CHAPTER 1

INTRODUCTION

1.1 Background

Newcastle disease is regarded being endemic in the world (OIE, 2012) and most countries, including all European Union countries enforce statuory control measure in the event of outbreaks of disease since it's recognition in 1926. Newcastle Disease Virus or NDV has a worldwide distribution, altough in some countries, only viruses of low virulence for chickens have been reported (Alexander, 2008). The disease is regarded to be the most important and challenging disease in regards of poultry industry. Among the viral disease affecting poultry, Newcastle Disease has evolved into a greater challenge due to emergence of novel strains and ultimately vaccine failures (Rahman et al, 2014).

Newcastle Disease in Indonesia was first reported in Jawa by Kraneveld back in 1926. Vaccines for prevention is available, but it seems yet to be effective in preventing ND to infect the chicken. Altough all commercial chickens in Indonesia are routinely vaccinated with live Newcastle Disease Virus vaccines, ND continues to be a major problem for the poultry industry (Samal, 2011). The disease still emerge from time to time. In 2009 and 2010, outbreaks of ND occurred in commercial chickens in Indonesia, causing up to 70% to 80% mortality (Xiao et al., 2012). Some observation shows wave of emergence of this disease on Indonesian commercial broilers starting in 2010 at the start of rainy season, and continued accordingly until 2011. Alteration of broilers genetic is one causing factor.

NDV strains is categorized into five group of pathotypes based on the severity of infection and clinical sign. Each group shows different lession and clinical sign and different strains of NDV worldwide have different pathotype. Mainly, clinical ND has been broadly classified into four syndromes, based on the disease in domestic chickens as velogenic, mesogenic, lentogenic, and avirulent (OIE, 2006)

Economical impact of NDV could be massive according to it's high morbidity rate. Because of the severe economic consequences of an outbreak of virulent ND in commercial poultry, the disease is reportable to the World Organization for Animal Health or OIE (Office International des Epizooties). Prevention is in the higher priority than treatment procedure, to avoid the economic loss. Various strain of vaccines is developed to cover various virus strains worldwide. Current NDV vaccines have been used for more than 50 years with proven safety and efficacy (Dortmans et al., 2012). The available vaccines may induce protection against the disease, but several tudies have shown that they don't prevent infection and virus shedding. This may result in still going transmission, even if there's no clinical sign shown.

Besides molecular pathogenicity assessment, biological characteristics is one important and can't be neglected study in case of determining pathogenicity of Newcastle disease virus. The assays that consisted of Meand Death Time (MDT), Intracerebral Pathogenicity Index (ICP), and Intravenous Pathogenicity Index (IVPI) can also conducted to compare a certain samples into known isolates or vaccines aside in determining their pathogenicity. ICPI, especially, is the gold standard for pathogenicity determination (OIE, 2018). So conducting these series

of assay is very important to complement the pathogenicity assessment from molecular method.

Continous study to improve Newcastle Disease vaccines is beneficial to maintain the eficacy of the vaccines against the virus. Local strains of vaccines could provide a better immunity against local virus. Field data collection and study is required to gather adequte amount of isolates which will be further processed into vaccines. Hence, based on the background, the research problem can be formulated as follows:

1.2 Problem Formulation

1.2.1 What is the NDV samples pathotype characterized by Mean Death Time (MDT) assay?

1.2.2 What is the NDV samples pathotype characterized by Intracerebral Pathogenicity Index (ICPI) assay ?

1.2.3 What is the NDV samples pathotype characterized by Intravenous Pathogenicity Index (IVPI) assay ?

1.3 Theoritical Base

Since 1926, the first outbreaks in Indonesia the NDV isolate have been made from the species all over the world from both wild and domestic species, where highly related 40 NDV isolates from subgenotype VIII have been isolated from poultry production and from pet birds, in Indonesia, Pakistan, and Israel since 2011 and during 2012 (Miller et al., 2015). NDV can be transmitted to another avian through aeorosol inhalation of excreted droplet particles or the ingestion of infective material such as faeces and this route of transmission depend on the environmetal condition (Alexander et al., 1984). Most low-virulent or avirulent

avian paramyxovirus serotype 1 strains are maintained in migratory waterfowl and other feral birds, whereas others are maintained in domestic poultry (Maclachlan et al., 2011).

Laboratory testing in embryos or chickens using standard pathogenicity parameters can be done, including MDT, IVPI, and ICPI (Cattoli et al., 2011). The MDT (Mean Death Time) is the mean time in hours for the minimal lethal dose to kill innoculated embryos (FAO, 2002). Other pathogencity test, such as intracerebral pathogenicity index (ICPI) and the intravenous pathogenicity index (IVPI), are used to classify the virulence of NDV isolates according to standard parameters (Cattoli et al., 2011). Currently, the primary methods such as MDT, ICPI, and IVPI for pathogenicity assessment cannot be neglected along with molecular method (WHO, 2002).

1.4 Research Objective

1.4.1 To analyze the the NDV samples pathotype characterized by Mean Death Time (MDT) assay.

1.4.2 To analyze NDV samples pathotype characterized by Intracerebral Pathogenicity Index (ICPI) assay.

1.4.3 To analyze NDV samples pathotype characterized by Intravenous Pathogenicity Index (IVPI) assay.

1.5 Research Advantage

This research will provide information about the biological characteristic of NDV isolates and more importantly the pathogenicity of the isolates. Pathogenicity determination is important for vaccines development because the

pathotype of the NDV isolates will determine wether the isolates can be further processed into vaccines and what type of vaccines the isolates are eligible to be processed further.