



## National Surveillance of Antimicrobial Resistance in Food-producing Animals in Japan

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**W**ith the rapid development of intensive systems for rearing food-producing animals, bacterial infection has brought about serious economic loss in animal husbandry. As a result, antimicrobials have been widely used for the control of infection. Some reports indicate that many bacteria of animal origin have become resistant to these antimicrobials. An increasing incidence of antimicrobial-resistant bacteria might create serious problems not only to animal hygiene, but also to public health. However, until recently there was a lack of nationwide information available on the antimicrobial resistance of bacteria of animal origin in Japan. Consequently, the Japanese Veterinary Antimicrobial Resistance Monitoring Program (JVARM) was established in 1999.

### 1. Background

In 1969, the Swann Committee<sup>1</sup> reviewed the agricultural use of antimicrobials. Among their recommendations was that regular and much wider surveillance should be made of the bacteria of animals, animal products and man, including their antimicrobial resistance. Recently, the relationship between the use of antimicrobials in food-producing animals and the emergence of resistant bacteria in the food chain has become of great concern and has been the subject of numerous international meetings.<sup>2,4</sup>

### 2. Objectives

The objectives of JVARM are to monitor the occurrence of antimicrobial resistance in bacteria in food-producing animals, and monitor the consumption of antimicrobials for animal use. Moreover, to identify the efficacy of antimicrobials in food-producing animals, to promote prudent use of such antimicrobials, and to ascertain the public health problem.

### 3. Outline of JVARM

JVARM is composed of three parts : monitoring the quantities of antimicrobials used in animals; resistance monitoring in zoonotic and indicator bacteria isolated from healthy animals; and resistance monitoring in animal pathogens isolated from diseased animals (Figure 1).

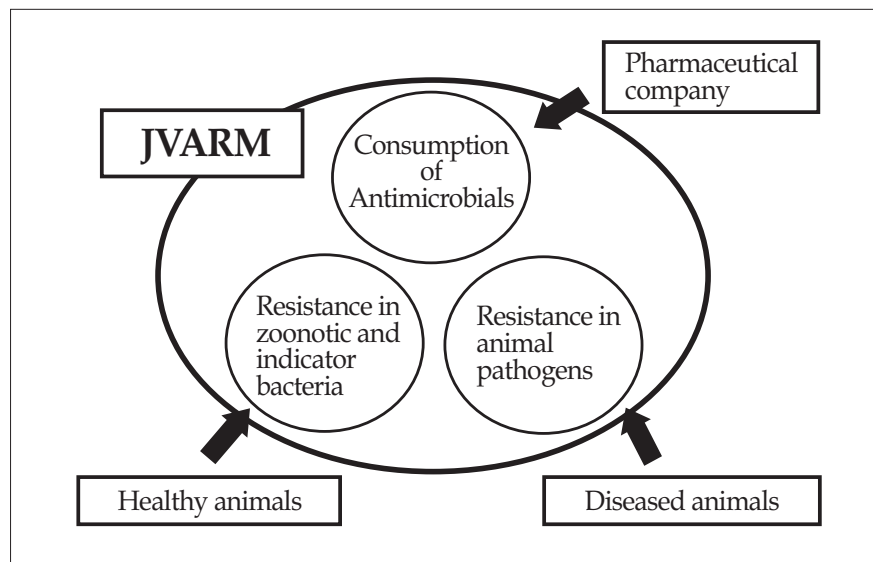


Figure 1. Outline of JVARM

### (1) Monitoring of Antimicrobial Consumption

Pharmaceutical companies that produce and import antimicrobials for animals are required to submit data to the National Veterinary Assay Laboratory (NVAL) annually in accordance with Pharmaceutical affairs law. NVAL subsequently sums, analyses and evaluates such data.

The annual weight in kilograms of the active ingredients of approved antimicrobials produced in Japan and imported from abroad is collected. This includes only therapeutic antimicrobials for animal use and the data are subdivided by animal species. However, this only provides an estimate of the consumption for each target species, because one antimicrobial is frequently used for multiple animal species.

### (2) Monitoring of Antimicrobial Resistant Bacteria

Bacteria for resistance testing are collected continuously and include: zoonotic bacteria and indicator bacteria isolated from healthy animals; and pathogenic bacteria isolated from diseased animals. Zoonotic bacteria include: *Salmonella* species, and *Campylobacter jejuni* or *E. coli*; indicator bacteria include *Escherichia coli* including O157 and *Enterococcus faecium* or *E. faecalis*, including Vancomycin-Resistant *Enterococci*. Animal pathogens included at present are *Salmonella* species, *Staphylococcus aureus*, *Actinobacillus pleuropneumoniae*, *Arcanobacterium pyogenes*, *Pasteurella multocida*, *Streptococcus* species and *Klebsiella* species. The zoonotic and indicator bacteria are isolated from faecal samples collected from cattle, pigs, broilers and layers. Six samples per animal species are collected in each prefecture every year. One sample is limited from one farm. Two strains per sample are collected for antimicrobial susceptibility testing. Animal pathogens are isolated from samples submitted for diagnosis. Minimum Inhibitory Concentration (MIC) of test bacteria are determined for antimicrobials by the agar dilution method as described by the National Committee for Clinical Laboratory Standards (M31-A2).

#### 4. JVARM Implementation System

The JVARM implementation system is shown in Figure 2. A total of one hundred and ninety-five Livestock Hygiene Services Centers (LHSC), which belong to prefecture offices, participate in JVARM. The LHSC function as participating laboratories of JVARM, and are responsible for the isolation and identification of target bacteria, as well as MIC measurement. They send results and resistant bacteria to NVAL, which functions as the reference laboratory of JVARM, and is responsible for preservation of resistant bacteria, summing and analysing all data and reporting to the Ministry of Agriculture, Forestry and Fisheries (MAFF) headquarters. In addition, NVAL conducts research into the molecular epidemiology and resistance mechanisms of the bacteria.

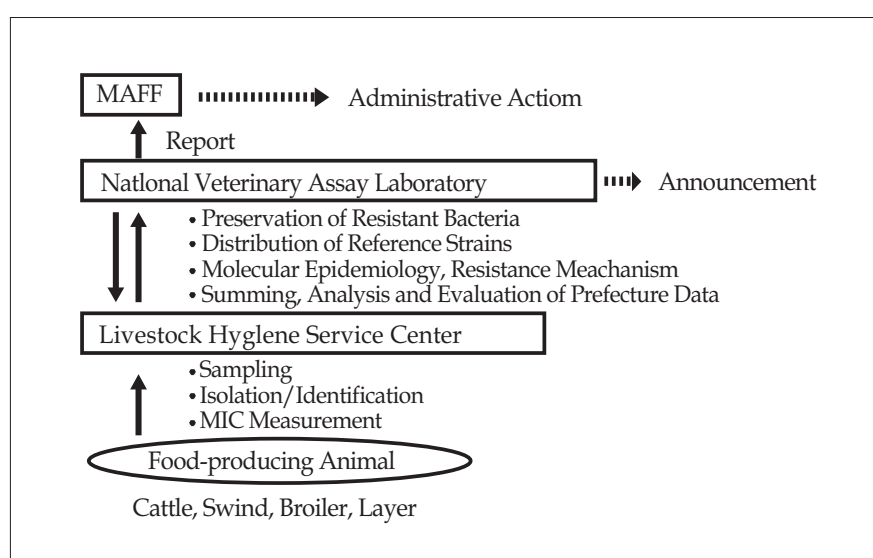


Figure 2. Monitoring of Resistant bacteria

#### 5. QA/QC Systems

Quality control procedures are implemented in participating laboratories that perform antimicrobial susceptibility testing to help monitor the precision and accuracy of the test procedure, the performance of the appropriate reagents, and the personnel involved. Strict adherence to standardized techniques is necessary for the collection of reliable and reproducible data from participating laboratories. Quality control reference bacteria are also tested in each participating laboratory to ensure standardization. Moreover, NVAL holds the national training course on antimicrobial resistance every year to provide training in standardized laboratory methods for the isolation, identification and antimicrobial susceptibility testing of target bacteria.

#### 6. Announcement of Data

Since a problem with antimicrobial resistance directly influences animal and human health, it is of paramount importance to distribute information on antimicrobial resistance as soon as possible. We

are officially taken three steps to publish such information; initially through the MAFF weekly newspaper called "Animal Hygiene news", then by publication in scientific journals and via the NVAL website (URL <http://www.nval.go.jp/>).

Although JVARM was started in 1999 and conforms to the OIE report on antimicrobial resistance,<sup>5,6</sup> further steps could be taken to ensure animal and public health in Japan. In particular, several countries have initiated national monitoring programs that include both animal and public health, but at present there is no global monitoring program in Japan or coordination between these areas. Joint efforts are now needed to establish a national antimicrobial monitoring program that includes both animal and public health to solve the emerging problem of antimicrobial resistance.

## References

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