

Soybean Choices and Challenges for Your Family

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Almost everyday the media contains information on new nutrition research. Unfamiliar terms, such as phytonutrients, isoflavones, and antioxidants, are linked with favorite or uncommon foods. One such food is soybeans or soy foods. Soy foods are popular ingredients in Asian meals. We can eat many forms of the soybean, such as fresh soybeans (edamame), roasted soy nuts, soy sauce, or soy oil. Other less familiar soy foods are tofu (soybean curd) and tempeh (fermented soybean). It is easier than ever to buy, prepare, and eat soy foods in typical American meals.

What do you know about soybeans? Research on soybeans is showing exciting health benefits for all family members. This publication focuses on three topics that will help you enjoy the health benefits of soybeans.

1. Soy-related nutrition terms and soy health benefits.
2. Basic soy products and easy ways to use soy in your family's diet.
3. Soybean production in Virginia.

There are many healthy food choices you can make to include soy in your family's favorite meals. The challenge is trying the not so familiar foods. Read on to gain information on how to make new food choices for your family.

Understanding Soy Terms

Phytonutrients are naturally occurring substances found only in plant foods. "Phyto" means "plant." Foods rich in phytonutrients may be termed "phytochemicals," "functional foods," or "nutraceuticals" due to their potential health benefits. Researchers continue to show that foods rich in phytonutrients have many health benefits, which may decrease your risk for chronic diseases. Fruits, vegetables, dried beans, and whole grains are good sources of phytonutrients. The important phytonutrients in soybeans are called isoflavones.

Isoflavones are phytoestrogens or plant hormones. Again, they are phytonutrients. Genistein and daidzein are important isoflavones found in soybeans. Research shows that some isoflavones may lower cholesterol in the blood and improve blood vessel functions. Also, isoflavones may prevent the chance of getting some



A soybean field

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cancers. Isoflavones work as antioxidants (see next section) to protect human cells from oxidation. Studies recommend that you eat 90 mg/day for best health benefits. Some food companies even put the amount of isoflavones on the label.

Antioxidants are a group of compounds found in foods that protect your body against normal cell damage. Everyday you are exposed to environmental factors (air pollution, tobacco smoke, or ultraviolet light rays) and stresses on your body (illness, obesity, or diabetes). Unstable forms of oxygen, called “free radicals,” are made during normal cell processes and day-to-day exposure to these factors. Free radicals will cause damage to the cells. This damage is called oxidation, and may start the growth of abnormal or cancerous cells. To understand the concept of oxidation, compare it to the rusting of iron. Exposure to oxygen “rusts” the iron, whereas cells exposed to “free radical” oxygen damages or “rusts” the cells. Foods rich in antioxidants help to stop the production of “free radicals” and prevent cell damage. Fruits, vegetables, whole-grains, and oils are good sources of antioxidants.

Soy Health Claims on Labels

“Diets low in saturated fat and cholesterol that include 25 grams of soy protein a day may reduce the risk of heart disease. One serving of (name of food) provides (number) grams of soy protein.”

To qualify for the claim, each serving of a soy food must abide by the following:

- 6.25 grams of soy protein
- low fat (less than 3 grams)*
- low saturated fat (less than 1 gram)
- low cholesterol (less than 20 milligrams)
- sodium value of less than 480 milligrams for individual foods, less than 720 milligrams if considered a main dish, and less than 960 milligrams if considered a meal.

* Soy products made from whole soybeans without adding fat may qualify for this claim.

Table 1. Isoflavones in Selected Soyfoods

Check food labels for amounts. Amounts vary depending on the product and manufacturer.

Soyfoods	Approximate Isoflavones (in milligrams)
Soymilk (1 cup)	25-35
Tofu (1/2 cup)	35-45
Tempeh (1/2 cup)	45-60
Miso (1/2 cup)	35-45
Textured Soy Protein (cooked, 1/2 cup)	50-60
Soy Flour (1/2 cup)	80-90
Soybeans	
(cooked, immature, 1/2 cup)	8-16
(cooked, mature, 1/2 cup)	25-35
Soynuts (1 ounce)	35-45

Source: United States Department of Agriculture (USDA). Iowa State University. *Database on the Isoflavone Content of Foods.* (1999). Washington, DC: USDA Research Service.

The Latest Research on Soy Foods and Disease Prevention

Heart Disease

More Americans die of heart disease every year than any other disease. Asian nations, where the people eat a lot of soy foods, do not have this problem. Scientists are researching the role of soy in preventing heart disease. They found that soybeans are made up mostly of starch, protein, fiber, unsaturated fats, calcium, and isoflavones. Some of these substances are of great benefit to people at risk for heart disease. Studies show that soy protein lowers blood cholesterol. A 1% decrease of blood cholesterol lowers the risk of heart disease by 2%.

Also, soy isoflavones may decrease artery damage and blood clotting. It appears that soy isoflavones, which are antioxidants, decrease artery damage because they protect the cells of the arteries from oxidation. Therefore, eating soy foods may have several ways to prevent heart disease.

The United States Food and Drug Administration has approved a health claim on labels of soy-based foods. This was the result of over 90 scientific studies. The claim states that “Diets low in saturated fat and cholesterol that include 25 grams of soy protein a day may reduce the risk of heart disease. One serving of (name of food) provides (number) grams of soy protein.” You can see this health claim on labels of soy foods that contain 6 or more grams of soy pro-

tein per serving. Foods made with the whole soybean, such as tofu, may qualify for the claim if they contain no fat other than that naturally present in the whole bean.

Cancer

Cancer is the second leading cause of death in the United States. Deaths from breast and prostate cancer are 12 to 20 times higher in America than in Asian countries. In Asian countries where diets are lower in saturated fats and higher in fiber and soy foods, people have lower rates of breast, colon, and prostate cancers. Studies show that people who eat a typical American diet, which is high in fat and low in fiber, may be more prone to hormone related cancers, such as breast and prostate cancer, than those who eat an Asian diet.

Soy research on breast and uterine cancer is focused on estrogen and isoflavones. Estrogen, a female sex hormone, may promote the growth of cancer cells. It is found in higher levels in premenopausal women than in men or postmenopausal women. Soy isoflavones known as genistein and daidzein have a structure similar to that of estrogen. These isoflavones replace some estrogen and keep it from attaching to body cells. By doing so they lower the effects of estrogen, which may promote the growth of cancer. Research also shows that eating one or two servings of soy per day leads to a marked (65–70%) decrease in prostate cancer. Therefore, eating soy foods daily may protect your family from many cancers.

Menopause

Research about the effect of soy isoflavones on the symptoms of menopause is ongoing. Estrogen levels drop during menopause. As a result, women experience hot or cold flashes and night sweats, which decrease their quality of life. Eating soy isoflavones may be effective in reducing hot flashes. Some studies have shown that women had fewer menopause symptoms when they took soy supplement or ate soy foods with 40 - 70 milligrams of isoflavones per day.

Osteoporosis

Osteoporosis is a disease characterized by thinning of the bones, which leads to increased fractures of hips and legs. One in every five women over 65 years of age will experience at least one fracture. Calcium is the main mineral responsible for the development and maintenance of healthy bones. It also plays a role in muscle contraction and relaxation, blood clotting, blood pressure, and the immune defense system. Dairy foods are the best known sources of calcium. However, whole soybeans and many soy foods such as calcium-fortified soymilk, tempeh, and texturized soy protein are rich in calcium as well.

How Much Calcium?

The amount of calcium that people need depends largely on their age. Children need high amounts of calcium for proper development of their teeth and bones. As adults get older, calcium is important to maintain bone health and prevent osteoporosis. Table 2 below indicates calcium levels based on age.

Table 2. Dietary Reference Intake Values For Calcium By Life Stage Groups

Life Stage Group	Adequate Intake (mg/day)
Children (4-8 years)	800 mg/day
Children (9-18 years)	1300 mg/day
Adults (19-50 years)	1000 mg/day
Older Adults (51-70 years)	1200 mg/day
Senior Adults (> 70 years)	1200 mg/day

Source: National Academy of Sciences (1998). *Dietary Reference Intakes*. Washington, DC: National Academy Press.

Dietary Guidelines for Americans.

Aim For Fitness

- Aim for a healthy weight.
- Be physically active each day

Build A Healthy Base

- Let the Food Guide Pyramid guide your food choices.
- Choose a variety of grains daily, especially whole grains.
- Choose a variety of fruits and vegetables daily.
- Keep food safe to eat.

Choose Sensibly

- Choose a diet that is low in saturated fat and cholesterol and moderate in total fat.
- Choose beverages and foods to moderate your intake of sugars.
- Choose and prepare foods with less salt.
- If you drink alcoholic beverages, do so in moderation.

Absorption of Calcium

Inadequate calcium intake along with poor calcium absorption leads to calcium removal from bones to be used for other important functions in the body. Calcium from food sources such as dairy products, oysters, small fish (with bones), and tofu (soybean curd) is utilized better than calcium in supplements. Calcium is not fully absorbed when eaten with high fiber foods, such as cereal brans. Tannins, a substance in tea, also decrease calcium absorption in the body.

Eating 10-15 grams (1/2 cup soybeans) of soy protein as a substitute for an equal amount of animal protein can improve calcium absorption. Soy protein intake can lead to a 10% increase in calcium absorption.

Eating too much animal protein increases the release of calcium from bones. The result is that calcium is excreted into the urine due to the animal protein make-up of the food. Soy protein is different from animal protein. It causes less calcium excretion. Therefore, soy consumption may prevent osteoporosis by providing a good source of calcium, increasing calcium absorption and decreasing calcium excretion. More research is needed to confirm its effects on bone health.

In addition to soy protein, soy isoflavones may also be beneficial for bone health. Ninety milligrams of isoflavones per day (Table 1) may prevent osteoporosis. The isoflavones found in soy (genistein and daidzein) are similar in make-up to ipriflavone, which is a synthetic drug used in Asia and Europe to prevent bone thinning. Genistein and daidzein may have the same effect as this drug on bones.

Isoflavone Supplements

Although soy foods are often a better choice than supplements, isoflavone supplements are available. The optimal isoflavone intake that could prevent or treat disease is not known. Though isoflavones have not been found to be toxic, do not take more than 90 mg/day.

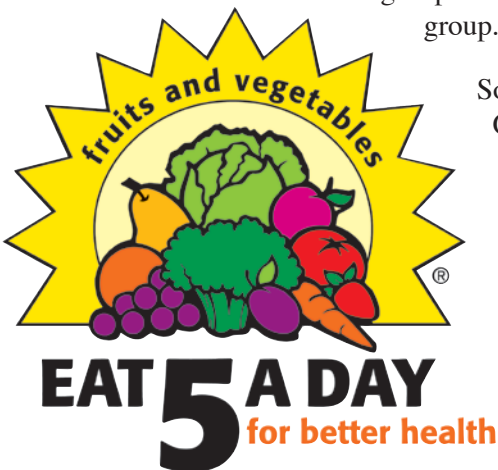
Soy in the Food Guide Pyramid

Your family is very active and busy with work, school, and family events. Choosing and cooking a variety of nutritious foods based on the Dietary Guidelines for Americans and the Food Guide Pyramid is important to keep you and your family healthy. But it is a challenge to feed a busy family!

The Food Guide Pyramid is a guide to help families eat a balanced diet. Each of the five major food groups in the Food Guide Pyramid gives your family a variety of vitamins, minerals, proteins, fats, and carbohydrates. Foods in one group cannot replace the foods in another group. Everyone should try to eat at least the minimum number of servings from each food group.

Soy foods are found in all parts of the pyramid except the fruit group. The National Cancer Institute developed the "5 A Day" program to encourage Americans to eat at least five servings of fruits and vegetables each day. Fresh, frozen, or canned soybeans are a vegetable option to help you achieve the "5 A Day" goal. Cooked dried beans also are counted as a meat substitute.

Soybeans are rich in fiber, protein, phytonutrients, antioxidants, and isoflavones. Also, they are low in saturated fat, cholesterol, salt, and sugar, especially when cooked in a healthy way. Soybeans contain about 18% oil and slightly higher calories than other beans. Read food labels for the calories and nutrients in one serving. Soy products in the fats, oils, and sweets category are high in calories and are not a significant source of soy protein or isoflavones. Soybeans, like other foods, should be eaten in moderation and



The Food Guide Pyramid

These symbols show that fat (●) and added sugars (▼) come mostly from fats, oils, and sweets, but can be part of or added to foods from the other food groups as well.

Fats, Oils, & Sweets:

soy sauce
soybean oil
soybean margarine
soy sour cream
soy cream cheese

Milk, Yogurt, & Cheese Group:

1 cup soy milk
1 slice soy cheese
1 cup soy yogurt

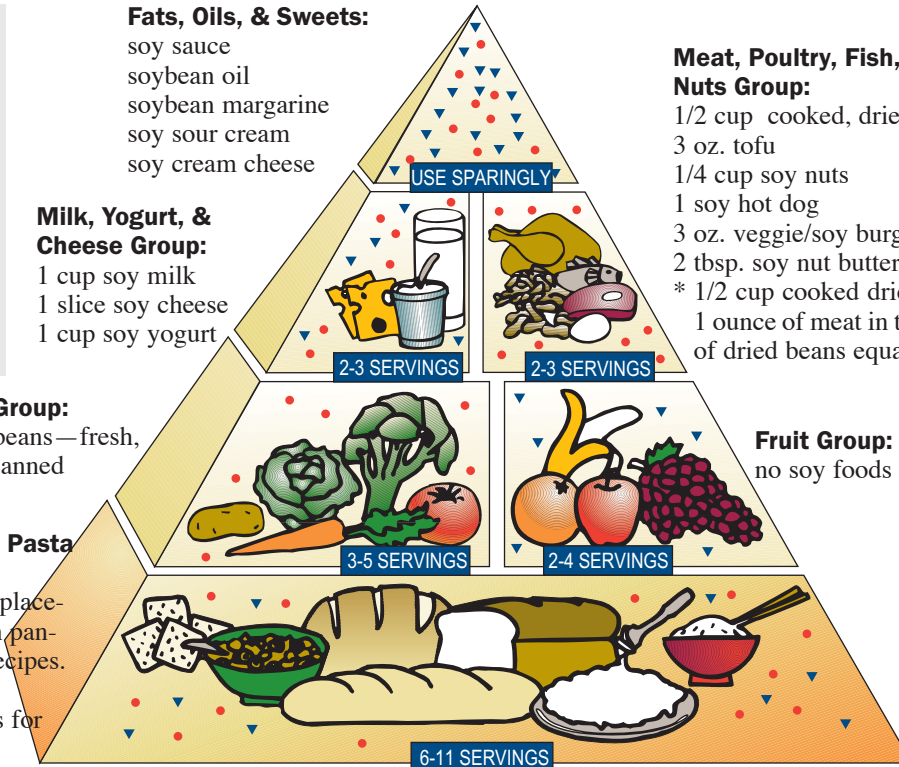
Vegetable Group:

1/2 cup soybeans—fresh, cooked, or canned

Bread, Cereal, Rice, & Pasta Group:

1/2 cup soy flour as a replacement of regular flours in pancake, muffin, or bread recipes.

Soy cereals—read labels for serving size.



Meat, Poultry, Fish, Dry Beans, Eggs, & Nuts Group:

1/2 cup cooked, dried soybeans*
3 oz. tofu
1/4 cup soy nuts
1 soy hot dog
3 oz. veggie/soy burger
2 tbsp. soy nut butter
* 1/2 cup cooked dried beans is 1/3 serving or 1 ounce of meat in this food group. 1 1/2 cups of dried beans equals one serving.

Fruit Group:

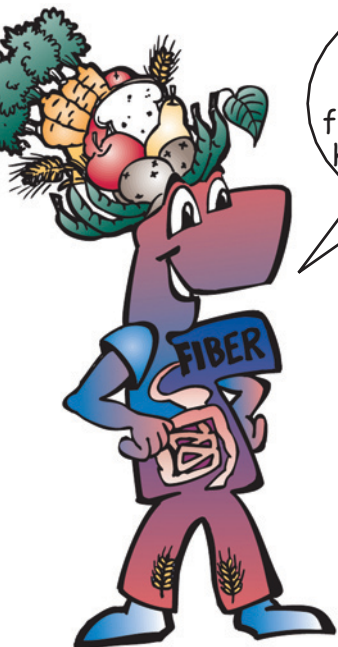
no soy foods

fit into a balanced diet with daily physical activity in order to stay healthy.

Soy Protein

Body proteins are constantly being made and used to maintain the functions of the cells and organs. Protein also is needed to help prevent muscle loss. Older adults especially need adequate protein intake and body protein reserves during times of emotional and physical stresses. (For more nutrition information for older adults, refer to VCE Publication 348-020, *As We Age: Nutrition for Senior Adults.*)

The Food Guide Pyramid recommends that we eat a variety of protein-rich foods. All soybean products are excellent sources of protein and meat alternatives. Mentioned earlier, soy proteins have heart healthy benefits. What types of soy foods will you eat to get the health benefits?



"Which soyfoods are a good source of fiber? Eat at least one high fiber food every day!"

Soy Fiber

All fruits, vegetables, and dried beans and peas are great sources of fiber, especially when you eat the skins and membranes. Adults need 20-35 grams of dietary fiber each day. Fiber or "roughage" is found only in plant foods. There is no fiber in meat, fish, poultry, eggs, or dairy products.

Plants have two types of fiber—insoluble and soluble. Our bodies cannot digest insoluble fiber, which is the part of the plant that is tough and chewy to eat. Fiber helps food pass through the digestive system quickly. Soluble fiber acts like a sponge. It absorbs liquid and increases the water content of

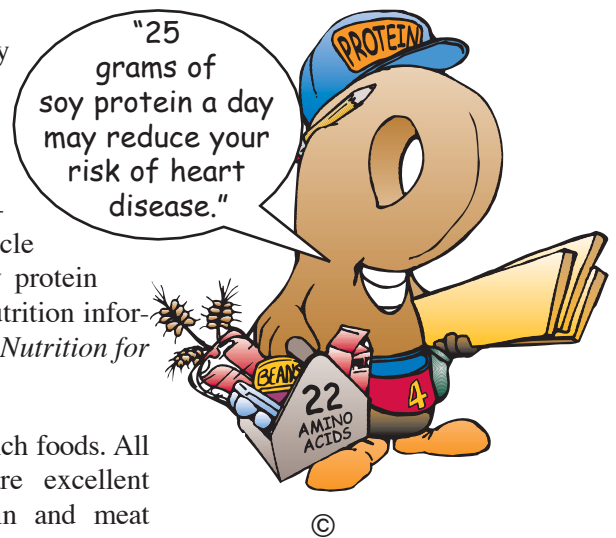


Table 3 Food & Nutrient Comparisons

Soyfoods	Serving size	Calories	Protein (g)	Fat (g)	Fiber (g)	Cholesterol (mg)
Soy milk	1 cup	81	6.7	4.7	3.2	0
Tofu	1/2 cup	97	10	5.6	0.5	0
Tempeh	1/2 cup	160	15.5	9	NA	0
Miso	1/2 cup	283	16	8.5	7.5	0
Texturized soy protein	1/2 cup prepared	60	11	0	NA	0
Soy flour	1/2 cup	183	14.5	8.5	4	0
Soybeans						
Fresh	1/2 cup	43	4.6	2	0.38	0
Fresh cooked	1/2 cup	38	4	4	0.8	0
Cooked dried	1/2 cup	149	14.3	7.7	5	0
Soy nuts	1/4 cup	202	15	10	3.5	0
Foods						
Milk (2%)	1 cup	121	8	4.7	0	18
Yogurt, plain	1 cup	155	13	3.8	0	14.9
Beef	3 oz.	183	25	8	0	73
Chicken	3 oz.	140	27	3	0	116
Fish	3 oz.	140	21	5	0	60
Wheat flour	1/2 cup	228	7.5	1	3.4	0
Pinto beans	1/2 cup	117	7	0.4	7.5	0
Mixed nuts	1/4 cup	203	6	17	3	0

Source: Handbook No. 8-4 and Human Nutrition Information Service, USDA. United States Department of Agriculture (USDA) Nutrient Database for Standard Reference. (2001). Washington, DC: USDA Agriculture Research Service.

the waste (feces) making it easier to expel. Fiber-rich foods may lower blood cholesterol, which may also decrease your risk for heart and artery disease. Also, lowfat, high-fiber foods may reduce the risk of certain cancers, obesity, and diabetes.

“You have not learned to like it yet!”

Eating new foods does not just happen. It takes a plan and encouragement by one or more family members. Is your family willing to try new foods? Is the cook willing to prepare new foods? Family food choices are influenced by cultural background, traditions, religion, likes/dislikes, and health considerations. Time, cost of food, season of the year, cooking skills, and nearby grocery stores also affect what you eat.

Your challenge is to help your family eat a variety of foods from each part of the Food Guide Pyramid every day and slowly incorporate soy foods into meals and snacks. Your family cannot eat what they don’t see. Take time to think of a meal or recipe into which you can easily incorporate a soy product. For example, try dried soybeans or textured soy protein in baked beans, meatloaf, or chili. Experiment with mashed canned soybeans in a bean dip or tacos. Try adding soynuts to a salad or dessert. Write down some options as you read the choices and challenges in the soy foods section.

Every family member must be encouraged to make good food choices and try new healthy foods. No matter what your age, the first step is to taste the food. It may take time to learn to like an old or new food. Try new soy products and recipes. Creatively add flavor and texture to make soy colorful and flavorful. Try, try again for the health of your family! Remind yourself and family members that “You have not learned to like it yet!”

Choices and Challenges of Soy Foods

What are your choices and challenges in finding, cooking, and serving a new food to your family? The choices and varieties of soy foods are many and will depend upon the stores and product availability in your area. The challenge and adventure is to find the soy foods that you and your family can prepare easily and like to eat. The nutritional advantages are to add variety, protein, isoflavones, and calcium into your family’s diet.

Where Can I Find Soy?

What soy foods are available at your local stores or farmer’s markets? Look in the freezer, refrigeration, and shelf sections for a variety of soy foods. Ask for help or ask for a soy product from the store manager. You may not be the only person who wants this product in the store.

Take a shopping list and shop alone to stay on your food budget! It takes a plan to buy the best foods for the best prices and to buy an uncommon food. Remember to buy store and in-season specials.

Whole Soybeans

Soybeans are available fresh, frozen, dried, canned, and in processed foods such as dips, spreads, stuffed ravioli, and soups. Soybeans may be prepared, cooked, and eaten in similar ways as other legumes or beans. Fresh, green soybeans or edamame are easily boiled and served with or without the pod. Families who like other fresh beans like lima beans will like soybeans. Dried soybeans, which may be white, tan, or yellow in color, may be used in any favorite dried bean recipe such as chili, baked beans, dips, or soups. Roasted soynuts are another delicious option to add to foods or eat as a snack similar to nuts.

Try These Soybean Choices:

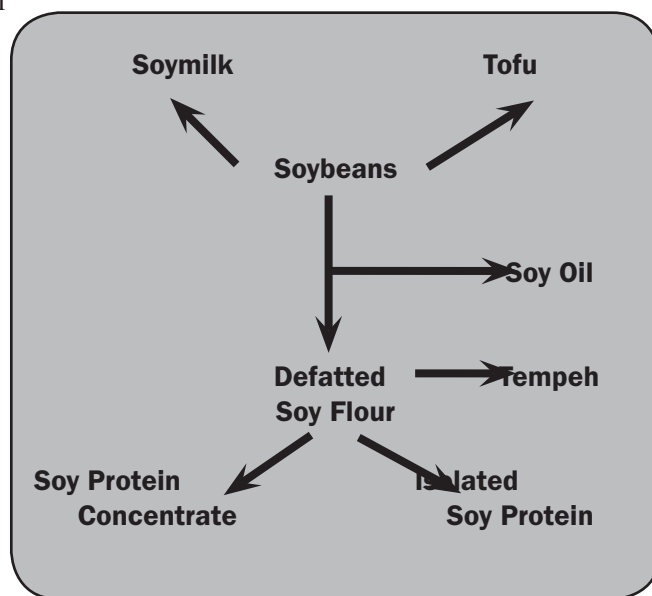
- Add color to pasta meals. Mix boiled green soybeans into pasta dishes.
- Soak and boil more dried soybeans than needed when making another dish. Use a blender or a fork to mash beans. Add onions, garlic, horseradish, chili pepper or favorite spices to make a bean dip for nachos or tortilla roll-ups.
- Mix different dried beans with soybeans for soups and bean recipes to add texture and color.
- Mix soynuts in cereal trail mix for snacks.

Cooking & Soaking Dried Soybeans

One pound of dried soybeans is cooked in approximately 8 cups of water for 2 to 3 hours. Cooking time will depend on the soaking method and how long the dried beans have been in storage.

Overnight soak method

Pick out damaged beans and stones. Rinse beans in cold water.
Put 1 pound of beans in a large pan and cover with 6 cups of lukewarm water.
Cover pan and refrigerate overnight or for 8 hours.
Drain the beans, rinse, and cover with fresh cold water.
Cook on low heat until beans are tender. Drain.



Short soak method

Pick out damaged beans and stones. Rinse beans in cold water.

Put 1 pound of beans in a large pan and cover with 6 cups of lukewarm water.

Boil beans uncovered for 2 minutes and remove from heat.

Cover and let stand 1 hour. Drain the beans, rinse, and cover with fresh cold water.

Cook on low heat until beans are tender. Drain.

Soy milk

A variety of flavored fluid soy milks are available as fresh soymilk or in aseptic or non-refrigerated cartons. Soy milk powder also is available. Unfortified soy milk is lactose and casein-free and does not contain calcium. Read the label for nutrient content. Choose brands that are fortified with calcium, vitamin D, and other nutrients. Unfortified soy milk is not a substitute for cow's milk or baby formula, which is a primary source of calcium. Check the dry milk and refrigerated sections of the grocery store to find regular and fat free soy milk products. Store an opened aseptic container or fresh soy milk in the refrigerator. It will stay fresh for about 5 days.

Try These Soy milk Choices:

- Add chilled soy milk to cereal and fruit.
- Add to hot oatmeal, cereals, baked rice, and puddings.
- Blend a frozen smoothie by mixing 1 cup vanilla soy milk and 1 cup fresh or frozen fruit in a blender. Add ice. Garnish with soynuts.
- Use in cream soups, casseroles, and vegetables.
- Use in baked products: cakes, cookies, pancakes, waffles, or desserts

Tofu

Tofu or soybean curd is a traditional protein staple in Asia and is becoming popular in the United States. Coagulating soymilk with calcium sulfate, a naturally occurring mineral, starts the tofu-making process. The whey is squeezed out of the curd to make a bland-flavored, high moisture, and smooth textured cheese-like food called tofu. Three types of tofu are available in aseptic containers, vacuum packets, or water filled containers within the refrigeration section of a grocery store. Rinse before using. Store unused tofu in water in the refrigerator. Change the water daily. It keeps about a week in the refrigerator.

Try These Tofu Choices

Firm Tofu is solid and holds its shape when cubed, sliced, and crumbled for a variety of dishes. It is best used in stir-fried dishes, soups, and casseroles. Marinated or seasoned tofu is sold in vacuum packets in the refrigerator section.

- Brown and season for more texture and flavor. Keep extra amounts in the refrigerator for 5 days and use in many dishes.
- Marinate in soy, teriyaki, or barbecue sauces. Grill or broil.
- Crumble and cook with scrambled eggs.
- Substitute 1 cup firm tofu, mashed, for 1 cup ricotta cheese in a lasagna recipe

Soft Tofu is best used in Oriental soups and recipes using blended tofu.

- Cube and add to chicken soup.
- Mix with ground beef or turkey to make a meatloaf or burgers.
- Mix tofu in a blender with onions, garlic, and dill weed for a vegetable dip.
- Substitute one 2-inch square of tofu for one egg in recipes.

Tofu Pudding Pops

One 10 oz. box frozen strawberries or raspberries, partially thawed

One 10 oz. package silken tofu

Sugar to taste

Place tofu in blender and start blending.

Slowly add berries.

Blend until smooth.

Add sugar if needed.

May be chilled an hour before serving.

Makes approximately 4 - 1/2 cup servings.

Serve in ice cream cones, parfait glasses,

or on a rice cake. Be creative. Add a variety of fruits, soynuts, or granola. Tofu pudding may be used as a pie filling for another dessert option.

1/2 Cup has 106 calories, 5g protein, 19g carbohydrates, 2g fat, 25mg sodium, 1mg iron, 28mg calcium, 2 RE vitamin A, 28 mg vitamin C

Silken Tofu is creamier and has a pudding-like consistency. It is best used in blended or mixed dishes like dips, desserts, and drinks.

- Make fruit dips by blending 1 cup silken tofu with favorite fruit or add vanilla or almond extract.
- Use silken tofu instead of yogurt. Add spices and herbs.
- Use silken tofu as a partial replacement for cream cheese in your favorite cheese cake recipe.

Soy Flour

Soy flour is made from ground roasted soybeans and is rich in protein. It is gluten free and will not rise. Also, natural or full-fat soy flour has more moisture than other flours. Soy flour cannot be totally substituted in regular flour recipes. Experiment by adding two tablespoons per cup of regular flour. This will add moisture, flavor, protein, and isoflavones to baked products.

Try These Soy Flour Choices:

- Use in thickening gravies and sauces
- Use recipes designed to use soy flour.
- Replace 1/4 of the flour in self-rising baked goods with soy flour.
- Replace 1/3 cup of flour in quick breads with soy flour.
- Substitute 1 Tbsp. soy flour for 2 Tbsp. flour
- Substitute 1 Tbsp. soy flour + 1 Tbsp. water for 1 egg

Textured Soy Protein

Textured soy protein (TSP), also called textured vegetable protein (TVP), is made from soy flour by compressing and changing its consistency. It may be sold in several forms, such as whole bean, defatted, browned, dried, or granulated. TSP is used to replace ground meats in stews, meatloaf, chili, soups, casseroles, and other recipes. Follow instructions on label to rehydrate. Here is a recipe to challenge your cooking skills!

Soybean Oil

The Dietary Guidelines for Americans recommends “Choosing a diet that is low in saturated fat and cholesterol and moderate in total fat.” Soybean oil is cholesterol free and contains mostly unsaturated oils (monounsaturated and polyunsaturated). Soybean oil is a “heart” healthy choice for baking, frying, and stir-frying foods. Make it part of a Food Guide Pyramid diet and limit fat or oil intake to less than 30% of your total caloric intake. Soy oil is often hydrogenated to make a solid shortening or margarine. Limit the amount of hydrogenated oils, which is similar to a saturated fat. For more information on fats and oils, see VCE Publication 348-898, *Heart Healthy Eating—Cholesterol, Fat, Fiber, and Sodium*.

Sloppy Joes

This is one of the best introductions to soyfoods for people who have never tried them. It’s a real winner. Serve with a low sodium food, such as vegetables or a salad.

1 cup boiling water	1 Tbsp. bottled chili sauce
1 cup dry TSP	1 cup chopped onion
1 cup finely chopped zucchini	1/2 cup chopped bell pepper
1 can (8 oz.) tomato sauce	1/4 cup bottled chili sauce
1/2 tsp. chili powder	2 tsp. Worcestershire sauce
1 tsp. cider vinegar	

Combine the boiling water and 1 Tbsp chili sauce and pour them over the TSP to rehydrate it. Set aside.

Sauté the onion, zucchini, and bell pepper in a non-stick pan until tender (add a little water if necessary to prevent sticking). Add the dehydrated TSP and cook, stirring, for another minute.

Stir the tomato sauce, 1/4 cup chili sauce, chili powder, Worcestershire sauce, and vinegar into the TSP mixture. Simmer for 5 minutes. Serve on hamburger buns.

Yield: 6 servings

Serving size: 1/2 cup

Per serving (without Bun): 95 calories; 0 g total fat (0 g sat fat), 11 g Protein, 16 g Carbohydrate, 5.0 g fiber, 420 mg sodium, 0 mg cholesterol

Exchanges: 1 starch, 1/2 vegetable, 1 lean meat

Spicy Sloppy Joes: Prepare Sloppy Joes, but substitute tomato sauce or ketchup for chili sauce and omit Worcestershire sauce and vinegar. Increase the chili powder to 2 tsp. Add 1 can (4 oz) chopped green chilies or 1/2 cup salsa, if desired. This makes a great taco filling, too.

Source: *Simply Soy, A Variety of Choices* cookbook, Virginia Soybean Association

Try These Soybean Oil Choices:

The following substitution will lower calories, saturated fat, total fat and cholesterol.

- Use soybean oil or margarine instead of lard, butter or shortening.
- Use 3/4 Tbsp. soybean oil for 1 Tbsp. margarine.
- Use 3/4 cup soybean oil for 1 cup margarine.
- Use 1/3 cup soybean oil for 1/2 cup margarine.
- Use 3 Tbsp. cocoa + 1 Tbsp. soybean oil for 1 oz. baking chocolate.

Table 4. Comparing Fats and Oils Chart

Oil	% of Total Fatty Acids		
	Saturated	Monounsaturated	Polyunsaturated
Soybean	15%	24%	61%
Corn	13%	25%	62%
Canola	6%	58%	36%
Sunflower	11%	20%	69%
Olive	14%	77%	9%
Lard	41%	47%	12%

Sources: Handbook No. 8-4 and Human Nutrition Information Service, USDA, and American Soybean Association. United States Department of Agriculture (USDA) Nutrient Database for Standard Reference. (2001). Washington, DC: USDA Agriculture Research Service. American Soybean Association. (2001).

Tempeh is a common food eaten in Indonesia. It is found in the frozen food section of health food stores and supermarkets. Tempeh has a chewy texture that can be added to stews, soups, chilies, and casseroles. Marinate and grill it to add to any meal. Use it in the same way as firm tofu to add a different texture to recipes.

Soy protein isolates and soy protein concentrates are extracted from defatted soy flour. They are used in processed foods to add taste and texture. Both are high in concentrated protein and low in calories, fat, and cholesterol. Baked goods, pasta, breakfast cereals, soups, milk shakes, and snacks may have these added. Check the label.

Soybean Production in Virginia

Soybean is Virginia's largest acreage crop and is second in value only to tobacco. In 2000, a record average yield of 39 bushels per acre was harvested on approximately 490,000 acres, resulting in a total production of over 19 million bushels valued at over \$85 million. While soybean is grown throughout much of Virginia, the largest acreage is in the eastern part of the commonwealth (Figure 1). The greatest concentration of acreage is on the Eastern Shore counties of Accomack and Northampton, but most counties in eastern Virginia contain relatively large acreages. Most of these acres are planted "double-crop" immediately following a barley or wheat crop. By harvesting two crops per year, producers can maximize their time, resources, and profits.

Production Efficiency

Soybean producers have nearly doubled their yields over the past 50 years (Figure 2). Yields are generally expressed in bushels per acre, with a bushel weighing 60 pounds. Though soybean yields nationwide have increased at a rate of about 0.4 bushels per year, Virginia soybean yields have only increased at a rate of about 0.25 bushels per year. These differences have resulted in average Virginia yields of approximately 9 bushels less than the rest of the nation. Why such a large difference? The answer primarily lies in the relatively low water-holding capacity of Virginia soils compared to those in the Midwest. Although Virginia receives more

rain than midwestern states, the soil does not hold as much water; therefore, it is more subject to drought. The large fluctuation in yields in Virginia shows the effects of seasonal drought (Figure 2). If Virginia receives adequate rainfall, then yields can be as high or higher than the average USA yields.

The future of soybean production in Virginia is encouraging and will likely increase due to the continuing demand for soybean and soybean products in peoples' diets. Virginia is a leader in the production and marketing of food-grade soybeans. Also, new uses such as soybean-based "biodiesel" fuel, glues, plastics, solvents, lubricants, inks, and crayons should insure a bright future.

2000 Soybean Acreage Harvested

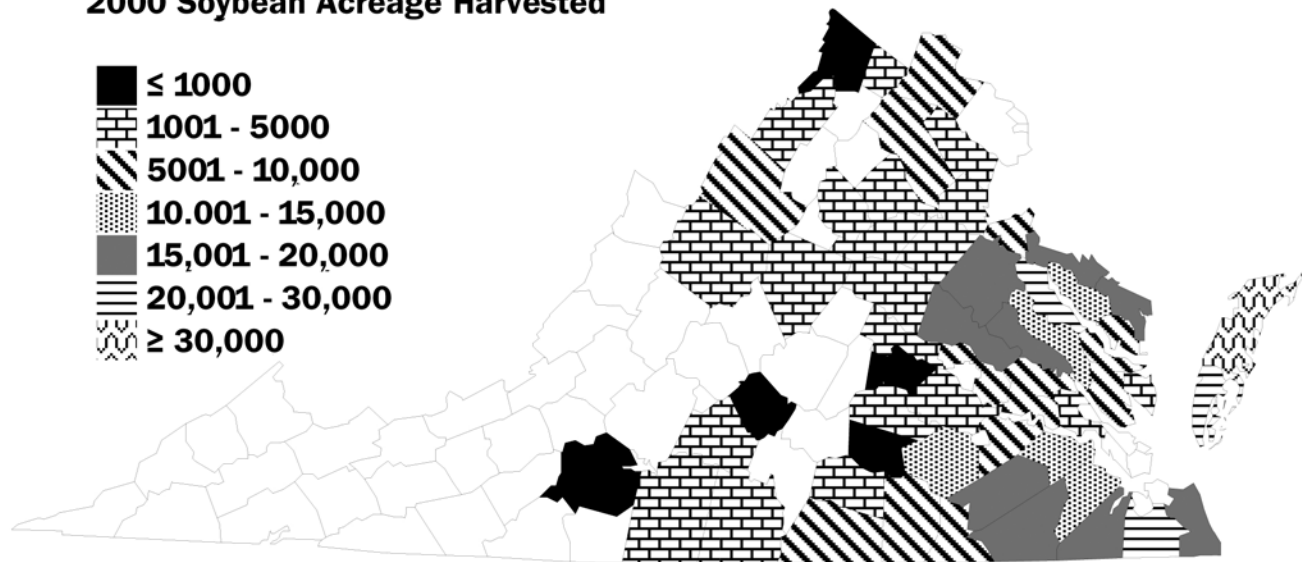


Figure 1.

Historical Soybean Yield 1945-2000

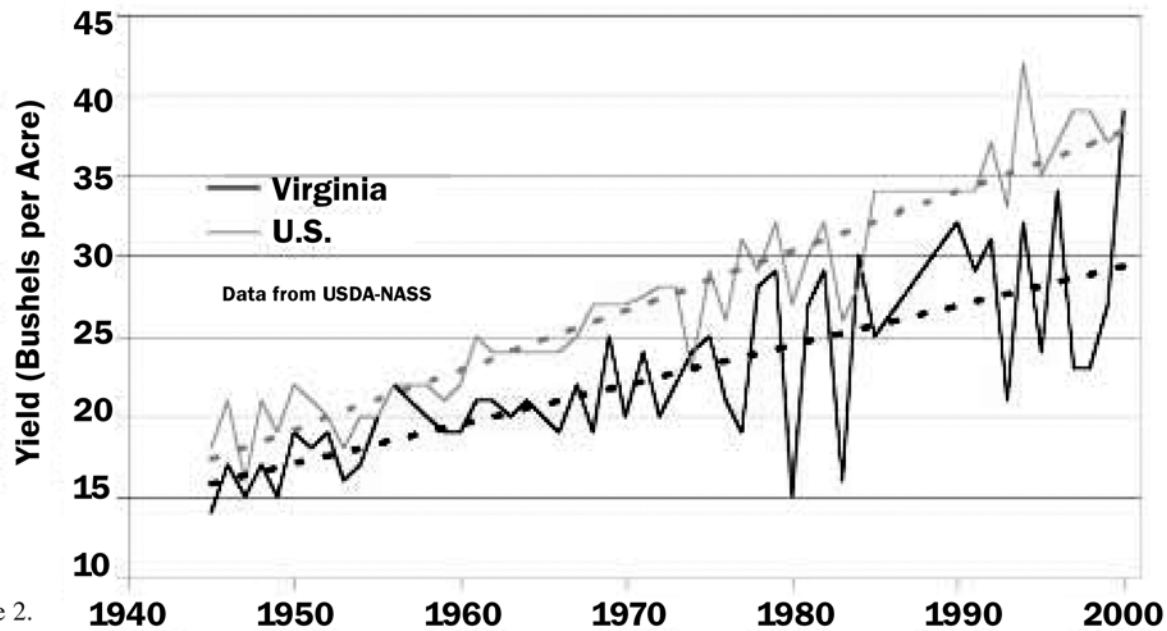


Figure 2.

For More Information: Contact these organizations for more soybean information and recipes.

American Soybean Association

Suite 100
12125 Woodcrest Executive Drive
St. Louis, MO 63141
1-800-688-7692
www.amsoy.org

Food and Drug Administration

www.fda.gov

National Cancer Institute

5 A Day for Better Health Program
1-800-422-6237
www.nci.nih.gov/

Soyfoods Association of North America

1723 U St., NW
Washington, DC 20009
(202) 986-5600

United Soybean Board

1-800-825-5769
www.talksoy.com

United States Department of Agriculture

www.usda.gov

U.S. Soybean Directory

www.soyfoods.com

Virginia Cooperative Extension

www.ext.vt.edu/

Virginia Soybean Association

151 Kristiansand Drive
Suite 115 E & F
Williamsburg, VA 23188
1-757-564-0153
www.vasoybean.org

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