

THAILAND

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INTRODUCTION

HACCP, which stands for Hazard Analysis and Critical Control Point, clearly expresses its approach to food safety, which is to identify the pertinent hazards and establish control measures to prevent them. Since the process of designing such control measures requires a science-based judgment, the HACCP system, if developed and implemented effectively, can assure product safety (though not 100%) and has become acceptable worldwide for food safety improvement.

HACCP becomes well known when developed countries like the US and EU have incorporated it into their food regulations. The new HACCP regulations, 21CFR 123 of the USFDA and the directive 94/356/EC of the EU, impose fish processors to be responsible for identifying hazards that are likely to occur and for establishing critical control points to prevent or reduce contamination. Thailand, as a fish processing country, has also adopted the HACCP program and made it

mandatory to its export-oriented fish processors since 1996 under the jurisdiction of the Department of Fisheries, the competent authority responsible for inspection and export certification of fish products.

As in many other countries, the HACCP principles were not thoroughly understood and difficult to apply effectively at the early stages of its implementation. Lots of trainings were organized for both private sectors and regulators to enable them to have a better understanding on the HACCP, which should not be seen as a trade barrier, but as measures to ensure product safety. 2003 is the sixth year since HACCP was implemented in Thailand. Though there are still a few problems faced, it has been much less than in the beginning. This report will describe the progress made in the application of HACCP in the export fish industry in Thailand, problems encountered, and planned strategy to overcome the problems.

PROGRESS MADE IN THE APPLICATION OF HACCP

The Department of Fisheries' (DOF) HACCP requirements mandate fish processors to conduct an analysis to identify hazards that are reasonably likely to occur and develop, as well as to implement plan to

control them. Apart from the HACCP plan, the processors are also required to develop the written procedures for controlling GMP and implement it to avoid the spreading of contamination from working

environment to the product. Examples of those controls are condition and cleanliness of construction and equipment, control of personnel hygiene, control of pests, etc. When the submitted documents are deemed to be satisfactory in accordance with food safety requirements, the DOF will proceed to in-plant audit to verify its compliance. The processors need to rectify the non-compliances found from the audit within the agreed time frame. The processor will be graded as

'compliance' only when the follow-up audit shows that all corrective actions are taken. The HACCP certificate will be issued upon request from the processor. The first issue will be valid for 6 months and thereafter will be in accordance with its later assessment records. The DOF will conduct an audit at the frequency of 2 - 4 times per year for each processor depending on its previous audit results.

Table 1. Number of fish processing plants implementing HACCP

Processing type	2000		2001		2002		2003*	
	R	H	R	H	R	H	R	H
1. Frozen	118	91	124	120	153	150	161	153
- shrimp		(77%)		(97%)		(98%)		(95%)
- cephalopod								
- fish								
- value added								
- surimi								
- surimi based products								
2. Canned	30	23	34	32	38	36	43	38
- tuna		(77%)		(94%)		(95%)		(88%)
- sardine/ mackerel								
- shrimp								
- bivalve mollusk								
- cephalopod								
3. Traditional	26	10	29	15	38	30	40	31
- salted		(38%)		(52%)		(79%)		(78%)
- fermented								
- dried								
- fish sauce								
- shrimp paste								
Total	174	124	187	167	229	216	244	222
		(71%)		(89%)		(94%)		(91%)

* as of June 2003

R: registered processors

H: HACCP implemented processors

FISH PROCESSING INDUSTRY IN THAILAND

The fish processing establishments in Thailand can be classified into three groups according to their products, that is, freezing plants, canneries and traditional fish products plants. The products from freezing plants include frozen shrimp, fish and cephalopod. Canneries products include canned tuna and other canned fish. Traditional products include dried and fermented fish, and chili shrimp paste.

Canneries and freezing plants sector show better progress in implementing HACCP in their premises than traditional fish products plants. This is because most canneries have developed the control procedures and carried out monitoring and recording as required in low acid canned food regulations of the USFDA and Canada even before HACCP came into force. This eases the development and implementation of HACCP in their premises. In addition, it was a common practice for the established cannery to have buyers or appointed agency to inspect their premises. This practice, similarly, enable the cannery to understand the proper control of particular hazard.

Unlike the established cannery, new canneries often do not have sufficient experience in quality control and/ or lack experienced staff to establish the appropriate control in processing.

Deficiencies found in canneries, at the beginning of HACCP application, were often associated with inappropriateness of written plans, e.g. invalid critical limit, inadequate frequency of monitoring, or inappropriate corrective action procedures. Later on, deficiencies are associated with the practice done, e.g. incompliance of monitoring frequency, corrective action not taken when deviation occur. The incompliance with the monitoring frequency is mostly due to the too stringent design of monitoring frequency, which often impractical in the actual operation. The

most often cases are the frequency of checking the fill weight at filling step and seam tear down measurement at the seaming step. Similarly, the deficiencies in corrective action are often associated with the too restrictive critical limits. In many cases, the product will still be considered safe, thus the processors often choose not to take corrective action, as it is deemed unnecessary. However, from auditor's point of view, noncompliance will be considered failure to comply with the written plan. In this case, the processor can opt to either revise its plan to suit the actual operation and monitoring or strictly follow the plan even though hazard will not actually occur from some certain deviation.

Freezing plants are another group that has been successfully implementing HACCP system. The main products of this group are frozen, raw or cooked black tiger shrimp; frozen cephalopods, both for ready-to-eat consumption and for cooking purpose; frozen fish; and value-added products, such as dimsum, breaded product, and Japanese style product. Some of these frozen products do not need HACCP plan, since there is no significant hazard that likely to occur, either from the raw material itself or from the process. Examples are frozen raw fish (with exception of scombroid group) and frozen raw cephalopods which required heating before consumption. Nevertheless, the non-HACCP product (does not need HACCP) is still required to comply with the minimum standard of GMP and sanitation control to eliminate introducing of contamination from environment onto the products.

Since frozen black tiger shrimp is mostly farm-raised shrimp, it's inevitable to include drug residues that are likely to be used during aquaculture period. In the past, control of this hazard was conducted upon shrimp arrival at the processing plants, where samples were taken for analysis. Acceptance of raw material lot relies

on the test results that sometimes did not represent the whole lot, if shrimp were from different sources and pooled up to be one lot. The more effective control that recently applied will focus on the control at the farm level. Good Agricultural Practice (GAP) has been introduced to shrimp farming. The DOF has conducted training for farmers and provided certification for the compliance farms. Though GAP is currently a voluntary program for the farmers, with effect from 1 Jan 2004, any processors who wish to comply with the DOF's requirements on drug control are required to use raw material only from the GAP farms. The processors are also required to establish system that enable tracing the product back to the source of raw material.

As for the process related controls, especially the cooked products, deficiencies found are associated with invalid critical limits of cooking time/ temperature or too restrictive cooking time/ temperature applied. Invalid cooking process is due to the lack of available studies to identify the proper procedure that is necessary to reduce the *Listeria monocytogenes* to 6D, which is one of the safety requirements. Too restrictive process time/ temperature causes noncompliance with the written plan. Like deviation in cannery, corrective action might not be taken for deviation since processors know that the products are still safe.

The most frequent deficiencies from frozen raw products processing is the invalid critical limit. As pathogenic bacteria were identified as a hazard from raw material, to reduce or eliminate bacteria, the critical control point was set at washing step, thus set critical limit was set as level of chlorine residue in water and water changing frequency. It is difficult to prove during validation whether the set level of chlorine and water changing time will be capable to eliminate the pathogenic bacteria, if present. It is often not mentioned on the actual condition of washing compared with the study condition, the initial load of bacteria, and how to maintain the chlorine levels

as required at all the time of washing.

Traditional product sector is the last group to join implementation of HACCP. It is relatively slower than the cannery and frozen sectors. Traditional fish product sector is dominated by medium and small-scale enterprises. The medium scale establishments are generally more ready in implementing HACCP than small-scale counterparts, where most of their prerequisite requirements are still not yet in place. However, there are more and more traditional fish processing establishments that are successfully implementing HACCP for export purpose.

The government has noted the difficulties of small-scale establishments in achieving the food safety requirements. The main reasons are due to their limited financial abilities and technical knowledge. To ease and encourage industry in developing HACCP system, the Ministry of Industry and the Small Industry Finance Corporation have launched two projects for financial and technical support to the industry. These projects have been successfully operated as proven by the increasing numbers of small-scale establishments that have been granted HACCP certification.

Overall, deficiencies from HACCP implementation were likely associated with CCP determination, invalidated critical limit and impractical corrective action. The processors have the misconception that only CCP can control contamination, hence absence of CCP on certain steps may not satisfy the external auditor. Hence some processing steps that did not really need CCP were apparently determined as CCP. Control procedures of critical limits, monitoring, and corrective actions of such CCP is not correctly targeted on the hazards, thus impractical to follow. Moreover, too many CCP also cause more difficulties to the processors to maintain effectiveness of their HACCP system, as too many factors need to take care of and verify, especially for

the small-scale processors. Another deficiency was related to the prerequisite controls. This was the case when determining if the hazards identified at that particular processing step were significant or likely to

occur. The prerequisite controls e.g. GMP, SSOP were normally referred to as a justification for not being a significant hazard and hence not a CCP. No monitoring and recording to prove the existing of such activities.

EXPORT OF FISH AND FISH PRODUCT

Table 2 shows the value of the major exported fish products from 1999 to 2002. US is the largest market for frozen shrimp and canned tuna, EU is the main

market for frozen cephalopods and Asia in particular Malaysia and Japan for fresh and frozen fish.

Table 2. Exports of fresh and frozen shrimp in quantity (metric tonnes)

Items	1999	2000	2001	2002
1. Asia	63,912	60,037	57,366	47,672
2. US	52,746	65,261	67,167	42,296
3. Canada	4,609	4,498	5,802	4,901
4. EU	7,743	6,612	7,059	1,814
5. Australia	5,906	3,927	3,643	3,209
6. Others	3,189	4,053	3,569	2,861
Total	138,105	144,388	144,606	102,753

It is irrelevant to point out that the application of HACCP increases the export quantity. The figure for HACCP-implemented establishments (Table 1) does not correlate with export quantities (Table 2 - 5). However, it is worth to note that the application of HACCP is something that unavoidably must be carried out if the processors wish to maintain their trading status and seek for the new markets.

The shrimp exports were quite stable from 1999 to 2001 but declined dramatically in 2002, especially to the EU market which decreased by more than 50% from the previous years (Table 2). This is due to the issue of nitrofurans residue in aquaculture black tiger shrimp. It has since been resolved and strictly controlled from the upstream and processing plants. The processors are

required to add this drug as a CCP at the receiving step. The controls must include the shrimp sources and proper system to ensure reliability of the sources.

Similarly, the cephalopods export has been quite steady from 1999 to 2001 and increased substantially in 2002 (Table 3). Most of frozen cephalopod processors do not need HACCP plan for their premises, as their products require heating before consumption. The bacterial contamination that may be introduced during the process can be controlled by applying proper GMP. However, there is a possibility of chemical hazard in the final products due to the occurrence of high amount of heavy metals in some catching area. In this case, CCP would be the control of raw material source.

Table 3. Exports of fresh and frozen cephalopods in quantity (metric tonnes)

Items	1999	2000	2001	2002
1. Asia	47,092	46,991	44,881	46,837
2. US	3,144	3,324	3,201	4,426
3. Canada	1,516	1,254	964	1,640
4. EU	27,880	27,036	26,916	32,337
5. Australia	2,703	2,542	3,955	4,648
6. Others	2,974	2,243	2,108	2,928
Total	85,309	83,390	82,025	92,816

The largest market for fresh and frozen fish is Asia, in particular Malaysia and Japan, followed by Middle East countries (Table 4). The products are in whole, fillets and breaded form. With the exception of scombroid

fish, there is relatively no hazard concerning this raw product. Like cephalopod processors, fresh or frozen fish process will not need HACCP plan, only the prerequisite GMP or SSOP.

Table 4. Exports of fresh and frozen fish in quantity (metric tonnes)

Items	1999	2000	2001	2002
1. Asia	220,209	181,248	176,121	175,573
2. Middle East	5,003	6,705	7,267	7,912
3. US	2,627	2,028	2,028	1,653
4. Canada	591	597	413	545
5. EU	4,911	2,888	3,034	1,903
6. Australia	2,945	565	646	334
7. Others	15,479	14,489	9,501	6,217
Total	251,765	208,520	199,007	194,137

The total export value of canned tuna is relatively stable from 1999 to 2002. The main markets like US, Australia, and EU require processors to have HACCP in place.

Table 5 Exports of canned tuna in value (US\$ millions)

Items	1999	2000	2001	2002
1. US	187.3	126	158.1	138.2
2. Canada	62.2	52.8	60.4	57.2
3. Australia	45.4	38.6	41.8	47.6
4. Japan	36.2	38	39.3	47.4
5. Egypt	20.3	40	43.5	32.8
6. Saudi Arabia	25.4	13.1	28.7	28.7
7. UK	37.8	23.3	32.8	28.7
8. Others	163.7	138.5	175.2	180.5
Total	578.3	470.3	579.8	561.1

SUMMARY OF PROBLEMS IN IMPLEMENTING HACCP FROM 2000 TO 2003 AND STRATEGIES TO OVERCOME PROBLEMS

As the DOF is responsible for the certification of exported fishery products only, the issues that will be mentioned below are limited to the export processing plants, of which most are medium to large size enterprises. Problems encountered by industry, especially the medium to small size enterprises, are related to personnel qualification and technical knowledge.

1. The main problem encountered during the first stage of HACCP application is the misunderstanding of HACCP principles of the HACCP team. Inappropriate written HACCP documents often miss some significant hazards and include inappropriate control measures to prevent hazards from occurring. This also includes an impractical HACCP plan that design too restrictive critical limit, which result to many deviations and corrective actions that need to be taken during the daily operation

To help develop effective HACCP plan, more advanced HACCP training have been organized by the DOF to clarify the industry on the gray areas and issues frequently misunderstood of HACCP application as well as new emerging hazards that need to be controlled. After a period of time, more understanding of HACCP is learnt and improvement of HACCP documents and implementation are gained

2. Invalid critical limits is another issue especially for the shrimp cooking process. Like the retorting process of the Low Acid Canned food, the cooking process of the shrimp needs to prove its sufficiency to reduce the pathogenic bacteria, such as *L. monocytogenes* to 6D. At present, large factories have their own equipment to establish the process based on the data provided by the DOF. Some institutes such as university and the

National Food Institute also provide the services for those who do not have knowledgeable personnel and equipment to conduct the study.

3. Inconsistent implementation of the HACCP plan as written in the approved manual. It was observed that the later regulatory audit to the HACCP effectiveness sometimes found that the plans are not followed as they were in the first audit. One of the causes of this problem relate to improper conducting of internal verification. This is because the HACCP team does not really understand what verification activities should be carried out and how to verify. Many processors choose to conduct the sanitation and GMP check rather than observing the HACCP activities like monitoring, corrective action, etc. In the case of the processor who is also certified for ISO 9000, internal audit is required by the ISO but will be more focused on ISO quality assurance activities rather than HACCP food safety issues.

Internal verification training has been organized by the DOF for the industry. Clarification of the internal audit and examples are given. From the later regulatory audits, it shows the improvement of this problem.

4. Lack of financial resources for improving construction and equipment and personnel competency to carry out the HACCP development and implementation, especially for the small processors. In regard to this, the Small Industry Finance Corporation has provided financial supports for renovation purpose and the National Food Institute, with the financial assistance from the Ministry of Industry, has also provided consultancy services and training with low fees to encourage the smaller enterprises to implement HACCP.

FUTURE DIRECTIONS

The Government has set 2004 as food safety year. As such, all sectors involved in the food chain, either private or government have to establish its own strategies to accomplish the food safety goal. As for DOF, the regulator for the fish product certification, future directions have been set to support the HACCP implementation of the industry as follows.

1. More controls to be focused on the raw material safety up to the sources, catching areas, culture farms and hatcheries. In the past, the safety of finished products is the entire responsibility of the processors. But as some hazards could come from the raw material itself and cannot be eliminated by any processing step, the strict control of incoming raw material will serve to enhance the safety of the final products. Product traceability is also required as part of the raw material controls
2. Conducting on-going training for the industry, e.g. internal verification, advanced HACCP course, etc
3. Conducting and designing more scientific studies to support the lack of scientific judgments in hazard controls
4. Strengthening the HACCP implementation of the traditional product manufacturers and upgrading them to meet the requirements
5. Conducting HACCP audits more frequently in the processing plants, in order to reduce the product sampling and testing
6. Outsourcing the HACCP audit activities to independent bodies that are certified by the DOF. However, before this can be done, standardization of the HACCP audit need to be carried out between the DOF and the nominated subcontractors to establish same standard of audit