

International Livestock Research Institute

One Health antimicrobial resistance research coordinating workshop

7–8 October 2019


Hanoi, Vietnam



© 2019 International Livestock Research Institute (ILRI)

ILRI thanks all donors and organizations which globally support its work through their contributions to the [CGIAR Trust Fund](#)

This publication is copyrighted by the International Livestock Research Institute (ILRI). It is licensed for use under the Creative Commons Attribution 4.0 International Licence. To view this licence, visit <https://creativecommons.org/licenses/by/4.0>. Unless otherwise noted, you are free to share (copy and redistribute the material in any medium or format), adapt (remix, transform, and build upon the material) for any purpose, even commercially, under the following conditions:

 **ATTRIBUTION.** The work must be attributed, but not in any way that suggests endorsement by ILRI or the author(s).

NOTICE:

For any reuse or distribution, the licence terms of this work must be made clear to others.

Any of the above conditions can be waived if permission is obtained from the copyright holder.

Nothing in this licence impairs or restricts the author's moral rights.

Fair dealing and other rights are in no way affected by the above.

The parts used must not misrepresent the meaning of the publication.

ILRI would appreciate being sent a copy of any materials in which text, photos etc. have been used.

Citation

ILRI (International Livestock Research Institute). 2019. *One Health antimicrobial resistance research coordinating workshop*. Workshop report. Nairobi, Kenya: ILRI.

*Patron: Professor Peter C Doherty AC, FAA, FRS
Animal scientist, Nobel Prize Laureate for Physiology or Medicine–1996*

Box 30709, Nairobi 00100 Kenya
Phone +254 20 422 3000
Fax +254 20 422 3001
Email ilri-kenya@cgiar.org

ilri.org
better lives through livestock
ILRI is a CGIAR research centre

Box 5689, Addis Ababa, Ethiopia
Phone +251 11 617 2000
Fax +251 11 667 6923
Email ilri-ethiopia@cgiar.org

ILRI has offices in East Africa • South Asia • Southeast and East Asia • Southern Africa • West Africa

Contents

| | |
|---|-----|
| Abbreviations and acronyms..... | iii |
| Acknowledgements | iv |
| Executive summary | v |
| Background | 1 |
| Workshop proceedings..... | 2 |
| Day 1: Sharing and learning about AMR research initiatives in Vietnam and Asia..... | 2 |
| Opening session | 2 |
| Session 1– Key international initiatives on AMR in Vietnam and Asia..... | 3 |
| Session 2 – Key national initiatives on AMR in Vietnam | 3 |
| Session 3 – Poster presentation..... | 4 |
| Day 2 (morning): Research priorities, gaps and synergies..... | 5 |
| Recap of Day 1 | 5 |
| Scoring research priorities | 5 |
| Development of joint concept notes..... | 7 |
| Day 2 (afternoon): AMR core group planning meeting..... | 8 |
| Outputs of the workshop and next steps | 10 |
| Annex 1: Participants and program | 11 |
| Annex 2: Participants reflections on Mentimeter | 16 |

Abbreviations and acronyms

| | |
|----------|---|
| AMR | antimicrobial resistance |
| AMU | antimicrobial use |
| A4NH | CGIAR Research Program on Agriculture for Nutrition and Health |
| BLRI | Bangladesh Livestock Research Institute |
| CDC | Centers for Disease Control and Prevention |
| CIRAD | French Agricultural Research Centre for International Development |
| DAH | Department of Animal Health |
| FAO | Food and Agriculture Organization of the United Nations |
| FHI360 | Family Health International |
| HUPH | Hanoi University of Public Health |
| ICARS | International Centre for Antimicrobial Resistance Solutions |
| ILRI | International Livestock Research Institute |
| JICA | Japan International Cooperation Agency |
| KAP | knowledge, attitudes and practices |
| LSHTM | London School of Hygiene and Tropical Medicine |
| MARD | Ministry of Agriculture and Rural Development |
| NAHPRI | National Animal Health and Production Research Institute |
| NGO | non-governmental organization |
| NIHE | National Institute of Hygiene and Epidemiology |
| NIVR | National Institute of Veterinary Research |
| OIE | World Organisation for Animal Health |
| OUCRU | Oxford University Clinical Research Unit |
| PACCOM | People's Aid Coordinating Committee, Vietnam |
| PigRISK | Reducing disease risks and improving food safety in smallholder pig value chains in Vietnam |
| RIAI | Research Institute for Aquaculture No.1 |
| RVC | Royal Veterinary College |
| SafePORK | Market-based approaches to improving the safety of pork in Vietnam |
| USAID | United States Agency for International Development |
| VIDA PIG | Health and Antibiotics in Vietnamese pig production |
| WHO | World Health Organization |

Acknowledgements

The organizers of the One Health antimicrobial resistance research coordinating workshop, 7-8 October 2019, Hanoi, Vietnam would like to express sincere appreciation and gratitude to the CGIAR Research Program on Agriculture for Nutrition and Health (A4NH) for the financial support as it enabled the organization of this workshop.

We thank the People's Aid Coordinating Committee, Vietnam (PACCOM) for facilitating the organization of the event.

Grateful thanks are rendered to Vietnam National Institute of Veterinary Research (NIVR) and London School of Hygiene and Tropical Medicine (LSHTM) for kindly co-hosting and contributing to the successful organization of this workshop.

Executive summary

Antibiotics and other antimicrobial drugs are among the most important tools available to medical and veterinary professionals for curing human and animal diseases and improving their welfare, yet these drugs are increasingly failing. To tackle AMR challenges in low- and middle-income countries and ensure the sustainability of global food and health systems, several initiatives have been developed. At international level, CGIAR Antimicrobial Resistance Hub (CGIAR AMR Hub) and the International Centre for Antimicrobial Resistance Solutions (ICARS) have recently been launched. Fleming Fund has been funding various facilities regionally and nationally to help countries cope with AMR. In addition, AMR is at high-level agenda of development partners such as the United States Agency for International Development (USAID), the World Bank, and United Nations agencies including the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE), and the World Health Organization (WHO).

The ‘One Health antimicrobial resistance research coordinating workshop’ was jointly organized on 7-8 October 2019 in Hanoi by NIVR, ILRI and LSHTM. This report summarises the discussions at the workshop and presents the key conclusions that were made to identify areas of working together among partners to address antimicrobial resistance (AMR) at national and regional level in Southeast Asia.

The workshop was attended by about 70 AMR experts and policymakers from 13 countries to reflect jointly on the multi-faceted challenges and gaps related to AMR and find ways for better collaboration and cooperation among stakeholders for making impacts together.

The workshop was an important first step towards actions that could be taken collectively and individually to strengthen One Health and AMR research in the region. Follow-ups on these opportunities will be required in order to take key concept notes discussed and suggestions made to a next level. At the end of the workshop, the participants:

- I. were able to map out AMR work in Vietnam and Southeast Asia;
- II. were able to identify gaps and challenges on AMR and antimicrobial use;
- III. outlined the research priorities for future collaboration among stakeholders;

Background

Antibiotics and other antimicrobial drugs are among the most important tools available to medical and veterinary professionals for curing human and animal diseases and improving their welfare, yet these drugs are increasingly failing. To tackle AMR challenges in low- and middle-income countries and ensure the sustainability of global food and health systems, several initiatives have been developed. At international level, CGIAR Antimicrobial Resistance Hub (CGIAR AMR Hub) and the International Centre for Antimicrobial Resistance Solutions (ICARS) have recently been launched. Fleming Fund has been funding various facilities regionally and nationally to help countries cope with AMR. In addition, AMR is at high-level agenda of development partners such as the United States Agency for International Development (USAID), the World Bank, and United Nations agencies including the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE), and the World Health Organization (WHO).

The key objectives of the workshop were:

- Share the key international initiatives on AMR research and related programs, and their AMR strategies for Vietnam and Asia;
- Share the AMR national strategy of Vietnam and national programs on addressing AMR in Vietnam and conduct a stakeholder mapping of AMR works;
- Identify gaps, synergies and overlapping work on AMR research among programs and partners, and to discuss modalities and priorities for collaboration on AMR research;

The workshop included a combination of individual work, small group discussion and plenary discussion. In most sessions, groups were formed to facilitate conversation among the participants. At the end of each session, groups presented their findings with the help of flipcharts.

The following parts provide detailed information on the organization of the workshop, the outcomes of the reflections, some recommendations on collaborative initiatives and a conclusion.

Workshop proceedings

Day I: Sharing and learning about AMR research initiatives in Vietnam and Asia

Opening session

The meeting was opened by Pham Thi Ngoc, director of NIVR, Jeff Waage, Chair, London Centre for Integrative Research on Agriculture and Health and CGIAR A4NH Improving Human Health, LSHTM, and Hung Nguyen, regional representative, ILRI in East and Southeast Asia. They all recognized AMR as one of the biggest threats to human beings today and emphasized more coordinated efforts are needed to better synergize and achieve desired impact. All speakers expected the workshop would help identify gaps, synergies and overlapping work on AMR research among programs and partners and discuss collaboration modalities and priorities on AMR research.

After the opening, participants were required to do an AMR **stakeholder mapping exercise**. They discussed with one another in their table using flip charts to answer two questions, and report back.

Questions:

- Who is influencing your AMR interests: name of your institution/ agency and why are you interested in AMR?
- Who are you influencing on AMR?

Key discussion:

- The governments influence research, private company, and the media and provide guidance on AMR activities. If there is anything new, the media will communicate it to private sector, producers and consumers. The research results will be shared with the Government for policies, guidelines aimed at private sector, feed companies and pharmaceutical companies.
- Collaboration in AMR in both human and animal health, with multi stakeholders both from local and international. Donors who fund AMR include Wellcome Trust, USAID, Australian Government and international non-governmental organizations (NGOs) such as Family Health International (FHI360), Oxford University Clinical Research Unit (OUCRU). Donors target to fund national institutions such as the National Institute of Hygiene and Epidemiology (NIHE), NIVR, and Tropical Diseases Hospital. In human health sector, Centers for Disease Control and Prevention (US CDC) and the World Health Organization (WHO) brings in research capacity development and training policies. In animal sector, FAO is supporting the Ministry of Agriculture and Rural Development (MARD) and agriculture universities in Hanoi and Ho Chi Minh City.



Group discussion for the AMR stakeholder mapping exercise (photo credit: ILRI).

Session 1 – Key international initiatives on AMR in Vietnam and Asia

Following the stakeholder mapping exercise, a range of stakeholders including ILRI, University of Copenhagen, LSHTM, FAO, French Agricultural Research Centre for International Development (CIRAD), OUCRU shared initiatives on AMR that they are conducting in Vietnam and Asia.

See all presentations in this session from this [link](#)

Session 2 – Key national initiatives on AMR in Vietnam

This session focused on highlighting the AMR national action plan (NAP) in health and agriculture sector of Vietnam and providing an overview of AMR research projects in Vietnam by national partners from NIVR (MARD) and Hanoi University of Public Health (HUPH) and the NIHE (MOH).

See all presentations in this session from this [link](#)

A **panel discussion** was held end of this session to define future priorities for AMR research in Vietnam. Six speakers joined the panel including Vo Ngan Giang, FHI360, Arshnee Moodley, CGIAR AMR Hub, Pham Thi Ngoc, NIVR, Pham Duc Phuc, HUPH, Tran Huy Hoang, NIHE, Mattias Larsson, Family Medical Practice with the moderation of Anders Dalsgaard from the University of Copenhagen. They discussed two questions:

- 1. What research is needed to support the implementation of the NAP on antimicrobial use (AMU) and AMR and how would you prioritize such research?*
 - The needs to provide **evidence** to influence policymakers on AMR. The policymakers are interested in AMR costing, market and economics.
 - There is **lack of data** on AMR and AMU, and the scientific evidence is very limited. The government of Vietnam needs to invest more on AMR and have baseline research and data, so that research agencies know where to apply and where to start.
 - The need for investments in **capacity development** and **behaviour change** of vet staff at the grassroots level as they lack knowledge and competency, awareness, and clinical testing. Panellists also recommended to integrate different settings into the system, with a start from connecting human health and animal health sectors using One Health approach, and enhancing collaboration between state agencies and international agencies.
 - More research to estimate **AMR costs** and more engagement at hospitals.
- 2. Government seems not fully recognize and utilize the vast amount of research on antimicrobial use (AMU) and AMR in Vietnam. What is needed to change this situation?*
 - **Lack of policy action** from the government on AMR

Despite there have been many diverse research projects addressing various aspects of AMR, there is a lack of policy actions from the government. Responding to this comment, a representative from Department of Animal Health (DAH) shared that more **scientific evidence is needed to make policy at country level**. Reports contain very little data, and cover only a few provinces in Vietnam, which cannot be picked up for policymaking at the country level. The available data are not communicated in a convincing way to policymakers.

- There is a **lack of AMU and AMR data** in aquaculture and crop sectors. It is important to have an overview of research on AMU and AMR in aquaculture sector to provide more comprehensive picture of the sector to be able to influence policymakers.

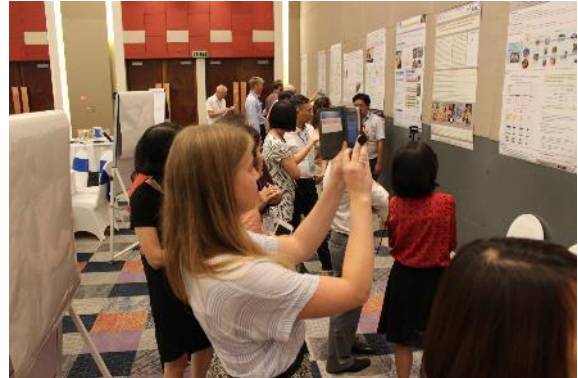
Feedback from participants when they were asked the question 'What are future AMR research needs for Vietnam' at the end of the first panel discussion via Mentimeter app (See [Annex 2](#))

Session 3 – Poster presentation

A total of 19 posters were presented in this session. Each presenter was given three minutes to present it. Poster presentations: short format 1 minute for each poster followed by poster walk.



Poster competition winners announced (photo credit: ILRI).



Poster walk (photo credit: ILRI)

See all poster presentations from this [link](#)

Participants reflections on poster session (See [Annex 2](#))

Session 3 culminated with a **panel discussion** on AMR in Asia. Panelists included:

- Md Abdus Samad, Bangladesh Livestock Research Institute (BLRI), Bangladesh
- Sothyra Tum, National Animal Health and Production Research Institute (NAHPRI), Cambodia
- Vannaphone Phouthana, National University of Laos, Laos
- Katinka DeBalogh, FAO, Thailand
- Jing Wang, OIE, Japan

See presentations by panelists from this [link](#)

Panelists discussed two questions:

1. *What is particular value of greater collaboration between countries in the region?*
 - **Tools for surveillance and communications.** Different countries can bring in different data set for comparison, especially in the context of transboundary diseases and movement of drugs across countries.
 - **Information sharing and capacity development** through international collaboration.
 - **Protocol for AMR surveillance.** In Cambodia, there are a lot of studies are collecting data from fish and animal.
2. *What do you think about mobility between different countries: do you share data across each country?*
 - FAO can encourage countries to share surveillance systems, but it depends on them to share or not.
 - **Open access of AMU and AMR data is limited.**
 - Policymakers do not see peer review journals. It is important for stakeholder mapping to know what is going on. ILRI may have some ideas on how this can be streamlined, and international organizations can contribute.

Day 2 (morning): Research priorities, gaps and synergies

Recap of Day 1

Hung Nguyen, ILRI provided a recap of Day 1 discussion:

1. Session 1: International initiatives on AMR in Vietnam and Asia → More on surveillance, less on solutions
2. Session 2: Key national initiatives on AMR in Vietnam and Panel discussion Vietnam: Future AMR research priorities
 - More AMR activities in public health than agriculture sector
 - More on surveillance and monitoring, less on solutions
 - Issue of linking research to policy
3. Session 3: AMR projects here and there (poster format) and Panel discussion on AMR in Asia → More on surveillance, less on solutions

Scoring research priorities

From research priorities discussed in Day 1, participants were asked to score those priorities for future collaboration.

Aquaculture

- Databases on AMR for different species (**high score**)
- Aquaculture research study for AMR
- More general aquaculture research

Alternatives and interventions

- Alternatives to antibiotics (**high score**)
- Alternative uses of antibiotics
- Cost-effectiveness/cost-benefit analysis of alternatives to AMU (**high score**)
- Research on implementation of intervention strategies
- Community-based interventions (**high score**)
- Understanding factors affecting acceptance of AMU strategies
- Assess impacts of AMU reduction interventions on smallholder livelihood

Collaboration

- AMR network
- Intersectoral collaboration framework
- Ensure/harmonize AMR data quality
- Use PATH AMR portal to extend surveillance and do data analysis
- Open access data

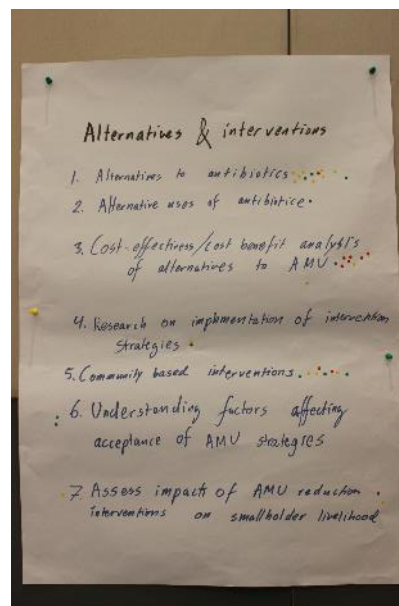
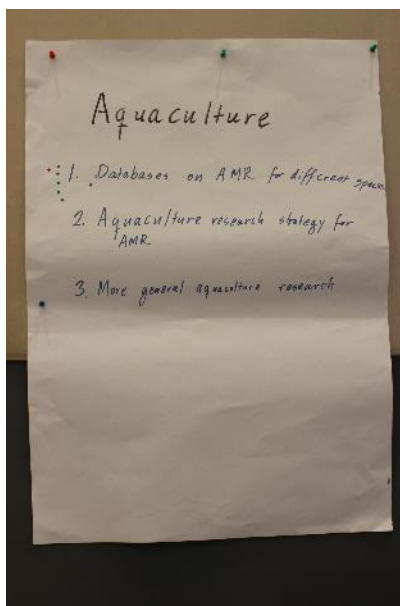
- Collaboration: AMR network, intersectoral framework, how to improve AMR quality, the extend surveillance to help analysis, more open access data. Comments on how to translate into policy; how to promote good AMU and good practice in the farm. How social media can involve in creating awareness and private sector.

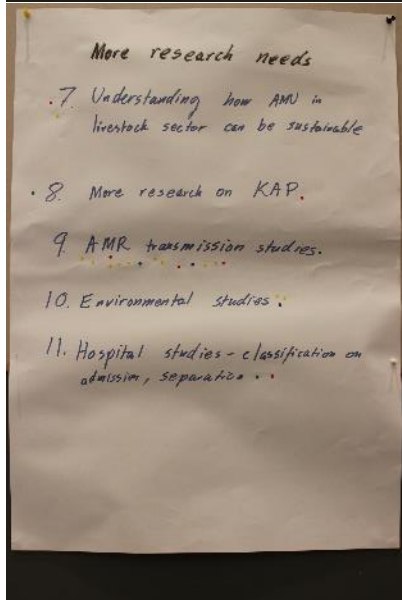
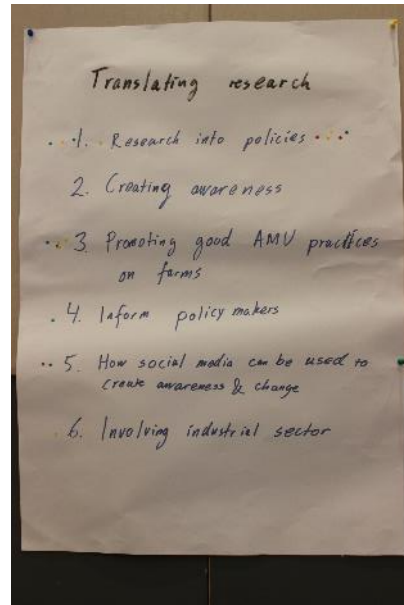
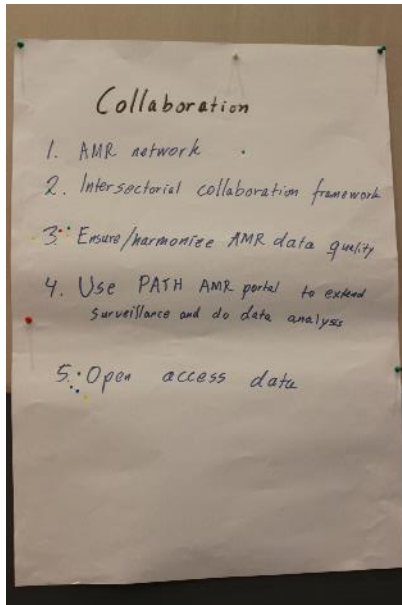
Translating research

- Research into policies (**high score**)
- Creating awareness
- Promoting good AMU practices on farms (**high score**)
- Inform policymakers
- How social media can be used to create awareness and change
- Involving industrial sector

More research needs

- Understanding how AMU in livestock sector can be sustainable
- More research on knowledge, attitudes and practices (KAP)
- AMR transmission studies
- Environmental studies
- Hospital studies – classification on admission, separation





Development of joint concept notes

Participants then worked in four groups to develop outline concept notes for top research priorities including

- AMR transmission studies
- Cost-effectiveness/cost-benefit analysis of alternatives to AMU
- Alternatives to antibiotics
- Research into practice and action

See all presentations from this [link](#)

Each group identified one Vietnamese and one international contact for following up the development of concept notes.

- Alternative to antibiotics: Phu (OUCRU) and Cuong (Can Tho University)
- Policy group: Jing Wang (OIE) and Vuong Ngoc Thi (Institute of Anthropology)
- Cost effectiveness: Nicolas (A4NH) and Giang (FHI360)

- AMR transmission: Arshnee (CGIAR AMR Hub) and Son (NIVR)

Day 2 (afternoon): AMR core group planning meeting

Participants included CIRAD (Flavie Goutard), ILRI Vietnam (Hung, Johanna, Fred), ICARS (Anders), NIVR (Son, Huyen, Yen), NIN (Huong), Royal Veterinary College, RVC (Maria), A4NH (Bernard, Jeff, Richard, Nicholas, Chris), HUPH (Phuc), CGIAR AMR hub (Arshnee), Can Tho University (Phu), Institute of Anthropology (Hang).

Planning for 2020

- What should be done next year?
- Structure of AMR interventions: what interventions should be included in the global agenda?

| <i>Institutions</i> | <i>Planned activities</i> |
|---------------------|---|
| CIRAD | <ul style="list-style-type: none"> • Two research projects started in 2019 (ROADMAP and ONE CHICK), both on poultry. One Chick to review of data on poultry production system. Roadmap to review of production system and mapping of different stakeholders <ul style="list-style-type: none"> - To start with some data collection in the north and south of Vietnam; - To set up agreement with different partners in the ROADMAP. - To collect information on AMR projects in the region. |
| ILRI Vietnam | <ul style="list-style-type: none"> • Field trials of probiotics at farm level (SafePORK project); • Will start a study on animal health and AMR in Son La province, part of CGIAR Research Program on Livestock and linked to A4NH; • Vietnam One Health Lab initiative built on the partnership between NIVR, HUPH, and ILRI; |
| ICARS | <ul style="list-style-type: none"> • To engage with MOH and MARD; • To do pilot studies on testing current use practices in pig (tentative); • Diagnostics link with ILRI in Son La; • To sign MOU with CGIAR. Currently discussing with WorldFish to do some interventions in aquaculture; • To have some interventions in aquaculture → to collaborate with RVC, and maybe CIRAD next year; |
| NIN | <ul style="list-style-type: none"> • VIDA PIG project <ul style="list-style-type: none"> - Human and animal health sampling in pig farms in Bac Ninh province; - Microbiological analysis from farms; - Collect field sample from farmers; - Anthropology research to understand perception and drivers of AMU; • To collaborate with JICA to monitor 500 participants at farms in Hanoi to collect samples to understand KAP of AMR in community. |

| | |
|---------------------------|--|
| | <ul style="list-style-type: none"> • WHO-funded project to pilot lab capacity in food-borne outbreaks; • Surveillance and monitoring of food-borne diseases including AMR in 28 provinces in Vietnam; • Community-based AMU with US CDC – methodology in development |
| NIVR | <ul style="list-style-type: none"> • To focus on alternative intervention research, AM residue, AMR resistance in pig and poultry; • To involve in project funded by FAO Vietnam on AM residue in pork and chicken. Also develop guideline on AMU on pig and poultry; • To engage in a Fleming Fund funded project to generate data using existing labs. Path will set up database on AMU and OUCRU will do some lab training; • To coordinate the AMR National Action Plan as a focal contact on AMR research; • One Chick funded by UK government for CIRAD, RVC, NIVR for poultry production and disease treatment intensification along poultry food chain. • To support the probiotics trial research of SafePORK project using NIVR lab; |
| RVC | <ul style="list-style-type: none"> • Economic drivers of AMU in aquaculture. Next year will revise evidence, and explore opportunities to collaborate with different collaborators (RIAI, WorldFish, ILRI) to provide evidence together. |
| Can Tho University | <ul style="list-style-type: none"> • Use of herbals as alternative to AM for catfish. |
| A4NH | <ul style="list-style-type: none"> • To continue collaboration with NIVR to implement research on transmission dynamics, PigRISK, SafePORK to look at transmission of Salmonella and drug resistance. • Systematic review of AMR (global) in focusing countries; • A project on economic modelling; |
| LSHTM | <ul style="list-style-type: none"> • Cost of effectiveness livestock setting, use of apps in business setting in Vietnam. |
| HUPH | <ul style="list-style-type: none"> • To engage in probiotics trial research (SafePORK project); • On-going project with Belgium university to define burden of AMR in different ecosystems, children hospital, collect wastewater, consumed food, livestock waste to see how different genes are in different settings; • One Health workforce project for the next 5 years to develop AMR curriculum for undergraduate and vet staff and develop capacity on AMR; |
| CGIAR AMR Hub | <ul style="list-style-type: none"> • Media training on how to communicate information on AMR and AMU out. |
| Institute of Anthropology | <ul style="list-style-type: none"> • To study factors influencing AMU among farmers, vet staff using anthropology approach. QSA company to support a qualitative study through a small research grant. |

Outputs of the workshop and next steps

At the end of the workshop, the participants:

- (i) were able to map out AMR work in Vietnam and Southeast Asia;
- (ii) were able to identify gaps and challenges on AMR and AMU; and
- (iii) outlined the research priorities for future collaboration among stakeholders;

Short-term actions:

- ILRI to follow up with focal persons to collect joint concept notes to discuss further collaboration opportunities.
- Information and documentation sharing between stakeholders.
- Explore linkage and further collaboration among stakeholders through joint concept notes and AMR plan of the core group.

Annex I: Participants and program

| No. | First name | Last name | Email | Institute/Company | Country |
|-----|------------|-----------------|---------------------------------|---|-----------|
| 1. | Agnes | Agunos | agnes.agunos@fao.org | Food and Agriculture Organization, Regional Office for Asia and the Pacific (FAO RAP) | Thailand |
| 2. | An | Vo Thi Tra | an.vothitra@hcmuaf.edu.vn | Nong Lam University Ho Chi Minh City | Vietnam |
| 3. | Anders | Dalsgaard | adal@sund.ku.dk | University of Copenhagen | Denmark |
| 4. | Arshnee | Moodley | a.moodley@cgiar.org | International Livestock Research Institute (ILRI) | Kenya |
| 5. | Bernard | Bett | b.bett@cgiar.org | International Livestock Research Institute (ILRI) | Kenya |
| 6. | Chi | Nguyen Quynh | c.nguyen@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 7. | Chi | Tran Kim | tkchi@ria1.org | Research Institute for Aquaculture No.1 (RIAI) | Vietnam |
| 8. | Chris | Pinto | cpinto7@rvc.ac.uk | London School of Hygiene and Tropical Medicine | UK |
| 9. | Cuong | Nguyen Van | cuongnv@oucru.org | OUCRU | Vietnam |
| 10. | Daesub | Song | songdaesop@gmail.com | Korea University | Korea |
| 11. | Dat | Dao Duy | duydat@vinasets.com.vn | VINASETS company | Vietnam |
| 12. | David | McGill | david.mcgill@unimelb.edu.au | Melbourne University | Australia |
| 13. | Falive | Goutard | flavie.goutard@cirad.fr | CIRAD | France |
| 14. | Fred | Unger | f.unger@cgiar.org | International Livestock Research Institute (ILRI) | |
| 15. | Giang | Hoang Thi | | Department of Livestock Production (DLP) | Vietnam |
| 16. | Giang | Vo Ngan | vgiang@fhi360.org | FHI 360/ Fleming Fund | Vietnam |
| 17. | Hang | Nguyen Thuy | hang.nguyenthuy@fao.org | Food and Agriculture Organization (FAO) | Vietnam |
| 18. | Hang | Tran Minh | hangtranminh@yahoo.com | National Institute of Anthropology | |
| 19. | Hanh | Le | h.le@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 20. | Hardwick | Tchale | htchale@worldbank.org | World Bank | Vietnam |
| 21. | Harry | Bartram | | Melbourne University | Australia |
| 22. | Hien | Bui | hnz0@cdc.gov | Centers for Disease Control and Prevention (US-CDC) | Vietnam |
| 23. | Hoan | Do Van | hoandv.cn@mard.gov.vn | Department of Livestock Production (DLP) | Vietnam |
| 24. | Hoa | Dinh Thi Phuong | dinhphuonghoaytcc1987@gmail.com | Nam Dinh University of Nursing | Vietnam |
| 25. | Hoa | Pham Thi Thanh | hoacirad@gmail.com | Poultry Hub/CIRAD | Vietnam |
| 26. | Hoang | Tran Huy | thh@nihe.org.vn | National Institute of Hygiene and Epidemiology (NIHE) | Vietnam |
| 27. | Hung | Nguyen Viet | h.nguyen@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 28. | Hung | Tran Thi Mai | maihungnihe@gmail.com | National Institute of Hygiene and Epidemiology (NIHE) | Vietnam |
| 29. | Huong | Bui Mai | buiMaihuong_73@yahoo.com | National Institute of Nutrition (NIN) | Vietnam |
| 30. | Hu Suk | Lee | h.s.lee@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 31. | Huyen | Nguyen Xuan | nxhuyen7@gmail.com | National Institute of Veterinary Research (NIVR) | Vietnam |
| 32. | Jeff | Waage | jeff.waage@lshtm.ac.uk | London School of Hygiene and Tropical Medicine | UK |
| 33. | Jing | Wang | j.wang@oie.int | World Animal Health (OIE) | Japan |
| 34. | Johanna | Lindahl | j.lindahl@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 35. | Jonathan | Bastard | jonathan.bastard@pasteur.fr | Pasteur Institute | Vietnam |
| 36. | Katinka | de Balogh | katinka.debalogh@fao.org | Food and Agriculture Organization, Regional Office for Asia and the Pacific (FAO RAP) | Thailand |

| | | | | | |
|-----|------------|-------------------|-----------------------------|---|------------|
| 37. | Kelly | Donnelly | | Melbourne University | Australia |
| 38. | Lan | Nguyen Thi Phong | yhq0@cdc.gov | Centers for Disease Control and Prevention (US-CDC) | Vietnam |
| 39. | Linus | Olson | linus.olson@ki.s | Karolinska Institute | Sweden |
| 40. | Maria | Bernardez | maria.bernardez@lshtm.ac.uk | London School of Hygiene and Tropical Medicine | UK |
| 41. | Maria | Garza | mgarza3@rvc.ac.uk | Royal Veterinary College | UK |
| 42. | Mattias | Larsson | mattias.larsson@ki.se | Family Medical Practice | Vietnam |
| 43. | Nga | Do Thi Thuy | ngadtt@oucru.org | OUCRU | Vietnam |
| 44. | Ngoc | Pham Thi | minhngoc27169@gmail.com | National Institute of Veterinary Research (NIVR) | Vietnam |
| 45. | Nichola | Naylor | nichola.naylor@lshtm.ac.uk | London School of Hygiene and Tropical Medicine | UK |
| 46. | Odette | Lewycka | | OUCRU | Vietnam |
| 47. | Oskar | Nyberg | oskar.nyberg@su.s | Stockholm University | Sweden |
| 48. | Phu | Tran Minh | tmphu@ctu.edu.vn | Can Tho University | Vietnam |
| 49. | Phuc | Pham Duc | pdp@huph.edu.vn | Hanoi University of Public Health (HUPH) | Vietnam |
| 50. | Richard | Stabler | richard.stabler@lshtm.ac.uk | London School of Hygiene and Tropical Medicine | UK |
| 51. | Rogier | van Doorn | rvandoorn@oucru.org | OUCRU | Vietnam |
| 52. | Samad | Md Abdus | samad_blri@yahoo.co.nz | Bangladesh livestock Research Institute (BLRI) | Bangladesh |
| 53. | Shayal | Bidesi | | Melbourne University | Australia |
| 54. | Sinh | Dang | s.dang@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 55. | Son | Dang Thi Thanh | chienson2006@yahoo.com | National Institute of Veterinary Research (NIVR) | Vietnam |
| 56. | Sothyra | Tum | sothyratum@gmail.com | National Animal Health Production Research Institute (NAHPRI) | Cambodia |
| 57. | Thanh | Nguyen Le | t.l.nguyen@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 58. | Thi | Vuong Ngoc | vuongngocthi@gmail.com | Institute of Anthropology | Vietnam |
| 59. | Thuy | Nguyen Ngoc | nnthuy@hcmuaf.edu.vn | Nong Lam University Ho Chi Minh City | Vietnam |
| 60. | Thuy | Nguyen Thi Thanh | thuynt.khcn@mard.gov.vn | Department of Science and Technology, Ministry of Agriculture and Rural Development | Vietnam |
| 61. | Trang | Dao Thu | thutrangdao@gmail.com | One Health Partnership | Vietnam |
| 62. | Trang | Le | t.le@cgiar.org | International Livestock Research Institute (ILRI) | Vietnam |
| 63. | Van | Phan Thi | phanvan@ria.l.org | Research Institute for Aquaculture No.1 (RIA1) | Vietnam |
| 64. | Vannaphone | Phouthana | v.phouthana@nuol.edu.la | National University of Laos | Laos |
| 65. | Vera | Erickson | vera.erickson@fao.org | Food and Agriculture Organization (FAO) | Vietnam |
| 66. | Yen | Luu Thi Hai | luuhaiyen188@yahoo.com | National Institute of Veterinary Research (NIVR) | Vietnam |
| 67. | Yen | Nguyen Thi Phuong | yenntp@oucru.org | OUCRU | |
| 68. | Yushara | Wijerathna | | Melbourne University | Australia |

| Time | Activity | Responsibility |
|---|--|--|
| Day 1: Monday, 7 October 2019 | | |
| 08.00 – 08:30 | Registration | ILRI |
| <i>Opening</i> | | |
| <i>Moderator: Johanna Lindahl (ILRI)</i> | | |
| 08:30 – 09:15 | Welcome remarks <ul style="list-style-type: none"> • NIVR, Pham Thi Ngoc • LSHTM/A4NH, Jeff Waage • ILRI, Hung Nguyen Stakeholder mapping exercise Group photo | ILRI, Nguyen Viet Hung ILRI, Fred Unger and Johanna Lindahl |
| <i>Session 1: International initiatives on AMR in Vietnam and Asia</i> | | |
| <i>Moderator: Bernard Bett (ILRI), 10 minutes talk and 5 minutes for Q&A each</i> | | |
| 09:15–09:30 | CGIAR AMR Hub and AMR research agenda at CGIAR | ILRI, Arshnee Moodley |
| 09:30–09:45 | Introduction to the International Centre for Antimicrobial Resistance Solutions (ICARS) | University of Copenhagen (UC), Anders Dalsgaard |
| 09:45–10:00 | London-based AMR research London School of Hygiene and Tropical Medicine (LSHTM) and Royal Veterinary College (RVC) | LSHTM, Jeff Waage, Richard Stabler and RVC, Maria Garza |
| 10:0–10:15 | Addressing antimicrobial resistance in agriculture in Asia: an overview of the Food and Agriculture Organization (FAO) activities | FAO RAP, Katinka De Balogh |
| 10:15–10:30 | Action research in CIRAD: How to promote collective action for antimicrobial use mitigation in South-East Asia | CIRAD, Flavie Goutard |
| 10:30–10:45 | Quantification of antimicrobial use and its impact on flock health among small-scale chicken flocks in the Mekong Delta of Vietnam | OUCRU, Nguyen Van Cuong |
| 10:45–11:00 | <i>Coffee</i> | |
| <i>Session 2: Key national initiatives on AMR in Vietnam</i> | | |
| <i>Moderator: Pham Thi Ngoc (NIVR Director), 10 minutes talk and 5 minutes Q&A each</i> | | |
| 11:00–11:20 | Vietnam national action plan on combating AMR in health and agriculture sector | MARD/NIVR, Dang Thi Thanh Son HUPH, Pham Duc Phuc |
| 11:20–11:45 | AMR research projects in Vietnam: review | NIHE, Tran Huy Hoang ILRI, Le Trang |
| 11:45–12:30 | Panel discussion Vietnam: Future AMR research priorities <ul style="list-style-type: none"> • Vo Ngan Giang, FHI 360 • Arshnee Moodley, AMR Hub | UC, Anders Dalsgaard ILRI, Fred Unger |

| | | |
|--|---|------------------|
| | <ul style="list-style-type: none"> • Pham Thi Ngoc, NIVR • Pham Duc Phuc, Hanoi University of Public Health • Tran Huy Hoang, NIHE • Mattias Larsson, Family Medical Practice | |
| 12:30–13:30 | Lunch | |
| <p>Session 3: AMR projects here and there (poster format)</p> <p>Moderator: Pham Duc Phuc (Hanoi University of Public Health)</p> | | |
| 13:30–15:00 | <p>Poster presentations: short format 1 minute for each project followed by poster walk</p> <ol style="list-style-type: none"> 1. AMR research in Nong Lam University, HCMC (Vo Thi Tra An) 2. Vietnam National Institute of Nutrition's projects (Bui Mai Huong) 3. Evaluating antimicrobial stewardship policy from a One Health perspective: A conceptual framework for quantitative evaluation (Nicholas Naylor) 4. AMR and whole genome sequencing (Richard Stabler) 5. High prevalence of colonization with carbapenem-resistant Enterobacteriaceae among patients admitted to Vietnamese hospitals: risk factors and burden of disease (Mattias Larsson) 6. Systems-thinking approach to identify hotspots for AMR emergence and selection, and elucidate pathways of human exposure in selected aquaculture systems in Vietnam (L.A. Brunton) 7. AMU in striped catfish aquaculture in Vietnam (Tran Minh Phu) 8. AMU in shrimp and marine fish farming in Vietnam and concerns about the development of AMR (Trinh Kim Chi) 9. Antimicrobial residues, non-typhoidal <i>Salmonella</i>, <i>Vibrio</i> spp. and associated microbiological hazards in retail shrimps purchased in Ho Chi Minh city (Nguyen Thi Phuong Yen) 10. Factors influencing antimicrobial use in pig production: an anthropological research in Bac Ninh province, Viet Nam (Tran Minh Hang) 11. Engaging with complexity for improved veterinary antimicrobial stewardship in Thai Nguyen, Vietnam (Tarni Cooper) 12. AMU and colistin-resistant <i>E. coli</i> in pigs and pig farm workers in Bac Ninh province, Vietnam (Dang Thi Thanh Son) 13. The use of antibiotics for therapeutic purposes in pig production in Bac Ninh province, Vietnam (Dinh Thi Phuong Hoa) 14. FAO AMR Action Plan: an overview of completed projects under the four thematic areas (awareness, governance, evidence and good practices) (Katinka De Balogh) 15. KAP of livestock and aquaculture producers regarding AMU and AMR in Vietnam (Sinh Dang) 16. KAP with livestock and aquaculture producers, veterinarians, animal drug and feed sellers in Vietnam (Nguyen Thuy Hang) | ILRI, Fred Unger |

| | | |
|--|--|---|
| | <p>17. Alternative to antibiotic in pig production: A nanosilver use trial (Hung Nguyen)</p> <p>18. Piloted AMR surveillance programme in livestock production in Vietnam (Nguyen Thuy Hang)</p> <p>19. Typology of interventions aiming to tackle AMU in aquaculture systems in low and middle-income countries (Maria Garza)</p> | |
| 15:00–15:30 | <i>Coffee</i> | |
| 15:30–16:30 | <p>Panel discussion on AMR in Asia including Bangladesh, Cambodia, Laos and Thailand: short statement on AMR work in each country</p> <ul style="list-style-type: none"> • Md Abdus Samad, Bangladesh Livestock Research Institute, Bangladesh • Sothyra Tum, National Animal Health and Production Research Institute, Cambodia • Vannaphone Phouthana, National University of Laos, Laos • Katinka DeBalogh, FAO RAP, Thailand • Jing Wang, OIE Tokyo | <p>LSHTM, Jeff Waage</p> <p>ILRI, Johanna Lindahl</p> |
| 16:30–18:30 | Side meetings | ILRI, Hung Nguyen |
| 19:00–21:00 | <p>Workshop dinner</p> <p>We will arrange vans to pick you up from Pullman Hotel at 6.15 p.m. to Sen Restaurant (Add: 60 Ly Thai To Street, Hanoi), and drop you off at Pullman Hotel after dinner.</p> | ILRI, Thanh Nguyen |
| Day 2: Tuesday, 8 October 2019 | | |
| <i>Research interests, gaps and synergies</i> | | |
| <i>Moderator: Johanna Lindahl, ILRI</i> | | |
| 09:00–09:30 | Recap day 1 and priority exercise | ILRI, Hung Nguyen |
| 09:30–11:00 | <p>Group work to identify research gaps, overlapping areas and synergies</p> <ul style="list-style-type: none"> • Enhance intersectoral collaboration • How to move from: • From assessment to interventions: Policy to action | |
| 11:00–11:30 | <i>Coffee</i> | |
| 11:30–12:30 | Group presentation and discussion, summary and closure | |
| 12:30–13:30 | <i>Lunch</i> | |
| End of common session | | |

Annex 2: Participants reflections on Mentimeter

| 1 | Voter | What are future AMR research needs for Vietnam?: |
|----|-------|---|
| 2 | 1 | |
| 3 | 2 | Implementation and incentive research |
| 4 | 3 | Improve knowledge and practices |
| 5 | 4 | More scientific evidents and push to government |
| 6 | 5 | Understanding the cost and benefit of particular interventions for both health and agricultural sectors |
| 7 | 6 | Large scale intervention studies |
| 8 | 7 | Intervention coordination |
| 9 | 8 | Interventions |
| 10 | 9 | Interdisciplinary research coordination |
| 11 | 10 | |
| 12 | 11 | Knowledge attitude and practice |
| 13 | 12 | Interventions to reduce AMU |
| 14 | 13 | Open access data |
| 15 | 14 | AMR database for catfish |
| 16 | 15 | Policy engagement |
| 17 | 16 | Alternative for AB use |
| 18 | 17 | IMPACT EVALUATION: To assess impacts of change in AMU for smallholders livelihood |
| 19 | 18 | Transmission studies |
| 20 | 19 | what would be recommended on farm practices based on evidence and what would work in Vietnam |
| 21 | 20 | Research on how to incentivise different stakeholders |
| 22 | 21 | How social media can do with AMR risk communication n creat social changes |
| 23 | 22 | knowledge attitude and practice |
| 24 | 23 | Polyci engament |
| 25 | 24 | Intervention |
| 26 | 25 | Interdisciplinary/transdisciplinary |
| 27 | 26 | In depth intervention study |
| 28 | 27 | Policy engagement |
| 29 | 28 | AMR in aquaculture |
| 30 | 29 | Overview on AMR research and activities in Vietnam with one health approach including all commodi |
| 31 | 30 | Methods for surveillanc of AMU and AMR to measure the impact of interventions |
| 32 | 31 | Industry sector involvement |
| 33 | 32 | Community based interventionEffect of classification of in- patient in first step of hospitalization |
| 34 | 33 | Research that can be submitted for policymaker but also have possitive impact to address the issue l |
| 35 | 34 | Farmers and service producers and social workers and politicians' interests, behaviors, knowledge, z |
| 36 | 35 | The environmental factor (rivers, ...) |
| 37 | 36 | Understanding how and why people use antimicrobials and have interventions to change risk behavio |
| 38 | 37 | |

Participants feedback in the first panel discussion.

What have you learnt from the poster session?:

Higher level of amr in chicken compared to pigs in Vietnam

Most studies conducted on AMU and AMR in pig and poultry productions at the small scale. Missing studies from human samples in hospital and community

Amazing amount of research activities and initiatives being done in Vietnam. Time for action

Lot of things going on but few solutions to AMR reduction
Surprisingly low quality of AB antibiotic compounds used in shrimp farming.
Evidence based interventions are still lacking despite of a few studies presented
KAP influence AMR and evidence on table that human AB getting resistance in livestock

Lots of quantitative and qualitative data being collected on AMU and AMR
AMR research in catfish should be done
local ownership is key for the sustainability and to make a change
Reflect what is missing from the study and how to improve in the future

Very high prevalence of Resistance in E coli

important operational and context specific challenges to consider when designing interventions
Strong evidence needs policy buy in
provide research idea or information
Scientific evidences are there But missing intervention data Also how to input to Government guidance on AMU?

More research
Poor quality drugs also a problem
Learn more information on AMU and AMR and have more chance to collaborate with others Organization
- Factors influenced the AMU in livestock production and aquaculture;
- AMR in livestock and aquaculture;
- Intervention, using alternative - Nanosilver;
- Role of international organisation in AMR.

ties.
Different methods for measuring AMU and AMR
Private sector need to involve in research activities

The different recent outcomes and research plan about AMR and AMU which picture a whole view about AM issue in different part in Vietnam.

Many studies overlapped. Need more indepth social/anthropological approaches. Such as what is the definitions, perceptions of the stakeholders of health and how are the actions affected by those perceptions?
Sociological drivers of AMU in farmers
I can know about topics on AMU and AMR are studying in Vietnam and give me new ideas on the future researches.
I know more method to prevent the animal life without Medicine.

Participants feedback in the poster session.