

The SOY Connection

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SOY SCHOOL LUNCH OFFERS HEALTHIER ALTERNATIVES

By Barbara Klein, Ph.D.

In the past 30 years, a threefold increase in obesity in school children aged 6 to 19 years occurred, proving childhood obesity is a critical health problem in the U.S.¹ The National Health and Nutrition Examination Survey (NHANES) places the incidence of overweight in U.S. children at 16%.²

Overweight and obesity have direct impacts on immediate and long-term risks of serious health conditions in children, including type 2 diabetes and cardiovascular disease.³ A recent American Dietetic Association position statement on pediatric obesity⁴ recognizes the problems associated with treating overweight and notes that a combination of family- and school-based activities is necessary. Programs should include a variety of approaches, ranging from physical fitness to behavioral modification to nutrition education for children, teachers and parents. A "healthy school environment," where children are taught about good nutrition and physical activity and practice these principles, is an essential part of an overall health and wellness approach.

Federally-funded school lunch programs are universally available in U.S. schools and must meet specific federal and state standards for nutritional quality. Nationally, about 28 million children receive free and reduced price lunches and breakfasts through the National School Lunch Program (NSLP) daily.⁵ Although it is the intention of the NSLP to provide menu plans that meet dietary recommendations, this goal has not been achieved. Data from studies conducted by the USDA⁶ indicate that the fat content of school lunches is well above the recommended dietary recommendations (30% of calories from fat and less than 10% from saturated fat). School lunch programs may provide the appropriate nutritional quality, at least on paper, but there are only a few studies of actual consumption.^{7,9}

Why should we use soyfoods in school lunch programs? An important issue is the high fat content of popular menu items. When soy protein is substituted for some of the high fat component, the total energy, saturated fat content and cholesterol can be reduced. USDA regulations were modified in 2000 to permit soy protein

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RESEARCH UPDATES

By Mark Messina, Ph.D.
Soy, Isoflavones and Hot Flashes

Numerous reviews and analyses on the efficacy of soyfoods and isoflavone supplements for alleviating hot flashes have been published. These papers have reached different conclusions in part because of the different criteria used for including or excluding studies. A recent meta-analysis by Howes et al. included studies only if they were randomized, placebo controlled, provided the number of baseline

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FOCUS ON // SOY SCHOOL LUNCH

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RESEARCH UPDATES

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hot flashes, the variance in flashes, and the reduction in flashes. Also, only parallel design studies (studies in which there were two separate groups of subjects) were included; crossover studies (studies in which half the subjects first take the placebo and half the active intervention and then switch to the alternate treatments) were excluded because hot flashes dissipate over time.

Isoflavone supplementation was found to be associated with a significant reduction in hot flashes although marked heterogeneity was found among the studies. The percentage reduction in flashes was significantly related to the number of baseline flashes per day and the dose of isoflavone used. That is, isoflavone supplements were efficacious primarily in women with at least four or five hot flashes per day and higher doses were more efficacious than lower doses. Although the effects of isoflavones were modest, this analysis did conclude they are useful for menopausal women with frequent hot flashes.

Maturitas 2006

Soy and Bone Health

A recent analysis by Whelan *et al.* on the effects of isoflavones on bone health concluded that while it is unclear whether these soybean constituents were efficacious for preventing bone loss in postmenopausal women, the positive results from several trials suggest that further investigation using well-designed trials and fully described products is warranted. These studies are underway; the United States Department of Agriculture is funding a large 3-year study and the National Institutes of Health, two large 2- and 3-year studies. All three studies involve postmenopausal women and isoflavone supplements rather

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SOY SCHOOL LUNCH

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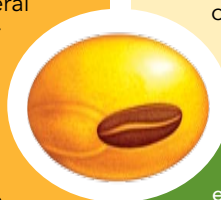
products containing a minimum of 18% protein to meet 100% of the meat/meat alternative requirement.¹⁰ However, it is more common to see soy used as partial meat replacement or enhancement in products ranging from chicken nuggets to taco fillings to lunchmeats.

School lunch programs do not offer soymilk, although incidence of lactose intolerance in U.S. children is relatively high, particularly in some ethnic groups. This is a concern because calcium intakes for children are known to be low.¹¹ Schools may make soymilk available to children if required for health reasons, but at the present time, alternatives to dairy milk are not reimbursable without a medical request.⁵ Reilly and coworkers¹² reported that almost half of elementary school students who were offered chocolate or vanilla soymilk alongside dairy milk were willing to try it, and after 4 weeks, 22% were continuing to drink it. The soymilk drinkers consumed 58% of their beverage, while dairy milk drinkers consumed 53%. The findings from this study suggest that soymilk is acceptable to children in the school setting.

Preschoolers, according to Endres and coworkers¹³, like soy-enhanced foods. Children received either ready-to-serve foods that had soy added by the manufacturer, soy-enhanced ground beef used in recipes, or foods made with added soy protein isolate. These were served as part of the regular lunch service in place of traditional products. Based on a plate waste study, there were no significant differences in the amounts of food consumed between soy-enhanced and traditional foods. Energy intake was slightly higher with soyfoods, as was protein, but fat intakes were lower. Examples of menus and nutrient analysis for a 3-week cycle using the products described by Endres can be found online.¹⁴

We conducted a pilot study in Illinois to determine whether elementary school students would find soy-based foods acceptable.¹⁵ Participants were more than 1,000 first- to sixth-grade students in four school districts, representing similar demographics to the overall state profile. Four menu items were tested—two (spaghetti sauce and ravioli) were made with 50/50 blends of meat and rehydrated textured soy protein, and two (chili and chicken-like nuggets) were made with 100% textured soy. Ravioli and nuggets were commercial products, and the others were recipes adapted for the school lunch program. In each school, one soy-enhanced and one soy-substituted product were served, and within four weeks the traditional counterpart appeared on the menu. Plate waste was

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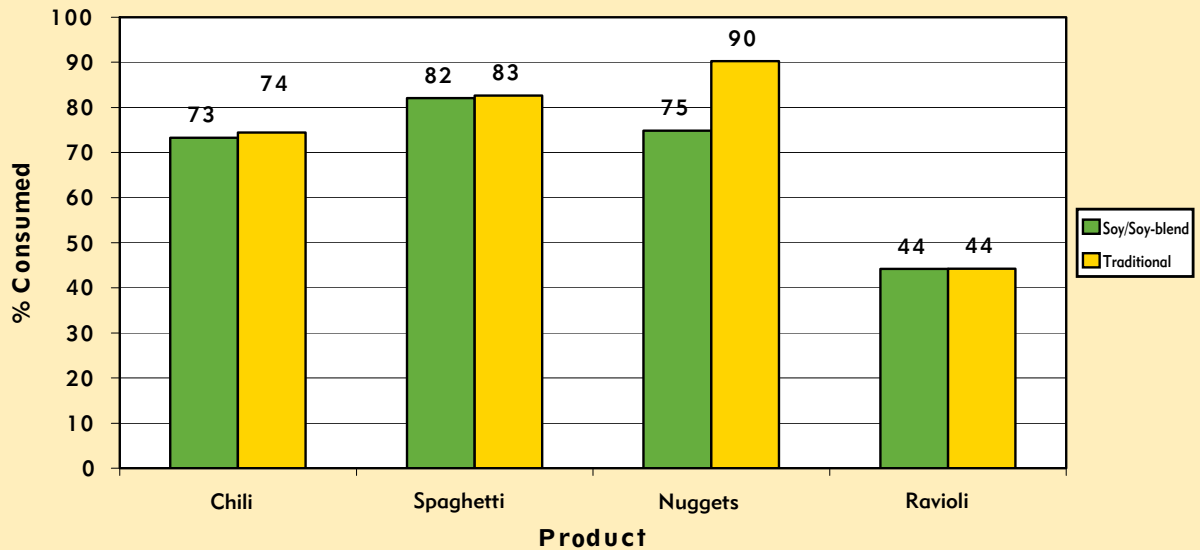
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Figure 1

Illinois Acceptability Study Results



used as a proxy for acceptability. The percent of each entrée consumed was similar for soy and non-soy products, with the exception of nuggets. Although regular nuggets were preferred over soy-based nuggets, the percent consumed was over 75% for both types, suggesting that soy-based nuggets would still achieve acceptance. (See Figure 1.) Nutritional profiles of spaghetti sauce and chili improved; spaghetti made with meat-soy blend had 22% fewer calories, 43% less fat, and half as much saturated fat and cholesterol when compared with the traditional product. Chili made with 100% soy had 32% fewer calories, 20% of the total fat, and essentially no saturated fat or cholesterol when compared to traditional chili. The nutritional profile of the commercial products (ravioli and nuggets) benefited less by soy substitution. However, soy-based nuggets were lower in saturated fat and cholesterol than regular nuggets. This study indicates that soy-enhanced foods are liked as well as their meat counterparts and have more desirable fat and energy profiles.

Many current school lunch menus exceed recommended levels of energy, fat and saturated fat. This can be a serious problem given that childhood obesity has assumed epidemic proportions in the U.S. Soy protein has the potential of providing a cost effective solution for controlling the amount of fat, while simultaneously improving the overall nutritional profile of a food. The USDA has encouraged the use of more fruits and vegetables in school lunches to decrease fat and energy values of the menus. Using soy is an economical way to increase variety in school lunch menus and decrease the fat content.

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Complete references for this article can be found on Page 7.



ABOUT THE AUTHOR

Barbara Klein, Ph.D., is a professor emeritus of food and nutrition at the University of Illinois at Urbana-Champaign. She received her doctorate from the university, and was appointed to the faculty in 1974. She currently serves as co-director of the Illinois Center for Soy Foods.

TOFU SCRAMBLE

From *Conscious Cuisine: A New Style of Cooking from the Kitchens of Chef Cary Neff*, published by Sourcebooks, Inc. 2002.

Yield: 3 servings

Ingredients:

1/2 tsp. extra-virgin olive oil
 1/4 cup finely-chopped red onion
 1 Tb. finely-chopped red bell pepper
 1 Tb. finely-chopped fresh shiitake mushrooms
 1 1/2 cups crumbled firm tofu (18 oz., drained)
 1/2 tsp. tahini (sesame seed paste)
 1 tsp. tamari (soy) sauce
 1/2 tsp. curry powder
 Fresh fruit

Preparation:

Heat a sauté pan over medium-high heat and add the olive oil. Add the onion, bell pepper and mushrooms. Sauté until the onion begins to soften, about 2 minutes. Add the tofu, tahini, tamari and curry powder. Cook, stirring constantly, until the tofu begins to dry out and is the consistency of scrambled eggs. Serve with fresh fruit.

Per serving:

Calories 110; Total Fat 7 g; Saturated Fat 1 g; Carbohydrates 6 g; Protein 11 g; Cholesterol 0 mg; Dietary Fiber less than 1 g; Sodium 127 mg. 🍌



SOYBEAN OIL: Providing a Balanced Fatty Acid Profile

By Penny M. Kris-Etherton, Ph.D., Sarah K. Gebauer, and Deborah H. Bagshaw

Soybean oil is the predominant edible oil in the U.S. diet. In 2004, the domestic soybean crop provided 80% of the edible fats and oils in the United States. Corn and canola oil are the second and third most popular oils in the U.S.¹; nonetheless, soybean oil utilization (in pounds) was 10.2 times greater than corn oil and 10.8 times greater than canola oil.¹ In 2004, 44% of soybean oil was used as salad or cooking oil, 44% was used as baking and frying fats, and 7% was used for margarine.²

Fats and oils are a major contributor to unsaturated fatty acids in the diet. Oils are a significant contributor to intake of polyunsaturated fatty acids (PUFA), i.e., linoleic acid (LA) and alpha-linolenic acid (ALA). Consumption data from the 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII) Survey show that 18% and 21% of LA and ALA, respectively, come from fats and oils in the diet of men; while 22% and 24% of LA and ALA, respectively, come from fats and oils in the diet of women.³ Another major food group contributor to PUFA is grain products, in which vegetable oils are used as an ingredient. Grain products are the source of 33% and 25% of LA and ALA, respectively, for both males and females.³ Thus, fats and oils, and soybean oil in particular, contribute appreciably to PUFA intake in the U.S. diet. Since fats and oils are sources of all classes of fatty acids, i.e., saturated (SFA), monounsaturated (MUFA), and PUFA, they contribute significantly to the fatty acid intake of the U.S. population.

Soybean oil has a balanced fatty acid profile that provides a good source of LA (52%), as well as a good source of MUFA (24%). Furthermore, soybean oil is relatively low in SFA (24%) and has one of the highest concentrations of ALA (7%), compared to other oils. Thus, soybean oil has a fatty acid profile that facilitates meeting current dietary recommendations to achieve nutrient adequacy and decrease risk of chronic disease.

In recent years, two industry efforts have had an impact on soybean oil composition. There has been a shift to reduce trans fatty acids in the diet by using oils rich in unsaturated fatty acids, since the production of trans fatty acids during the partial hydrogenation of vegetable oils accounts for more than 80% of total trans fatty acid intake.⁴ There has also been a focus to develop new seed oil varieties that are higher in MUFA and stearic acid, (some of which are lower in PUFA) in order to produce stable frying oils and solid fats that are trans fatty acid free.

The U.S. Dietary Guidelines 2005 recommend that total fat provide 20-35% kcal with most coming from PUFA and MUFA. SFA should provide <10% of kcals and trans fatty acids should

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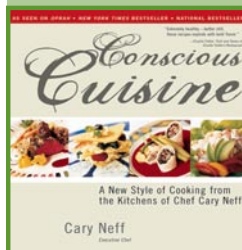
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From Your Dietitian

SOY COOKBOOK ROUNDUP

By Chef Suzanne Vieira, M.S., R.D., L.D.N.

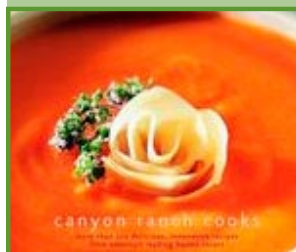
Several chefs and authors have developed cookbooks that feature some very interesting and flavorful soy-based recipes. Here are three of my favorites; each has its own unique approach to healthy eating.



Conscious Cuisine: A New Style of Cooking from the Kitchens of Chef Cary Neff, published by Sourcebooks, Inc. 2002.

Neff has captured the essence of how exciting and flavorful healthy eating can be. This cookbook can easily become your standard "go to" cookbook. The recipes are well written and easy to prepare. Neff has a talent of creating a wonderful balance of flavors and textures in his recipes. The book covers an array of topics from how to stock your pantry to "Delectable Desserts." Neff includes a wide range of soy-based recipes from Crisp Shrimp and Vegetable Spring Rolls with Edamame Ragout to Spinach White Bean

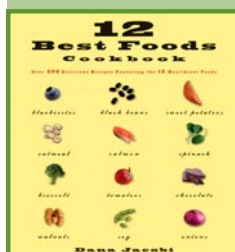
Tofu Spread. He also includes a recipe on how to make your own fresh tofu. The goal of **Conscious Cuisine** is to encourage the reader to embrace unique flavors, textures and aromas into a healthful preparation of food.



Canyon Ranch Cooks by Chefs Barry Correia and Scott Uehlein, published by Rodale, Inc. 2001.

Canyon Ranch holds the reputation of being ranked as one of the country's leading spas for the past 20 years. **Canyon Ranch Cooks** is a celebration of food that very nicely showcases the collaboration between chefs and dietitians at the ranch. It features a balanced, nutritional approach to cooking. The book lets the reader share the Canyon Ranch philosophy and guiding principles on eating and food preparation. **Canyon Ranch Cooks** includes a wide variety of soy-based

creations from Miso Soup to a wonderful take of an old standard, Caesar Salad. This book also has a very unique feature; an index listing all the recipes that are gluten-free and dairy-free. The goal of **Canyon Ranch Cooks** is to provide the reader with an effective, balanced and delicious approach to eating.



12 Best Foods Cookbook by Chef Dana Jacobi, published by Rodale, Inc. 2005.

This book features insights on 12 healthful foods in 200 creative and delicious recipes. Jacobi includes a brief explanation of why each food is important to health, as well as some very practical culinary advice. One of the "12 Best Foods" is soy. This section is very informative and extensive. It includes a chart with the number of grams of soy protein contained in food, as well as an up-to-date list and definition of soy-based products currently available in today's market. Some of the soy-based recipes in **12 Best Foods Cookbook** include Black Soybean and Butternut Squash Stew, Finger-Lickin' Edamame, and Soyca-tash. Her recipes are clear and concise, complete with the author's insights. 🍱

See Page 4 for the "Tofu Scramble" recipe from **Conscious Cuisine** by Chef Cary Neff.



FATTY ACID PROFILE

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be as low as possible. For a 2,000 kcal diet, 27 g/day of oils (or approximately 5-6 tsp.) is recommended.⁴ Soybean oil used in many ways, i.e., in margarines and shortenings, salad dressings, mayonnaise, cooking oils, baked goods, etc., can contribute to the 27 g/day oil target recommended by the USDA Food Guide. Soybean oil, as well as new soybean fats and oils that are unhydrogenated, can be used to achieve fatty acid recommendations that are central to a healthy diet.

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Penny Kris-Etherton, Ph.D. is a distinguished professor of nutritional sciences at the Pennsylvania State University. She received her doctorate in human nutrition from the University of Minnesota. Her research interests include the health effects of fatty acids. **Sarah Gebauer** is a graduate student in integrative biosciences. **Deborah Bagshaw** is a clinical research coordinator for the Kris-Etherton research group.

REFERENCES

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than soyfoods. Results will be available over the next 9 months to 2 years. One study that was not included in the analysis by Whelan *et al.* (due to timing of publication) adds support to the notion that isoflavones do provide skeletal benefits. This study was a one-year, controlled, parallel-arm, double-blinded trial with 145 participants, 50-80 years of age, who were randomly assigned to consume daily a soymilk beverage containing either 83 mg or 3 mg isoflavones. At 12 months, spinal bone mineral density increased by 1.32% in men consuming the isoflavone-rich beverage but by only 0.31% in those consuming the isoflavone-poor beverage. A similar trend was noted in women; women consuming the isoflavone-poor beverage lost 1.8% whereas the high isoflavone group gained 0.58% bone. None of these differences were statistically significant, however. At the hip, women in the isoflavone-rich and poor beverages gained 0.35% and 0.23%, respectively. Men in these groups gained 0.58% and lost 0.16%, respectively, but these differences were not statistically significant (*Maturitas 2006*).



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