

**WHY FLAVORED  
MILK IS A  
NUTRITIOUS  
CHOICE FOR  
CHILDREN****SUMMARY**

With the nation's focus on improving children's nutrition and health, some school districts have eliminated flavored milk as a choice for students based on the concern that this beverage contributes to childhood obesity. However, this decision ignores the potential for unintended adverse effects on children's nutrition and health, and the science supporting the benefits of flavored milk for children.

Nearly one-third of U.S. children are overweight or obese and, because of nutrient-poor sources of energy, many children are at risk of nutrient deficiencies. National surveys reveal dramatic shifts in children's beverage choices in recent decades, with a decline in milk consumption and an increase in intake of less nutritious, sugar-sweetened beverages such as sodas and fruit drinks. It is important that any intervention to help children achieve and maintain a healthy body weight be balanced with children's need for essential nutrients for growth and development.

Research shows that when low-fat or fat-free flavored milk is offered as a choice for children in school meals, they drink more milk and increase their intake of essential nutrients found in milk, including calcium and potassium which are identified by the 2010 Dietary Guidelines for Americans as limited in U.S. children's diets. Moreover, studies show that drinking flavored milk is not associated with adverse effects on children's body mass index.

Nearly 70% of the milk children choose to drink in the National school Lunch Program

is flavored, which offers the same nine essential nutrients as white milk. Recent studies have shown that when flavored milk is removed from school meals and only white milk is offered, there is a dramatic decrease in milk consumption. Moreover, it is difficult and expensive to replace the nutrients lost from decreased milk intake in school meals.

Concerns related to flavored milk center on its added sugar and calorie content. However, on average, flavored milk accounts for only 3% of total added sugars and 2% of total calories in children's diets. Over the past several years the dairy industry has been reformulating flavored milks to lower their fat, added sugars, and calorie content, while preserving their nutritional value and taste appeal. Preliminary research shows that children accept lower calorie reformulated flavored milks.

Leading health and nutrition organizations – the American Academy of Pediatrics, American Heart Association, American Dietetic Association, and School Nutrition Association, among others – as well as the 2010 Dietary Guidelines for Americans – support the important role of low-fat and non-fat milk, including flavored milk, in helping to meet children's nutrient needs. In addition, they recognize that the small amount of added sugars in flavored milk is a worthwhile trade-off for the nutrients provided. Health professionals can educate parents and others about flavored milk's beneficial role in child nutrition, encourage them to actively support low-fat and fat-free flavored milk as a healthful choice in school meals, and support their efforts to be role models for healthful eating behaviors for children.



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## INTRODUCTION

Childhood overweight/obesity is a serious public health concern in the U.S. (1-4). In an effort to curb the nation's childhood obesity epidemic, attention has focused on improving children's diet choices, in particular increasing intake of nutrient-dense foods and decreasing intake of sugar-sweetened beverages that contribute to excess calories and provide few essential nutrients (1). Concern about calories and added sugars as components of individual foods and beverages, rather than focusing on a food's total nutrient content or the total diet, has put low-fat and fat-free nutrient-dense flavored milk at risk of not being offered to children, especially in school meal programs. Some school districts, in response to local anti-obesity campaigns, food and parent advocates, or mass media reports of the flavored milk debate, have eliminated flavored milk in school meals (5).

Flavored milk is white cow's milk with flavoring (e.g., chocolate, strawberry) and a small amount of added sugars (6,7). Recently, flavored milks with less added sugars and fewer calories have become available (8). An example is fat-free chocolate milk providing 143 calories and 24 g of total sugars (i.e., 12 g of the naturally occurring sugar, lactose, and 12 g of added sugar such as sucrose) per 8-ounce serving.

Recommendations to eliminate children's access to flavored milk in school meals may have been made without consideration of potential unintended consequences with respect to children's nutrient intake and health, and the science supporting the nutritional benefits of flavored milk for children. While childhood obesity has reached epidemic proportions, many children are not consuming the recommended number of servings of nutrient-dense foods from the major food groups, thereby reducing their intake of nutrients essential for growth and development (1,2,9-12). It is critical that any intervention to help children achieve and maintain a healthy body weight be balanced with children's needs for essential nutrients for growth and development.



*With increased attention to the nation's childhood obesity epidemic, some school districts are eliminating flavored milk in school meals without consideration of potential unintended consequences related to children's nutrient intake and health.*

This *Digest* reviews the state of children's nutritional well-being; science supporting the nutritional benefits of consuming flavored milk for children; the negative impact of eliminating flavored milk in school meal programs on students' milk intake and nutrient availability; a perspective on concerns related to flavored milk and the dairy industry's commitment to reformulate flavored milks to contain less added sugars and fewer calories; and scientific and health organizations' support for flavored milk.

## CHILDREN'S NUTRITIONAL WELL-BEING AT RISK

Nearly 32% of U.S. children and adolescents aged 2 years through 19 years are overweight or obese and nearly 17% are obese, according to recent national data (3). Also, many children fail to consume recommended daily servings of nutrient-dense foods from the basic food groups, such as dairy foods, fruits, vegetables, and whole grains (2,9-12). As a result, children are at risk of lower than recommended intakes of specific nutrients, namely calcium, vitamin D, potassium, and fiber (1). The Institute of Medicine's recently released dietary recommendations for calcium and vitamin D identifies adolescent females aged 9 to 18 years as a group at risk of a deficiency of calcium, a nutrient essential for bone health (13).

The 2010 Dietary Guidelines for Americans acknowledges the important role of dairy foods as part of a healthful diet and recommends 2 cups of fat-free or low-fat milk and milk products every day for children ages 2 to 3 years, 2½ cups for children 4 to 8 years, and 3 cups for children 9 years and over (1). Unfortunately, many children are under-consuming dairy foods (2,10,12). According to data from the 2007-08 National Health and Nutrition Examination Survey (NHANES), more than 50% of boys aged 9 to 18 years and over 90% of girls do not consume recommended amounts of milk and milk products (2). National survey data reveal that the gap between recommended servings and average daily consumption of dairy foods begins as early as age 4 (12).



In recent decades large shifts in beverage consumption among U.S. children aged 2 to 18 years have occurred, with an increase in low-nutrient sugar-sweetened beverages (soda, fruit drinks) and a decrease in milk consumption (14,15). According to a recent report from the U.S. Department of Agriculture, children's milk consumption in the late 1970s was over three times that of their soda consumption, whereas by 2003-2006 children consumed approximately equal amounts of each beverage (15). Data from NHANES 2005-2006 indicate that sugar-sweetened beverages (soda and fruit drinks) were the top source of calories from added sugars and that these beverages contributed 173 kcal/day and 22% of empty calories (calories from added sugars and solid fat) to children's diets (16). Not only has children's consumption of beverages changed in recent decades, but as children enter adolescence, their milk intake often decreases, while their intake of calorie-dense, nutrient-poor beverages such as soda and fruit drinks increases (17,18).

## BENEFITS OF CONSUMING FLAVORED MILK FOR CHILDREN

Research shows that consumption of flavored milk can help close the gaps between children's actual and recommended intake of milk and milk products and milk's nutrients needed for growth and development. Children who drink flavored milk tend to drink more milk overall and fewer sodas and fruit drinks than those who do not drink flavored milk, according to 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 (19). Likewise, children and adolescents who consumed flavored milk reported higher total milk intakes than those who drank white milk only, according to data from more than 7,500 children and adolescents aged 2 to 18 years who participated in the 1999-2002 NHANES (20).

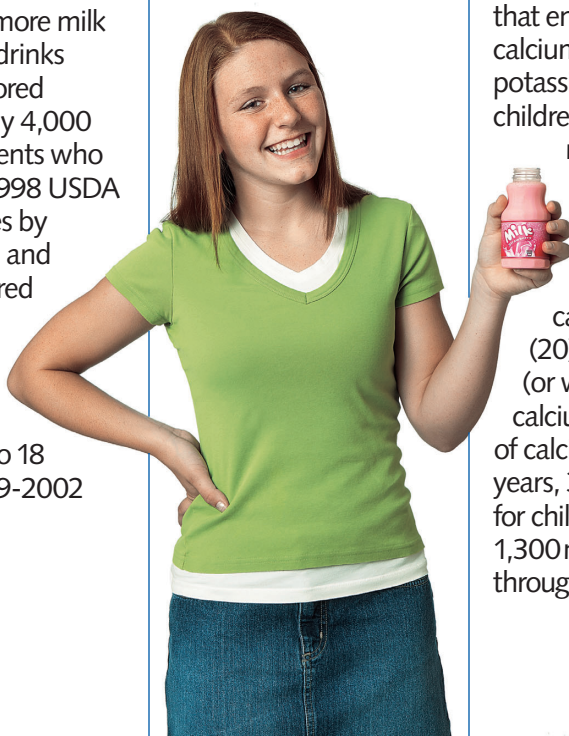
*Flavored milk contains the same nine essential nutrients found in white milk, including three of the four nutrients of concern identified by the 2010 Dietary Guidelines for Americans as limited in children's diets – calcium, vitamin D, and potassium.*

Taste is a key factor influencing children's preference for flavored milk. Flavored milk, nearly all of which offered in schools is low-fat or fat-free (18,21,22), is the most popular milk choice among school children, accounting for nearly 70% of milk chosen by children participating in the National School Lunch Program (NSLP) (21). In some ethnic groups such as Hispanics who are accustomed to whole milk, flavored milk such as chocolate and orange helps increase the acceptance of lower fat milks by children and adolescents (23).

The ability of flavored milk to increase children's milk consumption is important given the 2010 Dietary Guidelines' recommendation to increase current consumption of low-fat and fat-free dairy foods to recommended intakes (1). Also, the 2010 Dietary Guidelines points out that moderate evidence indicates that intake of milk and milk products is positively associated with bone health, especially in children and adolescents, and that those who consume milk at an early age are more likely to continue to do so as adults (1).

Just like white milk, flavored milk provides nine essential nutrients: calcium, potassium, phosphorus, protein, vitamins A, D, and B<sub>12</sub>, riboflavin, and niacin (niacin equivalents) (6). Studies show that consuming low-fat or fat-free flavored milk can help children increase their intake of milk's nutrients (19,20,24). For example, one study showed that energy-adjusted intakes of vitamin A, calcium, phosphorus, magnesium, and potassium were significantly higher for children who drank flavored milk or white milk than for non-milk drinkers (20).

Among females aged 12 to 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 (20). Each 8-ounce serving of flavored (or white) milk provides 300mg of calcium, which is 42% of the 700mg of calcium recommended for children 1 to 3 years, 33% of the 1,000mg recommended for children 4 to 8 years, and 23% of the 1,300mg recommended for those 9 through 18 years (6,13).

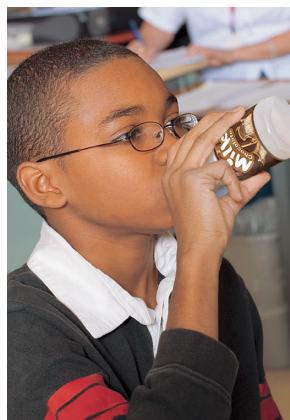


Children's consumption of flavored (and white) milk increases intake of calcium and potassium, nutrients identified by the 2010 Dietary Guidelines as shortfall nutrients in children's diets (1,19,20). In fact, fluid milk is the number one food source of these nutrients in the American diet (25). A retrospective analysis of diets of more than 3,000 children ages 6 to 17 years found that children's overall diets were enhanced when they chose flavored milk and yogurt instead of sodas and sweetened drinks (24).

## UNINTENDED NEGATIVE CONSEQUENCES OF ELIMINATING FLAVORED MILK FROM CHILDREN'S DIETS

Recent studies show that when flavored milk, such as chocolate milk, is eliminated from school meals there is a decrease in milk consumption (26,27). When flavored milk was removed from school meals and a la carte offerings and only white milk was available in a school district in Connecticut, milk sales measured over a three-month period decreased in all K-12 grades, anywhere from 37% to 63% depending on the grade (26).

A large study in 58 elementary and secondary schools in seven school districts across the nation found that when students did not have the option of flavored milk, milk consumption dramatically decreased (27). Moreover, the researchers found that it would be difficult and expensive for schools to replace the nutrients lost from decreased milk intake. This study included nearly 700 measurement days over three months. Elementary school students' milk consumption dropped by an average of 35% when only white milk was offered, with some schools seeing a decline of more than 50%. The decrease in students' milk consumption persisted over a year's time. In schools in their second year, students consumed 37% less milk on average compared to when flavored milk was available (27).




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*Research shows that offering children the choice of flavored milk helps meet their taste, nutrient, and health needs, without adverse effects on body mass index.*

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To replace the nutrients lost from the decline in milk consumption, the researchers estimated that it would require three to four different food items to match milk's nutrient contribution, add back more calories and fat than were being reduced, and cost schools up to \$4,600 more annually per 100 students (27).

## CONCERNS RELATED TO FLAVORED MILK: WHAT THE SCIENCE TELLS US

Concerns regarding flavored milk relate to this food's perceived contribution to childhood overweight/obesity due to its added sugars and calorie content. However, studies show that consuming flavored milk is not associated with adverse effects on children's body fat (20,28) and that flavored milk makes a minimal contribution to children's intake of added sugars and calories (29). Based on data from more than 7,500 children and adolescents ages 2 to 18 who participated in the 1999-2002 NHANES, researchers found that drinking flavored or white milk did not increase body mass index compared to milk non-drinkers (20). Body mass index 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 (20). A new study examining the associations between milk consumption and percent body fat among 2,245 children ages 10 to 13 in Avon, UK found no association between flavored milk consumption and percent body fat for consumers vs. non-consumers (28). A more comprehensive approach than simply focusing on a single food or nutrient is needed to curb childhood obesity. The key to achieving and maintaining a healthy body weight is to balance calories consumed from foods and beverages with calories expended by physical activities over time (1).

Both natural sugars (e.g., mostly lactose) and added sugars (e.g., sucrose) are found in flavored milk. However, on average, flavored milk contributes only 3% of total added sugars and only 2% of total calories

to the diets of children ages 2 to 18 years (29). In comparison, on average, carbonated soft drinks and fruit drinks together contribute 45% of total added sugars and 9% of total calories to children's diets, and in general these beverages provide few nutrients (29). Studies have shown that children who drink flavored milk do not have higher intakes of added sugars than children who do not drink flavored milk (19) or milk non-drinkers (20).

A small amount of added sugars can be used to increase the palatability of nutrient-dense foods such as flavored milk (e.g., fat-free chocolate milk) (1,30-32). This in turn can help increase intakes of milk's nutrients necessary for good health. According to the American Heart Association, "sugars add desirable sensory effects to many foods, and a sweet taste promotes enjoyment of meals and snacks. In fact, when sugars are added to otherwise nutrient-rich foods, such as sugar-sweetened dairy products like flavored milk and yogurt and sugar-sweetened cereals, the quality of children's and adolescents' diets improves, and in the case of flavored milks, no adverse effects on weight status were found" (30). Research shows that diets containing the lowest amounts of added sugars may not be the most nutrient-dense, and the relationship between sugars intake and nutrient dilution is not straightforward (24,33,34). A recently published study on added sugars and nutrient intakes found that the highest average intake of select nutrients such as calcium and phosphorus occurs with a moderate amount of added sugars (5-10% of total calories), instead of the lowest amount (0-5%) (34).

Because each manufacturer has a unique formula, the ingredients, including the amount and type of added sweetener(s), vary somewhat among flavored milk products. As discussed below, the amount of added sugars in flavored milk has decreased in recent years (31). With respect to the type of nutritive sweetener added to flavored milk, sucrose and high fructose corn syrup (HFCS) are common choices. The composition of sucrose or table sugar (50% glucose, 50% fructose) is similar

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to that of HFCS (55% fructose and 45% glucose) (35,36). Both sugars have the same number of calories, the same sweetness, and are similarly metabolized (35-37). Despite some allegations linking HFCS to obesity, a scientific review conducted by the American Medical Association indicates that HFCS does not appear to lead to obesity or other conditions any more than calories from other nutritive (caloric) sweeteners (38).

## **The Dairy Industry's Commitment to Reformulating Flavored Milk.**

The dairy industry acknowledges its role in providing products to meet the health, wellness, and taste needs of Americans, and over the past several years has been proactively reformulating flavored milks to contain less fat, added sugars, and calories (8,22,31). In the early 1990s, flavored milk containing 2% fat was most popular among NSLP participants who consumed flavored milk, whereas by 2005 the majority of flavored milk drinkers were offered low-fat or fat-free flavored milk (21). Currently, U.S. Department of Agriculture (USDA) regulations allow only low-fat (1%) and fat-free flavored milk to be offered with school meals, at least through the 2011-2012 school year (39). Proposed revisions to meal pattern guidelines for the NSLP and SBP currently under USDA review, if approved, would limit flavored milk in schools to fat-free only beginning in the school year 2012-2013 (39). Although currently there are no proposed sugar limits for milk in school meals, it is expected that the proposed calorie maximum for school meals will drive schools to select flavored fat-free milk with the lowest sugars content.

Between 2006 and 2010, the average calories per 8-ounce serving of flavored milk in schools decreased from 166 to 153 (31). This decrease in flavored milk calories can be attributed to the use of low-fat and fat-free milk and the reduction in added sugars (31). Today, flavored milks containing 150 calories or less and 25 grams of total sugar or less per 8-ounce serving are widely available, thereby adding to the variety of dairy foods developed to meet consumers' taste and nutrition needs (8,22).



Children's acceptance of lower calorie flavored milks is an important consideration (8,40). When nearly 100 flavored milks ranging from 130 to 180 calories and 15 to 31 grams of sugar per 8-ounce serving were tested with 2,100 children ages 8 to 17, three-quarters of flavored milks with 150 or fewer calories were well-liked (8). A plate waste study of flavored milk cartons from 793 students in grades 3 to 5 found that consumption of lower calorie flavored milk (<150 kcal/8 oz) did not significantly differ from that of traditional flavored milk (>150 kcal/8 oz) (40).

## SCIENTIFIC & HEALTH ORGANIZATIONS' SUPPORT FOR FLAVORED MILK

Many leading health and nutrition organizations in the U.S. (17,30,41-45) and the 2010 Dietary Guidelines for Americans (1) recognize the valuable role that milk, including flavored milk, plays in meeting children's daily nutrient needs. In addition, they acknowledge that the small amount of added sugars in flavored milk is a worthwhile trade-off for the nutrients provided.

The American Academy of Pediatrics, in a policy statement discouraging soft drinks in schools (17) and also in its report on optimizing infants', children's and adolescents' bone health and calcium intakes (41) encourages consumption of nutritious beverages including low-fat or fat-free flavored milk. Two members of the American Academy of Pediatrics, Committee on Nutrition, in a commentary to clear up confusion on dairy's role in children's diets, state "Unflavored milk is lower in sugar than flavored milk. However, given the importance of calcium, vitamin D and other key ingredients in the diets of children and adolescents, flavored milks could be a nice alternative since the contribution of added sugars to the overall diet of young children is minimal" (46).

The Institute of Medicine, in its recommended nutrition standards for foods in schools, recognizes the nutritional value of flavored milk with modest amounts of sugars for school



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children (42). Similarly, the American Heart Association states that adding sugars to nutrient-rich foods such as flavored milk improves the quality of children's and adolescents' diets, without adverse effects on body weight (30). The School Nutrition Association supports low-fat and fat-free milk options, including fat-free flavored milk, in schools to help students meet their critical nutrient needs for strong bones and healthy diets (43). Other health professional organizations including the American Dietetic Association and the National Medical Association support low-fat and fat-free milk, including flavored milk, in schools (44). The American Academy of Pediatric Dentistry identifies chocolate milk as a healthy snack for children (45). The 2010 Dietary Guidelines for Americans (1) acknowledges that adding a small amount of sugars to nutrient-dense foods such as fat-free chocolate milk helps enhance milk's palatability.

## CONCLUSION

Despite the science and health professional support for flavored milk as a healthy choice for children, there continues to be pressure on some school districts to eliminate or restrict flavored milk from school meals. It therefore is important to educate parents, school administrators, and others on the positive role of flavored milk in child nutrition and encourage them to actively support low-fat and fat-free flavored milk choices in schools.

Parents, for example, can help ensure that flavored milk continues to be an option for children in school meals. Recent marketing research shows that the majority of parents oppose bans on chocolate milk in schools (47). In expressing opposition to school bans on flavored milk, parents say they want their children to learn to make choices for themselves and not have decisions made for them, and they want schools to focus on more important issues such as the quality of education (47). Parents also appreciate that the availability of chocolate milk increases milk intake for some children who do not drink white milk. In addition, parents realize that obesity is caused by many factors,

including lack of exercise (47). While most parents oppose flavored milk bans, few proactively advocate for keeping flavored milk in their schools (48). Statements relating to how flavored milk balances nutrition and fun and gives children choices resonates with parents, and can help encourage them to become actively involved in keeping flavored milk in school meals as a choice for children (48).

Parents, as well as others who work with or care about children, can model healthful behaviors and increase the availability of nutrient-dense foods including low-fat and fat-free milk (white and flavored) (49-51). According to a study of 2,314 children in grades one through 12, home is where the largest proportion of total energy and energy from low-nutrient, energy-dense foods, especially sugar-sweetened beverages, is consumed (51). Therefore, family eating practices at home and away from home, as well as foods offered in the school environment, are important in addressing childhood overweight and obesity and meeting children's nutrient needs (51). At home for example, parents can offer children nutrient-dense, low-fat or fat-free flavored milk as a snack instead of energy-dense, nutrient-poor beverages such as soda or fruit drinks. With all the nutrients of white milk, and only a 60 calorie or less difference, low-fat or fat-free chocolate milk offered at home, away from home, or at school is a choice children love and that also gives them the nutrients their bodies need.

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1. U.S. Department of Agriculture and U.S. Department of Health and Human Services. *Dietary Guidelines for Americans*, 2010. 7th Edition. Washington, DC: U.S. Government Printing Office, December 2010. [www.dietaryguidelines.gov](http://www.dietaryguidelines.gov). Accessed May 6, 2011.
2. 2010 Dietary Guidelines Advisory Committee. *Report of the Dietary Guidelines Advisory Committee on the Dietary Guidelines for Americans*, 2010. [www.cnpp.usda.gov/DGAs2010-DGACReport.htm](http://www.cnpp.usda.gov/DGAs2010-DGACReport.htm). Accessed May 6, 2011.
3. Ogden, C.L., M.D. Carroll, L.R. Curtin, et al. *JAMA* 303: 242, 2010.
4. American Dietetic Association. *J. Am. Diet. Assoc.* 108: 1038, 2008.
5. Artemis Strategy Group for Dairy Management, Inc.™ *Flavored Milk in Schools: A Case Study of Four Local Markets*. January 7, 2010.
6. U.S. Department of Agriculture, Agricultural Research Service. *USDA National Nutrient Database for Standard Reference*, Release 23, 2010 [www.ars.usda.gov/ba/bhnrc.ndl](http://www.ars.usda.gov/ba/bhnrc.ndl). Accessed May 6, 2011.
7. U.S. Department of Agriculture, Agricultural Research Service. *USDA Database for the Added Sugars Content of Selected Foods*. Release 1. February 2006. [www.ars.usda.gov/nutrientdata](http://www.ars.usda.gov/nutrientdata). Accessed May 6, 2011.
8. Dairy Management, Inc.™ *New lower-calorie flavored milk formulations address nutrition issues and win kids' approval*. [www.innovatewithdairy.com](http://www.innovatewithdairy.com). Accessed May 6, 2011.
9. U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. *The Quality of Children's Diets in 2003-04 As Measured by the Healthy Eating Index-2005*. *Nutrition Insight* 43, April 2009.
10. Krebs-Smith, S.M., P.M. Guenther, A.F. Subar, et al. *J. Nutr.* 140: 1832, 2010.
11. U.S. Department of Agriculture. *What We Eat in America, NHANES 2007-2008: Nutrient Intakes from Food: Mean Amounts Consumed Per Individual, by Gender and Age*, 2010. [www.ars.usda.gov/ba/bhnrc/fsrg](http://www.ars.usda.gov/ba/bhnrc/fsrg). Accessed May 6, 2011.
12. Dairy Research Institute™ (NHANES 2007-2008). Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey Data. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, [2007-2008]. <http://www.cdc.gov/nchs/nhanes.htm>. Accessed April 9, 2011.
13. Institute of Medicine. *Dietary Reference Intakes for Calcium and Vitamin D*. Washington, DC: The National Academies Press, 2011.
14. Popkin, B.M. *Physiol. Behav.* 100: 4, 2010.
15. Smith, T.A., B.-H. Lin, and J.-Y. Lee. *Taxing Caloric Sweetened Beverages: Potential Effects on Beverage Consumption, Calorie Intake, and Obesity*. ERR-100, U.S. Department of Agriculture, Economic Research Service, July 2010. <http://tinyurl.com/38s6276>. Accessed May 6, 2011.
16. Reedy, J., and S.M. Krebs-Smith. *J. Am. Diet. Assoc.* 110: 1477, 2010.
17. American Academy of Pediatrics, Committee on School Health. *Pediatrics* 113: 152, 2004.
18. U.S. Department of Agriculture, Food and Nutrition Service. *School Nutrition Dietary Assessment Study – III*. Alexandria, VA: Food and Nutrition Service, USDA, November 2007. [www.fns.usda.gov](http://www.fns.usda.gov) (under Research, Child Nutrition Studies). Accessed May 6, 2011.
19. Johnson, R.K., C. Frary, and M.Q. Wang. *J. Am. Diet. Assoc.* 102: 853, 2002.
20. Murphy, M.M., J.S. Douglass, R.K. Johnson, et al. *J. Am. Diet. Assoc.* 108: 631, 2008.
21. School Nutrition Association and National Dairy Council. *School Milk: Fat Content Has Declined Dramatically Since the Early 1990s*. ENVIRON International Corporation for SNA and NDC, December 2008. [www.nationaldairycouncil.org](http://www.nationaldairycouncil.org). Accessed May 6, 2011.
22. 2009-2010 "Annual School Channel Survey." Final Report. Funded by the Milk Processor Education Program (MilkPEP) and conducted by Prime Consulting Group, July 2009.
23. American Dietetic Association. *ADA's comments on the USDA proposed rules on "Nutrition Standards in the National School Lunch (NSLP) and School Breakfast Programs (SBP)." Page 18*, April 13, 2011.

24. Frary, C.D., R.K. Johnson, and M.Q. Wang. J. Adol. Health 34: 56, 2004.
25. Fulgoni, V.L., III, D.R. Keast, E.E. Quann, et al. FASEB J. 24: 325.1 (abstr.), April 2010.
26. Patterson, J., and M. Saidel. J. Am. Diet. Assoc. 109: A97 (abstr.), 2009.
27. "The Impact on Student Milk Consumption and Nutrient Intakes from Eliminating Flavored Milk in Schools." 2009 Study funded by the Milk Processor Education Program (MilkPEP) and conducted by Prime Consulting Group, presented at the School Nutrition Association Annual National Conference, July 2010. [www.milkdelivers.org/schools/flavored-milk/](http://www.milkdelivers.org/schools/flavored-milk/) Accessed May 6, 2011.
28. Noel, S.E., A.R. Ness, K. Northstone, et al. FASEB J. 25: 781.19 (abstr.), 2011.
29. Dairy Research Institute™, NHANES (2003-2006), Ages 2 to 18 years. Data Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health and Nutrition Examination Survey. Hyattsville, MD: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, 2003-2004; 2005-2006. [www.cdc.gov/nchs/nhanes.htm](http://www.cdc.gov/nchs/nhanes.htm). Accessed May 6, 2011.
30. Johnson, R.K., L.J. Appel, M. Brands, et al. Circulation 120: 1011, 2009.
31. Van Horn, L., R.K. Johnson, B.D. Flickinger, et al. Circulation 122: 2470, 2010.
32. Johnson, R.K., and B.A. Yon. J. Am. Diet. Assoc. 110: 1296, 2010.
33. Institute of Medicine, Food and Nutrition Board. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein and Amino Acids (Macronutrients)*. Washington, DC: National Academies Press, 2005.
34. Marriott, B.P., L. Olsho, L. Hadden, et al. Crit. Rev. Food Sci. Nutr. 50: 228, 2010.
35. Fulgoni, V., III. Am. J. Clin. Nutr. 88(suppl.): 1715s, 2008.
36. International Food Information Council Foundation. *The Science of Sugars*. April 2010. [www.foodinsight.org](http://www.foodinsight.org). Accessed May 6, 2011.
37. American Dietetic Association. Hot Topics "High Fructose Corn Syrup." December 2008.
38. American Medical Association, Council on Science and Public Health. *The Health Effects of High Fructose Syrup*. Report 3 of the Council on Science and Public Health (A-08). June 19, 2008. [www.ama-assn.org/](http://www.ama-assn.org/) Accessed May 6, 2011.

39. U.S. Department of Agriculture, Food and Nutrition Service. Guidance Memo: Child Nutrition Reauthorization 2010: Nutrition Requirements for Fluid Milk, April 14, 2011. [www.fns.usda.gov/cnd/Governance/Policy-Memos/2011/SP\\_29-2011-os.pdf](http://www.fns.usda.gov/cnd/Governance/Policy-Memos/2011/SP_29-2011-os.pdf). Accessed May 6, 2011.
40. Yon, B.A., R. Johnson, and T. Stickel. FASEB J. 25: 781.1 (abstr.), 2011.
41. Greer, F.R., and N.R. Krebs for the American Academy of Pediatrics Committee on Nutrition. Pediatrics 117: 578, 2006.
42. Institute of Medicine, National Academy of Sciences, Committee on Nutrition Standards for Foods in Schools. V.A. Stallings and A.L. Yaktine (Eds). *Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth*. Washington, DC: National Academies Press, 2007.
43. School Nutrition Association. Fat-free flavored milk – helping students meet their critical nutrition needs. SNA News, April, 13, 2011. [www.schoolnutrition.org](http://www.schoolnutrition.org). Accessed May 9, 2011.
44. American Dietetic Association. Science supports the important role of milk, including flavored milk, in children's nutrition. Press release. November 11, 2009. [www.eatright.org](http://www.eatright.org). Accessed May 9, 2011.
45. American Academy of Pediatric Dentistry. AAPD Fast Facts. Diet and Dental Health. 2010. [www.aapd.org/media/FastFacts.pdf](http://www.aapd.org/media/FastFacts.pdf). Accessed May 6, 2011.
46. Bhatia, J.J.S., and F.R. Greer. AAP News 28 (June): 15, 2007. [www.aapnews.org](http://www.aapnews.org). Accessed May 6, 2011.
47. Motivequest for Dairy Management, Inc.™ Flavored Milk Online Anthropology 08/1/2009 – 09/30/2010, February 28, 2011.
48. Artemis Strategy Group for Dairy Management, Inc.™ Activating Moms: Flavored Milk in Schools. Review of Qualitative Research. December 8, 2010.
49. Fisher, J.O., D.C. Mitchell, H. Smiciklas-Wright, et al. J. Nutr. 131: 246, 2011.
50. Fisher, J.O., D.C. Mitchell, H. Smiciklas-Wright, et al. Am. J. Clin. Nutr. 79: 698, 2004.
51. Briefel, R.R., A. Wilson, and P.M. Gleason. J. Am. Diet. Assoc. 109(suppl 1): 79s, 2009.



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- National Dairy Council. Flavored Milk in Perspective, 2009.
- National Dairy Council. Flavored Milk: Questions & Answers. Dairy Council Digest 79(6), 2008.
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