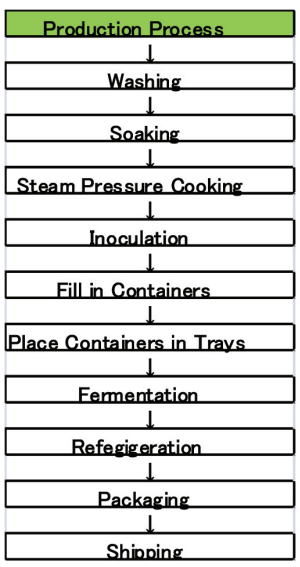
Natto—
Traditional Japanese Health Food
日本の伝統的健康食ー納豆

Series 3: Manufacture of *Natto* Fermented Soybeans
第 3 回　納豆の製造

First, soybeans are chosen, sorted by shape, color and size depending on the uses of the soybeans, such as for the production of tofu made from soybeans, soymilk, miso or soy sauce, and in addition it is determined the best use for them due to their quality. Compared to the soybeans in things like tofu and *miso* which are pulverized, attention must be paid to the shape of the kernels used for *natto* and extra care is taken in their cultivation and sorting. At the present time, practically all of the soybeans used in *natto* are specially cultivated exclusively for that use. On a yearly basis, the soybeans that are used for food amount to approximately 956,000 metric tons (as of research for the year 2007), while within that amount, approximately 14% or 135,000 metric tons are consumed as *natto* (tofu 53%, *miso* 15%, soy sauce 4% and other uses 14%). Surprisingly, 76% of the total amount consumed are soybeans produced in the United States. (Canadian produced are 21% and that produced in Japan is 8%.) It is to be found particularly in such states in the northern part of America as North Dakota, Minnesota and Ohio that many farmers cultivate soybeans under contract for use as soybeans in *natto*.

Well then, as for the manufacturing process for *natto*, the soybeans that have been selected are first washed in water. Next, they are soaked for a night. Soybeans used for *natto* are boiled and then fermented using *natto* bacteria that has been cultivated. In order to manufacture *natto*, it is necessary that the soybeans absorb enough water so that they are in a condition where they can easily incorporate the *natto* bacteria. The time needed for absorption is also dependent on the temperature of the water.

<Production Process diagram>



Next, the condition of the water content of the soybeans is determined, and pressurized steam cooking is performed (steam pressure cooking). The steaming changes the character of the soybeans, and is a necessary preparation so that the *natto* bacteria for the fermentation is easily absorbed. After steaming, natto bacteria in a thin liquid is uniformly sprayed on the surface of the soybeans (inoculation). At the present time in Japan, the *natto* bacteria that is on sale is isolated from things such as rice chaff and soil from all over the entire country. For *natto*, the flavor is good and it is sold with strong fiber that is purely cultivated.

The soybeans that are inculcated with the *natto* bacteria are immediately packed into containers and placed on trays before being transferred to fermenting rooms. Perhaps the reader will think it strange the kind of containers that the sticky natto is packed into, but actually before the *natto* bacteria multiplies, it ferments in small portions placed in containers. The soybeans that are placed in the fermentation rooms where the temperature is maintained at the proper degree to ensure the propagation of the *natto* bacteria, close to between 40°C and 50°C.The fermentation that takes place on the surface of the soybeans breaks down the nutrients finely. If the fermentation process continues too long, ammonia is produced, so after the passage of approximately 20 hours to 24 hours, the temperature of the fermentation room is lowered so that it is below that required for the *natto* bacteria to propagate. The next day, the soybeans are transferred to a refrigerated room with a temperature that is maintained below 5°C. With the fermentation halted, the *natto* is left to mature. After the fermentation room treatment and the fermenting is complete, it is now at the distribution stage, and the temperature is controlled so as to achieve the proper fermentation and delicious *natto* is produced that does not have any unpleasant odor.

まず、大豆選びですが、納豆用の大豆は豆腐、豆乳、味噌、醤油と違い、粒形・色・大きさが揃ったものを選別し、かつ比較的糖質の高いものを使用します。豆腐・味噌などは大豆を磨り潰すのに対して、納豆は粒の形状を気にするので、その栽培と選別には気を使います。現在ではほとんどの納豆は納豆用に特別栽培された専用の大豆を使用しています。日本における食品用としての大豆消費は年間約 956,000MT（2007 年度調べ）で、そのうち約 14% の 135,000MT が納豆用として消費され（豆腐 53%、味噌 15%、醤油 4%、その他 14%）、全体消費量の 76% は驚くことに米国産大豆です。（カナダ産 21%、日本産 8%）特に米国北部のノースダコタ、ミネソタ、オハイオ州などの多くの農家で納豆用大豆の契約栽培を見かけます。

さて、納豆の製造過程ですが、選ばれた大豆はまず水で洗浄されます。次に一晩水に浸しておきます。納豆は大豆の煮豆に納豆菌が繁殖し発酵したものですから、納豆製造のためには納豆菌が大豆成分を吸収しやすい状態にするため、まず水に十分に浸漬し水分を吸収させる必要があります。浸漬時間は浸す水の温度にもよります。

次に豆の水分状態を判断しながら、圧力をかけ蒸気で蒸していきます（圧力蒸煮）。蒸煮し大豆の成分を熱変形させ、納豆菌酵素による分解を受けやすい形に準備させていきます。蒸煮の後、納豆菌を薄めた液を大豆の表面にまんべんなく噴霧していくのですが、現在日本で販売されている納豆菌は、広く日本全体の稲わらや土壌などから分離され、納豆にして風味が良く、糸引きの強いものが純粋培養され、販売されています。

納豆菌を噴霧された大豆は、直ぐに容器に入れられ、トレイに載せられ発酵室に移されます。皆さんはあのネバネバした納豆をどのように容器に入れているのか不思議に思われたことがあると思いますが、実は納豆菌が繁殖する以前に小分けして容器の中で発酵させているのです。発酵室に入れられた大豆は、納豆菌の繁殖の最適温度である 40℃から 50℃近くまで温度を引き上げられ、体の外に酵素を出しながら大豆表面の養分を細かく分解して分裂していきます。あまり発酵を続けると、アンモニアを発生してしまうため、約 20 時間から 24 時間を経過した後、発酵室の温度を納豆菌の繁殖温度帯以下にし、翌日は冷蔵庫に移し 5℃以下で管理し、発酵を抑えいわゆる熟成をさせます。発酵室と発酵後、そしてその後の流通段階での温度管理が納豆の発酵度合いを左右し、変に臭みのない美味しい納豆に仕上げます。

Natto Dressing

Ingredients

(1.4 oz) cup of natto, chopped
3 tbsp soy sauce
3 tbsp rice wine vinegar
5 tbsp sesame seed oil
1 tbsp squeezed ginger juice (grate and squeeze ginger for juice)
2 tbsp white roasted sesame seeds

Preparation

Chop natto finely
In a bowl, combine soy sauce, rice wine vinegar and ginger juice
Slowly add sesame seed oil and combine everything well
Add sesame seeds