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Milk Enhancements Improve Milk Consumption and Increase Meal Participation in the NSLP: The School Milk Pilot Test

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Please note that this study was published before the implementation of Healthy, Hunger-Free Kids Act of 2010, which went into effect during the 2012-13 school year, and its provision for Smart Snacks Nutrition Standards for Competitive Food in Schools, implemented during the 2014-15 school year. As such, certain research may not be relevant today.

ABSTRACT

Purpose/Objectives

The objective of the School Milk Pilot Test and the Westside School Milk Pilot Study was to test the effect of a milk enhancement initiative to make milk more appealing and attractive to elementary and secondary school students and to improve milk consumption.

Methods

146 schools participated in the national School Milk Pilot Test and 4 schools participated in the local Westside School Milk Pilot Study designed to measure the effect of milk enhancements on school meal participation, milk sales, and milk consumption. Milk enhancement strategies included a variety of sizes and flavors offered ice cold, in plastic re-sealable bottles, and at diverse points of sale within the school. A total of 101 test schools implemented a variety of milk enhancement options and merchandizing changes while the remaining 49 control schools continued with their traditional milk product offerings.

Results

A significant 4.8% increase was measured in average daily participation in the federal National School Lunch Program at the secondary school level. Volume of milk sold and quantity of milk consumed also increased significantly at both elementary and secondary test schools, relative to control schools, with enhanced milk packaging and merchandising.

Application to Child Nutrition Professionals

Findings from this study suggest that if similar milk enhancements were to be adopted by schools nation-wide more students would participate in the school meals program, increasing the federal reimbursement and commodity entitlements received by participating NSLP schools. Milk sales and overall milk consumption might also be expected to increase. Increased milk consumption has beneficial dietary consequences in terms of enhanced diet quality, thereby affecting short and long-term student health which can benefit school wellness initiatives and translate into reductions in health care costs.

INTRODUCTION

The Dietary Guidelines for Americans (DGA) represent a federal mandate that forms the foundation of national nutrition policy for the U.S., and guides federal food programs such as the National School Lunch Program (NSLP). Published jointly by the United States Department of Agriculture (USDA) and the United States Department of Health and Human Services (USDHHS), the DGA are based on scientific research and designed to help Americans make food choices that promote health and reduce the risk of chronic disease (2005). Through the food guidance system *MyPyramid*, the DGA provide recommendations on the selection of foods from each of the five food groups (grains, fruits, vegetables, milk, and meat/beans) to achieve an adequate daily intake of essential nutrients.

In its most recent iteration, the 2005 DGA identified fruits, vegetables, whole grains and low-fat and fat-free milk and milk products as *Food Groups to Encourage* because they provide key nutrients that are typically low in the diets of Americans (USDHHS & USDA, 2005). Milk is rich in nine essential nutrients and supplies three of the five nutrients identified as consistently low in children's diets: calcium, magnesium, and potassium (USDA, 2005). To achieve dietary adequacy of these essential nutrients, the DGA recommends two cups of low-fat or fat-free milk or equivalent milk products for children aged 2-8 and three cups/day for individuals age 9 and above. The American Academy of Pediatrics (AAP) elevates the dairy food recommendation to 3 servings/day for children and 4 servings/day for adolescents (2006).

While the value of dairy foods extends beyond being a calcium source, dairy foods are nevertheless the most abundant source of calcium in the food supply, providing 70% of the nation's dietary calcium (Hiza, Bente, & Fungwe, 2008). Meeting dietary calcium adequate intake (AI) recommendations of 800 mg/d (age 4–8) and 1300 mg/d (age 9–18) without consuming dairy foods is difficult (Dietary Guidelines Advisory Committee [DGAC], 2005; Gao, Wilde, Lichtenstein, & Tucker, 2006; Institute of Medicine [IOM], 1997; Weaver et al., 2006) and studies show that diets low in calcium and dairy foods tend to be deficient in multiple nutrients (Barger-Lux, Heaney, Packard, Lappe, & Recker, 1992; Weinberg, Berner, & Groves, 2004).

The most economical and effective way to remedy these multiple deficits is to encourage adequate intake of low-fat and fat-free milk and milk products naturally containing calcium and other essential nutrients (DGAC, 2005; Shanklin & Wie, 2001). However, studies show that consumption of fluid milk by children declined 21% from 1977 to 2001 (Nielsen & Popkin, 2004). More than half of children age 2-8 and 77% of children age 9-19 do not consume the recommended daily dairy food servings (National Dairy Council [NDC], 2003). Consequently nearly 90% of teenage girls and 70% of teenage boys do not meet the calcium adequate intake (AI) of 1300 mg/day (USDA, Agricultural Research Service [ARS], 2005). In a national survey of students' beverage selections and behaviors, students rated their beverage preferences and reported reasons for not drinking milk. The reasons included: availability of competitive beverages; inferior product quality; poor temperature control; limited milk varieties/flavors available; unattractive milk cartons; and containers hard to open and drink from (Nicklas, 2003).

Against this background of sub-optimal calcium nutrition, decreased dairy intake, and diminished milk appeal, the School Nutrition Association (SNA) partnered with the National Dairy Council (NDC) in 2001 to test the effect of a milk enhancement initiative to make milk more appealing and attractive to students and to improve milk consumption. The national School Milk Pilot Test was conceived to measure the effect of milk enhancements on school meal participation, milk sales, and milk consumption. Independent of the national School Milk Pilot Test, a similar milk enhancement initiative, the Westside School Milk Pilot Study, was undertaken by an urban Midwestern school district (Westside Community Schools, Omaha, Nebraska) in 2006, to measure the effect of milk enhancements on milk sales and milk consumption. This report presents the outcomes of the pilot studies, and projects the impact of national milk enhancement implementation on improved diet quality, health benefits, health care costs, and implementation costs.

METHODOLOGY

Design

The national School Milk Pilot Test (SMPT) was conducted in 146 schools from 18 school districts during the 2001–2002 school year. Selected schools included 47 elementary schools, of which 18 were control and 29 test schools, and 99 secondary schools, of which 30 were control and 69 test schools.

A variety of milk enhancement options were implemented in the test schools. *Milk enhancement* refers to the various combination of changes in product quality (flavors, temperature, taste); packaging (plastic re-sealable bottles, portion sizes); and merchandising (vending, ala carte, marketing) designed to improve the appeal, the taste, and the accessibility of milk in the school lunch setting. Some of the enhancements were adopted by the test schools universally, while some were implemented in a portion of the test schools. The control schools made no changes and continued with their traditional product offerings.

Baseline data were collected in 14 of the 18 SMPT school districts for a minimum of one month. The test itself began as early as November 2001 in some districts and as late as February 2002 in others, and continued in all schools through the remainder of the school year.

During the 2005–2006 school year, four elementary schools having similar socioeconomic demography, as measured by participation in free and reduced price meals, took part in the Westside School Milk Pilot Study (W-SMPS) to measure the effect of various milk enhancements at the local school district level. One school served as the control school; the three test schools adopted a variety of milk enhancements and promotional activities. A milk marketing campaign (i.e. essay and poster contests, *Milk Mustache*™ photo opportunities, *3-A-Day of Dairy*™ item give-aways) was the focus in one of the test schools, while the other test schools adopted changes in milk packaging and display. Following a 10 day data collection period to obtain baseline measurements, test schools adopted the assigned milk enhancement for 11 weeks beginning in January 2006. Approval from the Westside Community Schools administration was obtained.

The sample SMPT schools are considered representative of national averages with respect to average enrollment, baseline Average Daily Participation (ADP) in NSLP, and percent free and reduced price meal demographics (Table 1). In each category, test and control schools were closely matched and none of the differences between test and control schools were found to be significantly different. The participating W-SMPS schools were selected based on Title 1 funding and similar free and reduced price meal demographics within the sample. The "offer vs. serve" approach was used at all secondary schools, all W-SMPT schools, and in 85% of the SMPS elementary schools. SMPS elementary test schools and control schools were matched within districts so the "offer vs. serve" variable was consistent.

Table 1. *Test and Control School Characteristics Compared to National NSLP Schools*

	ELEMENTARY SCHOOLS					**SECONDARY SCHOOLS**		
		SMPT		**W-SMPS**[1]			**SMPT**	
	National	**Test** n=29	**Control** n=18	**Test** n=3	**Control** n=1	**National**	**Test** n=69	**Control** n=30
Average student enrollment	468	507	448	341	376	760	930	1080
NSLP Average Daily Participation (ADP)	67%	74%	77%	80%	80%	45%	56%	53%
Free and reduced-price meal approvals	48%	46%	43%	Title 1	Title 1	31%	34%	29%

[1] Only elementary schools participated in the W-SMPS

Table 2 sets forth the various milk enhancements implemented in the SMPT and the W-SMPS test schools.

Table 2. *Milk Enhancement Strategies Implemented at Test Schools Strategies*

	SMPT		**W-SMPS**
STRATEGY	**Secondary** n = 69	**Elementary** n = 29	**Elementary** n = 3
Promotional milk marketing activities [1]	x	x	x
Milk packaged in plastic re-sealable bottles (PRB)	x	x	x

New coolers installed to maintain chilled milk temperature at 35–37 degrees [2]	x	x	x
3 milk flavors offered (white, chocolate, and one other) [3]	x	x	
Chocolate milk upgraded to retail quality [4]	x	x	
8 oz milk (PRB) offered on meal line	x	x	x
10 oz milk (PRB) offered on meal line	x		
10 oz and 16 oz milk (PRB) available a la carte	x		
16 oz milk (PRB) available in vending machines	x		
[1] Promotional milk marketing activities varied among schools. The coolers that were installed at the schools to maintain chilled temperature were also intended to visibly display the milk more attractively as part of the milk merchandising and promotion strategy			
[2] Maintaining milk temperature at 35–37° ensured a colder and more refreshing product, increasing milk appeal			
[3] W-SMPS offered only 1% white milk during the pilot			
[4] Milk processors generally produce a higher quality chocolate milk product for retail sales			

Data Collection
In all test and control schools, school personnel were trained to keep detailed records of milk sales and measures of participation in the NSLP throughout the baseline and test periods. Discarded milk containers were collected and the contents measured at each of the W-SMPS schools, and from a sample of students in 47 of the participating SMPT schools, to quantify actual milk consumption.
Data Analysis
The data were analyzed for the following outcomes: change in the number of NSLP meals sold, expressed as Average Daily Participation (ADP) in the NSLP; change in the number of units of milk sold (cartons or bottles) in the meal line and ala carte; and change in the quantity of milk consumed. Percent change of each outcome variable was analyzed relative to the test school's baseline measurement, and a mean net outcome was recorded relative to the control school(s). Mean calculations were performed in Microsoft Excel spreadsheet and Student's t-test statistical analysis was applied using SPSS 11.0 for Windows (Chicago).

RESULTS AND DISCUSSION

The measurements obtained by the schools were combined within test and control groups at the secondary level and the elementary level for the SMPT. Likewise, the combined results from the three W-SMPS test schools are presented in this analysis. Table 3 sets forth the results in terms of the mean net percent change from baseline for the test schools, relative to the control schools, for the SMPT and the W-SMPS.

Table 3. *Mean Net Percent Change in Average Daily Participation (ADP), Milk Sales, and Milk Consumption in Test Schools from Baseline*

	SMPT		W-SMPS
OUTCOME MEASURED	**Secondary** n = 69	**Elementary** n = 29	**Elementary** n = 3
ADP in NSLP	4.8 *	1.5	1.8
Milk sales per 100 ADP	22 *	15 *	9.1 *
Milk consumption per 100 in attendance	39 *	35 *	21.5 *
Milk consumption per unit sold	26 *	18 *	13.1 *
* Statistically significant; $p < 0.05$			
Study findings are reported as the mean net percent change from baseline for the test schools, relative to the control schools, for each outcome measured.			

NSLP Participation

ADP in the NSLP is reported as number of lunch meals sold per 100 students in attendance. This measure is used to standardize results across schools of different size and rates of ADP. Given that NSLP participation rates are high to begin with in the elementary schools, no significant change in ADP was found in either SMPT or W-SMPS elementary schools. SMPT secondary schools reported an increase in ADP of 4.8% which is statistically significant ($p < 0.05$).

Milk sales

Mean net change in milk sales is reported as a function of ADP in Table 3. Milk sales increased significantly by 9.1% in the W-SMPS test schools relative to the control school ($p<0.05$). This increase is consistent with SMPT test schools which reported net increases in milk sales ranging from 6% to over 30%, and an average net increase in total elementary school milk sales of 15%, which is statistically significant ($p<0.05$). SMPT secondary schools significantly increased total milk sales by 22%, which is reflective of the additional vending and a la carte opportunities that were available in the SMPT secondary schools. Flavored milk varieties, not offered at the W-SMPT schools, accounted for the major share of the increase in milk sales in the SMPT.

Milk consumption

Two approaches are taken in reporting the changes in milk consumption in Table 3. The adjusted value of milk consumption measured as ounces consumed per 100 students in attendance takes into account the contributing variables of meals sold and milk sold to most accurately reflect the cumulative milk consumption trend at the test schools. Using this calculation, SMPT schools showed significant net increases in milk consumption of 35% in the elementary schools and 39% in the secondary schools. The W-SMPS test schools showed a significant 21.5% net increase in milk consumption.

Change in milk consumption is also reported independently of other variables and expressed as change in the amount of milk consumed per each 8-ounce container of milk sold. Change in milk consumption relative to the number of milk units sold (bottle or carton) also increased significantly in the SMPT secondary (26%) and elementary (18%) schools. A similar significant net increase in milk consumption per unit sold was shown in the W-SMPS test schools of 13.1% (Table 3). Further contributing to the increase in unit milk consumption was a reduction in the share of discarded, unopened milk containers. Data segregated from W-SMPS schools show the number of discarded, unopened milk containers decreased 33% at the test schools which adopted the change in milk packaging from paper-board cartons to plastic re-sealable bottles, while there was no change in the average number of discarded unopened traditional milk cartons at the control school. National SMPT results show a 53% reduction in the number of discarded, unopened milk containers in secondary schools. Data is not available for SMPT elementary schools.

Discussion

The results of the national SMPT provide a basis for estimating the impact of implementing similar milk packaging and merchandising changes in all U.S. public schools participating in the NSLP. The impact on school meal participation rates has been noted as not statistically significant at the elementary school level, where ADP is already high. The increased ADP of 4.8% in the secondary schools, however, is statistically significant. On the basis that 36% of the nation's 30 million daily NSLP lunches are served in secondary schools (Nicklas & Hayes, 2008), a 4–5% increase in ADP would be projected to add an additional 470,000 secondary school participants in the NSLP per day.

Increased ADP does not alone account for the net increases in milk sales in the pilot. The purpose of the pilot was to test the effect of changes to make milk more attractive to children at school. Improved product quality, better temperature control, easy to open plastic bottles, augmented milk offerings (varieties, flavors, and sizes), and improved accessibility (vending, ala carte) combined to enhance milk's appeal to students. Increased milk sales of 15% in elementary schools and 22% in secondary schools can be attributed to students already participating in the NSLP who either started selecting milk with lunch during the pilot, or selected more than one milk. A la carte and vending sales contributed to 29% of the increased milk sales in secondary schools.

The nation-wide impact of implementing milk enhancements that result in increased NSLP participation, milk sales, and milk consumption can be projected to improve the overall diet quality and nutritional status of the nation's school children. Nationally, the average lunches consumed by NSLP participants at all school levels provide significantly greater amounts of protein, vitamin A, vitamin B12, riboflavin, calcium, phosphorus, and potassium than lunches consumed by non-participants (Gordon & Fox, 2007). NSLP participants are also less likely than nonparticipants to consume competitive foods in school (Gordon & Fox, 2007).

Federal child nutrition program costs and outlays for school meal reimbursement would be expected to increase with national implementation of the measures tested in the SMPT. Based on 2008–09 reimbursement rates and projected increased participation in the NSLP, total annual federal outlays to participating schools for meal reimbursements and commodity entitlements would increase by around $145 million (NDC, 2002; USDA, 2008).

Critical components of the SMPT and W-SMPS are associated with additional costs: upgraded packaging from paper-board cartons to plastic re-sealable bottles, installation of merchandising coolers to maintain desirable product temperature at 35–37°, additional flavor and serving size options, and strategic product display and access. Since the completion of the SMPT, the piloted milk enhancements now referred to collectively as the New Look of School Milk have been successfully adopted by over 10,700 schools nationwide. Many of these schools report that initial financial outlays are re-couped through sustained increased meal participation, milk sales, and increased federal reimbursements (NDC, 2008). Subsequent to the W-SMPS and district-wide implementation of the *New Look of School Milk*, the Westside Community Schools reported an average increased demand of 1,700 bottles of milk per day over the previous year's daily sales volume, effectively offsetting the increased costs of implementation (American Dairy Association and the Dairy Council of Nebraska, 2007).

The variety of milk enhancements adopted by the test schools in the SMPT and the W-SMPS demonstrates the degree of flexibility that school districts nationwide can exercise in adapting the various enhancements to their unique circumstances and budgets. The mix of enhancements implemented at the pilot test schools provide a reasonable approximation of the type and mix of milk enhancements school districts might consider and promote.

CONCLUSIONS AND APPLICATIONS

With the passage of the Child Nutrition and WIC Reauthorization Act of 2004, the federal government recognized the importance of the school environment in promoting student wellness and combating health problems associated with poor diets and poor nutrition. The projected impact of implementing the milk enhancements of the SMPT nationwide extends to student health outcomes, and provides schools with an effective strategy for promoting School Wellness initiatives mandated by the Act (USDA, Food and Nutrition Service, 2008).

Impact of milk consumption on diet quality

Milk and milk products are rich in several essential nutrients that increase milk's total nutritional value beyond calcium. A required component of all reimbursable school meals, milk accounts for 54% of the calcium, 30% of the vitamin A, 24% of the protein, and 21% of the carbohydrate contained in NSLP lunches, and is the primary or secondary source of vitamin B12, riboflavin, phosphorus, and potassium (Gordon & Fox, 2007). Nationwide food consumption surveys show that milk is the number one single food source of calcium, potassium, magnesium, phosphorus, and vitamin D in the diets of U.S. adults as well as children (Cotton, Subar, Friday, & Cook, 2004; Rafferty & Heaney, 2008; Subar, Krebs-Smith, Cook, & Kahle, 1998).

Studies have shown that children who consume flavored milk varieties have higher intakes of many nutrients compared to milk non-drinkers, and do not have higher intakes of added sugars or total fat, likely the result of lowered intakes of sweetened beverages (Johnson, Frary, & Wang, 2002; Murphy, Douglass, Johnson, & Spence, 2008). Indeed, the Bogalusa Heart Study found lower consumption of sweetened beverages, specifically regular soft drinks, with greater consumption of milk products in young adults (Ranganathan, Nicklas, Yang, & Berenson, 2005). Dietary behaviors such as habitual milk intakes developed in childhood have been shown to persist into adulthood, sustaining the beneficial impact of dairy nutrition on overall diet quality and long term health consequences (Sandler, Slemenda, & LaPorte, 1985; Soroko, Holbrook, Edelstein, & Barrett-Connor, 1994; Teegarden, Lyle, Proulx, Johnston, & Weaver, 1999; Welten, Kemper, Post, Van Staveren, & Twisk, 1997).

Impact of milk consumption on health outcomes

Diet quality is a strong predictor of health outcomes (Kant, 2004), and while milk is but one component of a healthful diet, the health benefits of milk and milk products are supported by a large body of scientific research. An adequate calcium intake is essential for the development and life-long maintenance of a strong skeleton. Childhood dairy consumption has been shown to augment adolescent bone mineral content accrual (Moore, Bradlee, Gao, & Singer, 2008). A rise in the risk of forearm fractures occurs in children near the time of puberty, and children with the thinnest bones are most likely to sustain fractures (Goulding et al., 1998). Calcium intake from milk and other dairy foods is a factor in determining bone strength at all life stages (Moore et al., 2008; Nicklas, 2003; Sandler et al., 1985; Soroko et al., 1994). Children who are milk avoiders have been shown to experience more than twice as many childhood fractures as others, and at the same time are nearly three times as likely to be obese (Goulding et al., 2004).

The preponderance of the evidence continues to link dairy consumption with improved body composition and weight management outcomes (Heaney & Rafferty, 2008; Moore, Bradlee, Gao, & Singer, 2006; Zemel, Richards, Mathis, et al., 2005; Zemel, Thompson, Milstead, Morris, & Campbell, 2004) and maintenance of muscle and bone during weight loss (Thorpe et al., 2008; Zemel, Richards, Milstead, & Campbell, 2005). Furthermore, available data indicate that the effects of supplemental calcium may be less propitious than those of dietary (dairy) calcium (McCarron & Heaney, 2004; Moore et al., 2008).

Impact of milk consumption on health care costs

The impact of improved nutrition on student health also has economic implications for national health care costs in the long term. Cardiovascular disease, hypertension, stroke, type 2 diabetes, osteoporosis, and cancer make up the bulk of the disease burden in the U.S. population, the treatment of which consumes a significant portion of the United States' healthcare budget. McCarron and Heaney have itemized the medical conditions known to be influenced by dietary intervention and estimated the healthcare cost savings that would accrue if U.S. adults adhered to the DGA recommendations for dairy and increased consumption of dairy foods to three servings/day. They projected a first year national healthcare cost savings exceeding $26 billion, and a 5-year cumulative saving of approximately $209 billion (McCarron & Heaney, 2004). For osteoporosis-related hip fractures alone, improved diet quality might save up to $10.6 billion each year in medical care costs, missed work, and premature deaths (Lin & Ralston, 2003).

Application

Results of the School Milk Pilot Test conducted jointly by the School Nutrition Association and the National Dairy Council, and replicated in an urban Midwestern school district, confirm that school children drink more milk when it is offered well chilled, in plastic re-sealable bottles, in a variety of sizes and flavors, and at diverse points of sale within the school. Increases were measured in average daily participation in the federal National School Lunch Program, volume of milk sold, and quantity of milk consumed in test schools when milk enhancements were implemented. If similar milk enhancements were to be adopted by schools nation-wide, the nutritional intake, diet quality, and health outcomes of millions of children could be projected to improve.

Ultimately, the decision to implement any of the milk enhancement strategies tested in these pilot studies rests at the local school district level. Thus, the data generated by the SMPT and the W-SMPS demonstrate the viability of measuring the impact of milk enhancements implemented at the local level. Implementation costs incurred by milk processors and participating schools must be evaluated in light of the potential for increased income from milk sales and federal disbursements, as well as the preference school children show for cold milk packaged in plastic re-sealable bottles. Future research is also needed at the local level to explore operator satisfaction with plastic re-sealable bottles, and to further quantify actual costs and benefits within school districts. The recycle potential of plastic re-sealable bottles over coated paper-board cartons, and methods of integrating a recycling component into the curriculum should also be addressed in future research.

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