



FLAVORED MILK: QUESTIONS & ANSWERS

SUMMARY

Flavored milk is white cow's milk (whole, low-fat, fat-free) with added flavoring (chocolate, strawberry, etc.) and sweetener(s). This highly preferred, nutrient-rich beverage is just as nutritious as unflavored (white) milk. Both flavored and white milk provide several nutrients (i.e., calcium, potassium, and magnesium) that are low in children's and adults' diets.

Currently, more than half of children ages 2 to 8 and three-quarters of adolescents fail to consume recommended servings of low-fat or fat-free milk or milk products. Therefore, it is important not to limit children's and adolescents' access to flavored milk due to its sugar content. Doing so may have the undesirable effect of further reducing intakes of many essential nutrients provided by milk.

Children's consumption of flavored milk has been shown to increase their total milk and nutrient intakes and reduce their intake of soft drinks and other energy-dense, nutrient-poor beverages. Moreover, a recent study found that drinking flavored or white milk was not associated with adverse effects on children's and adolescents' body mass index.

A review of the scientific literature indicates that flavored milk such as chocolate milk consumed in moderation does not cause overweight/obesity, tooth decay, or hyperactivity and other behavioral disorders in children. Also, chocolate milk contains a negligible amount of caffeine and the little amount of oxalic acid in chocolate milk does not impair calcium absorption. Emerging research indicates that chocolate milk may help adults recover from strenuous, energy-depleting resistance exercise.

Several health professional organizations including the American Academy of Pediatrics and the American Academy of Pediatric Dentistry support consumption of flavored milk, a nutrient-rich beverage, in moderation. The 2005 Dietary Guidelines for Americans state that small amounts of sugars added to nutrient-dense foods, such as reduced-fat milk, may increase consumption by enhancing palatability, thus improving nutrient intake without contributing excessive calories.

Flavored milk contains both natural (lactose) and added sugars. On average, flavored milk contains an additional 4 teaspoons of sugar and 60 calories per 8 ounces due to the addition of sucrose and/or other nutritive sweeteners. Flavored milk contains less added sugar than other beverages consumed by children, such as fruit drinks and soft drinks. There is no current consensus on a national school nutrition standard for flavored milk, however, suggestions have been made to reduce the amount of sugar in foods and beverages in schools. The dairy industry, through new product innovation, is developing reduced sugar flavored milk formulations that will appeal to children. D



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INTRODUCTION

Flavored milk is white cow's milk (whole, low-fat, fat-free) with added flavoring (e.g., chocolate, strawberry, vanilla, banana, root beer, etc.) and sweetener(s). Among flavored milks, chocolate milk is the most popular (1,2). Despite the wide variety and popularity of flavored milks, some questions about their nutritional and health benefits continue to be raised, especially by some parents/care providers and school nutrition policy makers. This *Digest* addresses some of the questions related to the consumption of flavored milk, particularly chocolate milk, and presents recommendations offered by health professional organizations.

Q. Is flavored milk as nutritious as unflavored (white) milk?

A. Flavored milk is a nutrient-rich beverage providing the same nine essential nutrients as white milk, including calcium, potassium, phosphorus, protein, vitamin D, vitamin A, vitamin B₁₂, riboflavin, and niacin (niacin equivalents) (3). Milk, flavored and unflavored, provides three of the five nutrients that fall short in children's diets (i.e., calcium, potassium, and magnesium) and four of the seven nutrients (i.e., vitamin A, calcium, magnesium, and potassium) low in adults' diets (4). Each 8-ounce serving of flavored or white milk provides 300 mg of calcium, which is 37% of the 800 mg of calcium recommended for children 4 through 8 and 23% of the 1,300 mg of calcium recommended for individuals 9 through 18 years (3,5).

The major difference between flavored and unflavored milk is the higher carbohydrate and calorie content of flavored milk due to the addition of sucrose and/or other nutritive sweeteners (3). In general, chocolate flavored milks provide about 60 more calories per 8-ounce serving than do their unflavored counterparts (3). An 8-ounce serving of low-fat (1%) chocolate milk provides 158 calories, whereas its unflavored counterpart provides 102 calories (3).

Flavored milk – a nutrient-rich beverage providing the same essential nutrients as unflavored (white) milk – is a well-accepted, nutritious alternative to the wide array of beverages available to children and adolescents.



Q. How does flavored milk impact the quality of children's and adolescents' diets?

A. Studies show that consuming low-fat or fat-free flavored milk can help children and adolescents meet the 2005 Dietary Guidelines for Americans' recommendations for dairy foods and increase their intake of milk nutrients (6-8). The Dietary Guidelines recommend that children ages 2 to 8 years consume 2 cups per day of low-fat or fat-free milk or equivalent milk products (i.e., cheese, yogurt), and that all people 9 years and older consume 3 cups per day of low-fat or fat-free milk or equivalent milk products (4). However, many Americans, both children and adults, are not consuming recommended daily servings of dairy foods (9,10). More than half (53%) of children ages 2 to 8 and more than three-quarters (77%) of adolescents do not consume the recommended daily servings of milk products (9). Approximately 60% to 80% of total dairy servings consumed by children and adolescents are consumed as milk, either as a beverage or as an ingredient in mixtures such as pudding or soup (11). As children enter adolescence their milk consumption often decreases, while their intake of soft drinks increases (12-15).

Children's diets are low in several essential nutrients such as calcium, potassium, and magnesium (4). Many children also have diets inadequate in vitamin D (16). These nutrients, especially calcium and vitamin D, are necessary for developing strong bones and teeth (17-20). The early years, particularly during adolescence, are a critical time to build bone mass (20). Studies have shown that consuming an adequate intake of milk and other dairy foods during childhood benefits adolescents' bone health (21) and that low intake of milk during childhood and adolescence is associated with low bone mass and increased risk of fractures in adulthood (19).

Children's consumption of flavored milk has been shown to increase their milk and nutrient intakes (6-8). Using data from nearly 4,000 school-aged children and adolescents who participated in the 1994-96 and 1998 USDA Continuing Survey of Food Intakes by Individuals, researchers

found that those who drank flavored milk consumed more total milk and fewer soft drinks and fruit drinks compared with children who did not drink flavored milk (6). In addition, flavored milk consumers had higher calcium and phosphorus intakes, but a similar percent of energy from total fat and added sugars compared with children who did not consume flavored milk (6). A retrospective analysis of diets of more than 3,000 children ages 6 to 17 years found a positive effect on children's overall diets when they chose flavored milks and yogurts instead of sodas and sweetened drinks (7). The researchers suggested that children and adolescents can enhance the quality of their diets by consuming flavored dairy products such as flavored milk in moderation as an alternative to energy-dense, nutrient poor beverages (7).

A recent study found that children and adolescents who included flavored milk in their diets had significantly higher total milk intakes than those who exclusively consumed white (unflavored) milk (8). Also, energy-adjusted intakes of vitamin A, calcium, phosphorus, magnesium, and potassium were significantly higher for children who drank flavored or white milk than for non-milk drinkers (8). Among females 12-18 years of age, calcium intakes by flavored milk drinkers and exclusively white milk drinkers were nearly double the calcium intakes of non-milk drinkers. Drinking flavored or white milk was not associated with adverse effects on body mass index. This study used data from 7,557 children and adolescents ages 2-18 years who participated in the 1999-2002 National Health and Nutrition Examination Surveys (8). Based on their findings, the researchers concluded that "limiting children and adolescents' access to flavored milk due to its higher added sugars or energy content may only have the undesirable effect of further reducing intakes of many essential nutrients provided by milk," while having no impact on body fat (8).

Recognizing the importance of adequate vitamin D for bone and overall health and the prevalence of vitamin D deficiency among children and adolescents, the American Academy of Pediatrics (AAP) recently issued a clinical report calling for doubling the amount of vitamin D (i.e., from



New research shows that children and adolescents who drink either flavored or white milk have higher intakes of nutrients low in their diets and similar or lower body mass indexes compared to non-milk drinkers.

200 I.U. per day to 400 I.U. per day) (16). The report recognizes the importance of vitamin D-fortified milk as a source of vitamin D for children and adolescents. While optional, nearly all fluid milk, flavored and plain, marketed in the U.S. is fortified with vitamin D to obtain the standard amount of 400 I.U. per quart (100 I.U. per cup) (5). The Food and Drug Administration recently released a health claim for calcium and vitamin D and osteoporosis that can be used on packages of reduced-fat, low-fat, and fat-free milks (22). Consuming vitamin D-fortified flavored milk could help improve vitamin D status, especially for those who drink little or no white milk.

Q. What about the amount and type of added sweeteners in flavored milk?

A. Flavored milk contains both natural (mostly in the form of lactose) and added sugars, either nutritive (e.g., sucrose, high fructose corn syrup [HFCS]) or non-nutritive, depending on the brand. Because each manufacturer has a unique formula, the ingredients, including the amount and type of added sweetener(s), vary somewhat among flavored milk products. On average, an 8-ounce serving of low-fat chocolate milk contains about 4 teaspoons of added sugar, while an equivalent amount of soft drinks contains 7 teaspoons. Flavored milk has less sugar and more nutrients than soft drinks.

Despite allegations linking HFCS with obesity, scientific evidence indicates that HFCS does not appear to contribute more to obesity or other chronic diseases than other nutritive (caloric) sweeteners (23,24). The American Medical Association (AMA), based on a review of the scientific literature, concluded that, because the composition of HFCS and sucrose is so similar, particularly with regard to absorption by the body, it is unlikely that HFCS contributes more to obesity or other conditions than sucrose (24). However, the AMA calls for additional research on the health effects of HFCS and other sweeteners.

The Food and Drug Administration (FDA) has approved five non-nutritive sweeteners (e.g., saccharin, aspartame, acesulfame-K, sucralose, neotame) (25).

Although extensive testing by the FDA has shown that these sugar-substitutes are safe for adults and children, many consumers who are aware of these sweeteners report that they are trying to consume less of them (26). The School Nutrition Association recommends that beverages containing non-nutritive sweeteners be allowed only in high schools and only after the end of the school day (27).

Q. Does consumption of flavored milk cause weight gain?

A. A recent study of 7,557 children and adolescents ages 2 to 18 years found that drinking flavored or white milk did not increase body mass index (BMI) (8). Average daily energy intakes of milk drinkers (flavored or white milk) were significantly greater than daily energy intakes of those who did not consume milk for all groups except boys ages 6 to 11 years. Yet despite higher daily energy intakes, the BMI of milk drinkers was either comparable (children 2-5 years and 6-11 years) or lower (males 12-18 years) than that of milk non-drinkers (8). There was no difference in intake of added sugars between flavored milk drinkers and non-milk drinkers.

The key to maintaining a healthy body weight is to balance calories consumed from foods and beverages with calories expended by physical activities (4). Added sugar, when used in moderation and with concern for overall caloric balance, can increase the appeal of nutrient-rich beverages such as flavored milk and provide additional choices for children and adolescents, thus improving nutrient intake without contributing excessive calories (4).

Q. Does flavored milk consumption cause tooth decay?

A. There is no scientific evidence that consumption of flavored milk such as chocolate milk causes tooth decay. Because flavored milk is a beverage, it is less likely to cause cavities than many other foods such as raisins or candies

Offering low-fat and fat-free flavored milk in schools can help children and adolescents meet the Dietary Guidelines for Americans' recommended servings for milk and other dairy foods.



that adhere to tooth surfaces. Also, studies have demonstrated that several components in chocolate milk such as calcium, phosphorus, protein, and cocoa may protect teeth from decay (28). The author of a paper on milk, flavored milk products, and caries concluded that the cariogenicity (cavity-forming potential) of flavored milks is "negligible to low" and, when consumed in moderation, flavored milks are a preferable alternative to similarly sweetened soft drinks (29). The American Academy of Pediatric Dentistry states that "chocolate milk is OK for children's teeth" (30).

Q. What other concerns have been raised about flavored milk?

A. Scientific evidence does not support the suggestion that added sugars in flavored milk cause hyperactivity in children. Reports that sugars cause hyperactivity (i.e., a cluster of symptoms including excitability, learning difficulties, and short attention span), other behavioral disorders, or interfere with academic performance in children have been based on anecdotal observations, not adequately controlled experiments (25,31,32).

With respect to the amount of caffeine in chocolate milk, each cup contains about 2 to 7 mg (33). Soft drinks, on the other hand, may contain up to ten times more caffeine than chocolate milk (33). An examination of food sources and intakes of caffeine found that soft drinks are the major source of caffeine in the diets of children ages 2 to 17 years, whereas a negligible amount of caffeine is provided by flavored dairy products (34).

Chocolate milk contains a negligible amount of oxalic acid, a compound occurring naturally in cocoa beans and other plants. Although oxalic acid can combine with calcium to form an insoluble salt, there is no scientific evidence that oxalic acid in chocolate milk impairs calcium absorption. One study found that the absorption of calcium from chocolate milk was similar to that from unflavored milk and other calcium-containing foods (35).

Q. Why is it important to offer flavored milk to children at school?

A. Offering flavored milk in schools can help children and adolescents meet the Dietary Guidelines' recommendations for dairy foods. Research shows that students drink more milk when flavored milk is offered in schools. A School Milk Pilot Test, co-sponsored by the School Nutrition Association and the National Dairy Council, found that children drank more milk when schools offered ice-cold milk in various flavors (strawberry, chocolate, etc.) in plastic, re-sealable containers, in different sizes, and different merchandising locations (e.g., vending machines, a la carte cafeteria, school stores) (36). Children who participate in the National School Lunch Program are more likely than non-participants to consume flavored milk (50% vs. 9%) and total milk (75% vs. 19%) at lunch as well as over a 24-hour period (15). The importance to children's health of offering low-fat and fat-free flavored milk in schools, as part of child nutrition programs and/or outside these programs (e.g., vending machines), is recognized by the AAP (14) and the Institute of Medicine (IOM), Committee on Nutrition Standards for Foods in Schools (37).

Q. Is there a national nutrition standard for flavored milk offered in schools?

A. Currently there is no consensus on a national school nutrition standard for foods and beverages, including flavored milk. However, Congress may support national nutrition standards in 2009 when it reauthorizes the Child Nutrition Act. In the meantime, restrictions on the calorie and sugar content of low-fat and fat-free flavored milks offered in schools have been proposed (27,37,38). The dairy industry, through new product innovation, is developing reduced sugar flavored milk formulations that will appeal to children (39).

Health professional organizations such as the American Academy of Pediatrics and the American Academy of Pediatric Dentistry have issued statements supporting and recommending flavored milk for children and adolescents.

Q. Do health professional organizations support flavored milk?

A. Several health professional organizations and nutrition experts recognize the importance of flavored milk in helping children and adolescents meet their recommended daily intakes of dairy foods and dairy food nutrients such as calcium. The 2005 Dietary Guidelines for Americans, which identify low-fat and fat-free milk and milk products as one of the "Food Groups to Encourage," state that small amounts of sugars added to nutrient-dense foods, such as reduced-fat milk, may increase consumption by enhancing palatability, thus improving nutrient intake without contributing excessive calories (4). Although not identifying flavored milk specifically, the American Dietetic Association states that "by increasing the palatability of nutrient-dense foods/beverages, sweeteners can promote diet healthfulness" (25). The AAP, in a policy statement discouraging soft drinks in schools (14) and in its report on optimizing children's and adolescents' bone health and calcium intakes (20), encourages consumption of nutritious beverages including low-fat or fat-free flavored milks. The IOM recognizes the nutritional value of flavored milk with modest amounts of sugar for school children (37).

Two members of the AAP Committee on Nutrition state "given the importance of calcium, vitamin D and other key ingredients in the diet of children and adolescents, flavored milks could be a nice alternative [to unflavored milk] since the contribution of added sugars to the overall diet of young children is minimal" (40). Researchers at Pennsylvania State University, recognizing the low dairy and calcium intakes of children ages 4 to 18 years, recommend that nutrition guidance be focused on increasing children's intake of low-fat dairy products "with special emphasis on increasing calcium intake in school-age children and adolescents through flavored low-fat milk products" (41). Similarly, researchers at the University of Saskatchewan, Canada,

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suggest adding chocolate milk to school vending machines as a strategy to increase children's and adolescents' milk intake (42). The American Academy of Pediatric Dentistry states that chocolate milk is OK for children's teeth, is a highly nutritious beverage, is preferable to many popular snacks that provide calories but few nutrients, and because children like flavored milk they drink more of it (30).

Q. Is it true that consuming chocolate milk helps adult athletes recover from strenuous exercise?

A. Preliminary findings from a single-blind, randomized study of nine male endurance-trained cyclists found that those who drank low-fat chocolate milk after an intense bout of exercise (i.e., glycogen-depleting exercise) were able to bike about twice as long during a second workout before reaching exhaustion than those who consumed a carbohydrate replacement sports drink, and as long as those who consumed a fluid replacement drink (43). Additional research is needed to support this benefit of chocolate milk. D

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RELATED RESOURCES

www.nationaldairycouncil.org

- Flavored Milk in Perspective (under Nutrition & Product Information, Dairy Foods, Supportive Science)
- A Perspective on Sugars & Health. Dairy Council Digest 78(4), 2007 (under Health Professional Resources, Dairy Council Digest Archives)

www.nutritionexplorations.org

- All About Flavored Milk (information for parents and educators)

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SPOTLIGHT ON DAIRY FOODS, DAIRY NUTRIENTS, & BLOOD PRESSURE

ACKNOWLEDGMENTS

National Dairy Council® assumes the responsibility for this publication. However, we would like to acknowledge the help and suggestions of the following reviewers in its preparation:

- Rachel K. Johnson, PhD, MPH, RD
Professor of Nutrition
University of Vermont
Burlington, VT
- Janey Thornton, PhD, SNS
School Nutrition Director
Hardin County Schools
Elizabethtown, KY

The *Dairy Council Digest*® is written and edited by Lois D. McBean, MS, RD.

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