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## Construction and Management Status of Agri–Food Safety Information System of Korea

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The food safety management system in Korea is largely managed by MFAFF and KFDA. Especially for the Agri–food safety management, MFAFF and its affiliated organizations are responsible to food safety management business. Agri–food safety Information System has provide safety information to consumers in real–time by connecting it to the food safety management information systems of MFAFF's affiliated organizations. Moreover, this system has constructed and operated with an–integrated DB and information sharing system through an information joint utilization system. The number of users who visited the web site of Agri–food Safety Information System (food safety) was 196,882 per year and the number of inquiries made appeared to be 720,482 annually. Also, survey results showing the degree of satisfaction of site users showed 71.2 points as a whole which means that users were generally satisfied and showed 70.2 points of satisfaction degree for convenience of using the service. Agri–food Safety Information System is planned to be upgraded continuously in the future by connecting practical safety management information and by constructing Emergency Warning System and Crisis Coping System which can be used to promptly cope with situation when a food accident occurs.

### INTRODUCTION

Consumers concerns and demands for safe food are rapidly increasing every day as new harmful substances are found and food–induced accidents are globalized due to the latest development of scientific technology, changes in food supply chain and changes in consumption patterns. Also, the number of consumers who purchase safe food with less attention for the price or taste is increasing with a new paradigm of wellbeing (Health Top Priority Principle) (KICAFF, 2009). In particular, consumer's anxiety about food safety was heightened due to the outbreaks of many accidents involving harmful agricultural, livestock and fishery products in Korea and in other countries in the second half of 1990s such as dispute on milk containing pus, mad cow disease of British beef, detection of O–157 from US beef, dioxin contamination of Belgium pork, detecting lead from Chinese blue crabs, detection of agricultural pesticides from Chinese mushrooms and melamine shock. A crisis management system is needed quickly to cope with the situation when such food accident occur along with development and management of food safety management information system is required to manage and transparently check the entire process of food safety at all times (Choi *et al.*, 2004).

In case of advanced countries, in the safety management business from a production stage to a consumption stage there is a need to reinforce the function to evaluate the risk of food safety. Much effort is made for food safety management and exchange of information about harmful food by maintaining specific organizations such as EFSA (European Food Safety Authority), FSA (Food Standards Agency) of UK, AFSSA (Food Safety Agency of France), Food Safety Commission of Japan, FSANZ (Food Standards Australia New Zealand) (Woo *et al.*, 2009). In Korea, to construct an integrated information service for food and medicine as a part of electronic government project in 2004, KFDA (Korea Food and Drug Administration) took charge of the general food field, Ministry of Agriculture and Fishery (MAF) and Ministry of Maritime Affairs and Fisheries (MMAF). They also took charge of agricultural/livestock/fishery product safety field to construct an Agricultural/livestock /fishery Product Safety Information System (MAF and MMAF, 2006; Han *et al.*, 2007). In order to construct the Agricultural/livestock /fishery Product Safety Information System, business processes were improved, and the IT strategic plan (BPR/ISP) was established in 2005. The system was constructed through development project of 3 stages from 2005 till 2008 (MAF and MMAF, 2008).

In this study, we will review the Agri–food safety management system of Korea and the operation statuses of food safety information management systems of related organizations, and describe the construction and management of Agri–food Safety Information System currently under operation.

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## MATERIALS AND METHODS

### 1. Food Safety Management System of Korea

Food safety in Korea is managed by the Ministry for Food, Agriculture, Forestry and Fisheries (MFAFF) and by 6 departments and administrations of the KFDA, Ministry of Education, Science and Technology (MEST), Ministry of Environment (MOE), National Tax Service (NTS) and Ministry of National Defense (MND). The role of each department or administration varies depending on food type and distribution stage (Table 1). As shown in Table 1, MFAFF manages agricultural products and as primary raw material and KFDA manages the processing and distribution stages. Livestock products are managed by MFAFF at production and distribution stages and by KFDA at consumption stage. Also, drinking water is managed by MOE, school meals are managed by MEST, alcoholic beverages are managed by NTS, and military supplies are managed by MND.

With regard to laws related to food safety, there are two basic laws, Food Safety Basic Act and Food Sanitation Act, and a total of 28 laws stipulated by items including Agricultural Product Quality Management Act, Livestock Product Processing and Treatment Act, Fishery Product Quality Management Act, Agricultural Pesticide

Management Act, Salt Management Act, Feed Management Act, School Feeding Act, and Liquor Tax Act (Figure 1).

### 2. Development and Status of Operation of Main Agri-food Safety Information Management Systems

Among organizations involved in food safety management, MFAFF (including its affiliated organizations) is operating diverse information systems related to food safety such as a food safety portal for people, certification information system and safety analysis system in order to positively cope with consumer demand of enhancement of food safety business efficiency and food safety (Table 2). MFAFF is providing safety information about domestic agricultural, livestock and fishery products and KFDA is providing safety information about processed goods and imported goods. The status of operation of the information system by ran by affiliated organizations of MFAFF involved in food safety management is as follows:

National Agricultural Products Quality Management Service (NAQS) is operating diverse information systems which can assure and manage safety of agricultural products. This can be done with a traceability management system which traces history of agricultural products from production to sales, GAP (Good Agricultural Practices), certification management information system including environment-friendly agricultural products, and Agricultural Product Safety Investigation, Analysis and Management (SafeQ). National Veterinary Research & Quarantine Service (NVRQS) has constructed and is utilizing Livestock Product Safety Management System which manages safety inspection of livestock products such as designation of slaughter houses and chicken slaughter houses as Hazard Analysis Critical Control Point (HACCP) and supervision thereof as well as management of the hygienic status of business places. NVRQS especially executes inspection of residue and microor-



**Fig. 1.** Diagram of food safety law system of Korea.

**Table 1.** Food safety management system by object item and distribution stage

Division	1st production		2nd production		Distribution (storage/ transport, etc.)	consumption (Final dealership: restaurants, department stores, etc.)
	growth/ breeding	import	domestic processin	import		
agricultural	MFAFF				KFDA	
fisheries	MFAFF				KFDA	
livestock			MFAFF			KFDA
drinking water					MOE	
etc.						School meals (MET), salt (MFAFF), alcohol (NTS), military food supplies (MND)

ganism on carcasses of cattle, pigs, chickens and ducks slaughtered in laboratories of 16 provinces and about 250 counties, through which NVRQS has constructed Livestock Safety Information Management System.

National Fisheries Products Quality Inspection Service (NFIS) has constructed and is operating Fishery History Traceability Management System (fishtrace) which can record history information of fishery products from fish-

**Table 2.** Status of main food safety information systems of Korea

System name	Main service and function	Purpose	Year of construction	Operating agency
Food safety service (www.foodsafety.go.kr)	<ul style="list-style-type: none"> <li>• Agricultural, livestock and fishery products hazard information collection/ propagation</li> <li>• Integrated management of safety information and common use</li> </ul>	National service	2006	KICAFF
Agricultural trace service (www.farm2table.kr)	<ul style="list-style-type: none"> <li>• Traceability of agricultural products from production to sale</li> </ul>	National service business system	2006	KICAFF
GAP Service (www.gap.go.kr)	<ul style="list-style-type: none"> <li>• GAP Certificate Management Information View</li> </ul>	National service business system	2006	NAQS
Environmental certification system (www.enviagro.go.kr)	<ul style="list-style-type: none"> <li>• Environmental certification agricultural products management and information view</li> </ul>	National service business system	2004	NAQS
LMO management system (www.lmo.go.kr)	<ul style="list-style-type: none"> <li>• LMO information and management</li> </ul>	National service	2009	NAQS
Agricultural quarantine system (www.safeq.go.kr)	<ul style="list-style-type: none"> <li>• Certification of free of toxic substances such as pesticides, heavy metals, microorganisms</li> </ul>	National service business system	2007	NAQS
Pesticide registration management system (epms0.rda.go.kr)	<ul style="list-style-type: none"> <li>• Information on registered pesticides by name, crop, disease and insect</li> </ul>	National service (civil affairs)	2008	RDA
Beef trace system (www.mtrace.go.kr)	<ul style="list-style-type: none"> <li>• Beef trace history information for each step of the process of recording / management</li> </ul>	National service business system	2005	APGS
Livestock safe management system (www.lpsms.go.kr)	<ul style="list-style-type: none"> <li>• Systematic safety management systems of livestock</li> </ul>	National service business system	2008	NVRQS
Fishtrace system (www.fishtrace.go.kr)	<ul style="list-style-type: none"> <li>• Traceability of fisheries products from production to sale</li> </ul>	National service business system	2007	NFIS
Fisheries safety system (www.nfsis.go.kr)	<ul style="list-style-type: none"> <li>• Investigate the safety of aquatic products, show enforcement, quarantine information</li> </ul>	business system	2006	NFIS
Disease prevention system (momdp.nfrdi.re.kr)	<ul style="list-style-type: none"> <li>• Management systems of disease and pest for fisheries</li> </ul>	business system	2008	NFRDI
Imported agricultural inspection system (import.aqis.go.kr)	<ul style="list-style-type: none"> <li>• Information Management for imported agricultural products</li> </ul>	business system	2009	NAQS
Livestock import quarantine system (eminwon.nvrqs.go.kr)	<ul style="list-style-type: none"> <li>• Information Management for imported livestock</li> </ul>	National service business system	1996	NVRQS
Imported beef trace system (www.meatwatch.go.kr)	<ul style="list-style-type: none"> <li>• Distribution step real-time monitoring of imported beef</li> </ul>	National service business system	2010	NVRQS
Food information service (www.foodnara.go.kr)	<ul style="list-style-type: none"> <li>• The integration of food safety related information and the emergency alert</li> </ul>	National service	2008	KFDA

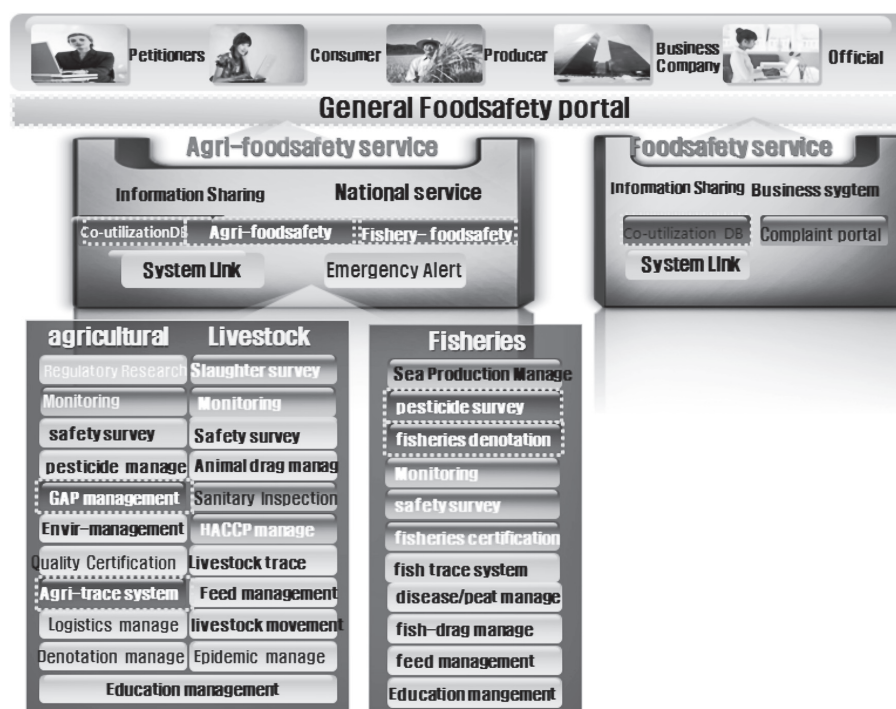


Fig. 2. Composition of Agri-food safety information system of Korea.

ery to table and Disease Prevention System which can perform quarantine and inspection to ensure disease prevention and safety. Safety management of imported agricultural, livestock and fishery products were operated by NAQS, NVRQS and National Fisheries Research and Development Institute (NFRDI).

### 3. Composition of Agri-food Safety Information System

Agri-food Safety Information System ([www.food-safety.go.kr](http://www.food-safety.go.kr)) promptly provides consumers with food safety information verified at home or overseas through connection (Web Service or EAI) to Food Safety Management Information System within MFAFF and is also operating a real-time information sharing system through the integrated food portal ([www.foodnara.go.kr](http://www.foodnara.go.kr)) and Open API (Application Programming Interface) of KFDA (Figure 2). It integrated two sites, Agricultural Products Safety Information System ([www.agros.go.kr](http://www.agros.go.kr)) and Fishery Products Safety Information System ([www.fsis.go.kr](http://www.fsis.go.kr)), which have been operating since 2007 in the Agri-food Safety Information System ([www.foodsafety.go.kr](http://www.foodsafety.go.kr)) to provide unified information about agricultural, livestock and fishery products by collecting, processing and distributing risk and safety information.

## RESULTS

### 1. Introduction of Main Screens of Agri-food Safety Information System

The service of Agri-food Safety Information System can be used by connecting to the Internet and visiting <http://www.foodsafety.go.kr>. Though it is serviced only in Korean right now, multi-language (English and

Japanese) service are planned to be in service in the future. The number of users who visited the web site of Agri-food Safety Information System was 196,882 annually and the number of inquiries made appeared to be 720,482 annually. Although a non-member can view site information without any limitation, a membership is required to leave a comment or a question. Members are divided into institutional members (government officials) and general members and the total number of members who are using the site is 17,466 at present. In accordance with the log-in information, institutional members are allowed access to the Information Joint Utilization System where safety management information can be jointly utilized and the system is constructed to enhance efficiency of safety management business further.

At the main screen of Agri-food Safety Information Service, the user has access to a large diversity information by selecting from the menu risk information, safety management, consumer plaza, safety consultation, or food safety contents (Webzine, on-line information hall, on-line education and safety movies). Also, food withdrawal and non-conformity information can be checked in real-time (Figure 3). The amount of contents of risk and safety information about agricultural/livestock products and fishery products registered with the site and provided during 2009 were 3,469 cases and 1,091 cases respectively (Table 3).

### 2. Collection, Analysis and Distribution System of Hazardous Information

Agri-food risk and safety information is collected through information provided by organizations, overseas private CP (Contents Provider), connection to information systems of related organizations and monitoring by





Fig. 3. Examples of main screen of Agri-food safety information service.

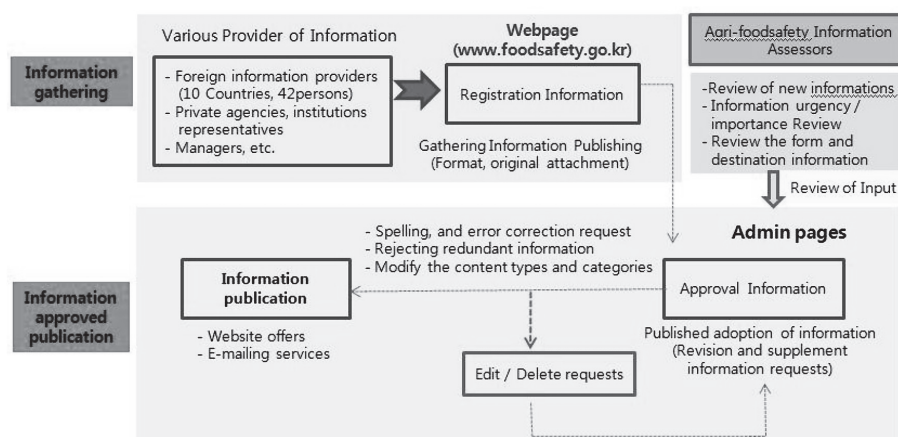
Table 3. Status of basic statistics of Agri-food safety information service (Dec. 31, 2009)

	Contents registration	Contents view	Visitors	Page view	PCRM member registration
Jan.	129	59,504	7,562	36,853	702
Feb.	145	55,759	7,870	38,402	747
Mar.	215	40,990	9,113	44,585	829
Apr.	174	41,711	9,202	50,795	345
May	301	73,120	9,725	77,502	1,032
June	271	41,927	8,405	38,699	16,646
July	427	119,802	10,538	39,712	677
Aug.	505	44,808	20,457	89,160	4,135
Sep.	759	96,605	23,754	114,416	197
Oct.	564	49,253	41,905	179,385	687
Nov.	604	45,557	20,890	117,191	37
Dec.	466	51,446	27,461	180,207	53
Total	4,560	720,482	196,882	1,006,907	26,087

the workers of organizations in charge. The risk information collected are then analyzed and assessed by specialists (civilians and government officials) and provided to general consumers through Agri-food Safety Information Service (www.foodsafety.go.kr). As to risk information which has the potential to cause a food accident, the service will be operated by arranging counter measures to cope with a food accident (Figure 4).

### 3. Operation of Agri-food Safety Information Service Joint Utilization System

For collection of Agri-food safety information, Information Joint Utilization System is being operated so that safety management information of related organizations can be collected in real-time. The information Joint Utilization System enabled construction and sharing of integrated DB of Agri-food safety management information through connection with 8 systems of 10 organiza-



**Fig. 4.** Block diagram of evaluation and analysis of collected information.

**Table 4.** List of information shared through Information joint utilization system (Dec. 31, 2009)

Information Provider		Primary co-utilization information
M I F A F F	Agricultural related	Registration status information traceability, GAP certification standards information, GAP certification status information, environmental certification standards information, pesticide registration information, safety information, test results, and other associated information for the item code
	Livestock related	HACCP information specified by livestock, Designation of HACCP information for livestock products, and Animal Tracking information for the drug registration, Residue tests, microbiological tests, collecting test results and health status monitoring, inspection status, including slaughter
	Fisheries related	Construction Safety Research Information, shellfish toxin survey status information, origin information, regulatory status, number of native fish-specific performance information, inspection, test results Varieties imported seafood and code information
KFDA		Pesticide toxicity information, and Animal toxicity information for the pharmaceutical, food additives, toxic information, check status of imported food, imported food-related statistical information, and disposal of food-related administrative information, additive information, and specify the information, HACCP food sector, food products licensing information, and health food business licensing Information, pesticide residue limits information, veterinary medicine residue limits information, microbial residue limits information, contaminants residual limits information, referral code information

tions. Certification information about agricultural, livestock and fishery products, history management information, safety management information and safety management standard information which are contents of main information provided by the Information Joint Utilization System were constructed as an integrated DB to be shared (Table 4).

#### 4. Result of Survey on User Satisfaction

Telephone interviews with users (general members and institutional members) of Agri-food Safety Information Service and public (farmers and consumers) using a structured questionnaire were performed by a specialized research organization from Dec. 18 to 21, 2009 (4 days). The objects of survey were total 800 persons including 200 general people, 100 farmers, 300 gen-

eral members and 200 institutional members.

In response the question, how much they know about Agri-food Safety Information Service, Majority of farmers (77.0%) knew about it, only 29.2% of general people knew about it showing relatively low percentage (Figure 5). Also, as to the question whether they have intentions to use the service, 81.0% of farmers showed their intentions to use it while less than half, 47.1%, of general people said they would use the service.

In regard to the question about contents and quality of safety information provided by Agri-food Safety Information Service, positive evaluation expressed by 'satisfied' (very + mostly) was 50.2% (when converted, 71.2 points out of 100). In response to the how satisfied they are with the convenience of using the services, positive evaluations expressed by 'satisfied' was 46.8% (70.2

points). In regard to how fully they are satisfied with organization and design of the web page, positive evaluations expressed by 'satisfied' was shown to be 50.6% (72.0 points). As to the question whether or not they are satisfied a whole, positive evaluation expressing that they were satisfied was 52.2% (71.2points) (Figure 6).

Lastly, the matters to be improved by Agri-food Safety Information Service with priority for better services, general members pointed out 'Reinforcement of available information on the website' (44.3%), 'User-friendly organization of the web page' (24.3%) and 'frequent update for the information' (19.3%).

## CONCLUSION AND DISCUSSION

The food safety management system of Korea is largely managed by MFAFF and KFDA and is equipped with a mutual cooperation and a sharing system. In the food safety management system of Korea, Food Safety Information System constructed on a scientific ground play a very important role. In particular, the Agri-food Safety Information Service has enhanced business efficiency for the workers of related organizations through the role of windows which comprehensively provide food safety information related to food safety management in the field of Agri-food and management of integrated DB and sharing of Agri-food safety information. Statistics showed that the number of users who visited the Agri-

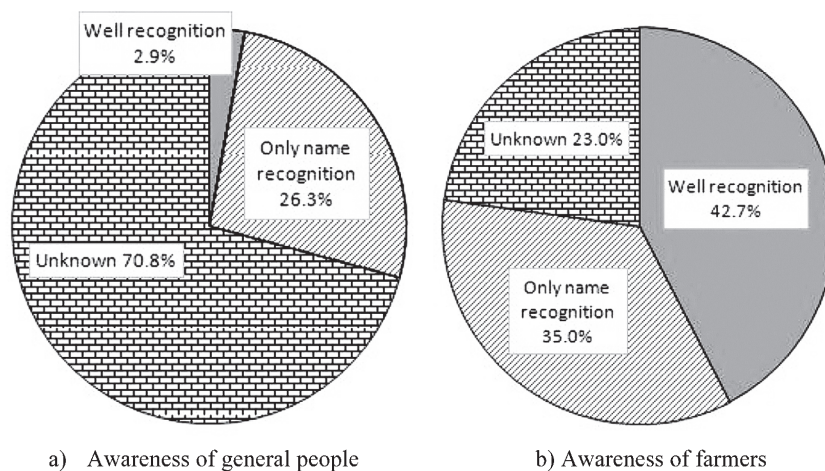


Fig. 5. Result of survey on awareness of Agri-food safety information service.

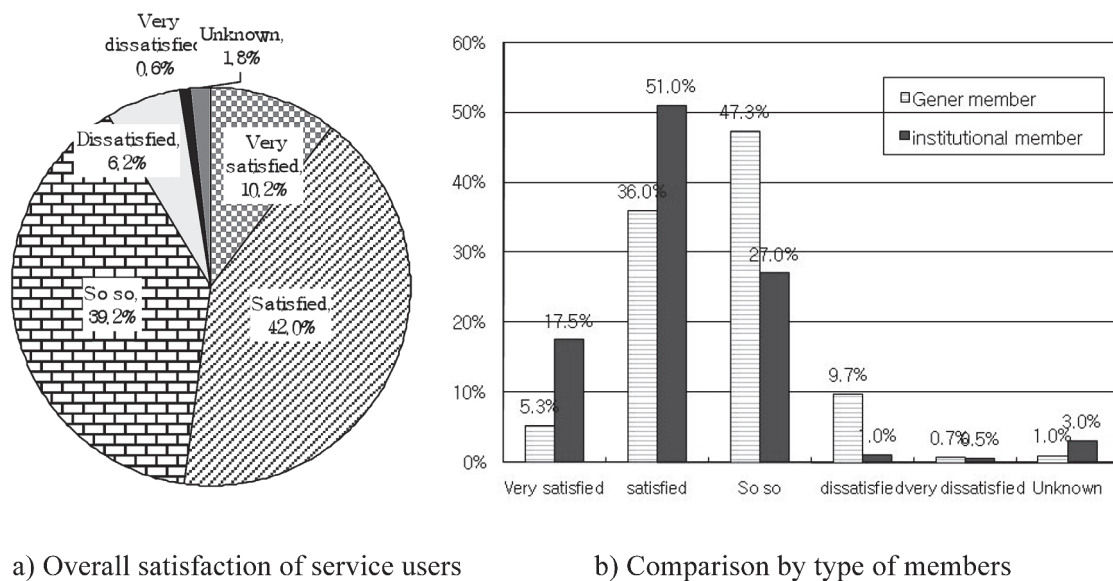


Fig. 6. Result of survey on overall satisfaction with Agri-food safety information service.



food Safety Information System web site was 196,882 annually, and there were 1,006,907 cases of page review, 4,560 cases of contents registrations, and 720,482 cases of contents inquiries. Also, the result of a survey which surveyed main users of the site showed that the degree of satisfaction was 71.5 points (out of 100 points) and the top priority requirement for better service was 'Reinforcement of available information on the web site' (44.3%).

In the future, it is required to connect practical safety management information to Agri-food Safety Information Service. The construction of Emergency Warning System and of Crisis Coping System which can be used to promptly cope with the occurrence of a food accident will be continuously promoted.

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