

Production trends in artificially-hatched fries of bluefin tuna

Introduction

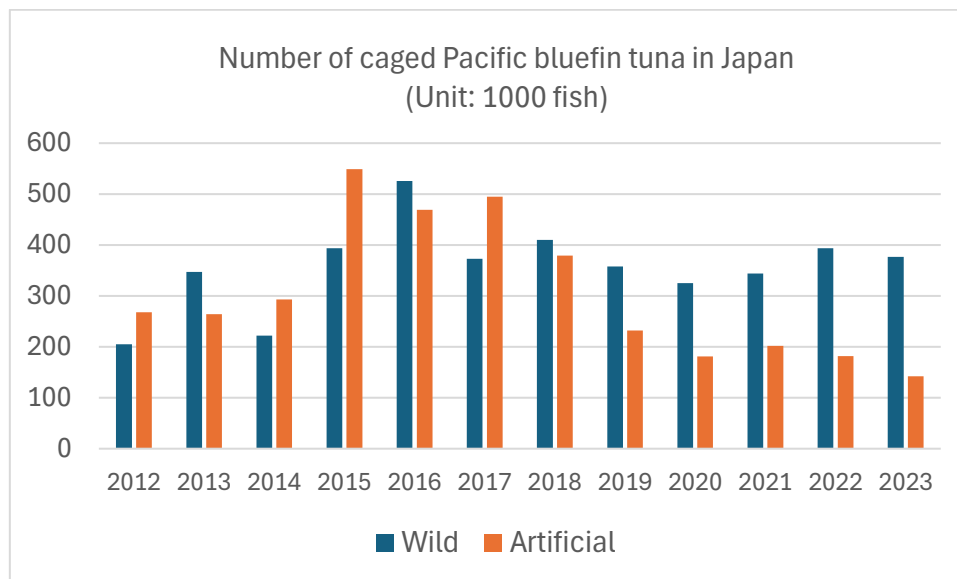
When I was employed as a researcher at the Fisheries Agency, I wanted to research farming, but I was assigned to the tuna resource research department, which was disappointing. However, I continued to be interested in farming. In 2023, at ICCAT (International Commission for the Conservation of Atlantic Tunas), a plan to use artificially-hatched fries of Atlantic bluefin tuna for farming was announced by Cape Verde (an island nation in the tropical zone west of Senegal in West Africa), which attracted attention, and in 2024 Egypt announced a similar plan. European people are also involved in these plans, and they aim to complete the plans in the next three to four years. In relation to this, I was curious about the state of artificially-hatched fries used for farming in Japan, so I looked into it. The technology for producing artificially-hatched fries of Pacific bluefin tuna has already been established in Japan, but as will be described later, the number of artificial hatched fries used for farming has been decreasing recently. I would like to share my thoughts on the trends related to the production of artificially-hatched fries of bluefin tuna.

History of bluefin tuna farming in Japan

The main events that occurred before the production of artificially-hatched fries of bluefin tuna are summarized below. When I joined the institute (about 50 years ago), the mainstream view in resource research was that sustainable use of wild fish resources through fisheries was more rational than farming in marine fisheries, and farming of tuna species, whose spawning ecology and survival process of larvae were almost unknown, was a fantastic story. However, the decline of resources due to overfishing became evident, and the management of tuna species, such as Atlantic bluefin tuna and southern bluefin tuna, became an international debate. As one of the measures to address these issues, momentum for farming of tuna species gradually increased, and Pacific bluefin tuna was taken up as one of the large-scale projects called the Marine Ranching Project. This project was unsuccessful because it was not possible to produce artificially-hatched fries. However, the practice of catching juveniles of bluefin tuna, called yokowa, with a trolling line and cultivating them in cages gradually spread throughout western Japan. As a result, the purchase price of bluefin tuna for farming rose significantly, which became a problem. Later, purse seiners started to catch larger bluefin tuna than those caught by a trolling line, and kept alive in large numbers, replacing the previous method of keeping alive bluefin tuna caught by a trolling line. In addition, some of the fries used for farming are also cultivated using artificially-hatched fries produced by a technology established by Kinki University.

Trends in production of artificially-hatched fries in Japan

Large-scale farming of Pacific bluefin tuna is also carried out in Mexico, but Japan produces the largest amount. Statistics on bluefin tuna farming in Japan are compiled in detail by the Fisheries Agency of Japan, so we will refer to them and discuss the case of Japan below. First, let's look at the changes over time in the number of artificially-hatched fries and wild ones caged alive (see figure below). One thing to keep in mind here is that the size of artificially-hatched fries at caging is much smaller than that of wild fries.



Quoted from the Fisheries Agency's "Domestic Bluefin Tuna Farming Results in 2023 (as of March 29, 2024)"

Looking at the change in the number of artificially-hatched fries caged alive over time, it increased in the early stages, and in some years, it even exceeded the number of wild fries caged alive, but has since been on a downward trend. On the other hand, the number of wild fries caged alive has remained stable in recent years. The decrease in the number of artificially-hatched fries caged alive is mainly due to the fact that the size of fries at the time of caging is smaller than that of wild fries caught by purse seine or trolling lines, and this results in the higher mortality rate. The number of wild fries caged alive has remained stable, but looking at the details, as mentioned earlier, the number of wild fries from purse seine has increased, while that from trolling lines has decreased. The production weight of farmed bluefin tuna has been on the rise, and although it has decreased slightly in recent years (about 17,000 tons in 2024: see the above reference), it significantly exceeded the wild bluefin tuna catch (about 10,000 tons in 2022: cited from the Fisheries Research and Education Agency's "Trends in International Fisheries Resources"). This is mainly due to an increase in the number of fries from purse seine, which is the main source of farming, and an increase in survival rate due to a shift in the size of fish from small ones caught by troll line to larger ones caught by purse seine.

Plans for Atlantic bluefin tuna farming using artificially-hatched fries and future farming

Will Atlantic bluefin tuna follow the same path as Pacific bluefin tuna in terms of farming? It is unclear what path the artificially-hatched fry production of Atlantic bluefin tuna will take in the future, but if we refer to the trends so far in Japan, which is ahead of the curve in terms of artificially-hatched fry production, we can get some idea. In other words, since there is a precedent in Japan for this activity, it is likely to be successful sooner or later. In the next stage, as in the case of Pacific bluefin tuna, it will encounter the competition with wild fries. This is a fairly high hurdle that farming with artificially-hatched fries in Japan are currently facing, and it will take time to resolve it. It will also be related to how resource management will develop in the future as resources recover. The trend of the bluefin tuna market is also an important factor. Taking these circumstances into consideration, in the case of the Atlantic bluefin tuna, it is unclear to what extent the use of artificially-hatched fries will take root, and I think it is unlikely that they will replace wild fries. In fact, in the case of the Atlantic bluefin tuna, when the resource condition was

poor, Spain was planning to produce artificially-hatched fries, but since then, the resource has recovered and the current form of farming, which uses wild fish, has stabilized, so at least I have not heard of any major farming countries planning to produce artificially-hatched fries. Cape Verde and Egypt, mentioned at the beginning, are countries that have no track record of bluefin tuna farming in their own countries, so they are probably very interested in artificially-hatched fry production.

On the other hand, According to the Ministry of Agriculture, Forestry and Fisheries' "Green Food System Strategy", the goal is to increase the proportion of artificially-hatched fries in bluefin tuna farming to 100% by 2050. (Incidentally, in Japan, when looking at the shipping weight by origin from artificially-hatched fries and wild fries, the artificially-hatched fries are an order of magnitude lower than the wild fries: see Fisheries Agency's "Domestic bluefin tuna farming performance in 2023 (as of March 29, 2024)").

Japan has decided not to increase the capacity of bluefin tuna farming any more than it is now, and limits the introduction of artificially-hatched fries to certain farms. However, under the WCPFC (Western & Central Pacific Fisheries Commission) has not yet created management rules for Pacific bluefin tuna farming, so it is necessary to quickly proceed with the creation of management rules for bluefin tuna farming, including artificially-hatched fries. In the resource management of Atlantic bluefin tuna, the majority of the bluefin tuna caught is used for farming, so detailed rules have been established for this. Furthermore, Egypt, as mentioned above, is to create a draft recommendation for the management of artificially-hatched fries. It will be interesting to see what kind of recommendation will ultimately be formulated.