Methods for Making Natto in North America

There are various methods for making natto, but the method here will focus on the one that uses natto bacteria (***bacillus natto***) for the people in Canada and the United States. It is essential to sterilize the utensils being used to make natto to reduce the chance of contamination by harmful germs as well as to maintain a temperature of approximately 40°C (104°F) for successful fermentation of natto. So the large ovens built into most of the North American homes are ideal to satisfy those two requirements.

On the other hand, an oven is just used as a "box" during the fermentation period. As long as you can maintain the temperature between 37°C (99°F) and 42°C (108°F) you can use any method such as a "cooler box" kept warm with a few water or soft drink bottles filled with hot water. One lady told me she has a good result using a jaccuzi (hot tub) to keep natto warm. If we can disregard the wastefulness of energy, this seems to be a fine idea.

I recommend you to use the spores of bacillus natto instead of a commercial package of natto as the source of natto bacteria since using bacillus natto spores is more economical and runs lower risk of contamination by harmful microbes. Some of the commercially produced natto may have been partially sterilized to reduce the aroma and stickiness of natto, thus making it questionable as a source of bacillus natto. You can obtain bacillus natto spores from several vendors in Japan. The spores can be kept in a refrigerator for a long time. **If you are going to use commercially-produced natto instead of natto bacteria, substitute 0.1g of natto bacteria with one pack of natto in the recipe bellow.** Some people have had good results with this method.

If you have never eaten natto before, but would like to try it for mostly health reasons, I would recommend you to try commercially made natto first. Natto is like a kind of cheese with strong smell. Some love it and others cannot stand it. You will need acquired taste for natto. Please refer to the recipe page for how to eat natto. Once you are sure you like to eat natto everyday, you may want to start making it. That way you will not waste something you cannot eat. More importantly you will know what good natto is when you start making it.

Ingredients (makes 1.2kg of natto**):**

- 500g soybeans (Smaller their size the better as the natto fermentation will permeate to the center of beans.)
- 0.1g Bacillus Natto bacteria
- 1/4 teaspoon salt (natural salt, if possible) A little salt increases stickiness and improves the flavour.
- 1/2 teaspoon sugar (brown sugar or molasses, if possible) Sugar aids the activation of natto bacteria spores and will help fermentation.

Utensils:

- One bowl to immerse soybeans
- One sieve to drain soybeans
- On steamer (You can boil soy beans instead of steaming, but the nutrition and flavour will escape, and the natto may become soggy.)
- Two casserole pans, about 25cm in diameter and 5cm deep
- Two sheets of aluminum foil (should be large enough to cover the casserole pans)
- Two soup plates to hold water, 20 - 30cm in diameter
- One thermometer
- One family-sized oven
- One work lamp or lamp stand without its shade (This is not absolutely necessary. You may just use the built-in oven lamp, but the heat may not be evenly distributed throughout the oven unless the heat source is placed at the bottom of the oven.)
- On each of 40W and 60W light bulb
- One each of heat-resistant cup, teaspoon and spatula
- One pair of rubber gloves (should be used as much as possible to prevent food poisoning.)

Preparation Method:

1.Wash 500g of soybeans thoroughly, and soak them in more than three times as much water.

The amount of time to soak soybeans is twelve hours in the summer and 20 hours in the winter, but in the case of North American central heating, 12 hours may be sufficient even in the winter.

One of my friends suggested when the surface of water becomes partly bubbly due to germination, enough soaking is done. This seems to be a good indicator.

Make sure to soak soy beans well.

2.When the soybeans have absorbed enough water and swollen to twice their dry size, put them into the large steamer pot and steam them for 6 hours.

If you have a pressure cooker it takes only 15 minutes to seam the soybeans. So you might want to invest in one if you make natto regularly.

The soybeans are finished steaming when a bean can be easily mashed between your tong and palate of your mouth.

Make sure that cooked soy beans are soft enough otherwise natto bacteria cannot penetrate to the center of the beans.

3. Two hours before the soybeans are finished steaming, cover the casserole pans with the sheets of aluminum foil, make air holes with a pointed object, such as a chopstick, and place them on the top oven rack.

Half fill the the soup plates with water, and place them on the middle oven rack. The water in the plates will keep the natto from drying out.

Also put the heat-resistant cup and teaspoon. Heat the oven to around 120°C (250°F) to sterilize the utensils.

When the oven has been adequately heated, turn off the switch and allow it to cool naturally.

Before using the rubber gloves to mix the natto, disinfect them in hot water.

Make sure to sterilize everything you use to prevent food poisoning.

Work quickly from this point on to prevent introduction of harmful bacteria into your natto.

4. When the you have finished steaming soybeans, strain out the water by keeping the lid in place while tipping the steamer.

5. Remove the lid and the steamer, leaving the soybeans in the pot. Put the lit back quickly to avoid contaminating the soybeans and losing heat.

6. Pour 20ml of pre-boiled water into a cup, and mix in salt, sugar and 0.1g of natto bacteria (See the note bellow in this section). Natto bacteria spores are very resistant to heat. It will take one hour at 140°C (284°F) to kill all the natto bacteria. But make sure the water temperature is bellow 80°C (176°F).

Also, if it is hard to handle the small volume of 20ml of pre-boiled water, increase the amount to two to three times. The amount of water will also affect the stickiness and sogginess of natto as well. So please experiment with it.

Instead of boiled water you may want to use the strained water at the step No. 4. Nutrients in the strained water makes the fermentation more vigorous, but if too much strained water is used, the taste of natto may become slightly bitter.

The photo is a 3g package from Takahashi Yuzo Research Facility. With this small package, 30kg of natto can be made.

It comes with a tiny spoon to measure the bacillus natto. The spoon-full of natto bacteria will give you 0.1g.

When you have become accustomed to this preparation method, you will be able to make good natto with even a smaller amount of natto bacteria.

7. Remove the lid from the pot, sprinkle the solution of salt, sugar and natto bacteria over the soybeans, and stir so that the natto bacteria will be evenly distributed.

Make sure to mix steamed soybeans with natto bacteria solution very well, but do it quickly to avoid losing heat and introducing harmful microbes into your natto.

8. Take the aluminum foil off the casserole pans and spread the soybeans to a 2-3cm thick layer. (Ideally there should be no more than three layers of soybeans.) Put the aluminum covers back on again.

The beans are covered with aluminum foil, but if there is not enough air circulation, natto may become bitter. With too much air circulation, its surface may become dry.

9. Make sure the oven is turned off first. Then put the aluminum foil-covered pans on the top oven rack. The soup plates half-filled with water should be left on the middle rack. The water should have cooled down to around 40°C (104°F).

Place the work lamp, fitted with a 40W bulb, in the lower part of the oven. You may use the built-in light in the oven instead. In the picture shown right, it is located in the upper left corner of the oven. However it may not warm the oven evenly.

You can substitute the work lamp with a small desk lamp stand as long as it goes into the oven.

Place the thermometer on the upper rack and close the door.

10. Check the temperature after a few hours. In order to keep the temperature between 37°C (99°F)

and 42°C (108°F) , you may have to swap the light bulbs with different wattage, or you may need to keep the oven door propped open a crack. After a few adjustments it will become easier to maintain the proper temperature that is between 37°C (99°F) and 42°C (108°F). Keep the temperature for 20 to 24 hours.

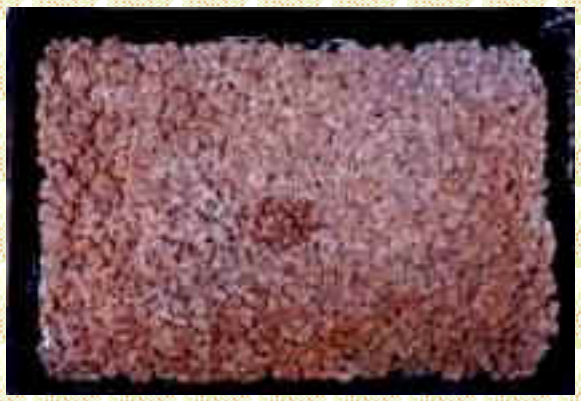
Make sure to keep the temperature between 37°C (99°F) and 42°C (108°F) for 20 to 24 hours.

11. After 20 to 24 hours at between 37°C (99°F) and 42°C (108°F), turn off the lamp, and wait a few hours until the natto becomes cool, stopping the fermentation.

When the aluminum foil is removed, you may see some white "frost" on the surface of soybeans. And the kitchen will be full of the aroma of natto. Some smell of ammonia is normal, but if it is too strong, undesirable germs may have flourished.

Note: if you would prefer well fermented natto, you might want to leave natto in the oven for up to 24 hours after turning off the lamp. If you do, do not remove the aluminum foil. Since leaving food at the room temperature for prolonged time increases a chance of food poisoning, avoid disturbing the oven and its contents.

The two photos to the right were taken at on a separate occasion. The natto is very sensitive to air circulation, temperature and moisture. So this can cause differences in the outcome of the fermentation. Observe the outcome of your natto making, and make adjustments when you make natto the next time.



12. Keep the natto in the refrigerator for a few days to one week for aging. It will develop a nice stringiness and richer taste.

If it is left for a long period even in the refrigerator, too much amino acids will crystallize, creating sandy texture. So after aging natto in the fridge , store it into several smaller packages, and freeze them.

Making natto is easy and fun. I hope you enjoy it.

About aging: An enzyme called protease is created in the process of natto bacteria fermentation. At around 0°C (32°F), natto bacteria form spores and becomes dormant, but the protease keeps breaking down soybean protein to amino acid. So keeping newly fermented natto at around 0°C (32°F) will age natto and give it a richer taste.

Note: If the natto fermentation is not successful, the finished natto may not be sticky enough, may not be stringy, or may be bitter or have strong smell of ammonia. On the other hand, white "frost" on the surface of natto as well as its stickiness does not guarantee the successful fermentation. Let's be careful about being sanitary when making natto so as not to introduce undesirable germs that contaminate natto.

Common Problems Q&A

Q: My natto is not sticky and does not much taste like natto.

Experiment with amount and type of sugar in the natto microbe solution. Sugar, a simple carbohydrate, is "baby food" for bacillus natto waking up from sleep. The more sugar you add, the better the natto fermentation, but the sweeter it becomes if it is too much. You might want to experiment with other types of sugar such as brown sugar and molasses. Salt seems to affect fermentation as well. Also experiment with amount of water in the solution. Too little water hinders the fermentation, but too much of it makes your natto soggy. Instead of boiled water you may want to use the strained water at the end of steaming beans. You might want to try a longer fermentation time

or leaving freshly fermented natto in the oven for up to a day. (Refer to the note at step 11.) Aging also helps.

Q: I cannot buy natto bacillus. Is there any other way?


Some people just use commercially available frozen or refrigerated natto as the source of bacillus natto. If one brand does not work, try another as they might use different variety of natto bacillus. I would suggest you to use a fresh pack of natto every time instead of reusing your fermented natto as the source of the bacillus natto to avoid contamination. In the long run, however using bacillus natto spores is cheaper and more reliable.

Q: Where can I buy commercially produced natto?


Most of the Japanese and many of Asian grocery stores sell frozen or refrigerated natto in convenient small packages for a couple dollars. You might want to try those commercially produced natto first so that you can check the quality of your natto against it. The people who want to try natto are usually motivated by their health reasons. But natto, like some kinds of cheese, needs acquired taste. Quite a few Japanese people cannot stand its smell and slimy texture. So you might want to try it first with a few commercial packages before committing to it.

Q: Can I just take natto bacillus instead of natto for health benefit?


Yes and no. Some research indicates natto bacillus becomes active in our digestive system and produce vitamin K2 and possibly some other nutrients and enzymes, too. However it might depend upon what kind of food you eat and what kind of intestinal flora you have. Natto on the other hand has full of nutrients and propagated bacillus natto. Besides taking bacillus natto itself could be quite expensive.

Disclaimer: As making natto involves food processing, there is a chance of food poisoning. Even at the best care it might happen. The information contained in this web site is accurate to the best of my knowledge. However there is no guarantee to its accuracy. The reported health benefits might not apply to you as well. Please make a good use of the information on this web at your own risk.

Happy natto making and enjoy your natto!
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This natto homepage is mainly composed of information available on the internet. I appreciate the efforts of these predecessors who published it. I also received some help from Takahashi Yuzo Research Facility. I would like to thank the staff for their help.