

SoyConnection

Health & Nutrition News About Soy

SPRING 2016

VOLUME 24, NUMBER 2

SOY PLAYS GROWING ROLE IN FEEDING A HUNGRY WORLD

By Peter Golbitz and Jim Hershey



With nearly eight billion people living on Earth today and another one billion projected by 2040,¹ an abundant source of efficiently produced and nutritionally-rich foods is going to be one of the keys to survival. Fortunately, we have *Glycine max*, more commonly known as the soybean, to help meet the nutritional needs of the growing population.

Originally domesticated in northeastern China during the 11th century BC,² production of this legume has since spread to North and South America, Europe, South Asia and Africa. In 2015, global production reached a record 320 million metric tons,³ equivalent to 41 kilos, or over 90 pounds of soybeans for every man, woman and child on the planet today. The United States is currently the world's largest soybean producer, accounting for one-third of global production.

Although the vast majority of the total soybean supply is processed into high protein soybean meal for animal feed and vegetable oil for cooking, a significant portion is processed directly into a variety of soyfoods and soy ingredients for human consumption. These foods include well-known products such as tofu, soymilk, miso and soy sauce, as well as edamame, natto, soy flour, tempeh, yuba and many other traditional and modern food products.

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A Food Chameleon

One of the most valuable attributes of the soybean is its unique ability to be used in a wide variety of food applications including as a beverage, center-of-the-plate protein, dried bean, baking flour, snack food, fresh green vegetable, cultured product, dessert or baked good. In addition, the soybean's relatively neutral flavor profile and unique macronutrient composition lends itself easily into being adapted in a variety of forms for regional cooking preferences.

A Traditional Food of Asia

Most people are familiar with the wonderfully varied, traditional soyfoods of Asia. These foods include tofu, with its diverse forms and textures; soymilk beverages extracted from cooked, soaked and strained soybeans; fermented soy pastes and sauces such as miso and soy sauce; and the unusual, but tasty cultured whole bean products such as tempeh from Indonesia and natto from Japan.



In many Asian countries, tofu is eaten daily in a variety of forms including silken, pressed, dry, baked, fried, fermented and even "stinky tofu," known for its pungent odor and blue veins of mold.

Given the significant changes in work and living patterns in Asia over the past few decades, convenience foods are growing in importance. As a result, sales of soymilk in aseptic packages are growing, as are soymilk powder products, sold in single-serve sachets or pouches to make one liter of soymilk in the home.

Due to the widespread traditional use of soyfoods in their daily diets, Asians consume the highest amount of soybeans as direct food in the world today, estimated to be between 20 and 50 grams of soybean or equivalent as processed food, each day.⁴

Americanized Soyfoods

In North America, soy products have been incorporated into mainstream diets in a number of ways. While traditional soyfoods such as tofu and tempeh can be readily found in most supermarkets, American consumers have preferred "Americanized" versions of these traditional foods, such as burgers, chicken, frozen entrees and meat alternatives. As well, soymilk consumed in the U.S. is formulated to be a dairy alternative, fortified with calcium



and vitamins and flavored to be more milk-like in taste than the traditional soymilk consumed in Asia.⁵

Latin American Soyfoods

Throughout Latin America, soyfoods have become well accepted due to their high nutritional quality and adaptability into traditional food preparations.

In Mexico, the leading brand of soymilk, Ades®, made by Unilever, is sold as either a high protein dairy alternative or a soy-fruit beverage. As fruit and fruit juice consumption is high throughout Latin America, soy-fruit beverages have been well accepted throughout Mexico, Argentina and Brazil. Popular flavors include soy with orange as well as grape, mango, apple, pineapple and peach. In the soy-fruit drinks, the protein content is lower than in products being sold as a dairy alternative.

Along with ready to drink soymilk, Mexico is a large market for powdered soymilk products. These instant beverage mixes are sold in sachets and cans and come in plain and flavored varieties. There are numerous brands on the market and they are made with isolated soy protein or spray-dried soymilk as the base ingredient, along with flavors and sweeteners.⁶

Mexico is also a large market for sausage products such as the chorizo. Textured soy proteins (TSP) are commonly used in Mexico as both a processing aid—they help to bind fat and water—and to increase the protein level and overall nutritional profile of the final product while keeping costs low. It is not unusual to see two types of the same sausage being sold alongside each other in stores, with the less expensive product stating that it contains soy protein.

The *Soy Connection*, funded by farmer checkoff dollars, is produced by the United Soybean Board. An electronic version of this newsletter, with complete references, can be found at www.soyconnection.com.

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The Soy Connection

P.O. Box 237
Jefferson City, MO 65102
Email: steve@qinc.co



Beginning in the 1960s in Guatemala, Alimentos S.A., a division of a major food and brewery group in that country, began to produce and market a mineral-fortified maize and vegetable protein flour product under the name INCAPARINA®. The name was derived from the Institute of Nutrition of Central America and Panama (INCAP), where the product was originally developed by Dr. Ricardo Bressani as an economical and highly nutritious food for children after breastfeeding. In 1995, soy flour was added to the formulation to improve the overall protein quality. Since the product's introduction over 50 years ago, Alimentos has launched a number of products under the INCAPARINA® brand, the most recent being a ready to drink single-serve portion in aseptic packaging. According to the company, INCAPARINA® can be found in 80 percent of Guatemalan homes and has 90 percent brand recognition across the population.⁷

In Brazil, the world's second largest producer of soybeans, soymilk reigns as the leading soyfood product in the market, followed by a selection of vegetarian burgers and tofu. The two largest brands of soymilk are Sollys®, produced by Nestlé, and Ades®. Both brands offer a plain, dairy alternative soymilk as well as soy and juice blends.

In Argentina, Peru, Colombia and Ecuador, there are multiple brands of aseptically packaged soymilk and soy-juice blends on the shelves, as well as numerous powdered soymilk products. While some of these products are being imported, there is processing and packaging occurring at a number of the larger, regional dairy plants.

Africa

Africa is the world's second most populous continent with nearly 1.2 billion people and some 54 countries. Due to a need for low-cost protein across the region, soy products are becoming increasingly important in Africa.



In the West African country of Nigeria, the growing market for soymilk was catalyzed by the importation of Vitamilk® from Thailand's largest soymilk producer, Green Spot. This glass bottle product, requiring no refrigeration, was readily accepted for its high protein, high fat and high energy content. Consumers appreciated the rich, sweet flavor and the high caloric content. Now that a significant market has become established, local production has begun of soymilk and soy-juice blends in aseptic cartons.

Ghana has followed a somewhat similar path to that of Nigeria. The markets are full of imported soymilks in glass

bottles and aseptic cartons and Ghanaians appreciate the taste and nutritional benefits of soymilk. Local production has started in Ghana as well and this will likely lead to greater distribution, lower prices and increased consumption.

In yet another West African country, Cote d'Ivoire, there are now significant volumes of TSP being utilized in school feeding programs to ensure that young children get adequate amounts of high-quality protein needed for proper development. This initiative came about as a result of work done by the American Soybean Association's World Initiative for Soy in Human Health (WISHH) which worked with the School Canteen Directorate that runs the school nutrition programs, and the National Soybean Research Laboratory (NSRL). The team introduced Ivorian program managers and cooks to the adaptability and the acceptability of soy to the children and cooks. The TSP worked well in local dishes and cooking methods and was much less expensive than the traditional canned meat and fish that had been filling their protein needs. In 2015, the Directorate ordered 165 metric tons of additional TSP, ensuring continuation of the program through the 2016 school year.

At the southern extremes of the African continent lies the vibrant country of South Africa. This diverse country has a varied and well-developed food industry and market consisting of traditional African staples as well as European- and Indian-influenced cuisine. With soymilk, soy-fortified cereals and flavored soya mince (textured soy protein) available at virtually all supermarkets, South Africans seem to have accepted soyfoods and soy protein as a valuable contribution to the diet. In addition, South Africa has become the continent's largest producer of soybeans and plans to continue to expand production in rotation with the country's maize (corn) crop.⁸

The largest soymilk processor in Africa, Good Hope International Beverages, sits just a few miles from the port in Cape Town, and produces a wide range of soymilk beverages in aseptic cartons. Products made by Good Hope can be found in many countries across Sub-Saharan Africa.

Dry soya mince is sold in bags or boxes and requires soaking prior to use. Once soaked, it is spiced and prepared like ground meat and served on top of the traditional 'pap,' or cooked maize meal, that is a staple throughout much of Africa.

There are also a number of soy-fortified breakfast cereals on the market in South Africa. Most of these are made of corn meal with the addition of isolated soy proteins, which contribute the greatest amount of protein per gram and have a neutral taste.

India

In the South Asian country of India, a vibrant soyfoods industry and market has developed. While the soybean is not native to India, production of soy has increased significantly over the past 20 years and has made the country a major supplier of soybeans to the world market.



With uniquely flavored soymilks such as pistachio, mango, rose, cardamom, as well as the conventional vanilla, chocolate and strawberry, Indian soymilk processors have put a decidedly Indian spin on these products. Produced by a range of small, medium and large processors, these products are available in glass retort bottles and aseptic packaging.

TSP is also widely available and is prepared both in homes and restaurants as a meat alternative. Tofu, or what may also be called “soy paneer” can be found in many shops as plain or highly spiced products. Soynuts, or roasted whole soybeans, are widely available in markets and kiosks and consumed primarily as a snack food.

The European Market

The soyfoods market in Europe has developed similarly to that in the United States. While there is acceptance of traditional Asian soyfoods based on their unique cultural roots, most Europeans are familiar with soymilk.



Alpro, the largest soymilk processor in the EU, has processing plants in Belgium and the U.K. from which it distributes soymilk products across the continent and to other global markets. In addition to ready-to-drink beverages, the company produces soymilk-based yogurts. The EU market has a number of other major players, and products can be found in every country and every supermarket across the continent.

The market for soy-based meat alternatives is also significant in the EU with many upscale products being positioned as plant-based and sustainable alternative foods.

Given current consumer focus on sustainability and growing acceptance of plant-based foods and proteins, the soybean will certainly be playing an expansive role in feeding humankind well into the future. 🌱

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ABOUT THE AUTHORS

Peter Golbitz is president of Agromeris, an advisory firm that focuses on the unique needs of the specialty agricultural products marketplace. He has authored numerous articles and publications on soybean products and published a cookbook, *Tofu and Soyfoods Cookery*. Prior to founding Agromeris, Golbitz was the president of Soyatech, publisher of the *Soya & Oilseed Bluebook* and was the director of International Business Development for SunOpta, a leading U.S. specialty soybean processor. Golbitz is on the board of directors of the Sustainable Food Trade Association, and an active member of the Soyfoods Association of North America and the Organic Trade Association.

Jim Hershey is the executive director of the World Initiative for Soy in Human Health (WISHH) at the American Soybean Association (ASA). WISHH assists developing countries as they incorporate soy into their diets. Hershey earned his BA in American Culture at Northwestern University. After two years in the Ivory Coast, West Africa with the Peace Corps, he attended the American Graduate School of International Management in Arizona, where he received his Master's Degree in International Management. Prior to building the WISHH Program, he held other export development positions with the American Soybean Association and the U.S.A. Rice Council.

Healthy Handout

INDIA TO LATIN AMERICA— TOFU INSPIRED DISHES

By Amy Moore, PhD, MPH, RD, LD
and Christine Werner, PhD, PA-C, RD

India

The history of incorporating soy into the Indian diet revolves around the large population of vegetarians and a concern over a lack of high-quality protein. These circumstances sparked interest in studying soy as a new food source.

Soyfoods were introduced by Indian authors who published numerous recipe books, the first of which was the *Handbook on Soyabean Recipes*,¹ which included recipes that used soy flour and dal, made from soybeans, in traditional Indian recipes.

The recipe² at right is a traditional bhurji, a popular North Indian dish commonly served as a brunch or side dish. The exotic aroma of Indian spices will fill your home as you prepare this dish. All spices can be found in the spice aisle of most supermarkets.

Mexico

Much of the credit for teaching how to cook with soy throughout Mexico is credited to Blanca Dominguez de Diez Gutierrez, the soyfood pioneer of Latin America.³ Teaching throughout the countryside of Mexico, she taught women how to incorporate soy into the traditional Mexican diet to help increase nutrition in a low-cost way. Recipes from *tofu chorizo* to *pozole* were created to show how soy could improve the traditional diet. 🍌



Tofu Bhurji

- 12 oz. extra firm silken tofu, drained
- 1 medium onion, finely chopped
- 1 large tomato, finely chopped
- 1 green chili, finely chopped (or 2 tsp. canned green chili)
- ½ inch ginger finely chopped (or ½ tsp. ground ginger)
- ½ tsp. cumin seeds
- ½ tsp. turmeric powder
- ⅛ tsp. red chili powder (more or less for desired spice)
- ¼ tsp. garam masala powder
- 1 Tbsp. soy oil
- 1 Tbsp. chopped coriander leaves or 1 tsp. dried

Drain any excess fluid from tofu. Crumble tofu with fork and scramble as you would an egg, then set scrambled tofu aside. In the same skillet, heat oil on low heat. Add cumin and brown, then add the onions and cook until they become soft. Next add the ginger and green chili and cook a few seconds. Add the tomatoes. Next sprinkle the turmeric powder, red chili powder, garam masala and stir. Add the scrambled tofu and stir. Sauté for 3–4 minutes. Lastly, add coriander leaves and stir. Serve tofu bhurji hot with some parantha or whole grain bread, or as a side dish with vegetable curry-rice.

Serves 4

Prep time: 5 minutes; Cooking time: 15 minutes

Nutritional Analysis: Calories per serving (½ cup), 94; total fat, 6g; sodium, 42mg; total carbohydrates, 5g; protein, 7g; cholesterol, 0mg

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ABOUT THE AUTHORS

Amy Moore, PhD, MPH, RD, LD, is an assistant professor at Saint Louis University in the department of Nutrition and Dietetics where she teaches nutrition counseling, nutrition education, and maternal and child health. Moore's research focuses on family meals and improving cooking skills and dietary intake of adolescents.

Christine Werner, PhD, PA-C, RD, is a professor at Saint Louis University in the department of Physician Assistant Education where she teaches nutrition, cardiology and evidence-based medicine. Werner's areas of research interest include evidence-based clinical practice in nutrition and medical therapy.

SOYBEAN OIL CORNER



Soy Para Soy: The Functional and Emotional Value of Soy in Latin and South America

By Vickie Allande-Fite and Pablo Adreani

Though Hispanics around the world are far from homogenous, diverse segments overall stay true to significant commonalities when it comes to food. In particular, Hispanics broadly share a strong preference for fresh, local and whole ingredients and traditional dishes that help preserve their connection to each other and their country of origin. In the United States, for example, Hispanics outspend the general market on food and are spending at a higher rate on “fresh” more frequently than other consumer groups.¹

This preference for eating “fresh” is a saving grace in a community disproportionately impacted by diabetes, obesity and stroke. More education is needed on how to pick healthier foods and how nutrition is connected to overall health and disease prevention.

Soy oil, prominently labelled “Aciete de Soja” or “Óleo de Soya” is a pantry staple in Hispanic households worldwide, especially considering fried food is likely on the menu for at least one, if not all three, daily meals. Soy oil is also used widely in the packing of canned fish products like sardines and in marinades and salad dressings. Already, soy is perceived by 81 percent of U.S. Hispanics as healthy.²

Turning specifically to South America, soybean oil consumption in Brazil and Argentina has been changing over the last decade.

In Brazil, the origin of soybeans occurred long before the production of soybeans in Argentina. For this reason, Brazil’s soybean oil is the main vegetable oil consumed by the Brazilian population. It is also culturally acceptable to the Brazilian

people, with much of the population consuming it for health benefits.

In Brazil, soy oil is used to make processed foods such as margarine and mayonnaise, sauces for salads, and to fry food. Total consumption of vegetable oils in Brazil is 1.58 million tons, with about 86.6 percent of that being soybean oil. Other vegetable oils represent 13.4 percent of total consumption. The second most popular oil consumed in Brazil is olive oil with 3.4 percent of consumption, followed by sunflower oil (2.8 percent) and corn oil (2.6 percent).³

In Argentina, the consumption of vegetable oil is led by sunflower oil, the cultural preference for consumers there. Argentina began producing sunflower oil in 1950, and was the world’s leading exporter of sunflower oil during the 80s and 90s. As a result, Argentineans became accustomed to consuming sunflower oil instead of soybean oil.⁴

Soybean production began in Argentina in 1996, with the population beginning to consume soy oil in the early 2000s. Consumption of vegetable oils in Argentina is currently 500 thousand tons. Seventy five percent is consumed directly and 25 percent is consumed in industrial applications, mainly in the production of margarine and mayonnaise.

Analysis of domestic oil consumption in Argentina indicates that 70 percent is sunflower oil and 26 percent soybean oil. Corn and olive oil make up the rest.

In Argentina, growth in the consumption of soybean oil has exploded in the last 15 years, as a result of the technological improvement in refining processes. Soybean oil is viewed as healthful by Argentineans. It has a good taste and flavor profile, and people are using it directly in seasoning foods or for frying. The consumption of soybean oil in Argentina is projected to steadily grow for the next decade, when it is expected to reach 30 percent of total oil consumption in the country. 🌱

ABOUT THE AUTHORS

Vickie Allande-Fite is the Multicultural Specialty director for MSLGroup, a public relations agency. Based in Los Angeles, she is involved in U.S. Hispanic communications programs for the United Soybean Board. She is a graduate of Loyola Marymount University.

Pablo Adreani is an agronomist in South America. He graduated from Buenos Aires University specializing in agricultural foreign trade, agricultural policies and grain market analyzation. With 30 years of experience as a market research analyst, he is a consultant to the United Soybean Board and the United States Soybean Export Council.

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