

## Comparative study on methods to improve understanding of food information between Korea and China

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### 〈Abstract〉

In this study, we propose a scheme for providing the consumer of Korea and China with more effective information about the safety of the food to understand easily. Among these countries and consumers, we proposed the graphical displays to help you understand the factors disturbing to think of pesticide residues in common. In the form of a one-dimensional graphical display, whether to provide a safety-related information in the form of conventional foods character, as compared to the graph representation of the larger amounts of information than a two-dimensional character which easily measures the effect of promoting the understanding of the most appropriate information, were reviewed. As a result, in the case of Korea, text and graphs utilizing the standards of pesticide residues than the information provided in a one-dimensional form 'Text + Graphics Display' to take advantage of the information provided with the relevant safety standards form the three was found that easy to show. On the other hand, Chinese, between the character and graph form with the advantage that the information providing service type information using the graphic display shown in one dimension could not see the difference between the evaluation and understanding.

Key Words : Visual Communication, Risk Communication, Food Information, Information Design

### I. Introduction

Food is not only the most basic and important areas needed to stay healthy human's life. Therefore, the safety of our food related events and accidents could be a chance to knowledge fear of food [1-2]. In particular, after launching WTO (World Trade Organization), the issues related food safety are not limited anymore to only one country

and have become a common concern of all countries under the accelerated globalization and open markets[3]. Korea and China have a lot in common because they not only have geographical proximity but also close relationship in trade. Thus, with regard to global issues of food safety, comparing between Korea and China is believed to be significant matter. According to one study conducted over a 500 20-year-old housewife living in the city of South Korea such as medium and small cities and towns, the survey shows that the item of very anxious (7.6%), and disturbing pieces

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(57.8%) are 65.4% of all the respondents to the safety of the food. To put it concretely, the order of feeling anxiety is as follows. The most anxious factor about the safety of food is pesticide (96.0%), the second is Food Additives(95.7%), the third is Endocrine disruptors(93.0%) and so on. Choi(2005) study pointed that housewives in Korea strongly feel the anxiety in relation to the safety of food additives · pesticide residues · Food poisoning bacteria such as endocrine disruptors[4]. Also In the Study of Jin (2011), it shows pesticide (96.0%), Food Additives(95.7%), Endocrine disruptors(93.0%) in order. [2]. Also the study of Eom Young Suk (1996) shows 50% of 675 housewives living in the J city of South Korea responded that the results of risk factors for food is pesticide. In the case of China, they are more concerned about using the dead meat from disease, vegetables and fruit exceeding the standard of pesticide residue criteria, and adding chemical additives excessively[5]. In other words, consumers in China and Korea, two countries' people are feeling anxious to the safety of the food, the extent of feeling afraid for pesticide residues is the highest common factor of them. In the case of South Korea, the food currently being sold on the market has a strict laws as not to damage a person's health pesticides for using and setting residue limits on the number of uses[6-8]. In the case of China, pesticide residue standard is low although it has serious problems of Pesticide Residues producing during agriculture production[9]. China sets up a specific limits based on all pesticide residue limits from major agricultural products to food starting on August

1th, 2014. [10]. Here, as that means there is maximum residue limits in food residue limit (Maximum Residue Limit, MRL), a set of criteria for the setting of the first daily intake (Acceptable Daily Intake, ADI) are required. Acceptable daily intake (ADI) is a daily intake of chemicals that are thought it will not hurt your health even if ingested daily over a lifetime, which is set by dividing the minimum value of the maximum non-toxic amount obtained through animal testing. It sets a safe level of residue limits through the materials of Scientific pesticide residues in food, the amount of food consumption and nation average weight (Food and Drug Administration Reports, 2005 / National Standard of the People's Republic of China, 2012). In addition, the theoretical intake was set within the acceptable daily intake of agricultural pesticides to ensure safety of food (ADI) [11]. In 2013 It was reported that pesticide residue was found on 15 agricultural products that were intended to distribute in the area at 10 wholesale market and 5 regional supermarket located in each region of Korea, but two cases exceeded the standard in total according to the report. Luckily at the survey, the others were safe level by daily intake (ADI) less than 1%[12]. This criterion of the amount of agricultural pesticide residues is very small, and the amount that remains even in small amounts is likely to cause health damage and will hardly affect health [13]. According to a Chinese newspaper People's Daily an official from the Chinese Ministry of Agriculture said that it is not harm to eat pesticide residues because the amount of pesticide residues can cause human body is 100 times as

much as the standard when he or she was asked. Though the consumers of Korea and China don't have sufficient knowledge about the standard of pesticides, it was a safe level in spite of exceeding the standard. It is hard to understand that eating the amount of pesticide 100 times less than the standard does not make a problem to the human body. This is because experts and consumers have different awareness about the safety of food. If food safety accident happens, experts in that field would try to reduce the anxiety of consumers based on the data such as incidence rate of negligent accidents, death rates, statistical evidence [7]. But consumer's anxiety still exist because they make a decision according to individual and subjective judgment based on intuition and common sense. [14]. Therefore it is needed to communicate adequately between professionals and consumers in order to relieve the anxiety of consumers regarding food safety. If consumers get sufficient information and education related to food safety through communication, they can make a reasonable assessment and the anxiety of the food will also be reduced[15]. This study is aiming to suggest a way that consumers in China and South Korea who lack knowledge about the food can easily and accurately understand information on food safety.

## II. Theoretical Background

### 2.1 The concept of risk communication

In recent years, though accidents related food

safety have happened a lot, the anxiety of food safety is increasing due to lack of expertise to assess the extent and impact of food (food risk & harm). To reduce the anxiety of these consumers, necessary means to improve the perception of food safety are the information and communication related to the understanding of food safety risk and[4]. By sharing information about the whole process of risk, communication for assessment and risk management is a factor to increase the fairness and reliability of the safety of the food. Risk communication is a mean to improve the awareness of food safety in the risk management process. It is a factor to increase fairness and reliability on food safety through sharing the process of delivering the results of the evaluation and the importance and limitations a process of exchanging information among individuals, groups and the agencies (Interactive process) (US Department of Health and Human Services, 2002)[16]. That is, it can be described as the expertise of food safety related to lack of clarity and understanding targeted at the consumer easy term and is a fundamental object by utilizing a number of elements that allow the accurate recognition for risk[15]. On the other hand, the problem of safety and risk communication related to the food is a basic awareness of food safety experts and the general consumer significantly different. Based on the analysis of the risks associated with food safety experts have scientific knowledge, understanding it to be considered a high probability ' is like no risks. On the other hand, when the general consumers of food safety related accidents, intuitively understand

this and want to judge yourself around the impact of the results of the risk is not definitive at all. In other words, the scientific risk · absence of risk for a more objective understanding, requires that telling you how to eat or not. Therefore, risk communication can be called work to reduce the information gap that exists between the general risks for consumers and professionals related to food safety. In the case of food safety risk communication related to the ever stops for conveying information about the risk to the consumer was provided with one-sided. Developing the understanding of risks presented by information professionals to better understand consumer focus and to better educate consumers in this study will be evaluated in the best possible risk communication. Recently, however, sharing ideas and information with each other, including the consumer a variety of subjects are not the type of information presented and delivered to unilaterally expand the meaning of the whole process reflected in the related field. Therefore, with respect to the safety of food for successful risk communication should be made of a sufficient communication consumers and professionals [13]. In the case of Korea as examples of risk communication, the Food and Drug Administration website from children through to adults, people of all ages are provided to help you understand the animation produced pesticide residues. Using animation characters to have fun for pesticide residues that remain in food, and needs for pesticides is being managed. Also it introduced about the vegetables that passed pesticide residue test before how it is served and

why it is safe [17]. In the case of China, the Chinese Ministry of Health and the State Food and Drug Administration uses DG homepage information on food safety to take advantage of such illustrations (illustration) introduces leverage. In particular, the Chinese Ministry of Health is responsible for the overall coordination and presents a sanitary norms and conditions of food production and distribution processes have the responsibility for dealing with serious food safety incidents related to food safety. And the agency to prescribe conditions for food production and distribution permission, posting to the point you need to know about the accidents related to food safety, which was published in Q & A format for the content that people can wonder. Also presented an appropriate answer for the part of consumers to be nervous or anxious questions and resolve to its citizens through information disclosure and the trust was to be led. However, the information provided to the character 's center to the consumer, the delivery of a large amount of information represented by the professional expertise honed terms only requires that the study related to in order to understand it. Professional, when providing a large amount of information, if available methods take advantage of the graphic form of the character instead of quickly may be effective to pass information. However, for the service types using a two-dimensional graph in a graphical form, which represents correctly the information consumer if there is no associated knowledge base, and they can be difficult to understand. Apter (2008) [18] and Nelson (2008) recommends to use a graphical display, such as

graphs to improve [19] communication with people with low quantity thinking skills, according to research. In other words, we believe the necessary knowledge and learning as a two-dimensional character -oriented information than a simple graph using a one-dimensional representation of information clearly form a proper understanding of the graphic representation as well as the number of communication errors can also help reduce it.

### III. Empirical Analysis

#### 3.1 General characteristics of survey participants

The survey was conducted amongst 250 Korean college students of I University in J city and D University in D Metropolitan city, 150 Chinese university students of D University in D Metropolitan city and J University and G University in the J city, to be expected in different results as to Korean citizenship and Chinese citizenship. Due to the limitations of the survey on Chinese students, the deviation of the survey respondents occurred. The survey participants divided into two groups. The first group have a math or science -related knowledge, such as information and graphs related to pesticide residues science and engineering graduate columns is determined, The second group have a math and science majors who Arts and Physical Education are deemed related lack of knowledge. Because of a survey of students in various majors, result came out focused on the 20s.

We made them to take test with three types (text, text + graph, text + graphic display), after understanding the information related to the reference of the three pesticides which has one certain type of a random distribution method as described in the questionnaire and the method, respectively, directed to the Safety Assessment. Based on the three criteria of pesticide residue, Pesticide residue standards, acceptable daily intake(ADI), in connection with non-toxic amount(NOAEL), 'feel that to some extent safety', 'Are you interested in his food', 'his family and loved ones are you interested in answers to the feed to have'used the Visual Analog Scale (VAS) of 150mm. Three types of distribution · After collecting the questionnaire, fill in omissions or mistakes Korean students fill out a questionnaire with the exception of 203 persons (Text: 69 persons, Text + Graph: 61 persons, Text + Graphics Display: 73 persons, the effective response rate 81.2%), a Chinese student 132 persons (text: 35 persons, text + graph: 66 persons, text + graphics display: 31 persons, the effective response rate 87.3%) questionnaires were to be analyzed.

Results for a typical characteristic of the survey participants is shown in < Table 1 >.

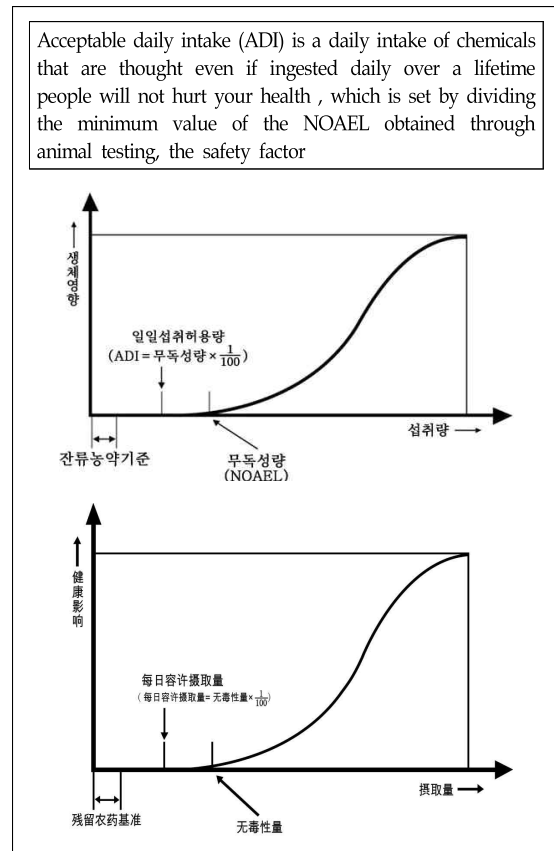
#### 3.2 Information provided measures

On three criteria of pesticides 'Text', 'Text + graph' or a questionnaire was prepared by three different methods described in the 'Text + graphical display'. 'Text' type questionnaire was described only pesticide residue standards with only three

<Table 1> general characteristics of survey participants (Korea, China)

	Korea	China
	N (%)	N (%)
Gender		
Male	110 (54.2)	62 (47.0)
Female	93 (45.8)	70 (53.0)
<b>Total</b>	<b>203 (100)</b>	<b>132 (100)</b>
Age(years)		
15~19	3 (1.5)	3 (2.3)
20~24	183 (90.1)	87 (65.9)
25~29	12 (5.9)	38 (28.8)
30~34	1 (0.5)	4 (3.0)
35~39	2 (1.0)	0 (0.0)
40~44	1 (0.5)	0 (0.0)
45~49	1 (0.5)	0 (0.0)
<b>Total</b>	<b>203 (100)</b>	<b>132 (100)</b>
Job		
Student	200 (98.5)	132 (100)
Employee	2 (1.0)	0 (0.0)
Manufacturing and trades (excluding the area of agriculture and food)	1 (0.5)	0 (0.0)
<b>Total</b>	<b>203 (100)</b>	<b>132 (100)</b>

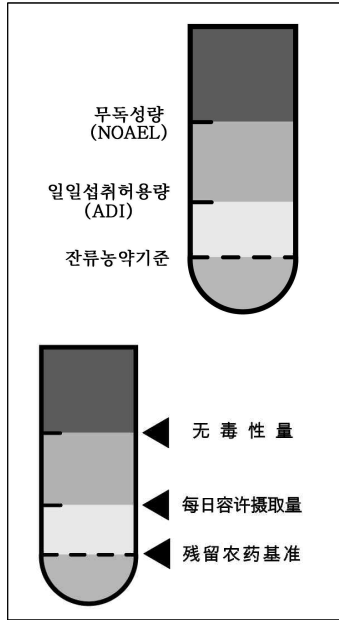
characters, 'Text+ Graph' type questionnaire based on the impact on the biological basis of the three relationships and intake of pesticide residues on 'Text' Type Description x, was described to attach the two-dimensional graph showing the y-axis. The display shows the standard way of existing pesticide residues in Korean and Chinese <Figure 1> and the same. 'Text + Graphics display' type questionnaire, 'Text' type described by the relationship and intake of the three criteria for pesticide residues explained attach a graphical representation showing the effect of the living body in a concise form the test tube one-dimensionally. Graphic displays used in this questionnaire <Figure 2> equal. Questions entries based on the three criteria of pesticide residue, Pesticide residue standards, acceptable daily intake



<Figure 1> standard display method of the existing pesticide residues (Korea, China)

(ADI), if the virtual encounter associated with non-toxic amount of food (NOAEL), 'feel that to some extent safe', 'they are willing to eat is there', 'was to answer the three questions of whether entries are willing to feed their families and loved ones'. This <Figure 2> one-dimensional approach based on the graphical display of pesticide residues (Korea, China) perception of the safety standards of three pesticide residues through, and examine whether there is a difference in their willingness intake, evaluation of safety in accordance with the

method of displaying information about the intention to encourage the uptake of others[19].



<Figure 2> one-dimensional approach based on the graphical display of pesticide residues (Korea, China)

#### IV. The empirical results

##### 4.1.1 Korea

In order to determine the difference in safety in each of the three situations related to residual pesticide, assessment results were collected from the VAS. The evaluation results were given values ranging from 0.0 to 15.0, corresponding to the distance between the left side of the VAS and the marked line. Based on these results, variance analysis was performed on the difference in values.

In order to determine the soundness of the safety assessment on the residual pesticide standards, 3 criteria(the pesticide residue standards, acceptable daily intake(ADI) or less, and the degree of non-toxicity or less) were evaluated to determine whether or not the safety assessment ranks matched the actual pesticide residue ranks. Matching ranks were considered 'correct' while non-matching ranks were considered 'incorrect'. The percentage of correct results (based on this display method) was obtained via cross-analysis. In all significant cases, the risk percentages were less than 5%. For statistical analysis, [PASW Statistics Ver. 22.0 for Windows] was used.

##### 4.1.2 China

In response to the question, "what is your level of interest in food safety?" the most common answer was [interested], chosen by 49 participants (37.1%). The second most chosen answer was [highly interested], chosen by 47 participants (35.6%). For the question asking for the level of consideration for food safety, the most common answer was [some consideration], chosen by 65 participants(49.2%). Another frequently chosen answer was [much consideration], chosen by 41 participants (31.1%). To the question asking for the participants' level of understanding of the dangers of the pesticides, the majority (53 participants, 40.2%) chose the answer [understand somewhat]. To the question asking the residual pesticide level on market produces, a very high percentage (104 participants, 78.8%) chose the answer [enough to at

&lt;Table 2&gt; Awareness of pesticide residues

		Korea		China	
		N (%)	Cronbach's $\alpha$	N (%)	Cronbach's $\alpha$
What is your level of interest in food safety?	Highly interested	28 (13.8)	Cronbach's $\alpha=0.562$	47 (35.6)	Cronbach's $\alpha=0.590$
	interested	85 (41.9)		49 (37.1)	
	neutral	0 (0.0)		30 (22.7)	
	not very interested	84 (41.4)		5 (3.8)	
	not interested at all	6 (3.0)		1 (0.8)	
How much do you consider food safety when purchasing food products?	Much consideration	28 (13.8)	Cronbach's $\alpha=0.547$	41 (31.1)	Cronbach's $\alpha=0.590$
	some consideration	122 (60.1)		65 (49.2)	
	neutral	0 (0.0)		20 (15.2)	
	little consideration	47 (23.2)		6 (4.5)	
	no consideration	6 (3.0)		0 (0.0)	
What is your opinion on the usage of pesticides?	Pesticide-free products preferred, regardless of the price	98 (48.3)	Cronbach's $\alpha=0.607$	77 (58.3)	Cronbach's $\alpha=0.610$
	residual pesticides are inevitable	21 (10.3)		26 (19.7)	
	the current amount is acceptable	22 (10.8)		24 (18.2)	
	no concern	23 (11.3)		5 (3.8)	
In your own opinion, how well do you understand the dangers of pesticides?	Understand well	18 (8.9)	Cronbach's $\alpha=0.598$	11 (8.3)	Cronbach's $\alpha=0.683$
	understand somewhat	88 (43.3)		53 (40.2)	
	neutral	50 (24.6)		43 (32.6)	
	understand little	39 (19.2)		18 (13.6)	
	no understanding	8 (3.9)		7 (5.3)	
How much pesticide do you think remains on the produces being sold on the market?	Enough to cause harm	39 (19.2)	Cronbach's $\alpha=0.638$	24 (18.2)	Cronbach's $\alpha=0.662$
	enough to at least require washing	152 (74.9)		104 (78.8)	
	safe amount for immediate consumption	10 (4.9)		4 (3.0)	
	little to none	2 (1.0)		0 (0.0)	
How concerned are you with residual pesticides when purchasing/consuming food products?	Very concerned	15 (7.4)	Cronbach's $\alpha=0.515$	29 (22.0)	Cronbach's $\alpha=0.571$
	a little concerned	107 (52.7)		58 (43.9)	
	neutral	32 (15.8)		36 (27.3)	
	not very concerned	40 (19.7)		9 (6.8)	
	not concerned at all	9 (4.4)		0 (0.0)	
Which is the most easy-to-understand information displayed indicating the amount of a pesticide	Text	25 (12.3)	Cronbach's $\alpha=0.716$	29 (22.0)	Cronbach's $\alpha=0.705$
	Graph	41 (20.2)		40 (30.3)	
	Graphics Display	37 (67.5)		63 (47.7)	
<b>Total</b>	<b>203 (100.0)</b>	<b>Cronbach's <math>\alpha=0.643</math></b>	<b>132 (100.0)</b>	<b>Cronbach's <math>\alpha=0.673</math></b>	

least require washing]. For the question asking for the participants' levels of concern on residual pesticides when purchasing/consuming food products, the most commonly chosen answer was [a little concerned], chosen by 58 participants (43.9%). For the question asking for the best indicator for

the residual pesticide information, the most commonly chosen type was the 'graphic display,' chosen by 63 participants (47.7%).

The results regarding the recognition of these pesticide residues shown in <Table 2>.



## 4.2 safety perception

### 4.2.1 Korea

Three kinds of pesticide residue standards (less pesticide residue standards, acceptable daily intake (ADI) or less, non-toxic amount or less) and in the relevant circumstances, 'do you feel it is somewhat safe' in the analysis of variance was performed on the safety assessment.

The result was, no significant differences safety evaluation value corresponding to the display method ( $p > .05$ ), there was a significant difference can see the safety evaluation value according to the three criteria of residual pesticide. And there was also a significant difference between the representation method on safety evaluation value and the interaction on standard value of pesticide residues ( $p < .001$ ).

The Korean results in the safety perception survey shown in < Table 3 >.

<Table 3> Safety perception (Korea)

Category	N	Average	The standard error	F	P-value
Text	69	68.78	1.926	2.875	0.057
Text + Graph	61	69.79	2.049		
Text + Graphics Display	73	63.70	1.873		

\* $p < 0.05$ , \*\* $p < 0.01$

### 4.2.2 China

Three kinds of pesticide residue standards (less pesticide residue standards, acceptable daily intake

(ADI) or less, non-toxic amount or less) and in the relevant circumstances, 'do you feel it is somewhat safe' in the analysis of variance was performed on the safety assessment. As a result, significant differences in the safety assessment in accordance with the standards of the displayed value method and three pesticide residues were not ( $p > .05$ ).

Results regarding the safety perception survey of Chinese is the same as <Table 4>.

<Table 4> Safety perception (China)

Category	N	Average	The standard error	F	P-value
Text	35	5.471	1.926	1.425	0.225
Text + Graph	66	5.674	2.049		
Text + Graphics Display	31	6.117	1.873		

\* $p < 0.05$ , \*\* $p < 0.01$

## 4.3 Ingestion intention degree

### 4.3.1 Korea

Three kinds of pesticide residue standards (less pesticide residue standards, acceptable daily intake (ADI) or less, non-toxic amount or less) and in the relevant circumstances, 'Are you interested in their food', analysis of variance was performed on the safety assessment. As a result, it was possible to see significant differences between the safety evaluation value corresponding to the display method ( $p < .05$ ).

Results Koreans on the intake willing enough to target is the same as <Table 5>.

<Table 5> intake intention degree (Korea)

Category	N	Average	The standard error	F	P-value
Text	69	73.36	2.808	4.684	0.010*
Text + Graph	61	77.52	2.986		
Text + Graphics Display	73	65.46	2.730		

\*p <0.05, \*\*p <0.01

#### 4.3.2 China

Three kinds of pesticide residue standards (less pesticide residue standards, acceptable daily intake (ADI) or less, non-toxic amount or less) and in the relevant circumstances, 'Are you interested in their food', analysis of variance was performed on the safety assessment. The result was, safety evaluation value is not significantly different according to the display method is not(p> .05), there was a significant difference can see the safety evaluation value according to the three criteria of residual pesticide. The results of the intake willing enough to target the Chinese shown in < Table 6>.

<Table 6> intake intention degree (China)

Category	N	Average	The standard error	F	P-value
Text	35	5.126	2.729	0.196	0.941
Text + Graph	66	3.259	2.902		
Text + Graphics Display	31	3.911	2.653		

\*p <0.05, \*\*p <0.01

#### 4.4 Ingestion solicitation intention degree

##### 4.4.1 Korea

<Table 8> intake recommendation intention degree (China) <Table 9> for a safety assessment value percentage of correct answers (Korea). Three kinds of pesticide residue standards (less pesticide residue standards, acceptable daily intake (ADI) or less, the amount of non-toxic or less) and in the relevant circumstances, 'Is there a willingness to feed their families and loved ones' was conducted on the safety assessment. As a result, it was possible to see significant differences between the safety evaluation value corresponding to the display method (p <.05). Koreans results on the intake recommendation seems willing enough to target the <Table 7>.

<Table 7> intake recommendation intention degree (Korea)

Category	N	Average	The standard error	F	P-value
Text	35	5.126	2.729	0.196	0.941
Text + Graph	66	3.259	2.902		
Text + Graphics Display	31	3.911	2.653		

\*p <0.05, \*\*p <0.01

##### 4.4.2 China

Three kinds of pesticide residue standards 'Are you interested to feed their families and loved ones (or less pesticide residue standards, acceptable daily intake (ADI) or less, non-toxic amount or less) and in the related situation analysis of variance was

performed on the safety assessment. As a result, significant differences in the safety assessment in accordance with the standards of the displayed value method and three pesticide residues were not ( $p > .05$ ).

Results of solicitation willing to consume enough to target the Chinese is the same as <Table 8>

<Table 8> intake recommendation intention degree (China)

Category	N	Average	The standard error	F	P-value
Text	35	3.909	2.729	0.414	0.798
Text + Graph	66	3.859	2.902		
Text + Graphics Display	31	4.553	2.653		

\* $p < 0.05$ , \*\* $p < 0.01$

#### 4.5 percent correct for the safety assessment values

##### 4.5.1 Korea

To find out whether it is safe to some extent determine the safety of three feels appropriately based on assessment of pesticide residues (less

pesticide residue standards, acceptable daily intake (ADI) or less, the amount of non-toxic or less) value was calculated based on the percentage of correct answers result, it was possible to see a significant difference according to the display method ( $p < .001$ ). In particular, the information provided was the highest percentage of correct answers to 'Text + Graphics Display', followed by 'Text + Graph', 'Text'. After they calculated based on the percentage of correct answers based on an estimate of the three pesticides to determine that the proper determination as to whether 'are you willing to eat', was able to see a significant difference according to the display method ( $p < .01$ ). In particular, the information provided was the highest percentage of correct answers to 'Text + Graphics Display', followed by 'Text + Graph', 'Text'. There were significant differences on the representation methods to see the results based on the standard value of the three pesticides residues ( $p < .001$ ). In particular, the 'Text + Graphics Display' representation method showed the highest percentages of correct answers, followed by 'Text + Graph'. Results of the percentage of correct answers

<표 9> for a safety assessment value percentage of correct answers (Korea)

	Text		Text + Graph		Text + Graphics Display		Total	P-value
	Answer	Wrong Answer	Answer	Wrong Answer	Answer	Wrong Answer		
feel that to some extent safety	3(1.5%)	66(32.5%)	3(1.5%)	60(29.6%)	20(9.9%)	51(25.1%)	203(100.0%)	0.000***
Are you interested in his food	7(3.4%)	62(30.5%)	9(4.4%)	54(26.6%)	21(10.3%)	50(24.6%)	203(100.0%)	0.007**
his family and loved ones are you interested in answers to the feed to have	1(0.5%)	68(33.5%)	12(1.0%)	61(30.0%)	16(7.9%)	55(27.1%)	203(100.0%)	0.000***

\* $p < 0.05$ , \*\* $p < 0.01$

on the Korean targets as a safety assessment value is equal to the <Table 9>.

#### 4.5.2 China

To find out whether it is safe to some extent determine the safety of three feels appropriately based on assessment of pesticide residues (less pesticide residue standards, acceptable daily intake (ADI) or less, the amount of non-toxic or less) value was calculated based on the percentage of correct answers result, there were no significant differences in indication method( $p > .05$ ). If the percentage of correct answers, 'Text + Graphics Display' information was supplied by the percentage of correct answers was highest, followed by 'Text + Graph', 'Text'. To calculate an estimate of the percentage of correct answers on the basis of three criterias to determine whether pesticide residue determination, there were no significant differences in display method ( $p > .05$ ). 'Text + Graphics Display' was highest, followed by 'Text + Graph', 'Text'. After calculating the percentage of correct answers based on an estimate of the standard three

pesticide residues to see 'willing to feed their families and loved ones', show how there was no significant difference ( $p > .05$ ). If the percentage of correct answers, the percentage of correct answers was the information provided in the 'Text + Graph' the highest, followed by 'Text + Graphics Display', 'Text'.

## V. Conclusions and future research

As exports and imports of food increase in the flood of globalization, the issues related to food safety is a common concern of all countries, not limited anymore to any one country. Even though consumers can easily contact the information related to food safety, anxiety is increasing due to the difficulty in judging proper information. In order to reduce the consumers' anxiety, there should be sufficient communication between professionals of food safety and general consumers. As Korean and Chinese consumers are considered not having enough knowledge of food safety and they overuse pesticide, pesticide residues are in a serious

<표 10> for the safety assessment value percentage of correct answers (China)

	Text		Text + Graph		Text + Graphics Display		Total	P-value
	Answer	Wrong Answer	Answer	Wrong Answer	Answer	Wrong Answer		
feel that to some extent safety	8(6.1%)	27(20.5%)	10(7.6%)	56(42.4%)	11(8.3%)	20(15.2%)	132(100.0%)	0.078
Are you interested in his food	5(3.8%)	30(22.7%)	7(5.3%)	59(44.7%)	8(6.1%)	23(17.4%)	132(100.0%)	0.148
his family and loved ones are you interested in answers to the feed to have	4(3.0%)	31(23.5%)	13(9.8%)	53(40.2%)	9(6.8%)	22(16.7%)	132(100.0%)	0.200

\* $p < 0.05$ , \*\* $p < 0.01$

situation. Therefore, the study proposes an efficient information-providing way for Korean and Chinese consumers to understand the information about food safety more accurately.

As Korea and China are close in the trade relations as well as in geography, the comparative study on food safety between them is meaningful. In particular, the study proposed graphic displays which indicate the amount of pesticide residues in one dimension in order to help the understanding of the pesticide residues related to the food safety information. In addition, the study reviewed whether one-dimensional graphic representation is more effective to enhance the understanding of information compared with the conventional text information form and two-dimensional graphic representation with more information.

The result showed that there were some differences in understanding food safety information between Korean and Chinese consumers. In Korean consumers, there were significant differences in the safety evaluation depending on the display method for all questions, except the question 'Do you feel it safe?' The study calculated the rate of correct answers based on safety evaluation to see whether to judge properly the safety of three pesticide residues or not, and found that there were also significant differences in the rate of correct answers in accordance with the display form in all question items. The 'Text + Graphics Display' method had the highest accuracy rates among all the information display methods.

In Chinese consumers, however, there were no significant differences in the safety evaluation value

in accordance with the display method in all three questions. After calculating the percentage of correct answers based on safety evaluation to see whether to judge properly the safety of three pesticide residues or not, the study showed that there were no significant differences in the percentage of correct answers depending on the display form in all the question items.

The results showed that one-dimensional form using a graphic representation of pesticide residues is more effective and easier than texts-graphics representation in indicating the safety of three pesticide residue criteria for Koreans. On the other hand, there were no differences on the evaluation and understanding between the text-graphics method and one-dimensional form for Chinese. Therefore, it can't be said that the graphic representation form enhances the understanding of the safety related to three pesticide residue criteria for Chinese.

The two-dimensional graph form describing three pesticide residue criteria used in this study would be difficult for the participants with insufficient knowledge. To understand it, participants need basic knowledge related to graphics. On the other hand, the one-dimensional graphic representation is considered to be a better method than general texts or graphics representation, because it does not require a lot of knowledge for understanding the pesticide residue criteria.

To develop representation methods enhancing the understanding of information, further studies need to survey various participants and propose a variety of methods of providing information.

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