

The **SOY** Connection

Health & Nutrition News About Soy



Winter 2008

SOY GOES TO SCHOOL: ACCEPTANCE OF SOYFOODS IN METRO MIDDLE SCHOOLS

By Kathleen Lazor, M.A., R.D.

Soy protein products continue to gain in popularity in commercial settings but have rarely been explored for use in the school meal program. In 2007, a study was conducted to test the acceptance of soy-based meal options adapted from popular lunch items in five middle schools with a diverse student population.

Fifteen potential soy based alternatives that looked and tasted like the most popular menu items were pre-tested in one school in a representative group of middle school students, who scored the foods for taste, appearance and texture, and indicated whether they perceived the new items to be at least as good as the foods currently offered in the cafeteria. Five soyfood items were chosen for additional testing:

- Veggie chicken nuggets vs. traditional chicken nuggets
- Veggie chicken vs. regular chicken in Caesar salad
- Soy pasta vs. traditional pasta in macaroni and cheese
- Soy beef patties vs. regular beef patty
- Soy black bean burger served on a bun, introduced clearly as a vegetarian item

Acceptance of food was measured using plate waste to compare amounts and proportion eaten of traditional and soy-based foods. The different food versions were offered in consecutive weeks. For example, one week the cafeterias sold the traditional beef patties and the next week the hybrid beef patties. A fifth product, a black bean burger, was introduced as an overt vegetarian option. The introduction of soy-based products was spread out over three weeks. Students and their parents were informed of the new menu items prior to the trial to alert people with soy allergies, but no other cues were provided in the cafeteria. Trained observers tagged trays with test items after students made their choices, and instructed them to return their trays with uneaten portions. The remaining foods were weighed and compared to the standard serving size to estimate how much was consumed. Other entrees were also tagged and weighed at random so that students were unaware of which foods were being tested.

The amount of food consumed was measured in ounces, and the proportion of food was calculated as the amount consumed divided by the starting weight. A mixed

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RESEARCH UPDATES

By Mark Messina, Ph.D.

Soyfood as a Healthy Source of Protein

For much of the last century, dietitians and nutritionists thought about soyfoods primarily because of their role in providing protein in plant-based diets. Their relevance to the diets of the general population was considered limited. This began to change in the 1990s when it was recognized that soy protein might offer benefits beyond meeting amino acid requirements and that soybeans and many

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soyfoods contained a variety of non-nutritive biologically active components such as isoflavones that might offer benefits in a wide range of areas.

These other proposed benefits in combination with product innovation led to a jump in soyfood consumption.

However, recent findings have once again positioned the spotlight on soyfoods for meeting protein needs. In the November 2007 issue of the *American Journal of Clinical Nutrition*, Canadian researchers concluded that the current protein EAR and RDA are too low.¹ Protein needs were determined using the indicator amino acid oxidation technique in healthy men who received graded protein intakes (0.10, 0.30, 0.60, 0.90, 1.2, 1.5 and 1.8 g/kg/d) as a crystalline amino acid mixture. The researchers concluded that the EAR and RDA for protein should be 0.93 and 1.2 g/kg/d, respectively. The current EAR and RDA are 0.66 and 0.8 g/kg/d, respectively. Although U.S. typical protein intake exceeds the current RDA, for about one-third of all women and about 40% of people over the age of 70 years this is not the case.² Protein needs appear to be higher for athletes as well. The International Society of Sports Nutrition recently concluded that protein intakes of 1.4–2.0 g/kg/d may improve the training adaptations to exercise in physically active people and that protein intakes at this level are not detrimental to kidney function or bone metabolism in healthy, active persons.³

The impact of protein intake on both renal function and bone is a subject of much ongoing research.

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model analysis was used to account for differences between schools, and a proportional odds model was used to compare amounts and proportions consumed.

Equal amounts were consumed of soy-based and traditional pasta, nuggets and beef patties. The amount of soy-based chicken consumed in the Caesar salad was slightly less compared to the regular chicken. (See Figure 1 above.)

The proportions of food consumed ranged from 0 (none of the product) to 1 (the entire product). For every type of product, most students ate the entire serving. When analysis was adjusted for school effects, slight differences were also observed in the proportion of burgers and nuggets consumed.

- The soy-based chicken product was well-accepted in the pre-test, where it was sliced on the premises. For the larger trial, the soy-based chicken was pre-sliced, which may have caused changes in color and texture.
- The standard serving size of the hybrid beef patty was slightly larger than the regular beef patty, which may partially explain why the amounts consumed were equal, yet proportions differed slightly. Significantly, students were more likely to have consumed almost all the regular beef patty, compared to the hybrid beef patty.
- No differences were observed in either the amount or the proportion consumed of the soy or regular pasta.
- Students consumed equal amounts of both types of nuggets, but were more likely to finish the entire serving of the traditional nuggets compared to the soy-based chicken nuggets. Standard serving sizes of the soy-based chicken nuggets were slightly larger than the traditional nuggets, which may partially explain this finding.
- Sales of the black bean burger were comparable to entrée salads. Most were entirely consumed.

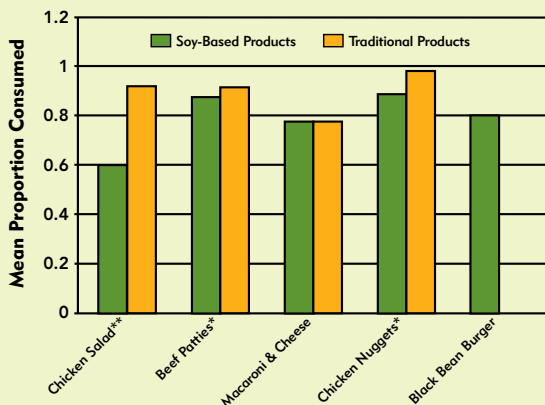


FIGURE 1. **<.0001 *<.01, or near equal

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Nutrient Comparisons of Soy-Based and Traditional Foods

On average the soy-based entrees had 18% fewer calories, 45% less fat, 57% less saturated fat and one-fifth the cholesterol compared to traditional entrees. None of the products contained trans fat. The soyfoods had nearly equal amounts of protein, twice the amount of iron and six times the amount of fiber compared to the traditional menu items. The soyfoods were 20% higher in sodium. (See Figures 2 and 3 below.)

FIGURE 2.	Soy-based Chicken	Reg. Chicken	Hybrid Beef Patty	Reg. Beef Patty	Soy-based Chicken Nuggets	Reg. Chicken Nuggets	Black Bean Burger
Serving Size	2 oz. or 57.5 g	2.1 oz. or 62 g	2.3 oz. or 64 g	2.2 oz. or 62 g	3.75 oz. or 106 g	3.75 oz. or 93 g	3 oz. or 93 g
Calories	80	200	130	132	230	230	180
Protein	14 g	17 g	13 g	14 g	15 g	14 g	15 g
Carbohydrates	4 g	20 g	2 g	2 g	22 g	14 g	18 g
Fat	2 g	11 g	7 g	8 g	9 g	13 g	6 g
Saturated Fat	0 g	3 g	3 g	3 g	1 g	3 g	1 g
Trans Fat	0 g	0 g	0 g	0 g	0 g	0 g	0 g
Cholesterol	0 mg	50 mg	25 mg	35 mg	0 mg	35 mg	0 mg
Sodium	220 mg	318 mg	310 mg	232 mg	604 mg	465 mg	480 mg
Fiber	1.5 g	0 g	0g	0.5 g	6.2 g	0 g	6.0 g

USDA studies indicate that the saturated fat and cholesterol content of school lunches often exceeds the Dietary Guidelines for these nutrients.¹ Soy-based products such as nuggets, pasta and soy-meat blends like the hybrid beef patty, are well-accepted by students as alternatives to popular entrées. Equal amounts of soy-based and traditional products were consumed; proportions eaten differed slightly, but most students consumed the entire product regardless of the food type. Soy-based products can help meet USDA regulations for fat and saturated fat while providing more vegetarian choices and variety.

The soyfoods industry is relatively new to the school nutrition market, and manufacturers appear to be willing to work with districts to refine the products as needed (for example, improving packaging to preserve color and texture or reducing sodium content) and to offer competitive pricing. 🍌

ABOUT THE AUTHOR

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REFERENCE

Complete references for this article can be found on our Web site. Log on to www.soyconnection.com and click on the "Newsletters and Tools" section.

FIGURE 3. Nutritional Comparison for Pasta Products

Category	Soy Macaroni	Traditional Macaroni
Serving Size	0.07 g (dry)	0.05 g (dry)
Calories	160	168
Fat	0.8 g	0.7g
Saturated Fat	0 g	0.1 g
Trans Fat	0 g	0 g
Cholesterol	0 g	0 g
Sodium	96 mg	3.2 mg
Carbohydrates	26.4 g	33.9 g
Fiber	1.6 g	1.1 g
Protein	10.4 g	5.79 g

ABOUT THE STUDY

The Montgomery County Public Schools study of the acceptance of soy-based lunches was conducted by Nancy Chapman and Associates and commissioned by the United Soybean Board.

This study was done in Montgomery County Public Schools, Maryland, a school system with an enrollment of 138,000 students. The five middle schools were selected to represent the diversity in the system. The demographics include: 38% white, 25% Hispanic, 22% African American and 15% Asian.

Thirty percent of students receive free or reduced-price meals (ranging from 14% to 52% of students within schools). The lunch program in middle schools feature up to seven entrée choices daily, including popular items like beef patties and pizza.

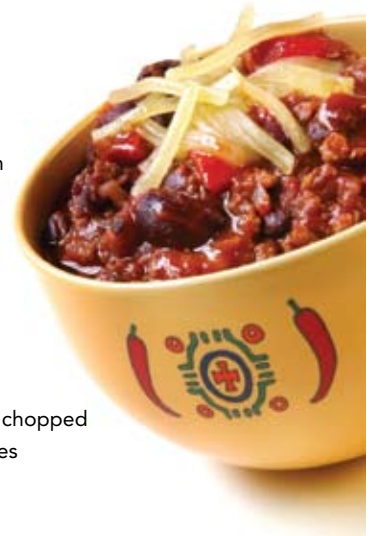
Game Day Chili

Yield: 8 servings

Ingredients:

2 Tbsp.	ground cumin	1-1/2 cups	tomato juice
2 Tbsp.	chili powder	3 cups	vegetable or beef broth
1 Tbsp.	unsweetened cocoa powder	1-1/4 cups	dry Textured Vegetable Protein (TVP)
1-1/2 tsp.	ground coriander	1 14.5-oz. can	diced tomatoes
1 tsp.	dried oregano	2 15-oz. cans	black beans, rinsed and drained
1 tsp.	sugar	2 15-oz. cans	kidney beans, rinsed and drained
1 tsp.	salt		
2 Tbsp.	vegetable oil		
1 large	onion, chopped		
1 clove	garlic, minced		
1 medium	green bell pepper, chopped		

Condiments (optional): grated cheese, chopped onions, diced avocado, sliced black olives



Method of Preparation:

- 1) Mix all the seasonings in a small bowl. Set aside.
- 2) Heat the oil in a large pot over medium heat. Add onions and sauté until golden. Add garlic, bell pepper and seasoning mixture and sauté for another minute.
- 3) Add the remaining ingredients (except condiments) and mix well. Bring to a boil, then reduce heat and simmer, stirring occasionally, for at least 15 minutes to let the flavors blend.
- 4) Serve with the optional condiments, if desired.

Make It Ahead – Come home from the big game to chili simmering in the crockpot. Follow the directions through step two, then combine everything in the crockpot and leave it on low for at least 3 hours.

Make It Easy – Make chili using a packet of chili seasoning mix, but substitute TVP for the ground beef.

Nutritional Analysis: 1 serving

Per serving (about 1-1/2 cups): 229 calories, 17 grams protein (7.7 grams soy protein), 33 grams carbohydrate, 5 grams fat (0.6 grams saturated) Exchanges: 1-1/2 lean meat, 2 starch

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CONSUMER ATTITUDES ABOUT HEALTH AND NUTRITION

The United Soybean Board recently completed its 14th annual Consumer Attitudes About Nutrition nationwide survey. The study was conducted by an

Nine in 10 consumers are at least somewhat concerned about the nutritional content of the food they eat. Over 75% of consumers say they have changed eating habits in the past three to five years due to health concerns. Half of today's consumers report it unlikely they would purchase foods with trans fat listed on the label, while 65% would be more likely to purchase products reformulated to eliminate trans fat.

Health Strategies

Consumers have digested the news about "good" and "bad" fats. Over 62% of consumers believe the most effective strategy for improving overall health is following a moderate-fat diet by choosing "good" fats (up from 47% in 2006). Just 11% believe adopting an overall low-fat diet is the most effective strategy.

For the first time in study history, trans fat surpassed saturated fat as the least healthy fatty acid. Ninety-one percent of consumers view trans fat as unhealthy. When comparing the perceived healthiness of saturated fat versus trans fat, 42% say the former is healthier. This suggests a need for nutrition professionals to educate consumers on the multiple harmful fats, so they do not replace trans fat with saturated fat. Omega-3 fatty acids were the only type of fat consumers rated as more healthy than unhealthy.

Nutrition Facts Label

The vast majority (90%) of consumers consider the Nutrition Facts label important in deciding which foods to buy. Overall health maintenance, such as monitoring fat or sugar intake, appears to be the primary

reason for viewing the label. Avoiding a specific health condition is secondary. An important note is that 12% of consumers named trans fat as the single item they pay closest attention, up from 7% in 2006. At the same time, the number of people who pay most attention to total fat dropped two points to 10%.

Cooking Oils Rated


The study found consumers perceive olive oil (89%), canola oil (76%) and soybean oil (70%) as the three healthiest oils. Flax seed ranks fourth, followed by sunflower and safflower.

Soybean oil (commonly labeled as vegetable oil) is second to olive oil in terms of cooking oil consumers say they use most frequently.

Soyfoods Consumption

Perception of soy's healthfulness jumped to 85%, up three points over 2006 and an 18 point climb over 1998. On an aided basis, consumers most often recognize the health benefits of soy in relation to weight management (36%), reduced risk of heart disease (35%) and reduced cancer risk (30%).

Over one-third of consumers are aware of the FDA-approved health claim that consuming 25 grams of soy protein per day reduces the risk of coronary heart disease, with 84% of that group agreeing with the health claim.

An increasing number of consumers seek out products containing soy for health reasons (up six points to 37%). One quarter of consumers consume soyfoods or beverages at least once a week, while 33% do so monthly. Consumer awareness is highest in regard to these soy products: soymilk, soybean oil, soy veggie burger, tofu and soy infant formula. 



independent research firm via an online self-administered survey of 1,000 random interviews consistent with the total American population.

The 2007 results reveal U.S. consumers are willing to pay more to satisfy health demands—a turning point in shopping behavior. Functional foods are a driving factor, as consumers try to avoid trans fat, increase intake of "good fat" and boost consumption of beneficial ingredients. This public interest in smart nutritional choices is encouraging, as it points to increased opportunity for compliance with U.S. dietary recommendations.

Purchasing Decisions

Nearly all consumers (90%) rate nutrition important when deciding what foods to buy. One important takeaway from the 2007 study is that 60% of consumers express a willingness to pay extra for healthier foods, reversing a four-year downward trend and a 7% rise over 2006.

About the Study

The 14th annual Consumer Attitudes About Nutrition study was conducted in February and March 2007. The margin of error is +/- 1.9–3.1 percent, with a confidence interval of 95 percent.



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Of particular interest is the effect of plant versus animal protein. The reader is referred to a recent article and follow-up letters to the editor in the *Journal of the American Dietetic Association* for information on the impact of protein, and animal versus plant protein, on renal function.^{4,5} Although still speculative, there are intriguing data suggesting that soy protein, despite being of very high quality, doesn't cause the adverse effects on the kidneys that occur in response to animal protein. In 2007, several studies in rodents found this to be the case; however, more human data are needed before definitive conclusions can be drawn.⁶⁻⁸ The effect of soy protein on renal function may be of particular public health importance since new data show that between 1988–1994 and 1999–2004, the prevalence of chronic kidney disease stages 1–4 increased by 30%.⁹

Recent data suggest that higher protein diets do not adversely affect bone mineral density and calcium retention as once thought.¹⁰ While plant proteins such as soy result in lower net acid excretion, it is not clear if they have skeletal advantages over animal protein.^{11,12} Aside from the protein, the isoflavones in soybeans are under study for their ability to reduce bone loss in postmenopausal women; recent clinical data are especially encouraging.¹³ Finally, evidence continues to show that, because protein is more satiating than carbohydrate and fat, higher protein diets may have an important role in body weight management.¹⁴ Soy protein is as efficacious as animal protein in this regard.¹⁵

In conclusion, a growing body of research suggests that obtaining adequate protein is an important dietary concern. This may be especially true for those engaged in physical activity and for people on weight loss diets. Soyfoods and legumes in general, which are greatly underutilized in this country, can make important contributions to the protein intake of Americans. 🍲

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