



A Design of Information Management System for Veterinary Epidemiological Research based on ICT

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Abstract— In these years, from the threat of livestock infectious diseases, such as represented by the BSE, to protect the livestock industry is getting more important. So in this study, we design the system that to support the epidemiological survey. The System is used the mobile phone and high portability. And also Smartphone has GPS and camera function that can be used for getting a variety of information. In this system, the information such as the owner of animal, animal, the clinical laboratory samples, such as manure or blood obtained from animal can collected. And the collected data are sort to database. And it can get variety of analysis through WEB system.

Keywords— Goat, Android, Mobile Phone Terminal, Veterinary Epidemiology

I. INTRODUCTION

In these years, the occurrence of Foot-and-Mouth disease (FMD) is getting increase in all over the world. In Miyazaki, FMD occurred in 2000 for the first time in 92 years. And in 2010, the disease occurred in the same region again(1). The Foot-and-Mouth disease has strong infection. Even though the Foot-and-Mouth disease is not a zoonosis, but it will be a huge effect to the livestock industry and the meat production and the milk yield will be reduced.

Also, Livestock infections can be a big issue in public health not only livestock industry. In these, The Rabies disease occurred in Far East Asia (2). The Rabies is a zoonosis caused by infection of rabies virus. When the people are infected with rabies, Fatality rate is 100%. There are about 3,000 people are killed by rabies virus every year in Asia. And vaccination rate of animal in Japan is less than 40%, It is below the 75% vaccination rate recommended by WHO, Some critics concerned about the epidemic of rabies in Japan. Also in 2013, severe febrile thrombocytopenia syndrome (SFTS) occurrence has reported in Japan. SFTS is listed in infectious disease that is necessary to reported to the government in Japan. In recent years, it is pointed out that the possibility of infection from pet, livestock and wild animals according to the report in China (3).

Like this, the occurrence of various infectious diseases in livestock, have an enormous impact on not only many people's lives but also livestock industry.

In order to prevent the occurrence of domestic animal infections, it is necessary that conducting epidemiological surveys such as collecting data about an antibody retention rate, situation of livestock feeding and management.

These survey and measures called “Epidemiological investigation” and “Quarantine”. In Public health administration, these duties are important.

But, these operations are not often digitized because of budget issue. So that it takes a lot of time and personnel to collect and organize the information. When infection was developed, spread of infection prevention and sharing information with the relevant departments particularly is the priority, But It had not widely adopted in present condition. Therefore, In order to solve these problems, we propose an Information Management System for Veterinary Epidemiological Research based on ICT in this study.

II. DESIGN OF VETERINARY EPIDEMIOLOGY FOR APPLICATION

The epidemiological investigation is to collect the data of animals and its owner in the target region, and to analyse these data statistically.

Also If it is infection, obtained information about infection speed and the transmission route, there also be performed suppression of infectious diseases in the region, and control of infection spread(Prevention). In epidemiological studies, collected information is analysed in detail by using statistical methods. At that time, mostly using computer and it is important to compile information of a database quickly that obtained by the survey.

In addition , there is a different between field of veterinary and field of medicine in human, There are a lot of livestock finish their life without receiving the medical treatment of the veterinarian. Therefore, there are a lot of fundamental information of individual livestock is lack. (Things like medical records in the human medical field) Also, in many survey, it is carried out by field work so usually making a statistical processing after input data that collected on field note.

But in this way, corresponding to situations such as epidemiological study conducted in an emergency in the event of an FMD is difficult. Our purpose is to develop the system that doesn't constrain the movement of researchers and provides rapidity and portability.

Table 1. shows the information has to be collected .The owner's address, name, the animal's fundamental information and when the investigation, collection of faeces and urine and blood sampling is performed so these are specification that can be collect the sample information.

TABLE I
FUNCTIONS OF VETERINARY EPIDEMIOLOGY FOR APPLICATION

Category	Details
Information of the owner	Name, Sex, Address, Phone Number, Ranch Name, Picture, Location Information
Information of Animals	Species of Animal, Breed, Sex, Age, Tag No., Label number, Sample, Picture, Information that should be noted
Information of Samples	Acquisition date, Anima ID No., Sample Type, Sample Number, Identification Number

Figure 1 shows the system configuration of the system. It uses a smartphone as a data hub in the spot in this system. Smartphone is one of the most popular electronics and there are a lot of cheap Android phone in the market. Also Smartphone has the GPS function, and camera function and bar-code reader that can obtain the current location information, picture information. And when we get the sample information, we can use bar-code reader to get the sample number. On this system, we can take full advantage of the features that are installed in the initial Android mobile device, so that it can be expected penetration because the initial cost of introducing take less.

On the system, the epidemiologist enters the information of the owner through the Android mobile devices at first, and the next acquires the position information of the farm by using the GPS function, and use bar-code reader to get the individual animal number and enter the information of animal. Also there is a method to read an RFID reader individual number of animal.

Also get the picture information of animal by using camera function. The data are saved to mobile devices in temporarily, and uploaded to the database on a regular basis. The database in the bottom right collects information of the owner and the animal. And is viewable from the computer as a web system through the API.

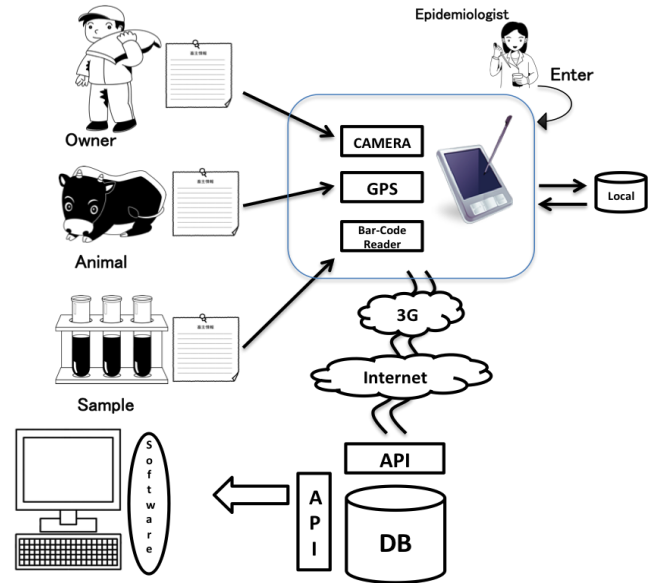


FIGURE I THE SYSTEM CONFIGURATION

The figure 2 shows the flow chart of the Android application. This application composed of three elements, the owner information part and the animal information part and the sample information part.

At the end of this application, the collected data are saved to the database. Also the farm location information will be obtained by using GPS.

Figure 4 shows the flow chart of obtaining the individual animal information and the sample information. When you are obtaining the individual information of animal, enter the fundamental information such as age or species of animal by using dropdown list at first. And then see whether needs tagging or not. If it is needed to tagging, read the tag number by using bar-code reader at first and then tagging. If the animal is already equipped, enter the tag number by manual. And when you are obtaining the sample information, chose the classification of sample first, the classification will be blood, faeces, urine, and other kind of samples. At this time, read the sample number by using bar-code reader and gather the samples. After registered the sample, take the pictured information by using camera function. At this time, if it has a specific thing has to be noted, take that picture too. And if it the other information has to be noted, write down on the note. The advantages to enter this information are veterinarians is easily to grasp the status of the animal later on. The advantage to obtain picture information, there is a purpose to facilitate the identification of animal individual.

Figure 4 shows the part of design of the application. The application are simplified. Enter one information by one screen. It were considered to be easily manipulated.

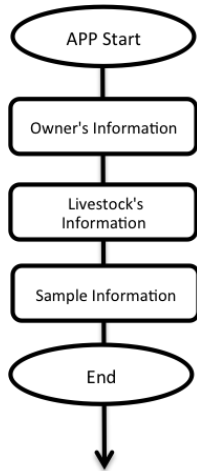


FIGURE II THE WHOLE FLOW CHART



FIGURE III THE DESIGN OF APPLICATION

III. FUTURE STUDY

In the future study, it needs to be considered to construct the electronic medical record that can share the information between the owner of animal and the veterinarian by using this application. Also the information that you have uploaded to the cloud will be viewable in the web system, and the owner of animal and veterinarians possible to use it. The realization of the system, the communication between the owner of animal and veterinarians will be easily maintained. So that it is possible that the veterinarian tells treatment and guidance to the owner of animal about diseases of animal more easily.

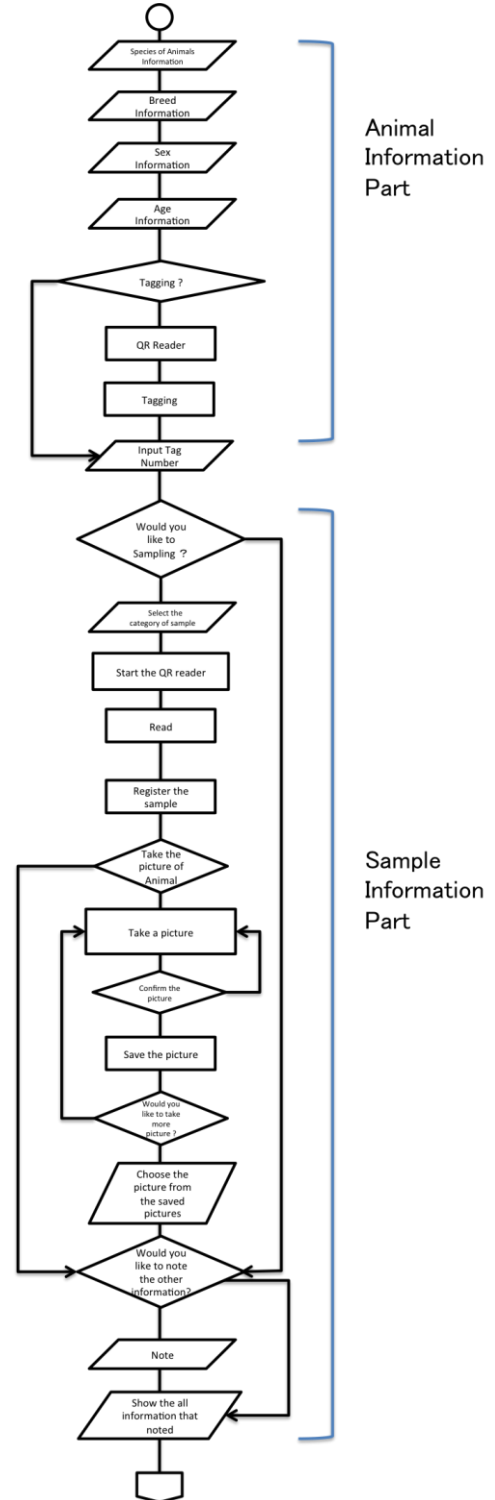


FIGURE IV THE FLOW CHART



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In these years, that has been made some attempts to predict the epidemics, formulate a suitable protection plan, based on the information obtained from epidemiological research

For example, Hirata(4) is doing research on the mathematical model of caprine arthritis-encephalomyelitis (CAE) which is infection disease of goat. It is necessary to provide the application that to predict the spread of infectious disease easily by veterinarian without the special knowledge of mathematics.

Also, Kinjo(5) is doing research about trying to identify dynamics system for the propagation of Severe febrile thrombocytopenia syndrome virus(SFTSV) based on the severe febrile thrombocytopenia syndrome (SFTS). And getting a parameter that indicates infection and speed of the disease. These indicators are very important value to take the necessary measures for the prevention of infectious diseases. In order to obtain these information, it is necessary to get more reference data. On this occasion, to introduce the veterinary epidemiological surveillance system that is designed on this study, it is possible to collect more data of animal.

It is planned to conduct the demonstration and implementation of systems approach these issues in the future.

IV. CONCLUSION

The security measures of this application that deigned on this paper are insufficient. Therefore, it is necessary to introduce a security function corresponding to the protection of personal information of the owner of animal. Also, it is the agenda of future sharing of information with the Web system.

It is planned to conduct the design of considering breeding and livestock systems designed by Hirata(4), also cooperation with the information management system.

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