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# THE PRINCE MAHIDOL AWARD CONFERENCE SIDE MEETING ON ADDRESSING ANTIMICROBIAL USAGE IN ASIA'S FOOD ANIMAL PRODUCTION SECTOR:

**Towards a unified One Health approach to  
preventing and controlling resistance**

**Proceedings**

Prince Mahidol Award Conference side meeting on  
antimicrobial resistance and antimicrobial use in  
Asia's food and animal production sectors

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**The Prince Mahidol Award Conference  
Side Meeting on Addressing  
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## LIST OF ABBREVIATIONS

AMR	Antimicrobial resistance
AMS	Antimicrobial stewardship
AMU	Antimicrobial use
APHCA	Animal Production and Health Commission for Asia and the Pacific
ASEAN	Association of Southeast Asian Nations
AST	Antibiotic susceptibility testing
CLSI	Clinical and Laboratory Standards Institute
DALY	Daily Adjusted Life Year
FAO	Food and Agriculture Organization of the United Nations
GAP	Global Action Plan
GHSA	Global Health Security agenda
IHR	International Health Regulations
MIC	Minimal inhibitory concentration

NAP	National Action Plan
OIE	World Organisation for Animal Health
PMAC	Prince Mahidol Award Conference
SAARC	South Asian Association for Regional Cooperation
SEAOHUN	Southeast Asia One Health University Network
USAID	United States Agency for International Development



## SUMMARY

The PMAC Side Meeting “Addressing Antimicrobial Usage in Asia’s Food Animal Production Sectors: Towards a Unified, One Health Approach to Preventing and Controlling Resistance” was implemented by the Food and Agriculture Organization (FAO) of the United Nations and the United States Agency for International Development (USAID). The overall objective of the meeting was to promote the prudent use of antimicrobials in Asia’s food animal production sectors. To address this overall objective, the following specific aims guided this meeting:

1. To share lessons and insights from experts and stakeholders on the following issues:
  - a. Characterizing antibiotic consumption and usage by food animal production sectors (both terrestrial and aquatic);
  - b. Review the evidence base linking usage and development of resistance in food animal production systems;
  - c. Review the regional economic impact in both animal health and production;
  - d. Share experience on policies, regulations, and compliance systems applicable to Asia contexts; and
  - e. Determine possible mechanisms by which the region can contribute to the overall momentum in the establishment and collation of national baseline information on antimicrobial use in animals.
2. To discuss the roles of various stakeholders in contributing to the development and implementation of national action plans for antimicrobial resistance (AMR) in the Region.

The meeting brought together various stakeholders and experts on AMR and antimicrobial usage (AMU) in food animal production sectors (both terrestrial and aquatic) to present research findings, highlight country experiences as well as share diverse perspectives on addressing AMR and AMU globally and regionally. The two-day meeting was held from 27 to 28 January 2016 at the Centara Grand Convention Center, Bangkok, Thailand. USAID's Dr Dennis Carroll provided the opening remarks. A total of 120 participants attended the meeting. Meeting participants included representatives from high-level authorities, academia, pharmaceutical companies from various countries in Asia, Australia, and Europe as well as representatives from regional economic organizations and international technical organizations.

The meeting consisted of plenary presentation sessions, a panel discussion, and a group activity. A total of 18 presentations were given during the plenary presentations which were grouped into five categories: 1) Setting the scene: Trends in Antibiotic Use and Resistance: Global and Asia; 2) Addressing AMR at the global level; 3) Experience at Regional and Country Levels: examples of strategies, policies, legislations, plans and multi-sectoral coordination (food, agriculture, health, and commerce); 4) AMU monitoring and AMR surveillance – required capacities; and 5) Ways forward.

The meeting allowed stakeholders to discuss roles and contributions to the development and implementation of National Action Plans for AMR. It was consistently highlighted by different participants that the FAO, the World Health Organization (WHO) and the World Organisation for Animal Health (OIE) play an important role in guiding the development of country specific National AMR Action Plans. Countries with inter-ministerial

committees that develop and implement legislation requiring national action plans is an important basis for developing country-based AMR activities. Mechanisms were discussed by which the region can contribute to the overall momentum in the establishment and collation of national baseline information on AMU in animals. An important emerging theme and finding from this meeting is the need for a One Health approach to harmonize and standardize AMR and AMU surveillance and laboratory diagnosis, including establishing mechanisms to exchange field and laboratory data from terrestrial and aquatic animal health and human health sectors. Awareness raising for all stakeholders is needed including consumers, veterinarians, farmers, human health practitioners, policy-makers, and governments. Gaps in knowledge were highlighted including the need to understand the economic consequences of AMR and AMU and the need for increased understanding of antimicrobial use in the food animal production sector. Lastly, an important step forward for addressing AMR and AMU includes the need for more effective restrictions, regulations and enforcement on antimicrobial sales.

An inaugural meeting of a USAID funded regional project through FAO entitled “Addressing Antimicrobial Usage in Asia’s Livestock Production Industry” followed the meeting on 29 January. Participants for this meeting represented 14 countries in Southeast and South Asia and China. The concept and plan of activities for this regional project aims at addressing needs identified during the PMAC side meeting on AMR.

## BACKGROUND

Antimicrobial resistance (AMR) is the ability of microorganisms to survive despite antimicrobial treatment. It is a growing public health threat, which requires a concerted global effort to manage the risks it poses to food and agriculture. The overuse and misuse of antibiotics and other antimicrobial agents contributes to increasing spread of AMR in both public and animal health.

AMR originated from the unregulated use of antimicrobials in public and animal health and production sectors, which exerted selection pressure on pathogen populations that encourages the development of resistance and exchange of resistance genes. There is widespread use in livestock production industry of antimicrobials for therapeutic, preventative and growth promotion purposes across Asia. A number of factors drive the development of AMR, among these are weak or non-existent regulatory frameworks governing antimicrobial use, sub-optimal enforcement and compliance with existing guidelines, low levels of AMR awareness and inadequate commitment to responsible antimicrobial stewardship.

The complex and cross-cutting issues driving AMU and AMR in livestock production in Asia requires a multi-faceted approach and a concerted effort to promote responsible AMU stewardship.

The Food and Agriculture Organization of the United Nations (FAO), World Organization for Animal Health (OIE) and World Health Organization (WHO) identified AMR as one of the three flagship topics for tripartite collaboration. It was during the 68<sup>th</sup> World Health Assembly in May 2015 that the World Health Assembly endorsed the Global Action Plan (GAP) on AMR. This cemented the tripartite collaboration and strengthened the One Health approach

among the three organizations. The GAP consolidates the Codex Alimentarius and OIE intergovernmental standards and guidelines and aims to ensure continuity of treatment and prevention of infectious diseases, effective use of medicine and accessibility to stakeholders.

The GAP on AMR guides member states, the Secretariat, and their international partners and national partners to: 1) improve awareness and understanding of antimicrobial resistance; 2) strengthen knowledge through surveillance and research; 3) reduce the incidence of infection; 4) optimize the use of antimicrobial agents; and 5) develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions. Consistent with this, the FAO, OIE and WHO in the Asia and the Pacific region are jointly mobilizing global and regional technical expertise and knowledge for use by member states and to accelerate technical support to member states in development and implementation of National Action Plans for AMR.



## 1. INTRODUCTION

The PMAC side meeting “Addressing Antimicrobial Usage in Asia’s Food Animal Production Sectors: Towards a Unified, One Health Approach to Preventing and Controlling Resistance” was implemented by the Food and Agriculture Organization of the United Nations and the United States Agency for International Development. The overall objective was to promote the prudent use of antimicrobials in Asia’s food animal production sectors.

Presentations highlighted ongoing global and regional activities, regional studies, research from experts and relevant stakeholders on antibiotic consumption, magnitude and trend of resistance as well as examples of interventions to decrease reliance on antimicrobials in priority production systems. This meeting provided an opportunity to outline further understanding of antibiotic consumption and trends of resistance within the broader global and regional agenda. These discussions have direct implications for how collaboration among stakeholders can be strengthened to better address AMR issues, including what is needed to implement the Global Action Plan and meet intergovernmental standards and guidelines. Lessons from this meeting will also help to guide how to shape national policies and approaches to gain political commitment and support.

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### 1.1 MEETING PARTICIPANTS

A total of 120 participants attended the two-day meeting. Meeting participants included representatives from organizations including FAO, WHO, OIE and USAID from both headquarters and regional offices. Representatives from regional organizations included the Association of Southeast Asian Nations (ASEAN), South Asian Association for Regional Cooperation (SAARC), members of regional

and local governments, members of academia and research institutes, and representatives from the private sector such as the livestock industry, and non-governmental organizations.<sup>1</sup>

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<sup>1</sup> A complete list of attendees is included as Annex 1.

## 2. MEETING SESSIONS

### 2.1 SESSION 1 OPENING AND INTRODUCTION

This session aimed to provide participants with context and background for the meeting. Dr Dennis Carroll, Director Global Health Security and Development Unit (USAID), delivered the opening remarks. Dr Carroll provided an overview of the two-day meeting including an introduction of the meeting objectives. He described how the meeting provided an opportunity to bring focus to what we know and do not know on AMU and AMR in food producing animals. Dr Carroll highlighted how most discussions have focused on antimicrobial resistance in humans with only side discussions on antibiotic use in animals. Dr Carroll emphasized the need to develop an evidence base to better understand the health implications of AMR and AMU to create a more informed policy to address these issues. Additionally, we need to understand the economic consequences of AMR and AMU. Dr Carroll described how the goal of this meeting is to create a way forward and to discuss how we address issues around AMR and AMU regionally and globally.

Dr Peter Black, FAO Deputy Regional Manager of the Emergency Center for Transboundary Animal Diseases, followed Dr Carroll's opening remarks. He provided a brief introduction of meeting participants. This introduction included identifying different groups present and having individuals stand when their group was listed. Groups were the pharmaceutical industry, veterinarians, academics, physicians, consumers, farmers, antibiotic users, and animal feed manufacturers. This introduction allowed meeting participants to be aware of who was involved in the meeting and identify stakeholders involved in addressing this issue. The opening

session effectively set the tone of the meeting by providing context and background.

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## 2.2 SESSION 2 SETTING THE SCENE: TRENDS IN ANTIBIOTIC USE AND RESISTANCE, GLOBAL AND ASIA<sup>2</sup>

This session was designed to provide background on the global and regional trends in antibiotic use and resistance from various perspectives. This session provided an opportunity to identify issues around AMR and AMU from private industry, academia and international organizations and identify gaps in knowledge and provide recommendations. The session included three plenary presentations and was chaired by Dr Dennis Carroll from USAID.

### **Patterns and trends of antibiotic use in food animal production sectors**

Mr Dennis L. Erpelding, Director, International Food Safety Standards and Policy, Elanco Animal Health

Representing the point of view of the private sector, Mr Dennis Erpelding presented trends in current antimicrobial use and the need for antibiotics in food animal production. Mr Erpelding underscored the need for a science-based risk analysis approach to assess AMR. He emphasized that public and private sectors need to work together to address AMR. Mr Erpelding stressed that industry is currently working with governments to frame antimicrobial policy and regulation. He stated that, as part of the Roadmap for Asia, strong, science-based laws and regulations based on risk analysis principles need to be in place for antimicrobial product approval. Laws around AMR need to have rules, regulations and the

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<sup>2</sup> Presentation abstracts appear as Annex 3.

appropriate infrastructure for enforcement to make these laws effective.

Mr Erpelding emphasized the need for education and monitoring and enforcement to increase prudent use of antimicrobials. An explanation on the definition of 'shared class' was provided and a description of how this definition varies from country to country was given. For example, in the USA, the definition is clear and growth promotion claims are not allowed in shared classes. If a product is used for both animal and human use, it is characterized as a shared class. Growth promoters are primarily animal-only antibiotic classes and countries are moving away from using shared classes of antibiotics. Mr Erpelding added that from a regulatory point of view, residues and resistance is dealt with differently. As a way forward, he proposed the following for antibiotic use in food animals: 1) shared class use should not be used for growth promotion, continuous use and concurrent use, but can be used for disease treatment, control and prevention, and should require professional veterinary oversight; and 2) antibiotics classified as animal-only use can be used under all conditions and should not require professional veterinary oversight.

### **Status of antibiotic resistance in food animals and the environment and possible impacts to human health**

Dr Joachim Otte, Antimicrobial Resistant Expert

Dr Joachim Otte presented background on the biology and epidemiology of antibiotic resistance. Antibiotic use in animals directly contributes to resistant genes in humans. Dr Otte highlighted that environmental scans have found genetic determinants of resistance excreted from animals in the environment. Certain bacteria are at a greater risk for developing

resistance. The bulk of resistance in humans and animals is from antibiotics that are almost exclusively used in animals. Dr Otte explained the three modes of transmission of resistance from farm animals to humans: 1) direct contact, 2) transmission through the food chain, and 3) the environment. Common pathways through the environment include animal excretion of bacteria through manure and groundwater. Dr Otte showed that Asia has much higher rates of resistance compared to other parts of the world. Additionally, he stressed the impacts of AMR in humans with an estimated 12 million DALYs attributed to gastroenteritis likely originating in farm animals. Recommendations for addressing AMR include a systems perspective on antibiotic and antimicrobial use and bans on antibiotics as growth promoters, which have proven successful in reducing levels of resistance in the past.

### **Socio-economic impacts of AMU and AMR in food animal production sectors**

Dr Jonathan Rushton, Adjunct Professor, Royal Veterinary College

Dr Jonathan Rushton provided historical context on the evolution of livestock production systems. There has been a dramatic increase in consumption of fish and meat globally. This increase has contributed to an increase in antibiotic use in animals. Current food production systems are dependent on antimicrobials and overuse and misuse of antimicrobials are commonly recognized. Antibiotics are used more commonly in healthy animals than unhealthy humans. Asia is a region with high antimicrobial use and is also where the highest growth is expected. Dr Rushton cited that the majority of Asia's livestock and poultry populations are reared in intensive or semi-intensive systems that rely on antibiotics. He identified the main benefit of antibiotic as the increase in the

availability of animal food sources for consumers, which reduces the overall costs for consumers relative to other goods.

Additional benefits include increases in animal welfare and potential benefits for farm level income and farmer welfare. Costs attached to the increase in antibiotic use include the financial cost of antimicrobials to the farmer. He further added that to analyze AMR appropriately, the following information is needed: 1) pricing of antimicrobials at the feed manufacture and farm level; 2) regulation and enforcement of antimicrobial use; 3) structure of the intensive livestock systems including investment in feed quality, investment in water quality, investment in housing, and husbandry and human skills and time; 4) production parameters; and 5) understanding of the dosage rates for animals. He concluded that data collection mechanisms are currently inadequate to capture use globally, particularly in developing countries. Better designed studies are needed to understand the epidemiology of specific antimicrobial diseases and applied research is needed on trends in animal husbandry practices.

### ***Session 2 Key comments and issues raised***

- Antibiotic classes considered to be classified under shared use are rather broad and their therapeutic use in animals should be further clarified.
- A country's risk analysis process needs to be aggressive in identifying primary concerns where food borne pathogens are involved.
- There is a need for collaboration and incentives for research on the return of investment on developing new antibiotics.
- The potential link between AMR genes and virulence factors that lead to the development of more dangerous pathogens is not always the case.

- There are varying levels of risk depending on the scale of production systems but more research is needed.

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## 2.3 SESSION 3 ADDRESSING AMR AT THE GLOBAL LEVEL

### **Roles of international organizations in the reduction of AMR risks from food animal production sectors**

This session offered three plenary presentations from the WHO, OIE and FAO on the roles of international organizations in the reduction of AMR risks from food animal production sectors. The session was moderated by Dr Jeff Bender from the University of Minnesota.

#### **WHO: Roles and activities on antimicrobial resistance**

Dr Awa Aidara-Kane, Coordinator of Food borne and Zoonotic Diseases Unit, Department of Food Safety and Zoonoses, WHO, Geneva, Switzerland and Coordinator of the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance

Dr Awa Aidara-Kane described the development of the Global Action Plan (GAP) on AMR, underscoring its emphasis on the need for One Health collaboration. The GAP was developed by WHO, but implementation goes beyond WHO. Dr Aidara-Kane described the GAP's five strategic objectives, guiding principles, and the 10 work streams for its implementation, which include One Health as a cross-cutting theme. WHO has made significant increase in their budget for addressing AMR. The GAP includes organization-wide coordination and implementation. Dr Aidara-Kane described the importance of WHO collaborating with the FAO-OIE-WHO Tripartite. She further described WHO activities under the One Health stream and its emphasis on building capacities through training. Current training and capacity building pilot projects are



underway in Cambodia, Viet Nam, India and Bangladesh. These pilot sites were selected based on an evaluation of proposals submitted.

### **OIE: Roles and activities on antimicrobial resistance**

Dr Elisabeth Erlacher-Vindel, Deputy Head, Scientific and Technical Department, World Organisation for Animal Health, Paris, France

After providing a brief background on the World Organisation for Animal Health (OIE), Dr Elisabeth Erlacher-Vindel presented OIE's main initiatives on AMR. The roles and activities of the OIE are largely anchored on its mandate as a standard setting body and its commitment to the One Health approach as part of the FAO-OIE-WHO Tripartite. Key activities include continued updating of the OIE Terrestrial Code and Manual, which now includes chapters relevant to AMR, the development of an OIE list of antimicrobial agents of veterinary importance, and contributions to the campaign of raising awareness. She described in detail OIE's ongoing work on establishing and populating the global database on antimicrobial agents in animals, emphasizing its pragmatic approach of collecting real world data which accommodates varying levels of available information and country systems through its three reporting options. Issues around AMR highlighted by Dr Erlacher-Vindel included: 1) limited control of antimicrobial circulation; 2) falsified products which make up the majority of circulating antimicrobials; and 3) unrestricted access to antimicrobials by farmers. Dr Erlacher-Vindel stressed that any use of antimicrobial agents in animals should be in accordance with OIE standards. OIE codes guide the prudent use of antimicrobials and provide, including a global database on the use of antimicrobial agents in animals.

## **FAO: Roles and activities on antimicrobial resistance**

Dr Alessandro Patriarchi, Specialist on Antimicrobial Resistance, Animal Production and Health Division, Food and Agriculture Organization of the United Nations, Rome, Italy

Recognizing that AMR is not a stand-alone issue, Dr Alessandro Patriarchi described the collaborative nature of contributions from FAO through a One Health and food chain approach in addressing this cross-sectoral issue. An FAO Resolution on AMR occurred in June 2015. Currently there is an inter-departmental working group on AMR with shared expertise from different sections within FAO itself (livestock, plant, fisheries, etc.) that oversees the FAO Action Plan on AMR. This plan focuses on AMR initiatives grounded on promoting awareness, providing evidence, supporting governance, and supporting good, sustainable practices to contain AMR. Dr Patriarchi advocated that awareness needs to focus on prudent use rather than on antimicrobials as something to avoid. Additionally, FAO supports the developmental of national strategies on AMR. Dr Patriarchi also highlighted FAO's contributions and roles in support of the GAP on AMR.

### ***Session 3 Key comments and issues raised***

- Objectives of the Global Action Plan are not time bound and while the process will take time, progress is being made. This is exemplified by the gathering of people from various backgrounds in one room to discuss AMR, which many years ago was thought of as impossible.
- The OIE National Focal Points for Veterinary Products are responsible for providing information about AMR and AMU in their countries and are the first step in obtaining official data. It was noted that what happens on the ground regarding distribution still needs to be captured.

- The role of other stakeholders such as academia and multinational companies in supporting FAO's work to promoting AMR awareness begins with a baseline assessment and situational analysis. Engagement of these stakeholders is key in moving this forward.
- The need to recognize economic incentives as key drivers was emphasized.

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## 2.4 SESSION 4 EXPERIENCE AT REGIONAL AND COUNTRY LEVELS

### **Examples of strategies, policies, legislations, plans and multi-sectoral coordination (food, agriculture, health, commerce)**

This session offered four plenary presentations. The first part of the session included a presentation on the Global Health Security Agenda and the AMR Action Package. This was followed by three plenary presentations highlighting country examples on AMR and AMU from Netherlands, Australia and France. This session was moderated by Dr Elisabeth Erlacher-Vindel from OIE.

### **An update on implementing the Global Health Security Agenda AMR Action Package**

Dr Dennis Carroll, Director Global Health Security and Development Unit, United States Agency for International Development

Dr Dennis Carroll described the background and objectives of the Global Health Security Agenda (GHSA). The GHSA arose from President Barack Obama's realization of the vulnerabilities following the H1N1 outbreak. The GHSA recognizes that the world is interconnected and that risks around emerging organisms and drug resistance are significant. GHSA prioritizes the prevention of emergence of avoidable epidemics, rapid detection and response.

GHSA is a global partnership involving more than 50 countries. Dr Carroll highlighted that eight years after enactment of the International Health Regulations (IHR), only 33% of all nations are fully prepared to detect and respond to epidemics.

AMR is recognized as the most significant risk for global health. The number of deaths associated with AMR across the globe is increasing at an alarming rate. Research shows that antibiotic use particularly in Asia, is projected to increase. Consequences of AMR include reducing effectiveness of first-line treatments, including common, important diseases such as TB and HIV-AIDS. Additional consequences include prolonged hospital stays and absence from work. A significant component of the GHSA addresses AMR through the GHSA-AMR Action Package. The package includes: 1) five-year targets for each participating country; 2) the creation of an AMR national plan for each country; 3) surveillance and lab capacity that meets international standards; and 4) improved conservation of existing treatments and medicines. Additional concerns highlighted include that AMR issues associated with pets are also important, as people are spending more time and money on pets. Further integration between animal and human health and correlation of disease surveillance data with animal health surveillance is needed. Dr Carroll ended the presentation with a quote from Albert Einstein “We can’t solve problems by using the same kind of thinking we used when we created them”.

### **Regional and country experiences**

This session included two parts. The first part consisted of three plenary presentations that included country examples from France, Netherlands and Australia. The second part included three plenary presentations with examples from regional and country

experiences in Asia. The first part of this session was moderated by Dr Elisabeth Erlacher-Vindel from OIE.

### **Regional and country experiences: Netherlands**

Dr Hetty van Beers-Schreurs, Managing Director of the Netherlands Veterinary Medicine Authority

Dr Hetty van Beers-Schreurs introduced her presentation with a graph demonstrating Netherlands as having some of the highest antibiotic use in Europe, while also showing that doctors do not prescribe antibiotics to humans as frequently as other European Union countries. Netherlands has a high livestock population and density with farm animals living in close proximity to people. Dr van Beers-Schreurs provided an example on how Netherlands reduced antibiotic use by 58% (over 8 years) in the swine sector. The Dutch approach included covenants between livestock sectors and government, goal setting by the government including a 20% reduction of use in 2011, 50% in 2013 and 70% in 2015, and establishing the Netherlands Veterinary Medicine Authority who are responsible for analyzing AMR and AMU data and setting thresholds. Progress on responsible antimicrobial use in the livestock sector has been attributed to farmers learning from one another through transparent farm practices, raising awareness among veterinarians and through improved regulations. Currently, the Netherlands forbids pre-medicated feed and prophylactic antibiotic use in food producing animals. This is monitored by the Food Authority who is responsible for ensuring proper antibiotic use.

## **Regional and country experience: Australia**

Dr Mark Schipp, Australian Chief Veterinary Officer, Australian delegate to the OIE

Dr Mark Schipp provided background on the creation of Australia's AMR National Strategy. He began by noting that the support from the Minister of Health, who was also a veterinarian, eased the collaboration between the Ministry of Health and the Ministry of Agriculture. Institutions involved in this strategy include the AMR Prevention and Containment Steering Group and the Australian Strategic and Technical Advisory Group on AMR. This strategy was officially released in June 2015 and is recognized as a national health priority. This strategy is in line with the Global Action Plan aiming to reduce the spread of antimicrobial resistance. Dr Schipp identified surveillance as a key component of an effective national AMR strategy. Dr Schipp described that proof of concept work is currently going on in samples of pigs.

Surveillance work will also start soon in poultry. Dr Schipp described human behavior including doctors and the general public, as impediments to prudent antibiotic use. To address antimicrobial stewardship and awareness, resources have been created. These include: 1) guidelines and codes of practice; 2) supermarket quality assurance programs; 3) an Animal Health Australia toolkit titled "*Farm Biosecurity*"; 4) *Fighting AMR*, and Australia Vet Association program; 5) an Annual Antibiotic Awareness Week that includes human and veterinarian sectors; and 6) dedicated webpages. Additionally, Dr Schipp commented that on-farm interventions on good hygiene would be most appropriate in countries with small-holders where cost-benefit can be a challenge.

## **Regional and country experience: France**

Dr Nicolas Ponçon, Deputy Agricultural Counselor for ASEAN countries, Embassy of France in Singapore

Dr Nicolas Ponçon provided an overview of France's National AMR Action Plan *Ecoantibio*. There are five priorities with 40 measures in this strategy. The strategy aims to reduce use of critically important antibiotics in veterinary medicine by 25% in 2017. The plan relies on voluntary restriction and promotes the concept that antibiotics as growth promoters should be forbidden, and that the preventative use of antibiotics should be limited. Additional aims include promoting proper use and best practices and the promotion of innovative alternatives to antibiotic use. A key component of this strategy includes a communication campaign to raise awareness aimed at pet owners and farmers. Monitoring and surveillance has been a focus area of this strategy including the Animal Level of Exposure to Antimicrobials Indicator (ALEA) implemented in 1999. Dr Ponçon highlighted a key concern with monitoring and surveillance includes careful selection of using and choosing the right indicator (e.g. animal level of exposure) to monitor the outcomes of a national AMR program.

Actions already taken as part of *Ecoantibio* include forbidding discounted antibiotic sales, antibiotics not be delivered by farmers or breeder organizations, clinical examination before prescribing critical antibiotics, and mandatory declaration in national antibiotic database. Challenges highlighted by Dr Ponçon include the enforcement of regulations through a voluntary approach if goals are achieved. Key recommendations from France include that all countries devise individual national action plans, stop the use of antibiotics for growth promotion, reduce antibiotic use for disease

prevention, and consideration of the economic cost of antimicrobial resistance.

### **Experience in Asia at country and regional levels**

The previous session highlighted the achievements of Netherlands, France and Australia in reducing AMR detection in the farm animal sector or produce of animal origin. The speakers in this session presented their efforts in monitoring, surveillance, policy regulations on AMU and AMR, and establishing standards in their respective countries in Asia. The session was moderated by Dr Awa Aidara-Kane from WHO.

### **Experience in Asia at country and regional levels: ASEAN**

Dr Maria V. Abenes, Head, Veterinary Biologics Assay Section, Veterinary Laboratory Division, Bureau of Animal Industry, Philippines, ASEAN National Focal Point on Veterinary Products and OIE National Focal Point on Animal Production Food Safety

Dr Maria Abenes provided a summary of findings from a questionnaire administered to ASEAN member countries. The questionnaire was designed to establish baseline information on ASEAN member countries efforts to address AMU and AMR in food animals and humans. Questionnaires were sent to ASEAN National Focal Points on veterinary products from each participating country. The questionnaire inquired about policies and regulations regarding AMU in food animals, monitoring programs for AMU in food animals, and obstacles for monitoring (e.g. funds, awareness, capacity building, coordination, unskilled staff, illegal importation etc.) The survey was conducted in April 2015 and 6 of the 15 countries responded to the survey. Out of the six responding countries, about four reported having guidelines and a policy on



regulations for AMU already in place or a surveillance program established for AMR. The other two participating countries reported that they are still in the process of developing appropriate country guidelines. The regulatory authorities of the responding countries are either the Veterinary Department or the Food Safety Authority of the Government. In most countries, the Veterinary Department does not control antibiotic registration, which is an obstacle to addressing antimicrobial use in food animals. Dr Abenes commented that the full results of the questionnaire will be further analyzed and released at the next meeting with the veterinary product focal points and that additional follow-up will occur with those countries who have not yet responded.

#### **Experience in Asia at country and regional levels: China**

Mr Xu Shixin, Director, Division of Safety Assessment, China Institute of Veterinary Drug Control

Mr Xu Shixin presented on the regulatory systems and measures taken to control AMU and AMR in the animal food producing sector in China. The Government of China regulates AMR and AMU through regulation of the administration of veterinary drugs and administrative measures for veterinary practitioners. Additionally, China employs provision under the Administrative Measures for Rural Veterinary Practitioners to monitor and carry out surveillance for AMR. In 2008, China established a surveillance system for AMR, which included dedicated laboratory support in 30 provinces throughout China. These laboratories follow AST and CLSI standards. Large farms and aquaculture are included in this surveillance system. In respect to monitoring AMR in animal origin food products for export, China considers that importing countries are expected to monitor and test the products they are importing following their own country specific requirements. Veterinary

antibiotics have a strictly enforced approval system in China. These measures include antibiotics specified for human use cannot be used in animals, and China has banned production and use of four fluorquinolones. These include ofloxacin, norfloxacin, pefloxacin, and lomefloxacin in the farm animal sector. China has had a positive reduction in AMR detection in food of animal origin and animal waste. Future work required on AMR and AMU in China includes enhancement of integrated administration on antimicrobials, establishing a classification system, developing guidelines for antimicrobial use in veterinary clinics, and conducting a risk assessment for antimicrobial resistance.

### **Experience in Asia at country and regional levels: Thailand**

Dr Visanu Thamlikitkul, Professor and Head of Division of Infectious Diseases and Tropical Medicine, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University

Dr Visanu Thamlikitkul presented on the AMR containment and prevention program in Thailand. The program was developed in 2012 and there are currently 10 operational actions and regulations on AMR in Thailand. Thailand regulates distribution of antibiotics in human and food animals through these regulations. Thailand has also launched a robust social campaign against the abuse of antibiotics. Since 2015 regulations have been established that prohibit the use of antibiotics as growth promoters. Laboratories for AMR surveillance have been identified and a system for monitoring has been established. Dr Thamlikitkul stressed the importance of countries having the support and guidance of WHO, FAO and OIE when developing country specific national action plans. He described the establishment of AMR national action plans as the most appropriate initiative to address AMR concerns for most countries. Dr Thamlikitkul expressed concerns on the

increased use of antibiotics not only in the farm animal sector but also in aquaculture and in plant agriculture in Thailand and Southeast Asia, which are inadequately regulated. Collaboration with the plant sectors will be the next phase of Thailand's strategy to move from livestock to agriculture. Concerns were also expressed about the lack of adequate surveillance for residues of antibiotics and other harmful substances in food of animal origin.

#### ***Session 4 Key comments and issues raised***

- For successful reduction in AMR, countries must consider the following: small animal practices, human behavior when examining the use of veterinary drugs, and governmental support, particularly coordination between different sectors including agriculture and plant production.
- For successful AMU regulation, it is important to reduce the use of critical antibiotics for all sectors. Additionally, all antibiotics must be registered. In Australia, all antibiotics are registered with the Australian Register of Therapeutic Goods. Additionally, nearly all antibiotics must be prescribed by a registered professional (e.g. veterinarian or doctor).
- For countries just starting to develop an AMR strategy, policies should focus on a bottom-up approach where farmers are engaged and encouraged to use the correct practices. Additionally, increased awareness of producers regarding the implications of AMR and the potential health effects is needed to convince farmers to stop using antibiotics in feed and for prophylaxis.
- AMU surveillance is essential for determining percent reduction in AMU and goal setting.
- Stakeholder engagement is an important aspect and there are plans for ASEAN to involve industry to play a role in addressing AMR and AMU in food animals and humans.

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## 2.5 SESSION 5 AMU MONITORING AND AMR SURVEILLANCE, REQUIRED CAPACITIES

This session included four plenary presentations and was moderated by Dr Lindsay Parish (USAID).

### **Summary of the AMR survey from the 6th Asia Pacific Workshop on Multi-sectoral Collaboration for the Prevention and Control of Zoonoses**

Dr Mary Joy Gordoncillo, Science and One Health Coordinator, OIE Subregional Representation for South-East Asia

Dr Mary Joy Gordoncillo presented findings from an AMR questionnaire distributed to participants from 23 countries attending the 6<sup>th</sup> Asia Pacific Workshop on Multi-sectoral Collaboration for the Prevention and Control of Zoonoses held in Sapporo, Japan 2015. Twenty-one of the 23 participating countries completed the questionnaire. The questions were related to: *Part 1* current operations related to governance, legislation and political support on AMR issues; *Part 2* current capacity related to AMR surveillance and mitigation; and *Part 3* current inter-sectoral collaboration in addressing AMR in the country. *Part 1* included questions on if AMR is a recognized issue at the human-animal interface, existing laws and policies specific to AMR mitigation, the existing National Action Plan on AMR mitigation, political engagement on AMR mitigation, existing AMR National Committee, existing recognized institution for AMR surveillance and agencies involved in antimicrobial usage monitoring. More than 70% of the respondents answer 'Yes' to these questions.

Part 2 included questions on the existing national reference laboratory for human health and needs related to laboratory

capacity for AMR research. More than 60% of respondents have national reference laboratories for human health but less than 40% have the same capacity for animal health. Identified needs related to laboratory capacity included improving testing capacity, strengthening human resources, national and regional networks and coordination and financial and logistical support.

For Part 3 of the questionnaire, more than 60% of the respondents answered 'Yes' for the existing human-animal health collaboration, however, existing public-private partnerships was less than 50%. Respondents reported that political engagement usually exists, but is generally weak, with a significant variety in the composition of national AMR committees. Dr Gordoncillo explained that the survey should be viewed with caution, recognizing limitations of how the survey was conducted as it focused on the human-animal interface only, rather than going into detail into specific sectors. However, findings from this survey help to provide an initial preview on AMR mitigation in the Asia Pacific Region on which future work can be based.

### **Laboratory capacity and AMR surveillance in food animal production sectors in Asia**

Dr Rungtip Chuanchuen, Veterinary Professor, Faculty of Veterinary Science, Chulalongkorn University

Dr Rungtip Chuanchuen presented on the laboratory capacity and AMR surveillance in food animal production sectors in Asia. She noted the high degree of country to country variation in capacity and AMR surveillance. Dr Chuanchuen highlighted that AMR data in Asia is limited, with no systemic data collection and non-comparable data. She highlighted that AMR is still not a priority in many countries. Dr Chuanchuen is currently conducting a research

project on the epidemiology and mechanisms of AMR in foodborne pathogens in Thailand and other countries in Southeast Asia. The Faculty of Veterinary Science at Chulalongkorn University has conducted many national and regional training programs for ASEAN universities, ASEAN member governments, as well as countries outside ASEAN, on the standardization and harmonization of AMR monitoring. Dr Chuanchuen recommended a standardized and harmonized AMR surveillance protocol for the region. For example, while commonly used, the disk diffusion method is not ideal for AMR surveillance and the minimal inhibitory concentration (MIC) method should be used as part of a standard protocol. Dr Chuanchuen advocated that AMR be made a priority and that lab staff be trained and the production of quantitative data should be encouraged. Dr Chuanchuen recommended that for real progress to be made informatics need to be improved and greater financial support is needed to support initiatives addressing AMR and AMU. She concluded that the AMR problem did not occur overnight and neither will the solution.

### **Japanese Veterinary Resistance Monitoring System (JVARM) collaboration with Japan Nosocomial Infections Surveillance (JANIS)**

Dr Michiko Kawanishi, Chief Researcher, Japanese Veterinary Antimicrobial Monitoring System

Dr Michiko Kawanishi presented on the Japanese Veterinary Resistance Monitoring System (JVARM) and its collaboration with Japan Nosocomial Infections Surveillance (JANIS). JVARM was established in 1999 and monitors AMR in relation to sales of antimicrobials by pharmaceutical companies, resistance in animal pathogens from diseased animals, and resistance in zoonotic and indicator bacteria from healthy animals. Under the Japanese

pharmaceutical law, all distributors of veterinary medical products have to report annually to the government the details of their distributions. The sales of antimicrobials in animals significantly fell from 1 292 tons in 2001 to 1 031 tons in 2013. The Livestock Hygiene Service Centers collect samples from farms and slaughterhouses and analyze indicator and zoonotic bacteria for AMR. Data are sent to the national lab for further analysis and evaluation from the Ministry of Agriculture, Forestry and Fisheries. From the bacterial isolates, E. coli as the indicator bacteria has demonstrated resistance to many antibiotics, particularly tetracycline. JVARM collaboration with JANIS was established in 2000. JANIS includes participation from 1 000 hospitals, each of which submits minimum inhibitory concentration (MIC) data into the JANIS database. JANIS calculates resistance and multi-antimicrobial resistance rates. Results are evaluated annually and the system enables examination of trends in resistances over time. Resistance to levofloxacin and cefotaxim in humans has been increasing over time. This is a different trend observed in animals, thus it does not appear that resistance in humans observed in JANIS is originating in food animals.

### **The role of academia in AMR and AMU**

Dr Chase Crawford, Director, Antimicrobial Resistance Initiative, Association of American Veterinary Medical Colleges & Association of Public and Land-grant Universities

Dr Chase Crawford presented on the role of academia in addressing AMR and AMU. Dr Crawford emphasized the importance of education initiatives on AMR and AMU in food producing animals that go beyond veterinarians to include agricultural groups and others. Dr Crawford illustrated how academic institutions have been active in AMR research for some time and that the role of

academia has evolved to include a One Health approach. The Association of American Veterinary Medical Colleges established an AMR Core Competencies Working Group (with FAO support) and an international knowledge exchange is being encouraged. Efforts already underway include the organization of a national consortium, educational workshops, as well as collaboration with federal agencies and intergovernmental organizations on regional roundtables to address regional variation. Dr Crawford provided the following recommendations to address AMR and AMU: 1) research on developing new antibiotics and alternatives to treat bacterial infections; 2) developing methods to build host resistance; 3) improving understanding of AMR; 4) research to measure the success of stewardship programs; and 5) research focused on the role of the environment in the development and transmission of resistant organisms.

#### ***Session 5 Key comments and issues raised***

- Farm hygiene and improved sanitary systems contribute to a reduction in antibiotic use.
- In relation to the impact of commodity groups on policy and practices, industry groups must be on board and can help with incentivizing and funding research.
- It is recommended that universities contribute to research particularly on understanding antibiotic usage, to assist food animal producers and industry.
- Residues should be included with AMR surveillance and there is a need for better prioritization at the national and regional levels.



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## 2.6 SESSION 6 REDUCING NEEDS AND PROMOTING PROPER USE OF ANTIBIOTICS IN FOOD ANIMAL PRODUCTION SECTORS

### **Roles of stakeholders in holistic approaches to reduce antimicrobial usage in food production sectors**

Session 6 included a panel discussion with six panelists representing various perspectives and sectors from different countries. This session was moderated by Dr Henk Jan Ormel (FAO).

#### **Panelists**

**Pushpanathan Sundram**, Market Access Director, ASEAN, Elanco Animal Health, Representing the Veterinary Pharmaceutical Industry

**Marzuki Bin Zakaria**, Head of Zoonoses and Veterinary Public Health Section, Department of Veterinary Services, Ministry of Agriculture and Agro-Based Industry, Malaysia, Representing Veterinarians

**Orawan Fakkham**, Director of Quality Assurance at Betagro Group, Representing Food Animal Producers

**Niyada Kiatying-Angsulee**, Director, Drug System Monitoring and Development Program, Chulalongkorn University, Representing Consumer Organizations

**Jeff Bender**, Professor, University of Minnesota, Representing Academia

**Surapat Chandaeng**, Assistant Vice President, Thai Veterinary Medical Association, Bangkok, Representing Animal Feed Manufacturers

The panel discussion highlighted key concerns, challenges and steps forward for addressing AMR and AMU. An important theme that emerged during this discussion is the need for the responsible use

of antimicrobials and that all actors in the food chain must be involved for a successful reduction in antimicrobial use and antibiotic residues. Barriers to responsible use include weak AMR and AMU knowledge among consumers, particularly in relation to food producing animals. Additionally, consumers are unaware of their rights in relation to AMR. Another challenge is limited farmer education and awareness on AMR. A country example was provided from Viet Nam where 60–70% of the population raise animals on a small scale. When small-scale farmers are asked about AMR, they reply that they give multiple antibiotics to their animals to reduce the risk of development of AMR. Their rationale is that to have healthy animals they need to be protected by antibiotics. An additional barrier to prudent antimicrobial use includes easy access to antibiotics without a prescription in Asia, particularly in Thailand, Viet Nam, China, Bangladesh and India. Another barrier to prudent antimicrobial use includes conflicting regulations in different countries on handling expired antimicrobial products. Progress within industry includes the development of animal-only use antibiotics. Industry also advocated the need to improve vaccine development and the use of enzymes for animal health. Additionally, industry recognizes the need to control the use of antimicrobials as growth promoters in line with government requirements. Other examples of progress include examples from Thailand where animals are checked at slaughter for residues. If residues are found, a farm check is conducted. Experience in Indonesia has shown that the FAO can play a valuable role working both with central and local government animal health services to engage with communities and small-scale farmers. It was highlighted that FAO plays a key role in working with ministries to collaborate between sectors.

The panel discussion concluded with panelists discussing if there are any positive signs in the next five years in relation to AMR and AMU. Panelists were overwhelmingly hopeful that the AMR situation would improve in the next five years. Panelists demonstrated support and commitment to solving the AMR problem. Key strategies highlighted include the need for each country to have their own specific National AMR Action Plan, the need for more strategic planning, and that this issue be viewed as a matter of food security and food safety.

Governments, in conjunction with other stakeholders, must introduce policies for the responsible use of antibiotics. It was highlighted that consumer groups need to mobilize around the issue of AMR and work together regionally to share information and knowledge. Additionally, there was a consensus that there is a need for greater cross-disciplinary collaboration. This includes increased collaboration between the human health sector, animal health sector, and the environment. Additionally, we need a better understanding of antibiotics in the environment.

***Session 6 Key comments and issues raised:***

- Barriers to responsible AMU include limited knowledge and awareness of AMR among key stakeholders particularly consumers and farmers, easy access to antimicrobials and conflicting regulations on handling expired antimicrobial products.
- Important progress is being made by industry that includes the development of animal-only use antibiotics. Industry also advocates improving vaccine development and the use of enzymes for animal health. Additionally, industry recognizes the need to control the use of antimicrobials as growth promoters in line with government requirements.

- Key strategies for addressing AMR include more strategic planning and viewing this issue as a matter of food security and food safety. Improved government regulation is needed in conjunction with other stakeholders to develop policies on the responsible use of antibiotics.
- Country specific National AMR Action Plans that include collaboration between different sectors is key for successful AMR reduction.

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## 2.7 SESSION 7 WAYS FORWARD

### **Engaging all sectors for national AMR policy and strategy development**

Dr Suriya Wongkongkathep, Director General, Department of Development of Thai Traditional and Alternative Medicine (DTAM), the Ministry of Public Health, Thailand

In 2014, Thailand established an AMR policy with the goal of developing an integrated AMR system through the development of a national AMR strategy. The strategy uses a One Health approach and aligns with the WHO Global Action Plan. The strategy starts with evidence and information sharing that enables stakeholders to gain an understanding of the complete picture of AMR in the Thai context. This strategy includes a multi-sectoral AMR Coordination and Integration Committee responsible for drafting the National Strategy. This strategy emphasizes the importance of multi-sectoral stakeholder participation and ensures engagement by the whole society through collaborating with the National Health Assembly. Global and international collaboration provided positive momentum for national implementation. A draft of the national strategy will be submitted to the Thai Cabinet for endorsement during 2016.

## **Group activity and discussion**

For the group activity and discussion, meeting participants were randomly assigned into six groups. Each group circulated to different stations set up around the meeting room. At each station, participants were asked to assume a different role. These roles included policy-maker for animal health and production, policy-maker for human health, the pharmaceutical industry, veterinary association, farmers and consumers. Assuming these different roles, participants answered questions as a group. These questions included: 1) As a (role), how would you describe your ideal future with respect to AMR by the year 2025? 2) As a (role), what are your main concerns about AMR at present? 3) How do you think these concerns could be overcome to achieve the ideal future with respect to AMR in 2025?

This exercise provided an opportunity for meeting attendees to better understand the differences and similarities in how different stakeholders understand and address AMR and AMU. Groups were asked what their main concerns were in regards to AMR. Examples of overlapping themes that emerged include the following: misuse and overuse of antimicrobials, residues in the environment, lack of regulation and oversight, lack of available alternatives, poor information and data to inform decisions and policy, and concern for human health consequences.

When groups were asked what their ideal future is with respect to AMR by the year 2025, there were important overlapping themes that emerged among all groups. These themes included a reduction in AMR, healthy animals, humans and the environment, the development of appropriate alternatives to antibiotics, a reduction in antimicrobial use, better information and data available, and AMR as a priority issue. Lastly, groups were asked how they would

achieve this ideal future by 2025. Common approaches identified included raising knowledge, awareness and engagement among different stakeholders, improved use of antibiotics, increased regulation, guidelines and enforcement, and country specific action plans.

***Session 7 Key comments and issues raised:***

- Country specific AMR Action Plans that emphasize multi-sectoral stakeholder participation are key for successful AMR reduction.
- Current key AMR concerns include the misuse of antimicrobials, residues in the environment, lack of regulation and oversight, lack of alternatives, poor information and data to inform decisions and policy, and concern for human health consequences.
- Approaches for addressing AMR and AMU include raising knowledge, awareness and engagement among different stakeholders, improved use of antibiotics, and increased regulation, guidelines and enforcement.

### 3. RECOMMENDATIONS AND CONCLUSIONS

AMR and AMU concerns emphasized during this meeting include the misuse and overuse of antimicrobials, residues in the environment, concern for human and animal health and the need for better prioritization at the national and regional levels. Significant barriers to responsible AMU include limited knowledge and awareness among key stakeholders particularly consumers and farmers, easy access to antimicrobials and conflicting country regulations on handling expired antimicrobial products. For successful reduction in AMR, governmental support is needed, particularly multi-sectoral collaboration. Approaches for addressing AMR and AMU include raising knowledge, awareness and engagement among key stakeholders, improved use of antibiotics, and increased regulation, guidelines and enforcement of these procedures.

Participants overwhelmingly emphasized the need for country specific AMR Action Plans that incorporate multi-sectoral stakeholder collaboration. This collaboration needs to include human health, animal health, and the environment. Additionally, there is a need for greater inclusion of plant agriculture with the increasing use of antibiotics for plant health. For countries beginning to develop an AMR strategy, policies should include improving farm hygiene and sanitation systems, which can lead to a reduction in AMR. Awareness raising is essential for consumers, human and animal health practitioners, government and farmers. Education targeting farmers on the implications of AMR and the potential human health effects is needed to stop the use of antibiotics in feed and for prophylaxis.

Stakeholders, including academia and multinational companies, play an important role in conducting research on issues surrounding AMR and AMU. In relation to the impact of commodity groups on policy and practices, industry groups must be on board and can help with incentivizing and funding research. Several gaps in research were highlighted including the economic implications of AMR and understanding residues in the environment. It is recommended that universities contribute to research, particularly on understanding antibiotic usage, and to assist food animal producers. Additionally, there is a need for collaboration and incentives for research on the return on investment in developing new antibiotics.

Improved government regulation is needed, in conjunction with other stakeholders to develop policies to improve the prudent use of antibiotics. Recommendations for specific regulations include procedures to ensure disposal of expired antimicrobials, antibiotic registration and prescription of antibiotics administered by registered professionals. Improvement of definitions of antibiotic classification is needed for shared class antibiotics and therapeutic use in animals should be further clarified. Lastly, AMU surveillance is essential for goal setting and determining percent reduction in AMU. Improving laboratory capacity for AMR surveillance is essential. AMR surveillance should include residues.

Needs, concerns and strategies identified during this meeting will guide the USAID funded regional project through FAO “Addressing Antimicrobial Usage in Asia’s Livestock Production Industry”. This project will include representation from 14 countries in Southeast and South Asia including China.



# Annexes

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## ANNEX 2 MEETING AGENDA

### Addressing Antimicrobial Usage in Asia's Food Animal Production Sectors:

#### Toward a Unified, One Health Approach to Preventing and Controlling Resistance

#### MEETING AGENDA

Day/Time	Details	Speaker	Format
<b>Day 1</b>	<b>27 January 2016</b>		
08.00-08.30	Registration		
<b>Session 1</b>	<b>Opening and Introduction</b>		
08.30-08.45	Opening and meeting overview: introduction of objectives	Dennis Carroll (USAID)	
08.45-09.00	Introduction of participants	Peter Black (FAO)	
<b>Session 2</b>	<b>Setting the scene: Trends in Antibiotic Use and Resistance, Global and Asia</b>	<b>Chair</b> Dennis Carroll (USAID)	
09.00-09.30	Patterns and trends of antibiotic use in food animal production sectors	Dennis Erpelding (Elanco Animal Health)	Plenary presentation

Day/Time	Details	Speaker	Format
09.30-10.00	Status of antibiotic resistance in food animals and the environment and possible impacts to human health	Joachim Otte (Antimicrobial Resistant Expert)	Plenary presentation
10.00-10.30	Socio-economic impacts of AMU and AMR in food animal production sectors	Jonathan Rushton (Royal Veterinary College)	Plenary presentation
10.30-11.00	Coffee Break		
<b>Session 3</b>	<b>Addressing AMR at the global level</b>	<b>Moderator</b> Jeff Bender (University of Minnesota)	
11.00-12.30	Roles of International Organizations in the Reduction of AMR risks from food animal production sectors:  <b>WHO:</b> Roles and activities on AMR  <b>OIE:</b> Roles and activities on AMR  <b>FAO:</b> Roles and activities on AMR	Awa AIDARA-KANE (WHO) Elisabeth Erlacher-Vindel (OIE) Alessandro Patriarchi (FAO)	20 minute presentations followed by Q&A
12.30-13.30	Lunch		
<b>Session 4</b>	<b>Experience at Regional and Country Levels: Examples of strategies, policies, legislation, plans and multi-sectoral coordination (Food-</b>		



Day/Time	Details	Speaker	Format
<b>Agriculture-Health-Commerce)</b>			
13.30-14.00	Implementing the Global Health Security Agenda (GHSA) AMR Action Package Update	Dennis Carroll (USAID)	Plenary presentation
14.00-15.30	Regional and country experience	<b>Moderator</b> Elisabeth ERLACHER-VINDEL (OIE)	
		<ul style="list-style-type: none"> <li>• Hetty van Beers-Schreurs (Netherlands)</li> <li>• Mark Schipp (Australia)</li> <li>• Nicolas Ponçon (France)</li> </ul>	Short presentations followed by panel discussion
15.30-16.00	Coffee Break		
16.00-17.30	Experience in Asia at Country and Regional Levels	<b>Moderator</b> Awa AIDARA-KANE (WHO)	
		<ul style="list-style-type: none"> <li>• Maria V. Abenes (ASEAN)</li> <li>• Mr Xu Shixin (China)</li> <li>• Visanu Thamlikitkul (Thailand)</li> </ul>	Short presentations followed by panel discussion
17.30	End of Day 1		

Day/Time	Details	Speaker	Format
<b>Day 2</b>	<b>28 January 2016</b>		
<b>Session 5</b>	<b>AMU Monitoring and AMR surveillance – required capacities</b>	<b>Moderator</b> Lindsay Parish (USAID)	
0.8.30-08:50	Summary of Day One	Peter Black (FAO)	
08.50-09.10	Summary of the AMR survey from the 6th Asia Pacific Workshop on Multi-sectoral Collaboration for the Prevention and Control of Zoonoses	Mary Joy Gordoncillo (OIE)	Plenary presentation
09.10-09.30	Laboratory capacity and AMR surveillance in food animal production sectors in Asia	Rungtip Chuanchuen, (Chulalongkorn University)	Plenary presentation
09.30-09.50	Japanese Veterinary Resistance Monitoring System (JVARM) and collaboration with the Japan Nosocomial Infections Surveillance (JANIS)	Michiko Kawanishi, (National Veterinary Assay Laboratory Japan)	Plenary presentation

<b>Day/Time</b>	<b>Details</b>	<b>Speaker</b>	<b>Format</b>
09.50-10.10	The Role of Academia in AMR and AMU	Chase Crawford (Association of American Veterinary Medical Colleges)	Plenary presentation
10.10-10.30	Wrap-up and additional Q&A	Peter Black (FAO)	
10.30-11.00	Coffee Break		
<b>Session 6</b>	<b>Reducing Needs and Promoting Proper Use of Antibiotics in Food Animal Production Sectors</b>	<b>Moderators</b> Katinka DeBalogh & Henk Jan Ormel (FAO)	
11.00-12.30	<p>Roles of Stakeholders in holistic approaches to reduce antimicrobial usage in food animal productions sectors:</p> <ol style="list-style-type: none"> <li>1. Veterinary pharmaceutical industry</li> <li>2. Veterinarians</li> <li>3. Food animal producers</li> <li>4. Consumer organizations</li> <li>5. Academia</li> <li>6. Animal feed manufacturers</li> </ol>	<ol style="list-style-type: none"> <li>1. Pushpanathan Sundram</li> <li>2. Marzuki Bin Zakaria</li> <li>3. Dr. Orawan Fakkham</li> <li>4. Niyada Kiatying-Angsulee</li> <li>5. Jeff Bender</li> <li>6. Surapat Chandaeng</li> </ol>	Panel discussion
12.30-13.30	Lunch		

<b>Day/Time</b>	<b>Details</b>	<b>Speaker</b>	<b>Format</b>
<b>Session 7</b>	<b>Ways forward</b>	<b>Moderator</b> Katinka de Balogh (FAO)	
13.30-13.50	Engaging all sectors for national AMR policy and strategy development	Suriya Wongkongkathep (Ministry of Public Health Thailand)	Plenary presentation
13.50-15.00	Group discussion to identify ways forward	Katinka de Balogh (FAO)	Group discussion and activity
15.00-15.30	Coffee Break		
15.30-16.00	Summary of group activity	Katinka de Balogh (FAO)	
16.00-16.15	Closing	Dennis Carroll (USAID)	

## ANNEX 3 ABSTRACTS OF PRESENTATIONS

### **Session 2 Setting the scene: Trends in antibiotic use and resistance, global and Asia**

*Addressing antimicrobial usage in Asia's food animal production sectors: "Patterns and trends of antibiotic use in food animal production sectors"*

Mr Dennis L. Erpelding

Antimicrobials are important for use in human and animal medicine and antimicrobial resistance needs to be minimized to ensure the long-term effectiveness of antimicrobials. All stakeholders need to collaborate to minimize antimicrobial resistance development. The adoption of best practices from global and national experiences can provide for a roadmap to the future. These include:

- 1) Establish strong laws and regulations that provide for antimicrobial product approval based on science-based risk analysis principles, including risk assessment, risk management and risk communication.
- 2) Regulatory risk assessment based on *Environmental Health Criteria 240, Principles and Methods for the Risk Assessment of Chemicals in Food* (FAO – WHO).
- 3) Risk Analysis for antimicrobial resistance based on the World Organisation for Animal Health (OIE) *Terrestrial Animal Health Code Risk Analysis for Antimicrobial Resistance Arising from the Use of Antimicrobial Agents in Animals*.
- 4) Consider the *OIE List of Antimicrobial Agents of Veterinary Importance*.
- 5) Consider the World Health Organization *Critically Important Antimicrobials for Human Medicine*.

*Status of antibiotic resistance in food animals and the environment and possible impacts on human health*

Dr Joachim Otte

Infections caused by antibiotic-resistant bacteria have become a major public health problem. Globally, more antibiotics are used in farm animals than in humans, mostly for non-therapeutic purposes and there is increasing consensus that links exist between veterinary drug use and drug resistance in human pathogens. This paper briefly covers the mechanisms and spread of antibiotic resistance (ABR) between bacterial populations. It then provides information on the prevalence of ABR in selected bacteria from various farm animal species and regions and outlines spillover pathways of ABR from farm animal bacteria into human populations. Estimates of associated disease burden in humans are presented for non-typhoidal *Salmonella*, *Campylobacter*, and toxigenic *Escherichia coli*, the most common zoonotic pathogens transmitted through livestock and food to humans. Furthermore, evidence is provided that *E. coli* and enterococci acquired from animal products are a source for resistance plasmids that spread to human adapted *E. coli* and enterococci, causing urinary and wound infections and septicaemia. The paper ends with recommendations for research and public policy.

*Socio-economic impacts of AMU and AMR in food animal production sectors*

Dr Jonathan Rushton and Sara Babo Martins

A review of the economic assessments of antimicrobial resistance in the human and animal health sectors is presented. The main focus of this research has been on the impacts of antimicrobial

resistance on human and animal health. Very little information is available on the attribution of resistance emergence from the use of antimicrobials in humans and animals. There is also a paucity of information around the costs of antimicrobial research developments and the institutional environment required to protect the common goods aspect of antimicrobials at the societal, business and private individual levels.

In order to address these gaps, a data collection, capture and analysis system is proposed that pays particular attention to antimicrobial use in all species and the monitoring of resistance emergence. In addition, it is proposed that data are collected and captured on antimicrobial development and manufacturing costs. To assist in the design of this data system a framework for socio-economic assessment antimicrobial resistance is presented based on the need for models that capture the impact of health issues relative to the costs of antimicrobials, and that change requires information on the marginal costs and benefits. A critical aspect of the proposed model is the need to think of the costs of antimicrobials as a combination of fixed costs (development, trials, marketing); variable costs (production, distribution); legislation (tax, subsidy); and profit. Any policy issues need to consider a combination of the emerging biological landscape with regards AMR through a lens that captures the institutional environment across the food system, animal health and human health.

### **Session 3 Addressing AMR at the global level: Roles of international organizations in the reduction of AMR risks from food animal production sectors**

*Activities on building capacity for integrated surveillance of AMR using a One Health approach and WHO Global Action Plan on AMR*

Dr Awa Aidara-Kane

The May 2015 World Health Assembly adopted the Global Action Plan (GAP) on antimicrobial resistance (AMR) which outlines five strategic objectives, including optimizing the use of antimicrobial agents in all sectors. Each WHO member state is expected to establish by 2017 a national action plan against antimicrobial resistance based on the One Health approach and include and address all the objectives of the Global Action Plan. This action plan underscores the need for an effective One Health approach involving coordination among numerous sectors and actors, including human and veterinary medicine and agriculture, and the need to strengthen the tripartite collaboration between WHO, FAO and OIE. To allow for effective implementation of the GAP, WHO has established ten work streams, including a One Health work stream. The aim of this work stream is to ensure that a collaborative, multi-sectoral approach is taken to minimize the public health impact of AMR associated with the use of antimicrobial agents in food producing animals. WHO activities on AMR containment at the human-animal interface include capacity building (training workshops and pilot projects), with the support of the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR) and in close collaboration with FAO and OIE.

*OIE – Roles and activities on antimicrobial resistance*

Dr Elisabeth Erlacher-Vindel

The World Organisation for Animal Health (OIE), recognized by the World Trade Organization as the international reference standard setting organization with a mandate from its 180 members to improve animal health worldwide, has completed and updated the



relevant standards for terrestrial and aquatic animals regarding responsible and prudent use of antimicrobials in veterinary medicine, and surveillance and monitoring of antimicrobial use and resistance, and has also updated the list of antimicrobial agents of veterinary importance to include specific recommendations. In May 2015, the OIE member countries adopted Resolution 26: *Combating Antimicrobial Resistance and Promoting the Prudent use of Antimicrobial Agents in Animals*, recommending member countries to follow the guidance of the Global Action Plan on Antimicrobial Resistance developed by the WHO with the contribution of the OIE and FAO. To support the implementation of the GAP, which is aligned with relevant OIE standards, the OIE is developing a global database on the use of antimicrobials in animals.

#### *FAO – Roles and activities on antimicrobial resistance*

Dr Alessandro Patriachi

Antimicrobial and multi-drug resistance is an emerging major global threat affecting human and animal health, food safety, the environment, and the agriculture sector including plant production and aquaculture. As a global issue, AMR can only be tackled by the close collaboration and cooperation of all sectors and all nations. The multi-sectoral and multi-disciplinary nature of AMR, particularly in food and agriculture, means no one organization has all the answers or can go it alone on combating the global threat of AMR. FAO has a unique role in strategies to reduce AMR as the sole international organization combining agricultural aspects, food safety, and environmental issues in aquatic and terrestrial settings. FAO has established strong and effective collaboration on AMR within the framework of the FAO/OIE/WHO tripartite agreement and with other public and private sector organizations. In support of tripartite dialogue and partnership, FAO, OIE and WHO have

developed a Tripartite Concept Note (2010), which emphasizes sharing of responsibilities and coordinating global activities to address health risks at the animal-human-ecosystems interfaces.

To support the implementation of Conference Resolution 4/2015, an inter-departmental working group on AMR (AMR-WG), bringing together different perspectives (health, **animal production**, Codex Alimentarius, legal, fisheries, food safety and plant production), was established and drafted as an FAO Action Plan on AMR through an inclusive cross-sectoral and multi-dimensional consultative process. The FAO action plan on AMR addresses four major focus areas that are important for public health, livestock, crops and aquatic resources, with impact on food security, nutrition, the environment, and sustainable development.

#### **Section 4 Experience at regional and country levels: examples of strategies, policies, legislations, plans and multi-sectoral coordination (food-agriculture-health-commerce)**

##### *The Dutch approach for responsible veterinary use of antibiotics*

Dr Hetty van Beers-Schreurs

Veterinary use of antibiotics in livestock in the Netherlands has been reduced by 58% in five years. This reduction is the result of clear targets defined by the government, measures for prudent use initiated by the private livestock sector (veal calves, pig, poultry and cattle) together with the veterinary association and transparency in use of antibiotics at farm level. It was realized by founding an independent control institute (SDa). Measures for prudent use, set up by stakeholders in 2009, included a mandatory treatment plan for each farm and a customized herd health plan, based on treatment guidelines from the Royal Dutch Veterinary Association.

In 2013, the Dutch Animal Drug Law was changed, ruling that only first choice drugs are allowed to be present on farms. Transparent reporting of use of antibiotics, benchmarking of livestock farms, and benchmarking of veterinarians as performed by the Netherlands Veterinary Medicines Authority (SDa) helped create awareness among farmers and vets.

#### *Australia's approach to combating antimicrobial resistance*

Dr Mark Schipp

Given the global call to action on AMR, Australia's response to this threat has involved a One Health approach through the joint release by the Minister for Agriculture and Water Resources and the Minister for Health of Australia's first National Antimicrobial Resistance Strategy 2015-2019. The strategy signals all animal and human health stakeholders of the need for their involvement. The development and implementation of this framework is being overseen by a steering group from the departments of agriculture and health and informed by an advisory group made up of expert stakeholders. This work is underpinned by authorities strictly regulating antimicrobials so that nearly all antibiotics used in humans and animals are prescription only, and product evaluation prior to registration involves an AMR risk assessment. Current important developments include support to medical and veterinary professionals through prescribing guidelines and enhanced AMR surveillance.

*French national plan to reduce the risks of antibiotic resistance in veterinary medicine*

Dr Nicolas Ponçon

Following several initiatives launched from 1999 regarding the surveillance of antimicrobial use and resistance, the Ministry of Agriculture launched in 2012 a five-year national action plan named “Ecoantibio” for the reduction of the risks of antibiotic resistance in veterinary medicine. This plan advocates cautious, rationale antibiotic use and is based on quantitative objectives (reduce antibiotic use in veterinary medicine by 25% in five years) and qualitative objectives (focus particularly on reducing the use of critically important antibiotics in veterinary medicine and, in particular, fluoroquinolones and third and fourth generation cephalosporins). Based on a global approach involving all the stakeholders (farmers, vets and pharmacists, scientists, pharmaceutical industry, public authorities, general public), this plan has achieved encouraging results for the past three years as all the measures have been launched and the use of antibiotics is decreasing.

*Survey on the current situation of antimicrobial use (AMU) and antimicrobial resistance (AMR) in ASEAN member states*

Dr Maria V. Abenes

A quick survey to determine the current situation of antimicrobial resistance (AMR) and antimicrobial use in ASEAN member states was conducted. The questionnaire, which was prepared by Thailand, was disseminated to ASEAN member states. Out of 10 states, only 6 responded, namely, Cambodia, Lao PDR, Malaysia, Philippines, Singapore and Thailand. Based on the answers that

were gathered from the respondents, there were similarities and differences that were identified in terms of policies and guidelines, laboratory capabilities, economic and social barriers and other issues related to AMR. The data that were collected need to be further evaluated and additional information may be required in order to develop an action plan to combat AMR in the region.

*Regulation on the use of veterinary antibiotics and surveillance of AMR in China*

Mr Xu Shixin

The presentation introduced the status of administrative measures on the control of antimicrobial agents used in AMR animal production and surveillance programs in animal derived samples in China. With the increasing concern over AMR worldwide, including selection of resistant bacteria and disruption of the barrier effect of the normal intestinal flora, the therapeutic use, particularly the prophylactic use of antimicrobial agents in food producing animals, has been becoming strictly limited when antimicrobial agents are approved for use in animals in China. A series of measures controlling antimicrobials includes prescription regulation and a catalog, a medicated feed additive list, and use by professional veterinarians. Several fluoroquinolones used both in human and animal medicine were suspended in animal production. No critically important antimicrobials in human medicine were approved for use in animals used for food production or pets. A network system for surveillance of AMR in animal was established in 2008 and the prevalence of AMR was monitored every year in compliance with internationally recognized standards and methods.

## *Thailand antimicrobial resistance containment and prevention program*

Dr Visanu Thamlikitkul

The Thailand Antimicrobial Resistance Containment and Prevention Program was founded to develop, co-ordinate and implement AMR containment, prevention, and operational actions in Thailand following the One Health' approach in 2012. The AMR containment and prevention operational actions are: estimating the national AMR burden, establishing the dynamics of AMR chains to understand how AMR in Thailand develops and spreads, developing national AMR containment and prevention governance, developing laboratory and information technology systems for surveillance of AMR, antibiotic use and hospital-acquired infections, regulating the use and distribution of antibiotics in humans and food animals, generating local evidence for promoting responsible use of antibiotics and efficient practices for infection prevention and control, designing AMR containment and prevention campaigns, creating an AMR containment and prevention package, implementing the AMR containment and prevention package in selected pilot communities, and conducting research and development on diagnostics, therapy and prevention of antimicrobial resistant bacterial infections. The program's core campaign is to stop producing AMR by promoting responsible use of antibiotics, and to stop the acquisition and transmission of AMR by promoting good sanitation and hygiene as well as compliance with infection control and prevention practices.

## **Session 5 AMU Monitoring and AMR surveillance, required capacities**

*Summary of the AMR Survey from the 6th Asia-Pacific Workshop on Multi-Sectoral Collaboration for the Prevention and Control of Zoonoses*

Dr Mary Joy Gordoncillo

Because of the complex nature of the issue of antimicrobial resistance (AMR) at the human-animal interface, mitigating this rising threat requires a coordinated One Health approach, a strong public-private partnership, and robust cooperation at the sub-national, national and global levels. To see how this is presently dealt with in parts of the Asia-Pacific region, the FAO-OIE-WHO Tripartite developed a questionnaire for the 6<sup>th</sup> Asia-Pacific Workshop on Multi-sectoral Collaboration for the Prevention and Control of Zoonoses held 28-30 October 2015 in Sapporo, Japan. This covered 1) governance, legislation and political support on AMR issues, 2) capacity related to AMR surveillance and mitigation, and 3) existing inter-sectoral collaboration in addressing AMR in the country. The responses from the 21 of the 23 participating countries reflected the varying progress thus far made, as well as the gaps that need to be addressed where AMR mitigation is concerned. While this survey needs to be viewed with caution owing to the recognized limitations by which the data were obtained, it provides a quick, initial preview on AMR mitigation in parts of the Asia-Pacific region, on which further work can be based.

*Laboratory capacity and AMR surveillance in food animal production sectors in Asia*

Dr Rungtip Chuanchuen

In Asia, the root causes and true cost of antimicrobial resistance (AMR) in bacteria associated with food animals remain largely unclear. There is an urgent necessity to produce comparable data from national surveillance programs in different countries and to combine the results at the regional level to support the formulation of rational and cost-effective AMR programs. Currently, the AMR epidemiology in most Asian countries has not been systematically investigated and the existing data is partly fragmented. Knowledge, technology and laboratory capacity vary greatly among and within countries. Major hindrances in implementation of AMR monitoring include scarcity of quality-assured laboratories; no standardized-harmonized antimicrobial susceptibility test and AMR monitoring protocol; limited qualified manpower; limited financial resources; limited availability of commercial laboratory supplies; no linkage of data from laboratory surveillance with epidemiologic data from the field; and poor access to information. Comprehensive and unified collaboration is essential to enhance AMR surveillance in the Asian livestock sector.

*Japanese Veterinary Resistance Monitoring System (JVARM) and collaboration JVARM and Japan Nosocomial Infections Surveillance (JANIS)*

Dr Michiko Kawanishi

The Japanese Veterinary Antimicrobial Monitoring System (JVARM) was established in 1999 to implement risk management measures effectively in response to international concern about the impact of AMR on public health. JVARM consists of 1) monitoring of AMR in



zoonotic bacteria, indicator bacteria and animal pathogenic bacteria, and 2) monitoring quantities of antimicrobials used in animals. The data of JVARM have been used for risk assessment of antimicrobials by the Food Safety Commission. JVARM has started collaboration with Japan Nosocomial Infectious Surveillance, AMR surveillance for human health sector, in order to establish the integrated surveillance system recommended by WHO.

### *The role of academia in AMR and AMU*

Dr Chase Crawford

The Association of Public and Land-grant Universities (APLU) and the Association of American Veterinary Medical Colleges (AAVMC) joint *Task Force on Antibiotic Resistance in Production Agriculture* has recognized that the agriculture, animal health and human health communities must be equal partners in efforts to address antibiotic resistance. The new national and global plans to address antibiotic resistance have motivated a call to action. Many of the recommendations outlined in these plans fit especially well with the expertise, capacity, and missions of our colleges and universities. Academic institutions must become strategic partners to ensure that our collective health is improved by addressing the problem of antibiotic resistance.

### **Session 7 Ways forward**

*Engaging relevant stakeholders for policy development to prevent and control AMR*

Dr Suriya Wongkongkathep, Nithima Sumpradit, Sitanun Poonpolsub on behalf of the AMR Coordination and Integration Committee, Thailand

Thailand started AMR policy development with a specific mission to develop an integrated AMR system via the development of a national strategy on AMR in 2014. The strategy development relies on two concepts, the One Health approach and alignment with the WHO Global Action Plan. It starts with evidence and information sharing to develop an AMR landscape report enabling stakeholders to understand the whole picture and contexts of the country. Then, with political engagement, a multi-sectoral AMR Coordination and Integration Committee was established which is responsible for the strategy development. The drafting process emphasizes the importance of multi-sectoral stakeholder participation and ensures wide society engagement by collaborating with the National Health Assembly. Global and international collaboration provided positive momentum for national implementation. The draft national strategy is to be submitted to the Cabinet to be endorsed as a national strategy in 2016.

## ANNEX 4 FINDINGS FROM SCENARIO EXERCISE IN SESSION 7

Group discussion to identify ways forward

<b>Group 1: Consumer</b>		
<b>As a consumer, how would you describe your ideal future with respect to AMR by the year 2025?</b>	<b>As a consumer, what are your main concerns about AMR at present?</b>	<b>How do you think these concerns could be overcome to achieve the ideal future with respect to AMR in 2025?</b>
Safe, high quality, competitively priced animal products	Overuse and inappropriate use of antibiotics	Form consumer organization
More organic food	Free access to antibiotics for farmers and people	Food safety act
Certification system	AM residues in livestock products	Food animals are treated by well-trained vet
Effective, affordable treatment	Safety of drinking water	Proper labeling
Clean and safe healthcare facility	Poor quality of antibiotics	Raise consumer awareness
Traceable antimicrobial profiles for foods	Pandemic bacterial diseases	Develop traceability systems
Antibiotic-free food	No new antibiotics in development	Restricted access to antibiotics
Decreased meat consumption rate	Consumer awareness	Food handling behaviors
Effective and affordable infection treatment available	Antibiotics in the environment have changed biodiversity evolution	Prudent use of antibiotics in animals and humans
Prevent vet from profiting from sale of antibiotics	Lack of reliable information on AMU/AMR	Ensure animals are treated by well-trained vets to ensure health and

		welfare
No antibiotic residues	Lack of viable alternatives that are commercially available	Regulation enforced for lab confirmation
Well-informed and educated consumers on AMR	Lack of industry governance	Form consumer organization networks
Healthy environment (water, plant)	Use of antibiotics without laboratory confirmation	Technical advancement, detection and control of AMR
Stable or increased ecological biodiversity	Poor quality antibiotics	Improve biosecurity/better farm management
The level of AMR is reduced to below 5% in Asia	Limited access to antibiotics in parts of the world	Develop global, regional, national strategies
		Ensure enforcement of regulations
		Increased number of available alternatives that are commercially available
		Monitor sales, uses, prescriptions, etc. of antibiotics in animal and human health sectors

<b>Group 2: Farmers</b>		
<b>As a farmer, how would you describe your ideal future with respect to AMR by the year 2025?</b>	<b>As a farmer, what are your main concerns about AMR at present?</b>	<b>How do you think these concerns could be overcome to achieve the ideal future with respect to AMR in 2025?</b>
Good markets, good profits	Losing markets	Build consumer trust
Healthy animals with less antibiotics	Consumers don't want to buy products for fear of antimicrobial resistance	Improve market access
More robust animals through genetic improvement	Cost	Reasonable prices
Animal production can be low cost	Restriction on prices	Cheap vaccines
Ability to continue enhanced production	Lack of alternatives, not enough availability of good quality drugs	New drugs that do not trigger AMR
Affordable practices	Too many regulations	Improve knowledge about prudent and responsible use of antibiotics
Human health and high quality livestock	Me, my family, and my animals getting sick	More regulations
More robust animal genetics	Infected animals cannot be treated	More guidelines
Good genetic breeds – disease resistant	Emergence of superbugs	Trainings and technical support
Appropriate drugs at reasonable cost	Too easy access to antibiotics	Government support
Clear information on what drugs I should use	Costs of antibiotics	Support from farmer groups
Good list and access to regulated antibiotics	No guidelines to follow	Creating alternatives to antimicrobial use

Cheap alternatives to antibiotics	Too many regulations (waste, paperwork)	Creating genetically modified animals that resist bacterial infection
Modern housing systems	Lack of alternatives	Improve farm biosecurity systems
More vaccination to prevent diseases	Insufficient technical know how	Strengthen enforcement of regulations
Alternatives to reduce the use of antibiotics	Availability and affordability of good quality drugs	
Sustainable systems		
Waste treatment		
Clean environment		
Less government involvement in my farm		

<b>Group 3: Veterinary association</b>		
<b>As a veterinary association, how would you describe your ideal future with respect to AMR by the year 2025?</b>	<b>As a veterinary association, what are your main concerns about AMR at present?</b>	<b>How do you think these concerns could be overcome to achieve the ideal future with respect to AMR in 2025?</b>
Strengthen vet society so that they are responsible and knowledgeable in using antibiotics with clear guidelines that enable appropriate use of AM	Inappropriate use at the farms	Education reform <ul style="list-style-type: none"> <li>• Vet</li> <li>• University</li> <li>• Those who sell products (industry-led training)</li> <li>• Users and farmers</li> </ul>
Code products/best practices applied in vet association regulations/guidelines	Impacts to environment	Regulation (code of conduct, vet accreditation) <ul style="list-style-type: none"> <li>• Having clear code of conduct</li> <li>• Regulate usage</li> <li>• Provide clear guidelines</li> <li>• Monitoring vets to ensure compliance</li> <li>• Clear labeling of vet products</li> <li>• Benchmark AMU in farms</li> <li>• Strengthen lab supporting systems</li> </ul>
Good management practices that get rid of antibiotics	Ineffective enforcement/lack of authorities	Extension outreach <ul style="list-style-type: none"> <li>• Provide incentives to farmers</li> </ul>
80% reduction in	AMR/AMU is a complex	Enhance

<b>Group 3: Veterinary association</b>		
incidence of AMR infection	issue	stakeholder engagement and advocacy <ul style="list-style-type: none"> <li>• Advocate for increased funding to animal health sector</li> <li>• (Vet association) Advise and engage in government AMR</li> <li>• Action plan development</li> <li>• Coordination (esp. with human health)</li> <li>• Resource mobilization</li> <li>• AMR data from human health side related to vet</li> <li>• Raising awareness of AMR among drug sellers</li> </ul>
No bacteria of veterinary importance resistant to antimicrobial use in treatment	Treatment failures	
AMU should be one of the priority issues which is appropriately regulated under vet laws	Future is unpredictable	



<b>Group 3: Veterinary association</b>		
Animals raised in the farms are healthy and no more diseases	Limited work relationship between sectors regarding AMR	
	Lack of appropriate medicine	
	Lack of responsible and prudent uses	
	Nosocomial infection with AMR	
	Lack of capacity of esteemed vet associations	
	Devolve authority to sub-national level	
	Human death from AMR pathogen	
	Lack of investment in R&D	
	Poor information	

<b>Group 4: Pharmaceutical Industry</b>		
<b>As a representative of the pharmaceutical industry, how would you describe your ideal future with respect to AMR by the year 2025?</b>	<b>As a representative of the pharmaceutical industry, what are your main concerns about AMR at present?</b>	<b>How do you think these concerns could be overcome to achieve the ideal future with respect to AMR in 2025?</b>
New products (not necessarily chemicals or drugs), need to be well priced	Can not continue to sell products	Development and delivery of action plans
Animal-only drugs	Cost may be high	Regulations and enforcement of production and use of AMR
Improve vaccines (as an	Inappropriate use and	Harmonize and

alternative to uses of antibiotics)	fake products	streamline regulations (production) across the region
Universal antibiotics that do not require multiple days dosage	Lack of environmentally friendly products	R&D for new products, encourage public investment as this is a public good
Drugs that do not create AMR	Seen as part of the problem	
Social perception of pharmaceutical industries as a part of the solution, not a part of the problem	Uncertainty of policy	
Standard diagnostic lab protocols	Economic drivers	
Encourage public investment in research	Fake products	
Stringent and harmonized legislation and regulations		
No counterfeit products		

<b>Group 5: Policymaker – animal health</b>		
<b>As a policymaker for animal health, how would you describe your ideal future with respect to AMR by the year 2025?</b>	<b>As a policy-maker for animal health, what are your main concerns about AMR at present?</b>	<b>How do you think these concerns could be overcome to achieve the ideal future with respect to AMR in 2025?</b>
Better knowledge	Awareness (ack of information)	Awareness

	available)	
Science-based risk analysis regulatory process	Evidence (lack of data to inform policy)	Evidence <ul style="list-style-type: none"> <li>– Translation of evidence to policy</li> <li>– Cost-benefit analysis</li> </ul>
Biosecurity measures are defined	Procedures	
Better compliance to regulations	Regulations and leadership	Regulations and leadership Finding good politicians
	Resources	Resources
	Coordination	Coordination

<b>Group 6: Policy-maker – human health</b>		
<b>As a policy-maker for human health, how would you describe your ideal future with respect to AMR by the year 2025?</b>	<b>As a policy-maker for human health, what are your main concerns about AMR at present?</b>	<b>How do you think these concerns could be overcome to achieve the ideal future with respect to AMR in 2025?</b>
Less use of AM	Availability of data on AMU and AMR	Action planning
No longer have AMR infections	No clear distinction between AM used in animals and humans	OH approach
Increase consumer demand for antibiotic-free products	No political support	Creating incentives for R&D for new antibiotics
Sustainable funding for AMR	Competing agendas	Increase political commitment
Better evidence-based decision making	Lack of coordination	Raise awareness of consumers
Public recognizes the importance of AMR	Overuse and misuse	Harmonization and promote voluntary approaches
Better health promotion	Lack of enforcement	Economic analysis paired with health studies to provide evidence on impacts
Available alternatives that reduce demand for use of antibiotics	Expensive	Develop regulations and improve enforcement
Animal-only antibiotics	Too easy to prescribe AM	Engage policy to gain political commitment
Reduced AMR bacteria in the environment	Lack of consumer awareness	Lab training and capacity building
No use of medically important antibiotics in animals	Lack of funding	Develop rapid diagnostics for antibiotic sensitivity to avoid misuse

Information is available to inform public on importance of prudent use of antibiotics	No new antibiotics in the research pipeline	Develop national action plans and implement the action plan
	Close contact of people and animals in rural farming systems	Provide incentives for responsible use of antibiotics by producers/vets
	Lack of diagnostic capacity	Share information across sectors and borders
	Incentives given to doctors by pharmaceutical companies	Provide incentives to R&D
	Infection control in medical facilities	Decrease human contamination to the environment
	Too many antibiotics used in the animal sector	Establish national AMR surveillance system
	Policies made without full consideration of the real world	Empower consumer groups

# ANNEX 5 EVALUATION FORM

## Post-event evaluation

*For participants - please provide comments where indicated and circle the number that best reflects your opinion:*

A. Content and Quality				
1.	Title of Event <i>(workshop/training/conference):</i> <b>Addressing Anti-microbial Usage in Asia's Livestock Food Animal Sector: Toward a Unified, One Health Approach to Preventing and Controlling Resistance</b>	Date: 27 – 28 Jan 2016		
2.	Overall contents were relevant, up-to-date and applicable	<i>poor/not good/useful</i>		<i>useful</i>
		1	2	3      4
3.	What new practical <b>skills or knowledge</b> did you learn from the workshop/ conference?  <i>Check here if not applicable</i> <input type="checkbox"/>  .....  .....			
4.	Time allocated for presentations	<i>Not Sufficient</i>		<i>enough</i>
		1	2	3      4
5.	Time allocated for discussions	<i>Not Sufficient</i>		<i>enough</i>
		1	2	3      4
6.	Regarding your current role in your organization, to what extent will this workshop/ conference contribute to	<i>Not Completely</i>	<i>at</i>	<i>all</i>

improving your role?	1	2	3	4
<p><b>7.</b> To what extent would you say the workshop/conference panel discussion met defined objectives?</p> <p>1. <i>To share lessons and insights from relevant experts and stakeholders on the following issues:</i></p> <p>a. <i>Characterizing antibiotic consumption and usage by production sector (both terrestrial and aquatic);</i></p> <p>b. <i>Review the evidence base linking usage and development of resistance in livestock production systems;</i></p> <p>c. <i>Review the regional economic impact in both animal health and production;</i></p> <p>d. <i>Share experience on policies, regulations, and compliance systems applicable to Asia contexts; and</i></p> <p>e. <i>Determine possible mechanisms by which the region can contribute to the overall momentum in the establishment and collation of national baseline information on antimicrobial use in animals.</i></p> <p>2. <i>To discuss the roles of various stakeholders in contributing to the development and implementation of National Action Plans for AMR in the Region.</i></p>	<b>Not Completely</b>		<b>at</b>	<b>all</b>
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
	1	2	3	4
<p><b>8.</b> To what extent would you say the workshop/conference met your expectations?</p>	<b>Small extent extent</b>			<b>Great</b>
	1	2	3	4
<p><b>9.</b> Please rate the quality of the following meeting components from this workshop/</p>	<b>poor/not</b>			<b>useful</b>

conference listed below: <ul style="list-style-type: none"> <li>• Group work</li> <li>• Oral presentations</li> <li>• Panel Discussions</li> </ul>	<b>good/useful</b> 1      2      3      4 1      2      3      4 1      2      3      4
<b>B. Logistics and organization of event</b> (where applicable)	
<b>10.</b> Organization (presentation, materials, assistance, etc.)	<b>poor/not good/useful</b> <b>useful</b> 1      2      3      4
<b>11.</b> Invitation process	<b>poor</b> <b>good</b> 1      2      3      4
<b>12.</b> Flight arrangement	<b>poor</b> <b>good</b> 1      2      3      4
<b>13.</b> Airport to hotel transportation	<b>poor</b> <b>good</b> 1      2      3      4
<b>14.</b> Accommodation	<b>poor</b> <b>good</b> 1      2      3      4
<b>15.</b> Venue / Room Facilities	<b>poor/not good/useful</b> <b>useful</b> 1      2      3      4
<b>16.</b> Food and drinks	<b>poor/not good/useful</b> <b>useful</b> 1      2      3      4
<b>17.</b> Supporting documentation and/or course materials	<b>poor/not good/useful</b> <b>useful</b> 1      2      3      4
<b>C. Overall assessment</b>	



		<i>poor/not useful</i>		<i>good/useful</i>	
<b>18.</b>	Overall rating of the workshop/ conference	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>19.</b>	What would you suggest to improve the workshop/ conference event?	..... .....			

### Participant information

<b>Country:</b>	
<b>Organization:</b>	
<b>Organization Type:</b>	Government <input type="checkbox"/> Academic Institution <input type="checkbox"/> International Organization <input type="checkbox"/> Private Sector <input type="checkbox"/> Other (please specify) <input type="checkbox"/> _____
<b>Position Title:</b>	
<b>Contact (optional):</b>	<b>email</b>
<b>Phone (optional):</b>	

## ANNEX 6 EVALUATION RESULTS

Out of 120 participants, a total of 63 respondents submitted their post event evaluation questionnaire.

Around 95% of the respondents stated that the contents from the workshop were relevant, up-to-date and applicable with 35% saying that the contents were good while 60% saying that they were very useful.

When asked about whether the time allocation for presentations and discussions were sufficient, over 95% noted that they were.

### **Objectives of the workshop**

Regarding the objectives of the workshop, over 80% of participants think that the workshop achieved in:

- Characterizing antibiotic consumption and usage by production sector (both terrestrial and aquatic)
- Review the evidence base linking usage and development of resistance in livestock production systems
- Review the regional economic impact in both animal health and production

In addition, over 90% think that the workshop managed to contribute in determining possible mechanisms by which the region can contribute to the overall momentum in the establishment and collation of national baseline information on antimicrobial use in animals. They also think that the

workshop was successful in being a platform for discussing the roles of various stakeholders in contributing to the development and implementation of National Action Plans for AMR in the Region.

### **Quality of meeting components**

There were 3 main meeting components used in the workshop: group work, oral presentations, and panel discussions. Although the overall feedback from participants was highly positive for the quality of these components (over 80% positive), several participants suggested that there should be more time allocated for the group work sessions and allow more activities that involve group work.

### **Logistics and organization of event**

In terms of logistics, the participants were most satisfied with the accommodation arrangements, followed by food and drinks, and flight arrangements. The least satisfied logistics were the availability of supporting documentation followed by the quality of the arrangements of the panel discussions.

Some participants suggested that there should be copies of handouts during the presentations, as stated in one of the comments: *“Should have PowerPoint (document) for participants”*

One of the specific suggestions regarding panel discussions was: *“Panel/group discussion needs to be structured to address the composition of the participants if we are*

*primarily policy-makers then the sessions should have been focused more on areas that we could speak to export from our experience”.*

### **Overall rating of the workshop**

About 92% of the respondents mentioned that the workshop met their expectations with having 43% that said the workshop greatly met their expectations. In addition, 97% of respondents rated the workshop to be very useful and relevant to their work.



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