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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  - food traceability system development using ICT (Information and Communication Technology).
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  - 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

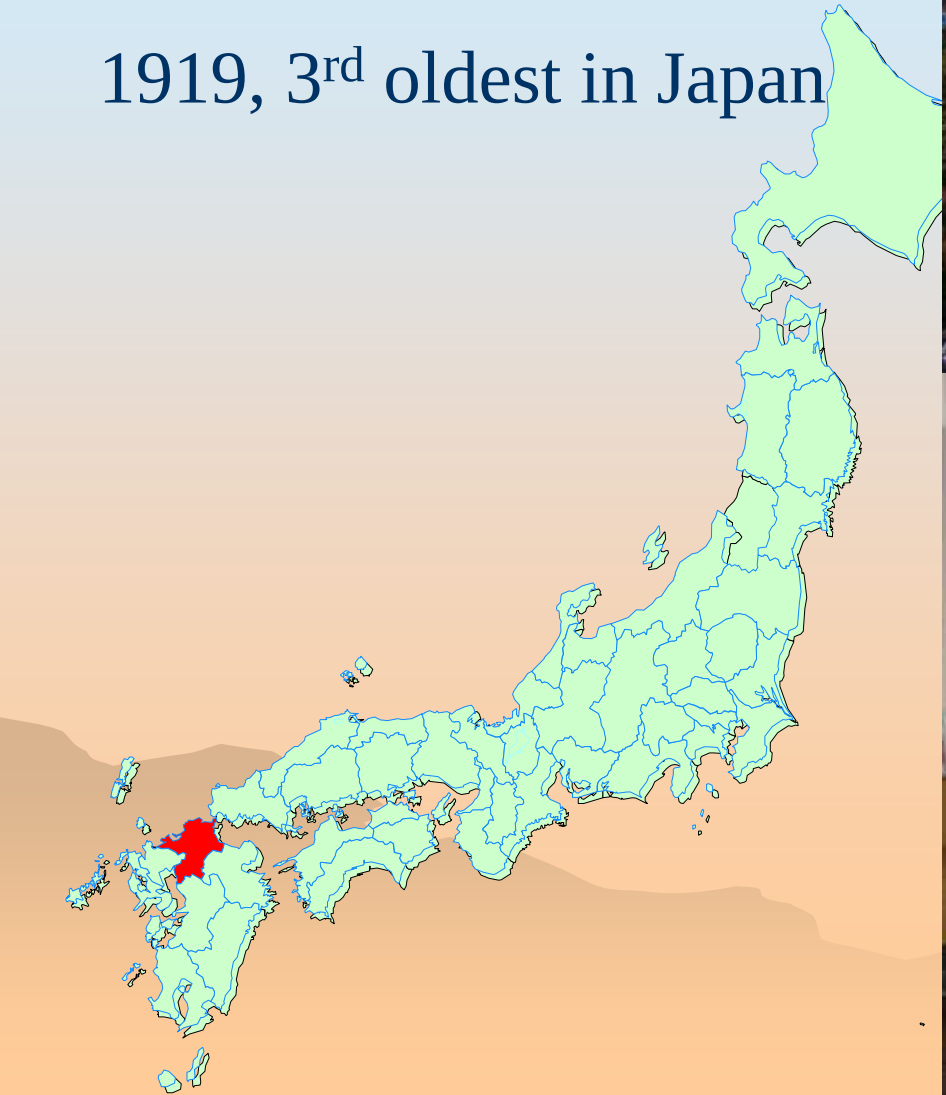
National Agriculture and Food Research Organization, Tsukuba City

2000 Research Staff
Many branches

National Kyushu University

Faculty of Agriculture since

1919, 3rd oldest in Japan



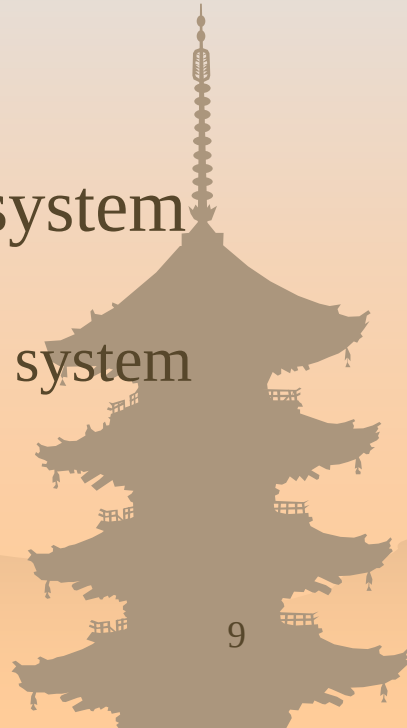
Recent food related accidents in Japan

- 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 seri es of food supply from the production of the agriculture, forestry and fish eries things to sales of food.

Beef Traceability Law

Construction of dissemination system for cow's individual identification number

HACCP Technique Support Law

Extension for application time limit five years of law

Agricultural Chemicals Regulation Law Fertilizer Regulation Law

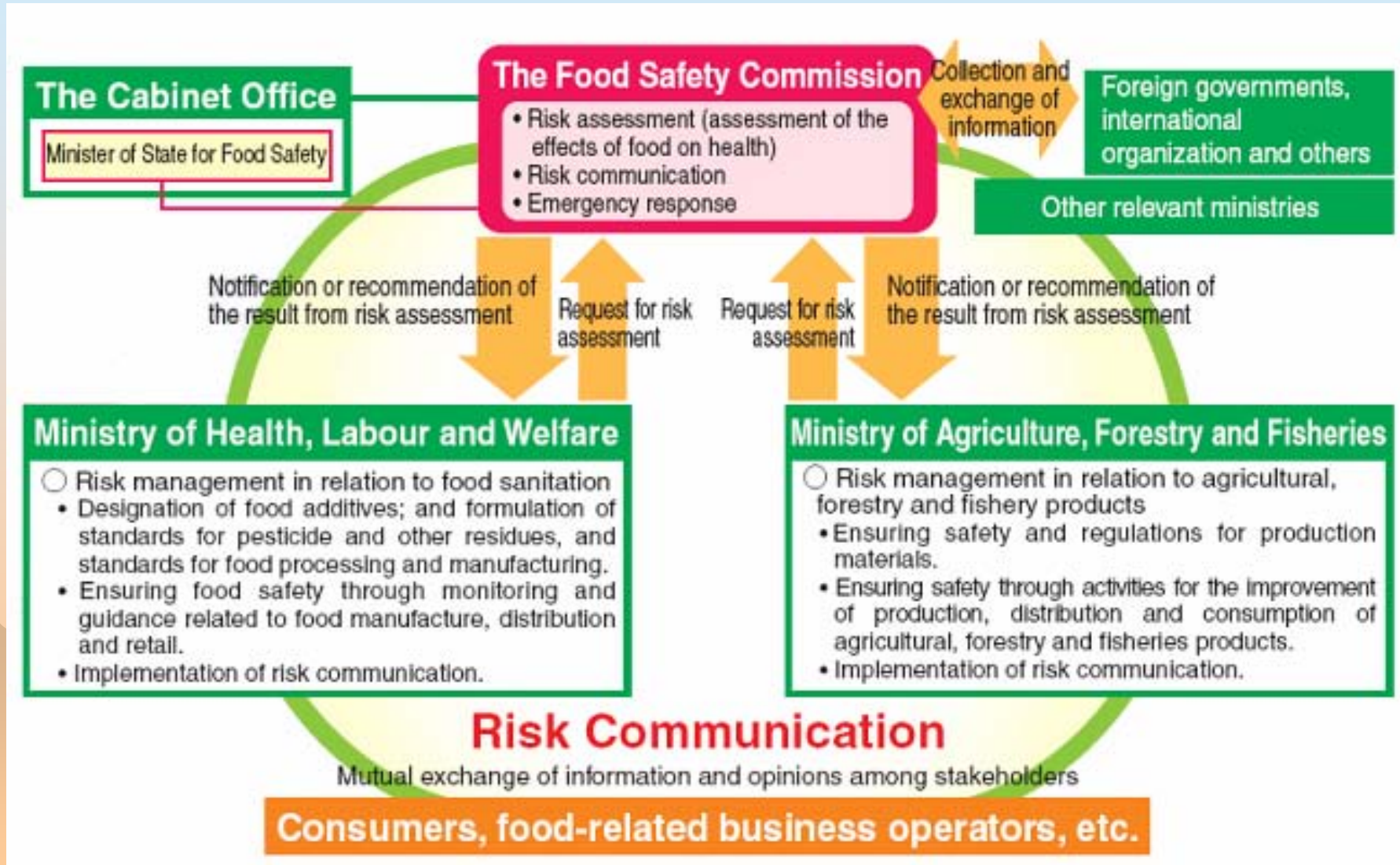
Measures for proper use such as agricultural chemicals and fertilizers

Animal's Food Safety Law

Manufacturing and the import of fodder including the poisonous substance are prohibited

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

Ear tag

Commodity label with ID

個体識別番号	生年月日	性別	種別	母牛の個体識別番号
1234567890	H12.05.21	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.[illegible].05.21	盛岡市	家畜改良センター岩手牧場
2	岩手県	転出	H.[illegible]	盛岡市	家畜改良センター岩手牧場
3	福島県	転入	H.12.[illegible]		
4	福島県	転出	H.15.0[illegible]		
5	東京都	搬入			
6	東京都	と畜			

(注)住[illegible]

Production history information with ID

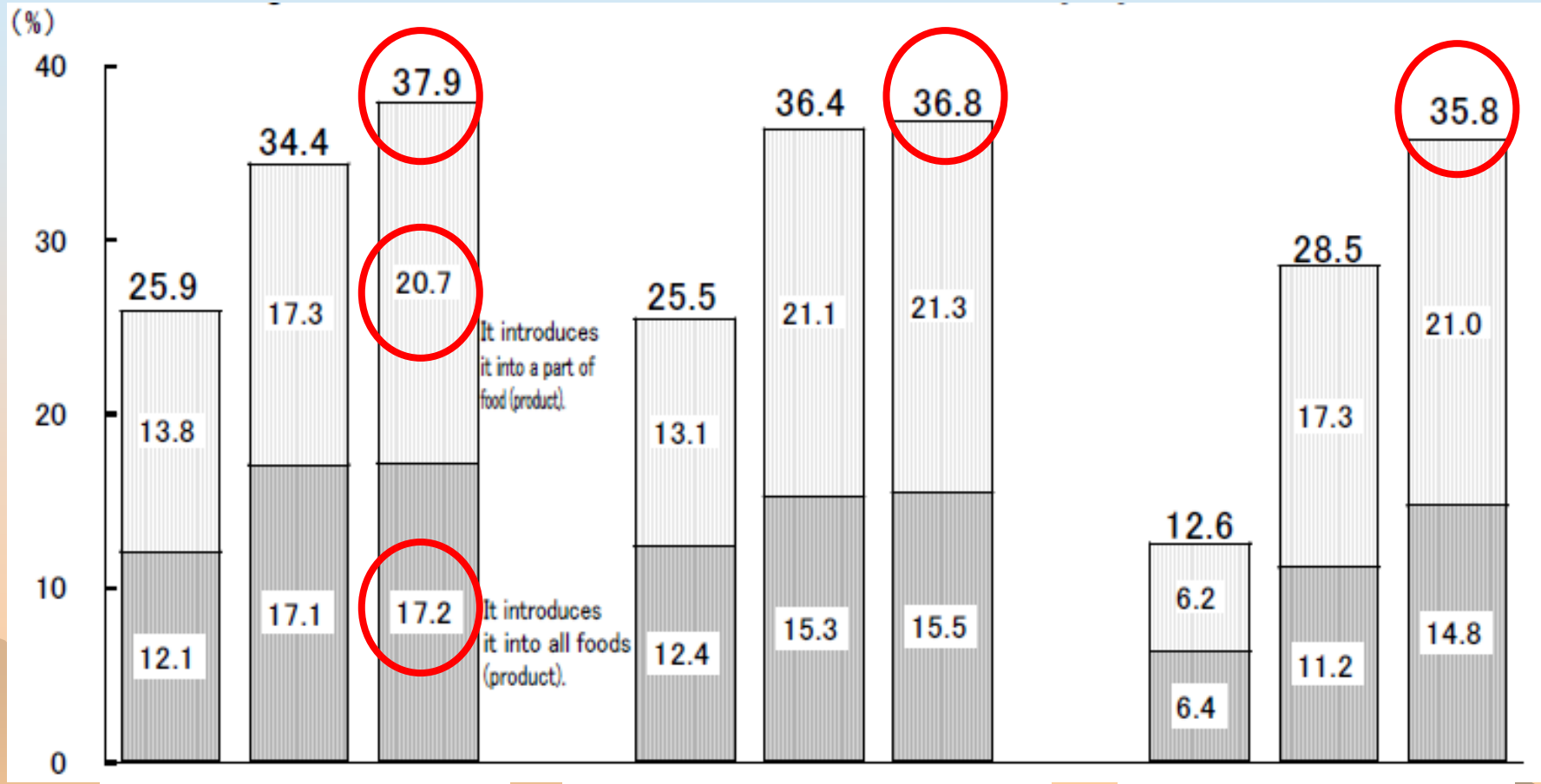
3. Current Status of Food Traceability

- 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%

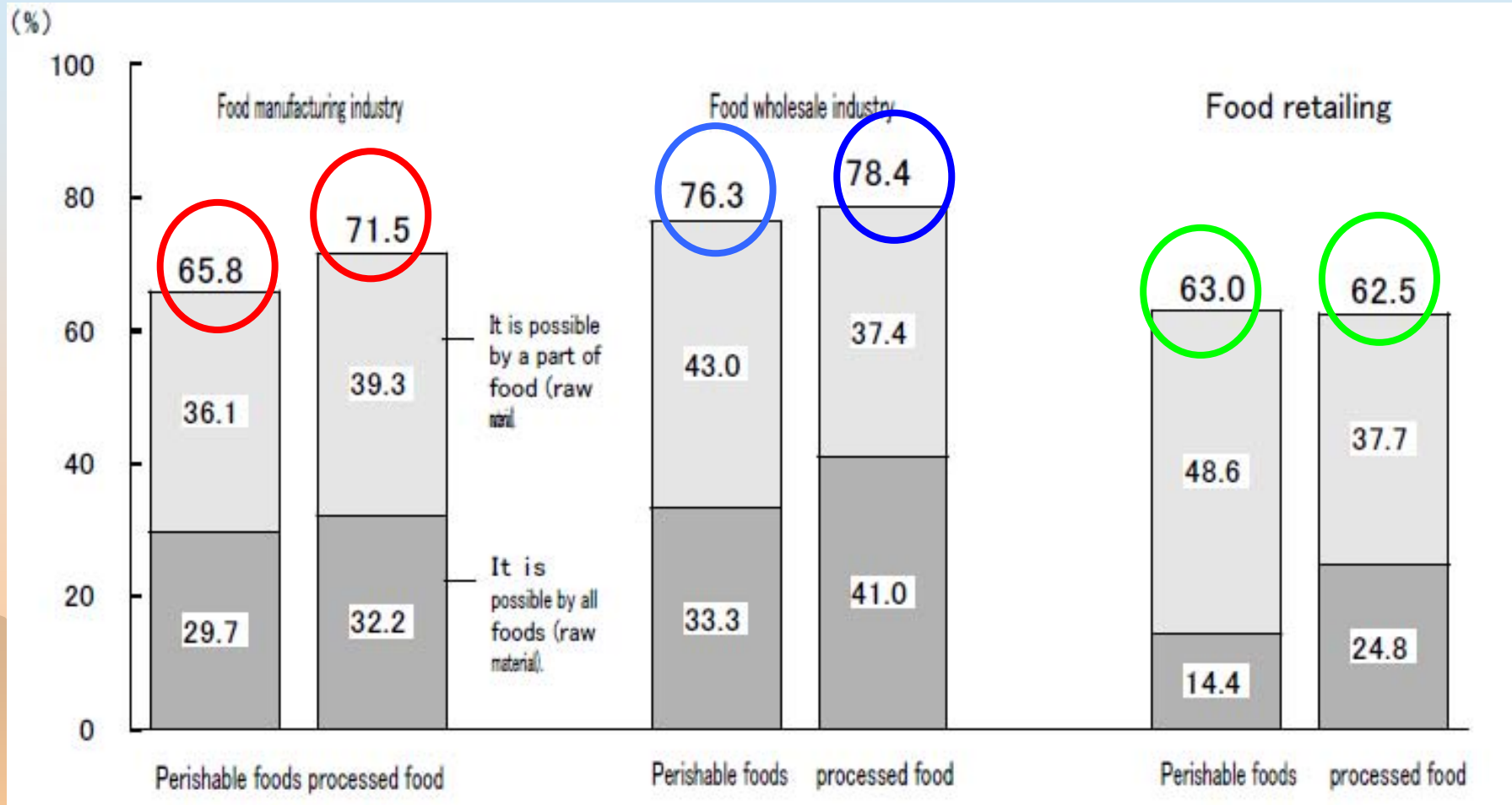
3. Current Status of Food Traceability

Introduction of Traceability System in Food Industry



3. Current Status of Food Traceability

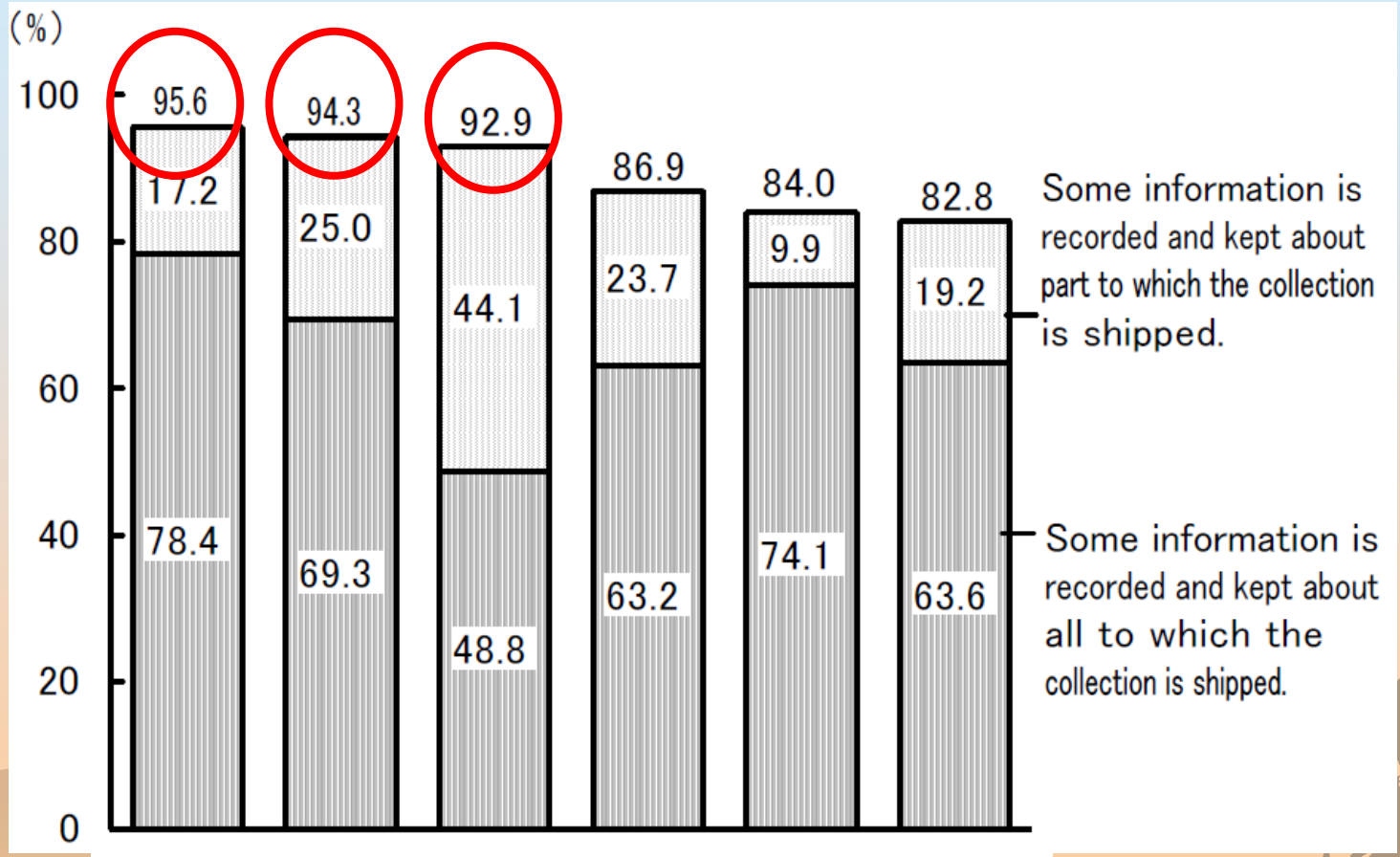
Trace Back in Food Industry



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.

Cultivation History Record in Agricultural Cooperative



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
NPO Nogyo (Agriculture & Farming) Navigation Laboratory	Milk and vegetables and fruits	b and d
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.

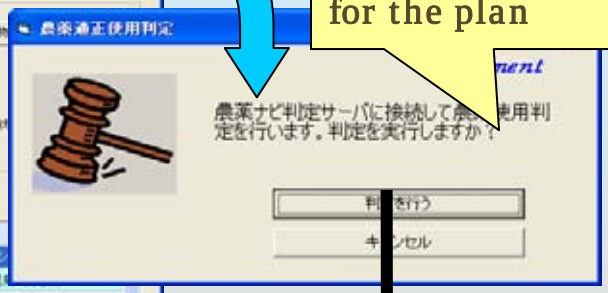
4. System for Securing Traceability and Safety of Food

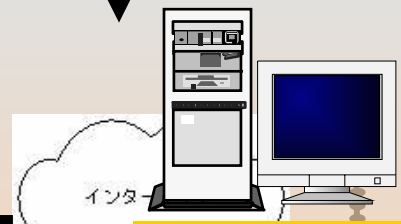
Multi-stage Judgment System for Proper Agrochemical Application

Flow of the system operation

1. Prepare a pesticide Spraying plan

2. Request a judgment for the plan





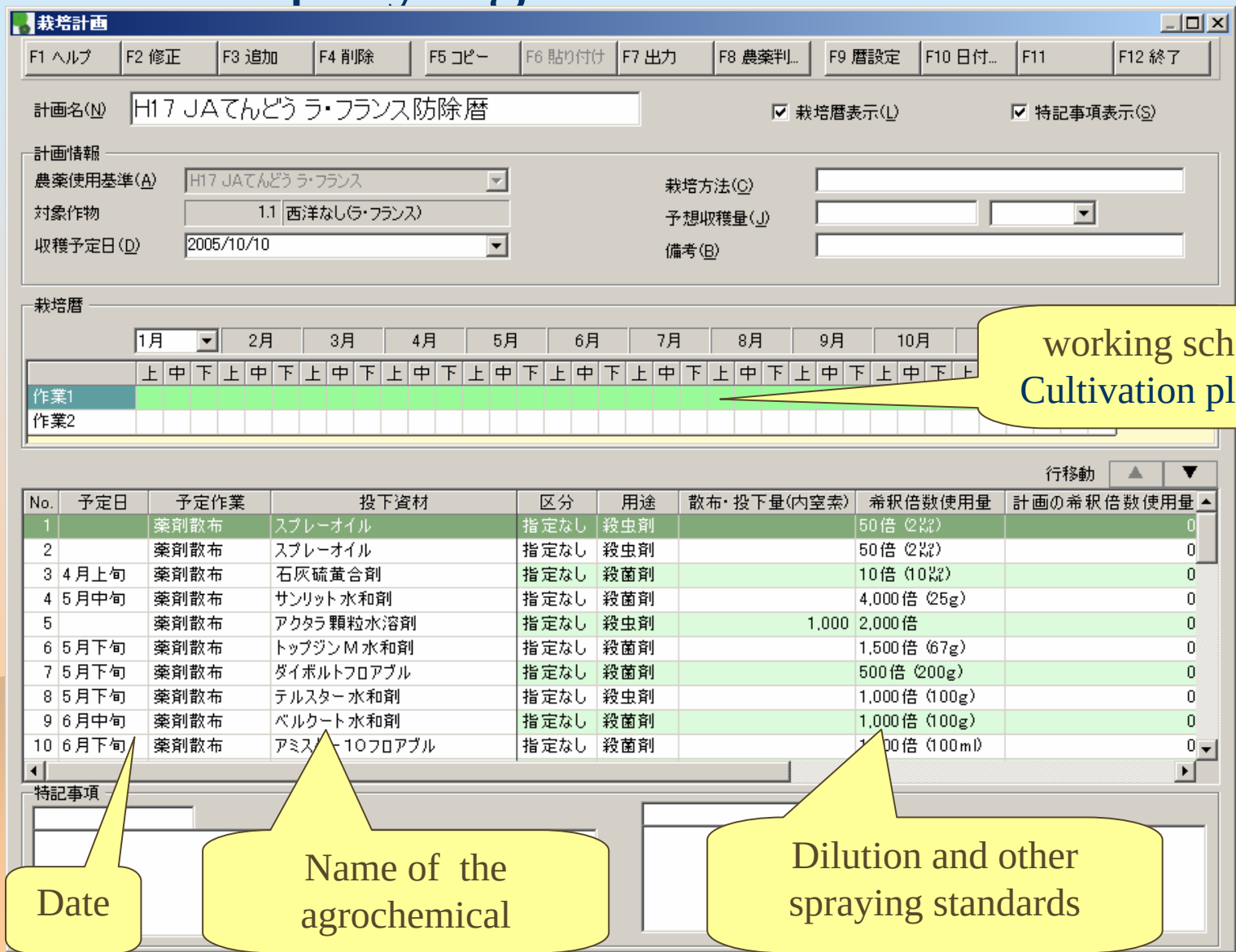
The Nouyaku-navi judgment server

3. You Get results of judgment

●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



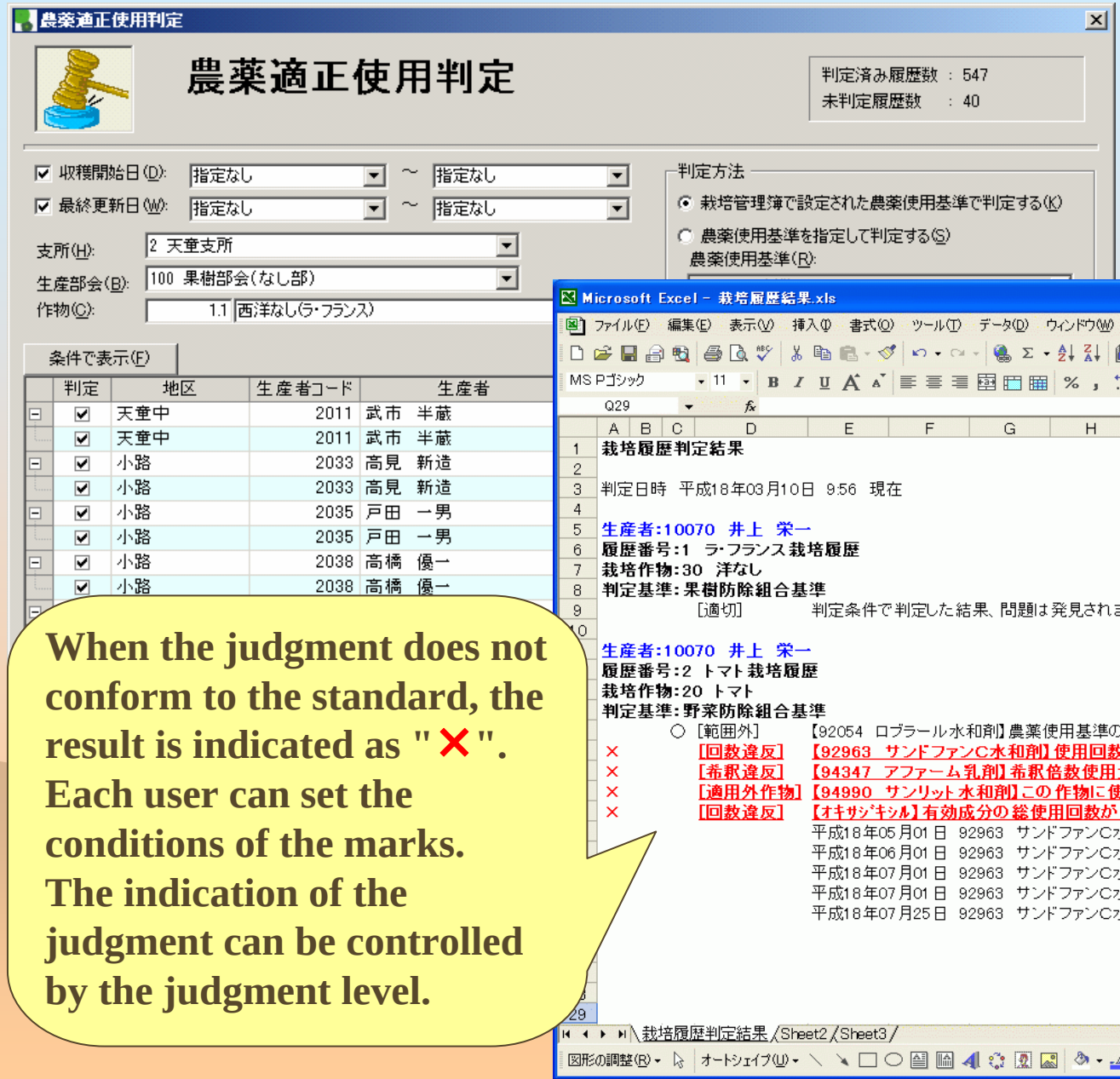
working schedule
Cultivation planning

Date

Name of the agrochemical

Dilution and other spraying standards

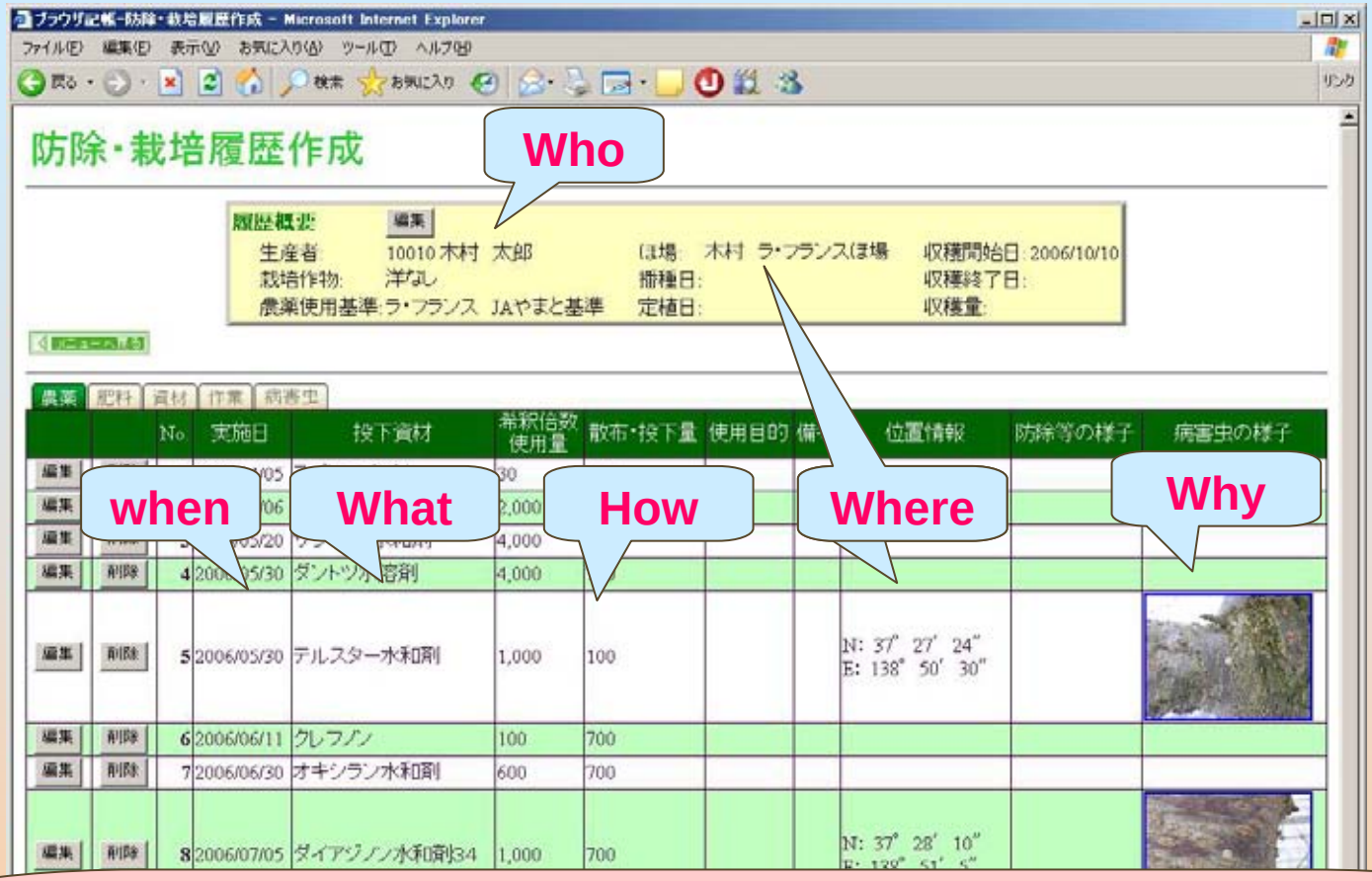
Judgment based on the legal and individual standards



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.



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

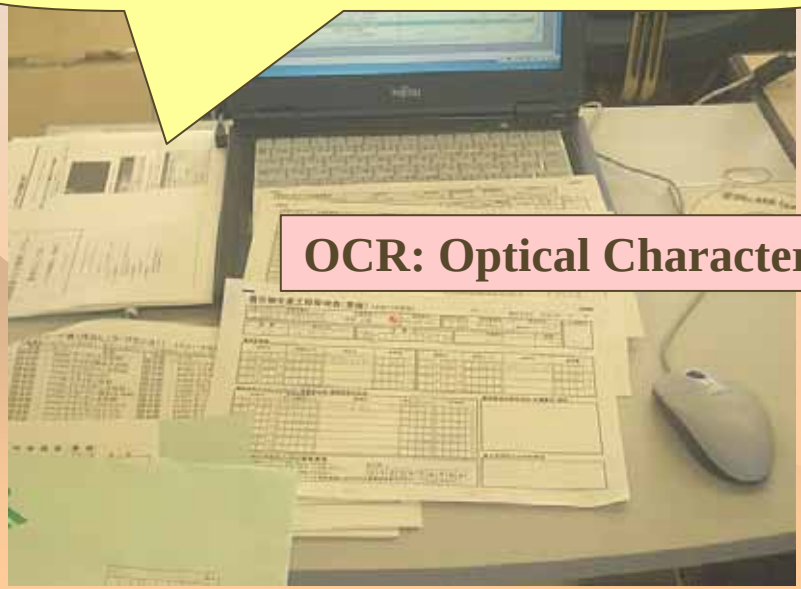
What :registration number or name of the agrochemical,

Why :images of target agricultural pest and weeds

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

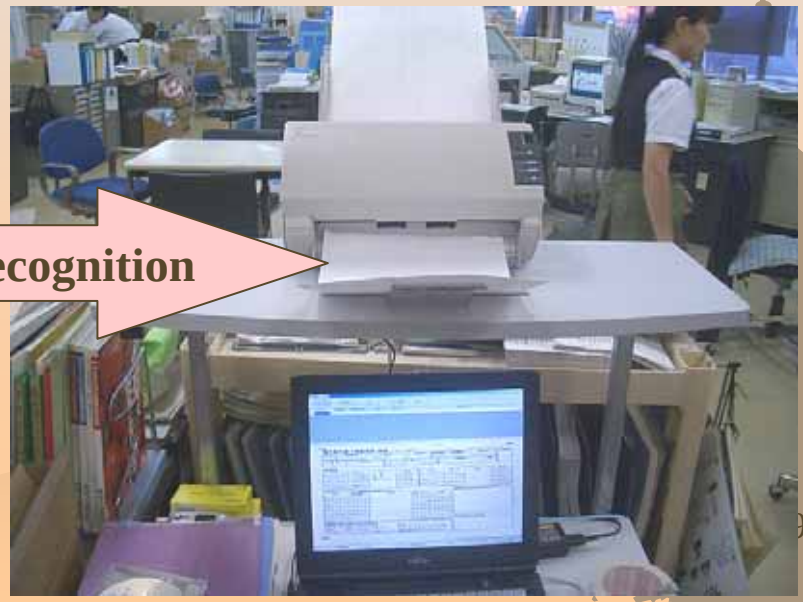
Optical character recognition (OCR) *vs.* mobile phone

620 farmers used OCR-based system



OCR: Optical Character Recognition

30 farmers used mobile phone-based system



Evaluation of mobile phone-based approach

Age	Farmers want to use the mobile phone system continuously	Dose not want to use the mobile phone system continuously
Over 51	27%	73%
Under 50	69%	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

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.

特定非営利活動法人
農業ナビゲーション研究所

6. References

- Nanseki, T.(2005)A navigation system for appropriate pesticide use and food safety, International Seminar on Technology Development for Good Agriculture Practice in Asia and Occeania, 134-152.
- Nanseki, T. et.al 2005 A navigation system for propriety pesticide use: design and implementation. Agriculture Information Research, 14(3),207-226. (In Japanese with English abstract)
- Nanseki, T. et.al (2006) Development of a risk management system for agricultural chemical use, Agricultural Information Research, 14(3), 207-226. (In Japanese with English abstract)
- Nanseki, T.(2007)A Status and Perspective of Food Traceability in Japan, International Food Traceability Symposium-Korea, Japan, EU-, Rural Development Administration, Korea
- Tomiyama, T.(2005) Introduction spread of food traceability, Y. Niiyama [ed.]Traceability in Food Chain, Showado,114-126.(In Japanese)