

Science Summary

Dairy Foods Help Nourish Infants and Toddlers



Overview



Leading pediatric and health organizations recognize the benefits of milk and dairy foods in the early years after birth. Exclusive breastfeeding is recommended for at least the first 6 months followed by breastfeeding along with a variety of nutrient-dense complementary foods from all food groups, including dairy (i.e., cheese, yogurt), to support early growth and build a life-long foundation for healthy eating. Food allergies, including dairy milk allergy, are rare and typically develop in the first 2 years after birth, then decline through childhood. Pediatric

and health organizations recommend introducing potentially allergenic foods, including dairy foods, during the complementary feeding period. After the first birthday, whole dairy milk is recommended as the primary beverage, and water may be given to help quench thirst. As part of a healthy diet for 1-2 year-olds, the 2020 Dietary Guidelines for Americans (DGA) recommends $1\frac{2}{3}$ to 2 cup equivalents of dairy foods (whole milk, yogurt, cheese) depending on daily calorie needs. In this age group, milk and dairy foods contribute more than 25% of daily energy consumed and about 40% of protein and vitamin A, 77% of vitamin D, 64% of calcium, 31% of magnesium, one-third or more of potassium and zinc – and less than 18% of daily sodium intake. For toddlers with confirmed dairy milk allergy, lactose intolerance or parental preference to avoid dairy foods, the only acceptable plant-based alternative to dairy milk is unsweetened fortified soy beverage. Other plant-based beverages lack or fall short of key nutrients found in dairy milk and have been linked to nutrient deficiencies and metabolic imbalances. Leading pediatric and health organizations recognize the benefits of dairy milk and foods for early childhood.

Leading pediatric and health organizations recognize the benefits of milk and dairy foods in the early years after birth

Guidance from leading pediatric and health organizations for infant and toddler feeding practices is grounded in decades of research assessing nutritional requirements for healthy growth, cultural influences on eating patterns and key developmental milestones.¹⁻³ Exclusive breastfeeding is universally recommended,^{1,2,4-8} including most recently by the 2020 Dietary Guidelines for Americans (DGA),⁹ for at least the first 6 months after birth followed by breastfeeding along with complementary foods, including yogurt and cheese, over the next 6 months. An iron-

fortified infant formula is the only acceptable alternative for breastmilk from birth to 12 months.^{2,7} The American Academy of Pediatrics (AAP)⁷ and others^{2,10} further state that when mutually desired by mother and child, breastfeeding may continue beyond 12 months.

Beginning at about 6 months of age, parents are encouraged to offer a wide variety of nutrient-dense complementary foods from all food groups, including the dairy group (i.e., plain, unsweetened whole milk yogurt, cheese), to help support infant growth and to begin to build a foundation for healthy eating.^{2,3,5,9,11} In the United States (U.S.), breastmilk, infant formulas and baby foods are the top three sources of energy intake by 6-12 month old infants and together account for 74% of daily calories; table foods and other beverages make up the remaining 26%.¹² Health professional organizations in the U.S. concur that the transition from breastmilk and/or infant formula to regular dairy milk should not occur before the first birthday^{2,9,13} because of increased risk for intestinal bleeding.^{2,14} About a third (34%) of 6-12 month old infants in the U.S., however, are given fluid dairy milk too early.³

The 2020 DGA recommends, as part of a healthy diet, 1-2 year-olds consume 1 2/3 to 2 cup equivalents (eq) of dairy foods (whole milk, yogurt, cheese) depending on daily calorie needs (~700-1000 kcal/d).⁹ Whole dairy milk is recommended as the primary beverage for most toddlers by four leading health organizations comprising a 2019 expert panel: the AAP, Academy of Nutrition and Dietetics, American Academy of Pediatric Dentistry and the American Heart Association.^{2,10} In addition to whole dairy milk being an important source of energy and key nutrients for growth, a systematic review and meta-analysis of 20 cross-sectional and 8 prospective cohort studies of 1-18 year-old children showed that consumption of whole dairy milk (3.25% fat) compared with lower fat milks (0.1-2% fat) was associated with a lower likelihood of overweight or obesity.¹⁵ Consumption of water, but not other beverages, also is encouraged to help quench thirst and meet fluid requirements.^{2,9-11}

Dairy's unique nutrient package provides key nutrients for healthy growth and development

The nutritional adequacy of the diet of infants and toddlers, environmental influences and the child's genetic background all play important roles in healthy growth and development.^{16,17} Inadequate or excess amounts of energy, individual nutrients and/or nutrient combinations can affect the development of organs, including the brain,¹⁷ bone¹⁸ and gastrointestinal system¹⁹ and can have lasting consequences.^{16,20} Consistent with the 2020 DGA recommendation that a variety of foods from all food groups be offered starting at about 6 months of age⁹, most 6 to 12 month old infants consume fruits (84%), vegetables (79%) and grains (89%); about half (47%) in this age group consume protein foods; and 19% and 11% consume cheese and yogurt, respectively.³

Beginning at 1 year of age, dairy milk replaces breastmilk and/or infant formula as the main beverage for toddlers and young children. Nearly all (96%) toddlers consume dairy milk, 66% consume cheese, and 22% consume yogurt³ with average consumption of 2.5 cup eq/d of dairy foods (milk, 2.1 cup eq; cheese, 0.4 cup eq; yogurt, 0.1 cup eq).⁹ Milk, cheese and yogurt are important sources of energy and nutrients for toddlers (12-24 months), together contributing more than 25% of daily energy, about 40% of protein and vitamin A, 77% of vitamin D, 64% of calcium, 31% of magnesium, one-third or more of potassium and zinc¹² – and less than 18% of daily sodium.²¹ Milk alone is the number 1 food source of energy, protein, calcium, vitamin D, potassium, vitamin A, magnesium and zinc for this age group.¹² Although consumption of macronutrients and most micronutrients is generally adequate from birth to 2 years of age

in the U.S.,^{22,23} nutrient gaps exist for iron between 6 and 12 months and for vitamin D, vitamin E, potassium and fiber between 12 and 24 months of age.^{9,23} In addition, toddlers overconsume sodium^{9,22,23} and added sugars.⁹

Yogurt and cheese as complementary foods help establish healthy eating habits

Infants begin to learn how to eat when first offered complementary foods.²⁴⁻²⁶ Preferences for specific foods also are learned, and offering a variety of nutrient-dense foods can help establish healthy eating habits that extend at least into early adulthood.²⁴ The overall goal in shaping an infant's eating behavior is to match their consumption to their energy and nutrient needs for healthy growth and development.^{25,26} Offering foods with a variety of flavors and textures can help with early acceptance of healthy foods across all food groups.² Yogurt and cheeses, for example, provide unique sensory experiences (e.g., texture, taste, flavors) that can contribute to healthy eating habits. Plain, unsweetened yogurt alone or with fruits and/or vegetables is a nutritionally sound approach for a sour/tangy taste experience, and cheese comes in a variety of textures ranging from soft and solid to lumpy (e.g., cottage cheese). Portion sizes vary and depend in part on when 6-12 month-old infants are developmentally ready to accept the individual dairy foods.^{27,28} The Child and Adult Care Food Program (CACFP) meal pattern guidance for this age group states that up to 2 ounces of cheese, up to 4 ounces of cottage cheese and/or up to 4 ounces of yogurt may be offered at breakfast, lunch and/or supper.²⁷ It has been proposed that with repeated exposure to a new food, infants associate its sensory properties to its energy density and at least to some extent learn to modulate amounts eaten.²⁴

Although health professional guidance states that complementary foods should be introduced starting at 6 months of age,^{2,9} about half (47%) of U.S. infants are first offered complementary foods between 4 and 6 months of age.³ The 2020 Dietary Guidelines Advisory Committee (DGAC) report, however, concluded that introducing complementary foods at 4-5 months of age does not offer long-term advantages or disadvantages with regard to the select developmental indicators examined: growth, size, body composition, overweight or obesity; iron status; or risk of developing food allergy, atopic dermatitis/eczema, or asthma during childhood.³ Even though offering complementary foods before 4 months of age is not recommended,^{3,11} a third (32%) of U.S. infants are introduced to complementary foods before the age of 4 months.^{3,9,29}

Experts support early introduction of potentially allergenic foods, including dairy

While food allergies typically develop in the first 2 years after birth,³⁰ they are rare and impact 6-8% at 1 year of age,³⁰ and are immune system reactions to specific proteins in foods, not the food as a whole. Immunogenic responses involve mainly the skin, respiratory system and digestive system^{2,31} and may be IgE-mediated or non-IgE-mediated.³²⁻³⁴ Symptoms range from mild to severe and can be immediate (within hours) or delayed (days to weeks after exposure).^{31,32} When digestive symptoms are present, differential diagnostics may be needed to distinguish from other causes such as lactose intolerance, which is a sensitivity to lactose (a disaccharide) and not an allergy.³² ³³ While any food can elicit an allergic response, nine types of foods account for the vast majority of food allergies: peanuts, eggs, milk and dairy, tree nuts, soy, wheat, fish, shellfish and sesame.^{35,36} Some allergies, including dairy milk and egg allergy, peak at around 1 to 2 years of age and then fall progressively through childhood.³⁷ Dairy milk allergy in the U.S is reported to affect about 1.5% of infants (<12 m), 4.3% of toddlers at 2 years of age and 1.1% of 11-13 year-old children.³⁷ Health professional guidance is widely available in the U.S.^{32,34} and globally^{31,38,39} to help physicians

diagnose dairy milk allergy, manage symptoms in infants and children and help ensure proper nutrition for healthy growth and development.

Pediatric and health organization recommendations about when to introduce potentially allergenic foods, including dairy foods, have shifted in recent years – from delaying introduction until after the first birthday to introducing these foods during the complementary feeding period.^{3, 9, 32, 34} Most recently, a 2019 Nutrition Evidence Systematic Review, which was conducted as part of the USDA and the Department of Health and Human Services Pregnancy and Birth to 24 Months project, concluded that moderate evidence suggests no relationship between the age of complementary food introduction and risk of developing food allergy, atopic dermatitis/eczema or childhood asthma.⁴⁰ This review informed the 2020 DGAC scientific report, which concurred with these findings³ and led the 2020 DGA to recommend introducing infants to potentially allergenic foods, including yogurt and cheese, beginning at around 6 months of age.⁹

In the 2019 Systematic Review, yogurt and cheese were included among the other complementary foods examined, however, fluid dairy milk (in the form of dairy milk-based infant formulas and regular dairy milk) was not.⁴⁰ The majority (81%) of infants in the U.S. are fed infant formula, including dairy milk-based formulas and/or regular milk in the first year after birth.⁴¹ Among these infants, 69% are fed dairy milk formula, 5% are fed gentle/lactose-reduced infant formulas, 12% are fed soy-based infant formulas, 6% are fed specialty formulas and 13% are fed regular milk (e.g., dairy milk, flavored milks, soy beverage). While fluid dairy milk did not meet the predetermined definition of complementary foods for the systematic review, it was noted that future work should include systematic review of studies that examined fluid dairy milk consumption during the first year of life in relation to allergy-relevant health outcomes.⁴⁰

Yogurt consumption by infants and toddlers – evidence for gut health benefits

A 2019 systematic review of seven randomized,⁴²⁻⁴⁸ one observational⁴⁹ and two prospective cohort^{50, 51} studies found that consumption of yogurt by healthy infants and toddlers and those with infectious diarrhea was linked to gut health benefits.⁵² Collectively, these studies examined effects of yogurt consumption on a broad range of interrelated outcomes that included duration of diarrhea, intestinal colonization and later risk of atopic disease. Yogurt consumption by infants and toddlers was shown to have beneficial effects on recovery from infectious diarrhea^{43-45, 47} and on intestinal microbial composition,^{46, 49} which included increased colonization with lactobacilli and bifidobacteria.⁴⁹ The two prospective cohort studies further showed that yogurt consumption by infants (<12 months of age) was associated with reduced risk of atopic dermatitis after the first birthday,^{50, 51} and in one of these studies, with a positive effect on food sensitivity.⁵¹ Conclusions about these benefits, however, are constrained due to the small number of studies, diverse endpoints examined, cultural influences across studies (i.e., developed/under-developed regions across the globe) and study population differences (e.g., healthy; acute/persistent diarrhea, malnutrition and/or hospitalization). More research clearly is needed to advance our understanding of the rapid and complex changes in intestinal microbiota and concurrent maturation of the immune system when new foods, including dairy foods, are added to the diet of infants and toddlers.⁵³⁻⁵⁵ As noted in a 2021 review by a leading expert in gut microbiology, “Although current data is often fragmentary and observational, it can be concluded that the nutrition that a child receives in early life is likely to impinge not only on the development of the microbiota at that time, but also on the subsequent lifelong, functional relationships between the microbiota and the human host.”⁵⁴

Plant-based milk alternatives are not recommended for toddlers and young children

Most toddlers and young children tolerate dairy milk.¹⁴ Among the many plant-based milk alternatives available today, unsweetened fortified soy-based beverage is the only one acceptable milk alternative for the approximately 4% of toddlers with dairy milk allergy.^{9,10,14} Although often labeled as “milk” (e.g., rice milk, almond milk, etc.), many plant-based milk alternatives lack or fall short of key nutrients found in dairy milk.^{10,14} A 2020 position paper by the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition (NASPGHAN) states that “without adequate compensation for nutrients not supplied in such a product, [plant-based “milk”] can place a young child at risk.”¹⁴ In addition to the potential for inadequate consumption of energy, protein and select micronutrients, adverse effects on growth, nutritional status and health indicators including protein-energy malnutrition and metabolic and electrolyte disorders have been found.¹⁴

The energy and nutrient content of plant-based beverages is highly variable.¹⁴ In addition, most have a lower protein content than dairy milk per serving and lower protein quality. The NASPGHAN position paper estimated that an 8-ounce serving of soy- or pea-based milk-alternative provides about 60% of the protein-equivalent found in an 8-ounce serving of dairy milk, and for oat-, rice- and almond- based milk alternatives, dairy milk protein-equivalents are even lower at around 36%, 8% and 2%, respectively.¹⁴ Although the protein quality of these milk alternatives can be improved by adding limiting amino acids, this often leads to unpleasant flavor and aroma profiles. Sweeteners can be and are added to improve the taste (as high as 17 g per serving),¹⁴ however, consumption of sweetened beverages, including sweetened forms of plant-based milk alternatives, by toddlers and young children is not recommended.^{9,10,14} Parents are encouraged to consult with their health care provider when considering a plant-based milk alternative to dairy milk for a toddler or young child with allergies or lactose intolerance, or if parental preference is to avoid dairy products.^{10,14} Leading pediatric and health organizations agree that unsweetened dairy milk should be the main beverage for all other toddlers (12-24 m) and young children^{2,9,10,14} along with water to quench thirst and, if necessary, fortified soy beverage as the alternative to dairy milk.^{2,9,10}

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