

# CHAPTER I

## INTRODUCTION

### 1.1 Background

Swine are known to be susceptible to infection with avian influenza viruses. However, natural infection of swine with the H5 strain has not been previously reported.

In order to assess the implications for human health, it is important to know whether the reported infections in swine are rare events, possibly caused by contact between swine and wild birds. Wild aquatic birds, which are the natural reservoir of all influenza A viruses, can carry the H5 strain without developing symptoms, and are known to excrete large quantities of the virus in their faeces.

A comparison of the H5 strain isolated in swine with strains recently circulating in poultry populations in parts of Asia is needed to determine whether the virus is being passed directly from poultry to swine. Evidence of direct transmission of H5 from poultry to large numbers of swine would be of particular concern, as this would increase opportunities to emerge a new influenza virus.

Swine have receptors in their respiratory tract that make them susceptible to infection with human and avian influenza viruses. A swine is simultaneously infected with both a human and an avian influenza virus, it can serve as a "mixing vessel", facilitating the exchange of genetic material between the two viruses in a process known as "reassortment". The resulting new virus, which will not be recognized by the human immune system, will have pandemic potential if it

retains sufficient human genes to allow efficient human-to-human transmission, and it causes severe disease in humans.

Confirmation of H5N1 infection in swine would add complexity to the epidemiology of this disease, but it needs to be viewed in perspective. During the peak of the poultry outbreak of H5N1 in Vietnam earlier in 2004, extensive testing of swine on farms where poultries were heavily infected failed to find evidence of infection in swine. In addition, Hong Kong authorities regularly performed random testing for the H5N1 avian influenza virus subtype in swine imported from mainland China, no infection in swine has been detected to date (WHO,2004). But in Indonesia, it has been detected conducted surveillance during 2005–2009 and it was found that 52 swine in 4 provinces were infected during 2005–2007 but not in 2008–2009 (Nidom, *et al*, 2009).

Swine have been considered as “mixing vessels” (Castruci, *et al*, 1993) because they support replication of avian and human influenza viruses (Kida, *et al*, 1994). Their tracheal epithelial cells reportedly bear SA $\alpha$ 2,3Gal and SA $\alpha$ 2,6Gal receptors (Ito, *et al*. 1998). However, recent studies have shown that despite SA $\alpha$ 2,3Gal and SA $\alpha$ 2,6Gal receptors in swine respiratory tracts, SA $\alpha$ 2,3Gal is found only in the smaller airways (bronchioli and alveoli) and not in the trachea. Kuchipudi *et al*. (2009) found SA $\alpha$ 2,3Gal and SA $\alpha$ 2,6Gal receptors in the bronchi, bronchioli, and alveoli of chickens and ducks; however, SA $\alpha$ 2,6Gal was dominant in chicken tracheal epithelium, and SA $\alpha$ 2,3Gal, in duck trachea. Given that influenza A (H5N1) viruses have been transmitted directly from birds to humans, the central dogma of swine as a mixing vessel may no longer stand.

Moreover, under experimental conditions, swine susceptibility to infection with avian influenza A (H5N1) viruses is low (Lipatov, *et al.*, 2008). Nevertheless, the pandemic (H1N1) 2009 virus is a reassortant originally from 4 genetically distinct viruses and appeared to be generated in swine, suggesting their role in the generation of pandemic influenza viruses (Smith, 2009).

Infection of swine with influenza A (H5N1) viruses has been reported in Vietnam and China; however, the infection status of swine in Indonesia remains unknown accurately. Therefore, it is needed to explore whether swine in Indonesia had been infected with influenza A (H5N1) viruses and, if so, whether the viruses were transmitted multiple times and had acquired the ability to recognize human-type receptors (Nidom, *et al.*, 2010).

## **1.2 Statement of The Problem**

Based on the background above, statement of the problem of the research would be as follows:

“Is there Sero prevalence of Avian Influenza H5 detected on Swine in Indonesia? how many the percentage of it ?”

## **1.3 Purpose of The Research**

The purpose of this study was to detect the Avian Influenza H5 sero prevalence on swine in Indonesia by serological study, and its percentage as more specific data.

#### **1.4 Significance of The Research**

If Avian Influenza H5 sero prevalence detected on swine in Indonesia, this study will be able to be reference to do a continuous study about Avian Influenza infects swine especially in Indonesia.