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Nationwide Survey on Numbers of Wooden Barrels for Soy Sauce Production (FY2020[※])

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醤油製造用木桶保有数の全国調査 2020

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Summary

From 2019 to 2020, we conducted a questionnaire survey through the National Federation of Soy Sauce Industry Cooperatives and received responses from 459 soy sauce manufacturers. The results showed that 281 companies owned a total of 6,731 wooden barrels: 4,765 used for soy sauce production, 1,261 unused items, and 705 unusable items. (This is the translation of a paper originally published in Japanese in *Journal of Soy Sauce Research and Technology*, 47(3), 2021).

抄 録

2019–2020 年にかけて全国醤油工業協同組合連合会を通じてアンケート調査を実施し、醤油メーカー459社から回答を得た。その内281社が計6,731本(醤油製造に使用中4,765本, 不使用品1,261本, 使用不可納品705本)の木桶を保有していることがわかった。(本報告は『醤油の研究と技術』Vol.47, No.3, pp.141-150(2021)に掲載された論文を翻訳したものである)

INTRODUCTION

The 2013 registration of “Washoku, traditional dietary cultures of the Japanese, notably for the celebration of New Year” as UNESCO Intangible Cultural Heritage brought renewed attention to the features and uniqueness of Japan’s traditional food culture. Fermented seasonings such as soy sauce, miso, vinegar, and sake are particularly important elements of Japanese food culture.

Other Asian countries have their own salty seasonings made from soybeans and grains^{1,2}. Among them, while Japanese miso and soy sauce and Korean doenjang and ganjang, respectively, have similar

tastes and appearances, traditional production methods call for different raw materials and storage vessels. In Japan, koji is brewed in *kioke* wooden barrels, while in South Korea, *meju* is brewed in earthenware jars³.

In China and the Korean Peninsula, earthenware jars have been used in traditional production, with mass production achieved by increasing the number of jars. In contrast, in Japan, the sake and soy sauce brewing industries switched to large-capacity wooden barrels when they industrialized in the Edo period (1603-1867). Modernization of brewing equipment in the Taisho and Showa eras (1912–) that followed saw

Keywords: soy sauce, traditional wooden barrel, national survey

※ FY2020: Fermentation Year from April 2020 to March 2021

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conversion from wooden barrels to vessels made of other materials, resulting over time in a lack of coopers to make new wooden barrels. And now the craftsmanship behind repairing old wooden barrels is also in danger of disappearing.

In April 2006, a meeting on the theme “Thinking about *Oke* [barrels] Late in the Game” (sponsored by the Wooden Barrels Preparation Preservation Society) was held in Roppongi, Tokyo. According to the record on sake brewing, as of 2000, there were virtually no brewers using wooden barrels, but by 2006, about 30 brewers around Japan had revived wooden barrel brewing⁴⁾. Some brewers take a negative view of wooden barrels because of difficult hygiene management and strict guidelines from the public health center. Other brewers see value in terms of unique flavor that outweighs any disadvantages, and they feel there is great value in passing on traditional brewing techniques to future generations. Currently, many sake brewers use barrels for one of their products, and some breweries especially in the Tohoku region have declared that all their products will be brewed in wooden barrels in the future. The tradition of brewing sake in barrels escaped the danger of disappearance around the year 2000, and new paths are constantly being sought.

There is a marked culture of wooden barrel brewing in the miso and soy sauce industries compared to sake, vinegar, and mirin. The true picture of wooden barrel use in the miso industry is unclear and will be an issue for future research, but in the soy sauce industry, there are still some brewers who make all their products in wooden barrels. We even learned of a young brewer who launched afresh into wooden barrel brewing from a desire to revive fermenting the mash in-house. However, no statistical data exists on the numbers of wooden barrels used by soy sauce makers nationwide, and the ratio of soy sauce prepared in wooden barrels to total production is unknown. Many of the wooden barrels currently used for soy sauce production were made some time in the first half of the 20th century, and most are nearing their end given a typical lifespan of 50 to 100 years. As with

sake brewing, efforts in the next few decades will determine whether scenes of rows of wooden barrels in Japanese soy sauce breweries will disappear, or if changing their scale and shape may help them survive.

Previous studies have yielded insufficient objective data to support the presence of unique taste and aroma components and microbiological peculiarities in soy sauce prepared in wooden barrels. In addition, we are yet to find research on taste preferences nor an experimental study comparing samples with all conditions held constant and the only variable being wooden barrel usage. The reasons include the fact that soy sauce has local characteristics^{5),6)} and that uniform comparisons are complicated by the array of applications of soy sauce as a basic seasoning with suitability changing depending on, for example, whether it is used as a dipping sauce or in cooking to flavor simmered dishes. In addition, there are great variations in the age and application of wooden barrels and conditions of the brewery itself. Preferences as to koji making method, preparation method, naturally occurring yeast in the brewery, and fermentation and aging conditions, among many other factors, also differ from brewer to brewer. It is commercially difficult for brewers to obtain samples of soy sauce brewed in large wooden barrels in a warehouse and soy sauce produced to the same scale and under all the same conditions except in vessels made of fiber-reinforced plastic (FRP) or some other material in order to compare them.

As such, this research on wooden barrels does not question the superiority or inferiority or pros and cons of wooden barrel usage in fermentation. Rather its purpose is to gain an accurate picture of wooden barrel usage for preservation and succession of Japan’s unique food culture and traditional production methods. It is positioned as the starting point for continuous tracking of fluctuations in the numbers of wooden barrels.

In this study, we seek to clarify the number and location of wooden barrels for soy sauce production as of 2019-2020 and the intentions of soy sauce brewers

who own the barrels regarding future increases and decreases.

CHANGES IN WOODEN BARREL USAGE AND TRENDS IN THE NUMBERS OF COOPERS

Below is a description of the connection between wooden vessels and Japanese soy sauce making, focusing on trends related to the coopers who construct them.

Fermentation and brewing technology in Japan began with the introduction of a seasoning product called hishio from the continent during the Nara period (710-794) by the envoy to Sui dynasty China. This was followed by the development of Japan's unique techniques for koji-making with seed koji. Until the Kamakura period (1185-1333), earthenware jars were the main vessels for fermentation and brewing as in the continent, but a shift occurred when wooden barrels became popular from the late 16th century and remained so through the 19th century.

Japan has a high forest rate of 67% (as of March 2017), and techniques for wooden buildings and woodwork using cypress and cedar timber have been developed over a long time. The technology for wooden barrel making is thought to have been introduced from both the Asian continent and Europe⁷⁾.

Until the 16th century, sake made at temples in Nara was considered premium sake, and based on a description in the *Tamonin Diary* (Tamonin Nikki) handed down by monks at Kofukuji Temple in Nara, “the existence of 10-koku (1.8 kL) barrels can be confirmed as of 1582.”⁸⁾ In the 17th century, the sake brewing industry in Itami and Ikeda near Osaka developed in great part thanks to abundant local supply of high-quality Yoshino cedar which was made into giant barrels with 1.8 kiloliter capacity. These enabled efficient preparation of the mash, and when the sake was transported, “because it was done so in sake barrels made from highly esteemed Yoshino cedar, sake from Osaka earned great fame in Edo”⁸⁾. Pictures of barrel-prepared sake brewing in Itami from that time can be seen in *Fujimi Sake in Itami, Illustration of Famous Places in Settsu, Osaka Vol. 6*⁹⁾.

In the 17th and early 18th century, large volumes of wooden barrels were placed on cargo vessels named Higaki Kaisen and later Taru Kaisen carrying sake and soy sauce from Osaka to Edo. The size of wooden barrels increased, and it is thought that “the basic shape for the 30-koku (5.4kL) barrels we see today was established in Nada before the Kansei era (1789-1801)”⁷⁾.

The appearance of wooden barrels and tubs as familiar tools in daily living is illustrated in a record of the customs of the late Edo period called *Morisada Manko*¹⁰⁾ and in ukiyo-e woodblock prints. One of the most famous of these is *Thirty-six Views of Mount Fuji, Bishu Fujimigahara* by Katsushika Hokusai depicting a cooper scraping the inside of a series of staves constructed into a rounded wooden barrel. In 1877, shortly after Edo became known as Tokyo, coopers accounted for “694 out of a total of approximately 54,000 households”, or “more than 1% of all households”¹¹⁾ in Tokyo. This shows how familiar wooden barrels and tubs were until the Meiji era (1868-1912).

In sake brewing, the mash prepared in winter is pressed in the spring, after which the wooden barrel is thoroughly washed and sun-dried throughout the rainy season and summer, a scene depicted in *Meiji Era Brewery*⁷⁾. As sake is brewed with fresh water, a thorough washing and drying process is repeated to prevent contamination by germs and the growth of mold. Wooden barrels are typically used for about 20 to 30 years in sake brewing, after which they are usually sold to soy sauce breweries, miso breweries, and pickle makers.

In contrast, soy sauce mash is prepared with salt water and aged for at least one year in the wooden barrel. Preparing the next mash immediately after pressing allows brewers to shorten the period during which the barrel is empty. For this reason, wooden barrels used in soy sauce production are said to last for 100-150 years, with very old barrels still in use today. In the meantime, as the modernization of brewing equipment progressed in the first half of the 20th century, many wooden barrels were discarded

and replaced with concrete tanks, and from the 1960s onwards with vessels made from other materials such as enamel, FRP, and stainless steel^{12, 13}. In recent years, there have been examples of super-large wooden tanks in use, but they are technically different from traditional bamboo-hooped wooden barrels¹⁴.

Wooden barrel craftsmen began to disappear with the sharp decline in demand for new barrels and repairs, such that now, without continuous transmission of the craft, only one cooperage remains – a place in Sakai, Osaka that repairs and manufactures large scale barrels. For soy sauce brewers who prepare mash in wooden barrels, the loss of the craftsmen's skills poses a major issue for both repairing barrels that begin to leak and procuring new barrels.

As of 2020, there were five developments in the field of wooden barrel making and repairs.

First, Mr. Takeshi Ueshiba of Fujii Seiokejo, who for about 10 years has been described as the last cooper in Japan, declared that he will no longer produce new barrels once 2020 orders are completed. The move apparently spurred many brewers to order new barrels and request reassembly of large barrels. Although new barrels will no longer be made, the business will continue to offer repairs and guidance on maintenance through brewery visits. The use of existing wooden barrels for as long as possible will require the brewers themselves to assume and pass on repair techniques.

Second, concern about a lack of coopers to make new barrels in the future motivated a soy sauce brewer and a group of carpenters from Shodoshima, Kagawa Prefecture to start the “Kioke Craftsmen Revival Project” and become apprentices to Mr. Ueshiba. Since 2012, a public event has been held in January every year to showcase the making of new barrels, and a system is being established to enable production of up to a dozen or so new barrels of 10 to 20-koku capacity (1.8-3.6 kL) each year. Also attracting attention is a new “Kioke Fermentation Culture Summit” (commonly known as the Kioke Summit) which first convened in January 2020,

gathering fermentation and brewing related people, coopers, and consumers and media interested in wooden barrels from all over the country.

The third development is the activities of the “Yuimono-de-Tsunagu-kai” centered on young coopers who have gone independent from the Shodoshima initiative and started visiting breweries to make new barrels or re-tighten the bamboo hoops of existing ones.

Fourth, sake brewers in Akita and Fukushima prefectures maintain contact with the Shodoshima revival project while also training their own craftsmen and cooperating with local coopers. Preparations are under way to start a barrel production and repair system.

Finally, there is a movement to introduce a new type of vessel to be used as large water tanks. The new variety is bound with a metal belt, and the shape is straight from the top to bottom without the gentle taper found in traditional bamboo-hooped wooden barrels. In addition, the position of the bottom plate and the construction for connecting the side plates is different from the wooden barrels made by a traditional craftsman, and the capacity is very large at 1,000-koku (180 kL) or more.

Here, it is necessary to confirm the meaning of the term *kioke*, typically translated into English as “wooden barrel or tub”. The Japanese definition of *oke* or barrel is “a vessel made by arranging elongated plates vertically to make cylindrical siding, adding a base, and binding with hoops. Can also be made of metal. Mostly used to store liquids or make pickles.”¹⁵. When made of wood (*ki*), it is a *kioke* wooden barrel – a word that refers to a fairly wide range of wooden vessels from sushi tubs to bathtubs and even coffins. Going forward, it will be necessary to distinguish between different types of wooden vessels, but as we did not separate traditional bamboo-hooped wooden barrels and large wooden tanks for the questionnaire survey in this study, both are included in the results on number of items in possession.

As outlined above, no one knows exactly how many wooden barrels are currently used for soy sauce

production, how rapidly scrapping of the barrels will proceed, or whether new and recycled barrels can be introduced fast enough to keep pace with the number of discarded barrels. Understanding the trends in wooden barrels through information from related businesses will allow us to keep an ongoing record of the disappearance and revival of Japanese wooden barrel brewing culture.

This research constitutes one part of our food culture research aimed at creating a record connecting the past to the present and onto the future. We hope that by sharing this record with people concurrently engaged in soy sauce brewing and the fermentation and brewing industries, we can contribute to the protection and succession of the wooden barrel brewing culture – one aspect of Japanese food culture.

SURVEY METHOD

In August 2019, we requested the participation of soy sauce brewers nationwide in a questionnaire survey through the National Federation of Soy Sauce Industry Cooperatives, and responses were collected by fax or mail. In March 2020 and again in March 2021, we reconfirmed the number of wooden barrels in possession with brewers who answered they owned them as well as with brewers who did not respond in 2019, and tabulated the results.

The questions investigated the kind of fermented seasonings produced (soy sauce, miso, vinegar, mirin, sake, other (multiple choice); the number of wooden barrels owned, separated by usage status (used for soy sauce production, currently unused but can be used, used for other purposes such as exhibits) and by capacity (number of koku or kiloliters); and thoughts on future increases or decreases to the number of wooden barrels (maintain status quo for the time being, increase, decrease, desire to newly obtain), and in the event of a present desire to change current barrel numbers, the preferred specific means for doing so.

RESULTS AND DISCUSSION

(1) Number of soy sauce brewers who own wooden barrels and total number of wooden barrels in possession

A total of 459 soy sauce brewers answered the questionnaire, of which 281 owned wooden barrels (including two brewers not belonging to any cooperative). This represents about 25% of the total 1,141 soy sauce brewers reported to exist in 2019¹⁶⁾.

The total number of wooden barrels owned by 281 brewers nationwide was 6,731, of which 4,765 are used for soy sauce production (hereinafter referred to as “in use”), 1,261 barrels are currently unused but can be used (hereinafter, “unused”), and 705 barrels are unusable for soy sauce production even after repairs due to leaks or long-term disuse, or whose condition is unknown (hereinafter, “unusable”). The survey revealed seven prefectures without a single wooden barrel-owning brewery: Kanagawa, Yamanashi, Osaka, Tottori, Saga, Okinawa, Kagoshima.

Figure 1 shows the number of wooden barrels by usage status across the eight regions of Japan. In Shikoku, 21 brewers held a total of 1,305 barrels, with a notably high ratio of those barrels “in use”, most of them in Shodoshima. Both the number of brewers owning wooden barrels and the number of barrels “in use” by region as shown in Fig. 1 have already been reported in the *Ajinomoto Foundation for Food Culture Center Research Results Summary Report*¹⁷⁾.

Figure 2 shows a breakdown of the total barrel numbers by usage status and capacity. Of the 4,765

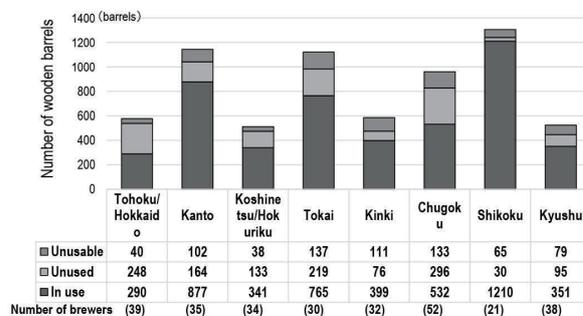


Fig. 1 Total number of wooden barrels owned by soy sauce brewers (by region and usage status)

barrels “in use” nationwide, 2,064 barrels had a capacity of around 30 koku (5.4 kL) and 1,269 were around 20 koku (3.6 kL), together accounting for 70% of the total. These also accounted for about 60% of “unused” and “unusable” barrels, showing the 20 to 30-koku capacity as the most common size among existing wooden barrels for soy sauce production.

(2) Number and regional characteristics of wooden barrels in use for soy sauce production

Figure 3 shows the number of wooden barrels in use by capacity for the eleven prefectures with the highest ownership of wooden barrels.

First, Kagawa Prefecture has by far the most with a total of 1,113 wooden barrels in use across eight breweries. There are only minor differences between the second-ranked Aichi Prefecture (13 breweries, a total of 387 barrels) and the ones below it. Looking at larger regions following the standalone Kagawa Prefecture, there are a total of 701 barrels in three

prefectures of the Tokai region (Aichi, Mie, Gifu); 811 in the three Kanto prefectures (Ibaraki, Chiba, Saitama); and Fukuoka, Shimane and Hiroshima prefectures, which are geographically relatively close in western Japan, follow with a total of 669 barrels.

By capacity, Kagawa Prefecture has 1,040 barrels around 30 koku (5.4 kL) – representing almost all of the total 1,113 barrels in use in the prefecture.

Looking at the Tokai region, in Aichi Prefecture, 221 of the 387 total barrels in use are around 30-koku capacity, and 130 barrels are around 40-60 koku (7.2 to 10.8 kL). In ninth-place Gifu Prefecture (4 breweries, 131 barrels in total), there are 65 barrels around 30 koku, and another 40 barrels in total around 40, 50 and 70 koku. Mie Prefecture in eighth place (10 breweries, 183 barrels in total) has 80 barrels around 30 koku and 28 barrels around 40 to 60 koku. Although small capacity barrels are also used, in general, it can be said that there is high usage of large barrels of more than 30 koku in the Tokai region.

Common among third-place Fukuoka Prefecture (18 breweries with a total of 299), sixth-place Shimane Prefecture (16 breweries with a total of 256), and eleventh-place Hiroshima Prefecture (11 breweries with a total of 114) is the prominence of relatively

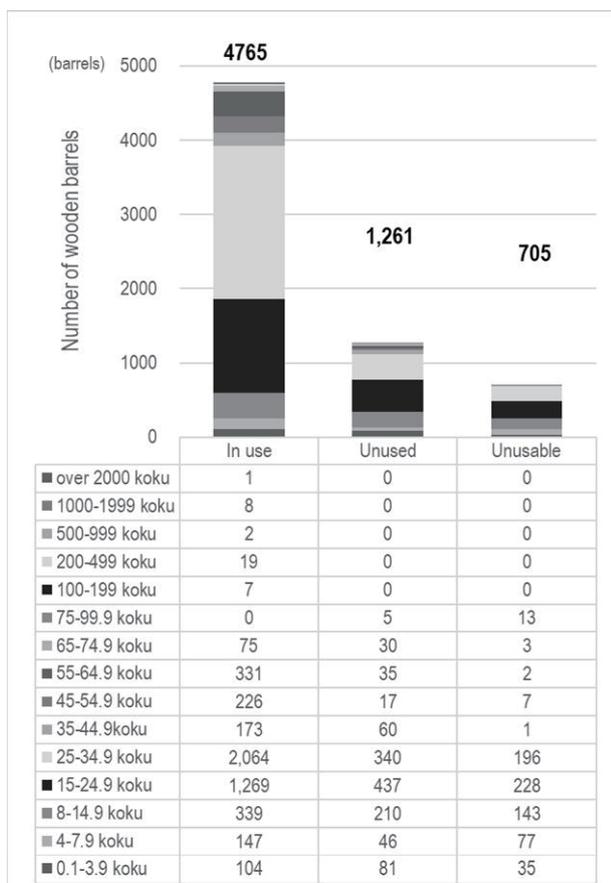


Fig. 2 Total number of wooden barrels owned by soy sauce brewers (by usage status and capacity)

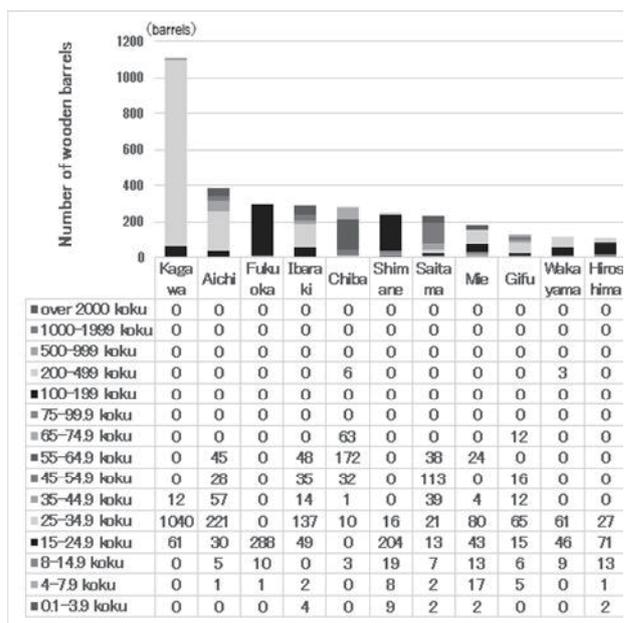


Fig. 3 Number of wooden barrels in use by capacity in prefectures with the highest ownership

smaller barrels around 20-koku capacity (3.6 kL), though there are differences in the breakdown. In Fukuoka Prefecture, one brewery alone owns 200 of the prefectural total of 288 barrels around 20 koku capacity, and not a single barrel over 30 koku is in use in the prefecture. In Shimane Prefecture, of a total of 204 barrels around 20 koku, the brewery with the most owns 79 barrels, and in many cases individual breweries own wooden barrels in a range of sizes, from small ones to large ones around 30 koku. On the other hand, in Hiroshima Prefecture, just two breweries own a combined 87 of 114 barrels, which breaks down as 59 of the 71 barrels around 20 koku and all 27 of the approximately 30-koku barrels.

Moving to the Kanto region, in Ibaraki Prefecture (11 breweries, 289 barrels in total), 137 barrels are around 30 koku and 97 barrels are around 40-60 koku. In Chiba Prefecture (8 breweries, 287 barrels in total), most of the barrels are in the 50-70 koku range, with a very high proportion around 60 koku. In Saitama Prefecture (6 breweries, 235 in total), most barrels are between 40 and 60 koku, with the highest number around 50 koku. This shows that the wooden barrels currently in use in the Kanto region are typically larger than the nationwide average.

As shown in Fig. 2, there is a total of 805 large-capacity wooden barrels between 35 and 75 koku across Japan, with 753 or 93.5% of those held by the top six prefectures – Aichi, Mie, Gifu, Ibaraki, Chiba, Saitama – all of which are located in the Tokai and Kanto regions. Of all the barrels in use around 30 koku capacity, Kagawa, Wakayama and the above six prefectures own 1,635 barrels of the total 2,064 nationwide, which accounts for 79.2%. In these prefectures, clearly the use of large wooden barrels has evolved and endures today.

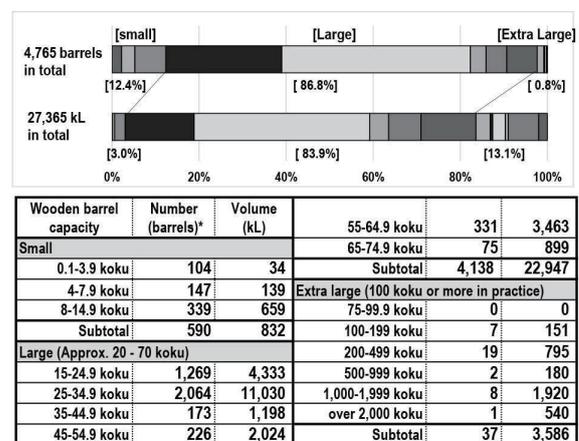
There are several possible factors for this. First, the existence of a supply-demand relationship for delivering high-volume, homogeneous products to market for the mass consumption areas of Edo and Osaka from surrounding prefectures, as evidenced in the statement, “The basic shape of the 30 koku barrels we see today was established in Nada before the

Kansei era (1789-1801)”⁷⁾. Second, there is limited stirring work in miso and tamari soy sauce brewing, which are the mainstream in the Tokai region, thus the large barrels presented few disadvantages. There may be other factors including the distribution of raw materials such as Yoshino cedar and local timber, and the spread of large barrel-making technology, but further investigation is needed in the future.

(3) Relationship between total capacity and the number of wooden barrels in use

Next, the total capacity of wooden barrels used for soy sauce production nationwide was calculated by multiplying the capacity of wooden barrels and the number of wooden barrels in use found in the questionnaire responses. The top half of Figure 4 shows the association between the total number and capacity of wooden barrels in use nationwide separated by barrel capacity. The bottom half of the figure contains the number of wooden barrels in use for soy sauce production owned by the 281 brewers that responded to the survey with subtotals of small, large and extra-large capacity barrels adding up to a total of 4,765 barrels nationwide with total capacity of 27,365 kL (152,026 koku).

Figure 5 shows the total capacity of wooden barrels in use held in each of the eleven prefectures with the highest levels of ownership and this is broken down



*These numbers are reproduced from Fig. 2

Fig. 4 Association between the total number and capacity of wooden barrels in use

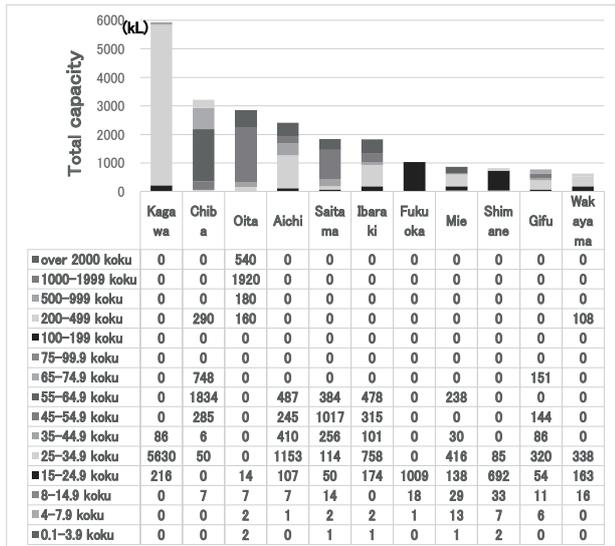


Fig. 5 Total capacity of wooden barrels in use in the eleven prefectures with the highest levels of ownership

by barrel capacity.

We interviewed two breweries in Shodoshima and Saitama Prefecture regarding soy sauce yields as a ratio of raw materials and salt water in the case of wooden barrel preparation. From this we calculated the amount of soy sauce produced as a ratio of the capacity of the wooden barrels, obtaining a rough number of 50%. Of course, we cannot simply calculate the amount of soy sauce produced based on the total capacity of a wooden barrel given the mash can be fermented and aged in a barrel from as little as one year up to three years, however, this would suggest that a little less than 14,000 kL of wooden barrel-prepared soy sauce is produced annually.

As shown in Fig. 4, the total number of extra-large wooden barrels with capacity of 100 koku (18 kL) or more is 37, or just 0.8% of all barrels in use, but the total capacity amounts to 3,586 kL, changing the ratio significantly to 13.1%. In the future, if more wooden tanks are introduced while traditional bamboo-hooped wooden barrels continue their natural decline, we will see changes in the proportion of wooden barrel-prepared soy sauce distributed in the market accounted for by each type of wooden vessel.

From Fig. 5, Kagawa Prefecture ranks first in terms of total capacity, but the difference between Chiba, Aichi, Saitama, and Ibaraki prefectures, which have

many large wooden barrels, is not as remarkable as the difference in the number of barrels. It should be noted that Oita Prefecture, ranked 29th in terms of the number of wooden barrels (31 in total), is in third place in the capacity rankings because extra-large wooden vessels ranging from 200 to 2000 koku (36 to 360 kL) or more are typically used.

The largest capacity bamboo-hooped cedar barrel in Japan can be found in Aichi Prefecture and is used for producing miso¹⁸⁾. However, in soy sauce brewing, while we were able to confirm the use of barrels around 70 koku in capacity (63 in Chiba Prefecture, 12 in Gifu Prefecture) in this survey, there were no reports of barrels in the 75-100 koku range, thus it is thought that preparation of volumes greater than 100 koku is instead undertaken in wooden tanks.

The estimated annual production of soy sauce prepared in wooden barrels calculated in result (3) is less than 14,000kL, or 1.88% of the total soy sauce shipment volume of 744,263 kL in 2019¹⁶⁾. If the introduction of extra-large wooden tanks continues, even if the total number of wooden barrels decreases, it is possible that the ratio of soy sauce prepared in wooden vessels of some variety to total shipment volumes will be maintained or even increased.

(4) Soy sauce brewers' future intentions for wooden barrel ownership

Figure 6 shows the results of 444 valid responses out of 459 responses regarding the desire to increase or decrease the number of wooden barrels in the future.

Of the 444 breweries, 75% expressed an intention to maintain the status quo of either the current number of holdings (177 breweries) or no barrels at all (157 breweries). A total of 55 breweries (12.4%) wanted to increase the number of wooden barrels, of which eleven breweries did not currently own any but wanted to obtain some and 44 breweries wanted to increase the number owned. A further 55 companies hoped to reduce the number of barrels owned.

Of the 44 breweries that wanted to increase existing numbers, as many as 29 breweries wanted

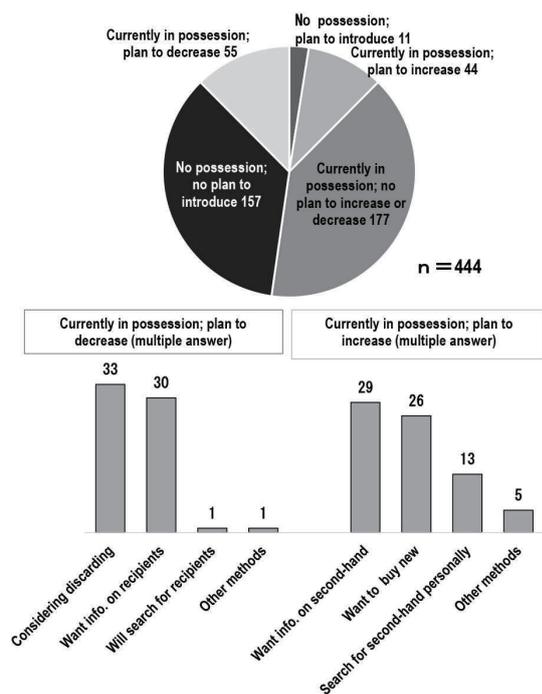


Figure 6 Intention to increase or decrease the number of wooden barrels in the future.

information on where to obtain second-hand barrels, 26 breweries wanted to buy new barrels, and 13 breweries wanted to search for second-hand barrels themselves. In addition, of the 55 breweries wishing to decrease the number of barrels in possession, about half were thinking of discarding them, and the remainder wanted information on possible recipients as they wished to give them away.

Table 1 is a summary of the free-form comments obtained from 86 breweries, classified according to the intention to increase or decrease the number of wooden barrels owned and excluding details on current numbers of wooden barrels and capacity.

Many comments from the 24 breweries that do not currently own wooden barrels and have no desire to introduce them in the future detailed how they disposed of their wooden barrels for reasons such as difficult hygiene management and quality control, labor intensiveness, and the absence of wooden barrel craftsmen, making repairs impossible. There was also expression of a wish that wooden-barrel prepared soy sauce not be considered the genuine article. From some of the 16 breweries that currently own barrels but wish to reduce numbers, we received comments

Table1. Results of Survey on Intentions to Increase / Decrease Number of Wooden Barrels (free-form comments classified by main intention)

| Free-form comments (86 companies in total) | Reason summary (number of cases) |
|--|--|
| No possession; no plan to introduce (24 breweries) | Difficult hygiene management (6), used before but disposed of (5), difficult to control quality (4), due to absence of wooden barrel craftsman (3), due to HACCP compliance (2), labor required (2), never used wooden barrels (2), don't want wooden barrel preparation to be considered the only genuine article, few merits to new introduction, valuable for exhibit purposes, difficult to repair, difficult to purchase new barrels, a business partner told me that I should have kept wooden barrels |
| No possession; plan to introduce in the future (2 breweries) | I think they have value in terms of differentiation, but the hurdles are high for <i>kiage</i> * manufacturers. Do not think traditional natural brewing means wooden barrel brewing, and our main brewing is with FRP, but want to try wooden barrel brewing in small quantities for a limited product line. *kiage is unpasteurized soy sauce |
| Currently in possession; plan to reduce (16 breweries) | Barrels abandoned / condition unknown (4), difficult hygiene management (2), unusable due to liquid leakage (2), plan to close the business (2), want to keep a few (2), discard wooden barrels, we have usable wooden tub, follow guidance of health center, labor is required, difficult to maintain due to absence of barrel craftsmen, want to change to FRP, value in holding for brewery tours, good for exhibition |
| Currently in possession; plan to increase (16 breweries) | I want to repair / repair information (4), I want to introduce new barrels (2), I want to consider introducing new ones in the future, I want to replace the barrels, I want information on repair companies, I want information on wooden barrel craftsman, would be nice to have craftsmen based in the Kanto region, new barrel production and maintenance of repair techniques both indispensable, I think the value of wooden barrels will continue to rise, I use them carefully, there are merits to preparing in wooden barrels, we should retain wooden barrel culture, will manufacture new barrels in-house |

including that they left barrels unused because of the difficulty in hygiene management, that they plan to close the business, or that they hope to reduce the number but want to keep a few for exhibition purposes.

Many comments were also made about the value of wooden barrels from two companies that do not currently own but are considering introducing them and the 16 breweries who want to increase numbers. Requests for information on repairing wooden barrels in use and on repair companies were raised by these breweries as well as 28 breweries that want to maintain current numbers, and the need to increase the number of wooden barrel craftsmen to make new barrels was also highlighted.

In addition, some breweries commented on a desire to use barrels in combination with FRP or to convert to FRP, and others expressed a wish to better understand the meaning and clear merits of brewing in wooden barrels compared to vessels made of other materials like FRP. It became clear that even among

brewers using wooden barrels, some have not yet found a clear answer about their merits.

CONCLUSION

1) Based on the responses from 281 soy sauce breweries who own wooden barrels as of 2020, there are a total of 6,731 wooden barrels for soy sauce production nationwide, of which 4,765 (70.8%) are in use, 1,261 (18.7%) are currently unused, and 705 (10.5%) are unusable, including items that have been used for other purposes such as exhibits or have been left idle in unknown condition.

2) Soy sauce brewers using wooden barrels are scattered all over the country, from Hokkaido in the north to Miyazaki in the south. We found notable accumulations of barrels in Shodoshima, the Kanto area (Ibaraki / Chiba / Saitama prefectures), Tokai (Aichi / Mie / Gifu prefectures), and western Japan from Kitakyushu to the Chugoku region (covering Fukuoka / Shimane / Hiroshima prefectures).

3) In terms of capacity of the wooden barrels in use, most are around 30 koku (2,064 barrels), followed by barrels with capacity of approximately 20 koku (1,269), 10 koku (339), 60 koku (331), 50 koku (226), and 40 koku (173). Capacity figures revealed regional characteristics with mainly 30 koku barrels in Shodoshima, larger 50-60 koku barrels in Kanto, and 20 koku barrels in Fukuoka, Shimane and Hiroshima prefectures.

4) Assuming that the ratio of soy sauce yield to capacity of the wooden barrel is 50%, and given the total number of wooden barrels is 4,765 with a total capacity of 152,026 koku (27,365kL), we estimated that a little less than 14,000 kL of soy sauce can be brewed in wooden barrels annually. This amounts to 1.88% of total soy sauce shipment volumes in 2019.

5) The number of extra-large wooden vessels with capacity of 100 koku or more was just 0.8% of the total number in use, but they accounted for 13.1% of the total capacity. The further introduction of extra-large wooden barrels (wooden tanks) of even greater magnitude is expected to significantly change the balance between the volume of soy sauce on the

market prepared in wooden barrels and the number of wooden barrels.

6) Regarding intentions to increase or decrease the number of wooden barrels owned, about 75% of the 444 breweries that responded planned to remain at zero or maintain the current number, 12.4% wanted to increase numbers, and 12.4% wanted to decrease numbers. In addition, many of the wooden barrel owners expressed anxiety about repairs and wanted information on the transfer of barrels, and there was also a request for clearer understanding around the merits and differences of wooden barrel preparation.

RESEARCH LIMITATIONS AND FUTURE ISSUES

In this study, we were able to estimate the potential production volumes of soy sauce prepared in wooden barrels by ascertaining the number of wooden barrels for soy sauce production of each size through a national survey of 2020 figures.

The following three points can be raised as future tasks. First, because we cannot be certain that all soy sauce brewers owning barrels for soy sauce production responded to this survey, we must continue to collect information and connect it to the next survey. Next, regarding the areas where information sharing within the industry was desired, such as repairs, purchase of new barrels, and transfer of second-hand recycled barrels, it is hoped that the reporting of these research results to various organizations will prompt consideration of possible solutions. Finally, while we showed that there are regional variations in the capacity of wooden barrels, this paper only demonstrates number and capacity differences and was not able to explore further from historical and food culture perspectives.

This research represents a starting point for examining how the soy sauce wooden barrel culture may be passed on to the future. Going forward, we expect to conduct similar surveys on an ongoing basis every three to five years, specifically examining the number of natural reductions due to aging, the number of disposals due to business closures, the

capacity and availability of second-hand barrels, and the number and capacity of new barrels introduced. Doing so will make it possible to predict shifts in the production of soy sauce prepared in wooden barrels and the state of wooden barrel culture at fermentation and brewing sites in Japan.

Currently, “wooden barrel” (kioko) is the general nomenclature to describe all wooden vessels, and soy sauce prepared in both traditional bamboo-hooped wooden barrels and large wooden tanks is all described as “wooden barrel-prepared soy sauce”. Some Japanese soy sauce prepared in wooden barrels is being called “Craft Shoyu” and is attracting attention in the United States and Europe. One brewer shipping such soy sauce celebrates its preparation in “traditional wooden barrels”, referring to wooden barrels with bamboo hoops. In the future, we hope to focus on trends in classifications of these names based on recommendations within the industry or requests from consumers.

During an interview, we heard from a miso and soy sauce brewer in Mie Prefecture that the scene of a brewery lined with wooden barrels is the very manifestation of brewing culture at soy sauce and miso breweries. In Mie Prefecture, a strong wooden barrel culture endures at many producers of tamari soy sauce. When we visited several breweries, we saw that some had introduced wooden tanks also made of cedar but fastened with a metal band, the same size as traditional bamboo-hooped wooden barrels. And a Hatcho Miso brewer in Aichi Prefecture has begun a trial introduction of wooden tanks with the same capacity and shape as conventional wooden barrels.

While there is a movement to make new barrels with bamboo hoops in the traditional style, with the number of craftsmen making traditional wooden barrels on the decline, we are also seeing the introduction of new types of wooden vessels like wooden tanks. What kind of wooden vessels will complete the landscape of the soy sauce brewery 100 years from now? We hope that this research report on the situation in 2020 will serve as a small cornerstone for passing on the Japanese wooden barrel culture.

ACKNOWLEDGMENTS

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REFERENCES

- 1) Fukutome, N., 2015, Soy Sauces of Asia “Soy Sauce Usage in the Philippines, Thailand and Vietnam”, *Food Culture*, Kikkoman Institute for International Food Culture, No.25, pp14-21.
- 2) Fukutome, N., 2017, Soy Sauces of Asia “Asian Soy Sauces in Japan”, *Food Culture*, Kikkoman Institute for International Food Culture, No.27, pp14-23.
- 3) Fukutome, N., 2014, Soy Sauces of Asia “Korea’s Use of Ganjang”, *Food Culture*, Kikkoman Institute for International Food Culture No.24, pp14-25.
- 4) Kato, K., 2008, *Okeya no Chosen* (The Barrel Maker’s Challenge), Chuokoron-Shinsha.
- 5) Tate, H., Ehara, A., Fukutome, N., and Utsunomiya, Y., 2016, *Food Culture*, Kikkoman Institute for International Food Culture, No.26, pp7-26.
- 6) Tate, H., Ehara, A., Fukutome, N., and Utsunomiya, Y., 2018, *Food Culture*, Kikkoman Institute for International Food Culture, No.28, pp3-23.
- 7) Ishimura, S., 1997, *Oke・Taru I* (Tubs and Barrels I), Hosei University Press, Chapter 3, pp157-323.
- 8) Yunoki, M., 2000, “Kindai Shuzogyo to Oketarushoku” (Modern Sake Brewing and Barrel Work). In K. Koizumi (ed.), *Oke to Taru*,

- Wakiyaku no Nihonshi* (Tubs and Barrels, Supporting Roles in Japanese History), Hosei University Press, p105.
- 9) Hondo, A., 2006, *Osaka Meisho Mukashi Annai Etoki 'Settsu Meisho Zue'* (Osaka Famous Places Historical Guide: Explanations of the Settsu Famous Places Picture Collection), Sogensha, pp209-214.
 - 10) Takahashi, M., *Morisada Manko Zuhan Shusei Jo/Ge* (Collection of Illustrations from Morisada's Sketches, Volumes 1 and 2), Yuzankaku.
 - 11) Koizumi, K., 2000, "Kurashi no naka no Oke to Taru" (Tubs and Barrels in Daily Life). In K. Koizumi (ed.), *Oke to Taru, Wakiyaku no Nihonshi* (Tubs and Barrels, Supporting Roles in Japanese History), Hosei University Press, p270.
 - 12) Kikkoman Co., Ltd., 2020, 100-Year History Compilation Committee: "Kikkoman Co., Ltd. 100-Year History", pp147-148.
 - 13) Oguri, T., 2008, "Shoyu Seizo Gijutsu no Keitoka Chosa" (Survey on the Systematization of Soy Sauce Manufacturing Technology), *National Science Museum Technology Systematization Survey Report Vol. 10*, National Museum of Nature and Science, pp151, 181-182.
 - 14) Ueshiba, T., 2003, *Shikomioko no Rekishi to Tenkai – Shoyu, Miso, Soshite Shokusu no Oke –* (History and Development of Food Preparation Barrels – Soy Sauce, Miso and Vinegar Barrels –), Jokyo (Brewing Society of Japan), Vol.98 No.7, p493.
 - 15) Shinmura Izuru (ed.), 2018, *Kojien 7th Edition* (Japanese dictionary), Iwanami Shoten.
 - 16) <https://www.soysauce.or.jp/statistical-data> (viewed March 31, 2021)
 - 17) Fukutome, N., 2021, "National Survey on Actual Usage of Wooden Barrels in Soy Sauce Brewing", *Ajinomoto Foundation for Food Culture Center Research Results Summary Report*, 2018 Research Grant.
 - 18) <https://www.ichibiki.co.jp/enjoy/history/> (viewed March 31, 2021)

Bolus Inflow Detection Method by Ultrasound Video Processing for Evaluation of Swallowing

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要旨

To prevent aspiration pneumonia, a system for non-invasive and quantitative evaluation of the swallowing function is required. Therefore, we have previously proposed a method of using ultrasound videos to establish evaluation indicators of the swallowing function. The proposed method aims to automatically estimate the velocities of the esophageal wall region and the bolus region in the ultrasound video. In this method, estimation of the bolus region comprises two steps: estimating the esophageal region through which the bolus flows and extracting only the frame in which the bolus passes through the esophageal region. However, the step of extracting the frame in which the bolus passes is still performed manually. Therefore, to automate this step, the purpose of this study was to automatically determine the frame in which the bolus flowed into the screen. This method was tested five times on five healthy adult male subjects by recording a cervical ultrasound video while swallowing a bolus of water. We identified the different elements of the esophageal region in the video by first identifying the esophageal wall region with the maximally stable extremal regions (MSER). Then, we used the luminance histogram of each frame to establish the graph of the histogram similarity. This, in turn, was used to detect a change in the observed region, thus indicating the inflow of the bolus. Moreover, we could distinguish the change caused by the inflow from the change caused by the elevation of the esophageal wall using the velocity results obtained by optical flow estimation in the anterior esophageal wall region. Our results showed that in most cases, the proposed method was successful in recognizing the inflow of the bolus and distinguishing it from the elevation of the esophageal wall. Furthermore, an accuracy sufficient for estimation of the velocity of the bolus was achieved. Keywords: ultrasound video, swallowing, optical flow, esophagus, bolus, maximally stable extremal regions.

19 世紀末から 20 世紀前半の新聞広告を通してみる練乳・粉乳の普及のプロセス
—輸入品需要と国産品振興の諸相—

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Abstract

This study aimed to analyze newspaper advertisements from the late 19th century through the early 20th century to ascertain how condensed milk and milk powder were gradually accepted in the lives of Japanese citizens, mainly in Tokyo. The number of advertisements for condensed milk and powdered milk published in the morning issue of Asahi Shimbun were tabulated based on records in the newspaper's digital archive "Kikuzo II" Tokyo edition (collected from 1879-1999) and classified by advertiser and brand. The content of advertisements including advertiser, advertisement text, and illustrations were also reviewed.

Analysis revealed fierce competition between imported and domestic products in the 50 years from the 1890s to 1941, triggered by World War I and the Great Kanto Earthquake. It was also confirmed that condensed milk played a key role from the 1890s to 1910s, and milk powder and condensed milk played parallel roles in the 1920s and 1930s as essentials for infant formula in artificial nutrition. keywords: newspaper advertisement, condensed milk, milk powder, promotion of domestic products

keywords: newspaper advertisement, condensed milk, milk powder, promotion of domestic products

要旨

本研究では、19 世紀末の明治時代後期から 20 世紀前半の昭和時代前期にかけての新聞広告分析を行い、練乳と粉乳が東京を中心とする市民生活にどのように段階的に受容されていったかを明らかにすることを目的とした。分析対象を朝日新聞アーカイブ『聞蔵Ⅱ』（1879-1999 年）の東京版朝刊に掲載された練乳・粉乳の広告とし、広告主別・ブランド別に広告数を集計し、広告主、広告文、およびイラストなどを含めた広告内容をみた。

その結果、1890 年代から 1941 年までの約 50 年間において、第一次世界大戦、関東大震災などを契機として輸入品と国産品の激しい競争が繰り広げられていた過程を明らかにした。また、1890-1910 年代は練乳が、1920-1930 年代には粉乳と練乳が人工栄養における育児用ミルクの必需品としての役割を並行的に担っていたことを確認した。

キーワード：新聞広告、練乳、粉乳、国産品振興

Elucidation of Japanese pepper (*Zanthoxylum piperitum* De Candolle)
domestication using RAD-Seq

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要旨

Abstract Japanese pepper, *Zanthoxylum piperitum*, is native to Japan and has four well-known lineages (Asakura, Takahara, Budou, and Arima), which are named after their production area or morphology. Restriction-site associated DNA sequencing (RAD-Seq) was used to analyse 93 accessions from various areas, including these four lineages. Single nucleotide variant analysis was used to classify the plants into eight groups: the Asakura and Arima lineages each had two groups, the Takahara and Budou lineages each had one group, and two additional groups were present. In one Asakura group and two Arima groups, the plants were present in agricultural fields and mountains, thus representing the early stage of domestication of the Japanese pepper. The second Asakura lineage group was closely related to plants present in various areas, and this represents the second stage of domestication of this plant because, after early domestication, genetically related lineages with desirable traits spread to the periphery. These results demonstrate that domestication of Japanese pepper is ongoing. In addition, this study shows that spineless plants are polyphyletic, despite the spineless lineage being considered a subspecies of Japanese pepper.

Female Athletes Genetically Susceptible to Fatigue Fracture Are Resistant to Muscle Injury: Potential Role of COL1A1 Variant

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Abstract

Purpose: We aimed to investigate the hypothesis that type I collagen plays a role in increasing bone mineral density (BMD) and muscle stiffness, leading to low and high risks of fatigue fracture and muscle injury, respectively, in athletes. As a potential mechanism, we focused on the effect of the type I collagen alpha 1 chain gene (COL1A1) variant associated with transcriptional activity on bone and skeletal muscle properties.

Methods: The association between COL1A1 rs1107946 and fatigue fracture/muscle injury was evaluated in Japanese athletes. Effects of the polymorphism on tissue properties (BMD and muscle stiffness) and type I collagen $\alpha 1/\alpha 2$ chain ratios in muscles were examined in Japanese nonathletes.

Results: The C-allele carrier frequency was greater in female athletes with fatigue fracture than in those without (odds ratio = 2.44, 95% confidence interval [CI] = 1.17-5.77) and lower in female athletes with muscle injury than in those without (odds ratio = 0.46, 95% CI = 0.24-0.91). Prospective validation analysis confirmed that in female athletes, muscle injury was less frequent in C-allele carriers than in AA genotype carriers (multivariable-adjusted hazard ratio = 0.27, 95% CI = 0.08-0.96). Among female nonathletes, the C-allele of rs1107946 was associated with lower BMD and lower muscle stiffness. Muscle biopsy revealed that C-allele carriers tended to have a larger type I collagen $\alpha 1/\alpha 2$ chain ratio than AA genotype carriers (2.24 vs 2.05, $P = 0.056$), suggesting a higher proportion of type I collagen $\alpha 1$ homotrimers.

Conclusion: The COL1A1 rs1107946 polymorphism exerts antagonistic effects on fatigue fracture and muscle injury among female athletes by altering the properties of these tissues, potentially owing to increased levels of type I collagen $\alpha 1$ chain homotrimers.

A pro-diabetogenic mtDNA polymorphism in the mitochondrial-derived peptide, MOTS-c

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Abstract

Type 2 Diabetes (T2D) is an emerging public health problem in Asia. Although ethnic specific mtDNA polymorphisms have been shown to contribute to T2D risk, the functional effects of the mtDNA polymorphisms and the therapeutic potential of mitochondrial-derived peptides at the mtDNA polymorphisms are underexplored. Here, we showed an Asian-specific mitochondrial DNA variation m.1382A>C (rs111033358) leads to a K14Q amino acid replacement in MOTS-c, an insulin sensitizing mitochondrial-derived peptide. Meta-analysis of three cohorts (n = 27,527, J-MICC, MEC, and TMM) show that males but not females with the C-allele exhibit a higher prevalence of T2D. In J-MICC, only males with the C-allele in the lowest tertile of physical activity increased their prevalence of T2D, demonstrating a kinesio-genomic interaction. High-fat fed, male mice injected with MOTS-c showed reduced weight and improved glucose tolerance, but not K14Q-MOTS-c treated mice. Like the human data, female mice were unaffected. Mechanistically, K14Q-MOTS-c leads to diminished insulin-sensitization in vitro. Thus, the m.1382A>C polymorphism is associated with susceptibility to T2D in men, possibly interacting with exercise, and contributing to the risk of T2D in sedentary males by reducing the activity of MOTS-c.

MOTS-c reduces myostatin and muscle atrophy signaling

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Abstract

Obesity and type 2 diabetes are metabolic diseases, often associated with sarcopenia and muscle dysfunction. MOTS-c, a mitochondrial-derived peptide, acts as a systemic hormone and has been implicated in metabolic homeostasis. Although MOTS-c improves insulin sensitivity in skeletal muscle, whether MOTS-c impacts muscle atrophy is not known. Myostatin is a negative regulator of skeletal muscle mass and also one of the possible mediators of insulin resistance-induced skeletal muscle wasting. Interestingly, we found that plasma MOTS-c levels are inversely correlated with myostatin levels in human subjects. We further demonstrated that MOTS-c prevents palmitic acid-induced atrophy in differentiated C2C12 myotubes, whereas MOTS-c administration decreased myostatin levels in plasma in diet-induced obese mice. By elevating AKT phosphorylation, MOTS-c inhibits the activity of an upstream transcription factor for myostatin and other muscle wasting genes, FOXO1. MOTS-c increases mTORC2 and inhibits PTEN activity, which modulates AKT phosphorylation. Further upstream, MOTS-c increases CK2 activity, which leads to PTEN inhibition. These results suggest that through inhibition of myostatin, MOTS-c could be a potential therapy for insulin resistance-induced skeletal muscle atrophy as well as other muscle wasting phenotypes including sarcopenia.

The MOTS-c K14Q polymorphism in the mtDNA is associated with muscle fiber composition and muscular performance

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Abstract

Human skeletal muscle fiber is heterogenous due to its diversity of slow- and fast-twitch fibers. In human, slow-twitched fiber gene expression is correlated to MOTS-c, a mitochondria-derived peptide that has been characterized as an exercise mimetic. Within the MOTS-c open reading frame, there is an East Asian-specific m.1382A>C polymorphism (rs111033358) that changes the 14th amino acid of MOTS-c (i.e., K14Q), a variant of MOTS-c that has less biological activity. Here, we examined the influence of the m.1382A>C polymorphism causing MOTS-c K14Q on skeletal muscle fiber composition and physical performance. The myosin heavy chain (MHC) isoforms (MHC-I, MHC-IIa, and MHC-IIx) as an indicator of muscle fiber composition were assessed in 211 Japanese healthy individuals (102 men and 109 women). Muscular strength was measured in 86 physically active young Japanese men by using an isokinetic dynamometer. The allele frequency of the m.1382A>C polymorphism was assessed in 721 Japanese athletes and 873 ethnicity-matched controls. The m.1382A>C polymorphism genotype was analyzed by TaqMan SNP Genotyping Assay. Individuals with the C allele of the m.1382A>C exhibited a higher proportion of MHC-IIx, an index of fast-twitched fiber, than the A allele carriers. Men with the C allele of m.1382A>C exhibited significantly higher peak torques of leg flexion and extension. Furthermore, the C allele frequency was higher in the order of sprint/power athletes (6.5%), controls (5.1%), and endurance athletes (2.9%). Additionally, young male mice were injected with the MOTS-c neutralizing antibody once a week for four weeks to mimic the C allele of the m.1382A>C and assessed for protein expression levels of MHC-fast and MHC-slow. Mice injected with MOTS-c neutralizing antibody showed a higher expression of MHC-fast than the control mice. These results suggest that the C allele of the East Asian-specific m.1382A>C polymorphism leads to the MOTS-c K14Q contributes to the sprint/power performance through regulating skeletal muscle fiber composition.

再録 口頭発表

日本調理科学会 2021 年度大会

日本における麻婆豆腐の伝来と受容 —調味料・香辛料によるタイプ分類—

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要旨

【目的】

現在、日本で食べられている麻婆豆腐には甘口から極辛口まで様々なタイプがある。本研究の目的は、中国から麻婆豆腐がいつごろ日本に入ってきてどのように日本の食卓に浸透したのかを明らかにし、調味料・香辛料の使い方から麻婆豆腐のタイプ分けを行い、料理の伝来と受容のプロセスを追うことにある。

【方法】

まず、料理書・家庭科教科書・調理実習書などから麻婆豆腐や四川料理に関する情報と麻婆豆腐レシピを収集した。次に、麻婆豆腐レシピ 125 品の調味料・香辛料に着目して、出現頻度が 5 以下のものを含むレシピを除き、101 品について階層型クラスター分析（ウォード法）を行い、得られたレシピ群に対し調味料・香辛料の組み合わせから特徴づけを行った。また、2020 年 6 月現在、市場に出回るレトルト製品「麻婆豆腐の素」25 品を集め、原材料名に記載された調味料・香辛料の種類からクラスター分析による分類を行った。

【結果】

- 1) 文献調査から、日本語の麻婆豆腐レシピの初出は『中国料理』（王馬熙純著、1958 年 6 月）で、麻婆豆腐を日本に紹介したとされる料理人陳建民による四川飯店開業（1958 年 11 月）と同年であった。その後、各種料理書での紹介と並行して NHK 「きょうの料理」（王馬熙純 1959、陳建民 1966）の放送や「麻婆豆腐の素」の発売（丸美屋 1971）が麻婆豆腐の一般家庭への浸透に寄与したと考えられた。
- 2) クラスター分析により、101 品の麻婆豆腐レシピは調味料・香辛料等の組合せで特徴づけられる和風（13 品）、中華風（43 品）、和中折衷型（45 品）の 3 タイプに分けられた。
- 3) 「麻婆豆腐の素」25 品に使用された調味料・香辛料は、和風・中華風に 2 分類された。

再録 口頭発表

日本語用論学会 第24回大会 (2021)

和菓子の命名における認知的基盤 — 百科事典的知識を通じた文化理解に向けて —

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要旨

本研究の目的は、和菓子の命名を認知的基盤により分類して、菓子分類名と結びつく語彙のリストを作成し、その意味を理解する上で百科事典的知識が必要なものとそうでないものを段階別に区別することにある。そこで、技術指導書にある代表的な和菓子名 114 点を語基に分け、広辞苑 (2018) の収録状況と永澤 (2019) を援用した語形成分類を行い、認知ドメイン・3つの比喻 (メタファーの類似性、メトニミーの隣接性、シネクドキーの類種関係) を用いて、分析を行った。結果、辞書に定義がある菓子名とないものがあり、命名に含まれる各語基は、メトニミーの風味、味付け、中身、外装、人名・故事由来等、メタファーの形状、色、模様・文様、質感、イメージ、描写等、和菓子の類種のカテゴリーの伸縮に基づくシネクドキー等に分類された。特に、人名・故事由来等の語基の理解には、百科事典的知識が必要であることを指摘した。

参考文献

- 永澤済. 2019. 「生物の和名・俗名における意味拡張」、森雄一・西村義樹・長谷川明香 (編) . 『認知言語学を紡ぐ』、東京: くろしお出版、93-114.
- 新村出 (編) . 2018. 『広辞苑第七版』東京: 岩波書店

再録 ポスター発表

日本調理科学会 2021 年度大会

日本の現代食生活におけるパスタ料理の受容の実態 ーパスタの種類とソース分類、食材に着目してー

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*東京聖栄大学

要旨

【目的】

明治時代以降、西洋文化のひとつとして伝来したイタリア料理は、現在、外食だけでなく中食、家庭内食への浸透が進む。本研究は、外来の食文化の受容と普及のプロセスをとらえる研究の一環として、イタリア料理のパスタに着目し、日本の現代食生活において身近に利用されるパスタの種類と調理法の実態をとらえることを目的とする。

【方法】

首都圏の小売店の販売状況を調査し、取り扱い上位のパスタの種類を特定した。また、家庭内食への影響や実態を反映する食情報のひとつとして、NHK『きょうの料理』アーカイブスに収録されたイタリア料理の中のパスタ料理と、レシピサービス『クックパッド』でパスタの種類別に検索した人気上位 50 品のパスタ料理を抽出し、使用食材とソース分類について集計・分析した。

【結果】

大型スーパーから都市型の小規模スーパー、輸入食品を多く取り扱う酒類量販店等計 20 店舗の内、11 店舗以上で販売されるパスタは 12 種類あった (2021 年 5 月現在)。NHK『きょうの料理』のイタリア料理レシピ 336 品中にパスタ料理は 95 品あり 1/3 弱を占めた。『クックパッド』のパスタ料理レシピ (パスタ 16 種類、計 800 品) において、ニンニク、トマトが 4 割前後のレシピで使用されているのに対し、和風食材・調味料の利用はきのこ類と醤油の利用が 1 割前後あるものの、ネギ、海苔、大葉、明太子・たらこ等は 3%前後の使用率だった。ソース分類については、マカロニ等のショートパスタでマヨネーズによるサラダの利用が、カップリーニ等細めのロングパスタでトマトのソースが、フエッテチーネやラザニア等いくつかの種類でトマトとクリームの両方を使うソースの利用が特徴的にみられた。

再録 ポスター発表

日本調理科学会 2021 年度大会

高知県の家庭料理 行事食の特徴 —土佐のおきやく文化と皿鉢料理—

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要旨

【目的】

高知県では宴会のことを「おきやく」と呼び、神祭や冠婚葬祭、節句や正月など様々なハレの行事や人が集まる際に、皿鉢料理が供されてきた。本研究では、高知県の皿鉢料理の特徴をとらえることを目的に調査を行った。高知県は森林率が高く、太平洋に面した海岸線が長く、また農業が盛んな平野もあることから山と海と里の食文化を有する。本研究では、中山間・山間部、沿岸部、平野部の3 エリアに分け、それぞれのエリアの皿鉢料理の特徴をとらえる。

【方法】

日本調理科学会 H24-26 年「次世代に伝え継ぐ 日本の家庭料理」研究の一環として、昭和 30～40 年代の高知県の食事について聞き取り調査を行った。その他に収集した食文化資料、家庭料理・郷土料理に関する資料を加え、3 エリアで皿鉢料理として供される料理を分類し比較した。

【結果】

皿鉢を構成する料理は、沿岸部は魚介類が、山間部は山菜が主であったが、共通してサバずしが用いられていた。サバは県内の沿岸部全域でとれたほか、山間部にも塩サバとして流通しており、サバの姿ずしは県内全域で祝いの席に欠かせない料理となっている。沿岸部ではカマスやアジ、マダイなど季節の魚の姿ずしが、山間部ではタケノコやミョウガ、コンニャクなどの山菜ずしが多く入り、すしの種類に違いがあった。昆布巻き、白和え、ようかん、きんとんなども広く皿鉢料理に用いられているが、使用する具材や作り方に地域差が見られた。また、「大丸（茹で卵入りの蒲鉾）」などの練り製品の使用も多様にあった。皿鉢に用いられる料理の種類を比較したところ、「きんとん豆の天ぷら」、「あたらしや（餅であんこを包み、模様をつけた上に3色の小さなもちを飾ったもの）」など地域で特徴的な料理が見られた。

再録 ポスター発表

国立国語研究所 言語資源活用ワークショップ 2021 音声言語スペシャルセッション

クックパッドの料理名におけるオノマトペと記号の基礎分析 —ABAB型オノマトペと顔文字の使用に着目して—

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要旨

本発表では、料理レシピの料理名に着目し、オノマトペと顔文字、記号がどのような関係にあるかを明らかにするにあたって、その基礎的な分析を行うことを目的とした。分析方法としては、まず、2002年から2017年までの16年間にクックパッドに投稿されたレシピから、45種類のABAB型の畳語（オノマトペ）が使用されているレシピ名を抽出し、形態素解析にかけた。なお、形態素解析するさいには、自作の顔文字辞書を使用し、各記号に分割されやすい顔文字を網羅的かつ解析漏れがないように工夫した。その後、このデータを用いて、レシピ名で使用されやすい記号と顔文字の種類、その多寡についてまとめ、特徴を明らかにした。さらに、オノマトペと顔文字の使用の関連性について分析し、オノマトペごとに使用されやすい顔文字の特徴を明らかにした。

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(論文の種類)

- 2、掲載論文の種類は和文または欧文で、次の基準によるものとする。抄録以外は未発表のものに限る。
 - 1) 総説 Review 学術的な研究分野をまとめたもの。
 - 2) 原著論文 Articles 独創的な研究論文の内容を備え、学術的な価値があると認められたもの。その掲載量は印刷面10頁以内とする。超過した場合は、超過分に関わる実費を徴収する。
 - 3) 短報 Note 原著論文に準ずる価値のあるもの。その掲載量は印刷面で6頁以内とする。
 - 4) 資料 Research Data 調査、実験データなどで、学術上有益と認められたもの。その掲載量は印刷面で10頁以内とする。
 - 5) 抄録 Abstract 他誌に発表した論文の要旨を著者がまとめたもの。
 - 6) 翻訳 Translation 既に発表された論文を翻訳したもの。
 - 7) 解説 Interpretation 学術的な研究分野をまとめたもの。
 - 8) 再録 Re-printing

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東京聖栄大学紀要執筆要領

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(原稿の執筆要領)

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は8.2cm×43行×2段を1ページとする。
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日) を記入する。
5. アブストラクトは英文とする。
6. 本文は明朝体とし、緒言、実験方法、実験結果、考察(実験結果と考察は同
じ項目としても良い)、要約、参考文献の順に記述する。
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箇所の肩にアラビア数字を片カッコをつけて記入する。
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大見出しは 1. 2. 3.
中見出しは 1.1 1.2 1.3
小見出しは 1.1.1 1.1.2 1.1.3
小見出しにさらに項を設ける場合には(1) (2) (3)
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12. 参考文献は本文末にまとめて掲載する。記載は、著者名、論文名、雑誌名、
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東京聖栄大学紀要審査基準

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(査読者)

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3. 論文の内容・表現はすべて執筆者が責を負うものとする。
4. 査読者の名は執筆者に秘すものとする。

(審査の方法)

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 - c) 修正後に再審査
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7. 修正後掲載可と判定された原稿については、委員会が査読者に代わって修正部分を確認し、修正が十分になされていると判断した場合は掲載を決定できる。修正が不十分と判断した場合は執筆者に修正を求めるか、査読者に再審査を要請することができる。
8. 査読者が原稿の修正が必要と判断した場合、および掲載不可と判断した場合は委員会は審査評を添付して、原稿を執筆者に返却する。
9. 修正後に再審査と判定された場合、修正後の再審査は、原則として、当初選任された査読者がこれに当たるものとする。
10. 原著論文として投稿されたもので、査読者が、内容が原著論文としての基準には達していないが短報としての価値があると判断した場合は、審査用紙にその旨を明記し、委員会に報告する。

令和3年度 東京聖栄大学紀要編集委員会

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