Getting Cultured with Fermented Dairy Foods
Indiana School Nutrition Association
November 14th, 2019

#WinnersDrinkMilk
#DairyNourishesLife

Today’s Presenter
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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
Fermented Foods:
What is old is new again

Americas
- Hawaii - Poi
- Mexico - Pozol
- Colombia - Guarapo
- Peru - Champus

Asia
- Korea - Kimchi
- Japan - Natto
- Tibet - Jun
- India - Lassi
Africa

Ethiopia
- Injera

Ethiopia
- Ayib

South Africa
- Incwancwa

Nigeria
- Iru

Europe

Germany
- Sauerkraut

Eastern Europe
- Smetana

Iceland
- Skyr

Central Europe
- Kefir

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, Chezar Lughat Al-Turk
- Lactobacillus bulgaricus, responsible for milk fermentation, is discovered
- 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
- Yogurt is commercialized through pharmacies

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

Modified from: Yogurt in Nutrition. Complete History of Yogurt Making
Fermented Foods: Topping the Trends Lists


https://www.lpollockpr.com/trends/


https://www.discoverundeniablydairy.com/curriculum

What are fermented foods?
A fermented food or beverage is a type of food made by extensive microbial growth. These foods are nothing new. They've been around for thousands of years. To understand how fermented foods are made, let's look at yogurt.

Yogurt is a fermented food made from milk. During yogurt fermentations, lactic acid producing bacteria grow on the sugars and other nutrients in milk. As they multiply, the bacteria produce compounds that change the flavor, texture, and nutrients in the milk to give us what we know as yogurt.

The value of fermented foods:
Source of live active probiotics
Improve food safety
Increase the nutritional content of foods
Increase the bioavailability of nutrients in raw foods
Increase food safety and shelf life
Fermented Food or Probiotic?

**Fermented Food**
- Made with microorganisms
- May or may not contain live active cultures at a level to confer a health benefit
- Most cheeses are fermented foods

**Probiotic**
- Should meet FAO definition: "Probiotics are live microorganisms that, when administered in adequate amounts, 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

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

Fermented Foods and Gut Health
- The human digestive tract contains approximately 100 trillion bacterial cells = gut microbiota
- An imbalance between "good" bacteria and "bad" bacteria = dysbiosis
- Factors influencing the gut microbiota composition
  - 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
- Fermented foods may contain living cultures that can add beneficial bacteria to the digestive tract
- Eating fermented foods helps maintain a balance between good and bad bacteria → contributing to a healthier microbiota

Dairy Foods and Health Outcomes
### Milk: 9 essential nutrients
- Protein
- Calcium
- Vitamin D
- Phosphorus
- Vitamin A
- Riboflavin
- Pantothenic acid
- Niacin
- Vitamin B12

### Cheese*: 6 essential nutrients
- Protein
- Calcium
- Phosphorus
- Vitamin B12
- Niacin
- Vitamin A

*Nutrients based on USDA Database for Cheddar #01009

### Yogurt: 7 essential nutrients
- Protein
- Calcium
- Phosphorus
- Vitamin B12
- Pantothenic Acid
- Riboflavin
- Zinc

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**Dietary Guidelines Recommend 3 Daily Servings of Dairy Foods for Those ≥9 years**

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.

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**Fermented Dairy Foods and Health Outcomes**
Fermented Dairy Foods & Type 2 Diabetes
Visit Science Summaries at nationaldairycouncil.org

Dairy Foods are Linked to Reduced Risk of Type 2 Diabetes and Neutral Outcomes

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
Consistent Evidence Demonstrates Eating Yogurt is Associated with Reduced Risk for Type 2 Diabetes


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

14 Prospective Cohort Studies
>450,000 participants

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

Prospective Cohort Studies
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Fermented Dairy Foods & Cardiovascular Disease

Visit Science Summaries at nationaldairycouncil.org
Dietary Guidelines for Americans, 2015-2020

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Dietary Guidelines for Americans, 2015-2020

Cheese Consumption does not Impact Cholesterol Levels

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

Results: No differences in total, LDL and HDL cholesterol

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

"This meta-analysis of prospective studies suggests a nonlinear inverse association between cheese consumption and risk of CVD."

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

13 Prospective Observational Studies

Hypertension Results: Yogurt and DASH Scores


“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.”

3 Cohort Studies (NHS I & II, HPFS)
~184,000 participants
*NDC sponsored study

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


Infographic adapted from Bell Institute: https://twitter.com/bellinstitute/status/968546334163767296

“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.”

2 Cohort Studies (NHS & HPFS)
~74,000 participants
*NDC sponsored study

Reduction in risk of having a heart attack in females

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

Systematic Review of 52 Clinical Trials

Fermented Dairy Foods & Inflammation

Inflammation
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Critical Reviews in Food Science and Nutrition
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Systematic Review of 52 Clinical Trials
Eating Yogurt Linked to Reduced Inflammation and Improved Markers of Gut Integrity

Low fat yogurt consumption reduces biomarkers of chronic inflammation and improves markers of gut integrity in healthy premenopausal women in a randomized controlled trial. 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.

Economic Model Predicts Increased Yogurt Consumption Could Reduce Health Care Costs

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

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

Fermented Dairy Foods Matrix

DELIBERATELY LIVING FERMENTS TO THE GI TRACT

- Microorganisms in the diet
  - The consumption of yogurt or fermented foods increases the numbers of microorganisms by up to 10^10/day.
  - It could be equivalent to introducing new, albeit transient, bacteria into the indigenous, intestinal microbiota.

- 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.
  - The consumption of low-fat cultures in yoghurt contributes to improve digestion of lactose in individuals with lactose malabsorption.

Is this good for my body? Is this good for the animals? Is this good for the planet?

People are Asking…
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

...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."
In Only 70 Years, We’ve Reduced our Impact…

The dairy community has a voluntary commitment to further reduce GHG 25% by 2020

From Research to Resources and Recipes

Safety & Storage to Minimize Food Waste

<table>
<thead>
<tr>
<th>Cheese</th>
<th>Yogurt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not leave at room temperature for &gt;2 hours, 1 hour if &gt;90° F</td>
<td>Stored properly, shelf-life 7-14 days</td>
</tr>
<tr>
<td>Keep refrigerator at 35-40° F</td>
<td>Store tightly covered in original container on top-shelf of refrigerator</td>
</tr>
<tr>
<td>Factor 20-30 minutes to come to room temp</td>
<td>Eating only a portion of a carton? Spoon out what you intend to eat and return the carton to the refrigerator</td>
</tr>
<tr>
<td>• Soft Cheeses: Toss after 2 hours</td>
<td>If separation occurs, stir the liquid (aka: whey) back into the yogurt</td>
</tr>
<tr>
<td>• Hard Cheeses: Can sit out for 2 hours then wrap well; refrigerate to use again</td>
<td>What about freezing?</td>
</tr>
<tr>
<td>Mold?</td>
<td>• Changes texture. May lose active cultures</td>
</tr>
<tr>
<td>• Soft Cheeses: Don’t eat</td>
<td>• Won’t significantly impact nutritional value</td>
</tr>
<tr>
<td>• Hard Cheeses: Cut ≥ 1” around and below the mold spot, re-cover the cheese in fresh wrap</td>
<td>What about freezing?</td>
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<td>What about freezing?</td>
<td>• Soft cheese freeze well when shredded</td>
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<td>• Aged cheese may become crumbly</td>
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<td>• Thaw 24-28 hours in refrigerator</td>
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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/2016/can-you-freeze-yogurt
Safety & Storage to Minimize Food Waste

**Cheese**
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- Mold?
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- What about freezing?
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**Yogurt**
- Do not leave at room temperature for >2 hours, 1 hour if >90° F
- Keep refrigerator at 35-40° F
- 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
- What about freezing?
  - Changes texture; may lose active cultures
  - Won’t significantly impact nutritional value

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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
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 suggests 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.

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 media
- In-person educational and networking events
Questions?

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