b</sup> Wageningen University, The Netherlands

<sup>c</sup> Animal Production Systems Group, Wageningen University, P.O. Box 338, Wageningen, The Netherlands

> 85% of "feed" (metabolizable energy) consumed by cattle is not digestible by humans

~75% of CO<sub>2</sub> and CH<sub>4</sub> produced by cows is "natural forage decay"


46



CO<sub>2</sub> CH<sub>4</sub>

Bacterial decomposition of fiber occurs in the rumen stomach

44



### The unique role of cattle in the food chain

- Cattle have a unique synergy with plants
- Cow's have the incredible ability to produce essential amino acids (*de novo* synthesis)

47



Natural Prairie Landfill

Backyard Compost

45

### Where Do We Get Essential Amino Acids?

48



### Essential Amino Acids are Produced by Bacteria

Primary source is plants

Bacteria on the roots fix nitrogen from the soil ...

... generate organic "amines" used by plants to make AAs

Manipulation of interactions between nitrogen-fixing bacteria and plants performed using synthetic biology

49

PNAS Proceedings of the National Academy of Sciences of the United States of America

### Nutritional and greenhouse gas impacts of removing animals from US agriculture

Robin R. White<sup>1,2</sup> and Mary Beth Hall<sup>1,2</sup>

Currently 50% of fruits and 20% of vegetables are imported

For additions, 100% of new fruits and 50% of new vegetables will be imported

White RR et al., Proc Natl Acad Sci USA, 2017  
doi:10.1073/pnas.1617031114

52

Global Food Security 14 (2017) 1-8

Contents lists available at ScienceDirect

Global Food Security

journal homepage: www.elsevier.com/locate/gfs

Livestock: On our plates or eating at our table? A new analysis of the feed/food debate

Anne Motte<sup>a,\*</sup>, Cees de Haan<sup>a</sup>, Alessandra Falucci<sup>b</sup>, Giuseppe Tempio<sup>c</sup>, Carolyn Opio<sup>d</sup>, Pierre Goebel<sup>e</sup>

<sup>a</sup> Food and Agriculture Organization of the United Nations, Animal Production and Health Division, Viale delle Terme di Caracalla, 00153 Rome, Italy

<sup>b</sup> Independent consultant, The Netherlands

<sup>c</sup> Animal Production Systems Group, Wageningen University, P.O. Box 338, Wageningen, The Netherlands

<sup>d</sup> Animal Production Systems Group, Wageningen University, P.O. Box 338, Wageningen, The Netherlands

Cattle convert 60 g of poor-quality plant proteins (grass) into 100 g of high-quality protein (meat or milk)

"Upcycling"

50

PNAS Proceedings of the National Academy of Sciences of the United States of America

### Nutritional and greenhouse gas impacts of removing animals from US agriculture

Robin R. White<sup>1,2</sup> and Mary Beth Hall<sup>1,2</sup>

Theoretical Diets  
versus  
Unintended Consequences

Balancing Tradeoffs: Key to Sustaining Healthy People and a Healthy Planet

White RR et al., Proc Natl Acad Sci USA, 2017  
doi:10.1073/pnas.1617031114

53

PNAS Proceedings of the National Academy of Sciences of the United States of America

### Nutritional and greenhouse gas impacts of removing animals from US agriculture

Robin R. White<sup>1,2</sup> and Mary Beth Hall<sup>1,2</sup>

- Reduce GHGE and increase total U.S. food supply, but mostly from corn and soybeans
- Need to eat more food to meet nutrient requirements due to lower nutrient density in plant-based foods
- Risks of deficiency for essential nutrients - calcium, vitamins A, B<sub>12</sub>, essential fatty acids, & amino acids

Balancing Tradeoffs: Key to Sustaining Healthy People and a Healthy Planet

White RR et al., Proc Natl Acad Sci USA, 2017  
doi:10.1073/pnas.1617031114

51

Plants + Dairy: Better Together

Toby Amidor, MS, RD, CDN, FAND  
Founder of Toby Amidor Nutrition  
@tobyamidor

54

### Disclosures

- National Dairy Council, Speaker Honoraria
- Ambassador, National Dairy Council
- Member, Beef Checkoff's Expert Bureau
- Yogurt Board Member, Dannon
- Spokesperson, Grapes from California
- Spokesperson, California Strawberry Commission

55

### Various Professional Definitions of "Plant-Based"

- No formal definition to the term "plant-based"
- Health professionals have described plant-based as:
  - Strict vegan eating
  - A vegetarian diet
  - A diet that includes "some" animal foods
  - "Flexitarian"
  - "Plant-forward"
  - "Plant-rich"

58

### What Does Plant-Based Mean?



Does a Plant-Based Diet Mean Eating Vegetarian?

Our resident nutritionist examines what it really means to follow a plant-based diet.



What Does 'Plant-Based' Actually Mean?

"Plant-based" is now expanding from shorthand for "meat substitute" to refer to just about anything a marketer wants.



It's Called 'Plant-Based,' Look It Up

There's a difference between disavowing all animal byproducts and simply trying to eat less meat.



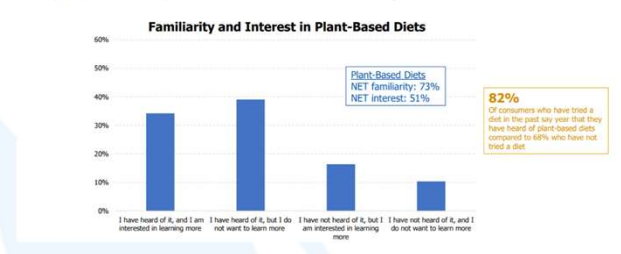
'Plant-Based' and Vegan Are Two Totally Different Terms. Don't Confuse Them.

One has a strict definition the other is, well, fuzzy.

56

### Consumers are Familiar with Plant-Based Diets

Three quarters are familiar with plant-based diets and half are interested in learning more



Q2: Which of the following best describes your familiarity and interest with "plant-based diet"? (n=1,020)

Source:IFIC 2019 Health and Food Report

59



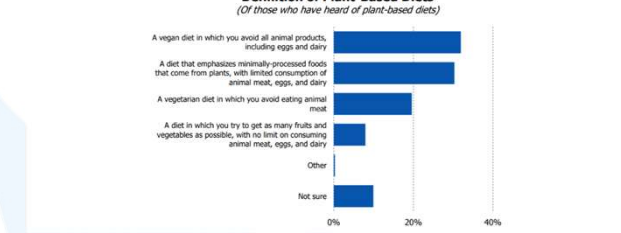
Combining these two eating patterns can help clients meet their nutrition requirements and promote better health.

© TERRY ANDROR, MS, RD, CNS, FAND

57

### Consumers Split on Definition of Plant-Based

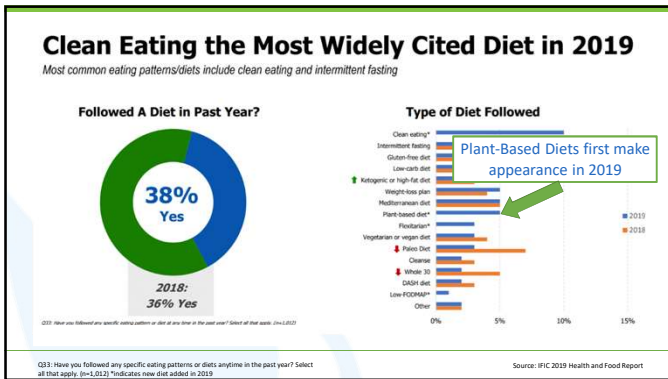
Vegan diets, those that are minimally processed, limited animal consumption and vegetarian diets most widely held definitions of plant-based



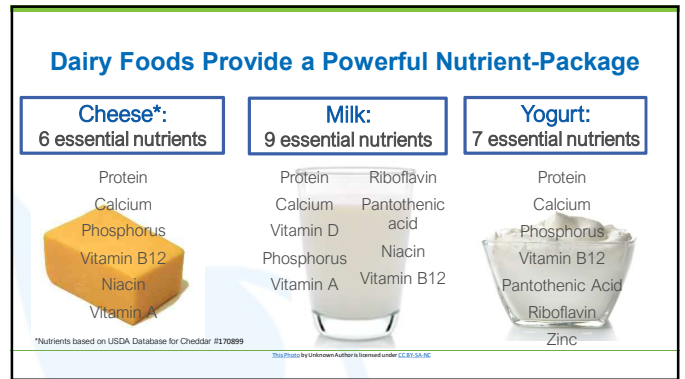
Q13: Which of the following best matches how you would define a "plant-based diet"? Please select only one answer. (Of those who have heard of plant-based diets, n=742)

Source:IFIC 2019 Health and Food Report

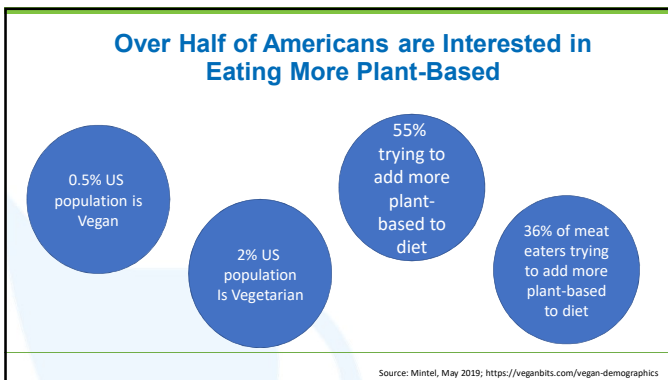
60



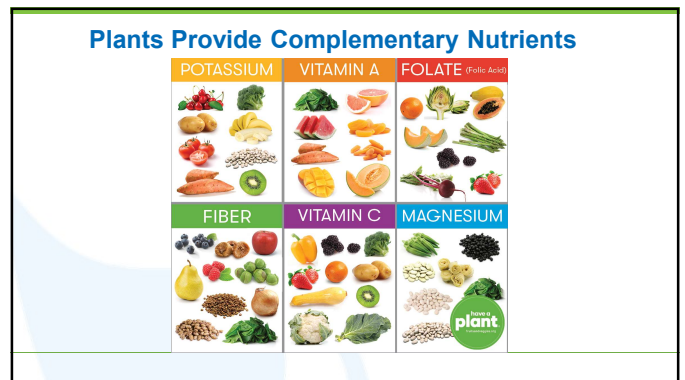
61



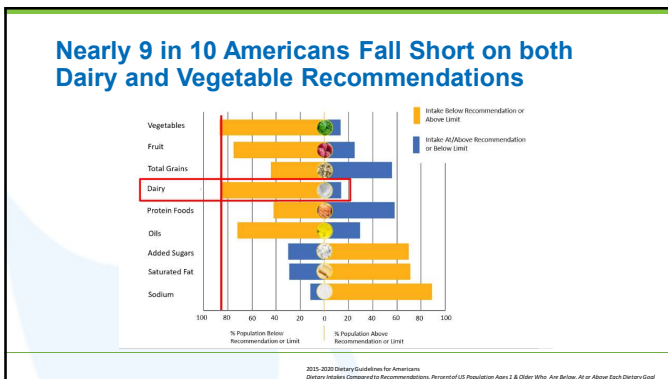
64



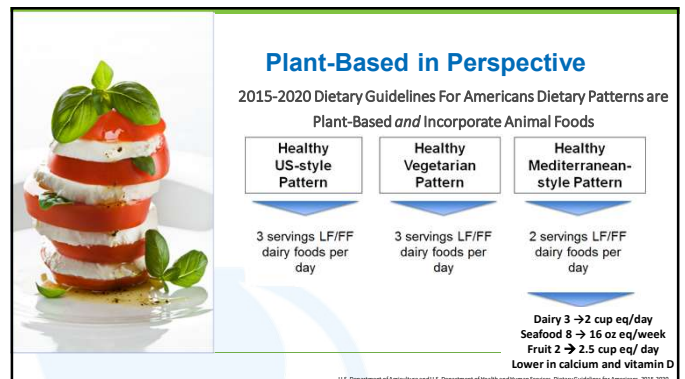
62



65



63



66

### Plant + Animal Foods = Improved Nutrient Intakes

**nutrients**  
an open access journal by **Wiley**

Increasing Plant Based Foods or Dairy Foods Differentially Affects Nutrient Intakes: Dietary Scenarios Using NHANES 2007–2010

Christoph J. Clark<sup>1,2</sup>, Amy A. Hsieh<sup>1,2</sup>, Elise Deaton<sup>1,2</sup>, and Victor L. Fulgoni<sup>1,2</sup>

NHANES Modelling Study  
N=17,387, ≥ 2 years

“Specific recommendations to increase low fat and nonfat dairy foods in conjunction to increasing healthy plant-based foods will help to close some of the nutrient gaps currently present among Americans of all ages.”

Modelling Scenario	Improved Intakes	Insufficient Intakes
<b>Double usually consumed plant-based foods</b>	Magnesium Iron Folate Vitamin C Vitamin E	Calcium* Vitamin D* Vitamin A Vitamin E Protein
<b>Double milk, cheese, yogurt</b>	Calcium* Vitamin D* Vitamin A Protein Magnesium	

\* = Nutrient of Public Health Concern

Funded by National Dairy Council

Clark et al. Increasing Plant Based Foods or Dairy Foods Differentially Affects Nutrient Intakes: Dietary Scenarios Using NHANES 2007–2010. *Nutrients* 2016, 8(7), 422

67

### Plants + Dairy = Better Together

- Dairy foods can help make plant-packed plates even better by adding nutrients, health benefits, flavor, texture and satisfaction.
- Dairy enhances your plant-based diet choices by providing additional nutrients and health benefits.
- Dairy's nutrients – like high-quality protein, calcium and vitamin B12 – can help enhance your greens.



### Plants + Dairy are the new superfood power couple

70

### Culinary Attributes of Plant Foods

<b>Nuts and seeds:</b> Crunch, creaminess	<ul style="list-style-type: none"> <li>Add nuts on ricotta cheese with strawberries</li> <li>Roasted: more complex flavor</li> <li>Nut butters: creaminess</li> </ul>
<b>Vegetables:</b> Color, flavor, texture	<ul style="list-style-type: none"> <li>Raw vs cooked</li> <li>Salad with green lettuce, yellow peppers, and orange carrots</li> </ul>
<b>Starchy vegetables and legumes:</b> thickener	<ul style="list-style-type: none"> <li>Pureed potatoes or beans can help thicken soups</li> </ul>
<b>Fruits:</b> Sweetness, texture, color	<ul style="list-style-type: none"> <li>Broccoli salad with dried cranberries</li> <li>Blueberries in a yogurt parfait</li> </ul>
<b>Whole grains:</b> Add nutty flavor, texture, mouthfeel	<ul style="list-style-type: none"> <li>Oatmeal with milk</li> <li>Brown rice in tomato soup</li> </ul>

68

### The New Superfood Power Couple: Dairy & Plants

#### My Tips for Dairy Foods in Plant-Based Diets

*Dairy foods pair well with plant-based foods from fruits and vegetables to whole grains, legumes, nuts and seeds.*

- Make cottage cheese savory. Sprinkle on everything bagel seasoning and mix in grape tomatoes, diced cucumbers and sliced radishes.
- Make homemade or buy Labneh (i.e. yogurt cheese). Drizzle with olive or avocado oil, sprinkle in Za'atar and dip your favorite veggies, whole grain crackers and bread into it!
- Make a bountiful board with a few cheeses, nuts, whole grain crackers, figs, raisins, dried apricots, fresh grapes and enjoy.
- Make a milk and yogurt smoothie with frozen fruits and veggies like pineapples, mangoes, spinach, avocados or bananas – the possibilities are endless.
- Make a savory yogurt bowl with farro or quinoa, fresh herbs, and roasted veggies.

71

### Culinary Attributes of Dairy Foods

<b>Butter:</b> Adds body, depth and a silky-smooth mouth feel to food	<ul style="list-style-type: none"> <li>Stir 1 tablespoon of butter into cooked vegetables</li> </ul>
<b>Milk:</b> Adds texture, creaminess, and foam	<ul style="list-style-type: none"> <li>Whole milk added to a soup for creaminess</li> </ul>
<b>Cheese:</b> Adds creaminess and flavor (bitter, salty, sour)	<ul style="list-style-type: none"> <li>Mac and cheese</li> <li>Blue cheese crumbles on a salad</li> </ul>
<b>Yogurt:</b> Fermented food, adds moisture, creaminess, tang, acidity	<ul style="list-style-type: none"> <li>Its mild acidity and calcium content act as a natural tenderizer for meats</li> <li>Adds moisture and tang to baked goods like cakes</li> </ul>

69

### What's Your Favorite Superfood Power Couple? Take the #HaveAPlantWithDairy Challenge!

- Take a photo of your favorite superfood power couple (dairy + plant)
- Post it to Instagram, Facebook or Twitter
- Use the Hashtags:
  - #HaveAPlantWithDairy
  - #NationalDairyMonth
- Tag me @tobyamidor
  - @fruitsandveggies
  - @NatlDairyCouncil (twitter)



72

### Homemade Labneh


1. Start with 32 ounces of Greek or regular plain yogurt
2. Stir in 1 tsp of salt
3. Strain for at least 24 hours in cheese cloth place inside a colander over a bowl to catch the excess whey
4. Place strained yogurt into a dish
5. Get creative with your toppings
  - Drizzle with olive oil and sprinkle with za'atar seasoning
  - Drizzle with honey and garnish with fresh mint
  - Serve with fruits, vegetables, whole grain pitas



73

### Veggie Egg Scramble

- 4 large eggs
- 6 large egg whites
- ¼ tsp salt
- ¼ tsp ground black pepper
- Nonstick cooking spray
- 2 plum tomatoes, chopped
- 1 green bell pepper, chopped
- 2 tsp. reduced-fat shredded cheddar cheese



Source: Create-Your-Plate Diabetes Cookbook, American Diabetes Association

76

### Honey-Ricotta with Strawberries

- 1 cup part-skim ricotta cheese
- 2 tablespoons honey
- ¼ cup unsalted cashews, chopped
- 3 cups strawberries, halved

Combine the ricotta, honey, and cashews. Place ¼ cup of the ricotta mixture and ¼ cup strawberries in each of 4 resealable containers. Store honey ricotta in resealable container for up to 5 days in the refrigerator.



Source: The Greek Yogurt Kitchen

74

### Salad Parfait

- ½ cup nonfat plain Greek yogurt
- 2 tablespoons chopped fresh basil
- 2 tablespoons chopped fresh parsley
- 2 plum tomatoes
- 2 Kirby or Persian cucumbers
- ¼ head romaine lettuce
- 1 yellow bell pepper
- 2 medium carrots



Source: The Greek Yogurt Kitchen

77

### Pear and Almond Overnight Oats

- ½ cup old-fashioned oats
- 1/3 cup nonfat milk
- 1/3 cup nonfat plain Greek yogurt
- 1 tsp zero-calorie sweetener or honey
- ¼ tsp vanilla extract
- 1/8 tsp ground cinnamon
- ½ medium pear, chopped
- 1 tsp roasted, chopped almonds



Source: Create-Your-Plate Diabetes Cookbook, American Diabetes Association

75


### Zucchini Fritters with Yogurt Sauce

**For the Lemon-Yogurt Sauce:**

- ½ cup nonfat plain Greek yogurt
- Juice of ½ lemon
- 2 tsp fresh chopped dill
- 1 clove garlic, minced
- 1/8 tsp ground black pepper

**For the Fritters:**

- 2 medium zucchini, shredded
- ½ cup whole wheat pastry flour
- 2 tbsp chopped fresh dill
- ¼ tsp salt
- 1 large egg, beaten
- 1 large egg white, beaten
- 1 tablespoon olive oil



Source: Create-Your-Plate Diabetes Cookbook, American Diabetes Association

78

### Turkish Eggs with Greek Yogurt and Sautéed Spinach

- 2 eggs
- 2 cups low fat Greek yogurt
- 2 cups fresh baby spinach
- 8 small cherry tomatoes
- 1 tablespoon fresh basil
- Red pepper flakes
- Smoked paprika
- 4 slices toasted 7-grain bread




Source: <https://dairygood.org/content/recipes/turkish-eggs-with-greek-yogurt-and-sauteed-spinach>

79

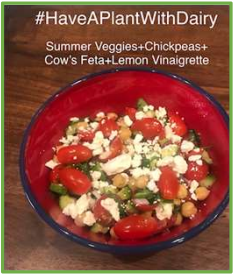
#HaveAPlantWithDairy

Cherries + Mint + Greek Yogurt



#HaveAPlantWithDairy

Summer Veggies+Chickpeas+ Cow's Feta+Lemon Vinaigrette



82

### Avocado Yogurt Soup

- 1 cup Greek yogurt 2% (or fat level of choice)
- 1 cup buttermilk
- 2 large ripe avocados
- 2-3 dill sprigs, rough chopped
- 2 tablespoons mint, rough chopped
- 1/2 lemon freshly squeezed (add more to taste)
- 1/2 teaspoon Kosher Salt (adjust to taste)
- 3/4 cup milk – or more as needed (fat level of choice)



Source: <https://dairygood.org/content/recipes/avocado-yogurt-soup>

80

### Dairy + Plant-Based Diets: A Way to a Balanced Meal

Dairy foods contain high-quality protein and are recommended by the Dietary Guidelines for Americans for people following a plant-based diet as they contribute key essential and under-consumed nutrients.

## Dairy Foods + Plant Foods = Better Together

A balanced diet includes a <b>variety of protein sources.</b>	<b>Dairy foods</b> are an important part of healthy eating styles necessary for Americans and vegetarians diet.	Protein from animal products is <b>complete, high-quality protein</b> because they contain all essential amino acids.
We should aim to eat at least <b>20%-30% more of some plant proteins</b> to get the same high-quality protein.	Dairy foods are an important part of a diet rich in <b>vitamin B12</b> – a nutrient primarily found in animal products.	When it comes to <b>protein</b> , dairy is a <b>simple, delicious and nutritious</b> choice.
Milk is a <b>simple and full of the nutrients</b> we need for <b>energy and strength.</b>	It is a <b>nutrient-dense</b> source rich with <b>protein, calcium, vitamins A &amp; D</b> and more.	

US Dairy | @NIDairyCouncil | #DairyNourishesLife

83

### In Conclusion

- There are varying interpretations among health professionals and consumers surrounding the meaning of "plant-based."
- Nearly 9 in 10 Americans fall short in vegetable and dairy recommendations.
- There are food groups for a reason. Eating patterns that include a variety of foods of plant and animal origin help ensure nutrient needs are met.
- Dairy foods can help make plant-packed plates even better by adding nutrients, health benefits, flavor, texture and satisfaction.

81

### Host of Resources on www.USDairy.com

10+ Science Summaries



Recipes



US Dairy | @NIDairyCouncil | #DairyNourishesLife

84



- Quarterly updates
- Advance notice of webinars
- Recipe ideas/meal tips
- Engaging contests
- Opportunities to be highlighted on NDC's social
- In-person educational and networking events

To join visit [USDairy.com](http://USDairy.com)

USDairy.com @NDC Dairy Council #DairyNourishesLife NDC

85



COMPLIMENTARY WEBINAR | JULY 15 | 12:00-1:00 PM CDT

THE FOOD MATRIX:  
MORE THAN THE  
SUM OF NUTRIENTS



NDC NATIONAL DAIRY COUNCIL

Register Here: <https://tinyurl.com/y6ugw57w>

USDairy.com @NDC Dairy Council #DairyNourishesLife NDC


86

## Questions?

Please enter your questions into the chat window.

Continuing education certificates and handouts will be shared via email within 24 hours of the webinar's conclusion.

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



87