

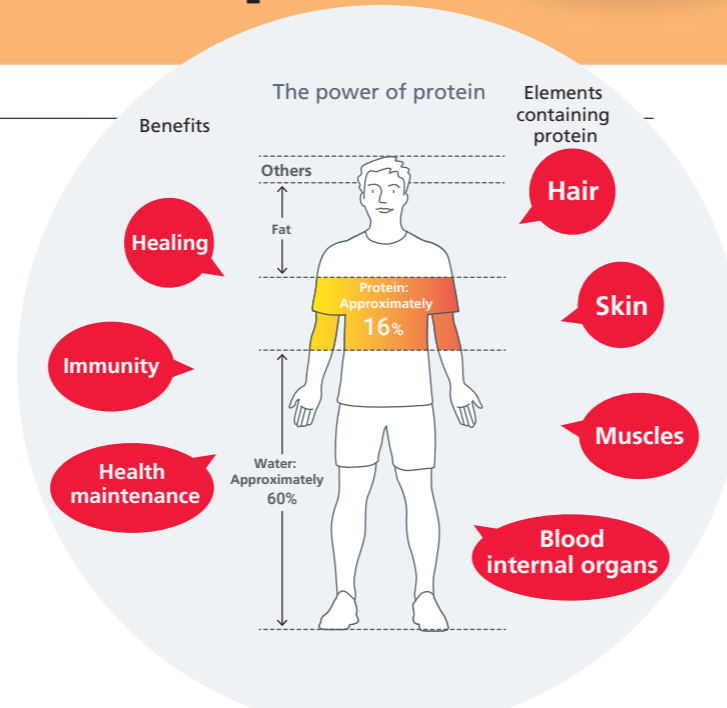
Protein and the NH Foods Group

1 Protein and physical health

Essential nutritional elements making up 20% of the human body

Proteins are substances created by linking together 20 types of amino acids. They are essential nutritional elements that make up approximately one-fifth of the human body. In such forms as cell components and collagen, proteins are building blocks for various parts of the body, including muscles, internal organs, skin, bones, and hair. Proteins are also essential for body growth and internal production of digestive enzymes and immunological substances, and hormones. Nine of the 20 types of amino acids cannot be produced internally and must be replenished through food in order for human beings to remain alive.

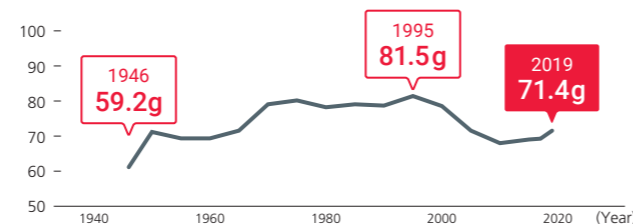
Proteins enhance the body's healing powers and immunity and stimulate the brain and other internal organs. They also help to maintain the body's balance and create a feeling of well-being. Proteins derived from animals in such forms as meat and milk are especially beneficial because of their well-balanced amino acid content.



Japanese protein intake increasing but still below target

The daily protein intake (total average) of Japanese people peaked at 81.5g per day in 1995. This level was maintained until 2000, but by 2019 it had fallen to 71.4g. According to the 2020 edition of the *Dietary Reference Intakes for Japanese* published by the Ministry of Health, Labour and Welfare, the recommended daily protein intake for people aged 18 and older is 65g for men and 50g for women. However, these are minimums, and the target amounts are higher. For example, men aged 18-29 should consume 86-133g, and women in the same age group 65-100g. There is growing interest in the role of protein intake in relation to health maintenance and enhancement.

Average daily protein intake (g)



A leading supplier of protein in Japan

The NH Foods Group was founded to manufacture ham and sausages from the bounties of nature. Since then, we have expanded our activities to include processed foods, processed marine products, lactic acid drinks, and dairy products. In the fresh meats category, we are able to supply high-quality products reliably from our own pig and chicken farming operations in Japan, as well as from our dependable partners in Japan and overseas. With a history of supplying protein in various forms for over 80 years, we are today one of Japan's leading suppliers of protein products.

	Protein intake (Per person per day)	NH Foods Group's share	Foods that include a well-balanced range of amino acids
Overall	71.4g	6.0%	Protein content (g/100g)
Animal protein	40.1g	10.6%	Beef 16.6g
Livestock-derived	27.9g	15.3%	Pork 15.6g
Meat	17.6g	23.5%	Chicken 20.7g
			Eggs 12.3g
			Milk 3.3g

* Estimated by NH Foods from internal product volume data and various external sources, including the nutrition chart published by the Ministry of Education, Culture, Sports, Science and Technology in 2019, and results from the National Health and Nutrition Survey conducted by the Ministry of Health, Labour and Welfare in 2019

2 Proteins and mental health

Scientists believe that neurotransmitters play an integral role in mental health. Because all 20 amino acids are needed to synthesize neurotransmitters, doctors recommend that people should combine an adequate protein intake with regular exercise. The Lifestyle Research Office of NH Foods monitors awareness and perceptions of the link between proteins and mental health through the Protein Intake

Top three foods preferred by people wishing to restore their physical and mental energy when tired

1st Meat 61.1% 2nd Confectionery, ice cream 48.3% 3rd Fruit 36.8%

* Extracted from results of the Protein Intake Survey Survey period: May 31-June 7, 2023 Participants: General monitors (n = 683) <https://www.nipponham.co.jp/fun/report/>

Top three nutritional elements sought by people wishing to restore their physical and mental energy when tired

1st Proteins (48%) 2nd Vitamins 46.5% 3rd Amino acids 28.5%

3 Frailty and proteins

Frailty is a condition that occurs when aging causes a gradual decline in a person's physical functions until they approach the stage of requiring care. Measures to address this issue have become an urgent priority because of the likelihood of further demographic aging in Japan. A key preventive measure from a dietary viewpoint is to ensure that people have an adequate protein intake. One of the most important sources of protein is meat, but researchers report that people tend to eat less meat as they grow older. Adequate consumption of meat is seen as an effective way to prevent frailty. For example, meat contains imidazole dipeptide, which is reported to improve the extension strength of the knees and increase the time that people can stand on one leg with their eyes open.*1

The Group has studied the relationship between meat consumption and frailty-related factors in elderly people living in general communities*2. A detailed analysis of the data showed that walking speed rose in proportion to the amount of meat consumed.

*1 Source: Mikako Sato, Kimihiko Maemura, Yoshihisa Takahata, Fumiki Morimatsu, Yuji Sato, [The Effect of Chicken Extract Consumption on Muscle Strength in Middle-aged and Elderly People], Journal of the Japanese Society for Food Science and Technology 59, 4, 182-185, 2012

*2 Elderly people not living in rest homes or hospitals

Industry-academia cooperation

NH Foods, Kansai Medical University, Heiwado Co., Ltd., and Koga Software Inc. have signed an agreement to conduct a Social Awareness course and a joint scientific study of food, exercise, and health with the aim of developing a model for a healthy society based on a virtuous circle of food and exercise. Between March 31 and June 30, 2023, the participants developed a program to prevent frailty in old people and hosted seminars on health improvement methods with the potential to reduce physical age by five years.

Heiwado Co., Ltd. provided highly accessible spaces in its shopping centers. Kansai Medical University provided exercise advice based on scientific knowledge. NH Foods provided advice about healthy diets. Koga Software Inc. used its healthcare digital transformation technology to provide a frailty prevention program.



Please visit the following website for detailed information. (Japanese only)



Protein and the NH Foods Group

Challenges for the NH Foods Group

World population growth, climate change, and other problems are expected to result in protein shortages. The challenges for the Group are to procure and supply protein reliably, to expand the potential of protein from the bounties of nature, and to create and provide diverse options for its consumption.

Expanding the
potential of protein
as a bounty of
nature

The challenge of ensuring reliable supplies of protein

Challenge: Sustainable procurement

Development of a co-creation network

The Group produces and breeds cattle, pigs and chickens mainly in Japan, but we also have cattle breeding operations in Australia and chicken production and breeding operations in Turkey. Our natural capital includes 131 company-owned farms in Japan and 20 overseas. As reliable sources of fresh meats, the farms where we produce and breed livestock form the starting point for our supply chains. We will continue to engage in co-creation with diverse partners, including collaboration at their business sites in Japan and overseas, with the aim of strengthening our reliable supply structure and ensuring sustainable production.

Challenge: Development of future generations of livestock farmers

Training of the people needed to support the future of the livestock industry

Since 2018, the Group has been providing practical training and university lectures for teaching staff and students at the Obihiro University of Agriculture and Veterinary Medicine under a comprehensive collaboration agreement signed in December 2017. The aim of this program is to contribute to the training of future generations of farmers and the development of the livestock industry.

We are helping to achieve these goals by training livestock technicians who can work internationally, by providing practical educational programs for students, and by sharing information so that research findings can be used in society.



Challenge: Reduction of farmers' workloads

PIG LABO smart pig farming system

Japan's population decline is leading to increasingly serious labor shortages in the livestock industry. Pig rearing in particular involves many tasks that require experience, and the transfer of skills to future generations has become a major focus of concern. The NH Foods Group and the NTT DATA Group are addressing these issues through the joint development of PIG LABO, a pig rearing support system that utilizes AI and IoT technology. The system uses cameras and sensors placed in pig houses to monitor a variety of data related to pig rearing and can also make assessments of piglet health, estrus in sows, and other factors. In October 2022, the NH Foods Group commenced trial sales of PIG LABO Breeding Master, Japan's first AI-based estrus detection service. The launch of the service was preceded by a six-month trial program involving 900 sows. This resulted in a 1.4% improvement in the conception rate compared with assessments by human operators, and a 79% reduction in assessment workloads. By 2029 we aim to perfect a total support system covering all stages from care for breeding sows to piglet raising.

PIG LABO
smart pig farming system

Creating Diverse Protein Products

Challenge: Responding to demand for meat substitutes
NatuMeat series

As diets become more diverse, there is growing need for a wider selection of protein sources. The world market for soy protein is expected to reach ¥1.87 trillion by 2030^{*1}. The Japanese market for soy meat is expected to expand to ¥4 billion by fiscal 2025^{*2}.

The Group supplies products made from soybeans, which are known in Japan as *hatake no niku* ("meat from the soil"). Our extensive range of consumer and commercial soy meat products includes ham, sausages, hamburgers and other processed foods.

In March 2023 we expanded the lineup to eight products with the launch of *NATUMEAT Fishless Fried Fish Fillets* (Plant-based). This product was created by adding a seaweed-derived ingredient to soy meat (as of September 2023).



^{*1} Source: Kanto Regional Agricultural Administration Office website

^{*2} Source: Research by the JMA Research Institute Inc. (2021)

Challenge: Discovery of protein-rich foods

Research and product development focusing on the use of malt as a food ingredient

The Group began to explore the potential for the development of new products based on malt. Malt has traditionally been used in the production of fermented products, including uniquely Japanese products such as *miso*, *soy sauce*, and *sake*. It offers excellent nutritional value, including protein and fiber levels comparable to those of soybeans, which are known as "meat from the soil," and is seen as a potential solution to future shortages of protein.

Challenge: Creation of cellular foods

Research and product development relating to cellular (cultured) foods

In 2019, the NH Foods Group launched an R&D program focusing on the potential of cellular (cultured) foods as a reliable future source of animal protein.

In 2022, we succeeded in the development of a culture medium derived from food ingredients instead of blood serum. The discovery of a reliable, low-cost way to procure this essential material is an important step toward the realization of cellular foods.

Our R&D efforts are now focused on the development of production technology in preparation for large-scale culturing.

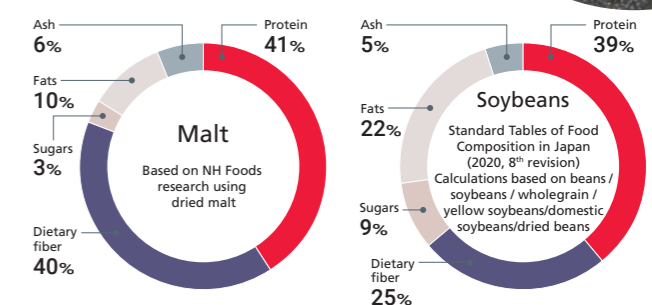
Please visit the following website for detailed information. (Japanese only)



Cell-based foods (cultured meat) produced from chicken tissue (35mm length x 25mm width x 5mm thickness)



Nutritional elements in malt and soybeans



Please visit the following website for detailed information. (Japanese only)

