## CHAPTER I

## **INTRODUCTION AND OBJECTIVES**

## **1.1 Introduction**

Pork and pork product is one of the major food categories worldwide in general and in Vietnam in particular. In 2011, an average amount of pork consumption per capital per year in EU, China and Russia or Japan was 43, 38, and 20 kg, respectively. It is all higher amount when compare with beef and poultry meat consumption (USDA, 2011). In Vietnam (2011), an average amount of pork consumption was 21 kg/capital/year (USDA, 2011) and ranked at the most popular animal origin food. It is estimated that 95% of the households are consuming pork in their daily meals (Dinh, 2001). However, pork production is mainly based on the household level; about 60% of the rural population keeps pigs (Costales, 2007). More than 75% of pork on markets is from small business with small scale slaughterhouses. Most of produced pork in Vietnam is mainly for domestic demands and only 1-2 % for export (Nguyen, 2006). Moreover, Vietnamese's taste prefers fresh meat to frozen. Therefore pigs are slaughtered on a daily basis and most of the pork is consumed as fresh meat within a day (GAIN, 2006).

Pork is considered as a significant source of *Salmonella* to humans next to eggs and poultry meat (EFSA, 2008b). The entrance of *Salmonella* in pork production chain may occur at any stage from input at farm to the output at home consumption. At each stage, *Salmonella* can be introduced vertically or horizontally from feed, breed, environment, etc at farm, then at slaughter line, or handling and storage at market or household. Many studies reported that prevalence of *Salmonella* in pig at farm to pig carcass at slaughterhouse was wide range from 6.2% to 69% (Käsbohrer, 2000, Duggan et al., 2010, van Hoek et al., 2012, Schmidt et al., 2012) or higher in Thailand (69,5%) (Patchanee, 2002) or in Vietnam (95.7%) (Le Bas et al., 2006). In

addition, *Salmonella* in pork was also reported as a high prevalence such as 29% to 65% in Thailand (Padungtod and Kaneene, 2006, Sanguankiat et al., 2010) and 69.9% in Vietnam (Tran et al., 2004, Phan et al., 2005a). Due to *Salmonella* can cause salmonellosis via consuming contaminated pork. It was estimated that 15–20% of all human cases of salmonellosis were associated with the consumption of pork in Germany (Botteldoorn et al., 2003). However, reported cases are likely to represent likely a minor proportion of the total number of cases found in human population (EFSA, 2008b). The number of nontyphoidal *Salmonella* gastroenteritis cases was estimated at 93.8 million globally each year, with 155,000 deaths. In South East Asia region, there is an absence of official *Salmonella* surveillance data but it is estimated that up to 22.8 million cases occur annually with 37,600 deaths (Majowicz et al., 2010). These numbers showed the burden of *Salmonella* in pork chain as a source of transmission to human.

Hung Yen is one of important source in pig and pork produce with pig farms and slaughterhouses in varieties of scale. This province located in the North of Vietnam and has population about 1.2 million with 926 km square (GSO, 2011). This is developing area of both commercial and livestock production, particularly pig breeding and producing. Pork consumption in Hung Yen is about 70 tons per day. In addition, Hung Yen is far from Hanoi about 50 kms. It is one of the major pig and pork providers for Hanoi where average pork consumption per day is approximately 400 tons. However, pork and pork products are distributed mostly on traditional ways with small-scale slaughter, retail and pork producers (ILRI, 2010). So, it is needed to pay attention on not only quantity but also quality in pork production chain in Hung Yen.

In recent years, qualitative risk assessment and quantitative microbial risk assessment have been studied and widely applied to assess risks in public health and veterinary public health including food safety and foodborne diseases or zoonoses. In Vietnam, food safety conditions and practice at pork market (in Hanoi) is mostly (88.4%) at medium level (Toan, 2011) as well as the small scale pig slaughterhouse. So, the risk of microbial (including *Salmonella*) contamination into pork is likely

high. Therefore, microbial identification and characterization are needed to be quantified so that the management can be developed early intervention programs. Base on those data, risk analysis will support to minimize risk and to reduce adverse effects of risk to human health, as well as economic losses. It is one of significant elements to help policy makers to make good decisions or plans timely and effectively.

Regarding to human, animal health and food safety, not only the biological contamination, but also personal perception and individual behavior play an important role for risk assessment along a chain. In practice, it is known that factors of related groups (slaughter workers, pork sellers, people living around slaughterhouse, pork consumers as well as veterinary and public health staffs), such as practice behavior, perception on food safety or foodborne disease and management, etc, may involve directly or indirectly onto microbial contamination risk. On the other hand, an integrated approach on food safety will help to review the human health risk from a more standpoint including environment, animal and human health. Hence, the perception and practice behavior of these groups can be used and analyzed as a manner of risk management and communication.

For all reasons above, besides providing animal protein source and worldwide consumed, pork is also considered as a significant source of *Salmonella* to humans' salmonellosis. Risk assessment becomes one of applicable approach to assess risk in public health and veterinary public health including food safety and foodborne diseases or zoonoses. So that, both data from biological analyses and information of personal perception, practice behavior play an important role for risk assessment along a chain. Hung Yen province is one of important source of pig and pork production with pig farms and slaughterhouses in varieties of scale in Vietnam. However, there are only few studies on *Salmonella* in pork chain in Hung Yen province. From these points, how to define the situation and assess the risk to human health if it comes to *Salmonella* contaminated pork. Thus, we conducted this study aims to provide information and data for control, prevention *Salmonella*.

## 1.2 Objectives of study

- 1. To detect the *Salmonella* prevalence and concentration on pig carcasses at slaughterhouse and at the market.
- 2. To identify risk factors of *Salmonella* contamination in the pork production chain.
- 3. To explore people and relevant stakeholders perception related to *Salmonella* contamination.

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