Antimicrobial Resistance and Drug Usage Monitoring System

Masumi SATO
National Institute of Animal Health
NARO, JAPAN
- National Monitoring systems
- Japanese Veterinary Antimicrobial Resistance Monitoring System, JVARM
- Monitoring Systems in other countries
National Monitoring systems

Japanese Veterinary Antimicrobial Resistance Monitoring System, JVARM

Monitoring Systems in other countries
Purpose of surveillance and monitoring

Surveillance and monitoring of antimicrobial resistance is necessary to:

1) assess and determine the trends and sources of antimicrobial resistance in bacteria

2) detect the emergence of new antimicrobial resistance mechanisms

3) provide the data necessary for conducting risk analyses as relevant to animal and human health

4) provide a basis for policy recommendations for animal and human health

5) provide information for evaluating antimicrobial prescribing practices and for prudent use recommendations.

Terrestrial Animal Health Code 6.8 OIE
National antimicrobial resistance monitoring

National antimicrobial resistance monitoring and surveillance programmes should be scientifically based and may include the following components:

a) statistically based surveys

b) sampling and testing of food-producing animals on the farm, at live animal market or at slaughter

c) an organised sentinel programme, for example targeted sampling of food-producing animals, herds, flocks and vectors (e.g. birds, rodents)

d) analysis of veterinary practice and diagnostic laboratory records.

Terrestrial Animal Health Code 6.8 OIE
### National antimicrobial resistance monitoring

<table>
<thead>
<tr>
<th>Country</th>
<th>Program</th>
<th>Organization</th>
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<tbody>
<tr>
<td>USA</td>
<td>NARMS</td>
<td>FDA, CDC, USDA</td>
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<td>National Antimicrobial Resistance Monitoring System</td>
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<tr>
<td>Canada</td>
<td>CIPARS</td>
<td>Public Health Agency of Canada</td>
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<td>Canadian Integrated Program for Antimicrobial Resistance Surveillance</td>
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<td>Denmark</td>
<td>DANMAP</td>
<td>NFI, NVI, DMA</td>
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<td>Danish Integrated Antimicrobial Resistance Monitoring and Research Programme</td>
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<tr>
<td>Sweden</td>
<td>SVARM</td>
<td>NVI</td>
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<td>Swedish Veterinary Antimicrobial Resistance Monitoring</td>
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<td>Japan</td>
<td>JVARM</td>
<td>NVAL</td>
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<td>Japanese Veterinary Antimicrobial Resistance Monitoring System</td>
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</tbody>
</table>
- National Monitoring systems
- Japanese Veterinary Antimicrobial Resistance Monitoring System, JVARM
- Monitoring Systems in other countries
### Number of the animals

<table>
<thead>
<tr>
<th>Animal</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>Beef cattle</td>
<td>2,642,000</td>
</tr>
<tr>
<td>Dairy cattle</td>
<td>1,423,000</td>
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<tr>
<td>Pig</td>
<td>9,685,000</td>
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<tr>
<td>Broiler</td>
<td>131,624,000</td>
</tr>
<tr>
<td>Layer</td>
<td>172,238,000</td>
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2013
JVARM
Japanese Veterinary Antimicrobial Resistance Monitoring System

Objectives

● to monitor the occurrence of antimicrobial resistance in bacteria in food-producing animals
● to monitor the usage of antimicrobials in animals
● to identify the efficacy of antimicrobials in food-producing animals
● to promote prudent use of such antimicrobials
● to ascertain the public health problem

- Nationwide monitoring of antimicrobial resistance
- Monitoring of veterinary antimicrobial usage
History

Trial period; 1999

1st stage; 2000-2003
• Establishment of the monitoring system
• To learn the distribution of the antimicrobial resistant bacteria in farm animals

2nd stage; 2004-2007
• Continuous learning of the trend of antimicrobial resistant bacteria in farm animals
• Analysis and investigation (characteristics of bacteria, antimicrobial inoculations)

3rd stage; 2008-2011
• Review the monitoring system (ex. time span, isolation of Salmonella)
• Continuous learning of the trend of antimicrobial resistant bacteria in farm animals
Usage of Antimicrobials Resistance in Zoonotic and Indicator bacteria Resistance in animal pathogens

Pharmaceutical companies

Healthy animals

Diseased animals
Monitoring of antimicrobial resistant Bacteria

Usage of Antimicrobials

Pharmaceutical companies

JVARM

Usage of Antimicrobials

Resistance in Zoonotic and Indicator bacteria

Healthy animals

E. coli
Enterococci
Campylobacter

Resistance in animal pathogens

Diseased animals

Salmonella
Monitoring of antimicrobial resistant Bacteria

MAFF ➞ Administrative action

National Veterinary Assay Laboratory (NVAL)
Food and Agricultural Materials Inspection Center (FAMIC)

- Preservation of resistant bacteria
- Distribution of reference strains
- Molecular epidemiology, resistance mechanisms
- Summing, analysis and evaluation of prefecture data

Livestock Hygiene Service Center

- Sampling
- Isolation/ Identification
- MIC measurement

Food-producing Animals
- Cattle, Pig, Broiler chicken, Layer chicken
- 47 prefectures
- Each prefecture has several Livestock Hygiene Service Centers (LHSC)
- Total No. of the LHSC ; 170
  Total No. of the Vets. ; 2102
- Role of the LHSC
  - Annual inspections under ‘Domestic Animal Infectious Disease Control Law’
  - Check, guide, advise for farms
  - Diagnosis of diseases etc.
### Antimicrobial resistance survey, Japan

#### Materials and Methods

**Animals**
- Cattle, Pigs, Broiler chickens,
- Layer chickens

**Sampling (from healthy animals)**
- 6 farms for cattle
- 2 farms for pig
- 4 farms for Broiler chickens
- 4 farms for Layer chickens

in each prefecture in every 2 years

Number of farms and samples investigated:
- 16 farms x 47 pref. = 752 farms

**Isolation and typing**
- 2 isolates/ 1 sample
- Characterization, PCR, serotyping

**Antimicrobial resistant test**
- Standardized agar dilution method
  - Semi-automated broth micro dilution system

**Antimicrobial resistant rate**
- MIC (CLSI guideline)
Monitoring of Antimicrobial Usage

JVARM

Usage of Antimicrobials

Resistance in Zoonotic and Indicator bacteria

Resistance in animal pathogens

Pharmaceutical companies

Healthy animals

Diseased animals
Monitoring of Antimicrobial Usage

Under the Pharmaceutical Affair Law

Pharmaceutical companies

Report

Format

National Veterinary Assay Laboratory

Summing, Analysis, Evaluation

Report on the website of NVAL

Report from the Marketing Authorization Holder

- Sales amount
- The name of antimicrobials
- Annual weight in kilograms of the active ingredients
- The route of administration
- Target animal species
- Estimated percentages of sales for each animal species
  etc.
Feed Additives

- Commenced to use in the 1950s
- All of antimicrobial feed additives must be subjected to National Assay before distribution
- National assay is held by Food and Agricultural Materials Inspection Center (FAMIC)
- Total usage volume of antimicrobial drugs is much greater than that of antimicrobial feed additives in Japan

Antimicrobial drugs are given priority as risk factor associated with bacterial antimicrobial resistance

A report on JVARM -2008 to 2011-
Reports

A Report on the Japanese Veterinary Antimicrobial Resistance Monitoring System -2000 to 2007-
National Veterinary Assay Laboratory
Ministry of Agriculture, Forestry and Fisheries


A Report on the Japanese Veterinary Antimicrobial Resistance Monitoring System -2008 to 2011-
National Veterinary Assay Laboratory
Ministry of Agriculture, Forestry and Fisheries
2013

Outline of JVARM
Japanese Veterinary Antimicrobial Resistance Monitoring

★ Implemented by
National Veterinary Assay Laboratory (NVAL),
Food and Agricultural Materials Inspection Center (FAMIC),
Ministry of Agriculture, Forestry and Fisheries (MAFF)

● Resistance in Zoonotic and Indicator bacteria
  Samples from healthy animals ; collected by LHSC

● Resistance in animal pathogens
  Samples from diseased animals ; collected by LHSC

● Usage of Antimicrobials
  Antimicrobial drugs; Data from Pharmaceutical companies
  Under the Pharmaceutical Affair Law
  Feed Additives; Data from the National Assay (FAMIC);
  Feed companies
● National Monitoring systems

● Japanese Veterinary Antimicrobial Resistance Monitoring System, JVARM

● Monitoring Systems in other countries
National antimicrobial resistance monitoring

Monitoring Systems in EU and US

**USA** NARMS
National Antimicrobial Resistance Monitoring System

**Canada** CIPARS
Canadian Integrated Program for Antimicrobial Resistance Surveillance

**Denmark** DANMAP
Danish Integrated Antimicrobial Resistance Monitoring and Research Programme

**Sweden** SVARM
Swedish Veterinary Antimicrobial Resistance Monitoring
1. Human Component ; CDC
2. Retail Meat Component ; FDA
3. Animal Component ; USDA, ARS

Executive Report ; FDA
Thank you for your attention.