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■ Overview of Activities of University of Zambia

At the University of Zambia, students can study veterinary medicine characteristic of Africa which is hard to learn directly in Japan, such as infectious diseases and wild animals that are only seen in textbooks in Japan. In this program, a curriculum is organized at the University of Zambia and National Park, focusing on infectious diseases and wildlife science. In 2019, five students were sent to Zambia for 2 weeks, and they interacted with lecturers and students of the University of Zambia in an environment and culture that is different from Japan, and they had many experiences that were unlikely to be obtained in Japan. To understand what students have studied in Zambia and what they felt through the valuable experiences, please have a look at the report.

Student Exchange Program with University of Zambia

The Schools of Veterinary Medicine at the University of Zambia and Hokkaido University have had an agreement since 1991 for educational and research exchanges. During this time, many professors and students have been interacting without interruption. In particular, in 2004, the Ministry of Education, Culture, Sports, Science and Technology's GP program "International Veterinary Education Promotion Program" was adopted. Starting in

To University of Zambia, from August 17 to September 4, 2019

2005, more than 30 students were dispatched to the University of Zambia for 3 years. Under the guidance of the faculty members at the University of Zambia, the students studied practical training on livestock infectious diseases and wildlife and had valuable experiences that could not be obtained in Japan.

In the IVEP, which was newly started in 2018, we send students for two weeks to the School of Veterinary Medicine of University of Zambia from August to September. During the project implementation period, five undergraduate students (3rd- to 5th-year) are

scheduled to be dispatched every year, and the students learn how to manage infectious diseases that are a problem in southern Africa, as well as wildlife in the characteristic ecosystem. In this project, students will study specialized subjects in English, interact with local lecturers and students, and will be exposed directly to Zambian culture and academics. The purpose of IVEP Zambia is to develop veterinarians with an international perspective through various experiences, learning about the role and activities of veterinarians in Zambia in a completely different environment from Japan.

To University of Zambia ①

Haruki SHIMODA (4th year)

The reason I decided to participate in studying in Zambia is that I was interested in infectious diseases that are spreading in Africa and wanted to learn about the current situation and the difference between Japan and Zambia. Another reason is that I wanted to observe the magnificent nature and wildlife of Africa that I couldn't experience in Japan on a safari in South Luangwa National Park.

First, a student exchange party was held at UNZA. The contents were a self-introduction organized by us, a quiz tournament about Japan, and about 40 veterinary students from 4th to 6th grades from UNZA participated. Thanks to the active participation of Zambian students, the party was very exciting. UNZA students were very friendly and kind and took pictures and talked together after the party. There are many international students in Hokkaido University, but I felt that this attitude of cooperation was a part that had to be followed.



Self-introduction at exchange party

In the lecture that continued from the next day, we studied bacteriology, parasitology, and virology. In a bacteriological lecture, there was a story that impressed me. In Zambia, even if a cow had clinical symptoms of tuberculosis, if there was no lesion, the meat could circulate. In addition, it was very surprising that there were areas where children were infected by drinking milk from cows infected with tuberculosis directly from their breasts. There were also stories of people eating meat from animals that died from anthrax due to lack of animal protein intake. Both stories are not possible in Japan, but it was a natural story for people in some parts of Zambia, and it seemed difficult to immediately improve the situation. In addition, that both tuberculosis and anthrax infect wild animals is a major problem not seen in Japan. In Zambia, where contact with wild animals is greater than in Japan, it is a major challenge to prevent disease infection from wild animals that are difficult to manage, unlike livestock.

At Kafue's visit to Slaughter shelter, an unexpected happening occurred. The slaughterhouse was closed because of the foot-and-mouth disease. It was a bit disappointing that I couldn't see a slaughterhouse in Zambia, but I think I learned a lot because I was able to see the current state of foot-and-mouth disease in Zambia. It was said that the cause of the spread of foot-and-mouth disease is that raw meat from pigs infected with foot-and-mouth disease is used as feed for domestic pigs, or that infected pigs are managed by the wrong knowledge of farmers. Also, killing was not promoted much in Zambia for financial and political reasons. There was a story that it would be difficult to control outbreaks due to the lack of understanding of foot-and-mouth disease across the country, and that it would be necessary to focus on thorough education and specialist training.

During the tour of the animal hospital, we visited the clinic and operating room. There seemed to be an

average of about 6 patients a day, and there were not many secondary medical treatments. The facility itself was not as good as Hokkaido University, but many of the staff worked and provided careful care. During the tour of the operating room, we visited a surgery to remove the uterus and ovaries. I did not know the details because it was my first visit to the surgery, but the procedure was performed aseptically and quickly. I felt that it was good that the teachers actively challenged the students. I thought that it was a very skillful and good experience for undergraduate 5-6 students to participate in the actual surgery while receiving instructions from the teachers. The challenge was how to provide high-quality services in the shortage of equipment, and I thought that high technical skills, abundant knowledge, and appropriate management of drugs, etc. were required for that purpose.

In South Luangwa National Park, we observed wildlife on safari and caught tsetse flies. There are two types of safari, early morning and evening-night, and we were able to see different animal species and behaviors. I went to a safari with the goal of searching for my favorite animal hippopotamus, but soon after I left, I met countless hippopotamus and observed it to my heart's content. Of course, besides the hippopotamus, I was able to meet many animals such as lions, giraffes, elephants, hyenas, warhogs, and it was a wonderful experience as if I entered the world of movies. I could see many animals from the window of the hotel where I stayed, and it was a wonderful experience that I could not experience in Japan.



elephants in South Luangwa National Park

While observing wild animals, we caught the tsetse fly with a tsetse trap installed in the hood of the car. The tsetse trap is an innovative trap that sticks sticky tape to a blue plate, taking advantage of the property that tsetse flies tend to gather around blue objects that move around. Although we were stabbed, we were able to catch several tsetse flies after the struggle. Although the trypanosome retention rate of tsetse flies in South Luangwa is not as high as a few percent, we were able to have a very valuable experience of capturing and observing the vectors that cause the sleeping sickness, a serious problem in Africa.

Finally, Dr. Musso and UNZA teachers and students, thank you very much for helping with the preparation and guidance. I would like to apply the knowledge and experience gained through this dispatch to my research and future career in Japan.

To University of Zambia ②

Mariko NAKA (4th year)

On Aug. 18th, we arrived at Lusaka International Airport and our program in Zambia started. At first I was filled with anxiety because everything was new to me, but doctors and staffs in UNZA welcomed us, so I was relieved. I have learned some basic knowledge about bacteriology, parasitology and virology in Hokkaido University, but learning them in English had another difficulty. Thankfully, doctors used easy English words so that we could understand the lecture, therefore I was able to catch up most of the contents. The excellent thing was that I was able to learn the situation of infectious diseases in Zambia which I could never know in Japan. In the lecture of bacteriology,



Pig anatomy in the parasitology lab work

prof. Bernard M. Hang'ombe told us that controlling tuberculosis was not so easy because they had infection in Interface Area, where domestic animals and wildlife met. We don't have so many wild animals in Japan, so I could hardly imagine domestic animals and wildlife are so close. Moreover, I heard that the direct milk consumption from cattle nipples was still a big infection route in rural areas. It surprised me very much. He also said that they sold the meat of the cattle suspected tuberculosis as low rank meat if it didn't have any lesions in its organs. That system of meat inspection is different from that in Japan, so it was new to me.

In parasitology class, Dr. Andrew M. Phiri told us general information about parasitology and some concrete parasites. He said, "parasite doesn't have passport." to show us how easy they can spread all over the world. That sentence was very impressive. He also explained us that poverty led ignorance of disease. I understand it is difficult to correspond each parasite diseases.

In Helminthology class, Dr. Chummy S. Sikasunge taught us classification and morphology of worms. I had learned these things in Hokkaido University before, but I didn't know how I could say the technical terms in English, so learning in this class was quite new to me.

Next day we went to Shibuyunji and watched the castration and medicated bath of the cattle. It was impressive that people who worked there whistled and drove cattle into the aisle to the bath with the branch of tree. I also saw children working. I had never seen cattle swimming in such a deep bath in farms in Japan. I was surprised they did castration without anesthesia.

We went to Kafue Slaughter Shelter on 24th, but it was closed because of FMD. I was sorry about that, but Dr. Musso told us enough about the procedure of the meat inspection. I was able to feel that diseases like FMD existed very close to life of people in Zambia. We also went to the MUNDA WANGA Zoo on that day. Animals there looked relaxing. They were kept in far wider places than most of the zoos in Japan.

Next Monday, we had virology class by Dr. Edgar Simulundu. He taught us about FMD, ASF, Lujo hemorrhagic fever and Crimea-Congo hemorrhagic fever. I heard that Zambia had had large outbreak



Lion in the South Luangwa National Park

of ASF in the Eastern province since 1912 to 1987 and ASF which became a big problem in China now is the one which occurred in Zambia during that outbreak. I was able to feel that ASF had strong power to spread all over the world. I had heard of Lujo hemorrhagic fever in the zoonosis class at Hokkaido University, but it was only a little. Therefore, it was a really good thing that I was able to know details and the progress of research.

Next day we visited the quarantine to watch anesthesia of the Sable Antelope. It was a first time for me to watch anesthesia by gun, so it was interesting. I learned that they had a variety of bullets of the anesthesia gun. It was a good experience that we were able to touch the real cartridge. I was also surprised because the antagonist worked very quickly. They had 4 fences around the animals and seemed to be careful about parasites and the other diseases.

Next day we visited Chaminuka game reserve. I was moved because I was able to see giraffes as soon as we start driving. I was satisfied that I was able to see many species of animals which I could see only in zoos in Japan. We couldn't get Tsetse flies, but we could catch a lot of nymphs of *Rhipicephalus appendiculatus*. It was a first time for me to catch ticks by flag and I was surprised how easy I was able to get them (They were also easily trapped by our cloths, though.) It was a good experience that I was able to watch ticks which I caught by myself by microscope.

Last day in UNZA, we visited UNZA veterinary clinic. First we saw the facilities of the clinic. I was surprised that they had not only different rooms for ill dogs and cured dogs, but also rooms for goats and sheep or horses and donkeys. They also had vaccine programs for dogs and cats as we had in Japan. I watched the contraceptive surgery of the dog. I hadn't learned much about surgery in Japan yet, so I wasn't able to compare it to that in Japan. However, I was surprised that the undergraduate could work really good in the surgery. We also experienced the iron injection, tail cut, teeth cut and castration of pigs. We don't often have enough number of animals for undergraduates, so some of them only see the technique. Therefore, that was a good experience for me because I was able to do by myself.

I also enjoyed the South Luangwa National Park. I had been interested in wildlife, but I had seen animals like lions and elephants only in zoos. I had a chance to see them in natural this time and it was excellent. I'll belong to the laboratory of theriogenology, so I'd like to become a vet who can help these animals which are facing the danger of extinction.

I had a lot of wonderful experiences this time. I was able to have deeper understanding in infectious diseases, parasites and wildlife, connecting new information in the lectures and practices with the knowledge which I had had in the class in Hokkaido University. I couldn't have such precious experiences without the cooperation of all the people in UNZA. Thank you very much and I appreciate it if you treat our juniors who will visit UNZA next year as you did for us.



Student Exchange Event

To University of Zambia ③

Mio SHIBUYA (4th year)

I had many great experiences in UNZA, which cannot learn in Japan. I would like to write about Quiz in culture exchange, outbreak of FMD, sampling of tsetse fly, the most impressive things for me.

The culture exchange was held in the first day of program, so I was excited and little bit nervous before quiz of Japan. Students who came to event was very friendly and kind. Their positiveness and enthusiasm for victory make me think about how to communicate with people from different country, because I am not good at say my opinion and have less confident to speak out in English. Thank for kindness the moderator who help us a lot, the quiz result in success. After quiz,



enjoy Quiz Show

many students came and ask us a lot about Japan, and exchange SNS. I had a lot of fun and would like to speak more, so it was sad that I did not have a chance to meet again in this program. If possible, it is better that taking lecture or workout with students in UNZA.

Talking about FMD outbreak, it was the first time that I experienced how FMD affect for everyday life. I was looking forward to learning about epidemiology in Zambia, infection control, and seeing case of infectious disease which do not exist in Japan, but I did not expect that I would encounter FMD outbreak. There was FMD outbreak in Japan 9 years ago, and FMD became famous and important disease especially for farmers and veterinarians. FMD are totally controlled in Japan now, so I do not



closed slaughterhouse

have a kind of real feeling that FMD is ongoing problem in the world. But thinking how to deal with infectious disease is important for Japanese veterinarian, because swine fever is outbreaking from 1 years ago and not controlled yet, and many other diseases such as African swine fever may be introduced in few years. It was good chance for me to think about the problem of infectious disease.

I was really looking forward to visit slaughterhouse, so I was shocked when I saw there was no animal there.

The owner said that he did not have job because slaughterhouse had to be closed. Since FMD virus can live in cold temperature, I was surprised when owner said that after they introduce freezer and able to deep freeze the meat, they can re-open the slaughterhouse. I also heard that there are many roads for foreign countries, so FMD can be easily expanded. Seeing some pigs and cows were in same place, gouts walked around near the slaughterhouse, and wildlife which has cloven hoof live near the river, I felt that the tradition and environment make the problem more difficult. After visiting slaughterhouse, we had chance to ask about FMD control in viral disease class. Professor said that making rule which reflect veterinary medicine is difficult, and some rule is not followed some time. He also said that stamping out is too costed, so control could not work enough. Through these experiences, I thought not only studying basic knowledge but also catching up national situation and knowing how people think about infectious disease is important for us veterinarians.



Tsetse sampling, watching wild lives

Because of FMD outbreak, we could not go lower Zambezi and tsetse sampling was canceled, so we tried sampling in south Luangwa. It was difficult to catch tsetse fly, and we tried again and again to see real living tsetse fly. Thank for support of game driver and worker in lodge, we caught living tsetse fly and observe details. There is no tsetse fly in Japan and only learn in pictures, it was valuable experience to know how they fly, how they look like, and how sharp the mouth part is. I will never forget about tsetse fly after seeing real one.

Through this program in UNZA, I learned deeply about infectious disease, and found my issue such as English ability, confident to speak out, flexibility and so on. Learning in English is good opportunity for me to practice understanding and thinking in English, not translate in Japanese. It is still difficult, but my English ability was improved in this program. I would like to learn more proactive and become veterinarian who can think about world problem.

Thank you for inviting us, and I appreciate all your kindness. I hope I would have opportunity to go Zambia.

To University of Zambia ④

Takuma ARIIZUMI (5th year)

One of the reason why I decided to enter Hokkaido University is the cooperative relationship with University of Zambia, so I'm happy to participate in this program. At University of Zambia, I learned about infectious diseases, wildlife and clinical medicine. I had a lot of valuable experiences while having fun in an environment completely different from Japan. I'm interested in infectious diseases, so it was a very good chance for me.

In many African countries including Zambia, a lot of humans and animals suffer from infectious diseases. At Zambia University, I deepened my understanding of infectious diseases in Africa through lectures and practical training of bacteriology, parasitology, helminthology and virology. In the bacteriology class, Tuberculosis and anthrax were the main topics. Both of them are unusual infectious diseases in Japan, however I learned they are very serious diseases in Zambia. I was very surprised that children in villages often suck a nipple of cattle directly, and I learned it causes Bovine tuberculosis. Interestingly I learned that protein shortage can be a trigger for some infectious diseases such as anthrax. In some anthrax endemic cases, people ate contaminated dead bodies of animals because of protein source scarcity.



Our class at UNZA

I realized how important problems of hygiene and food shortage are. It is difficult to imagine it by studying only in Japan. In the parasitology class, we got practical training of autopsy. The pig we used had a lot of cysts of *Taenia solium* in its skeletal muscles and heart. We can rarely see such a case in Japan, so it was good chance to observe living parasites and interesting for me. In the virology class, I learned about viral hemorrhagic fever, foot-and-mouth disease (FMD) and Africa swine fever (ASF). I was very interested in FMD. FMD has occurred in some part of Zambia during our studying program,

and it made us realize its threat (the slaughterhouse was closed and some programs were changed). I understood Zambia has some difficult problems to eradicate FMD. First, they cannot kill all cattle in contaminated farm because of insufficiency of money and food. Second, some media tells people the wrong preventives and treatments. Third, Zambia borders countries which have FMDV. I thought that only making vaccines or strategies cannot eradicate infectious diseases. We have to have a broad view to prevent infection.



My first time to eat nshima

Africa is home to a wide variety of wildlife. From the perspective of One Health, ecosystems including animals are thought to have a significant impact on human health. The wildlife-livestock and wildlife-human infection cycles is an important problem, especially in the Interface Area. In order to prevent infections, farm prevention and import / export quarantine are important because we cannot control wild animals. We visited a quarantine station and learned how to prevent diseases. Also we learned about anesthesia darts there. When I observed the anesthesia of sable antelope, I was surprised at the speed of sedation and arousal. I learned that it is important to quickly sedate, treat and arousal to reduce the burden on animals. In South Luangwa national park, we watched a lot of wildlife. Their habitat was vast and the number of wildlife was uncountable, so I understood that it is impossible for people to control infections of wildlife as taught in the lectures. Also I understood that African nature attracts people all over the world. Unfortunately, we could not take an extra lecture in South Luangwa. I would like to learn the role of veterinarians in national park if I have the next chance.

Last but not least, I would like to thank the various people who supported us, including University of Zambia, IVEP and Hokkaido University. Taking advantage of this experience I will continue to make further efforts.

To University of Zambia ⑤

Honami SHIMAKURA (4th year)

During this IVEP program, I was often surprised to see the differences between Zambia and Japan.

For example, in the bacteriology class, I learned that there are some places in Zambia where domestic animals and wildlife got interacted, which caused the transmission of the diseases such as bovine tuberculosis. Despite tuberculosis is zoonotic, people are not aware of the danger very well. In the countryside, we can still see the children drinking milk directly from the cattle's teats. Moreover, cattle which the lesion is not found after slaughtered can be used for human consumption, even if infection is suspected. Also, anthrax is a familiar infectious disease in Zambia as well. This year, there was several outbreaks of anthrax because of the low rainfall. The outbreak also happened in humans, because of eating the carcasses of infected animals. This lecture was very interesting for me because the diseases mentioned were very familiar in Zambia, but we seldom saw them in Japan. Also, the outbreaks of the diseases are closely related to the natural environment and human's practice, which are totally different from those of Japan.

Other interesting thing I learned about is foot-and-mouth disease (FMD). This year, there was a large outbreak of FMD in Zambia, and I frequently heard of the story of it through the program. It is estimated the pathogen was disseminated from the neighbouring country, and the outbreak extended even to Lusaka. The most effective control measure for FMD is stamping-out, and Japan adopted this method when the outbreak happened in 2010. However, it requires the compensation for



Swine inspection

farmers and thus largely depends on political will and available resources. With tight finance, ring vaccination is now undergoing in Zambia instead of it. It was not until I heard this that I realized that stamping-out costed so much and economical condition could influence the disease control.

Not only in the lecture, but also in lab works and fieldworks, there were lots of things to learn. In the lab work of parasitology, we inspected the pig with Taeniasis. We could see many cysts of Taenia solium, particularly in myocardium, triceps, and cheek muscle, which were rich in oxygen supply. Furthermore, the pig got wane because of parasitism, and we could see some lice on the surface. I learned about the pork tapeworm in Japanese class. However, we rarely see this disease there. It is because I participated this program that I could observe the real parasites.

Wildlife in Zambia was also amazing. In South Luangwa National Park, I could see many wild animals such as giraffes, hippos, antelopes, warthogs, and buffaloes. As I watched these animals, I realized that there was a variety of animal species I had not known and that some animals showed the characteristic



Tsetse fly caught in the national park

behavior. All animals looked lively and totally different from those I had seen in Japanese zoo. This experience made me more interested in wildlife and wanted to learn about it and the behavior of it.

In addition to that, we tried to catch the Tsetse flies by the trap during the game drives. Before we left for the national park, we learned that the number of Tsetse flies was now decreasing, and those which held Trypanosoma accounted for only 10 percent. However, there were still many flies jumping into the running car. Thus, I

could not sweep away the anxiety to be bitten by them, even if I knew that the chance of suffering from sleeping sickness was very low.

Through this IVEP program, I felt a lot of differences between Japan and Zambia. As for the infectious disease control, I learned we had to change our way of thinking when we were in the different countries. However, the knowledge I got in the lectures in Japan helped me understand the diseases in Zambia. This experience inspired me a lot and made me more eager to study. Moreover, the diversity of wildlife in Zambia made me overwhelmed. The animals and the nature surrounding them should be protected, and I got more interested in wildlife through this program.



In front of the entrance of UNZA

It was the first time I visited African country. Before I came to Zambia, I was worried about my stay because Africa was very far and I did not about it very much. However, people in Zambia were very kind to us and I had a very good time there. Also, the experience I had there will help me understand other countries or people in the different situation. I am deeply grateful to be given such a precious opportunity. Finally, I would like to say thank you to all who engaged in this program and supported me.