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EC9963 Soybeans as a Food

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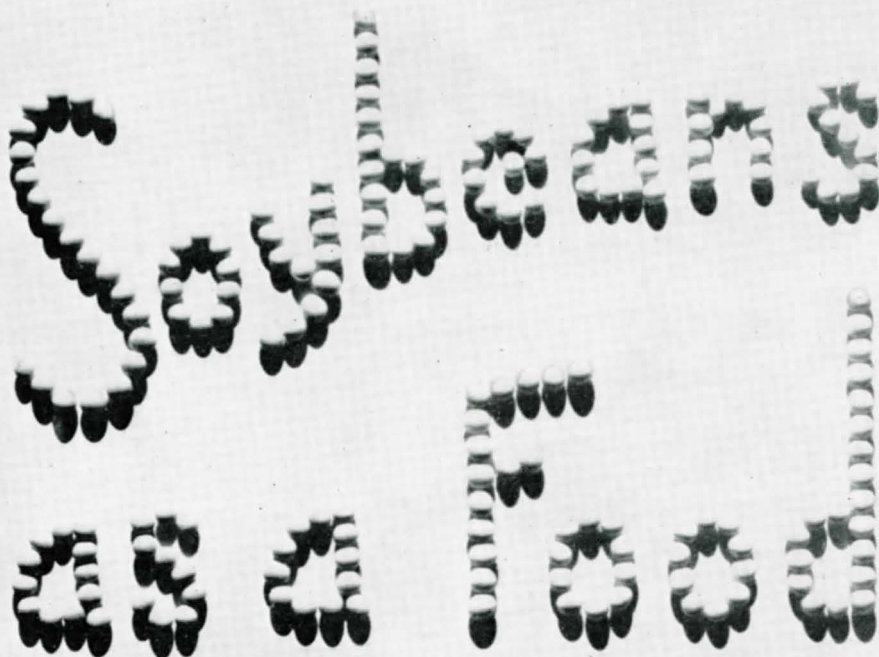
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University of Nebraska Agricultural College
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Extension Circular 9963

December, 1943, 25M

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The College of Agriculture Extension Service
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W. H. Brokaw, Director, Lincoln, Nebr.

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Soybeans as a Food

May Stanek

Soybeans are a new food to most Nebraska people. Soy flour, cereals, flakes, grits, and canned, immature beans may be purchased on the market. Because there is a growing interest in soybeans, many home-makers are trying to raise them. Both the edible and the field varieties may be grown to a limited extent in gardens over the state.

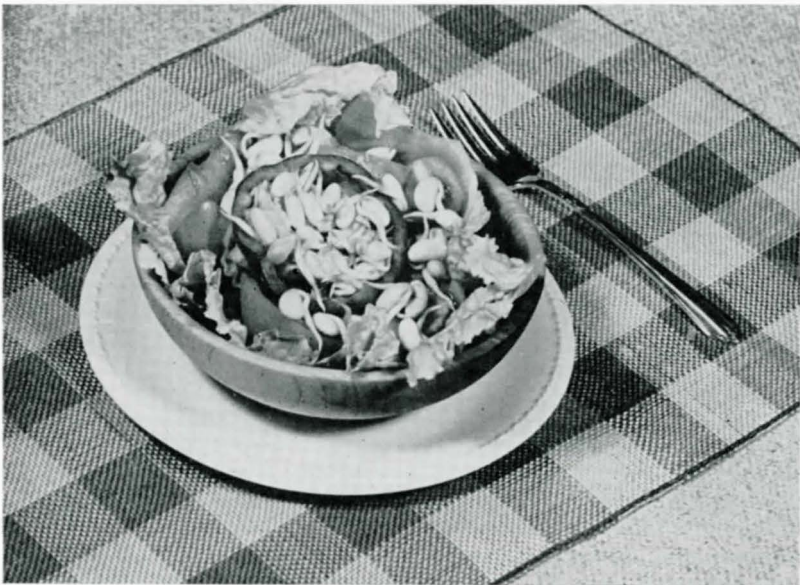
In wartime, less prepared and processed food is available. Nebraska families can help the situation by producing soy beans which contain many food nutrients. As a nation, we must eat:

LESS

Fats of all kinds
Meats of some kinds
Shipped-in fruits and vegetables
Commercially canned and frozen
fruits and vegetables
Sugar

MORE

Locally produced foods
Greens from early spring until
December
Tomatoes
Home-canned and dried foods
Cereals
Potatoes



Sprouted soybeans make a nutritious addition to any appetizing vegetable salad.

Growing edible or field varieties of soybeans in the family garden for home use may be practical over much of Nebraska. Information on the subject is limited at the present time, however, to scattered reports from gardeners and to experimental work at the College of Agriculture at Lincoln. Results of the tests with edible varieties at Lincoln are being published in Experiment Station Bulletin No. 356.

Bansei, Mendota, Kanro, and Jogun have been the best edible varieties at Lincoln. Dunfield and Illini are the most commonly grown field varieties in Nebraska. Because of the shortage of seed of the edible soybeans, it is suggested that home gardeners use them only for green beans, and that they plant suitable field varieties for use as dry or sprouted beans.

Food Value of Soybeans

As one of the basic seven, soybeans rank in group five along with protein rich foods, such as meat, poultry, fish, eggs, and legumes.

The beans may be used as extenders to make foods like meat and eggs go farther. In some cases they are used as a cereal or flour, in other cases as a vegetable.

The soybean may help to add some of the food nutrients which may be lacking in diets. When compared with navy and lima beans on a dry, mature basis, they contain about one and one-half times as much protein, twelve times as much fat, about one-half as much carbohydrate, and considerably more minerals, particularly calcium and iron. Even as a green shelled vegetable, soybeans are richer in protein and fat than other green beans either shelled or in the pod.

Much of the carbohydrate content in soybeans is of a kind not well utilized by the body. Because soybeans are low in carbohydrate content, they are used in diabetic diets.

Fresh green soybeans are rich in vitamin A, especially the varieties that are deepest green in color. Indications are that the dry soybeans are a good source of vitamin B₁, riboflavin and niacin, but less potent in vitamin A than the fresh green soybeans.

During sprouting, vitamin C is formed by the bean and the niacin and riboflavin increase. The beans are also a fairly good source of calcium. Soybean protein must be heated to improve its digestibility and palatability. Sprouting seems to give the same results as heating.

Fresh or dry soybeans can be relied upon as a fair source of phosphorus and iron. Flour or meals made from soybeans are similar to the dry soybeans in food value.

How to Use Green Soybeans

Fresh green soybeans are very similar to fresh green peas in appearance and flavor. Cooked soybeans may be used in place of cooked green peas in most recipes.

When the beans have reached nearly full size but are still green and succulent, they make a palatable and nutritious food. The proper green vegetable stage has been found to extend from the time the pods

are approximately two-thirds filled until they reach maximum size, but before they begin to turn yellow. The beans are suitable as a green bean over a growing period of about 2 weeks.

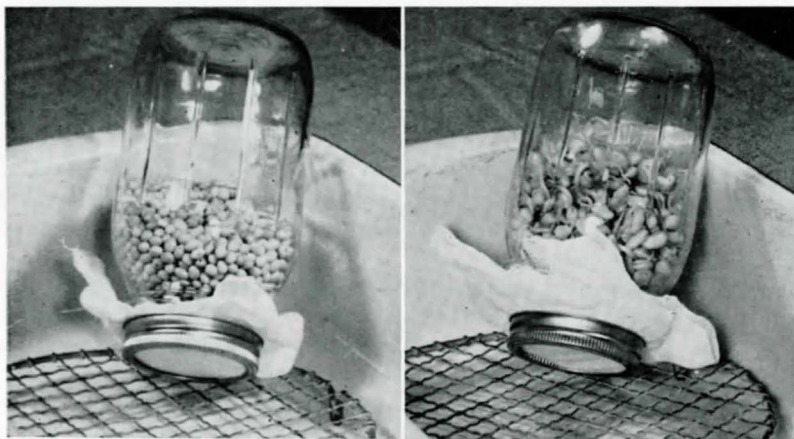
Soybeans are difficult to shell, particularly field varieties. To shell the green beans, boil in the pods first for about 5 minutes then immerse in cold water. The seeds can be squeezed out of the pods by pressure with the fingers. Then the shelled beans may be steamed or boiled in lightly-salted water. The time of cooking depends on the variety. Some cook as quickly as green peas; others are more like lima beans. When cooked, they have a pleasant firm texture and nutty flavor. Because they are rich, they need only simple seasoning with salt and pepper to taste and a little melted butter or crisply fried bacon or salt pork.

Dry Soybeans

Dry soybeans, either the vegetable or field type, should be prepared and served in practically the same way as other dry beans, except that most of the varieties require a longer period of cooking. They should always be soaked overnight. After soaking overnight, drain, add fresh water, and simmer. One cup of dry beans will make about two cups of cooked soybeans. Some varieties will cook tender in about 2 hours. The field varieties require additional cooking time. With a pressure cooker at 15 pounds pressure the cooking time required is from 15 to 30 minutes. Three cups of water to one cup of beans may be used. The vegetable type softens more quickly than the field type of soybean.

Soybean Sprouts

Soybeans are easy to sprout during the cool months of the year. Summer brings trouble with molds. However, it is in the winter that sprouted beans are most useful because fresh foods are scarce. When



Soybeans can be soaked in a fruit jar and drained in this way. At the left, the start of the process; at the right the sprouted beans nearly ready to use.

the sprout of the soybean is about an inch or two long, much of the bean still remains. Both the bean and the sprout should be eaten.

For success in sprouting soybeans use:

1. A good quality bean with a high percentage of germination.
2. A can of chlorinated lime, which the chemist calls calcium hypochlorite and which may be used for purifying drinking water. A little of this helps to prevent mold growth, although the beans can be sprouted successfully without it. A small amount of chlorinated lime will go a long ways.
3. A sprouting vessel that has a wide mouth for getting the beans in and out, with a hole or screen in the bottom to drain off the water. This may be a flower pot, fruit jar, other crockery or glass container or a cloth bag. Tin, chipped enamelware, or galvanized metal containers do not make satisfactory receptacles because of the danger of rust or poisoning.

The sprouting vessel should be big enough to let the beans swell 3 to 4 times. If a clean flower pot is used, put a piece of wire netting or cloth across the hole in the bottom. For a fruit jar, cover the opening with a zinc top punched full of holes or with wire screen or cloth.

The method for sprouting the beans is as follows:

1. Sort the beans, removing broken pieces and foreign seeds.
2. Wash thoroughly.
3. Cover the beans with lukewarm water and soak overnight. Allow three pints of water to a pound of beans and dissolve a pinch of chlorinated lime in the water before adding the beans. Lime water can be mixed in stock quantity, using $\frac{1}{2}$ teaspoon of chlorinated lime to 1 gallon water. Make a paste of the lime with a small amount of water, then add to the larger quantity.
4. Keep the beans warm and moist (75-85°). If the beans are in a dark place they will remain white, if left in the light they will turn yellowish green. Cool temperatures will retard the sprouting. Water two or three times a day by filling the jar with water then inverting it so the water drains out and the beans have air. The watering should be thorough to flush off bacterial growth. Each evening it is wise to flush with lime water. Beans that show signs of darkening or decay should be picked out.

Soybean sprouts are cooked and served with the bean attached. The sprouts and beans need to be cooked only long enough to remove the "raw bean" flavor. Usually 10 to 20 minutes cooking is sufficient. The bean will have a chewy texture, crisp, and waxy like a peanut.

If more beans are sprouted than are needed immediately, part of them may be refrigerated. They should be cooked before they are refrigerated. They will keep this way at least 4 days. The sprouted beans may be frozen or canned.

Soybean Flour and Grits

Dry beans may be ground to make flour. If the entire bean is used, the flour has the same food value as the dry beans. Soybean flour compares favorably with whole wheat flour in food value; however, it contains more protein, calcium, phosphorus and vitamin B per cup than does whole wheat flour. The flour is yellowish in color and has very little taste of its own. It cannot replace all wheat flour in bread or in thickening a sauce or gravy, for it lacks the necessary starch and gluten. Soybean flour may be substituted for part of the white flour in most recipes without any noticeable change in the texture of the finished product. As much as one-fourth of the total flour in most recipes may be soybean flour. In cookies and pie crust, this may be increased to one-half.

For success with soybean flour, directions in soybean recipes should be followed carefully. Soybean flour absorbs more liquid than wheat flour and for that reason a good deal of liquid is called for in almost every recipe. It packs down in the package, so it needs to be stirred well before measuring.

The flour is useful also as an extender when supplies of meat, milk, eggs, and cheese run short. In meat dishes, the soybean flour can replace up to one-fourth of the meat without changing the character of the dish. Soybean grits are used with coarsely ground meals like cornmeal. In some recipes, such as potato or sausage cakes, soups and puddings, either the flour or grits can be used equally well.

Some flour manufacturers are using five per cent of soy flour and ninety-five per cent wheat flour to make bread more tender and keep it moist longer.

Preservation of Soybeans

If the garden crop of soybeans is too large for immediate use, homemakers may can the surplus in a pressure canner, following methods used for canning other kinds of beans and peas. It would be wise to plan to can a supply of green soybeans for winter use. The green beans may also be frozen.

Canning Green Soybeans

Green vegetable soybeans are a palatable and desirable food when canned. Boil the beans in the pods for about 5 minutes. Shell and wash the beans, and scald for 3 minutes in boiling water. Drain. Pack hot in tin cans or glass jars to within $\frac{1}{4}$ inch of the top. Add 1 teaspoon salt to each quart and boiling water to cover. Small pieces of salt pork may be added if desired. Process in a steam pressure cooker as follows:

Pint glass jars—60 minutes at 10 pounds pressure.

Quart glass jars—70 minutes at 10 pounds pressure.

Freezing Green Soybeans

The beans should be harvested when in prime condition. The shorter the time between harvesting and the time the product is properly prepared and placed in the sharp freeze the better the product.

Boil the pods for about 5 minutes. Plunge into cold water. Shell. Scald the beans 1 to 2 minutes. Cool promptly by plunging into cold water. Pack in air-tight containers. Quick freeze.

Suggestions for Use of Soybeans

Dry Soybeans

1. Any standard recipe for baked beans may be followed substituting soybeans for the other beans.
2. They may scalloped with tomatoes or used as stuffing in tomatoes or peppers.
3. They may be used in salads.

Marinate cooked beans which have been drained, with French dressing for one-half hour or more, then add one of the following combinations:

- a. Shredded raw cabbage or watercress and raw carrots.
- b. Diced cucumber, or diced celery.
- c. Chopped green pepper, raw onion rings and sliced tomatoes.
- d. Chopped pickle, minced parsley, and grated raw carrot.

Serve these combinations on a bed of salad greens with a bit of mayonnaise or boiled dressing.

Soybean Casserole

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|----------------------------|-------------------|
| 2 c. cooked soybeans | 6 Tb. flour |
| 1/4 c. diced salt pork | 2 c. milk |
| 2 c. chopped celery | 1 tsp. salt |
| 2 Tb. chopped onions | 1 c. bread crumbs |
| 2 Tb. chopped green pepper | |

Brown pork, add celery, onion, and green pepper. Sauté 5 minutes. Add thickening (flour, milk, and salt), stir in cooked beans. Pour into greased baking dish. Cover with bread crumbs. Bake in a moderate oven (350° F.) for 30 minutes or until the crumbs are brown.

Chile Con Carne

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| 2 c. cooked soybeans | 1/2 lb. ground beef |
| 1/4 lb. salt pork, diced | 1 Tb. chili powder |
| 1/4 c. chopped onions | 2 c. tomatoes (canned or fresh) |

Fry pork until crisp. Remove pork and brown the onions. Add beef, stir and cook slowly for 5 minutes. Add crisp pork and remaining ingredients. Heat to boiling.

Soybean Loaf

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|--------------------------------|----------------------|
| 2 c. cooked soybeans (chopped) | 3 Tb. minced onion |
| 1 c. cooked rice | 1 Tb. lemon juice |
| 2 unbeaten eggs | 1/2 tsp. celery seed |
| 2 Tb. catsup | 1 tsp. salt |
| 1/2 tsp. pepper | |

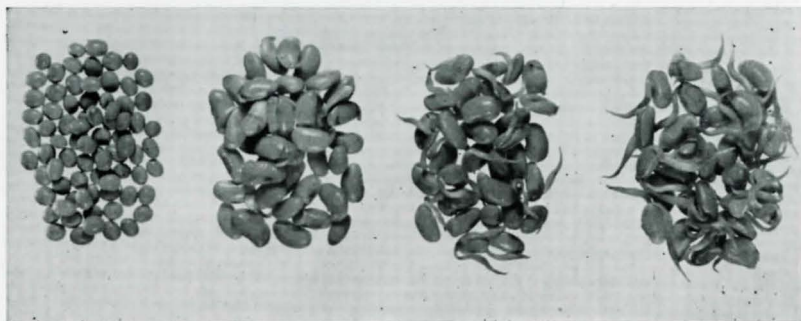
Mix ingredients in order given. Put in greased loaf pan and bake at moderate temperature (350° F.).

Salted Soybeans

Soybeans may be fried in deep fat and salted to serve like salted nuts. Any vegetable variety may be used.

Method 1. Soak dry soybeans overnight, or until completely swollen. Dry the surface between towels and fry in deep fat, a few beans at a time, for 5 to 8 minutes depending upon the size of the beans (temp. 350° F.). When they are slightly brown and crisp, drain, salt and use as salted peanuts would be used.

Method 2. Soak washed beans overnight. Boil them for one hour in salted water, spread in a shallow pan and roast in a moderate oven (350° F.) until browned. Sprinkle them with salt while still warm.



It takes about four days to sprout soybeans. At the left, the dry beans, next the soaked beans beginning to sprout, next the beans the third day, and at the right the beans on the fourth day.

Soybean Sprouts

1. Soy sprouts may be used in chicken a la King, Spanish rice, scrambled eggs, stews, vegetable and meat casserole.
2. Finely chopped, they are crisp and chewy in sandwich spread.
3. They may be served as a plain vegetable. Brown with onion. Season and cook 10 to 15 minutes.
4. They may be used in vegetable and fruit salads.

Molded Sprout Salad

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|----------------------------------|--|
| 1 package lemon flavored gelatin | 1 c. shredded cabbage |
| 1½ c. hot water | 1 c. shredded carrots |
| ¼ c. vinegar | 1 c. chopped celery |
| 3 Tb. lemon juice | 1 c. cooked fresh or canned or sprouted soybeans |
| 1 tsp. salt | |
- 2 Tb. chopped chives or onion

Dissolve gelatin in hot water. Add vinegar, lemon juice, and salt. Chill. When partially thickened, add vegetables and pour into mold. Chill until firm. Serves 8 to 10.

Soy Sprout Casserole

2 Tb. fat	$\frac{1}{8}$ tsp. pepper
2 Tb. flour	1 c. diced cheese
2 c. milk	$\frac{1}{4}$ c. finely minced onion
1 Tb. Worcestershire sauce	3 Tb. of chopped celery leaves
$1\frac{1}{4}$ tsp. salt	2 c. sprouted soybeans
Paprika	2 c. noodles cooked 9 minutes

Heat fat and stir in flour. Slowly add milk and cook until thick, stirring constantly. Add Worcestershire sauce, salt, pepper, and cheese; let cheese melt slightly. Add remaining ingredients except paprika. Mix thoroughly and turn into greased casserole. Dot with butter or diced bacon. Sprinkle with paprika and bake in moderate oven (350° F.) for 30 minutes. Serves 6.

Chop Suey Soy

2 Tb. fat	$\frac{3}{4}$ c. coarsely cut green pepper
1 lb. diced pork or chicken	3 cups. soybean sprouts
1 c. thinly cut onion strips	1 c. boiling water
2 tsp. salt	1 Tb. soy sauce
$1\frac{1}{2}$ tsp. pepper	1 Tb. flour
$1\frac{1}{2}$ c. diced celery	

Melt fat in frying pan. Brown meat with onions, add half of salt and pepper. Add remaining vegetables, seasonings and boiling water. Cook until thick. Serve on hot puffy rice. Hard-cooked eggs and lightly sautéed tomato slices make an attractive garnish. Serves 6. (If soy sauce cannot be obtained, a mixture of 3 Tb. of molasses, $\frac{1}{3}$ tsp. of ginger and 2 Tb. of Worcestershire sauce may be used instead.)

Creole Soy Sprouts

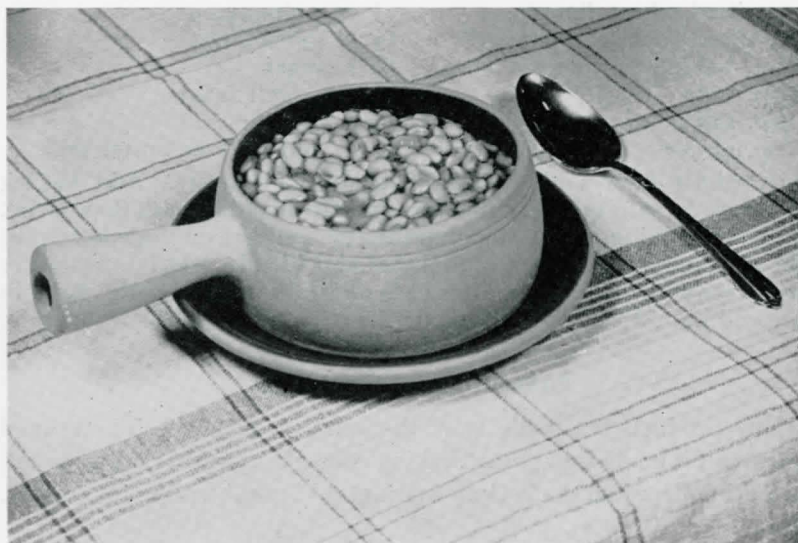
1 Tb. fat	2 bay leaves
$\frac{1}{2}$ c. minced onion	$1\frac{1}{2}$ tsp. salt
$\frac{3}{4}$ c. diced celery	$\frac{1}{8}$ tsp. pepper
$3\frac{1}{2}$ c. canned tomatoes	3 c. sprouted soybeans

Melt fat. Add onion and celery. Sauté until slightly brown. Add tomatoes, bay leaves, salt and pepper. Let simmer 10 minutes, then remove bay leaves and add soybean sprouts which have been steamed 15 minutes. Cook for 8 minutes. Serves 6.

Bean Sprout Tossed Salad

2 c. sprouted beans, steamed	2 Tb. vinegar
and chilled	1 head lettuce
$1\frac{1}{2}$ tsp. salt	1 large green pepper chopped
$\frac{1}{8}$ tsp. pepper	$\frac{1}{2}$ c. onion, chopped fine
$\frac{1}{4}$ c. salad oil	

Steam or boil sprouted beans 10 minutes. Drain and chill. Make dressing by mixing salt, pepper, salad oil, vinegar, and small amount of minced onion. Chill. Rub salad bowl with garlic if desired. Toss shredded lettuce, bean sprouts, chopped pepper and onion together in the salad bowl. Just before serving add salad dressing.



Soybeans may be baked and served like other dry beans.

Chicken Chow Mein

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| 1 c. celery strips | 2 tsp. soy sauce |
| 1 small onion, sliced | 2 c. shredded cooked chicken |
| 1 green pepper, finely sliced | 2 c. sprouted soybeans |
| 2 c. chicken stock | 1 tsp. cornstarch |
| 1 tsp. salt | 2 Tb. water |

Cook celery, onion and green pepper in stock 20 minutes; add salt, soy sauce, chicken, and cornstarch mixed with water, and cook 10 minutes, stirring until thickened. Serve on crisp noodles, rice or potato chips. The top may be garnished with slices of breast meat if desired. Serves 6 to 8.

Soybean Flour

1. For yeast bread, use less than 25% proportion of soybean flour, 5 to 10% gives better baking results.
2. Noodles may be made with equal parts of soy flour and other flour. They may be combined with meat to make a main dish that is high in protein value.
3. A small amount of soy flour may be used in sandwich spread to make it more nourishing. For example, $\frac{1}{2}$ c. peanut butter, $\frac{1}{2}$ c. soy flour, and $\frac{1}{2}$ c. mayonnaise.
4. Cream soups, puddings, cereals, and dumplings may be made more nourishing by adding soybean flour.

Spicy Soy Gingerbread

2 c. sifted wheat flour	1 tsp. cinnamon
$\frac{1}{4}$ c. sifted soybean flour	$\frac{1}{3}$ c. shortening
3 tsp. baking powder	$\frac{1}{2}$ c. sugar
$\frac{1}{4}$ tsp. soda	1 egg, well beaten
$\frac{1}{4}$ tsp. salt	$\frac{2}{3}$ c. molasses
2 tsp. ginger	$\frac{3}{4}$ c. sour milk or butter milk

Sift wheat flour and soybean flour once, measure. Add baking powder, soda, salt, ginger, cinnamon and sift together with flour twice. Cream shortening. Add sugar gradually and cream together until light and fluffy. Add egg and molasses and blend. Add flour mixture alternately with milk. Beat after each addition until smooth. Bake in a greased pan, 8"x8"x2" in a moderate oven, (350° F.) 50 to 60. min.

Other Uses of Soybeans

Many products are made from the versatile soybean. The refined soybean oil is made into paints, baking enamels, varnishes, water-proofing, leather dressing, shade-cloth coating, rubber substitute, inks, putty, etc.

Glycerine, soft and hard soaps, and insecticides are also manufactured from the soybean oil.

Industrial products such as adhesives, washable wallpaper, paper coating, synthetic wool, plastics, plywood glue and molding material are made from the soybean oil meal.

Feeds for beef and dairy cattle, poultry, swine, sheep, fox and other animals are mixed with the soybean oil meal.

Bakery goods and foods such as breads, pastries, sausage binders, macaroni, diabetic foods and egg white substitutes are among the common products made from soy flour.