

# Overview of HACCP Implementation in Singapore's Fish Processing Industry

**Chew Su-Pei\* and Chiew King-Tiong\*\***

*\*Head, Meat and Fish Processing Plant Section, Veterinary Public Health & Food Supply Division,  
Agri-food and Veterinary Authority, Singapore*

*\*\*Head, Food Inspection Services Branch, Veterinary Public Health & Food Supply Division,  
Agri-food and Veterinary Authority, Singapore*

## ■ ABSTRACT

The Hazard Analysis Critical Control Point concept (HACCP) is gaining increasing attention internationally as the system of choice for ensuring food safety and is also becoming an important component for international trade and market access. In Singapore, the Veterinary Public Health and Food Supply (VPHFS) Division of the Agri-food and Veterinary Authority (AVA) has recently mandated HACCP requirements for meat, poultry and fish processing. This paper reviews the current status of the fish processing industry in Singapore and their progress in the application of HACCP.

## ■ Introduction

The Veterinary Public Health and Food Supply (VPHFS) Division of the Agri-food and Veterinary Authority of Singapore (AVA) is the competent agency responsible for the inspection and licensing control of all fish processing establishments in Singapore. AVA's primary concern for the local fish processing industry is to ensure the wholesomeness and public health safety of the fish and fishery products for human consumption as well as to meet with the health and sanitary requirements of the importing countries in respect of the plants' exports and premises.

Presently, AVA licenses a total of 103 fish processing establishments. A wide range of fish and fishery products are manufactured at these establishments. They include comminuted fish products which mainly consist of the traditional fish jelly products such as fish balls and fish cakes, Chinese delicacies such as shark's fins and sea cucumber, frozen and chilled raw seafood of a wide variety of species, crustaceans

and molluscs as well as canned seafood products. The majority of the fish processing establishments produce for the domestic market. However, there are those that process mainly for export.

Regular inspections are carried out at the processing establishments to ensure their compliance with AVA's mandatory requirements and to monitor closely their performance and standards of hygiene. AVA adopts a Hazard Analysis Critical Control Point (HACCP) approach in conducting food safety inspections at these establishments.

## Fish Processing Industry

■ The fish processing industry in Singapore can be divided broadly into two categories, namely the export-oriented processing establishments and the local processing establishments.

### 1. Export-Oriented Fish Processing Establishments

Export-oriented fish processing establishments export their fish and fishery products to a number of countries such as the European Union, Australia, China, Cyprus, Hong Kong, Indonesia, Israel, Korea, Maldives, South Africa, Switzerland, United States of America, etc. Some of the common fish and fishery products exported overseas are, frozen raw fish, crustaceans and shellfish such as tuna, shark, swordfish, dory, prawn, shrimp, mussel, scallop, squid etc. and processed fishery products such as frozen surimi-based products, canned seafood products etc. To facilitate the industry's exports abroad, AVA provides health certification services for them. As part of the certification programme, production

processes of the products destined for exports are monitored closely to ensure that they comply strictly with the requirements imposed by the importing countries and that the sanitary and hygiene standards of the establishments are maintained at the highest level at all times. Besides regular inspections of the facilities and production lines, HACCP records and documents are also audited and verified at the premises. Samples of the products are also collected for the relevant laboratory tests i.e. microbiological tests, chemical tests, heavy metals, freshness test etc. Health certificates are then issued pending satisfactory laboratory results.

Many of the export-oriented processing establishments have readily adopted Good Manufacturing Practices (GMP) at their premises and have set HACCP in place to meet with the importing countries' standards and requirements. Workers are also usually trained and have been cultivated to observe food hygiene and sanitary practices at all times during processing.

## 2. Local Fish Processing Establishments

Local fish processing establishments consist of mainly small to medium sized enterprises. Many of which are family-owned businesses with operations that rely heavily on labor intensive methods. Some of the products processed by the industry include fish jelly products such as fish balls, fish cakes, chilled /frozen seafood, shark's fins, sea cucumber and dried seafood products.

Most of the fish processing establishments are relatively small, typically of 90 - 120 square meters. The physical space constraints can give rise to poor housekeeping and maintenance of the premises and increase chances of cross contamination between the cooked and raw food. In addition, many of the workers have inadequate knowledge of food hygiene and sanitation. Hence, personal hygiene, quality control and food safety programmes are more often than not given sufficient attention.

### ■ Progress and Status of Implementation of HACCP in Local Fish Processing Industry

The application of HACCP concept to the fish processing industry has gained an increasing popularity in many developed countries in recent years as a system of choice for enhancing food safety and quality. It has been greatly recognized and accepted that the basic principle underlying the HACCP concept is that it is

possible to identify and control potential hazards and faulty problems at an early stage in food production, and thereby, preventing them from constituting risks to consumers or economic burden to the industry. This is the key advantage of HACCP over the other conventional approaches such as inspection and end-item testing, where a negative result can only be remedied when detected but does not prevent the occurrence of the hazard in the first place. As a result, many of the developed countries have integrated this system into their food inspection services programme and national legislation. Some of these countries now required their domestic industry as well as those that export fish and fishery products into their markets to adopt the same concept in their operations.

The concept of HACCP was brought into the food legislation in the European Union (EU), after the adoption of the EU Food Hygiene Directives in June 1993. Under the directive, food business operators are required to identify steps in their processes and activities that are critical to achieving food safety, and to ensure that adequate safety procedures are identified, implemented, maintained and reviewed based on the principles of the HACCP concept. To comply with this directive, the EU-approved fish processing establishments in Singapore have readily adopted the principles and applications of this concept and implemented it into their production operations

The introduction of the US Food and Drug Administration regulation which mandates the application of HACCP in the processing of all fish and fishery products imported into the US in December 1998 was another compelling force for export-oriented processing establishments to adopt and implement HACCP.

Over the years, some export-oriented fish processing establishments have taken a leap in progress as they move from quality control to company-wide quality assurance by achieving ISO 9002. With increasing awareness of the HACCP concept, more plants have also developed HACCP Plans in addition to their quality management systems to achieve both safe and quality products for consumers. This definitely enhances their sales and exports to overseas markets. In fact, meeting the export requirements of importing countries has generally been a strong motivation to the application of the HACCP concept by the establishments. Thus, the concept is better accepted and increasingly integrated

by fish processing industries that are targeting their products towards the export market.

Export-oriented processing establishments are generally those which are better supported by resources in terms of financial capabilities, qualified personnel and facilities. With these, they are able to advance themselves to compete with the world market.

On the other hand, local establishments have not embraced this concept into their operations so readily. Most of the progress achieved in implementing the HACCP concept has been found in the larger processing establishments. Small business is bound to have greater difficulties in adapting to this system as they have little or no incentive to do so. Unlike the export-oriented processing establishments, the implementation of this concept in the smaller enterprises is also hampered by insufficient technical resource base and training and the high turnover of plant personnel.

Nevertheless, considerable improvements have been made at the local processing establishments over the past 5 years. Many of these establishments have striven to improve on the standard of hygiene and sanitation and Good Manufacturing Practices (GMP) at their premises. They have also begun to be more receptive towards the use of new technology in processing and are more willing to work towards automating their production process. Many of the processing establishments have also been resettled or upgraded to newer and larger premises where better production operations and flows can be achieved. AVA continually provided assistance to licensees who are interested in setting up new establishments as well as those who have intentions to upgrade their existing premises. At the same time, AVA also provided them with technical and scientific guidance and advice on public health safety, hygiene and sanitation matters and ensure that all the mandatory requirements are clearly understood.

New and upgraded premises are generally well designed and equipped with appropriate facilities for food processing operations. The management of these processing establishments have also come to acknowledge the increasing and pressing need and importance to train their employees in GMP and imparting to them principles of food hygiene and sanitation. With the knowledge and understanding, employee will be more aware of the critical role they play in ensuring food safety and the

possible consequences that may take place resulting from their negligence.

### ■ AVA's Approach to the Implementation of HACCP

In December 1999, The Wholesome Meat and Fish Act was enacted. AVA is responsible for the administration of the new Act, which regulates the slaughtering of animals and the processing, packing, inspection, import, distribution, sale, trans-shipment and export of meat and fish products.

One of the key features of the new Act is the requirement for all meat and fish processing establishments in Singapore to develop and implement a food safety programme at their premises. In view of the numerous benefits arising from the implementation of HACCP and the need to align itself with international food safety requirements, AVA mandated the HACCP requirement for all meat, poultry and fish processing. The details and scope of each system would be dependent on the size and nature of the business as well as the risk of the food products.

Although the implementation of a complete and fully documented HACCP system was only made a mandatory requirement recently, AVA had been encouraging the industry to move in this direction as early as 1995. AVA had been actively communicating the basic principles and necessary information required for its effective implementation to the various establishments. As the regulatory authority, AVA had continually assessed the appropriate means of implementation of the HACCP system by the establishments. Follow-up inspections to these establishments to ensure their consistent application of the system and to verify and audit their relevant documents are also performed regularly.

The implementation of HACCP in production systems in Singapore is still in the infancy stage, although marked progress have been seen in the export-oriented fish processing establishments. In recent years, some of these processing establishments have enlisted third party accreditation organizations to audit their HACCP plans and systems. Following successful auditing of the system, processing establishments had been awarded certifications under various HACCP schemes. Audit checks are performed regularly to ensure that the HACCP plans are correctly administered and that the system is working effectively. The HACCP plans and systems are also

reviewed continuously and verified accordingly to reflect the most current changes of production processes.

Following the many episodes of food poisoning outbreaks around the world, many processing establishments have begun to realize the importance and urgency of implementing a reliable and effective food safety system for their production processes. Many have come to acknowledge the long-term benefits brought about by HACCP as more processing establishments are seen engaging expert consultants in the design and implementation of HACCP plans and systems.

Although the government has made HACCP a mandatory requirement, the driving force lies heavily on the industry's eagerness and commitment to develop and implement effective food safety systems to make this initiative a success.

With the advent of mandatory HACCP at the processing establishments, the roles and responsibilities of inspectors have also evolved from traditional inspection methods towards one involving assessment and verification of systems. Inspectors would now need to shift the emphasis from end-product examinations to a more preventative approach. With HACCP, results of the monitoring reports and relevant information and data captured in records will offer inspectors the opportunity to obtain a complete and accurate picture of the effectiveness of the control over a process for a long period of time.

#### ■ **Problems/Difficulties Encountered by Industry**

Unlike the export processing establishments, the implementation of HACCP in smaller enterprises has generally been slow.

Time constraint and resource requirements of HACCP implementation are the common deterring factors cited by processing establishments. Economic concerns such as high cost of training employees and operating the system are also some of the reasons processing establishments hesitate in adopting the HACCP system. This is especially so in the smaller establishments. Another critical factor that has been hindering the acceptance and practical implementation of HACCP in processing establishments is the limited understanding of its principles and application as well as the misconceptions of the HACCP strategy.

The following are some common misconceptions of the HACCP strategy:

#### 1. **HACCP is a quality control programme**

HACCP is commonly misinterpreted as a quality control programme. It must be stressed that HACCP is a food safety programme. The quality of the product may improve, however, as a side benefit of the HACCP activities. By introducing quality enhancement components into HACCP plans is highly discouraged as the plans would become too complex and the focus of the system, which should be to improve food safety can often be undermined.

#### 2. **HACCP replaces GMP**

It must be understood that neither programmes are replaceable. Instead they are complementary to one another. Both programmes must be in place to ensure that production operations and the factory environment are in optimal conditions for producing safe and wholesome foods. HACCP is not a stand-alone programme. For its effective implementation, essential pre-requisite programmes such as GMP and Sanitation Standard Operating Procedures (SSOP) have to be in place.

#### 3. **HACCP is a paper exercise**

In some processing establishments, HACCP is sometimes treated as a paper exercise. It must be stressed that a HACCP system is a living and dynamic programme. In practice, a plan should reflect the status and changes in the production operations. In certain ways, it may be true that HACCP inevitably introduces more paper work. However, records and documentation are critical for the system to work systematically and effectively. More importantly, it allows for traceability.

#### 4. **HACCP implementation involves only the HACCP team and consultants**

Contrary to the misconception, HACCP involves the whole company. The top management has to be committed in providing full support to the HACCP team who in turn has the responsibility to guide and lead employees at the production lines. The empowerment of employees is often lacking at the processing establishments. The devolution of responsibility at some

traditional processing establishment seemed to be difficult for management and supervisory staff to accept. By empowering suitable and competent employees, problems can be arrested rapidly with little or no loss in process control. At the same time, employees will develop a sense of responsibility and pride as they discharge their duties.

#### 5. HACCP is intended to add a new layer of technically trained personnel

Some processing establishments may employ a few technically trained personnel or consultants to aid in the design and implementation of the system. However, the core group of people administering the HACCP plan should be the present employees, who are familiar with the establishment's facilities and production operations. Processing establishments need not re-hire. Instead, more relevant training should be provided to their existing workforce. The tendency is that many processing establishments rely solely on their consultants to develop HACCP schemes that may be unrealistic in practical terms.

#### 6. HACCP cannot work in Small and Medium Size Enterprises (SMEs)

SMEs often associate the adoption of HACCP as a criterion with which only those who intend to export their products overseas must comply. With the HACCP mandatory requirements, all processing establishments would be required to develop and implement an effective system. Where potential food hazards exist, HACCP can be applied to control them in all food producing situations.

#### ■ **Strategies to Overcome Problems/ Difficulties Encountered by Industry**

In Mar 2000 the Singapore Productivity and Standards Board (PSB) in collaboration with AVA and the Ministry of the Environment (ENV) initiated a project entitled "Journey to HACCP" for the industry. The objectives of the joint project were to introduce HACCP to the local processing industry and to equip them by means of training with the necessary skills and tools for the effective implementation of HACCP system. It shall serve as a springboard from which the local industry can be trained in HACCP, learn to apply the concept practically in their production operations and

eventually implementing it at their premises and having full ownership of the system.

The key features of the project are:

- Training sessions based on generic HACCP plans (product specific) would be conducted for the processing establishments.
- Processing establishments shall adopt and make adjustments to the generic HACCP plans to suit the production activities at their premises.
- During the implementation phase, processing establishments can engage a "shared HACCP Manager" to assist with the monitoring and verification of the system. At the same time, the HACCP manager can also provide ongoing training for the employees of the establishment. The cost of hiring the HACCP manager could be shared amongst the processing establishments.

During the development and implementation stages, processing establishments could engage the assistance of consultants whenever they deem necessary. By enlisting help only when required, the cost of implementation could be kept to a minimum. Besides defraying cost, this scheme also allows the processing establishments to be fully involved throughout the design and implementation phases of HACCP at their premises.

This scheme is optional. Processing establishments may explore other avenues to implement HACCP successfully.

To facilitate the processing establishments' implementation of HACCP, AVA would continue to support the industry by providing them with technical assistance in the form of training, talks and seminar as well as undertaking collaborative studies and initiatives with the processing establishments.

As an incentive for the local industry, the Government has also provided financial assistance for consultant cost under the Local Enterprise Technical Assistance Scheme (LETAS). Processing establishments can apply for grants of 70% (up to a maximum of S\$14,000) are provided for consultant cost and 50% (up to a maximum of S\$5,000.00) for certification cost.

#### ■ **Audit and Certification of HACCP Systems**

Once a HACCP system is implemented, continuous assessments of the systems are essential to ensure that it is working effectively and accurately. Assessments may be carried out at two levels: (i) internal audit carried

out by the processing establishment and (ii) independent assessment carried out either by the regulatory agency or third party organizations.

The audit and certification process would validate the effectiveness of a HACCP plan and provide verification of compliance of the HACCP system with the HACCP plan. Certification also confirms that HACCP system is able to provide adequate and appropriate food safety controls to ensure that the food produced are safe and wholesome.

Anticipating the growing number of HACCP systems that will be implemented at processing establishments, AVA is currently looking into the possibility of accrediting third party organizations that are competent to perform the audits and certifications. Such third party auditors will have to be certified and possess the key competencies relevant to the food operations they audit. Accredited auditors will audit and certify HACCP systems implemented in the processing establishments on behalf of the regulatory authorities/AVA.

### ■ Future Developments

HACCP has evolved over a number of years and without doubt, it has been accepted by both regulatory agencies and industries worldwide as a revolutionary system for improving food safety. It is also rapidly becoming the “food passport” to the international market place as more countries are making the application of HACCP mandatory in their legislation. In recent times, having a fully implemented HACCP system in a processing establishment is no longer considered an added advantage but a necessity to meet with regulatory requirements and to engage in international trade.

Entrusted with the responsibility of controlling and monitoring the fish processing industry in Singapore, AVA takes on an active role in helping the processing establishments in improving and upgrading their standards of hygiene and sanitation at their premises, enhancing the application of HACCP

in their production operations as well as in the advancement of processing technology.

In this connection, AVA will continue to vigorously pursue the following:

- To assist processing establishments in enhancing the safety and quality of their food products by providing relevant technical training courses, seminars and talks on GMP, public health and food safety concerns and specialized subjects such as HACCP to the various levels of personnel from the industry. This aims to create a constant awareness on the issue of food safety amongst the industry and to help train their personnel.
- To assist the fish processing industry in the application of HACCP in their production operations by means of relevant schemes and available funding. The HACCP committee is also currently reviewing the Third Party Auditors Scheme where HACCP Audit and Certification Procedures and Auditor Approval Criteria would be developed.
- To encourage the fish processing industry to move into areas of research and development to improve their processing technology and produce value-added fish products. As Singapore has limited natural marine resources, it is crucial that her local fish industry constantly upgrades and improves itself to stay competitive and to continue to create a niche for itself in the overseas markets.

### Reference

Chew, S.P. and Chiew, K.T. 1996. Control of Fish Processing Establishments in Singapore. In: Proceedings of the Seminar on Advances in Fish Processing Technology in Southeast Asia in relation to Quality Management, 1996, Singapore: 68-71. Marine Fisheries Research department, Southeast Asian Fisheries Development Center.