

Review

Information system equality for food security-implementation of the food safety control system in Taiwan

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Food security plays a central role in governing agricultural policies in Taiwan. In addition to overuse or the illegal use of pesticide, meat leanness promoters, animal drugs and melamine in the food supply; as well as food-borne illness draws the greatest public concern due to incidents that occur every year in Taiwan. The present report demonstrates the implementation of a food safety control system in Taiwan. In order to control foodborne outbreaks effectively, the central government of the Department of Health of Taiwan launched the food safety control system which includes both the good hygienic practice (GHP) and the HACCP plan, in the last decade. From 1998 to the present, 302 food affiliations that implemented the system have been validated and accredited by a well-established audit system. The implementation of a food safety control system in compliance with international standards is of crucial importance to ensure complete safety and the high quality of foods, not only for domestic markets, but also for international trade.

Key Words: food security, food safety, foodborne illness, good hygienic practice (GHP), HACCP

INTRODUCTION

Food security was originally used to describe whether a country had access to enough food to meet dietary energy needs, this refers to the availability of food and one's access to it.¹ In the 1970s, the concept of food security has evolved and diversified. Three major shifts in thinking were accomplished that included: a) from the global and the national to the household and the individual; b) from a food first perspective to a livelihood perspective; and c) from objective indicators to subjective perceptions.² To ensure all people at all time have physical and economic access food to meet their dietary needs, safe and nutrition were added into the concept of food security in the World Food Summit of 1996 for a healthy and active life.³ Therefore, food security is currently built on food availability by ensuring sufficient food sources, food access by obtaining appropriate foods for a nutritious diet, and food use via comprehending proper use in terms of knowledge on nutrition and care, as well as ensuring food sanitation and safety, including free of fear and/or food anti-terrorism.³

Food security has played a predominant role in Taiwan's agricultural policy for a long time.⁴ Taiwan has been long recognized as a self-sufficient country. Though, due to increasing land scarcity in Taiwan, and natural disasters (such as the severe earthquake in 1999), global climate change, and the sub-mortgage crisis in 2008, food surplus and the prices of agricultural products still remain stable as a result of international harmonization of food policy, including food safety standards and quality assurance.

It has been more than a decade since several developed countries, such as the USA, Canada and Europe, have developed information system to build community food security. This approach provides data for all residents to obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system.⁵ In Taiwan, public food safety is a predominant task for the government and institutes; especially, as more than 70 percent of adults over 20 years old dine out at least once everyday. Therefore, several chemicals causing safety concerns have been scrutinized, those include pesticides in horticultural products, food hazardous chemicals (acrylamide in fried foods, polycyclic aromatic hydrocarbons or heterocyclic amines in roasted meats, and aflatoxin in grains), meat leanness promoters (such as salbutamol, ractopamine, clenbuterol), antibiotics in fishery (malachite green or nitrofurans), environmental hormones (dioxin, bisphenol A), as well as melamine (Table 1).

Food poisoning is a major concern if consumers become ill as a result of foods consumed from food establishments. During 1981–2008, an average of 146 foodborne outbreaks (with 2921 cases in 2008) happened

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Table 1. Major threats to the food supply in Taiwan

Causative agent	Food commodity	Source of contamination	Occurrence
1. Aflatoxin	Peanut	Vietnam	2009
	Corn	Thailand	2009
2. Dioxin	Milk powder	Europe	2008
	Sheep	Taiwan	2009
	Duck	Taiwan	2005
3. Enrofloxacin, Nitrofurantoin	Aquatic products, including hairy crab, eel, tilapia, shrimp etc.	China	2008
4. Malachite green	Grouper	Taiwan	2009
5. Salbutamol, Ractopamine; Clenbuterol	Pork	USA	2007
6. Melamine	Milk powder	China	2008
	Coffee whitener		
7. Food poisoning	Lunch box;	Taiwan	
	Ready-to-eat products		

per year in Taiwan, with the highest frequently from May through October. Foods involved were mostly prepared foods (including box meals) and seafood. Bacteria covered 92 percent of causative agents, with *Vibrio parahaemolyticus*, *Staphylococcus aureus*, and *Bacillus cereus* ranked as the top three pathogens. Leading factors that caused foodborne illness were cross-contamination between raw materials and cooked foods, inadequate cooking, and holding foods too long at room temperature,⁶ quite similar to those reported by the US Centers for Disease Control.⁷

The aim of this report is to determine the actual situation in the food industry after the implementation of the food safety control system in Taiwan.

HARMONIZATION OF REGULATORY ACTIONS

The central government of the Department of Health (DOH) of Taiwan has recognized the importance of con-

trolling food-poisoning outbreaks owing to the increasing number of meals consumed outside the home. The Hazard Analysis Critical Control Points (HACCP) system, including the Sanitation Standard Operating Procedure (SSOP) and HACCP plan, was initially introduced to box-meal factories and foodservice sectors in 1997. Free guidance and implementation of the HACCP program was provided by the Taiwanese provincial government and later by the DOH of central government.⁸

As a member of the World Trade Organization (WTO), Taiwan must harmonize its national food safety control systems with international codes and standards recommended by the Codex Alimentarius Commission.⁹ A comprehensive food safety control system, including Good Hygienic Practice (GHP) and HACCP plan, was launched in 2002 after the amended "Law Governing Food Sanitation" was promulgated in 2000.

Table 2. SOP of GHP for the food industry adopted in the Food Safety Control System

Food Manufacturers	Foodservice Sectors
1. SOP for the control of sanitation in work areas and equipments, cleaning of equipment and utensils sanitation control of workers control of chemicals and detergents waste disposal (including pest control) full-time food protection staffs	1. SOP for the control of sanitation in work areas and equipments cleaning of equipment and utensils sanitation control of workers control of chemicals and detergents waste disposal (including pest control) full-time food protection staffs
2. SOP for processing and quality control purchasing and receiving contract review control food additives prevention of cross contamination prevention of chemical and physical hazards examination of half-finished products sampling for testing	2. SOP for processing and quality control purchasing and receiving contract review control food additives pretreatment preparation or cooking service planning process flow diagram prevention of cross contamination prevention of chemical and physical hazards verification of finished product hazards
3. SOP for storage	3. SOP for storage
4. SOP for transportation and shipping	4. SOP for transportation and shipping
5. SOP for calibration of equipments	5. SOP for calibration of equipments
6. SOP for customer complaints	6. SOP for customer complaints
7. SOP for product recall	7. SOP for product recall
8. SOP for documentation	8. SOP for documentation
9. SOP for education and training	9. SOP for education and training

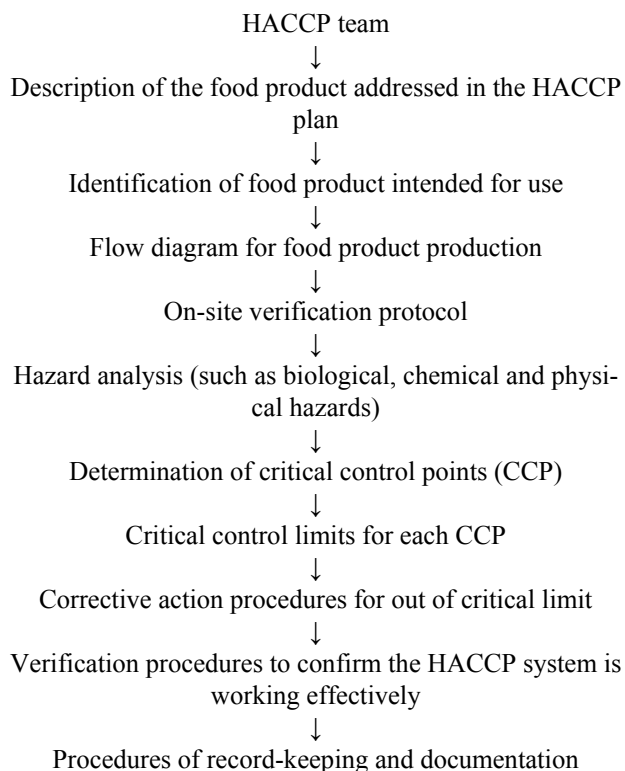
FOOD SAFETY CONTROL SYSTEM

GHP

It has been recommended that before HACCP was implemented, a pre-requisite program is necessitated.¹⁰ The current "Law Governing Food Sanitation" requires that GHP in the food industry is needed prior to implementing the HACCP plan. According to the "Guidance Norms for Implementation of Food Safety Control System in Food-services industries",¹¹ there are nine SOPs for food manufacturers and foodservice sectors. Most of the SOPs are comparable between these two sectors, except minor changes in the SOP for processing and quality control (Table 2).

HACCP PLAN

An HACCP plan is defined as "a document prepared in accordance with the principles of HACCP to ensure control of hazards which are significant for foods safety in the segment of the food chain under consideration".⁹ The HACCP plan in Taiwanese law covers the rules and procedure of actions as follows:



ASSESSMENT OF FOOD SAFETY CONTROL SYSTEM

A third-party audit is required by Taiwanese law to evaluate whether the food industry is able to produce or distribute safe food products. The Food Industry Research and Development Institute in Hsinchu, Taiwan, is the only agency appointed by DOH to carry out audits. The audit team, comprising of: government inspectors, university faculties and experts from research institutes, food industries as well as dieticians have the responsibility to ensure the GHP and HCAPP plan used by the food manufacturers and foodservice sectors are properly designed and implemented.¹⁰ An example of the checklist that is usually used during the follow-up audit was illustrated by Jeng and Fang.⁸

Table 3. Key issues requiring attention after follow-up audits of 80 food establishments that implemented the Food Safety Control System during 2004-2006

◆ Smoking, eating or drinking by employees in food preparation are prohibited
◆ Date and label stored foods
◆ Cover foods with plastic, stainless steel or foil properly
◆ Core temperatures needs to be recorded
◆ Calibrated thermometers every 6-12 months
◆ Auditing food suppliers regularly
◆ Correct defrosting of foods
◆ To avoid pest infestation and cross-contamination
◆ Hold half-finished and finished products at room temperature for not more than 4 hr
◆ Food-preparation tables should be exclusively used for cooked or raw foods

From 1998 to the present, the total numbers of box meal factories and foodservice sectors that obtained validation or accreditation of the implementation of the Food Safety Control System were 219 and 83, respectively.⁶ The certificates of 24, out of 302, food manufacturers and foodservice sectors, were suspended or terminated due to failure of two consecutive audits. Table 3 lists the top ten issues that food manufacturers and foodservice sectors had trouble complying with and should be incorporated into the training program to enhance the efficiency of the system.

CONCLUSION

Having experienced earthquakes, typhoons, flooding and overuse of pesticides, animal drugs and melamine in local and imported foods; the supply and price of foods in Taiwan is still relatively stable. The central government of Taiwan make every effort through worldwide information systems to harmonize its national food policy with international regulations and standards to ensure security and minimize international trade conflicts. Implementation of a comprehensive and internationally compatible food safety control system is a fundamental approach in order to secure the safety of foods for both domestic and foreign markets.

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AUTHOR DISCLOSURES

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糧食安全資訊系統的一致性－以臺灣實施食品安全管制系統為例

糧食安全在臺灣政府制訂農業政策方面扮演重要的角色。除了農藥、瘦肉精、動物用藥及三聚氰胺等過度或不法使用案例外，食物中毒由於每年都會發生，而引起大眾的高度關切。本篇報告介紹臺灣實施食品安全管制系統的方式。為達到有效控制食物中毒，臺灣的衛生署於過去 10 年推行包含良好衛生規範(GHP)及危害分析關鍵管制點(HACCP)計畫的食品安全管制系統。從 1998 年至目前，已有 302 家食品業者遵循本系統且通過稽核獲得驗證。實施國際標準同步的食品安全管制系統，是確保國內外市場食品的安全及高品質的關鍵。

關鍵字：糧食安全、食品安全、食源性疾病、良好衛生規範（GHP）、危害分析關鍵管制點（HACCP）