


Student Free Design Activities (One Health on-site Training)  
報告書 Report

報告者 [Reporter]

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活動報告 [Activity Report]

※活動内容が判る様な写真や図表を加えて下さい。 / Provide photos, tables and figures that clearly show the activities during the period.

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|-------------------------------|--|
| タイトル [Course Title]           | Strengthening avian influenza surveillance and control measures through international collaboration  |
| 実施期間 [Periods]                | June 1 <sup>st</sup> – June 8 <sup>th</sup>  |
| 共同実施者<br>[Other participants] | Takahiro Hiono; Hew Yik Lim<br>(Graduate School of Infectious Diseases (Laboratory of Microbiology)) |
| 言語 [Language]                 | Vietnam, English   |
| 実施場所 [Location]               | Lang Son and Ha Noi, Vietnam   |

申請時計画の実施報告 [Report how you carried out your plan in the application form]

Applying a One Health approach, the Microbiology Laboratory at Hokkaido University as the Reference Laboratory of the World Organization for Animal Health (WOAH), has cooperated closely with the Vietnamese Department of Animal Health (DAH) to conduct avian influenza surveillance and transfer reverse genetics techniques in Vietnam in 2024. During the trip to Vietnam, I followed the initial plan of organizing a workshop and transferring reverse genetic techniques at the Vietnamese National Center for Veterinary Diagnostics (NCVD) from June 2<sup>nd</sup> to 4<sup>th</sup> and 7<sup>th</sup>. Regarding the meeting with staff of the Vietnamese Department of Animal Health (DAH), due to their heavy workload at that time, they proposed to change the meeting time, we agreed to meet on June 7<sup>th</sup> instead of June 2<sup>nd</sup>. Field and sampling observation at live bird markets in Lang Son provinces were carried out as originally planned on June 5<sup>th</sup> and 6<sup>th</sup>. In addition, we had a meeting with the staff of Lang Son sub-DAH to understand the current situation of live poultry trade across the border between Vietnam and China. We had a meeting with DAH staff on the morning of June 7<sup>th</sup> and continued to do technical transfer to NCVD in the afternoon of the same day.

For the details of activities, I will describe as major topics below.

Workshop and transferring reverse genetic techniques at NCVD

For the success of reverse genetics, co-culturing Madin-Darby canine kidney (MDCK) cells and human embryonic kidney (HEK) 293T cells is extremely important. Therefore, we mainly focused on transferring the cell co-culture technique. On June 2<sup>nd</sup>, we checked the conditions of MDCK and HEK 293T cells and performed cell co-culturing.

On the 3<sup>rd</sup>, we organized a workshop on the application of reverse genetics to generate recombinant viruses, with attendees including staff from DAH, NCVD, and Vietnamese National Center of Veterinary Medicine Control (NCVMC). Using Vietnamese and English, we explained the steps and notes in detail when performing the techniques to achieve the highest efficiency. After the presentation, there was a lively discussion between the attendees, the presenter, and Dr. Hiono in Vietnamese and English. Overall, the outcome reached that all attendees understood the process and steps involved in generating a recombinant virus using reverse genetics.

Co-culture of MDCK and HEK 293T cells was performed several times in the following days due to the condition of the cells, and we also performed passages for the cells to achieve stability. Therefore, we cannot generate a recombinant virus as initially scheduled. The key staff of NCVD and NCVMC continued to perform cell co-culture and virus rescue with our support through online discussion.

#### Field and sampling observation at live bird markets

Live bird markets (LBMs) in Vietnam where poultry, mainly chickens and ducks, from different regions gather together, are suitable locations for avian influenza surveillance. LBMs in Lang Son province, North Vietnam, are chosen as surveillance sites due to their high risk of high pathogenicity avian influenza (HPAI) and long national borders where live birds were thought to be easily transported and traded illegally.

We had a meeting with the staff of Lang Son Sub-DAH to discuss the current situation of illegal cross-border trade that poses a very high risk of introducing emerging or re-emerging pathogens into Vietnam. In general, the situation of illegal cross-border trade has decreased significantly in recent times due to building fences at the border and applying the One Health approach locally, linking sectors, including border guards, veterinarians, health, and state management officers at border guard points in prevent immigration control and illegal trade.

We then had the opportunity to visit 2 LBMs, where we observed the staff sampling for surveillance and had a brief discussion with staff of the market management about infectious disease prevention at the market level. In general, the sellers cleaned up every day after the market session, and the application of disinfectants was done following the schedule of the local veterinarians. The staff of market management carried out daily awareness raising of infectious disease and prevention measures among sellers through loudspeakers, leaflets, and direct communication with individual sales.

#### Meeting with staff of Department of Animal Health

We had a meeting with the deputy director of DAH, the head and staff of the epidemiology session, and the staff of the drug management session to report the results of avian influenza surveillance in 2023 and review the results of genetic and antigenic analysis of viruses isolated at LBMs in Lang Son in 2023. Overall, the viruses circulating in North Vietnam had genetic and antigenic characteristics similar to those circulating in other countries worldwide. These strains were antigenically distinct from the antigens of commercial vaccines in



Vietnam in recent years. In addition, the head of the epidemiology session also shared about the case of recombinant viruses detected in the southern provinces of Vietnam, which border Cambodia.

We also discussed future collaborations to continue the avian influenza surveillance program and further analyze the antigenic characteristics of various strains circulating in Vietnam. The results will contribute to the development of effective disease prevention strategies as well as the development of vaccines against avian influenza.

目的達成状況報告 [Report how you achieved your goal/objectives listed in the application form]

I have enhanced my understanding of the One Health approach in the international collaboration network through the great collaboration between the Microbiology Laboratory as an avian influenza reference laboratory of WOAHA and Vietnamese DAH.

I understood how to transfer technology to foreign units and organize an international workshop abroad by organizing the reverse genetics workshop seminar and technique transfer sessions in collaboration with NCVD, NCVMC, and DAH staff. There are some difficulties in establishing a new system of techniques due to a lack of equipment, unexpected problems, and time limitations, for example, the failure of cell co-culture in NCVD. Therefore, I can learn how to analyze and handle problems through these activities.

Through the field trip and having opportunities to discuss with local officials who are directly involved in infectious disease prevention and control in the border province, I understand field situation at live bird markets in a border province and how they conduct monitoring and countermeasures against infectious diseases. Not only that, I also have a better understanding of the work of controlling illegal poultry trade across the border.

Through the meeting with the leadership of DAH, I updated the latest situation of high pathogenicity avian influenza circulating in Vietnam and their characteristics. Moreover, I have great opportunities to continue international cooperation within the framework of further research on the characteristics of diverse viruses to have an overall view of the epidemiology of viruses in Vietnam.

One Health Approach実践報告 [Report how your activity could link to One Health Approach]

Since I worked in the research field, even though I studied for a degree in veterinary medicine, I have never worked and had a close relationship with animal quarantine officers and state management officials, especially in border areas, who are directly responsible for monitoring, detecting, and destroying smuggled and illegally traded animal products enter Vietnam. During the field and sampling observation at live bird markets, I got the opportunity to work and discuss with them. I can understand more about the role of multi-sectoral cooperation, including farmers, traders, border guards, health, veterinarians, and stakeholders, to control illegal human immigration and illegal animal trafficking across the border that pose a very high risk of introducing emerging or re-emerging pathogens into Vietnam. Besides that, I understood there were still limitations in on-site diagnostics, making it difficult to immediately detect and cull disease-carrying poultry. This valuable experience and information can be used to analyze the risk of spreading infectious diseases which will be useful for my future research. Furthermore, it is important to establish a system to provide appropriate technical training to develop on-site diagnostic capabilities for local staff in the future.

備考 [Remarks]

As a Vietnamese citizen and member of the Microbiology Laboratory, the Avian Influenza Reference Laboratory of WOAHA, I am grateful for the chance to contribute to enhancing international collaboration in HPAI detection and prevention.

※ 報告書を作成後、担当教員に確認をお願いし署名をもらってください。PDFファイルとしてVetlogから提出してください。

提出先：「Student Free Design Activities報告書」

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