

Effective Use of ATP Test (Kikkoman A3) and “Histamine Test” in a Fishery Processing Plant

Maruha Nichiro Retail Service Co., Ltd.

Information

Year established :
2005 (Changed to current company name in 2016)
Head office address : 3-5-10 Irfune, Chuo-ku, Tokyo
Business :
Import, processing, and sales of marine products and processed foods; freezing and refrigerated warehousing of foods

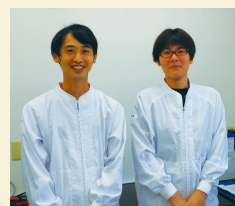
Number of employees : 190
Sales : 13.7 billion yen
(fiscal year ending March 2020)
Website : <http://www.mnrs.co.jp/>
Exterior view of Yaizu Factory
(2297-16 Fujimori, Yaizu-shi, Shizuoka) ▶



Interviewees

Quality control section,
Yaizu factory
Quality control department

Mr.Kaneto Fujii and
Ms.Eri Sugiyama



Maruha Nichiro Retail Service Co., Ltd. is a company of the Maruha Nichiro Group, known as a national brand in fishery processing, and is mainly engaged in the commercial processing of tuna.

The quality control section at the company's Yaizu factory conducts microbiological testing, ATP Test (Kikkoman A3) “Histamine Test”, and physical and chemical tests. The company has already acquired HACCP certification for its seafood processing facilities from Japan Fisheries Association to ensure safety, hygiene, and quality control, and is looking to acquire ISO 9001 and FSSC 22000 certification in the future.

In order to ensure the stable shipment of safe and reliable final products, it is important to strive for continuous

improvement using the PDCA (Plan-Do-Check-Act) cycle based on the results of various inspections of final products, intermediate products, raw materials, and the environment. In order to shorten the time required for voluntary testing and reduce costs, the company has adopted the ATP Test (Kikkoman A3) kit (the “Lumitester Smart” measurement device and the “LuciPac A3” series of reagents) and the histamine test kit “Check Color Histamine” (“Histamine Test” for Global Market) manufactured by Kikkoman Biochemifa Company as an alternative, simple, and rapid testing method. This time, we interviewed Mr. Kaneto Fujii, Quality control section, Yaizu factory, Quality control department, about the use of simple and rapid alternative testing methods (test kits).

POINT

ATP Test (Kikkoman A3)



Microbiological testing takes at least a day or more. In order to shorten the time and reduce the cost of voluntary inspections, we adopted the ATP Test (Kikkoman A3), which reveals the contamination status (cleanliness) of the environment on the spot in a timely manner.

Background/Issues

Results of implementation

Benchmark values and inspection frequency

Since we can see the results in real time, it has a great effect in improving the level of hygiene management and raising awareness of hygiene in the workplace. The system has also been very effective in educating foreign technical intern trainees. When we need to re-clean, the number of the microbiological test samples has clearly decreased.

The benchmark values are set as “Pass”, “Caution”, and “Fail” for each inspection point. Before producing, the staff of the quality control section inspect 10 locations. The ATP Test (Kikkoman A3) is also applied to the areas where the results of the previous day's microbiological test were not good.

“Histamine Test”



We used to outsource the testing to an external organization, but we implemented “Histamine Test” to reduce the cost by testing in-house and shorten the time for results.

The shortening of the inspection time was remarkable.

It is used for raw material testing. About 10 samples are handled per week. In addition to voluntary inspections, periodic external inspections are outsourced for the purpose of validation.



Inspect 10 locations before work with flexible benchmark values

First of all, please tell us the reason why you introduced the ATP Test (Kikkoman A3).

Since our factory mainly processes unheated tuna for consumption, prevention of secondary contamination from the environment is an extremely important control point. We have been conducting microbiological tests for a long time, but it takes at least a day to get the test results that involve culture. By the time we get the results, the product has already moved on to the next process. For this reason, we thought that the ATP Test (Kikkoman A3) would be extremely effective in determining the contamination status (cleanliness) of the environment on the spot, in a timely manner.

How do you set the target (location), timing, and person in charge of the inspection?

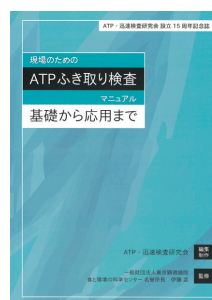
Before producing, the quality control section staff inspects 10 areas, focusing on those that are ‘likely to remain dirty’, or those where ‘microorganisms have been detected in the past’. Shafts of silent cutters and shooters of weighing machines (computer scales) are a good example of structures that are difficult to clean. Areas that did not show good results in the microbiological test on the previous day are also subjected to the ATP Test (Kikkoman A3).

We do not give prior notice for the inspected areas, because it does not make sense to clean specific areas just for inspection in hygiene management. When using the ATP Test (Kikkoman A3), I think it is important not to lose sight of the original purpose of the test, which is to ‘clean the entire work environment and, as a result, control the number of bacteria in the final product’.

Specific inspection points are chosen by the benchmark of “ATP Hygiene Monitoring Manual for the Field: From Basics to Applications” (*supervisor: Takeshi Ito, editor: ATP and rapid test forum*) and receiving information from other factories within the group. We are still looking for the right inspection point, which increases ATP Test (Kikkoman A3) location.



The factory mainly produces processed tuna products that are eaten without heating. In addition to our own product, we also handle contract manufacturing products.



“ATP Hygiene Monitoring Manual for the Field: From Basics to Applications” supervised by Takeshi Ito, edited by ATP and rapid test forum (2016)



The ATP Test performed in the factory.



What is your approach to setting the benchmark values?

“Pass”, “Caution”, and “Fail” are set for each inspection point. Benchmark values are set based on Kikkoman Biochemifa Company relative values, related books, and examples from other factories (Shown in table). Difficult cases to set a benchmark value, we

use the idea of setting a provisional benchmark value at a level where about 80% of the test subjects pass the ATP Test (Kikkoman A3). The benchmark values are reviewed on an ongoing basis.

(Example) : Rank of cleanliness using ATP Test

< Cut off line >

	Clean ←			Cleanliness level			→ Dirty			
Cleanliness level →	1	2	3	4	5	6	7	8	9	
Measurements (RLU)	<100	101~500	501~1000	1001~2500	2501~5000	5001~10000	10001~25000	25001~50000	>50000	Total of each rank
(Left) Large shooter										
(Right) Large shooter										
(Left) Small shooter										
(Right) Small shooter										
White shutter										
Returned strainer										
Returned tray										
Slicer belt										
Back side of workbench										
2F: Table										
2F: Small belt										
2F: Blue shutter										

< Thin sliced fish line >

	Clean ←			Cleanliness level			→ Dirty			
Cleanliness level →	1	2	3	4	5	6	7	8	9	
Measurements (RLU)	<100	101~500	501~1000	1001~2500	2501~5000	5001~10000	10001~25000	25001~50000	>50000	Total of each rank
Plate of silent cutter										
Shaft of silent cutter										
Inside of the hopper										
Around the drum shaft of molding machine										
Wagon for lifting										

Explanation of the rank of cleanliness

→ The numbers in the table indicate the number of times the measurement results are applied to each of the ranges in the ATP Test before production.

Depending on the test objects, there are various circumstances making it difficult to obtain uniform results. The numerical values can help us determine whether the result of cleaning was good or not.

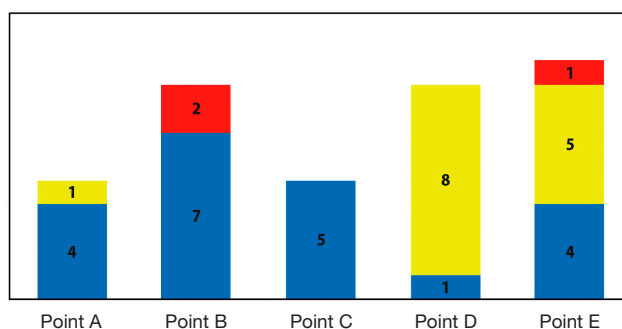
Greater the numbers in ranks 1 to 3, the cleaner the area is.

If there are high numbers in ranks 7 to 9, there is no need to panic, but it is an area where you should work on improving your cleaning methods.

The benchmark values are classified into three levels: “Pass (green)”, “Caution (yellow)”, and “Fail (red)”. The table on the left is used to check the distribution of RLU values every month (the number of samples is entered into the table). By graphing the distributions as shown on the right, the hygiene management status is visible.

Rank distribution image

■ 0~1,000 ■ 1,001~10,000 ■ 10,001~





High effectiveness for on-the-spot hygiene education

ATP Test (Kikkoman A3) is effective in raising awareness of hygiene management and hygiene education because the results could be obtained on spot.

In the case of microbiological tests, the results cannot be shown on the spot, so we inevitably have to explain a few days later, for example, “This is where the contamination was found”.

A test result from few days ago is difficult for them to understand what exactly they need to improve.

On the other hand, with the ATP Test (Kikkoman A3), the contamination status (cleanliness) is indicated by a numerical value, and you can see the results on the spot. Since numbers are universal, it is very easy to understand that if the measurement is low, it is clean; if it is high, it is dirty.

ATP Test (Kikkoman A3) can show results with numerical values on the spot, and it has been very effective, since our factory employs foreign technical intern trainees. We can explain “The values are high here, so this area is still dirty. You need to preform re-cleaning”, while showing the numerical values on the spot. Thus, it has a great impact as a hygiene education tool.

Is there anything that you do to communicate the results?

In addition to showing the test result real time at the site, a graph stating the transition of the inspection results is posted in the cafeteria. Each graph is displayed in red, yellow, and green like traffic lights. Employs can intuitively grasp the status of the results “Pass”, “Caution”, and “Fail” at a glance. Since the results are visualized and everyone uses the cafeteria, it is easy to understand “the status of my working location” while eating. We try to update the data to the latest version, because same poster on the wall might become a landscape.

Huge effect in improving the level of hygiene management and raising awareness of hygiene

Do you feel that there are any advantages implementing the ATP Test (Kikkoman A3)?

Since we can see the results in real time, it has been very effective, especially in terms of improving the level of hygiene management and raising awareness of hygiene in the field. In addition, there are times when we notice that something looks clean but is actually dirty, which leads us to improve our hygiene management system. Incidentally, when re-cleaning is carried out, microbiological tests are performed, and the number of specimens has been clearly reduced.

We will continue to make effective use of the ATP Test (Kikkoman A3) in order to maintain a high level of hygiene awareness.



The results of the ATP test is posted in the cafeteria as an easy diagram, including improvement points for the future. In addition, the company is making efforts to raise awareness of hygiene and production management among workers by effectively using posters. Since we have many foreign staffs, each bulletin boards are created in multiple languages.



Time- and cost-reduction of voluntary inspections

How was the decision made to implement “Histamine Test”?

The Maruha Nichiro Group formulated the “Guidelines for Histamine Management” (referred to as the ‘Guidelines’), which is positioned as a common set of rules for histamine management in 2011. The guidelines specify the target fish species, testing methods, and benchmark values for histamine testing.

As for the testing methods, the guidelines stipulate that testing methods of equivalent accuracy to the official methods (HPLC and fluorescence methods) must be used. Our factory used to outsource the testing to an external organization but decided to switch to a simple and quick test kit in order to reduce costs through in-house inspection and shorten the time required to get the results.

As a result of our study, we are now using “Histamine Test” for all voluntary histamine tests. In the past, it used to take up to two weeks to get the test results, but now it takes just a few hours.

In addition to voluntary inspections, we also outsource periodic external inspections for the purpose of validation.

Emphasis on raw material inspection, with product inspection as validation

Please explain the subject of the test and the benchmark values.

Basically, it is used for raw material testing. We handle about 10 samples per week, based on inspection by lot. We also conduct product inspections twice a year to confirm the adequacy of our process control. The benchmark values are specified in our guidelines as 50 ppm for raw materials and 200 ppm for finished products. Our benchmark values are based on the standards of the U.S. Food and Drug Administration (FDA) and the Codex Alimentarius Commission (there is no benchmark value set for histamine in Japan).

Why do you put so much emphasis on the inspection of raw materials?

The tuna that we use as raw material is frozen in the ultra-low temperature zone immediately after being caught. After receiving them at the factory, there is no need to think about the possibility of histamine production, as the factory is under strict control via low temperature. Moreover, in the case of tuna, any mismanagement that results in the production of histamine will cause enough discoloration to be determined visually. For this reason, our histamine management focuses on the raw material stage of testing. In our HACCP plan, we do not have a CCP for histamine, and we manage it by PRP.



A trend of an increasing need of histamine testing, with a simplified method allowing anyone to perform accurate testing

Do you feel that histamine testing is becoming more important?

We also undertake contract manufacturing of other companies' products (in addition to our own). Some of our business partners have obtained FSSC 22000 certification, and the importance of quality control is expected to increase in the future. As a result, the number of histamine test samples will undoubtedly increase in the future.

Inspections are conducted by staff whose skills have been verified through cross-checking with the Institute of Food Hygiene of the Japan Food Hygiene Association. In preparation for the increase in the number of specimens in the future, we are considering training test personnel (i.e., making current staff more versatile). Since "Histamine Test" is simple to operate, accurate testing can be done without special knowledge or skills. Therefore, we believe that we will be able to handle the increase in the number of specimens in the future.

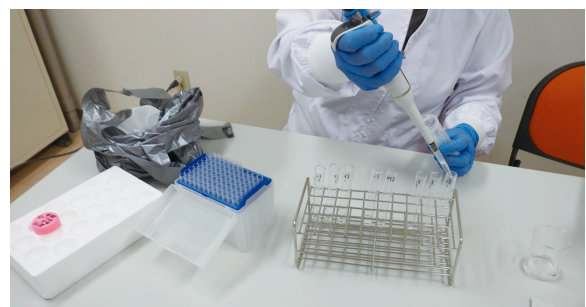
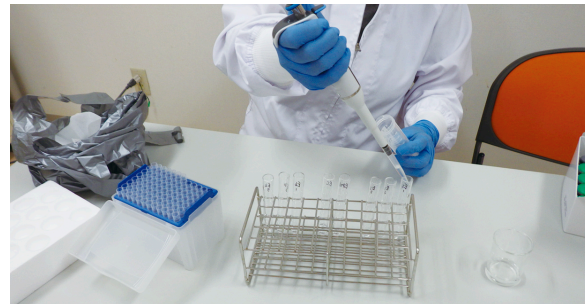
In addition, FSSC 22000 has requirements for test accuracy, and "Histamine Test" and "LuciPac A3" have obtained PTM certification (Performance Tested Methods) by AOAC-RI. Therefore, in international distribution, it is recognized as an alternative method that has been validated for consistency with the official method, and its test results are accepted with a high degree of confidence.

About AOAC-RI PTM Certification

The AOAC Research Institute (AOAC-RI) is one of the divisions of AOAC INTERNATIONAL, a U.S. academic organization on analytical methods for food, pharmaceuticals, cosmetics, etc. One of its major activities is validation of microbial detection and identification methods.

Based on the results of validation, AOAC issues two types of certifications: Official Method Analysis (OMA) and Performance Tested Method (PTM). 8 to 12 laboratories participated in the validation process for OMA and one laboratory for PTM. OMA-certified test methods have been adopted as national standard methods in many countries, including the U.S. (they have gained credibility as international standard methods alongside MicroVal in the Netherlands, NordVal in Norway, and AFNOR in France). In addition, PTM-certified test methods are highly trusted in situations such as the international distribution of food and pharmaceuticals as analytical kits that have been evaluated for accuracy of results, reproducibility, and detection limits.

Measurement using "Histamine Test"



Histamine can be measured easily and quickly with high accuracy by simple pretreatment of specimen and pipetting.

kikkoman
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