International Livestock Research Institute

Report on development of a One Health Centre in Vietnam

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Abbreviations and acronyms

ACIAR	Australian Centre for International Agricultural Research
AMR	antimicrobial resistance
A4NH	CGIAR Research Program on Agriculture for Nutrition and Health
AMS	antimicrobial stewardship
DANIDA	Danish International Development Agency
HEV	Hepatitis E Virus
HUPH	Hanoi University of Public Health
ILRI	International Livestock Research Institute
NIVR	National Institute of Veterinary Research
OHP	Vietnam One Health Partnership for Zoonoses
SafePORK	Market-based approach to improving the safety of pork in Vietnam project
SEAOHUN	Southeast Asia One Health University Network
VIDA-PIG	Health and antibiotics in pig production in Vietnam project
VOHUN	Vietnam One Health University Network

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Executive summary

One Health is a useful paradigm for framing complex public health issues and addressing new global and public health challenges like COVID-19. In Vietnam, researchers at ILRI and partners are embracing the One Health approach to address the intersectoral issues such as food safety, antimicrobial resistance (AMR) and zoonotic diseases.

ILRI, the National Institute of Veterinary Research (NIVR) and the Hanoi University of Public Health (HUPH) have been working together since 2007. The partnership has been focusing on One Health research in Vietnam and Southeast Asia. While Vietnam One Health activities are more on policy and training side, research on One Health is less popular and therefore this One Health research partnership helps advance the knowledge of One Health in specific areas and generate local evidences on One Health.

Besides conducting research on food safety, zoonoses and AMR, ILRI and partners discussed the development of a One Health platform at a national level for mobilizing more resources and translating research evidences into policy advocacy. The platform is intended to work for One Health partnership strengthening and help come up with other concepts including biosecurity, vaccination. Through One Health platform ILRI and partners can work out what are relevant and fundable to work on joint-proposals. This platform should connect people together and aims at policy influencing.

Two workshops were organised in 2017 and 2018 in Hanoi with key One Health partners in Vietnam and A4NH. In 2020, ILRI and national One Health partners reviewed the progress and achievements of the One Health research work at Thai Nguyen Province (Tonkin Delta of Vietnam). Some studies have been conducted in the province focusing on AMR, antimicrobial use and stewardship, testing probiotics use in pig production. In the future, ILRI and partners will pilot more One Health models at the site.

Discussion on One Health research partnership among ILRI, NIVR and HUPH

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ILRI, NIVR and HUPH have been working together since 2007. The partnership has been focusing on One Health research in Vietnam and Southeast Asia. While Vietnam One Health activities are more on policy and training side, research on One Health is less popular and therefore this One Health research partnership helps advance the knowledge of One Health in specific areas and generate local evidences on One Health.

We organised a workshop One Health research partnership: Achievements and way forward on 19 October 2017 at NIVR office. In the meeting, ILRI, NIVR and HUPH reviewed the past and on-going activities of One Health research, and discussed the future of One Health research and the partnership modalities.

The platform will work for One Health partnership strengthening and help come up with other concepts including biosecurity, vaccination. Through One Health platform ILRI and partners can work out what are relevant and fundable to work on joint-proposals. This platform should connect people together and aims at policy influencing. It was expected the One Health platform to be recognized and institutionalized to ensure sustainability. All members who join the platform work together to initiate One Health ideas, and ILRI to take lead to present ideas to funders to mobilize resources.

Some other discussion points for working better:

- Not nurture partnership by single projects, but through common activities.
- ILRI to support NIVR and HUPH to develop capacity, for example, write shops.
- FAO representative proposed publishing publications more often for information sharing.
- Pham Duc Phuc (HUPH) to connect Vietnam One Health University Network (VOHUN) to this partnership to provide training.
- ILRI to provide some funds for meetings and publishing papers.

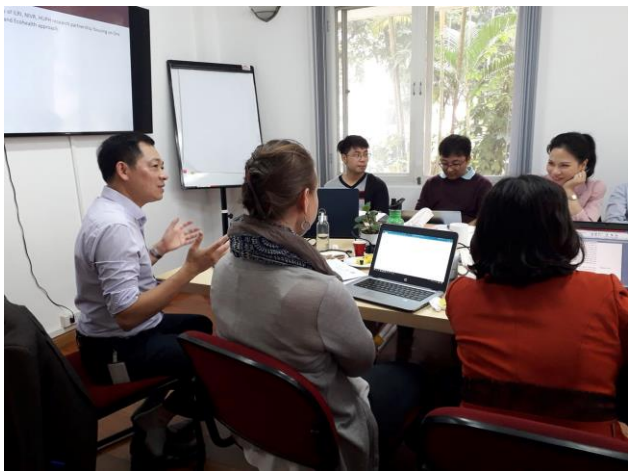
A workshop was held October 2017 to review the One Health collaboration between ILRI, NIVR and HUPH at NIVR office (photo credit: ILRI/Chi Nguyen).

Discussion with One Health partners on setting up a One Health research platform for better policy impacts

On 20 November 2018, representatives from NIVR, HUPH and ILRI and members of the Vietnam One Health Partnership for Zoonoses (OHP) met in Hanoi to review achievements of a One Health research partnership among related stakeholders. The meeting discussed the setting up of an official One Health research centre in Vietnam that was proposed by the partners in November 2017.

At the meeting, partners agreed that food safety, AMR and zoonotic diseases would be the priorities for the One Health centre. Pham Duc Phuc, director at the Centre for Public Health and Ecosystem Research, HUPH suggested connecting the proposed centre with other Southeast Asia countries so that it can cover regional One Health issues. Participants also agreed to engage national state agencies so that the platform can have national support and become sustainable.

After the meeting, ILRI would work closely with NIVR and HUPH to draft the agreement setting up the One Health research centre which would be preceded by consolidation of the concept notes and discussions on the working mechanism of the platform.



Participants discussed the setting up of a One Health research centre in Vietnam to connect the dots and for policy advocacy (photo credit: ILRI/Chi Nguyen).

Engaging Thai Nguyen University of Agriculture and Forestry to promote One Health field work in Thai Nguyen

In November 2018, HUPH, VOHUN, the Thai Nguyen Sub-Department of Animal Health, Production and Fishery, the Thai Nguyen Center for Diseases Control, the Thai Nguyen University of Medicine and Pharmacy, Thai Nguyen University of Agriculture and Forestry (TUAF) and ILRI signed an agreement to form a new One Health research partnership. Under the partnership, these organizations have been collaborating in One Health research at a provincial-level One Health research site in Thai Nguyen Province.

On 2 July 2020, human and animal health experts from the partnership met to review the progress and achievements of the One Health research work at the field site. They discussed ways of enhancing research at the site, which includes testing probiotics use in pig production and piloting of One Health models.

At the meeting, representatives presented some key One Health projects in the province including those working in rabies control, reduction of antimicrobials use and AMR in poultry production, strengthening AMR surveillance, improving food safety at slaughterhouses and managing communicable diseases at commune levels, among other initiatives.

So far, the One Health partnership has carried out several important studies in Thai Nguyen Province. These include a study (from 2016 to 2019) in Phu Binh District that assessed how decisions around veterinary antimicrobial use and stewardship are made by family farmers and their animal health networks. Another study, which explored the challenges of investigating AMR in Vietnam, was conducted in Hanoi and Thai Nguyen Province to understand the willingness and abilities of the human and animal health sectors actors to carry out investigations of AMR using a One Health approach.

At the review meeting, participants also discussed how ILRI and VOHUN can assist the Thai Nguyen One Health partners in developing communication products to better disseminate their project outputs and outcomes and to promote One Health in the province. One potential collaboration that was discussed with the Thai Nguyen partners was testing probiotic use in pig production to reduce the use of antibiotics in pig fattening under the 'Market-based approach to improving the safety of pork in Vietnam', or SafePORK project which is funded by ACIAR.

One Health partners met at Thai nguyen Sub-department of Animal Health, Production and Fishery to explore ways to promote One Health research at a provincial level (photo credit: ILRI/Chi Nguyen).

One Health partners joined a field trip to test the use of probiotics to reduce antibiotics use in pig production in Thai Nguyen Province (photo credit: ILRI/Chi Nguyen).

Key collaborations under One Health partnership

A systems approach to livelihood-sensitive veterinary antimicrobial stewardship in Vietnam (2016–19)

This study aimed to understand how decisions around veterinary antimicrobial use and stewardship are made by family farmers and their animal health networks, and identify leverage points for improved antimicrobial stewardship (AMS) in Vietnam. (Cooper, 2019)

Some key outcomes include:

- A system understanding of veterinary AMS in Thai Nguyen;
- Proposed leverage points for improved AMS;
- And, a transferable approach to studying and improving AMS in family farming communities;

The study was funded by CGIAR Research Program on Agriculture for Nutrition and Health (A4NH) and Australian Government Research Training Program Crawford Fund.

The challenges of investigating antimicrobial resistance in Vietnam – what benefits does a One Health approach offer the animal and human health sectors? (2018)

In 2018, Marisa Mitchell – a master student from the Australian Volunteer Program and co-hosted by ILRI – has conducted a study to explore the challenges of investigating antimicrobial resistance in Vietnam and the benefits a multi-sectorial approach offers. This study used two scenarios of food-borne AMR bacteria found within the pork value chain as case studies to investigate challenges and opportunities for improving collaboration across different stakeholders and to understand benefits offered by a One Health approach surveillance system.

Under support from partners in One Health centre, 15 semi-structured interviews with 11 participants from the animal and six from the human health sectors at the central level in Hanoi and the provincial level in Thai Nguyen were conducted. The findings of this study suggest that there is potential to strengthen multi-sectorial collaboration between the animal and human health sectors by building upon existing informal networks. Based on these results, an inclusive approach to multi-sectorial communication supported by government network activities to facilitate partnerships and create cross-disciplinary awareness and participation was recommended. Regarding to diagnostic capacity, both sectors are facing challenges to undertake investigations in AMR. The need to strengthen the animal health sector is more pronounced.

The results of this study were published on BMC Public Health journal in 2020. (Mitchell, 2020)

Public health and animal health system in Vietnam: A One Health analysis (2018)

In collaboration with the Southeast Asia One Health University Network (SEAOHUN), ILRI has co-hosted a research fellow in 2018. The research fellow has involved in a study 'Public health and animal health system in Vietnam: A One Health analysis' which aimed to describe how animal health and public health systems currently operate in Vietnam. Available documents were reviewed and a case study in Thai Nguyen province was conducted to identify opportunities to improved collaboration between these systems.

The study used semi-structured questionnaire to explore information on human resources, working plan, report process, finance and cost recovery of both systems. Key informants from Sub-Department of Animal Health, Department of Health, Phu Binh District Veterinary Station and Phu Binh Health Centre were involved in the study. It is found that the collaboration to control zoonotic disease has already existed in human and

animal health system, unofficially through personal meeting and connection or officially following the curricular of Ministry of Health and Ministry of Agriculture and Rural Development of Vietnam. People between two sectors aware that they should work together to control the disease. However, a clear method to implement the collaboration is not available, lead to the lack of sharing information timely. There is no mandatory regulation for report and communicate when a potential risk happens. People in each sector can choose to report or not base on their own perspective and experience. The monitoring and reporting of infectious cases through the online system are still limited, the data has not been adequately reported and timely updated. The lack of sharing information timely resulted in inadequate control from the side of animal health. Hence, it is necessary to build a regulation from authority on how to collaborate between different sectors at grassroot level.

Reducing antimicrobial use by best farm practices in Vinh Phuc province (2018)

Antimicrobial use in livestock production in developing countries and in Vietnam in particular is not well controlled. In Viet Nam, 80% of pork is produced by smallholder farmers where antibiotics used as growth promoters regularly due to its low cost and lack of farmer's knowledge on the AM use. To reduce the antimicrobial use and move forward to Antimicrobial free-using in livestock, an appropriate approach with a clear identification on benefit for farmers when reducing AM is essential. Following this long-term goal, ILRI-NIVR, in collaboration with Sub-department of Animal Health and partners in Vinh Phuc, have conduct a trial to develop and test an intervention six small pig farms.

The intervention included 2 groups of pig which were fed by 2 different types of feed: feed added Amoxicillin and the other was antibiotic-free but added with Nano silver (Sinavet 01 - Nano-san plus). The result indicated no difference between the Average Daily Gain weight and AMR profile of *E. coli* of 2 groups. These findings contributed evidence to the household owners and the local stakeholders that reducing use of antimicrobials had no effect on the productivity and efficiency of livestock. These trial results are encouraging to potentially offer an alternative to antibiotic use in pig production to reduce AMU and AMR. An environmental impact assessment of nanosilver is needed before scaling up this use. (Hung Nguyen-Viet, 2019)

Metropolitan mosquitoes: understanding urban livestock keeping and vector-borne diseases in growing tropical cities (2018–21)

This project fills knowledge gaps regarding urban livestock keeping and associated disease vectors and pathogens related risks. The project team comprises scientists with veterinary and medical backgrounds and experience in working with disease transmission in tropical urban environments, with a particular focus on mosquito-borne infections, such as dengue and Japanese encephalitis.

Some key achievements include:

- Capacity development for students from both animal and human health sectors;
- And, some important papers were published on the impacts of urban livestock keeping on zoonotic diseases from a KAP and risk factors perspective (Jakobsen, 2019), (Thang Nguyen-Tien, 2019), (Paixão, M.M., 2019), (Ashmore, P., 2020), and (Chapot, L., 2020).

The study is funded by Swedish Research Council for Environment and Agricultural Sciences and Spatial Planning (Formas).

Health and antibiotics in pig production in Vietnam (2018–21)

The Health and antibiotics in pig production in Vietnam, or VIDA-PIG project has through a One Health approach mapped the network of factors that drive antimicrobial use and resistance across the Vietnamese pig value chain. Field work with pig farmers in Bac Ninh Province has provided a firm baseline for analyses of local networks and stakeholders' rationales for antimicrobial use. Pig feed was shown to contain low levels of Salmonella and mycotoxins, but antimicrobials were detected in commercial feed products. VIDA-PIG works and shares information with the Strategic Sector Cooperation partners to support their activities. In the second phase of the project, outcomes will be used to design larger and well targeted interventions to reduce antimicrobial use and resistance in pig production.

The project is funded by DANIDA.

Bioaerosol sampling to detect avian influenza virus in Hanoi's largest live poultry market (2019)

The objective of the research is to examine the ecology of four types of respiratory viruses circulating in the north of Vietnam including influenza A, B, C, and D, adenoviruses, coronaviruses, and enteroviruses, and to develop the diagnostic capacity among Vietnamese professionals in the animal and human health sectors within a One Health context. This research is carried out by the Duke University (USA), Duke-NUS Medical School (Singapore), NIVR, ILRI. Activities include the use of bioaerosol to sample virus in live bird markets and pig farms (monthly collection of swabs, bioaerosol, and poultry and pig farm worker nasal wash samples in the live bird markets and pig farms in three border provinces). Results show that bioaerosol sampling can be applied for avian influenza virus surveillance in LBMs and poultry farms. Bioaerosol sampling can be used for early warning screening of poultry markets for novel influenza virus detection such as H7N9 and other emerging infectious diseases. Continued surveillance of influenza virus in the border provinces is critical to early warning of the cross-virus transmission (Bui Nghia Vuong, 2018)

Prevalence and phylogenetic analysis of Hepatitis E Virus (HEV) in pigs in Vietnam (2019)

The study was conducted in five provinces of Vietnam including Son La, Ha Noi, Nghe An, Dak Lak, and An Giang. The main objective of this study was to assess the sero-prevalence and phylogenetic analysis of HEV in Vietnam. Pig blood and fecal pooled samples were used to determine the prevalence of HEV. We evaluated the true prevalence of HEV from apparent prevalence by taking into account the sensitivity and specificity of diagnostic tests using a Bayesian approach.

This study provided evidence that HEV is circulating in domestic pigs in Vietnam with the prevalence rate of HEV in pigs in Dak Lak, Nghe An, Son La, Ha Noi and An Giang being 90%, 79%, 75%, 27%, and 21%, respectively. From a public health perspective, it is very important to raise public awareness for high-risk groups, for instance, slaughterhouse workers, pig traders, farmers and market sellers, who have more opportunities to come in contact with pig and contaminated meat (Hu Suk Lee, 2020).

Probiotic experiment in pig farms in Thai Nguyen province (2020-2021)

With the same goal to test the feasibility alternative to antibiotics in livestock production, from that reducing the excessive use of antibiotics in Vietnam, a research 'Probiotic experiment in pig farms in Thai Nguyen province' has being implemented in Thai Nguyen. This research is a component of the SafePORK project. The research was designed based on the randomized controlled trials with 3 pig groups which will be fed by three different types of feed: feed added probiotics, feed added antibiotics (treatment groups), and feed having no probiotic and antibiotics (control group). Varied indicators will be used to measure the differences, which include growth performance of pigs, antibiotic usage and profile, antibiotic resistance and residual properties, animal health indicators, and economic and beneficial measurement. This trial research has received the collaboration of private companies in sharing cost and technical support and will be finished by the end of February 2021.

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