

## Chapter 5

### Discussion

This study collected data from 899 pig farms and 3464 cattle farms located in Chiang Mai and Lamphun provinces (17 districts in Chiang Mai province and 5 districts in Lamphun province) to identify the risk factor of FMD in pig and cattle farms in Chiang Mai and Lamphun area. Much information was found in this study such as farm management, FMD occurrence and risk factors of FMD outbreak in cattle and pig farms.

This study has showed the geographical information and regular management of pig and cattle in the study area. Mostly of the pig and cattle farmers in this area are small holder farmers and manage their farms with conventional system. Furthermore, the history of FMD outbreaks was collected. There are a few outbreaks were found in pig farms but in cattle farms found more than 100 outbreaks in one year. From the practice of farm management and FMD outbreak information, these can be analyzed to find out the risk factors of FMD outbreak in pig and cattle farms in Chiang Mai and Lamphun area. Many risk factors were found in both pig and cattle farms. This information can be used to prevent the FMD introduce into pig and cattle farms, especially in Chiang Mai and Lamphun area.

The results showed that, the study area was flatland surrounded with slope and mountains. Most of pig farms and cattle farms were located on flatland, a few were found on the mountain. This area had 5 main roads connecting with area outside the mountain. The domestic animals were transported via roads to this area. Thus, the

government can effortlessly control the animal movement that coming in and going out this area by setting animal quarantine check points on these roads. This strategy can control and prevent the introduction of the infected animals into Chiang Mai and Lamphun province, especially FMD. According the study of Martínez-López et al. in 2008, they had analyzed the probability of FMD introduction into Spain through the live animal importation. They found that the importation of the lives pigs showed higher probability of FMDV introduction than through importation of other species susceptible to FMDV infection (Martínez-López, et al., 2008).

In Chiang Mai and Lumphun area had nearly 4,000 pig farms and more than 10,000 cattle farms. The majority of pig farms were individual and finisher pig farms. There was limited number of large commercial pig farms, which were of economical significance in the study area. Most farms used all-in all-out management system from nursery to finisher, which was close proportion to farms managed by continuous management. A large number of pig farmers manage their farm original management and low development.

The cattle farm, mostly were smallholder with less than 20 cattle per farm and has other job for their cash income which may influence the attention of good husbandry practice of them. Most of cattle were free range cattle and shared pasture with other farm or other villages. The main water sources were river or canal.

The biosecurity practice in each farm was generally poor. They could not protect FMDV spread into the farm because farmers did not decontaminated vehicles and visitors before came into the farm. Only 2 % of farmers had disinfectant basin in front of cattle barns. The cattle farmers in this study did not practice disease

protection with biosecurity, particularly the beef cattle farms. Most of the farmers believe that only vaccination could protect the animals from the disease.

The biosecurity practice of pig farms in this study was weak in most of farms especially individual and small farms with no strictly biosecurity. Most of them had only disinfectant basin in front of the farm for decontaminated visitor's footwear before entry, they did not have shower for visitors. They did not have disinfectant spray house or disinfectant spray machine for decontamination of vehicles before coming into the farm. Most of them did not have method for decontaminated vehicle before came in farm. In the study of Pinto and Urcelay in 2003 found that pig farms with low biosecurity practice theoretically have higher potential for introduction and spread of diseases (Julio Pinto & Santiago Urcelay, 2003). Thus, biosecurity can reduce disease especially FMD introduce in to the pig farm.

Not only biosecurity can prevent the FMD, but also vaccination is another method that can be a tool of FMD prevention. In Thailand have FMD vaccine from several sources such as Bureau of Veterinary Biologic of DLD or private company. The most of cattle and pig farmers had used trivalent vaccine that produced by DLD. They have promoted FMD prevention in this area by encouraged vaccination strategy in cattle farms. DLD also supplied officers as vaccinator and supplied free FMD vaccine to animal in the border areas, livestock markets, and during transportation in northern Thailand (Chaisrisongkram, 1993). But, some cattle farmers can buy other FMD vaccine from private company.

About the pig farms, most of the farmers use trivalent vaccine that was produced by DLD, although DLD does not supply free vaccine for pig farmers, because the price of DLD vaccine is cheaper than the commercial one. However, the

vaccine could not be supplied regularly especially when the outbreak occurred. Nowadays, FMD still outbreak in this area. It might indicate that vaccination is not enough for disease control and biosecurity is one of choice that can be chosen. Moreover, most of pig farmers did not vaccinate the finisher pigs because the attitude of Thai farmer looks over this risk especially the small farm holder. DLD should more encourage biosecurity practice into cattle farms and cattle farmers should realise biosecurity is one important disease control strategy as vaccination.

Total of 117 FMD outbreaks were reported in Thailand in 2005 by DLD, 14 outbreaks were reported in northern Thailand (11.97%). This number is higher than the outbreaks in 2003 and 2004. Which DLD reported 209 FMD outbreaks and 119 FMD outbreaks in Thailand, in 2003 and 2004, respectively (Veterinary Epidemiology section, Bureau of disease control and veterinary services, 2005). This study collected the outbreak data during 2003-2004. We found 677 FMD outbreaks in cattle farms and 11 FMD outbreaks in pig farms in northern Thailand. The most of the outbreaks, both cattle and pig farms occurred in area with high density of live stock farms, which was similar to the result of the study of Gloster J. in 1982. Which concluded the high density of livestock was a risk factor of FMD outbreak (Gloster, 1982).

The number of FMD outbreak in this study was higher than the report of DLD. Because the data in this study was gathered from interview the farmers. The farmers were asked about the typical clinical signs of FMD, which they have seen from their animals in previous year. The laboratory was not used as the FMD confirmation tool. Furthermore, the farmers were separately interviewed. This is one positive case represented one point of outbreak. In case of the FMD report of DLD, one outbreak

means one point of outbreak. It might cover several farms. The error of number of identification in this study might be the cause of the difference.

Moreover, the results showed that the pig and cattle farmers reported the outbreak to the DLD officer only 20% and 66.80%, respectively. Some cases of FMD outbreaks were not reported or informed to the officers, particularly in beef cattle. The farmers tried to solve the problem by themselves. If they could control the situation, the disease would be limited. But if not, the disease would spread widely and could not control. The outbreak reporting system in this area was more successful in dairy farms than pig farms, but one-fourth of farmers still sold healthy and recovered animal in outbreak farm to livestock market and slaughter houses, which might facilitate the spread of FMD in the area. It might indicate self responsible of some farmers in disease control and public awareness.

Multivariable logistic regression analysis was used to identify the risk factors and protective factors associated with the occurrence of FMD in pig and cattle farms. In pig farms, two significant risk factors and four protective factors were identified in this study.

Risk factors included treating sick animals by non-veterinarian and the number of feed trucks comes in to the farm. Small holder farmers usually treated sick pigs by themselves or by care givers for their convenience. One limited factor is the number of available veterinarian. This information indicated that there were few veterinarians who work on farm level with limited roles (only 4 % of pig farmers called for veterinary service). It seems to be that the limited number of available veterinarian officer plays an important role for public service. The owners of the large farm prefer to call for the service of veterinarian who works for drug companies which supply

veterinary services for their customer. Thus, there are opportunities for veterinary services in the pig industry in northern Thailand.

Another risk factor was the number of feed trucks that came into and go out of the farm. This factor was associated most of the pig farms, which bought animal feed from commercial feed supplier and did not have method to decontaminate vehicle before farm entry. Farmers can reduce the risk of FMD outbreak by disinfected vehicle before come in farm, especially the feed truck. As same as the study of Boklund et,al in 2004, found that biosecurity for the transport vehicles and visitors is important in fattening pig farms(Boklund, et al., 2004).

The protective factors that could reduce the risk of FMD outbreak at farm level were the personal disinfection, the pig trucks was parked in front of farm, the Proportion of vaccinated pig in farm and the recognition of FMD outbreak in neighboring farm. These factors related with the farm biosecurity, the vaccine application and the network of disease recognition.

A little number of farms used the disinfectant to clean up the person before coming in the farm. This study indicated that, the farmer should use the biosecurity as the FMD prevention method. The fence is a way to prevent the outside animal and person which come into the farm. If they use the disinfectant to clean up the person, their farm might have high level of the protection. This is similar to the study of Cleland et.al, 1996 and Suttmoller et.al, 2003 which good biosecurity practice could reduce disease outbreak in farm level, and it is an important strategy to control FMD (Cleland, et al. 1996; Suttmoller & Olascoaga, 2003).

The vaccination is another tool that can reduce the risk of FMD occurrence, but only 15.23% of pig farms in the present study did FMD vaccination. The study of



Eble et al. in 2007 found that the vaccine could reduce the FMD virus excretion, significantly. Furthermore, the pig was not considered as the carrier of FMD and after their recovery from the infection, the virus was not found in these pigs (Alexandersen, et al., 2002). Thus, the pig farms, which use the FMD vaccination could control the FMD by reduce the virus spreading in their farm and can eradicate the virus by themselves.

In cattle farms, three risk factors associated with FMD occurrence and two significant protective factors were found in this study. Those risk factors were using public pasture, number of cattle in farm and number of new replacement. The protective factors of FMD outbreak in cattle farms included having disinfectant pool and recognition of FMD outbreak in neighboring farm.

Many of the beef cattle in this study shared the public pasture and water source among neighbouring farms or villages during day time and the owner took their cattle back to the farm at night. This factor can facilitate FMDV transmission among cattle sharing the same pasture. The significant of public pasture observed in this study is similar to the study of Cleland et al. in 1999.

The number of cattle and new replacement in farm were significantly risk factors in this study. This similar to the result of Cleland et al. in 1996 and Suttmoller et al. in 2003. The number of cattle in farm and number of new stock in farm in each month associated with FMD outbreak in farm (Cleland et al, 1996 and Suttmoller et al, 2003), which is similar to the observation by Cleland in 1995, which found that the total number of cattle and buffaloes purchased in the previous year were risks factors of FMD outbreak in villages in northern Thailand (Cleland, 1995). This may be due to

the fact that most farmers did not quarantine new cattle and disinfected cattle after released it in public pasture.

Biosecurity is an important FMD control strategies, not only in pig farms but also the cattle farm. Vehicles and human can carries virus in and out of the farm. Disinfectant can reduce number of FMDV spread to other places. This study indicates that the vehicle disinfection could protect the farm from the FMD outbreak.

Since the significantly protective factors in recognition of neighboring farm was found in pig and cattle farm, it might relate with the FMD outbreak notify to pig and cattle farmers and they can reduce opportunity of FMD by using the limitation of people, equipment including the new stocks which come into farm. The farmers can protect their farms earlier by vaccination and strict biosecurity.

In conclusion, the poor biosecurity practice seems to be a weak point of farm management in this area. It becomes the risk of FMD outbreak in pig and cattle farms. The strengthen biosecurity practice combination with the vaccination and surveillance network should be used simultaneously for the prevention of FMD introduction into the pig and cattle farms.

Furthermore, The DLD, who has the duty of FMD prevention and control in Thailand, should encourage the implementation of these three strategies; the strengthen biosecurity, the vaccination and surveillance network. Simultaneously, the other strategies such as strict control of animal movement, animal quarantine, sanitary control, outbreak investigation, field surveillance and slaughtering of sick animal are basically used among the area to help prevention and control in all infectious diseases including FMD.



This information would encourage the successful of FMD eradication in northern Thailand. Nevertheless, the perception and collaboration of the social section is need.



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