Getting Cultured with Fermented Dairy Foods

Indiana School Nutrition Association
November 14th, 2019

AMERICAN DAIRY ASSOCIATION INDIANA INC.
Winners Drink Milk.

#WinnersDrinkMilk
#DairyNourishesLife

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Today's Presenter

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American Dairy Association Indiana

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@HannaKelleyRD

#DairyNourishesLife

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Learning Objectives

1. Distinguish between fermented foods and probiotics
2. Discuss the growing body of scientific evidence supporting consumption of fermented dairy foods within healthy dietary patterns and:
   a. Reduced risk of type 2 diabetes (T2DM)
   b. Reduced risk of cardiovascular disease (CVD)
   c. Emerging evidence on yogurt's role in reducing inflammation
3. Describe the benefits of dairy food / fermented dairy matrix
4. Provide practical examples for building healthy and appealing eating patterns, which incorporate fermented dairy foods

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Fermented Foods: What is old is new again

https://commons.wikimedia.org/wiki/File:Egyptian-woman-painting_Beer.jpg

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Americas

Hawaii Poi	Mexico Pozol	Colombia Guarapo	Peru Champus

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Asia

Korea Kimchi	Japan Natto	Tibet Jun	India Lassi

6

6

Africa

Ethiopia Injera

Ethiopia Ayib

South Africa Incwancwa

Nigeria Iru

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Europe

Germany Sauerkraut

Eastern Europe Smetana

Iceland Skyr

Central Europe Kefir

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The History of Yogurt

Herdsman in the Middle East kept milk in goatskin bags, which transformed into a tangy custard

The Turks were the first to evaluate yogurts medicinal use in a comprehensive dictionary, *Diwan Lughat al-Turk*

Lactobacillus bulgaricus, responsible for milk fermentation is discovered

Yogurt is commercialized through pharmacies

~10,000 BC | 2,000 BC | 1072 | 1208 | 1905 | 1909 | 1919

Yogurt became a popular way to preserve milk of domesticated animals

Genghis Khan, is reputed to have fed his army yogurt, based on the belief it instilled strength and bravery

Metchnikoff's theory on yogurt's "Life-extending" properties

Modified from: Yogurt in Nutrition. Complete History of Yogurt Making

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Fermented Foods: Topping the Trends Lists

Source: Pollack Today's Dietitian. What's Trending in Nutrition. 2019

https://www.foodlocker.com/trends/
https://www.todaysdietitian.com/news/t120119_news.shtml

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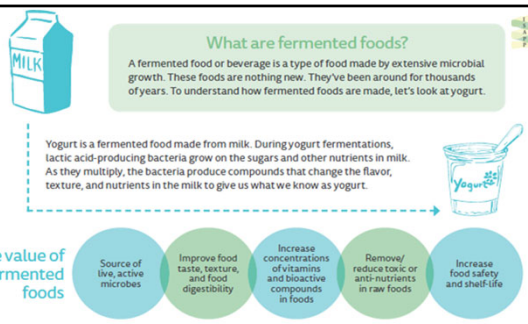

https://isappscience.org/wp-content/uploads/2017/01/Marco-health-benefits-fermented-foods-ISAPP-rev-17.pdf

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https://www.discoverundeniablydairy.com/curriculum

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Fermented Food or Probiotic?

Fermented Foods	Probiotics
✔ Made with microorganisms	✔ Should meet FAO definition: "Probiotics are *live microorganisms* that, when administered in *adequate amounts* confer *a health benefit*"
✔ May or may not contain live active cultures at a level to confer a health benefit	✔ Yogurts can be considered probiotic for people with lactose intolerance because traditional cultures, *Lactobacillus bulgaricus* and *Streptococcus thermophilus*, have been well studied for their ability to help with lactose digestion
✔ Most cheeses are fermented foods	

The voluntary Live & Active Culture seal indicates a significant amount of the good bacteria remain alive after the fermentation process is complete.

Hill C, et al. *Nat Rev Gastroenterolog Hepatolo.* 2014;11:506-514.

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Fermented Foods and Gut Health

- The human digestive tract contains approximately 100 trillion bacterial cells = gut microbiota[1]
- An imbalance between "good" bacteria and "bad" bacteria = dysbiosis[2]
- Factors influencing the gut microbiota composition[2]
  - Vaginal birth vs. Cesarean
  - Breast vs. formula feeding infants
  - Diet and intake of fiber
  - Antibiotic use
  - Hygiene levels
  - Genetic background
- Some diseases are characterized by microbial colonization patterns that differ from healthy controls[3]
- Fermented foods *may* contain living cultures that can add beneficial bacteria to the digestive tract[3]
- Eating fermented foods helps maintain a balance between good and bad bacteria
  - → contributing to a healthier microbiota[3]

1. Turnbaugh PJ, et al. *Nature.* 2007;449:804–810.
2. Gagliardi A, et al. *Int J Environ Res Public Health.* 2018;15:1679-.
3. Ko CR and Hutkins R. *Nutrition Reviews.* 2018;76(S1):4-15.

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Dairy Foods and Health Outcomes

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Cheese*:
6 essential nutrients

Protein
Calcium
Phosphorus
Vitamin B12
Niacin
Vitamin A

Milk:
9 essential nutrients

Protein
Calcium
Vitamin D
Phosphorus
Vitamin A
Riboflavin
Pantothenic acid
Niacin
Vitamin B12

Yogurt:
7 essential nutrients

Protein
Calcium
Phosphorus
Vitamin B12
Pantothenic Acid
Riboflavin
Zinc

*Nutrients based on USDA Database for Cheddar #01009

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2005, 2010, 2015* Dietary Guidelines Recommend 3 Daily Servings of Dairy Foods for Those ≥9 years

*3 servings for Americans 9 years and older in the Healthy U.S.-Style and Healthy Vegetarian Eating Patterns.

The 2015 DGA states that healthy eating patterns, including low-fat or fat-free dairy foods, are associated with reduced risk for several chronic diseases, including cardiovascular disease (strong evidence) and type 2 diabetes (moderate evidence). Research has also linked dairy intake to improved bone health, especially in children and adolescents.

Dietary Guidelines for Americans, 2015-2020

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Fermented Dairy Foods and Health Outcomes

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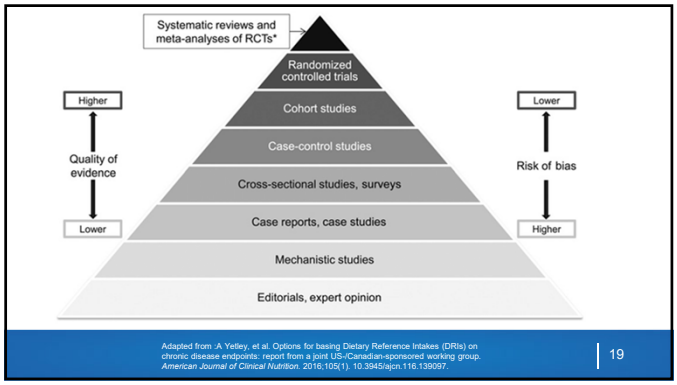
Systematic reviews and meta-analyses of RCTs*
Randomized controlled trials
Cohort studies
Case-control studies
Cross-sectional studies, surveys
Case reports, case studies
Mechanistic studies
Editorials, expert opinion
Higher
Quality of evidence
Lower
Lower
Risk of bias
Higher
Adapted from :A Yetley, et al. Options for basing Dietary Reference Intakes (DRIs) on chronic disease endpoints: report from a joint US-/Canadian-sponsored working group. American Journal of Clinical Nutrition. 2016;105(1). 10.3945/ajcn.116.139097.
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Fermented Dairy Foods & Type 2 Diabetes
Visit Science Summaries at nationaldairycouncil.org
SCIENCE SUMMARY: Cheese & Health
SCIENCE SUMMARY: Yogurt & Health
SCIENCE SUMMARY: Type 2 Diabetes
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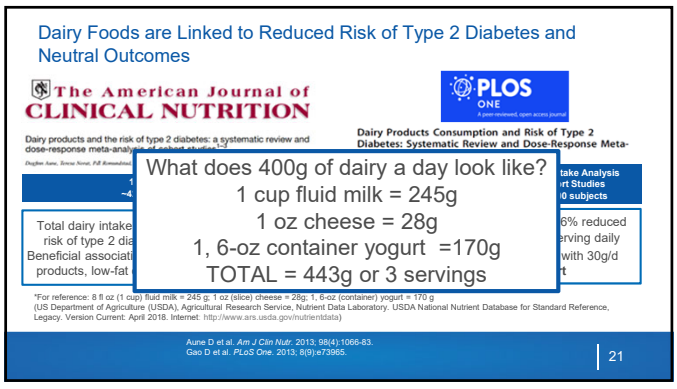
Dairy Foods are Linked to Reduced Risk of Type 2 Diabetes and Neutral Outcomes
The American Journal of CLINICAL NUTRITION
PLOS ONE
Dairy Products Consumption and Risk of Type 2 Diabetes: Systematic Review and Dose-Response Meta-
What does 400g of dairy a day look like?
1 cup fluid milk = 245g
1 oz cheese = 28g
1, 6-oz container yogurt =170g
TOTAL = 443g or 3 servings
*For reference: 8 fl oz (1 cup) fluid milk = 245 g; 1 oz (slice) cheese = 28g; 1, 6-oz (container) yogurt = 170 g
(US Department of Agriculture (USDA), Agricultural Research Service, Nutrient Data Laboratory. USDA National Nutrient Database for Standard Reference, Legacy. Version Current: April 2018. Internet: http://www.ars.usda.gov/nutrientdata)
Aune D et al. Am J Clin Nutr. 2013; 98(4):1066-83.
Gao D et al. PLoS One. 2013; 8(9):e73965.
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Consistent Evidence Demonstrates Eating Yogurt is Associated with Reduced Risk for Type 2 Diabetes

BMC Medicine

Dairy consumption and risk of type 2 diabetes: 3 cohorts of US adults and an updated meta-analysis

14 Prospective Cohort Studies
>450,000 participants

Yogurt intake (one serving/day) associated with a 17% reduced risk for type 2 diabetes

The American Journal of CLINICAL NUTRITION

Consumption of dairy foods and diabetes incidence: a dose-response meta-analysis of observational studies[1,2]

22 Cohort Studies
>570,000 individuals

14% reduced risk per 80 g/day (~1/3-1/2 cup per day) compared to 0 g/day yogurt intake

Chen et al. *BMC Med.* 2014; 92:215.
Gijsbers et al. *Am J Clin Nutr.* 2016;103(4):1111-24.

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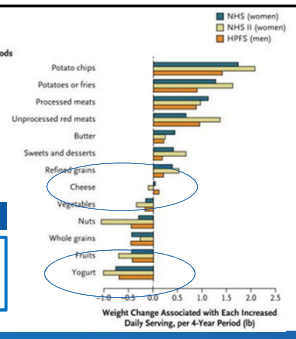
The NEW ENGLAND JOURNAL of MEDICINE

Changes in Diet and Lifestyle and Long-Term Weight Gain in Women and Men

Dariush Mozaffarian, M.D., Dr.P.H., Tao Hao, M.P.H., Eric B. Rimm, Sc.D., Walter C. Willett, M.D., Dr.P.H., and Frank B. Hu, M.D., Ph.D.

3 Cohort Studies (NHS I & II, HPFS)
>120,000 women and men

Each serving of yogurt/d was associated with -0.82 lb. weight change over a 4 year period



Mozaffarian D et al. *NEJM.* 2011. 364:2392-2404.

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Fermented Dairy Foods & Cardiovascular Disease

Visit Science Summaries at
nationaldairycouncil.org

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2005, 2010, 2015* Dietary Guidelines Recommend 3 Daily Servings of Dairy Foods for Those ≥9 years

*3 servings for Americans 9 years and older in the Healthy U.S.-Style and Healthy Vegetarian Eating Patterns.

The 2015 DGA state[s] [re]p[ort] dai[ry] inclu[sion] evide[nce] evi[dence] [al]so linked dairy [in]take to improved bone health, especially in children and adolescents.

At least 10 systemic reviews/ meta-analyses & 13 cohort studies published between 2009-2017 suggest dairy food consumption – *regardless of fat content* – is not linked with higher risk for CVD, CHD or stroke

Dietary Guidelines for Americans, 2015-2020

Source: NDC Science Brief on Whole and Reduced-Fat Dairy Foods and Cardiovascular Disease

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Cheese Consumption does not Impact Cholesterol Levels

2 or more risk factors for MetS

139 Subjects

- Regular Cheese 80 g/d — 14% kcal from SFA
- Reduced Fat Cheese 80 g/d — 11% kcal from SFA
- Control — 9% kcal from SFA

1 oz cheese = 28g; 80g cheese = ~3 oz

The American Journal of CLINICAL NUTRITION

High intake of regular-fat cheese compared with reduced-fat cheese does not affect LDL cholesterol or risk markers of the metabolic syndrome: a randomized controlled trial[1,2]

Randomized Controlled Trial
139 subjects

Results: No differences in total, LDL and HDL cholesterol

Conclusion: "A high daily intake of regular-fat cheese for 12 weeks did not alter LDL cholesterol or metabolic syndrome risk factors."

*NDC sponsored study

Raziani et al. *AJCN.* 2016; 104(4):973-81.

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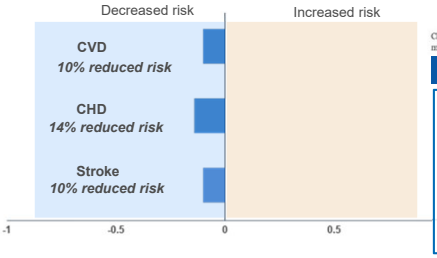
Meta-Analysis: Cheese Consumption is Associated with Reduced CVD Risk



EJCN

Cheese consumption and risk of cardiovascular disease: a meta-analysis of prospective studies

15 Prospective Observational Studies
~340,000 participants

"This meta-analysis of prospective studies suggests a nonlinear inverse association between cheese consumption and risk of CVD."
"…the largest risk reductions observed at the consumption of approximately 40 g/d (~1.3 oz)"

Chen et al. *Eur J Nutr.* 2017; 56(8):2565-75.

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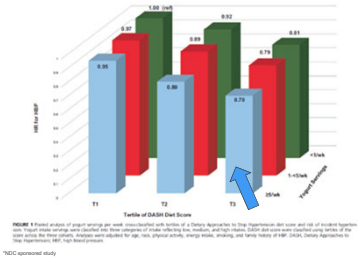
Hypertension Results: Yogurt and DASH Scores



Journal of Hypertension

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

3 Cohort Studies (NHS I & II, HPFS)
~184,000 participants

"Higher total dairy intake (3 to <6 servings/day), especially in the form of yogurt (at least 5 servings/week), was associated with lower risk of incident HBP in middle-aged and older adult men and women."

Buendia JR et al. *J of Hypertension*. 2018;36(8):1671-79.

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Yogurt Consumption Associated with Reduced Cardiovascular Disease Risk in Adults with Hypertension

AJH AMERICAN JOURNAL OF HYPERTENSION

Regular Yogurt Intake and Risk of Cardiovascular Disease Among Hypertensive Adults

2 Cohort Studies (NHS & HPFS)
~74,000 participants

"Hypertensive men and women who consumed ≥2 servings/week of yogurt, especially in the context of a healthy diet, were at lower risk for developing CVD."

Buendia JR et al. *Am J Hypertension*. 2018; 31(5): 557 – 65.
Infographic adapted from Bell Institute:
https://twitter.com/bellinstitute/status/968546334163767296

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Fermented Dairy Foods & Inflammation

Inflammation

- ✔ Eating dairy foods does not seem to be linked to increased inflammation
- ✔ In some cases eating dairy foods has been linked to reduced indicators of systemic inflammation

Critical Reviews in Food Science and Nutrition

Dairy products and inflammation: A review of the clinical evidence

Alessandra Bordoni, Francesca Danesi, Dominique Dardevet, Didier Dupont, Aida S. Fernandez, Doreen Gille, Claudia Nunes dos Santos, Paula Pinto, Roberta Re, Didier Rémond, Danit R. Shahar & Guy Vergères

Systematic Review of 52 Clinical Trials

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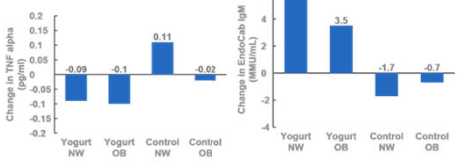
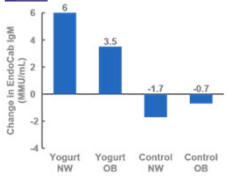
Eating Yogurt Linked to Reduced Inflammation and Improved Markers of Gut Integrity

BJN

Low-fat yogurt consumption reduces biomarkers of chronic inflammation and inhibits markers of endotoxin exposure in healthy premenopausal women: a randomised controlled trial





NW = normal weight
OB = obese

Yogurt = Yoplait Low-fat
Control = ZenSoy SoyPudding

*NDC sponsored study

Randomized Controlled Trial
128 premenopausal women

12 ounces (1.5 servings) of low-fat yogurt/day x 9 weeks = reduced biomarkers of chronic inflammation and improved markers for gut integrity - compared with a non-dairy control food

Pei R et al. *Br J of Nutrition*. 2017; 118:1043-51.

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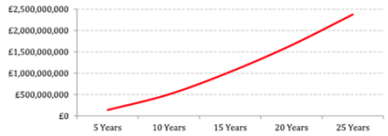
Economic Model Predicts Increased Yogurt Consumption Could Reduce Health Care Costs

Estimated UK population cost savings



BMC Nutrition

RESEARCH ARTICLE Open Access

An economic model for the use of yoghurt in type 2 diabetes risk reduction in the UK

Patient Simulation Model

Increasing average yogurt consumption by 100g/d could result in 388,000 fewer people developing T2D, which could save the UK £2.3bn

Lenoir-Wijnkoop et al. *BMC Nutrition* (2016) 2:77

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Dairy Foods Matrix

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Dairy Foods' Matrix is Unique: Whole is Greater than the Sum of its Parts

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Fermented Dairy Foods Matrix

DELIVERY OF LIVE FERMENTS TO THE GI TRACT NS

Microorganisms in the diet
The consumption of 'living' fermented foods potentially increases the numbers of microorganisms by up to 10 000-fold[10].

It could be equivalent to introducing new, albeit transient, bacteria into the indigenous, intestinal microbiota[11].

Practical vehicle
The delivery of microorganisms to the GI tract is supported by the food matrix, which promotes the long-term survival of microorganisms during distribution and storage[12].

The consumption of "live yogurt cultures in yogurt contributes to improve digestion of lactose in individuals with lactose maldigestion"[13].

YOGURT IN NUTRITION
INITIATIVE FOR A BALANCED DIET

For full list of references, visit: http://www.yogurtinnutrition.com/live-ferments-fermentation-of-milk-into-yogurt/

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People are Asking…

Is this good for my body?

Is this good for the animals?

Is this good for the planet?

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Use this slide if you don't play the previous video

Ensuring Milk, Cheese and Yogurt are Free of Antibiotics

- 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

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Recombinant Bovine Somatotropin (rbST): A Safety Assessment

Initially presented at the Joint Annual Meeting of the American Dairy Science Association®, Canadian Society of Animal Science, and American Society of Animal Science

Montreal, Canada
July 14, 2009

Updated on March 22, 2010

"…food products from cows treated with rbGH are safe for consumption by human."

"The FDA's review of rbGH has been scrutinized by both the Department of Health and Human Services' Office of Inspector General (OIG) and by GAO, as well as by JECFA."

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From Research to Resources and Recipes

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Safety & Storage to Minimize Food Waste

Cheese	Yogurt
Do not leave at room temperature for ≥2 hours, 1 hour if ≥90° F Keep refrigerator at 35-40° F	
Factor 20-30 minutes to come to room temp ▪ **Soft Cheeses**: Toss after 2 hours ▪ **Hard Cheeses**: Can sit out for 2 hours then wrap well; refrigerate to use again	Stored properly, shelf-life: 7-14 days Store tightly covered in original container on top shelf of refrigerator Eating only a portion of a carton? Spoon out what you intend to eat and return the carton to the refrigerator If separation occurs, stir the liquid (aka: whey) back into the yogurt
Mold? ▪ **Soft Cheeses**: Don't eat ▪ **Hard Cheeses**: Cut ≥ 1" around and below the mold spot, re-cover the cheese in fresh wrap	
What about freezing? ▪ Softer cheese freeze well when shredded ▪ Aged cheese may become crumbly ▪ Thaw 24-28 hours in refrigerator	What about freezing? ▪ Changes texture. May lose active cultures ▪ Won't significantly impact nutritional value

https://dairygood.org/content/2016/how-long-can-cheese-sit-out
https://dairygood.org/content/2016/can-you-freeze-cheese
https://dairygood.org/content/2018/can-you-eat-moldy-cheese
https://dairygood.org/content/2017/how-long-can-yogurt-sit-out
https://dairygood.org/content/2018/can-you-freeze-yogurt

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Safety & Storage to Minimize Food Waste

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https://dairygood.org/content/2016/can-you-freeze-cheese
https://dairygood.org/content/2016/can-you-eat-moldy-cheese

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Safety & Storage to Minimize Food Waste

Yogurt

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- Eating only a portion of a carton?
  - Spoon out what you intend to eat and return the carton to the refrigerator
- If separation occurs, stir the liquid (aka: whey) back into the yogurt
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  - Changes texture; may lose active cultures
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https://dairygood.org/content/2017/how-long-can-yogurt-sit-out
https://dairygood.org/content/2016/can-you-freeze-yogurt

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Quick Tips for Adding More Fermented Dairy to Your Plate

Breakfast

- Add yogurt, kefir or buttermilk to your smoothies, granola or oatmeal
- Create a savory breakfast bowl and top with yogurt and shredded cheese

Lunch/Dinner

- Use yogurt in place of mayonnaise on your sandwiches
- Try a yogurt-based salad dressing or make your own ranch using buttermilk
- Top salads with flavorful cheeses to add depth

Snacks

- Create your own dips using buttermilk or yogurt as the base
- Create yogurt parfaits by layering yogurt with granola & fresh fruit

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Bringing Science to the Table

Visit www.nationaldairycouncil.org/recipes
for inspiration on how to bring the benefits of fermented dairy foods to the table

RECIPE

9 Simple Ways to Help You Get 3 Servings of Dairy

LUNCH

Grilled Shrimp with Yogurt Cilantro Salsa

BREAKFAST

14 Tasty Twists on Overnight Oats

APPETIZER

Roasted Red Pepper Yogurt Dip

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Conclusions

- Current Dietary Guidelines for American 9 years and older recommend 3 daily servings of dairy foods as part of healthy diet patterns
- Fermented dairy food consumption is on the rise and is associated with lower risk of type 2 diabetes and cardiovascular disease as part of healthy diet patterns
- Emerging evidence suggest a reduction in post-meal and chronic inflammation may be one of the mechanisms mediating these beneficial effects
- Foods are more than just the sum of their individual nutrients; the dairy foods/fermented dairy matrix is unique and needs to be considered collectively when looking to understand these health benefits

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Dairy Nourishes NETWORK

Dairy Nourishes Network members will receive:

- 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

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Questions?

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American Dairy Association Indiana

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