

# Food Safety and Traceability in Japan

April 1st 2008, 10:00am -12:30pm

The Dominican Institute of Agriculture, Livestock and Forestry Research (IDIAF)

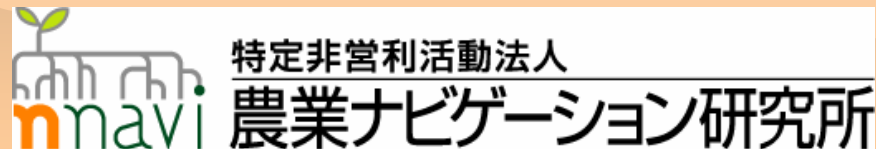
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  - the beef traceability system based on the law
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  - the investigation of the Ministry of Agriculture, Forestry and Fisheries
- ❁ 4. System for Securing Traceability and Safety of Food
  - food traceability system development using ICT (Information and Communication Technology).
- ❁ 5. Concluding Remarks
  - an integration of the traceability system and the agricultural risk management system

# Japan and Dominican Republic

- ❁ Island
- ❁ Rice is the main staple food
- ❁ To go to Japan, Mr. Columbus navigated. He reached Dominican Republic and he misunderstood that the place was Japan.



# Rice field in Okayama Prefecture





Cornell University, USA



# National Agriculture and Food Research Organization, Tsukuba City

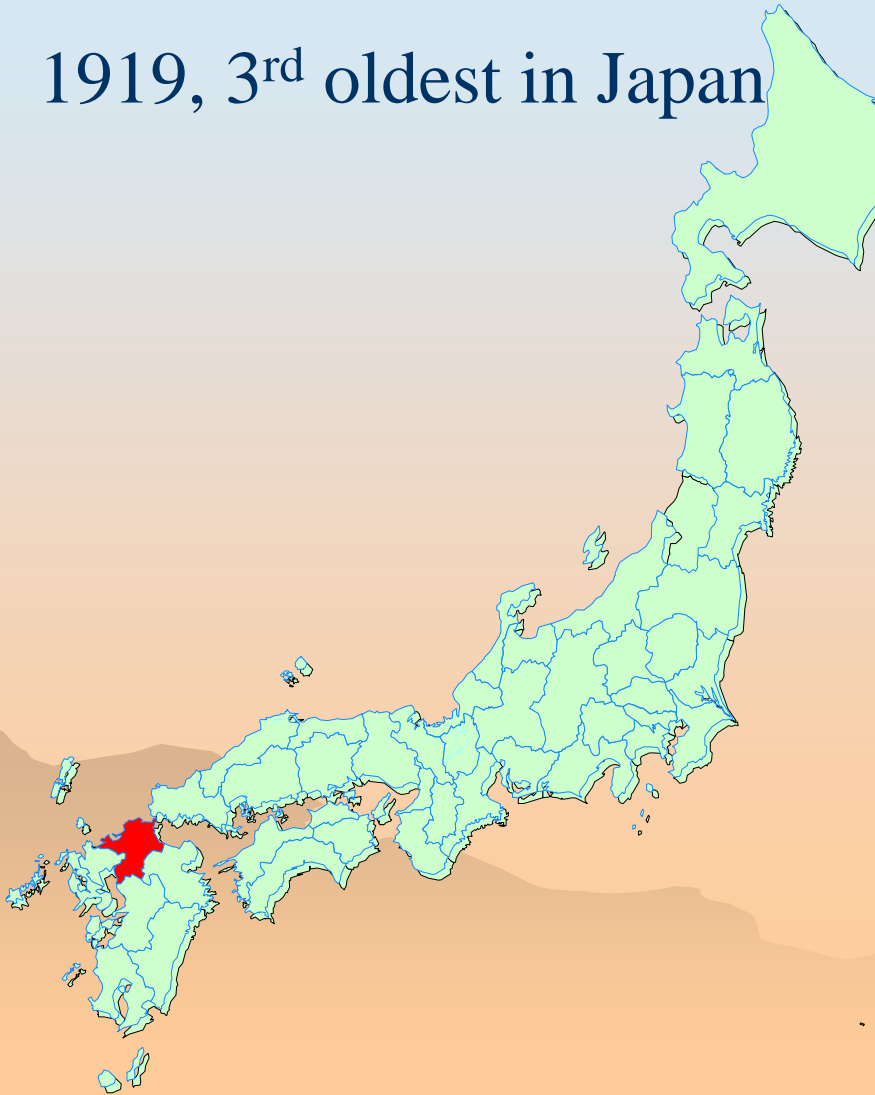
2000 Research Staff  
Many branches



National Kyushu University

Faculty of Agriculture since

1919, 3<sup>rd</sup> oldest in Japan



# Recent food related accidents in Japan

- ❁ Consumer's concern for food safety
  - the Japanese consumer feels insecure in the safety of farm products including imported products.
  - This is a result of various events relating to the food safety after 1996
- ❁ Good examples
  - **pesticide residue of imported frozen vegetable**
  - **use of unregistered agricultural chemical**
  - The first cow affected by the BSE in Japan was discovered in September, 2001.
  - the false meat labeling.
  - food poisoning by intestines tube hemorrhage E. coli bacteria 0157
  - large-scale food poisoning that originates in processing milk
  - mixing of genetically modified corn (GMO) with food.
  - the generation of a high virus bird flu in Japan and Southeast Asia in 2004.



## 2. Policy of Japanese Government

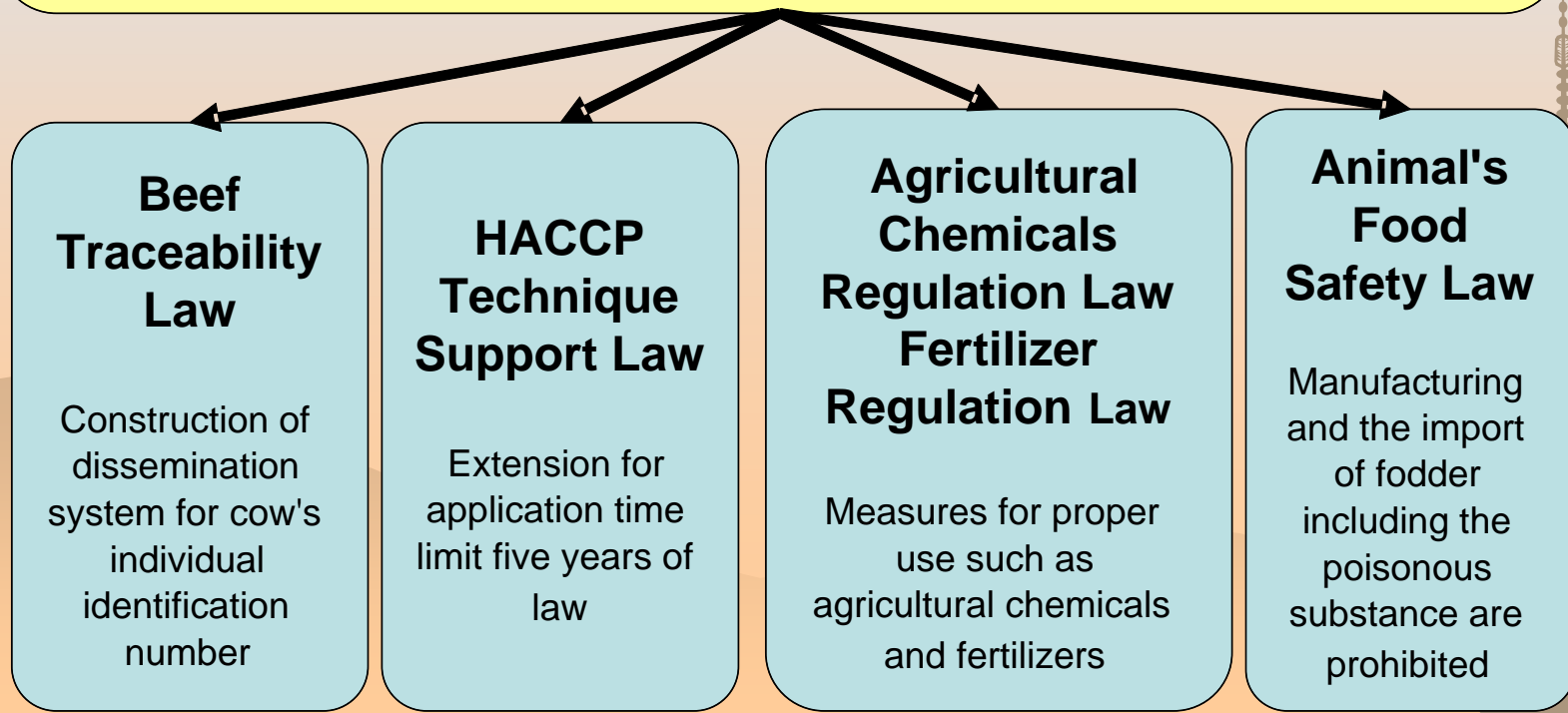
- ❁ Securing the food safety as an important theme of the policy
  - MAFF (The Ministry of Agriculture, Forestry and Fisheries ) announced
    - "Reproduction plan of food and agriculture" in April, 2002
    - "policy outline for food safety" in June, 2003
- ❁ The system development promotion and the system introduction promotion
  - aiming at the construction of the food traceability system with ICT

## 2. Policy of Japanese Government Food Safety Basic Law (2003)

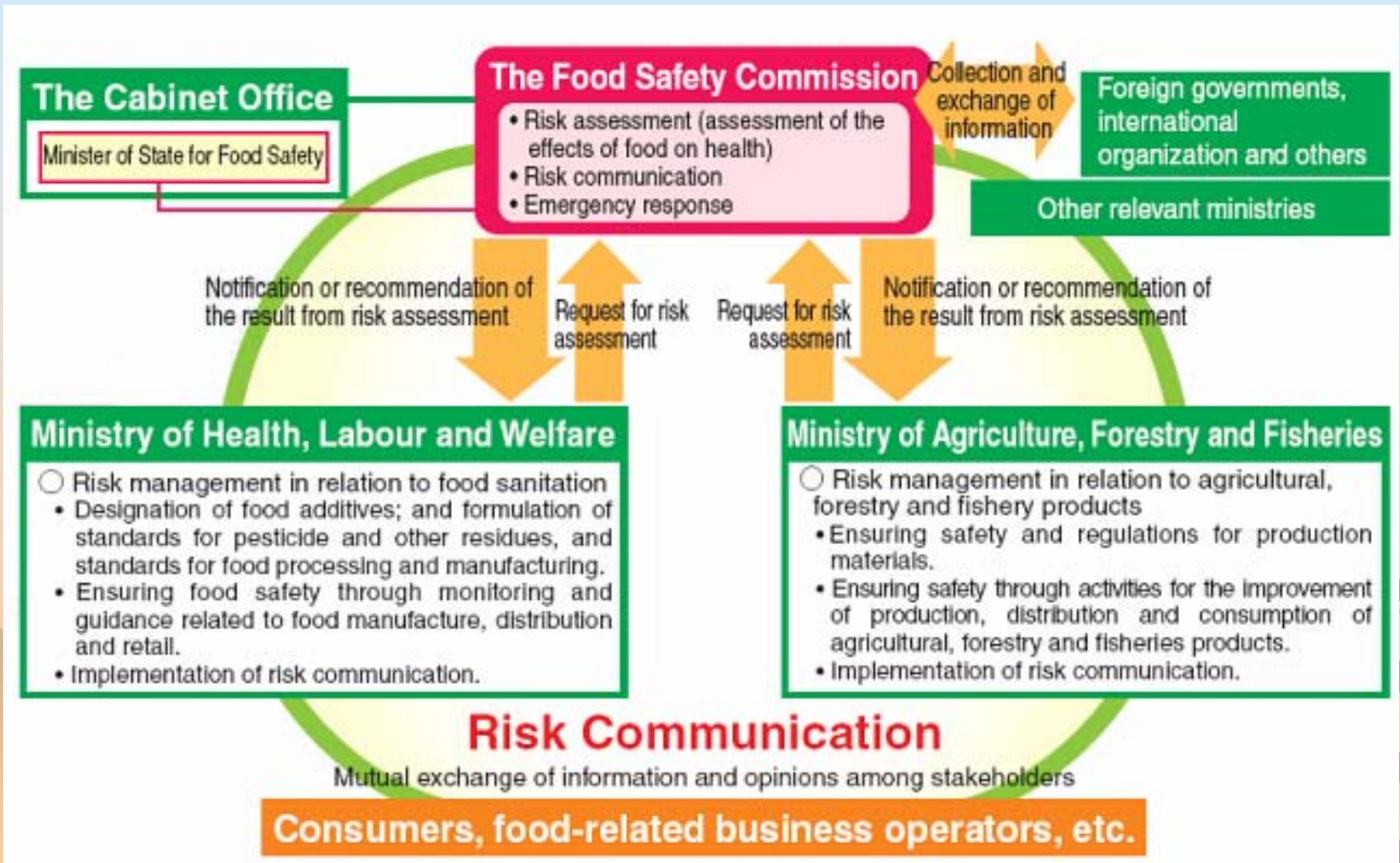
### **Food Safety Basic Law**

Installation of Food Safety Commission

Idea of law : Necessary measures for securing the safety of food must be lectured on appropriately in each stage in the process of a series of food supply from the production of the agriculture, forestry and fisheries things to sales of food.



## 2. Policy of Japanese Government Food Safety Commission



## 2. Policy of Japanese Government

# Institutional System of Food Traceability

- ❁ The beef traceability system
  - domestic beef
  - date of birth, sex, type, the breeding location, breeding manager
- ❁ The food traceability system
  - foods other than domestic beef
  - The producer and the enterprise independently set recorded information
- ❁ The production history registration movement
  - whole food
  - An effort obligation to record the item provided by Food Sanitation Law
- ❁ The system of production information making (JAS)
  - Beef(2003), pork(2004) and farm products(2005)
  - animal medicine, agricultural chemicals, the fertilizer

# 2. Policy of Japanese Government Traceability system of beef

## National Livestock Breeding Center

Individual identification number, date of birth, and sex, breeding ground, those who breed, date of movement and slaughter, mother's individual identification number



## 牛トレーサビリティ

牛の個体識別台帳に記録されている出生の年月日、雌雄の別、母牛の個体識別番号、種別(品種)、飼養場所の履歴の検索ができます。

Commodity label with ID

Ear tag



国産黒毛和牛サーロインステーキ用

消費期限 00.0.00

個体識別番号 1234567890

100g当り(円) 000

内容量(g) 00

000 価格(円)

加工者(株) 〇〇〇〇〇〇〇〇〇〇〇〇 保存温度 4℃以下



## 消費者



個体識別番号	生年月日	性別	種別	母牛の個体識別番号
1234567890	H.12.05.21	オス	ホルスタイン種	0000654321
飼養地	異動内容	異動年月日	住所	氏名または名称
1 岩手県	出生	H.12.05.21	盛岡市	家畜改良センター岩手牧場
2 岩手県	転出	H.12.05.21	盛岡市	家畜改良センター岩手牧場
3 福島県	転入	H.12.05.21		
4 福島県	転出	H.12.05.21		
5 東京都	搬入	H.15.05.21		
6 東京都	と畜	H.15.05.21		

Production history information with ID

(注)住所

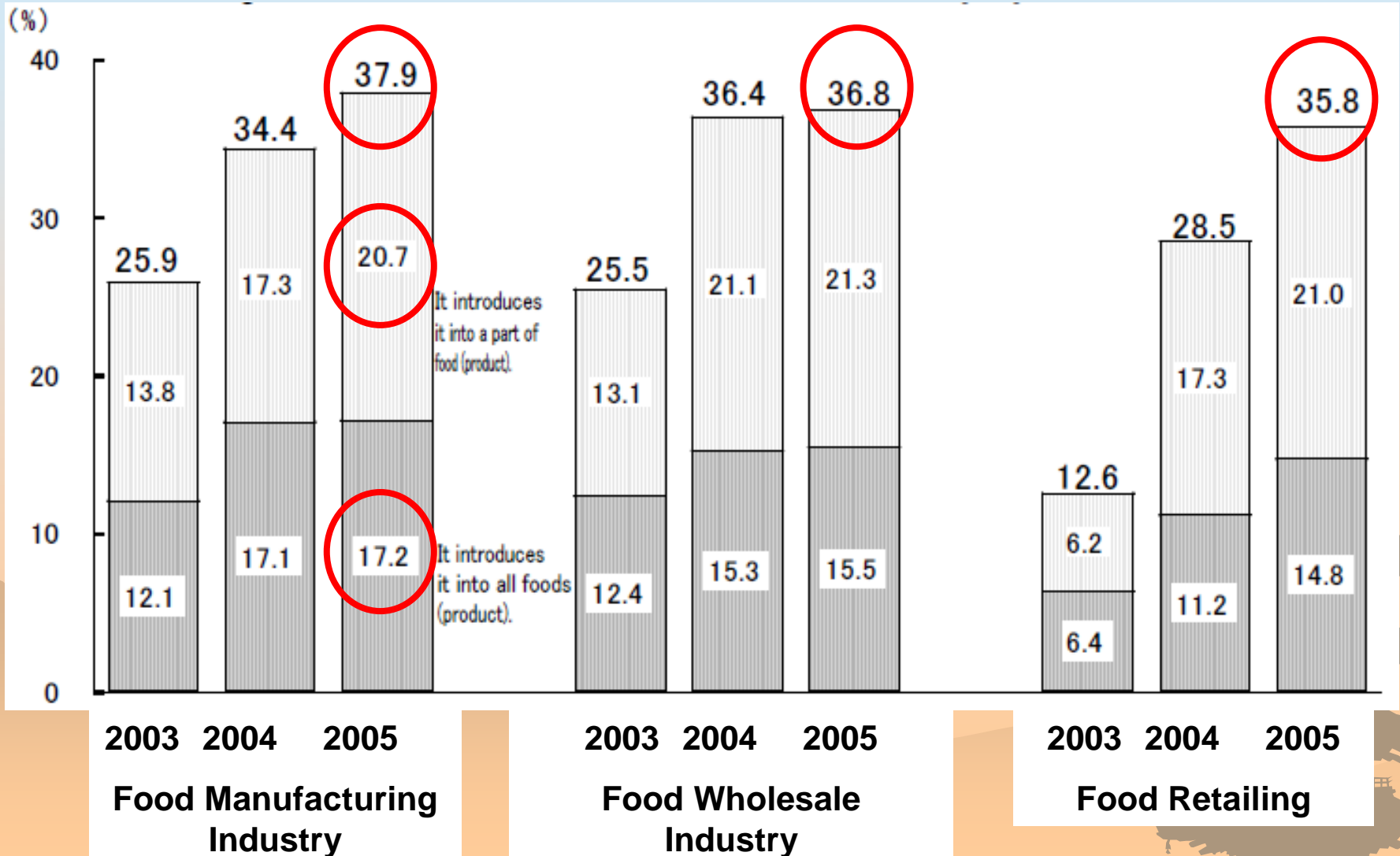
### 3. Current Status of Food Traceability

- ❁ Food industrial trend investigation result in 2005 fiscal year by MAFF
- ❁ The investigation enterprise number are more than 2000 .

		(1)Number of investigations	(2)number of collections	(3)collection rate =(2)/(1)
Food industry	Total of Food industry	2,840	2,140	75.4%
	food manufacturing industry	940	740	78.7%
	food wholesale industry	940	705	75.0%
	food retailing	960	695	72.4%
Agricultural cooperative		140	135	96.4%

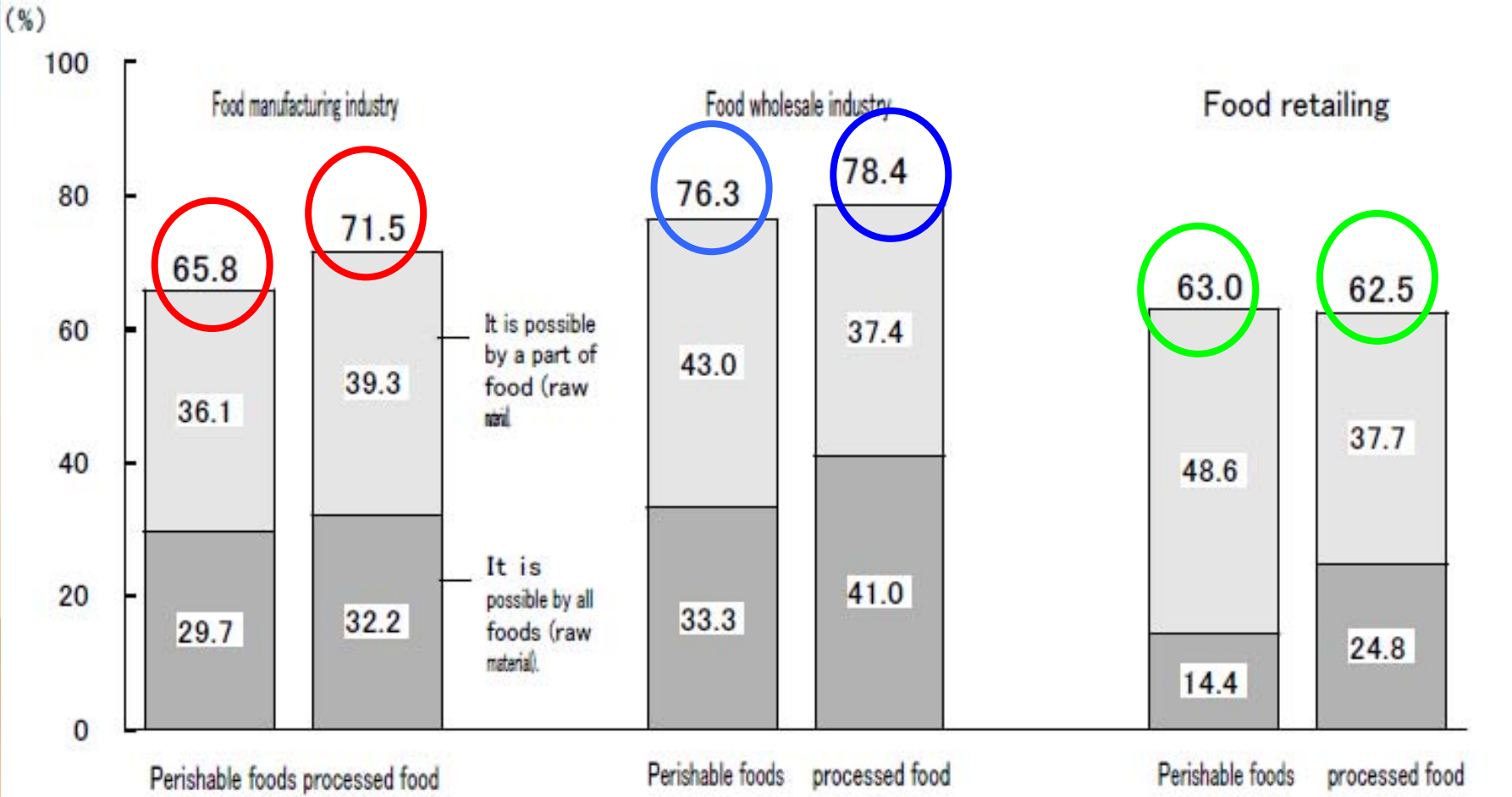
### 3. Current Status of Food Traceability

## Introduction of Traceability System in Food Industry



# 3. Current Status of Food Traceability

## Trace Back in Food Industry





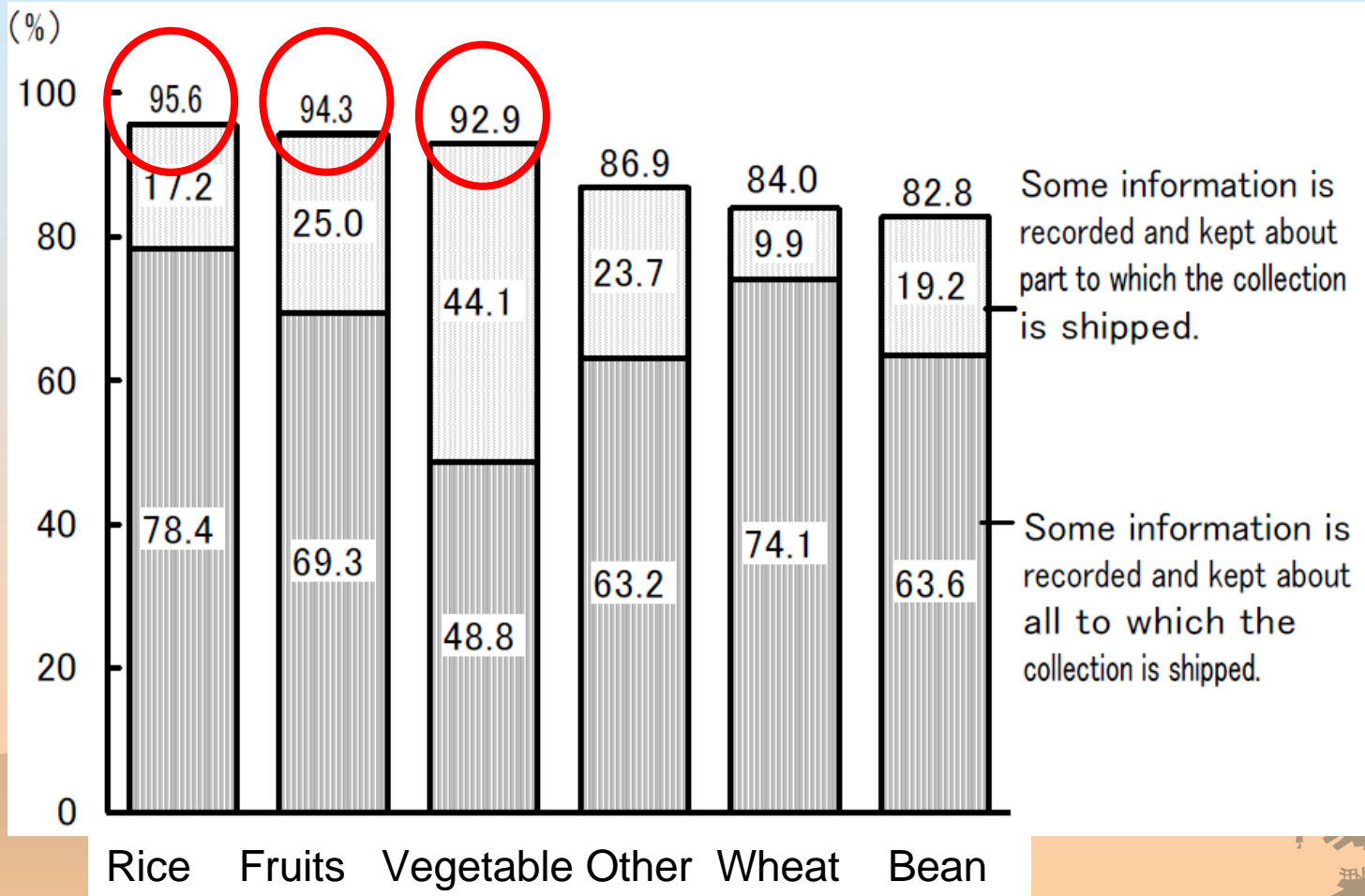
### 3. Current Status of Food Traceability

## Method of transmitting information

- ❁ In each industry, the ratio (88.1%-91.4%) of "Paper ( cutform etc.)" is the highest.
- ❁ The ratio of "Character representation to the wrapping materials" is high (44.3-46.4%) in second.
- ❁ The ratio of "Two dimension code" is 10.3-16.2%.
- ❁ The ratio (1.3-3.8%) of " Electronic tag " is low.

### 3. Current Status of Food Traceability

## Cultivation History Record in Agricultural Cooperative



### 3. Current Status of Food Traceability

## Trace Back in Agricultural Cooperative

- ❁ 20.7% of the agricultural cooperative can specify the producer of farm products by all commodities shipped to the market.
- ❁ 60.7% of the agricultural cooperative can specify the producer by a part of commodity.

# 4. System for Securing Traceability and Safety of Food

- MAFF is promoting the development of **both a food traceability system and a production risk management system** by ICT and Ubiquitous computing technology.
- the automation of record making of all information on food handy are expected to advance.
  - speed-up of call back and cause investigation at food accident;
  - efficiency improvement of production and circulation of food;
  - enhancement of various information on food that consumer can use.
- In fiscal year 2006, there was an application of 19 proposals, and six projects were adopted by MAFF.

## 4. System for Securing Traceability and Safety of Food

# 'Development of Safety System of Food' in 2006

Group that manages project	Target commodities	Adoption requirement
<b>NPO Nogyo (Agriculture &amp; Farming) Navigation Laboratory</b>	<b>Milk and vegetables and fruits</b>	<b>b and d</b>
Fresh Produce Traceability Society	Vegetable	b
Kyoto Egg and Chicken Safety Promotion Conference	Chicken	b
Japanese Traceability Society	Egg, chicken, beef, and fruits	a
Food history informational common conference	Pickles, tofu, frozen food, and dining out commodity	b
Japan Fisheries Association Corp. and Oceanic Fishery System Society	Natural seafood and cultivation seafood	a and d

Note: The adoption project in fiscal year 2006 is pertinent to either of the following adoption requirements.

- a. The system of stages of production must cooperate with the system of the distribution level.
- b. A small-scale entrepreneur should be able to introduce it.
- c. Cooperate with HACCP and the stock control at the food manufacturing stage.
- d. The proper use confirmation that uses the data base of manufacturing supplies must be possible.

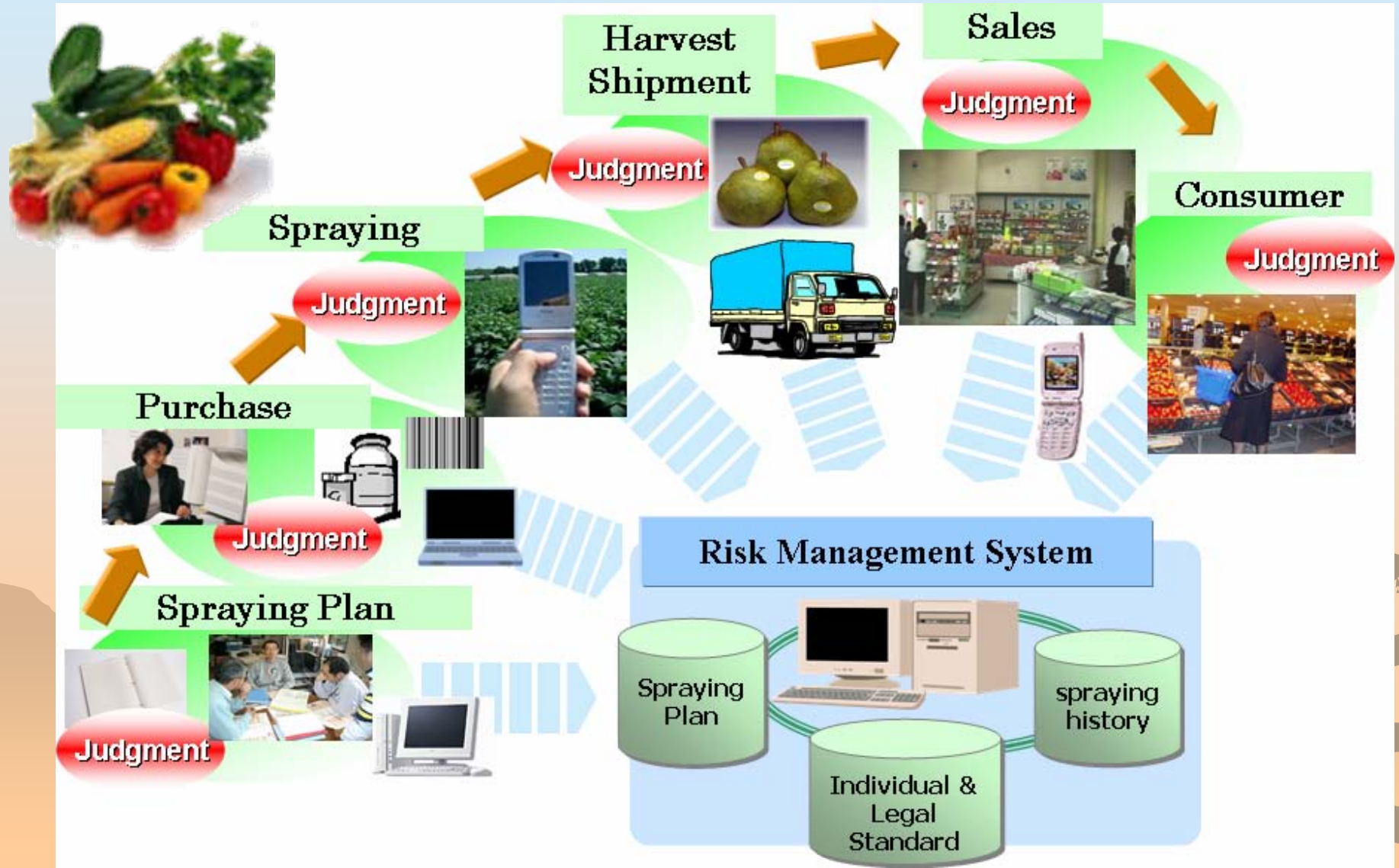
## 4. System for Securing Traceability and Safety of Food

### Risk management system and traceability system

- ❁ NNL: Nogyo (Agriculture & Farming) Navigation Laboratory is one of the groups for which the proposal is adopted.
- ❁ a navigation system for the proper use of agricultural production materials is developed based on Nanseki et.al (2005, 2006)
- ❁ This system is
  - composed of data base of the veterinary products and agricultural chemicals, and propriety use support system for them.
  - integrated with the traceability system that a small-scale entrepreneur can introduce.

# 4. System for Securing Traceability and Safety of Food

## Multi-stage Judgment System for Proper Agrochemical Application



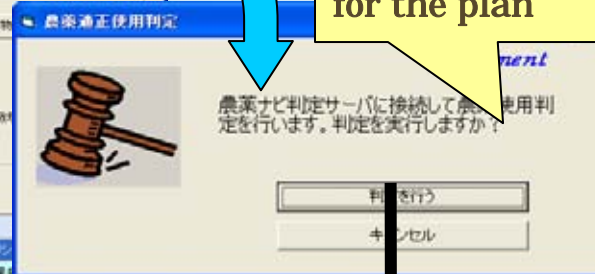
# Flow of the system operation



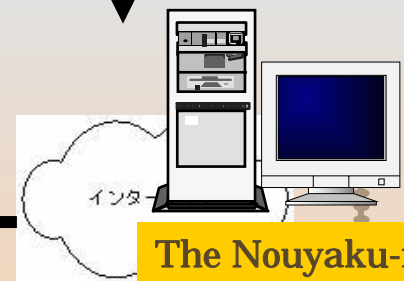
1. Prepare a pesticide Spraying plan

No.	農薬使用日	農薬登録番号	農薬名	作業区分・目的	単位造訪	使用量	病害虫
1	2004年03月29日	18180	ハーベストオイル	発芽前-2月下旬~4月上旬	50倍	3500kg/10a	ウドシ
2	2004年03月29日	11573	トップジンM水和剤	発芽前-2月下旬~5月上旬	1000倍		灰星病
3	2004年04月19日	20980	サンリット水和剤	風乾状-開花1日前-4月下旬	2000倍	3700kg/10a	灰星病
4	2004年04月19日	20309	マトリックプロアブル	風乾状-開花1日前-4月下旬	2000倍		炭そ病・ハマキムシ類
5	2004年04月29日	18821	ベルコート水和剤	満開1日後-5月上旬	1000倍	3700kg/10a	灰星病・炭そ病
6	2004年05月09日	2544	クオンサイド水和剤	満開15日後-5月中旬	800倍	3700kg/10a	カゲムシ
7	2004年05月09日	4962	スミダオン乳剤	満開15日後-5月中旬	1000倍		ハダニ・灰星病・炭そ病
8	2004年05月18日	11502	ペンレート水和剤	5月中旬~5月下旬	2000倍	3700kg/10a	ハダニ
9	2004年05月18日	10529	ペンレート水和剤	5月中旬~5月下旬	1000倍		灰星病

2. Request a judgment for the plan



The Nouyaku-navi judgment server



3. You Get results of judgment

農業ナビ判定サーバシステム判定結果

2004年03月29日 2004年03月29日 2004年04月19日 2004年04月19日 2004年04月29日 2004年05月09日 2004年05月09日 2004年05月18日 2004年05月18日

2004年03月29日 18180 ハーベストオイル 50倍 3500kg/10a ウドシ

2004年03月29日 11573 トップジンM水和剤 1000倍 灰星病

2004年04月19日 20980 サンリット水和剤 2000倍 3700kg/10a 灰星病

2004年04月19日 20309 マトリックプロアブル 2000倍 炭そ病・ハマキムシ類

2004年04月29日 18821 ベルコート水和剤 1000倍 3700kg/10a 灰星病・炭そ病

2004年05月09日 2544 クオンサイド水和剤 800倍 3700kg/10a カゲムシ

2004年05月09日 4962 スミダオン乳剤 1000倍 ハダニ・灰星病・炭そ病

2004年05月18日 11502 ペンレート水和剤 2000倍 3700kg/10a ハダニ

2004年05月18日 10529 ペンレート水和剤 1000倍 灰星病



Total frequency of use of the active ingredient will exceed the total frequency prescribed in the law.



## Multi-standard Judgment

# Pesticide Spraying and Cultivation Planning

栽培計画

F1 ヘルプ F2 修正 F3 追加 F4 削除 F5 コピー F6 貼り付け F7 出力 F8 農薬判... F9 暦設定 F10 日付... F11 F12 終了

計画名(N)   栽培暦表示(L)  特記事項表示(S)

計画情報

農薬使用基準(A)  栽培方法(O)

対象作物  予想収穫量(J)

収穫予定日(D)  備考(B)

栽培暦

1月 2月 3月 4月 5月 6月 7月 8月 9月 10月

作業1  
作業2

行移動 ▲ ▼

No.	予定日	予定作業	投下資材	区分	用途	散布・投下量(内室素)	希釈倍数使用量	計画の希釈倍数使用量 ▲
1		薬剤散布	スプレーオイル	指定なし	殺虫剤		50倍 (22L)	0
2		薬剤散布	スプレーオイル	指定なし	殺虫剤		50倍 (22L)	0
3	4月上旬	薬剤散布	石灰硫黄合剤	指定なし	殺菌剤		10倍 (10L)	0
4	5月中旬	薬剤散布	サンリット水和剤	指定なし	殺菌剤		4,000倍 (25g)	0
5		薬剤散布	アクタラ顆粒水溶剤	指定なし	殺虫剤	1,000	2,000倍	0
6	5月下旬	薬剤散布	トップジンM水和剤	指定なし	殺菌剤		1,500倍 (67g)	0
7	5月下旬	薬剤散布	ダイボルトフロアブル	指定なし	殺菌剤		500倍 (200g)	0
8	5月下旬	薬剤散布	テルスター水和剤	指定なし	殺虫剤		1,000倍 (100g)	0
9	6月中旬	薬剤散布	ベルコート水和剤	指定なし	殺菌剤		1,000倍 (100g)	0
10	6月下旬	薬剤散布	アミスター10フロアブル	指定なし	殺菌剤		1,000倍 (100ml)	0

特記事項

working schedule  
Cultivation planning

Date

Name of the  
agrochemical

Dilution and other  
spraying standards

# Judgment based on the legal and individual standards

**農薬適正使用判定**

判定済み履歴数 : 547  
未判定履歴数 : 40

収穫開始日(D): 指定なし ~ 指定なし  
 最終更新日(W): 指定なし ~ 指定なし

判定方法  
 栽培管理簿で設定された農薬使用基準で判定する(K)  
 農薬使用基準を指定して判定する(S)  
 農薬使用基準(R):

支所(H): 2 天童支所  
 生産部会(B): 100 果樹部会(なし部)  
 作物(C): 1.1 西洋なし(ラ・フランス)

条件で表示(F)

判定	地区	生産者コード	生産者
<input checked="" type="checkbox"/>	天童中	2011 武市 半蔵	
<input checked="" type="checkbox"/>	天童中	2011 武市 半蔵	
<input checked="" type="checkbox"/>	小路	2033 高見 新造	
<input checked="" type="checkbox"/>	小路	2033 高見 新造	
<input checked="" type="checkbox"/>	小路	2035 戸田 一男	
<input checked="" type="checkbox"/>	小路	2035 戸田 一男	
<input checked="" type="checkbox"/>	小路	2038 高橋 優一	
<input checked="" type="checkbox"/>	小路	2038 高橋 優一	

Microsoft Excel - 栽培履歴結果.xls

MS Pゴシック 11 B I U A

Q29

栽培履歴判定結果

判定日時 平成18年03月10日 9:56 現在

生産者:10070 井上 栄一  
履歴番号:1 ラ・フランス栽培履歴  
栽培作物:30 洋なし  
判定基準:果樹防除組合基準  
[適切] 判定条件で判定した結果、問題は発見されませんでした。

生産者:10070 井上 栄一  
履歴番号:2 トマト栽培履歴  
栽培作物:20 トマト  
判定基準:野菜防除組合基準

- [範囲外] 【92054 ロブラール水和剤】農薬使用基準の希釈倍数使用量と異なります(範囲外)。ただし、使用には問題あり
- × [回数違反] 【92963 サンドファンC水和剤】使用回数が違反です(4回まで使用可)。
- × [希釈違反] 【94347 アファーム乳剤】希釈倍数使用量が違反です(2,000が可)。
- × [適用外作物] 【94990 サンリット水和剤】この作物に使用できない薬剤です。
- × [回数違反] 【オキサジキル】有効成分の総使用回数が違反です(4回まで使用可)。

平成18年05月01日 92963 サンドファンC水和剤  
平成18年06月01日 92963 サンドファンC水和剤  
平成18年07月01日 92963 サンドファンC水和剤  
平成18年07月01日 92963 サンドファンC水和剤  
平成18年07月25日 92963 サンドファンC水和剤

When the judgment does not conform to the standard, the result is indicated as "×". Each user can set the conditions of the marks. The indication of the judgment can be controlled by the judgment level.

# Mobile Phones System



# 5W1H information of agrochemicals use by camera-equipped GPS mobile phone.

防除・栽培履歴作成

履歴概要

生産者: 10010 木村 太郎 (農場: 木村 ラ・フランスほ場) 収穫開始日: 2006/10/10  
栽培作物: 洋なし (播種日: ) 収穫終了日:   
農薬使用基準: ラ・フランス JAやまと基準 (定植日: ) 収穫量:

	No.	実施日	投下資材	希釈倍率 使用量	散布・投下量	使用目的 備	位置情報	防除等の様子	病害虫の様子
編集		05		30					
編集		06		2,000					
編集		05/20		4,000					
編集	削除	4 2006/05/30	ダントツ水剤	4,000					
編集	削除	5 2006/05/30	テルスター水和剤	1,000	100		N: 37° 27' 24" E: 138° 50' 30"		
編集	削除	6 2006/06/11	クレフノン	100	700				
編集	削除	7 2006/06/30	オキシラン水和剤	600	700				
編集	削除	8 2006/07/05	ダイアジノン水和剤34	1,000	700		N: 37° 28' 10" E: 138° 51' 5"		

The 5W1H historical information on agrochemical application automatically recorded.

**When** : time of access to the server

**Where** : name of farm fields or latitude and longitude obtained by the GPS

**Who** : name of producer, login ID, or identification information of the mobile phone

**What** : registration number or name of the agrochemical,

**Why** : images of target agricultural pest and weeds

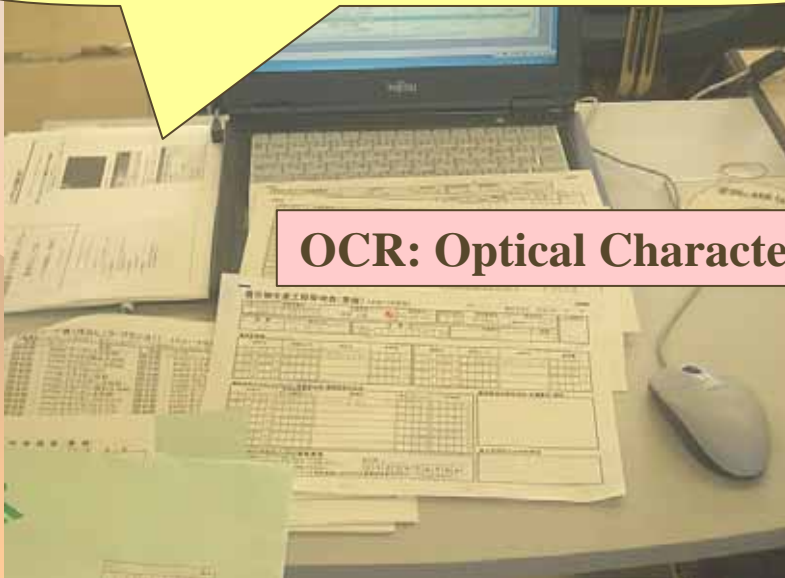
**How** : dilution rate, amount, or images of spray may be also available

# Optical character recognition (OCR) vs. mobile phone

30 farmers used mobile phone-based system



620 farmers used OCR-based system



OCR: Optical Character Recognition



# Evaluation of mobile phone-based approach

Age	Farmers <b>want to</b> use the mobile phone system continuously	<b>Dose not</b> want to use the mobile phone system continuously
Over 51	27%	<b>73%</b>
Under 50	<b>69%</b>	31%
Total	50%	50%

Note: n=24

# Mobile Phone vs. OCR

## ❁ OCR-based system

### – Advantage

- easy installation

### – Disadvantage:

- difficult to actually collect and judge the documents often,
- prejudgment just before spraying cannot be performed,
- reading and correction of OCR documents at the JA branch offices are inevitable.

## ❁ Mobile phone-based system

### – Advantage

- solve the disadvantage of the OCR-based system
- improve the reliability of the 5W1H information.

### – Disadvantage

- Not clear. Need for mobile phone literacy ?



# 4. System for Securing Traceability and Safety of Food

## Traceability System of Vegetables and Fruits with mobile phone

The image illustrates a traceability system for vegetables and fruits. It shows a person using a mobile phone to scan a box of produce. A computer monitor displays a web browser interface with the URL <http://s5nnaviore/seika/F>. The browser displays the '青果流通トレーサビリティシステム' (Green Fruit Distribution Traceability System) with the following information:

青果流通トレーサビリティシステム  
流通履歴表示

戻る

品目名・品種名	ラ・フランス	ロット番号	
送り状コード	152483	出荷元名	
出荷日	2006/12/11 13:20	数量	

戻る

流通業者	入出荷	入荷・出荷日	入荷元・出荷先	数量
1 東京千住青果	入荷	2006/12/11 23:22	JAてんどう	23
2	出荷	2006/12/11 23:22	全日食チェーン	23
3	出荷	2006/12/11 23:24	全日食チェーン	23
4	出荷	2006/12/11 23:24	東京青果センター	23
5 東京青果センター	入荷	2006/12/12 00:47	東京千住青果	23
6	出荷	2006/12/12 05:58	アジュールケゾー	7
7	出荷	2006/12/12 05:58	スーパーケゾーウエスト	8
8	出荷	2006/12/12 05:58	富分岩津支店	8
9 スーパーケゾーウエスト	入荷	2006/12/12 07:28	東京青果センター	8
10 富分岩津支店	入荷	2006/12/12 08:37	東京青果センター	8
11 アジュールケゾー	入荷	2006/12/12 08:43	東京青果センター	7

戻る

ページが表示されました

The mobile phone screen shows the following information:

<流通履歴登録>

ロット番号:1234  
送り状コード:900010  
出荷元コード:0011  
出荷元名:JAひがしうわ  
出荷日:2006/05/31  
品目名:温州みかん  
品種名:○○○  
品目・品種コード:1020  
出荷元JANコード:  
4900001000029  
SEICAコード:0001

入荷処理  
出荷処理  
流通履歴を見る

The mobile phone screen also shows the following information:

<流通履歴検索>

りんご  
品種名  
ロット番号:301  
送り状コード:311  
出荷元コード:102001

出荷元:JAてんどう  
出荷日:  
2006/11/01 09:38  
数量:15

東京千住青果  
2006/11/01 09:49入荷  
数量:15  
2006/11/01 10:16出荷  
数量:5  
2006/11/01 10:16出荷  
数量:10

全日食チェーン  
2006/11/01 10:45入荷  
数量:10  
2006/11/01 11:01出荷  
数量:3

Shipment and arrival processing

Display of marketing channel information



## 4. System for Securing Traceability and Safety of Food

### Risk management system and traceability system for milk



- ❁ Risk management system for the dairy farmer
  - for appropriate use of the animal medicine
  - a nationwide spread is being examined now by the Central Dairy Farming Conference.
- ❁ This system has been integrated with the traceability system of milk with mobile phone.

# 5. Concluding Remarks (1/3)

- ❁ Various ICT based food traceability systems have been developed
  - and their commercialization has been promoted
  - in order to deal with consumers' interest in food safety in Japan.
- ❁ However, the systems are not widespread yet.
- ❁ The reason is
  - the benefit of introducing the traceability system is not clear for the food distribution industry.
- ❁ In the agricultural production process campaigns
  - for agrochemicals application records have been promoted.
  - Some systems having ex-post checking functions of pesticide application records were developed.
  - The systems are able to check whether a pesticide application is appropriate or not after the application.
- ❁ However, if a misapplication of agrochemicals is discovered after the application,
  - the problems of disposal of the agricultural products concerned will occur,
  - and a violation of the obligation of appropriate pesticide use will occur.
- ❁ Such problems will destroy public trust in distributors
  - as well as producers and production area
  - and possibly becomes an issue of critical importance.

## 5. Concluding Remarks (2/3)

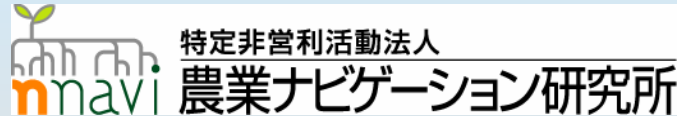
- ❁ In order to solve these problems,
  - it is necessary to develop systems from view point of prior risk management (Nanseki, 2005).
- ❁ The goal of the risk management system is to enable farmers
  - to prevent pesticide misapplication due to carelessness and
  - to automatically register the application records.
- ❁ A seamless integration of two systems will be accomplished . . .
  - First, the pesticide application history records are created by the risk management system
  - Second, the history records are incorporated into the traceability systems
- ❁ The safety of agricultural products will be further improved and enhance the food safety
  - by collaboration between the risk management system in agricultural production
  - and traceability systems.
- ❁ The two types of systems must obviously be integrated.
- ❁ One example of the integrated system has been developed by the Nogyo Navigation Laboratory based on Nanseki et.al(2005).



# 5. Concluding Remarks (3/3)

- ❁ For further extension of the mobile phones system
  - frequent briefing sessions to instruct producers on the operation
  - development of a user interface good for elderly people.
- ❁ The next research task is
  - to analyze the determinants of intention to use the system by performing a large-scale evaluation to generalize results.
- ❁ The system (mobile phones and OCR) is available at NPO Nogyo Navigation Laboratory.
  - extended to application of medication for animals
- ❁ Furthermore, the system is applicable for evaluating agrochemical risk for environment.
  - We propose a method of integrating both environmental and economic indicators of an agricultural technology using the system.
  - Research and development of an agrochemical application supporting system utilizing information science and technology is becoming an important issue in the society and research community.

# Thank you for listening and attention.



## ❁ 6. References

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