

THE HOME PRODUCTION OF VEGETABLE PROTEIN

The production of inexpensive high protein, low fat food at home is not difficult. Included are methods of producing milk, yogurt and tofu (soya bean curd) from soya beans, and growing protein-rich sprouting seeds. Considerable savings can be made by producing these foods at home over buying them ready-made. Production of the basic foods is the intention here; recipe books are available, or a Web search can be made.

SOYA BEANS AND PRODUCTS

It can be very satisfying to produce one's own tofu and costs some five to six times less than buying it ready made. Soya milk can be made for about a tenth of the price of the commercial product. Virtually no waste results from this process.

Soya products are amongst the most protein-rich plant-based foods known and contain some 40% protein. They contain vitamins A, E and some B group, along with calcium, iron, phosphorous and other trace elements. To make soya beans palatable they require thorough cooking. Start by boiling some water, add the beans, cover and leave to soak for 12 to 24 hours. Cook for 25 to 30 minutes in a pressure cooker, or up to about two hours in a covered saucepan. If they are sprouted - this takes 4 to 6 days at a temperature of 20 degrees C (68F) - cooking times can be cut to less than half. Tofu is easier to digest, but takes much more time to produce. Of the known 22 amino acids necessary for good health, 14 are believed to be synthesised by the body and 8 need to be obtained from food. Meat, fish, dairy and soya bean products contain these.

SOYA MILK

Soya milk is messy to make, but only costs about 20% of the shop price. The equipment needed is a liquidiser, saucepan, bowl, colander, stirrer, a cup, and a piece of muslin, cheesecloth or fine plain net curtain about 350mm (14 inches) square. A very fine hand grinder can be used if a liquidiser is not available. Ensure the working area is clean and all equipment thoroughly washed. The following recipe will produce roughly one litre (just under 2 pints) of soya milk.

Boil 500ml (just under a pint) of water, add 120g (4 oz) of soya beans, simmer for about one minute, cover and leave to soak for 12 to 24 hours. Drain and wash the beans. Place a cupful of beans in the liquidiser, add 500ml of hot water and blend thoroughly at high speed for about 2 minutes. Lay the muslin in the colander so all the holes are covered and place on top of the saucepan. Pour the soya milk-to-be through the muslin and squeeze the muslin to extract all the milk. Repeat until all the beans are used up. Set aside the pulp left inside the muslin (okara); instructions for using this appear later. Bring the milk to the boil, stirring frequently, as it tends to stick to the bottom of the saucepan and boil over. Gently simmer the milk for 15 to 20 minutes. Then remove from the heat and allow to cool - the soya milk is now ready for consumption. Store in a fridge or other cool place.

The irony of all this is that I don't like soya milk from the shops, and mine tasted very similar!

TOFU

Tofu is curdled soya milk, which is a highly nutritious and versatile food. Tofu has slightly more protein than wholemeal rice or whole dairy milk, just over half the protein of eggs and wholemeal flour and over a third the protein of beef, chicken, fish and cheese. However, it is the proportion of the available protein that the body can actually utilise that is important to us. When this is considered, tofu has similar useable protein to chicken and roughly two thirds that of beef for a given weight. If tofu is eaten with wholemeal bread, grains or similar, more protein is made available owing to the combination. Tofu is low in saturated fat, has no cholesterol and about half the calories found in eggs and about a quarter of those found in beef. Tofu is versatile in that it can be used in salads and spreads, tofunaise, cooked dishes, and can be cut into small cubes and shallow fried.

The following assumes that all the soya milk produced from the above recipe will be used. Again, ensure all equipment and the working area is clean. The equipment required is the same as that used for making soya milk, plus a plastic box, perhaps about 100mm square and 25mm deep (4 inches square and one inch deep) with holes in the bottom and a cover which is a close fit inside the box. A coagulant will also be required (see below). The yield varies, but approximate figures are given.

While the soya milk is simmering (refer to bottom paragraph, page 1), prepare the coagulant, which will make the soya milk curdle. This can be one teaspoon of Epsom salts or nagari dissolved in 3 tablespoons of lemon juice. Nagari is what remains after the salt and water are removed from seawater and is rich in minerals. When the soya milk has finished simmering, remove from the heat, add the coagulant and leave for about 5 minutes. Meanwhile place the muslin in the colander and the colander on top of the saucepan, which will collect the runoff (whey). Carefully pour the contents of the saucepan over the muslin so that the whey flows through and the curd remains. Fold the muslin over the top of the tofu, cover with a saucer, concave side up and place about 2kg (4.5lb) of weight on top for about 3 hours. Alternatively, the plastic box can be placed in the colander and the muslin placed inside the box. Add enough tofu to nearly fill the box and put the cover on top. Place a weight of 2kg on the cover and leave for about 2 hours.

Carefully unfold the muslin and remove the "pancake" of tofu. Place the tofu in a storage container and cover with water if not using it straight away. Tofu will keep for about a week if refrigerated and the water changed daily. Some 140 to 170g (4 or 5 oz) of tofu will have been produced. The tofu produced did not hold its shape (lacked cohesiveness) as well as it should; perhaps more weight may be necessary.

Tofu can also be made from soya flour, which is easier than making it from the beans. However, the tofu lacks cohesiveness and is best used in recipes requiring mashed or puree'd tofu e.g. tofunaise. Gradually add one part of soya flour to five parts of boiling water, stirring all the time. Ensure no lumps remain and simmer for about 20 minutes, stirring occasionally. Then add the coagulant and proceed as described from that point above.

TOFUNAISE

Ingredients:-
240g (8oz) tofu
3 tablespoons lemon juice
6 tablespoons vegetable oil
½ teaspoon salt
½ teaspoon mustard

Place all the ingredients except the oil in a liquidiser or suitable hand blender. Start blending at high speed, gradually adding the vegetable oil. Blend for about a minute with the liquidiser; a hand blender will take far longer. This tofunaise costs about a fifth of that of the commercial product.

OKARA

This is what remains in the muslin after making soya milk. It can be used for making burgers, and added to cakes to make them lighter. Roughly 210 to 240g (7 to 8 oz) will have been produced from the above recipe. Okara is a high fibre food and has about half the protein content of tofu, so is well worth using. A recipe for okara burgers follows; feel free to experiment.

Ingredients:-
210 to 240g okara
1 tablespoon soya milk or water
90g (3oz) whole flour
1 stick of celery, finely chopped
1 small onion, finely chopped
1 tablespoon soya sauce
1 teaspoon mixed herbs
½ teaspoon ground pepper

Combine all the ingredients and knead well, adding extra flour or water if necessary to form a stiff, cohesive mixture. Form into patties and grill or shallow fry in vegetable oil.

WHEY

This is the liquid runoff from making tofu, and contains some of the protein and natural sugars of the soya beans. It can be used to make soup stock and in making bread - its sugar content helps the bread to rise. The above method for making tofu yields some one litre (2 pints) of whey.

YUBA

Yuba is the skin that forms on soya milk when it is warm. In the far East it is considered a delicacy. It is very nutritious with over 50% protein, a high mineral content and is rich in unsaturated oils and natural sugars. It is a "high energy" food and is good for sportspeople.

To produce it, heat the soya milk to 80 degrees C (175F), using a good thermometer. After about 10 minutes a skin forms on the top. Cut the skin around the edge of the saucepan and lift the skin carefully from beneath with a large spatula. If the soya milk is

kept on the heat, further pieces can be removed. It can be eaten as it is or as a savoury spread. Yuba can be dried by carefully hanging in a warm place until dry, then stored in a clean, sealed jar.

YOGURT

Yogurt starter cultures can be purchased or some live yogurt can be used to make soya yogurt. The equipment required is a saucepan, a good thermometer, and a wide - necked Thermos flask or yogurt maker. Ensure the working area is clean and the equipment is sterilised in boiling water.

Bring the soya milk to the boil, remove from the heat and allow to cool to 40 degrees C (105F). Gently and thoroughly stir in the culture. Pour the yogurt into the Thermos flask or yogurt maker. The incubation time largely determines the thickness of the yogurt - the longer the thicker. The first batch may be rather thin, but as the culture is passed on from batch to batch the quality should improve. The culture should not need renewing for weeks or even months, but will need renewing as the old culture weakens. A sign of a weak culture is that the yogurt gradually becomes thinner from batch to batch.

SPROUTING SEEDS

Producing vegetable protein in the form of sprouting seeds has a number of advantages. The principal advantage is that seeds can be stored in a cool, dark, dry place for up to 5 years depending on species. For example, mung and soya beans will last up to about 4 years, and alfalfa up to 2 years, but for any seed viability will gradually decrease over time. They can be grown all year round and do not need light. The home production of sprouting seeds saves money, and they are absolutely fresh.

Sprouting seeds are a tasty and versatile food in that they can be eaten raw in sandwiches and salads and some, such as mung beans can be cooked. They are inexpensive and easy to produce. Most whole beans or peas such as chick and garden peas, whole lentils and grains, such as barley will germinate to produce edible sprouts. Runner and kidney beans are regarded as being toxic unless cooked for at least 10 minutes. **IF IN ANY DOUBT DO NOT EAT ANY RAW BEANS, SPROUTED OR NOT.** Sprouting seeds are an excellent source of protein, vitamins and minerals.

It is best to sprout seeds at a temperature of 18 to 21 degrees C (65 to 70F). If the larger seeds such as mung are soaked for about 12 hours, and smaller ones such as alfalfa for about 6 hours, most will be ready to eat in 4 to 6 days at the above temperatures. The simplest way to grow them is to place the seeds in a jar, fit a piece of muslin or similar over the top and secure with a rubber band. Soak for the appropriate time, drain, rinse with fresh water and drain again. Rinse and drain daily (twice daily if very warm) until ready, then use within 36 hours. Bear in mind that the seeds will expand some 4 to 10 times their original volume. A rotation with a number of jars could be started to provide a constant supply.

ALFALFA - These are the most nutritious sprouting seeds that can be eaten raw. They contain about 35% protein, vitamins A, B complex, C, D, E, G, K, and U. Essential vitamin B12 is rarely found in vegetables, but is present in alfalfa. Its mineral content includes calcium, phosphorous, iron, magnesium and sodium.

MUNG BEANS - Mung bean sprouts (as found in Chinese cuisine) contain some 35% protein, and vitamins B and C. These can be eaten cooked or raw. They seem to be more productive than most sprouting seeds for a given weight of seeds.

FENUGREEK - These contain 25% protein, vitamins A, C and D, plus iron. They make a tasty addition to soups and stews.

ADZUKI - Adzuki sprouts contain about 25% protein with vitamins B and C and can be eaten raw or cooked.

MUSTARD AND CRESS - These can be grown at any time of year on a windowsill but not in direct sunlight. It is best to grow them at a temperature of 15 to 21 degrees C (60 to 70 F). Growing them is a good way to introduce children to growing plants. It is best to grow mustard and cress separately, as cress takes some 3 to 4 days longer to grow than mustard. They can be grown in a used margarine or similar container. Place a few layers of newspaper in the bottom of the container and sprinkle the seeds evenly on top. Cover the container until the seeds have germinated. Harvest when the seedlings are about 50mm (2 inches) high. If kept moist more will appear from slower germinating seeds, but in practice only amounts to some 10 to 20% extra. It is important not to allow the plants to dry out at any time.

APPENDIX - SOYA BEAN CULTIVATION IN THE U.K.

Having read about the cultivation of soya beans in "The Soybean Grow and Cook Book" by Ray Whisker and Pamela Dixon, it was decided to experiment with growing them. The book describes Mr. Whisker's extensive work with soya beans in Surrey. By crossbreeding, he has produced a strain suitable for growing in the U.K. This is to be encouraged as it would make the U.K. more independent in terms of food production. In addition natural habitats are being destroyed and cleared for the cultivation of soya beans in some countries.

According to Mr. Whisker's book soya beans will grow in poor soil, and are fairly pest-resistant. The main challenge of cultivating soya in this country is the unreliable climate and the highly variable daylength over the seasons at our latitude of around 52 degrees. Soya is normally grown in a warm climate at some 30 to 40 degrees latitude. He stresses that the yield will not be as prolific as that typically obtained from peas and runner beans, but the quality will be very high. Producing food from plants is far more efficient in terms of resource usage per unit weight than raising livestock.

Soya seeds (variety Fiskeby V) were obtained from Ryton Organic Gardens in Warwickshire and a number were germinated. Six of the most vigorous sprouts were planted in sterilised compost in 75mm (3 inch) pots in a cold frame. Nine days later the seedlings were hardened off (gradually acclimatised to outdoor conditions) and planted out in early June. At the end of June the young plants were very healthy and seemed pest-free. Towards the end of the Summer the plants seemed to be struggling although they appeared to be pest-free. The beans were harvested in mid-October, the average yield being an average of 2.5 beans per pod and 38 pods per plant.

The yield wasn't as good as hoped, although it was a good growing season. Moving to another part of the country prevented me from trying again.