

Fermented Foods for Community and Health

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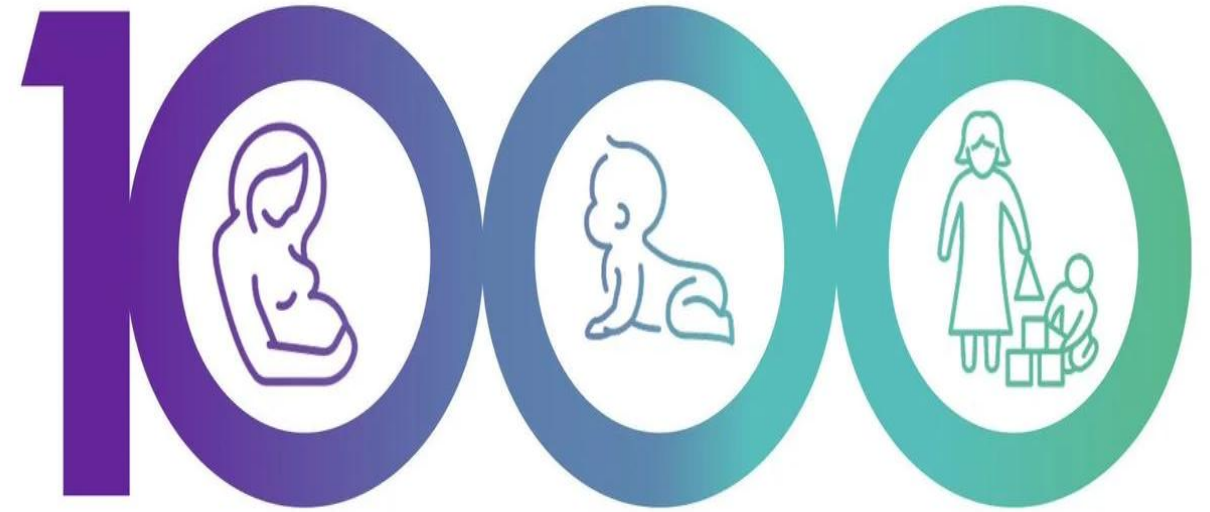
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Nuestros Sabores

October 29, 2025



Today's Expert Presenter



- Jenny Smilowitz, PhD
- Assistant Professor, Cooperative Extension
- Department of Nutrition, UC Davis

Interests

- Researching evidence-based microbiome supporting diets
- Promoting breastfeeding
- Supporting assistance programs through nutrition education



From Abuela's Kitchen to Clinical Practice

Outline of Today's Presentation

1. What is food fermentation?
2. Examples of fermented foods.
3. Benefits of fermented dairy.
4. Research on fermented foods & health.
5. Fermented food intake in the U.S.
6. Evidence-based practices to support fermented food consumption.

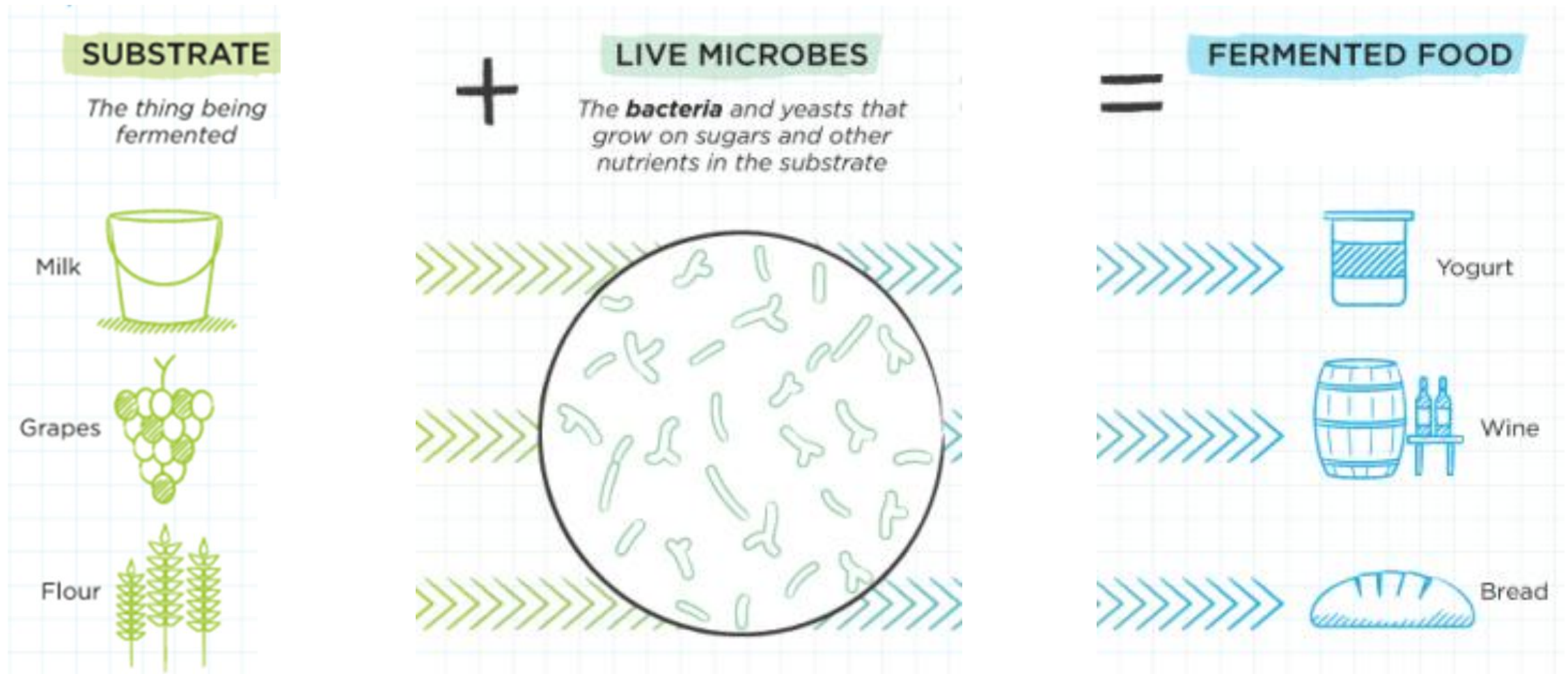
Fermentation Saves Humankind

- Humans have fermented foods for at least 10,000 years.
- Foods made through desired microbial growth and enzymatic conversions of food components.
- Benefits: preservation, nutrition, digestibility, taste & texture.
- Driver of human survival & possible hominin brain expansion.
- Fermentation is represented by cultures around the world.



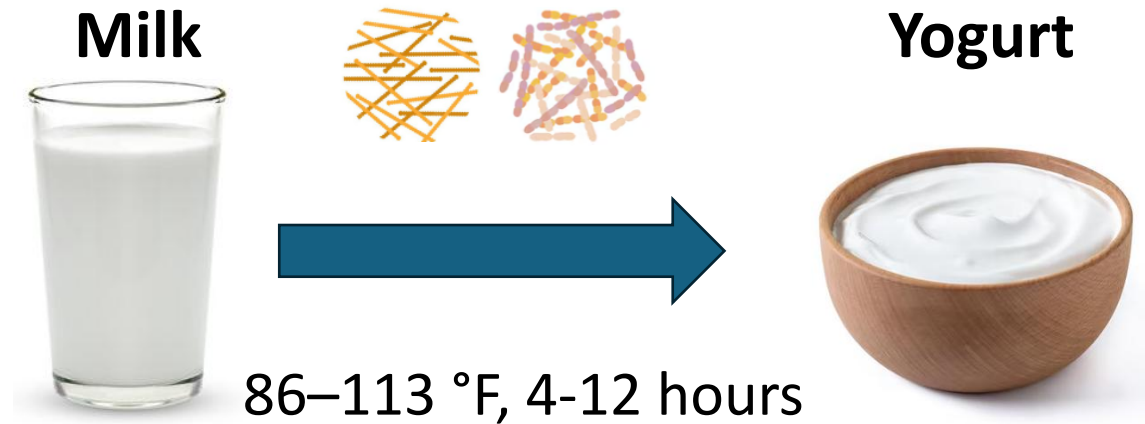
Goddess Mayehuatzin with a mature agave and a pot of fermented pulque.

How is food fermented?



Some products have
“live” microorganisms

How is food changed with fermentation?



Component	Milk (1 cup)	Yogurt (6 ounces)	Effect
Lactose	12 g	4-5 g + Lactic acid	Improves lactose intolerance
Protein	Intact	Partial hydrolysis, peptides	Improves digestibility, bioactive
Microbes	Low	$\sim 10^{8-10}$	Supports host, microbial health
pH	6.7	4.2-4.6	Acidifies: thickens & preserves
Metabolites	None	Lactic acid	Supports gut barrier & immune regulation

What are
examples of
fermented foods
& beverages?



Fermented Foods with “Live” Microbes

- Yogurt, kefir, most cheeses
- Miso, natto, tempeh
- Fermented vegetables & fruits
“keep refrigerated before
opening” “contains live
cultures”
- Dry fermented sausages
- Most kombuchas & raw,
unfiltered vinegars made
with the “mother”, cloudy,
“refrigerate after opening”
- Some beers, “unfiltered”



Fermented Foods without “Live” Microbes



- Bread, including authentic sourdough (baked)
- Shelf-stable pickles/fermented vegetables (heat-treated)
“refrigerate after opening”
- Semi-dry sausages (heat-treated) “keep refrigerated”
- Soy sauce (heat-treated)
- Vinegar (filtered, heat-treated)
- Wine, most beers, distilled spirits (filtered)
- Coffee & chocolate beans (roasted)

Foods that are NOT Fermented



- Fresh sausage
- Vegetables pickled in **vinegar** and clear (vs. “fermented” or “lactic acid fermentation”)
- Chemically-produced **“hydrolyzed”** soy sauce (vs. “naturally brewed”)
- Non-fermented cured meats & fish (ham, bacon, deli meats)
- Acidified cottage cheese (**“cultured”** vs. “made with live active cultures”)

Definitions

Probiotics



- Live microorganisms that have **documented benefits** on the host.
- Example: *Bifidobacterium animalis* subsp. *lactis* BB12.
- Can be in nutritional supplements or added to foods.

Fermented foods



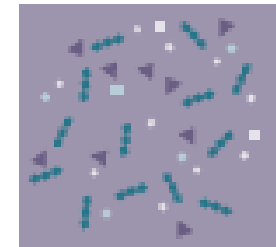
- Made by desirable microbial growth & enzymatic conversions. Not necessarily with probiotics.
- Example: yogurt contains *S. thermophilus* and *L. bulgaricus*.

Prebiotics



- Food used by host microbes & confer a benefit.
- Examples: human milk oligosaccharides, inulin.

Postbiotics

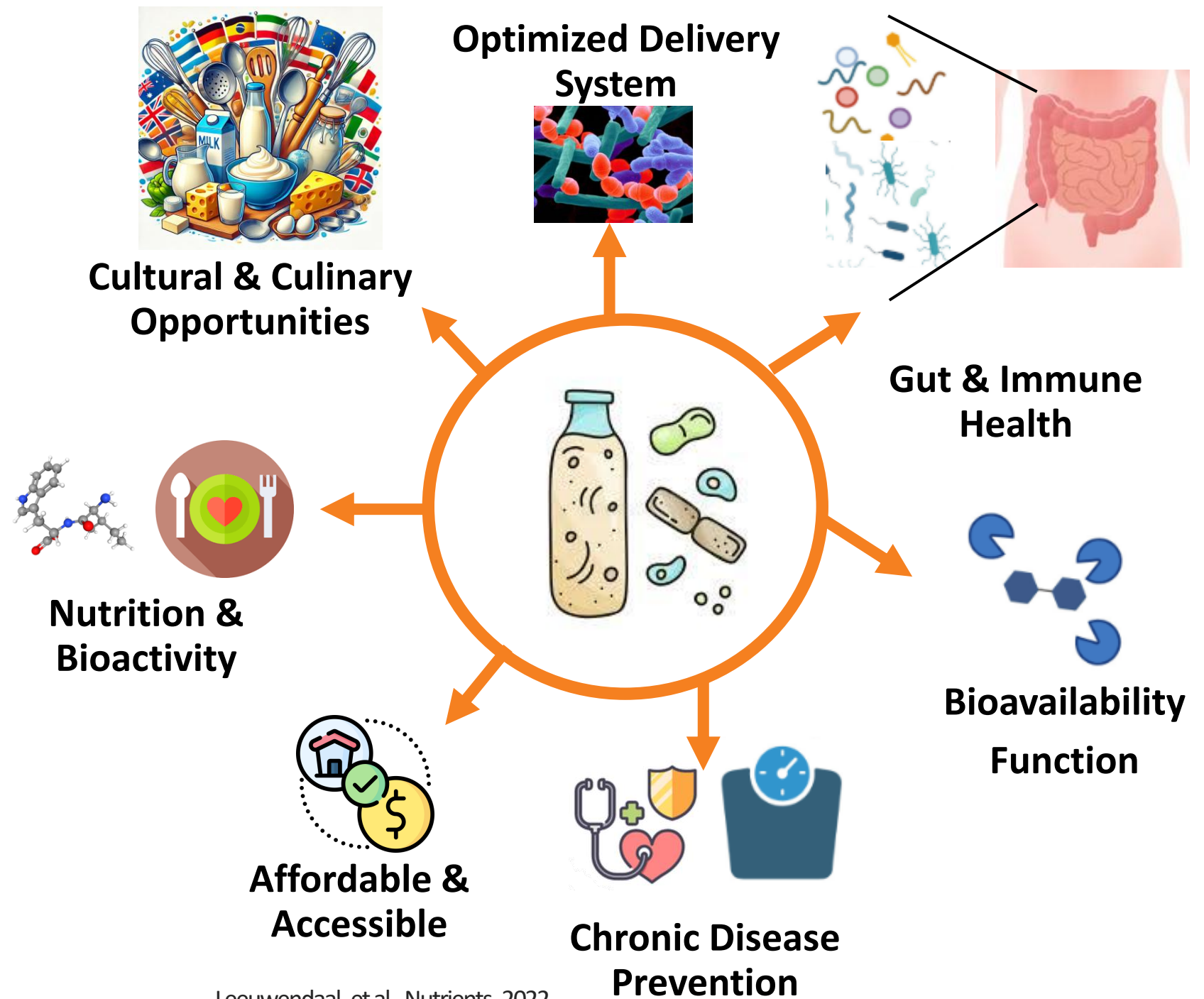


- Parts of non-viable microorganisms or their metabolites that exert benefits on the host.
- Examples: lactic acid

Fermented Dairy Offers Unique Benefits



Fermented Dairy Foods' Unique Benefits



Fermented Dairy: Nutrition & Bioactivity

Nutrients

- High quality proteins, vitamin D, calcium, phosphorous, magnesium & zinc.
- Microbes synthesize B-vitamins.
- Lack anti-nutrients.

Bioactive molecules

- Milk peptides: ACE-inhibitory, antimicrobial, immunomodulatory.
- Exopolysaccharides: texture, sensory, prebiotic.
- Bacteriocins: antimicrobial peptides.
- Organic acids: acidify, preserve and inhibit pathogens.
- Neuroactive metabolites: γ -Aminobutyric acid (GABA).

Fermented Dairy: Affordable & Accessible

Affordable

- Less expensive than plant-based dairy alternatives.
- Least-cost sources of calcium and vitamin D in the U.S. diet.
- Dairy ranks high among high-value foods on nutrients-per-dollar-index.

Accessible

- WIC food package increases retail availability.
- Fermentation extends product quality & shelf life.



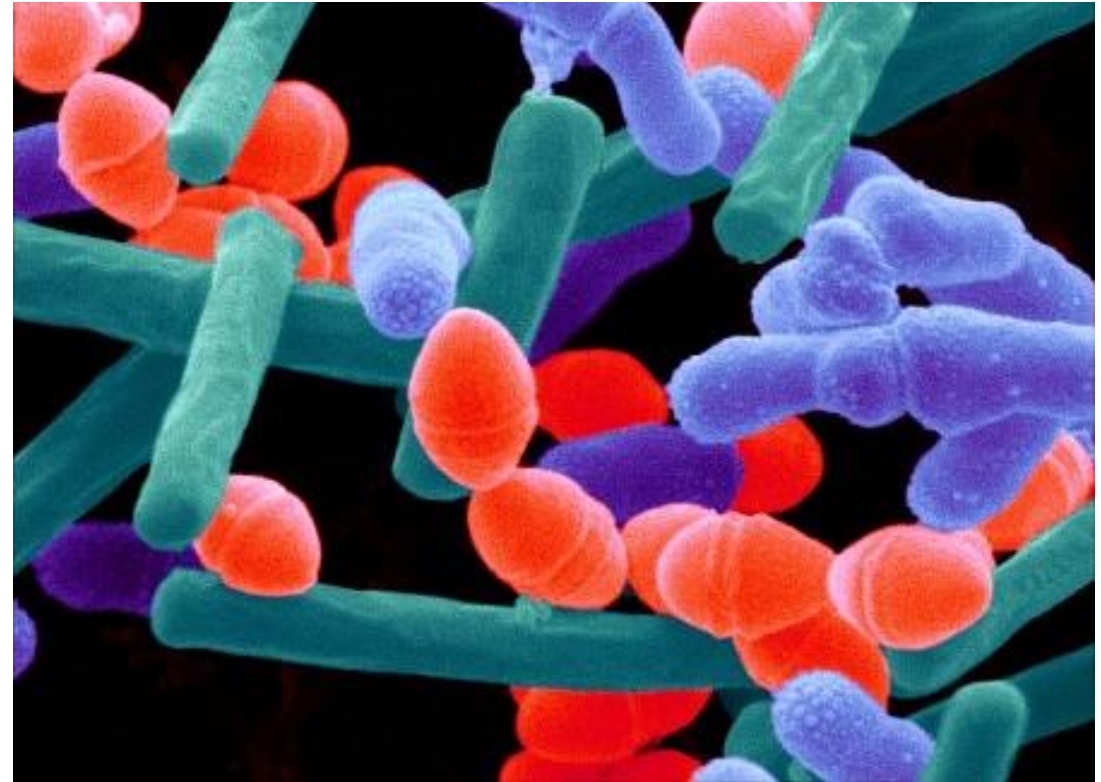
Fermented Dairy: Bioavailability Function

- Enhance digestibility of milk proteins.
- Improves mineral solubility and absorption.
- Lactose hydrolysis and improves tolerance.
- Enhance lipid digestion & regulate cholesterol metabolism.
- Gut microbiome synergy & micronutrient absorption.



Fermented Dairy: Optimized Delivery System

- Superior fermentation matrix support.
- Milk proteins neutralize acid stress.
- Rich nutrient source for starter cultures.
- Lack plant secondary metabolites that inhibit starter culture growth.



Fermented Dairy: Culture & Culinary Opportunities

- Historically significance in Latin America.
- Today, yogurt has a strong part of Latinx traditions vs. U.S. traditions.
- Yogurt and kefir have potential to be adapted into Latin American cuisines.

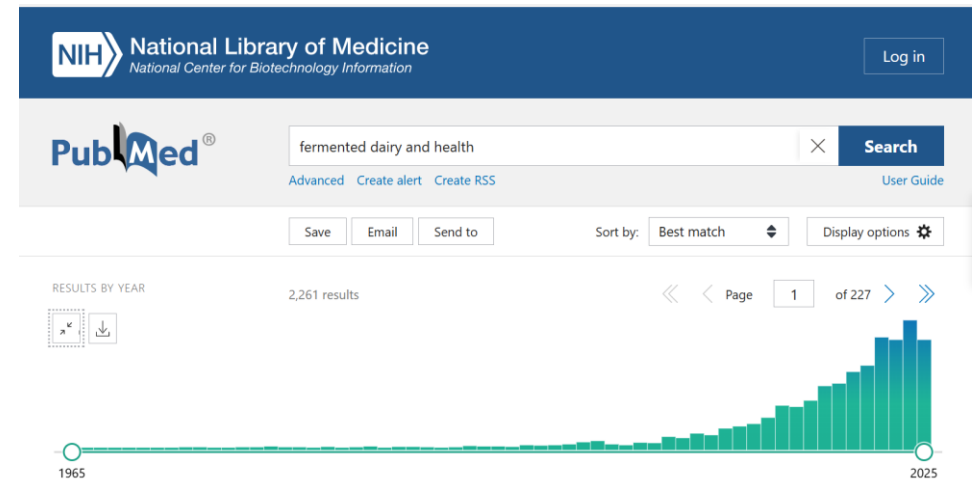


Fermented Dairy: Chronic Disease Prevention

Mostly favorable outcomes or some neutral

- Gut microbiome
- Gut disorders
- Inflammatory/immune biomarkers
- Acute gastrointestinal & respiratory infections
- Cardiometabolic markers: lipids, glucose/insulin/HbA1c, blood pressure
- Abdominal obesity/adiposity
- Cognitive/psychological outcomes

2,261 total publications, 259 in 2025



Research on Fermented Foods & Health



Fermented Foods & Cardiometabolic Disease Risk

- Cross-sectional analysis, NHANES 2001-2018.
- ~40,000 Adults 19 y and older.
- Foods with live microbes/fermented foods.
- **Outcomes:** blood pressure, anthropometric measures, and plasma biomarkers.
- **Results:** Additional 100g intake of foods with live microbes was associated with improved physiological parameters.
- Patterns were similar when 100g fermented foods were analyzed separately.

Outcome	Covariate set 1
	<i>n</i>
Mean diastolic BP (mm Hg)	40,898
Mean systolic BP (mm Hg)	41,077
Body mass index (kg/m ²)	41,697
C-reactive protein (mg/dL)	31,439
Plasma glucose (mg/dL)	18,509
HDL cholesterol (mg/dL)	40,313
Insulin (μU/mL)	18,163
LDL cholesterol (mg/dL)	17,980
Total cholesterol (mg/dL)	40,314
Triglycerides (mg/dL)	18,327
Waist circumference (cm)	40,804
Weight (kg)	41,847

Fermented Milk & Blood Pressure

- Meta-analysis of 14 randomized placebo-controlled trials (n = 702)
- Fermented probiotic milk vs. placebo control.
- **Results:**
 - Systolic BP reduced by 3.1 mmHg
 - 33% greater effect on systolic BP in hypertensive vs. normotensive participants.
 - 3x greater effect on systolic BP in Japanese vs. Europeans.



Yogurt & Type 2 Diabetes Risk

7 cohort studies, >250,000 participants and 19,082 cases.

- **22% lower** type 2 diabetes risk for every 200g/d of yogurt consumed.

Two cohort studies, ~200,000 Americans followed every 4 years.

- **17% lower** type 2 diabetes risk with each extra serving of yogurt.

Meta-analyses of 14 prospective cohort studies, ~459,000 participants and 35,863 cases.

- **18% lower** type 2 diabetes risk with one serving of yogurt per day.



The American Journal of Clinical Nutrition
Volume 98, Issue 4, October 2013, Pages 1066-1083



Dairy products and the risk of type 2 diabetes: a systematic review and dose-response meta-analysis of cohort studies ^{1 2 3}

Dagfinn Aune, Teresa Norat, Pål Romundstad, Lars J Vatten

Chen et al. BMC Medicine 2014, 12:215
<http://www.biomedcentral.com/1741-7015/12/215>



RESEARCH ARTICLE

Open Access

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

Mu Chen^{1,2}, Qi Sun^{1,3}, Edward Giovannucci^{1,2,3}, Dariush Mozaffarian^{1,2,3,4}, JoAnn E Manson^{2,3,5}, Walter C Willett^{1,2,3} and Frank B Hu^{1,2,3*}

FDA Announces Qualified Health Claim for Yogurt and Reduced Risk of Type 2 Diabetes

HFP Constituent Updates

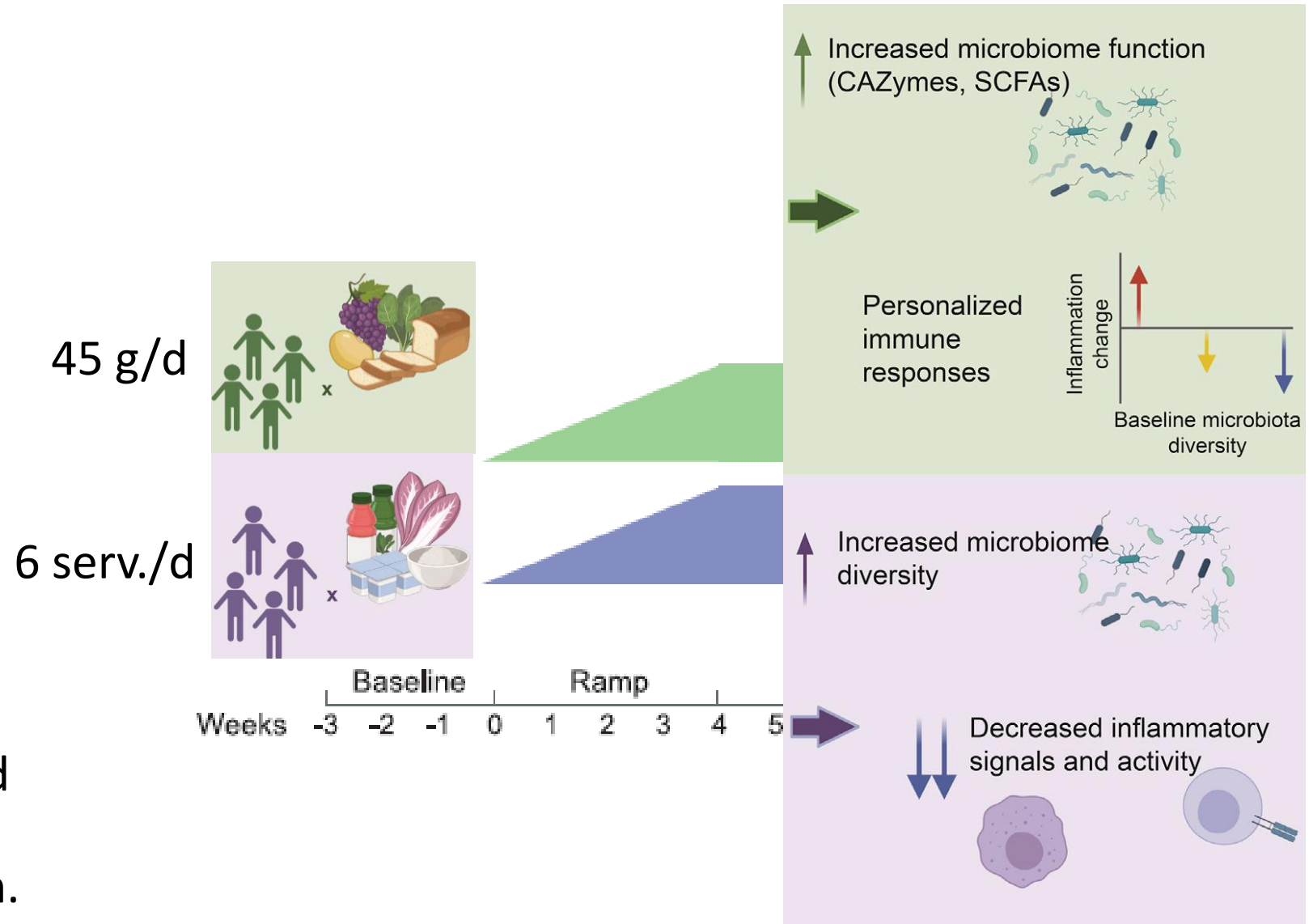
Constituent Update

March 1, 2024

- 28 observational studies were identified as relevant.
- Qualified health claim = some evidence but not conclusive
- “Eating yogurt regularly, at least 2 cups (3 servings) per week, may reduce the risk of type 2 diabetes according to limited scientific evidence.”

Fermented Foods & Gut Microbiome-Immune Axis

- 17-week randomized study
High fiber
Or
High fermented foods
- Ramped up intake for 4 wks. & maintained for 10 wks.
- **High fiber** increased gut microbiome carbohydrate function & personalized systemic inflammation responses.
- **High fermented food** increased gut microbiome diversity & reduced systemic inflammation.

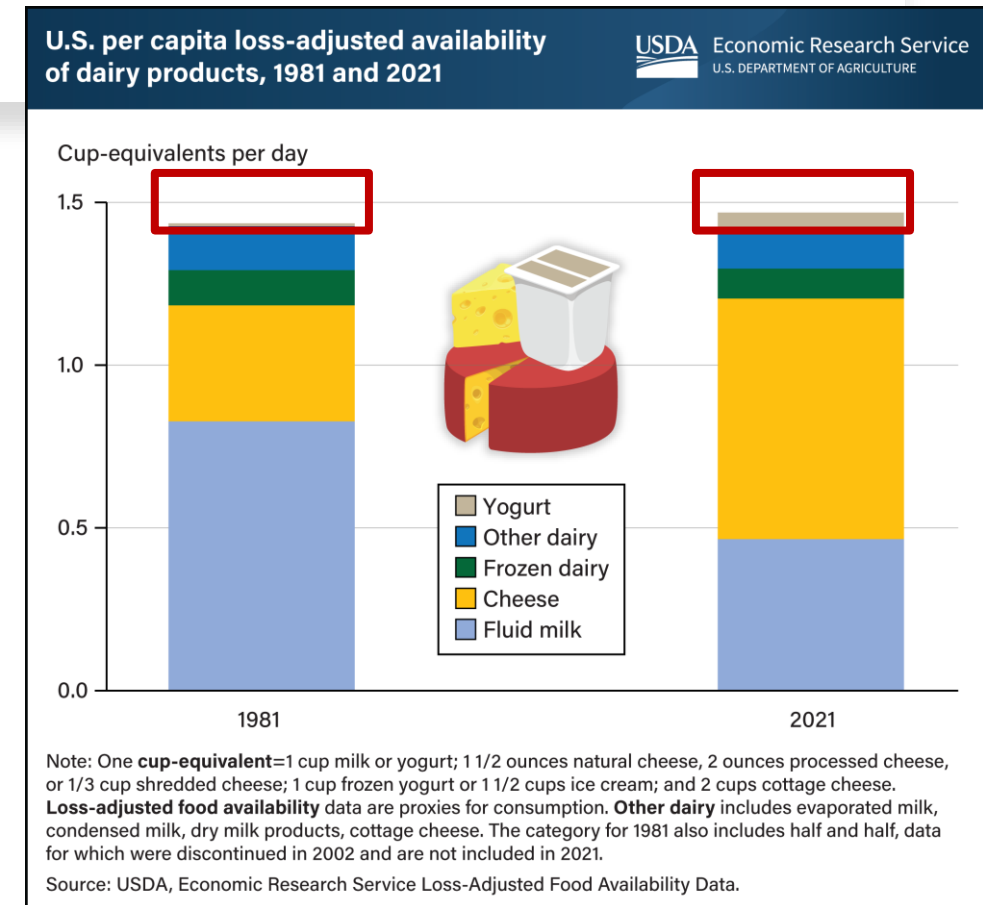


Consumer Research



How much yogurt do Americans consume?

- Yogurt consumption increased by 5x, from 0.01 to 0.05 cup equivalents per person/day (~1.5 cups/month per person).
- NHANES data 2001–2016 data ($n = 65,799$).
 - 6.4% children & 5.5% adults consumed 5-6 ounces yogurt/day.
 - Associated with higher healthy eating index scores.
 - Differences in yogurt consumption by gender, race, income level, physical activity.



What community members may be saying

I don't like fermented foods because they taste sour.

Fermented foods are too expensive.

I really want to eat more fermented foods but don't know how to use them in my cooking or meal prep.

My kids don't like yogurt.

Addressing the Needs of Community Members





Evidence-based Practices to Support Fermented Food Intake

1. Education & literacy
 2. Taste familiarization & repeated exposure
 3. Access & affordability
 4. Cultural framing & relevance
 5. Small habit targets & behavior change
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Education & Literacy

- Clarify what counts as a true fermented food (live + active cultures, effect of processing).
- Use brief visuals or cooking demos to show fermentation in action.
- Teach participants to read labels: look for “live and active cultures”, note sugar/sodium levels, and understand shelf stability.
- Link fermented foods to known health outcomes (digestive comfort, microbiome diversity, nutrient absorption).
- Integrate short micro-lessons into nutrition curricula (e.g., EFNEP, WIC, or wellness classes).



Taste Familiarization & Repeated Exposure

- Introduce small tastings first (1–2 tbsp yogurt or sauerkraut).
- Encourage at least 5–10 repeated exposures—research shows repeated tasting reduces neophobia and increases liking.
- Pair fermented foods with familiar items (yogurt + fruit, kimchi + rice, kefir + smoothie).
- Use milder ferments for beginners (e.g., yogurt before plain kefir).



Access & Affordability

- Identify low-cost, high-quality fermented options (plain yogurt, bulk sauerkraut, homemade pickles).
- Share recipes and quick DIY fermentation guides (simple yogurt/kefir starters, small-batch vegetables).
- Partner with local grocers and food pantries that offer refrigerated live ferments.
- Address barriers: refrigeration space at home, product availability, and price—offer community fermentation workshops to build confidence.

Cultural Framing & Relevance

- Position fermentation as a traditional and cultural practice, not a “new trend.”
- Incorporate culturally resonant examples: Curtido (Latin America), requesón (Mexico), kimchi (Korea), miso (Japan), yogurt lassi (South Asia).
- Substitute non-fermented ingredients with fermented ingredients in culturally resonant examples (e.g. replace milk with kefir to make licaudo).
- Encourage storytelling around family recipes and food heritage.
- Use community champions to demonstrate local relevance and build trust.



Small Habit Targets & Behavior Change

- Encourage participants to set one micro-goal per week, such as “eat yogurt three mornings this week.”
- Track success visually (stickers, logs, or text-message reminders).
- Celebrate small wins—habit reinforcement predicts long-term dietary change.
- Gradually expand goals: “add one new fermented food type this month.”



Conclusion

- Food fermentation has been used for over 10,000 years delivering benefits from food preservation, taste & texture, digestibility and nutrition.
- Fermented dairy offers unique benefits by 1) delivering nutrients and bioactives, 2) optimized delivery system for live microbes; 3) enhancing nutrient bioavailability, 4) providing affordable and accessible sources, 5) adaptable to diverse cultural cuisines.
- Consumption of fermented foods, especially fermented dairy, is linked to improved cardiometabolic health outcomes.
- Embracing evidence-based practices to support fermented food consumption by community members that include education, exposure and accessibility can drive initial adoption while cultural framing and small, achievable goals sustain long-term behavior change.



UCDAVIS
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NIFTY
& Study



**DO YOU RECEIVE WIC BENEFITS
OR
QUALIFY TO RECEIVE WIC?**

Tell us what you think of yogurt
& other fermented dairy

Participate in the **NIFTY Study!**

We are recruiting California residents who are WIC eligible participants to complete an online survey about their use and needs for fermented dairy foods for a \$50 gift card to Target.

Thank you!



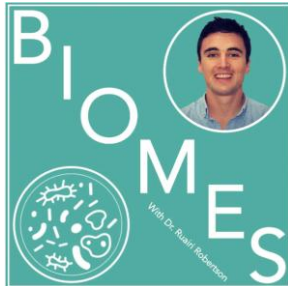
**SCAN FOR THE STUDY
WEBSITE!**

Resources for Clinicians



ISAPP is a scientific organization that gathers scientific data and creates reliable, science-based information for clinicians and consumers.

<https://isappscience.org/topics/>



BIOMES is a scientific podcast for scientists and clinicians Interested in our understanding of the human microbiome.

<https://ruairi robertson.com/biomes-podcast>



UC Master Food Preserver Program

The University of California Master Food Preserver Program extends UC research-based information about home food safety and preservation to the public.

<https://ucanr.edu/program/uc-master-food-preserver-program>



A website with clinician/user-friendly sections: Why eat fermented foods? How to recognize them? How large a “serving”? How to start slowly?

<https://med.stanford.edu/nutrition/education/Resources>