

CHAPTER I

INTRODUCTION AND OBJECTIVES

1.1 General overview

Vietnam is one of the Southeast Asian countries bordered by China in the north, Lao PDR and Cambodia in the west and its east and south boundaries about on the Pacific Ocean. Vietnam area is 331.211.6 square km with more than 3000 km coast line and the population was 92.477.857 in 2013 (GSO, 2012). Tropical forests and mountains regions constitute each around 40% of the land area, whereas hilly and densely forested regions cover around 20%.

Vietnam is a tropical country with very high density of rivers. The climate varies from north to south of the country due to the differences in latitude and topographical reliefs. The average annual temperature is generally higher in the plains than in the mountains, and higher in the south than in the north. The climate is quite different from the north to the south in-country. In the north, the climate is subtropical with four separate seasons but in the south, the climate changes to tropical savanna with dry and wet seasons. The average of annual humidity is 84% and the temperature ranges from 5°C to 37°C.

According to the National Environmental Present Condition Report 2005, Vietnam is one of twenty-five countries regarded to a high level of biodiversity country. It is ranked 16th worldwide in biological diversity, being home to approximately 16% of the world's species. Therefore, the flora and fauna are diverse in whole country, special in Mekong Delta, southern of Vietnam.

Mekong Delta is 40.548,2 square km and the population is approximately 17.3 million inhabitants (GSO, 2012). It is not the highest rivers density area in Vietnam

but the largest and very important domestic agricultural production site. Also, Mekong Delta is the largest rice field supplying more than 50% rice yield, 30% other agriculture products and 54% aquatic animals yield in-country in 2011 (GSO, 2012, GSO, 2013).

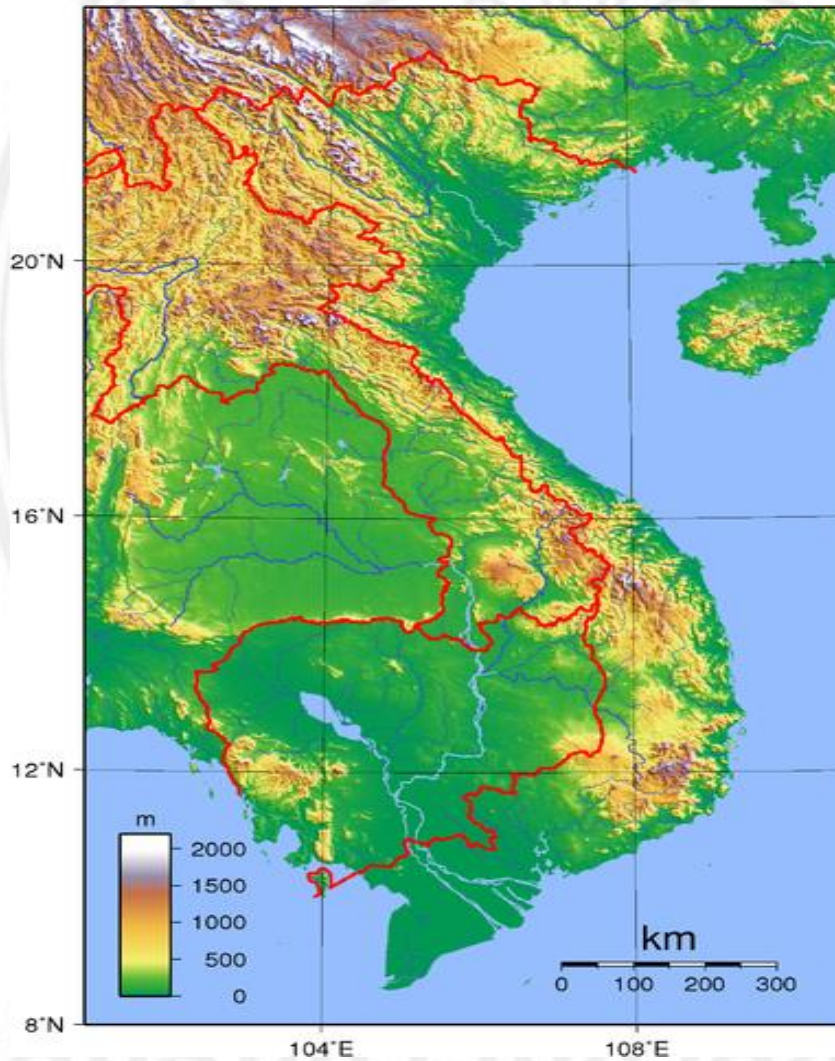


Figure 1 Topographic map of Vietnam

Source: Sadalmelik et al., 2007

In Vietnam, the livestock population was 2.63 million buffaloes, 5.2 million cattle, 26.5 million swine and 308.5 million poultry included 223.7 million chickens (GSO, 2012, GSO, 2013). The livestock population in 2012 decreased about 2% comparing to the livestock population in 2011(GSO, 2012). Reasons were high input

costs, low meat and meat products price, and competition between domestic meat market and imported meat. However, the livestock supplied 4.3 million tons meat for consumption in 2012, increased around 5.7% compared to the yield of meat in 2011. In fact, Vietnamese prefer fresh meat to frozen or chilled meat, fresh pork rather than other kinds of meat. Therefore, although consumers' disquiet about chemicals making lean tissues, Porcine Reproductive and Respiratory syndrome virus (PRRSV) and antibiotic substances in meat and meat products, the meat market were very actively and fresh pork were found in every supermarket or wet market in rural and urban.

A very large number of meats were consumed every year but the food safety was not concerned properly in Vietnam since only 58% of slaughterhouses operated under control of the authorities in whole country in 2007(MARD, 2007). However, the public concern in food safety and hygienic issues increased in current years. For adapting to consumers requirements, the authority had planned to reconstruct the slaughterhouse system since 2010. In Mekong Delta's provinces, the local authorities set up to build 1-3 pig central slaughterhouses per district onward 2015 to supply fresh meat for the local as well as tighten food safety issue and control animal diseases.

1.2 Animal diseases and animal disease surveillance system in Vietnam

Vietnam is a tropical country and its nature and environment may be good conditions for many disease agents and this low bio-security farming system can be factors to spread diseases very well. Moreover, the poor management skills might contribute to failure to control in some diseases animals as well as in human. So, these factors put a lot of burden to society.

In animal disease aspects, some zoonotic diseases or other diseases caused economic losses, caused the national and local veterinary authorities in Vietnam to pay special attention on High Pathogenic Avian Influenza (HPAI), Porcine Reproductive and Respiratory syndrome (PRRS), Classical swine fever (CSF), Foot and Mouth disease (FMD), swine influenza (SI). Therefore, the situation of mentioned

diseases was quite clear and be up-to-date daily. However, other diseases were not concerned on the right way such as the diseases caused by bacteria and parasites. It might cause some disadvantages to the farmers in their animal management somehow.

1.3 The pig sector and veterinary services in Mekong Delta

In Mekong Delta, animal farming is mainly based on backyard model. According to General Statistics Office (GSO), Vietnam, backyard pigs farmed less than 20 pigs per holder came up 97.5% in 2012 in the area (GSO, 2012, GSO, 2013). Some local breeds are still available but almost the farms were upgraded with Landrace, Yorkshire, Duroc, Hampshire or Piet strains for increasing meat quality and reducing the fattening period. There was no development-oriented for pig farming but the spontaneous development seemed to adapt to the local consumer preference.

Most pigs were farmed in small pens built near the ponds, rivers or canals in Mekong Delta. There were open farms and the contact between other animals and human occurred quite easily in the pig pens. The pigs were raised by traditional farming such as using water from the ponds, rivers or canals without treatment, gobbling agricultural by-products, producing home-made feed, and having low bio-security.

In Mekong Delta, local vet services were quite developed meanwhile the official veterinary services were quite low in hamlet and village levels. The local vets supplied the private veterinary services to the farmers. However, the relationship between official and local vets was established in outbreak control cases.



Model of traditional pig farm in Mekong Delta



Figure 2 Model of traditional pig farm in Mekong Delta, Vietnam

1.4 *Alaria* spp. and Alariosis

The public is increasingly concerned about food safety since every day “new” diseases seem to emerge. The concerns are not only about hazards to human health, but also about economic losses and food security implications. Supporting to the public concerns, modern machines, new techniques and methods are developed. Thus, some new agents were found by accident or some agents were ignored in the past to become hot topics in science communities today.

In aspects of food safety and zoonosis, *Alaria sp.* in particular *A. americana*, can be the reason for severe damages in humans. Several reports of human larval alariosis indicate that infected game animals are a potential source of infection to humans, but also animals (Bruzinskaite-Schmidhalter *et al.*, 2011, Castro *et al.*, 2009, Dollfus and Chabaud, 1953, Foster *et al.*, 2009, Freeman *et al.*, 1976, McDonald *et al.*, 1994, Möhl *et al.*, 2009, Murphy *et al.*, 2012, Shimalov and Shimalov, 2001, Shoop and Corkum, 1987, Shoop and Corkum, 1984, Shoop and Corkum, 1983b,

Shoop and Corkum, 1983a, Shoop and Corkum, 1981, Shoop *et al.*, 1990). Another *Alaria* species, *A. alata*, can exist in the intestines of carnivores worldwide, the zoonotic potential is not proven until now, but there is comparative evidence for that hypothesis. The knowledge of *Alaria alata* is quite limited. Beside an adult stage in game animal, the life cycle of *A. alata* involves two intermediate stages in intermediate hosts. The first stage, *Alaria alata* sporocysts can be found in snails (Family Planorbidae) (Portier *et al.*, 2012). The second stage, mesocercariae, is found not only in the regular intermediate hosts, as amphibian or tadpoles (Möhl *et al.*, 2009, Wolfe *et al.*, 2001), but also in a range of vertebrates, amongst them also pigs and wild boars (“paratenic hosts”) (Paulsen *et al.*, 2012, Pearson, 1965, Riehn *et al.*, 2010).

Alaria alata was found accidentally during meat inspection process in Europe. The trematode was ranked as a very low risk to human health, and sometimes virtually ignored. This can be a reason to explain why researches of *Alaria* spp. are very few and the biological data is lacking today. Moreover, most of studies on *Alaria* spp. were conducted in Europe and America, but the *Alaria* spp. data is not enough to conduct a sound risk assessment. The life cycle of *Alaria* sp. was unclear and until recently, no sensitive methods were available for detection of mesocercarial stages. This caused some difficulties for detecting the developmental stages of the parasite, controlling and treating the disease.

1.5 Statement of problem in Vietnam

Data on the prevalence of the adult form in the definitive hosts are yet lacking and both environmental factors and intermediate hosts of the fluke as well as the current animal husbandry system in Vietnam may create a niche for this parasite such as the density of watercourses being very high in whole country Vietnam, special in the Mekong Delta in the southern part of Vietnam.

The animal keeping is not so well organized. In the southern part of Vietnam, small-scale swine husbandry is very popular. Pig pens are built near rivers, ponds or

canals, not always with a solid bottom. The animals are not kept separately from human and direct contact between different species such as swine, dogs, cats and human, is possible. Quality of the water supply for pigs is not always controlled. Risk factors for pigs being infected with mesocercariae are: (a) density of waterways, ponds etc. (i.e. presence of a habitat suitable for intermediate hosts); (b) low bio-security in pig farming, (c) contact to (wild) carnivores carrying the adult parasite. All these factors might create a niche for *Alaria* spp.

1.6 Objectives of the study

There is no data about the presence of *Alaria* spp. in Vietnam nowadays. So, a study is undertaken

- To obtain data on the occurrence of *Alaria* spp. (*A. alata*) mesocercariae in swine population of nine provinces bordering the Mekong Delta, south of Vietnam.
- To link the data on occurrence of mesocercariae to potential risk factors in traditional swine farming in the area is expected.

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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