BEYOND THE CARTON:

The Contribution of Dairy Foods to Nutritious Diets and School Meals

By Christina Uticone

Dairy milk and foods are nutritional powerhouses, fueling growth and supporting health throughout the human lifespan. You might even say that milk "Does a body good!" As the body of science continues to show the potential role of nutrient-dense dairy foods—specifically milk, cheese and yogurt at all fat levels—in a healthy diet, what remains constant is that these nutrient-rich dairy foods deliver high-quality nutrition to Americans at each stage of life.

DAIRY NOURISHES A LIFETIME OF HEALTH

When it comes to delivering essential nutrients, dairy foods are tough to beat. Milk alone contains 13 essential nutrients in every serving, including protein, zinc, iodine, vitamins A, D and B12, selenium, calcium potassium and phosphorus. Other dairy foods, like cheese and yogurt, also contribute high-quality protein, calcium, phosphorus, selenium, iodine and B vitamins to our daily diets. Studies show that Americans get about 52% of their calcium, 51% of their vitamin D and 17% of their protein via their dairy intake.

Current guidance* recommends dairy consumption across all life stages from infancy (6-11 months) through older adulthood. Early and regular consumption of dairy milk and dairy foods deliver health-supporting nutrients with a host of science-backed benefits, from bone and heart health, immune support and more. In addition, people who are pregnant or breastfeeding also benefit from consuming dairy milk and dairy foods, which support fetal brain and spinal cord development as well as maternal health.

The protein in dairy milk and dairy foods helps build and repair muscle tissue and supports immune cells. Nutrients like calcium, phosphorus, zinc, potassium and vitamin D are key for building and maintaining strong bones and teeth, while vitamin A also chips in to support healthy immune cells and to keep eyes and skin healthy. The B vitamins found in many dairy foods—think B12, riboflavin (B2), pantothenic acid (B5) and niacin (B3)—help us convert food into fuel. In addition to the protein and vitamin A found in dairy foods, healthy immune function is also supported by zinc, selenium and vitamins D and B12. The unique nutrient package of dairy foods makes it difficult to replace with non-dairy foods and still reap the same nutritional benefits. Dairy foods are frequently the most affordable option to meet those nutrient needs as well.

A body of evidence links diets that include low-fat and fat-free dairy foods to a reduced risk of chronic diseases like type 2 diabetes and cardiovascular disease in adults, as well as reduced blood pressure and neutral-to-lower levels of inflammation. However, like fruits and vegetables, dairy foods are also an under-consumed food group. As children age the gap widens between the recommended amounts of dairy foods and dairy foods consumed, particularly in teen girls, and overall Americans are under consuming dairy foods—averaging about two dairy servings per day versus the recommended three. What's the difference between two and three? Consuming the recommended three servings of dairy foods contributes just 12% of daily calories but deliver 20-69% of many recommended key nutrients like calcium, vitamin D and potassium.

The good news keeps on coming as emerging research indicates the benefits of dairy foods like milk, cheese and yogurt may go beyond those individual, building-block nutrients and extend to the 'whole food'. What does that mean? Simply put it means that consuming dairy nutrients as a "packet" may increase the overall benefits of the individual nutrients versus consuming them individually.

On a recent episode of the "Your Dairy Checkoff" podcast, Dr. Chris Cifelli, Senior Vice President of Nutrition Research at National Dairy Council, discussed the potential role of nutrient-dense dairy foods, which includes milk, cheese and yogurt, at all fat levels in an overall healthy diet and how the consumption of the unique "dairy packet" of nutrients could potentially offer more benefits than the sum of their (nutrient) parts.

BALANCED DIETS ACROSS LIFE STAGES

INFANTS
(6-11 months)

Introducing developmentally appropriate foods like cheese and yogurt encourage healthy eating habits and deliver nutrition.

TODDLERS
(12-23 months)

The transition from human milk or infant formula to whole milk and dairy foods will supply essential nutrient support for ongoing growth and development.

PRESCHOOLERS
(2-5 years)

Did you know? Leading health experts agree that water and plain milk are the only recommended beverages for children up to five years of age, except in cases of dairy protein allergies where fortified soy beverages are recommended.

"Dairy fat is incredibly complex and made up of more than 400 different types of fatty acids," explains Dr. Chris Cifelli. "People often think only of saturated fat, but about 20% of milk fat is oleic acid, a monounsaturated fat also found in olive oil. And these fats are carried within the milk fat globule membrane (MFGM), a unique structure that may influence how fats are absorbed and used in the body, which may be part of the reason whole milk dairy foods are not linked with cardiovascular disease risk."

FAT LEVELS: "FAT" VS. FICTION

It's been awhile since we've seen dairy foods with more fat such as whole or 2% milk on school lunch trays, but when it comes to milk consumption, retail data reveals that many Americans still strongly prefer higher-fat milk at home; 48% of all milk sold at retail is whole milk, followed by reduced fat (35%), low-fat (11.7%) and fat-free skim (5.2%).

With increased chatter about the potential for higher-fat dairy in school meals and keeping in mind that nutrition science is always evolving, now seems like the right time to take a closer look at the current data surrounding the benefits of dairy consumption (were talking those nutrient-rich options like milk, cheese and yogurt) at all fat levels as part of a healthy diet.

It is true that choosing lower-fat or non-fat dairy options helps support the recommendation that we limit our intake of saturated fats, however emerging data also indicates that regardless of fat content, dairy consumption of milk, cheese and yogurt contributes to an overall healthy diet. Whether it's whole, low-fat, fat-free, or lactose-free, every glass of dairy milk delivers 13 essential nutrients, which means it has the same role to play in terms of building healthy bones and supporting a healthy immune system.

Studies show that healthy diets including low-fat and fat-free dairy foods are associated with a reduced risk of chronic diseases like type-2 diabetes and cardiovascular disease, as well as reduced blood pressure, however that doesn't necessarily mean there is no room for higher fat dairy foods in a healthy, well-balanced diet. In fact, there is a growing body of evidence that suggests we may have room for "fat flexibility" when it comes to dairy and heart health. Research increasingly shows that whole milk dairy foods may have a role in protective heart health too.

A 2024 study of nearly 245,000 adults in 80 countries showed that "diets that included 14 servings of dairy per week (mainly whole milk dairy foods) were linked to a reduced risk of cardiovascular disease (CVD), heart attack, stroke and mortality." A 2020 study published in *Frontiers in Nutrition* found that for Americans 9 years and older, one of the three recommended daily servings of dairy foods could be whole milk (3.25% milk fat) or reduced-fat (2%) while still staying within current* recommended limits for saturated fat, calories and sodium intake, especially if those choices are reduced-fat or whole milk.

Going back to those potential benefits of 'the whole food,' we know that it's not simply the nutrients but the bioactive compounds and physical components of a food—including fat content—that can influence how we digest, absorb and metabolize what we eat.

**Based on Dietary Guidelines for Americans, 2020-2025*

GRADE SCHOOLERS
(6-12 years)

Building bone mass and healthy habits, dairy's calcium, vitamin D, protein and phosphorus help support bone mass and may reduce risk of osteoporosis in the future.

TEENS
(13-18 years)

The gap between dairy foods recommended and dairy foods consumed widens during a period of critical growth.

ADULTS
(19-59 years)

Consuming dairy foods is important during this period when adults want to accrue peak bone mass, as well as potentially lowering the risk of cardiovascular disease and type 2 diabetes.

OLDER ADULTS
(60+ years)

High-quality protein found in dairy foods helps maintain muscle and bone-building nutrients in a stage when adults are at greater risk of health conditions related to changing bones and loss of muscle mass.

MOO-VING THROUGH THE MYTHS: TOP DAIRY QUESTIONS ANSWERED

01. Does lactose intolerance mean no more dairy?

Simply put, lactose intolerance is the inability to digest lactose, a natural sugar found in dairy foods. Symptoms can vary but usually include abdominal pain, bloating, diarrhea or gas.

Lactose intolerance is different than a milk allergy, where all dairy foods need to be avoided. So, with lactose intolerance, it's often doesn't have to be all or nothing. Think of it as a spectrum, where many people can still confidently enjoy dairy foods, depending on the amount of lactose. And there are options that can help:

Lactose-free dairy foods: These are dairy foods that have lactose removed. For example, lactose-free dairy milk is real milk without lactose. Lactose-free dairy milk meets the school meal pattern requirements for fluid milk. Schools may choose to provide lactose-free dairy milk to participants without needing to obtain a written request from a parent or guardian.

Lower-lactose foods: Natural cheeses, cottage cheese and Greek yogurt have less than 5 grams of lactose per serving, making them easier for most people to digest and incorporate in a variety of recipes.

02. Is flavored milk nutritious?

Flavored milk is an important source of nutrients for many growing kids. It offers a good or excellent source of 13 essential nutrients and only supplies about 4% of added sugars to kids' diets. According to this study published on Science Direct, flavored milk consumption is not associated with being overweight or obesity and often is linked to healthier overall diet quality. Kids like the taste and are therefore more likely to drink it, which leads to nutrition benefits and reduced food waste. Since 2007, the U.S. dairy community has reduced added sugars in school milk by 57%. Currently, the average added sugar content in 8 ounces of flavored school milk is only 7.2 grams.

03. How is dairy milk different from plant-based beverages?

Plant-based beverages can fit in a healthy diet, but they are not nutritionally equivalent to dairy milk. Compared to plant-based alternatives, dairy milk is often a better source of high-quality protein and 12 other essential nutrients with a simple ingredient list and affordable price point. Plant-based beverages vary in nutritional profiles, additives and added sugar. That's why expert organizations caution against plant-based beverages for growing kids but instead recommend plain milk and water. For those with dairy protein allergies, fortified soy beverages are recommended.

DEEP DIVE:

THE IMPORTANCE OF DAIRY FOODS IN CHILDREN'S DIETS

While dairy consumption can help improve health outcomes at all life stages, it is particularly important in children's diets. Children's physical and neurological growth and development depend on nutrients that are easily obtained from dairy foods. Healthy brains, bones and bodies are built with the nutrition dairy foods provide.

When children consume dairy milk and foods they are setting the foundation for a lifetime of health benefits, such as a lower risk of developing diet-related chronic diseases—think type 2 diabetes (T2D), hypertension, stroke, metabolic syndrome, and cardiovascular disease (CVD)—as well as reducing the risk of obesity. Establishing good nutrition during pregnancy and in the early stages of childhood gives children a strong start for the development of cognitive function, motor skills and social-emotional development.

BRAIN HEALTH

Our brains grow more quickly in the first 1,000 days than at any other time in our lives, which makes the nutrients consumed in that 1,000 days, from conception to 24 months, critical to brain development. Dairy foods deliver fully half—7 out of 14—of the nutrients that are important to early brain development: protein, zinc, selenium iodine, choline, vitamin B12 and vitamin A.

BONE & MUSCLE SUPPORT

The nutrients found in dairy are also crucial to the development of healthy bones, as well as muscle growth. Bone mass created during childhood and adolescence reduces the risk for osteoporosis and related injuries later in life, and dairy foods provide more of those bone-building nutrients than any other single food group.

- **Protein** provides the "structural matrix" of our bones
- **Phosphorus** promotes bone strength and supports the body's acid-base balance
- The primary building block of our bones, **calcium** provides structure and strength
- **Potassium** promotes an alkaline environment to help preserve calcium in bones
- **Vitamin D** is required for calcium absorption
- It's role in stimulating collagen production makes **zinc** a key component for building strong bones

IMMUNE HEALTH

Building a healthy immune system means supplying the body with the nutrients it requires to defend and protect itself. The nutrients found in dairy milk and foods support healthy immune function in children, antibody production, cellular immunity and the development of epithelial barriers to external threats.

- We know that **protein** is the main building block for all cells in the human body, and that includes immune cells and immune signaling molecules
- We need **zinc** for normal immune function, growth and development
- **Selenium** protects healthy cells from damage
- **Vitamins A and D** help support and maintain healthy immune cells, and a healthy immune system overall
- Immune cell function and activity are supported by **Vitamin B12** consumption

GROWTH & DEVELOPMENT

Experts agree that what children drink during the first five years of their lives can have a significant impact on health outcomes. Children can start consuming dairy (cheese and yogurt) as young as six months of age, and dairy milk consumption can begin as early as 12 months; milk and water are the only beverages recommended for children between 1-5 years old—milk for nutrition and water for hydration (except in cases of dairy protein allergies, where fortified soy beverages are recommended). Making sure kids have milk at mealtime ensures a nutrition "safety net" for picky eaters, supporting growth and development for growing children.

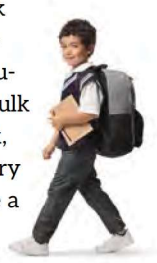
DAIRY FOODS AT SCHOOL: PRACTICAL INNOVATIONS FOR TODAY'S TRAY

You already know that school meals fuel students for whatever the school day might bring, giving them the energy to learn, play and grow. The essential nutrients that are easily obtained from the dairy foods offered in schools support healthy growth and development, as well as learning and behavioral outcomes during the school day—but only if students are consuming them!

Dairy milk has been contributing high-quality nutrients to students' diets since the inception of school feeding programs. While the National School Lunch Program wasn't created until the 1946 National School Lunch Act, federally supported school milk programs emerged as early as 1940 in Chicago and New York City. That means students have been benefitting directly from dairy in schools for 86 years and counting.

School meals help ensure children can meet their daily dairy servings and benefit from those essential nutrients found in dairy milk and foods. When it comes to dairy in school meals, studies show that school meals account for 77% of total daily dairy milk consumption and 70% of total dairy consumption for low-income children ages 5-18. Further, according to USDA data, foods provided as part of school meals are the richest source of dairy in children's diets and children who participate in school meals consume more dairy milk, fruits and vegetables than non-participants and they also consume fewer desserts and snacks.

It's crucial to continue to educate and encourage students to take advantage of the benefits of dairy milk and dairy foods available in the school cafeteria. To that end, National Dairy Council (NDC) is always working to elevate the role of dairy in school meals and exciting innovations to help educate and encourage participation among students. In their 2025 report, "Nourish to Flourish: Milk Pours on Results", NDC documents the challenges and successes of six pilot studies: reintroducing 1% flavored milk, bulk milk dispensers, shelf-stable dairy milk, smoothies, lactose-free shelf-stable dairy milk, and hot chocolate milk. Let's take a brief look at three of those pilots.



1. LACTOSE-FREE, SHELF-STABLE DAIRY MILK

Summary: Conducted from September 2023 through May 2024 in Cincinnati Public Schools, this pilot was so successful that the intended end date of December 2023 was extended through the full school year. In 2024, the district expanded the program to all schools in the district based on its success in the pilot schools.

Outcomes: There was a high acceptance of lactose-free, shelf-stable dairy milk among students that resulted in a positive impact on overall milk consumption and meal participation. Chocolate lactose-free shelf-stable dairy milk increased milk consumption and reduced waste, leading to higher meal participation which resulted in nutritional and financial benefits.

This pilot resulted in +10% incremental meal participation vs. 2 points in control schools and +20% milk servings (and growing).

Takeaways: The availability of lactose-free, shelf-stable dairy milk increases access for students.

2. SMOOTHIES

Summary: Conducted in 2021, this pilot consisted of 130 schools operated by Chartwells nationwide implementing smoothies into their school meal programs a minimum of three (3) times per week; data captured in November 2022 was then compared to the same period in 2019 to measure results. Schools were provided with equipment, recipes, and training/marketing support by Chartwells and General Mills.

Outcomes: Successful as both a breakfast and a lunch offering, smoothies enjoyed high acceptance with both students and school nutrition staff. Smoothies provide the opportunity to use bulk milk and yogurt and can help boost meal participation. While participation increases varied by location, this pilot resulted in a +1.5% increase in milk sales and +30% increase in yogurt sales. Staffing, equipment and administrative support are important considerations.

Takeaways: Smoothies can help increase consumption of under consumed food groups.

3. HOT CHOCOLATE MILK

Summary: Conducted from January to February 2024, 58 schools operated by Chartwells Foodservice implemented a "hot chocolate milk" program at breakfast and/or lunch at least three (3) times per week. Schools were provided equipment and marketing support, and the data captured was compared to the same period in 2023.

Outcomes: The hot chocolate milk pilot had high acceptance from both students and school nutrition staff, increasing both dairy consumption (an additional 54,575 servings of milk overall) and incremental meal participation (+5.6% increase in breakfast ADP, +3.6% increase in lunch ADP). In addition to adequate staffing and equipment, the availability of bulk milk and packaging are key considerations for implementation.

Takeaways: Hot chocolate milk was a success with both students and staff, with breakfast proving to be the most popular time for service.

Along with powerful nutrition, dairy foods offer flavor and flexibility to our daily diet. As emerging research informs our understanding of how nutritious dairy foods (i.e., milk, cheese and yogurt) across all fat levels can support a healthy overall diet—at home and at school—school nutrition professionals will rely on updated guidance and best practices to create healthy and delicious meals for students across the country.

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