



# Reasons for implementing the HACCP system and advantages and disadvantages of HACCP implementation on animal farms in Korea

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**Abstract:** This study was conducted to analyze the reasons for and advantages and disadvantages of implementing the HACCP (Hazard Analysis Critical Control Point) system on animal farms in Korea. The study was carried out by randomly selecting 45 swine and 24 dairy farms where HACCP has been implemented. The results were as follows: 24% of the swine farmers responded that extension of their business was the major reason for implementing HACCP; the second (21%) was financial support from local or national government. Dairy farmers had similar responses. The top advantage of adopting HACCP was improvement of the welfare of employees in both swine (21%) and dairy (22%) farms. The first-ranked disadvantages of HACCP implementation were HACCP education (23%, swine farm) and high turnover of employees (24%, dairy farm). On farms, HACCP may increase the sanitation and safety levels of domestic livestock products. However, the Korean government should address the disadvantages of HACCP to encourage its adoption at the animal production stage.

**Key words:** HACCP, swine farm, dairy farm, implementation, advantage, disadvantage

## INTRODUCTION

The Hazard Analysis Critical Control Point (HACCP) system is a management system to control biological, chemical, and physical hazards that may result from producing, harvesting, processing, manufacturing, transporting and distributing, and preparing and consuming manufactured food [4]. The goal of implementing HACCP is to manage potential hazards through risk assessment during food production with a focus on prevention rather than end-product testing [18]. The HACCP system was originally developed in the 1960s. After the Codex Alimentarius Commission introduced the HACCP system with regard to product hygiene and safety in 1993, the Ministry of Agriculture, Food and Rural Affairs (MAFRA) in Korea started implementing the HACCP system throughout the livestock industry, including animal feed factories, livestock farms, slaughterhouses, meat packing centers, livestock product processing centers, and meat markets, thus establishing the legal basis of the Livestock Products Sanitary Control Act. Most developed countries, including the USA (1998), the EU (1996), and Australia

(1997) require livestock product businesses such as slaughterhouses, meat packing centers, livestock product processing centers, and meat markets to implement the HACCP system. In Korea, HACCP implementation is only compulsory in slaughterhouses, milk collection centers, milk processing centers, and egg processing centers. Therefore, the HACCP system is currently being used in over 9,900 livestock related-companies, including livestock farms, out of the approximately 75,000 in the country [15]. HACCP system implementation started on swine farms in 2006, cattle farms (dairy and beef) in 2007, and poultry farms (broilers and laying hens) in 2008 [7-11]. The total number of animal farms in Korea was approximately 19,000 in 2011, and over 6,500 farms are currently using the HACCP system [15]. In the livestock industry, the HACCP system has achieved remarkable success in this short term. This development will contribute to increasing the sanitary level of livestock products in Korea. Recent studies on HACCP have focused on the evaluation of sanitation management performance, benefits of HACCP implementation, and employee knowledge and performance of HACCP principles in the school food service area [5, 16]. However, there have not yet been studies about the basic reasons for implementation and advantages of the HACCP system on farms.

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Therefore, the aim of this study was to determine the reasons for implementing HACCP and the advantages and disadvantages of HACCP implementation on swine and dairy farms in Korea.

## MATERIALS AND METHODS

### Animal farms and data survey

We randomly selected 69 animal farms (45 swine farms and 24 dairy farms) in Korea that operate HACCP systems. A survey was conducted from July to November 2014. Table 1 shows general information about the farms. All of the respondents were the farm owners. The survey questionnaire was prepared and modified according to the results of related studies to give a score for each item in order of importance to the farmers [2, 17]. The survey consisted of three parts. Farm owners ranked the items within each part in order of importance (1 - 6 or 1 - 7). In part one, we investigated the reason for implementing the HACCP system: (1) financial support from local or national government; (2) higher pig (or milk) price; (3) hygienic pig (or milk) production, (4-1) farm extension (swine farms) or (4-2) the ability to advance to a small milk processing business (dairy farms); (5) systematic farm management; and (6) enhancement of competitiveness. For part two, we asked farmers to rank advantages of HACCP implementation: (1) productivity improvement; (2) reduction of production cost; (3) improvement of the sanitation management level; (4)

systematic farm management; (5) improvement of awareness; (6) improvement of the welfare of employees; and (7) hygienic pig (or milk) production. In part three, we surveyed the disadvantages of HACCP implementation: (1) HACCP recordkeeping; (2) altered consciousness; (3) high turnover of employees; (4) HACCP verification; (5) HACCP monitoring; and (6) HACCP education.

## RESULTS

### General information

Table 1 shows general information about the farms, such as the proportions of domestic and foreign labor and the number of head of each growing stage of the animals. The average number of pigs on the 45 swine farms that participated in this study was 4,282.88. The piglet, growing-fattening pig, and sow stages were represented by an average of 1,869.84 (43.66%), 1,952.33 (45.85%), and 460.60 (10.76%) pigs, respectively. The average number of employees on swine farms was 8.45, with domestic and foreign workers averaging 73.25% (6.19 people) and 26.75% (2.26 people), respectively. The average number of cows in the 24 dairy farms that participated in this study was 106.75. Calves, growing cows, and lactating (drying) cows were represented by, on average, 12.09 (11.33%), 37.21 (34.85%), and 57.45 (53.82%) animals, respectively. The average number of workers was 2.67 people and domestic and foreign labor were 62.55% (1.67 people) and

Table 1. General information from the respondents who participated in the survey for HACCP system implemented swine and dairy farms in Korea

Classification	Number of labor			
	Swine farm	%	Dairy farm	%
Domestic	6.19	73.25	1.67	62.55
Foreigner	2.26	26.75	1.00	37.45
Overall	8.45	100.00	2.67	100.00
	Number of head		%	
Swine farm				
Piglets	1,869.84		43.66	
Growing-fattening pigs	1,952.33		45.45	
Sows	460.60		10.76	
Overall	4,282.77		100.00	
Dairy farm				
Calves	12.09		11.33	
Growing cows	37.21		34.85	
Lactating(Drying) cows	57.45		53.82	
Overall	106.75		100.00	

n= swine farms: 45, dairy farms: 24.

37.45% (1.00 people), respectively.

#### Reasons for implementing the HACCP system

Table 2 shows the reasons for implementing the HACCP system on swine and dairy farms. In the case of swine farms, 24.15% of farmers rated business extension as their primary reason for implementing the HACCP system. Other swine farmers indicated their top reason to be financial support from local or central governments (21.35%), systematic farm management (18.25%), higher pig price (16.32%), enhancement of competitiveness (11.27%), and hygienic pig production (8.66%). On dairy farms, the top reason for implementing the HACCP system was to advance to a small milk processing business (22.28%); financial support from local or central governments (20.75%) was the second-most common choice. Other farmers selected higher milk price (19.95%), systematic farm management (15.77%), enhancement of competitiveness (11.82%), and hygienic milk production (9.43%).

#### Advantages and disadvantages of HACCP system implementation

The advantages of HACCP system implementation on swine and dairy farms are shown in Table 3. There were

similar trends for swine and dairy farms. Improvement of the welfare of employees was the top advantage on HACCP system-implemented swine and dairy farms. For swine farms, 21.18% of the respondents stated that the application of HACCP has improved the welfare of employees; 22.63% of cattle farmers chose this response. The second most-chosen item, with 17.86% of swine farm owners and 17.85% of dairy farm owners selecting it, was the reduction of production cost. Productivity improvement was third (17.55% of swine farm owners and 16.59% of dairy farm owners). Improvement of HACCP awareness among the farm staff was fourth, at 13.29% of swine farmers and 16.50% of dairy farmers. Systematic farm management came in fifth at 10.49% of swine farmers and 12.64% of dairy farmers. In the case of swine farmers, hygienic pig production was ranked sixth (10.38%). However, dairy farmers ranked hygienic milk production seventh (5.38%). Conversely, the improvement of the sanitation management level was ranked seventh (9.25%) by swine farmers and dairy farmers ranked it sixth (8.59%).

The disadvantages of HACCP system implementation on swine and dairy farms are shown in Table 4. On swine farms, the primary difficulty of HACCP system implementation was

Table 2. Purpose of implementing HACCP system on swine and dairy farms in Korea

Classification	Swine farm		Dairy farm	
	%	Rank	%	Rank
Financial support from government	21.35	2	20.75	2
Higher pig(milk) price	16.32	4	19.95	3
Hygienic pig(milk) production	8.66	6	9.43	6
Swine: Farm extension				
Dairy: Advance to small milk processing business	24.15	1	22.28	1
Systematic farm management	18.25	3	15.77	4
Enhancement of competitiveness	11.27	5	11.82	5

n= swine farms: 45, dairy farms: 24.

Table 3. Advantages of HACCP system implementation on swine and dairy farms in Korea

Classification	Swine farm		Dairy farm	
	%	Rank	%	Rank
Productivity improvement	17.55	3	16.59	3
Reduction of the production cost	17.86	2	17.85	2
Improvement of the sanitation management level	9.25	7	8.59	6
Systematic farm management	10.49	5	12.46	5
Improvement of awareness	13.29	4	16.50	4
Improvement of the welfare of employees	21.18	1	22.63	1
Hygienic pig(milk) production	10.38	6	5.38	7

n= swine farms: 45, dairy farms: 24.

Table 4. Disadvantages of HACCP system implementation on swine and dairy farms in Korea

Classification	Swine farm		Dairy farm	
	%	Rank	%	Rank
HACCP record	11.08	6	10.54	6
Altered of consciousness	14.63	5	13.45	5
High turnover of employees	15.21	3	24.44	1
HACCP verification	15.17	4	15.02	4
HACCP monitoring	20.81	2	15.92	3
HACCP education	23.10	1	20.63	2

n= swine farms: 45, dairy farms: 24.

HACCP education (23.10%). HACCP monitoring (20.81%), high turnover of employees (15.21%), HACCP verification (15.17%), altered consciousness (14.63%), and HACCP recordkeeping (11.08%) followed in that order. However, high turnover of employees (22.44%) was the top difficulty of implementing the HACCP system on dairy farms. HACCP training (20.63%), HACCP monitoring (15.92%), HACCP verification (15.02%), altered consciousness (13.45%), and HACCP recordkeeping (10.54%) followed.

## DISCUSSION

The major reasons for implementing the HACCP system on both swine and dairy farms were business expansion and financial support from local or central governments. In contrast, hygienic livestock product (pig and milk) production was ranked relatively low by both swine and dairy farmers. This was a little different from the original purpose of the HACCP system. These results indicate that farmers want to use the HACCP system as a tool for future business expansion. Therefore, for development and use of the HACCP system in the future, it is important that farmers gain an understanding of the purpose of the HACCP system through education. The Korean government has two different systems for supporting HACCP and eco-friendly certified farms financially. One is a direct payment system and the other is a farm facilities modernization project [12]. The former can support farms after they obtain HACCP and eco-friendly certifications. Previous studies have reported that operation of a HACCP pre-requisite program increases productivity of animals [6] and methodical farm management [1, 14].

According to our study, the three major advantages of HACCP system implementation were an increase in productivity, reduction in production cost, and improvement in employee welfare.

HACCP systems implemented in Korea are composed of five preliminary steps of the Codex Alimentarius (assemble HACCP team, describe product, identify intended use, construct flow diagram, and confirm flow diagram on-site) and the seven principles of HACCP (conduct a hazard analysis, determine the critical control points (CCP), establish critical limits, establish a system to monitor control of the CCPs, establish corrective action to be taken when monitoring indicates that a particular CCP is not under control, establish procedures for verification to confirm that the HACCP system is working effectively, and establish documentation concerning all procedures and records appropriate to these principles and their application) [4].

In addition, the HACCP system has to be operated according to a prerequisite program based on the livestock laws in Korea. The prerequisite program includes seven evaluation items in biosecurity; nine items in farm facility administration; nine items in farm sanitation; 11 items in feeds, drinks, and medication handling; seven items in disease control; five items in import and shipment; and nine items in milking [9, 11]. Maldonado *et al.* [14] and Back *et al.* [1] reported that one prerequisites program of the HACCP system improves the welfare of employees. Cho *et al.* [3] also reported that an implementation of the HACCP system on farms increases productivity and reduces production cost. Therefore, we believe that a prerequisite program in the HACCP system influences the three major advantages. However, improvement of the sanitation management level and hygienic pig (or milk) production (Table 3) were ranked lower. These results show that farmers are thinking only about creating income with HACCP system implementation. Difficulties with HACCP system implementation are caused by a lack of understanding of HACCP. Especially in the case of foreign employees, operation of the HACCP system is almost impossible due to a lack of seamless communication.

Therefore, development of HACCP education programs and an open HACCP education course for foreign employees might be needed.

Currently, over 33% of animal farms in Korea are using the HACCP system [15] and this will continually increase every year thanks to governmental policy in Korea [13].

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