Natto feijão de soja fermentado com Bacillus subtilis, proveniente do Japão

Nattō

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Nattō (なっとう or 納豆?) is a traditional Japanese food made from soybeans fermented with Bacillus subtilis. It is popular especially as a breakfast food. As a rich source of protein, nattō and the soybean paste miso formed a vital source of nutrition in feudal Japan. Nattō can be an acquired taste because of its powerful smell, strong flavor, and slippery texture. In Japan nattō is most popular in the eastern regions, including Kantō, Tōhoku, and Hokkaido.

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[edit] History
Sources differ about the earliest origin of nattō. The materials and tools needed to produce nattō have been commonly available in Japan since ancient times; one source \[citation needed\] puts the first use of nattō in the **Jōmon period** (10,000–300 BC). According to other sources \[citation needed\] the product may have originated in **China** during the **Zhou Dynasty** (1134–246 BC). There is also the story about **Minamoto no Yoshiie** who was on a battle campaign in northeastern Japan between 1086 and 1088 when one day they were attacked while boiling soybeans for their horses. They hurriedly packed up the beans, and did not open the straw bags until a few days later, by which time the beans had fermented. The soldiers ate it anyway, and liked the taste, so they offered some to Yoshiie, who also liked the taste. A third source places the origin of nattō more recently, in the **Edo period** (1603–1867). \[citation needed\] It is even possible that the product was discovered independently at different times.

One significant change in the production of nattō happened in the **Taishō period** (1912–1926), when researchers discovered a way to produce a nattō **starter culture** containing **Bacillus natto** without the need for straw. This simplified production and permitted more consistency.

[edit] Appearance and consumption

[Image 85x347 to 250x488] Opening and stirring a container of nattō

The first thing noticed after opening a pack of nattō is its distinctive smell, somewhat akin to a pungent cheese. Stirring the nattō produces lots of sticky **gossamer**-like strings. The nattō strings themselves are often described by the Japanese **ideophone** **nebaneba**, which roughly translates as 'viscid' or 'gooey'. The flavor of nattō is nutty, savory, and slightly salty.

Nattō is commonly eaten at breakfast to accompany rice, possibly with soy sauce, **tsuyu** broth, **mustard**, **scallions**, grated **daikon**, **okra**, or a raw egg. In Hokkaidō and northern Tohoku region, some people dust nattō with sugar. Nattō is commonly used in other foods, such as nattō sushi, nattō toast, in **miso soup**, tamagoyaki, salad, as an ingredient in **okonomiyaki**, or even with spaghetti or as fried nattō. A dried form of nattō, having little odor or sliminess, can be eaten as a nutritious snack. There is even nattō **ice cream**[^2]. Soybeans are sometimes crushed and fermented. This is called Hikiwarinattō. It is a food that is easy to digest.
The flavor of nattō can differ greatly between people; some find it tastes strong and cheesy and may use it in small amounts to flavor rice or noodles, while others find it tastes bland and unremarkable, requiring the addition of flavoring condiments such as mustard and soy sauce. Many non-Japanese find the taste unpleasant and smelly, while others relish it as a delicacy. Some manufacturers produce an odorless or low-odor nattō. The split opinion about its appearance and taste might be compared to Vegemite in Australia, blue cheese in France, surströmming in Sweden, lutefisk in Norway and Sweden, mämmi in Finland and Marmite in New Zealand, South Africa and the UK. Even in Japan, nattō is more popular in some areas than in others. Nattō is known to be popular in the eastern Kantō region (Tokyo), but less popular in Kansai (Osaka, Kobe). 236,000 tons of nattō are consumed in Japan each year.

[edit] Production process

Nattō is made from soybeans, typically nattō soybeans. Smaller beans are preferred, as the fermentation process will be able to reach the center of the bean more easily. The beans are washed and soaked in water for 12 to 20 hours to increase their size. Next, the soybeans are steamed for 6 hours, although a pressure cooker can be used to reduce the time. The beans are mixed with the bacterium Bacillus subtilis natto, known as nattō-kin in Japanese. From this point on, care has to be taken to keep the ingredients away from impurities and other bacteria. The mixture is fermented at 40 °C for up to 24 hours. Afterwards the nattō is cooled, then aged in a refrigerator for up to one week to allow the development of stringiness. During the aging, at a temperature of about 0 °C, the bacilli develop spores, and enzymatic peptidases break down the soybean protein into its constituent amino acids.

Historically, nattō was made by storing the steamed soybeans in rice straw, which naturally contains B. subtilis natto. The soybeans were packed in straw and left to
ferment. The fermentation was done while the beans were buried underground underneath a fire or stored in a warm place in the house, for example under the kotatsu.

Regardless of the process, Japanese manufacturers need permission from prefecture based on food sanitation law. [citation needed] Most of the natto on sale is made of *B. subtilis natto* as seed germ that is cultivated in pure culture. [citation needed]

**End product**

Today's mass-produced nattō is sold in small polystyrene containers. A typical package contains two, three or occasionally four containers, each 40 to 50 g. One container typically complements a small bowl of rice. It usually includes a small packet of soy sauce and another packet of karashi, a type of mustard. Other flavors, such as shiso, are available.

Mito City and Kumamoto Prefecture are major nattō-producing areas.

Outside Japan nattō is sometimes sold frozen and must be thawed before consumption.

To make nattō at home you need a bacterial culture of *B. subtilis*. *B. subtilis* nattō is weak in lactic acid. It is important to prevent lactic acid bacteria from breeding. Some *B. subtilis* nattō which are more odorless are usually inactive, so, there are possibilities that minor germs will breed. Bacteriophage is *B. subtilis*'s enemy. After bacteriophage has acted minor germs may breed, particularly in boiled soy beans.

**Medical benefits**

The Japanese media frequently claim, especially in television shows for health-concerned viewers, that nattō is health-enhancing and that these claims are backed by medical research.
One example is pyrazine: Pyrazine is a compound that, in addition to giving natto its distinct smell, reduces the likelihood of blood clotting. It also contains a serine protease type enzyme called nattokinase, which may also reduce blood clotting both by direct fibrinolysis of clots, and inhibition of the plasma protein plasminogen activator inhibitor 1. This may help to avoid thrombosis, as for example in heart attacks, pulmonary embolism, or strokes.

An extract from natto containing nattokinase is available as a dietary supplement. Studies have shown that oral administration of nattokinase in enteric capsules leads to a mild enhancement of fibrinolytic activity in rats and dogs. It is, therefore, plausible to hypothesize that nattokinase might reduce blood clots in humans—although clinical trials have not been conducted. Another study suggests the FAS in natto is the substance which initiates fibrinolysis of clots, which accelerates the activity of not only nattokinase but urokinase.

A 2009 study in Taiwan indicated that the nattokinase in natto has the ability to degrade amyloid fibrils, suggesting that it might be a preventative or a treatment for amyloid-type diseases such as Alzheimer's.

Natto contains large amounts of vitamin K, which is involved in the formation of calcium-binding groups in proteins, assisting the formation of bone and preventing osteoporosis. Vitamin K1 is found naturally in seaweed, liver, and some vegetables, while vitamin K2 (Menatetrenone) is found in fermented food products such as cheese, miso, and Natto. Natto has large amounts of vitamin K2, approximately 870 micrograms per 100 grams of natto.

According to a study, fermented soybeans, such as natto, contain vitamin PQQ, which is important for the skin. PQQ in human tissues is derived mainly from diet.

According to recent studies, polyamine suppresses excessive immune reactions, and natto has a much larger amount of it than any other food. Dietary supplements containing the substances extracted from natto such as polyamine, nattokinase, FAS and vitamin K2 are available.

Natto contains chemicals alleged to prevent cancer, for example, daidzein, genistein, isoflavone, phytoestrogen, and the chemical element selenium. However, most of these chemicals can also be found in other soybean products, and their effect on cancer prevention is uncertain.

Recent studies show natto may have a cholesterol-lowering effect.

Natto is said to have an antibiotic effect, and its use as medicine against dysentery was researched by the Imperial Japanese Navy before World War II.

Natto is claimed to prevent obesity, possibly because of its low calorie content of approximately 90 calories per 7–8 grams of protein in an average serving. Unverified claims include improved digestion, reduced effects of aging, and the reversal of hair loss in men due to its phytoestrogen content, which can affect testosterone associated with baldness. These conjectured physiological effects of eating
Natto are based on biochemically active contents of natto, and have not been confirmed by human study.

Natto is also sometimes used as an ingredient of pet food, and it is claimed that this improves the health of the pets.[1]

**Similar foods**

Many countries produce similar traditional soybean foods fermented with *Bacillus subtilis*, such as shuidōuchi (水豆豉) of China, cheonggukjang (청국장) of Korea, thuanao of Thailand, kinema of Nepal and the Himalayan regions of West Bengal and Sikkim, India.[12] In addition certain West African bean products are fermented with the bacillus, including dawadawa, sumbala, and iru, made from néré seeds or soybeans, and ogiri, made from sesame or melon seeds.

Methods of eating natto differs from region to region and many ways are resisted. Natto is eaten with rice, with curry, Chinese noodles, Japanese style pasta, and tempura.[citation needed]

**Natto dishes**

Salted natto is a local dish in the Kouchi prefecture of Japan. Natto is sprinkled with salt, and roasted "nuka" (powdered rice bran) is added in the pan. In the traditional recipe, the natto soybeans are steamed with "momigara" (rice bran).

Stamina natto is natto is mixed with minced chicken, then stir-fried in sesame oil, ginger, and garlic. Tabasco is added as a "secret ingredient." It is offered with the school lunch in the Tottori prefecture of central Japan.

Natto Ae is natto is mixed with cheese, soy sauce, parsley and sugar. It is offered with the school lunch in the city of Toyota in the Aichi prefecture of Japan.

Sakura natto is natto with horse meat.[13]

In the *Iron Chef* episode which featured challenger Tatsutoshi Kumamoto vs. Iron Chef Masaharu Morimoto, natto, the theme ingredient, was used in many creative ways including abalone stew, natto sausage and in a cola flavoured dessert.[14]

**Gallery**

A natto bean-size legend using beans before fermentation in a supermarket
Natto being stirred with chopsticks

*Nattō gunkan maki* (Nattō *sushi*)

Nattō wrapped in rice straw, old style nattō package

[edit] See also

- [Japanese cuisine](#)

Other fermented soyfoods include [soy sauce](#), Japanese [miso](#), Chinese [dòuchǐ](#) (fermented black soybeans), fermented tofu and (a subcategory) *chòu dòufu* (stinky tofu), Korean [doenjang](#) and [cheonggukjang](#), Nepalese [kinema](#), and Indonesian [tempeh](#) and [oncom](#).

- [Fermented bean paste](#)

Note that [amanattō](#) is not nattō but, rather, beans sweetened with sugar.

[edit] References


6. ^ Soy Product Fights Abnormal Protein in Alzheimer's Disease


http://chieflfgameshow.homestead.com/files/icepsnz.htm#natto