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SEROPREVALENCE OF AVIAN INFLUENZA SUBTYPE H5N1 IN NYCTICORAX NYCTICORAX, PULAU DUA SANCTUARY, BANTEN

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Abstract - Wild waterfowl is known as natural reservoir of Avian Influenza subtype H5N1. Pulau Dua Sanctuary, Banten is a place for waterfowl resident. This study aimed to determine the prevalence of H5N1 in Night Herons (*Nycticorax nycticorax*) through Serology Test. Observation on the habitat and behavior of Night Herons was done to analyze the interaction that occurred in that area. A total of 56 serum samples consisted of 51 samples of juvenile and 5 sample of adult birds were examined through Haemagglutination Inhibition in order to identify antigen of H5N1. Result showed that 10.7% tested positive for H5N1 antibodies where 20% for adult and 9.8% for juvenile. Geometric Mean Titter is $2^{0.28}$ which is relatively very low. The result proved that *Nycticorax nycticorax* in Pulau Dua Sanctuary has antibody of AI virus subtype H5N1.

Keywords - H5N1, Waterfowl, Haemagglutination Inhibition, *Nycticorax nycticorax*

I. INTRODUCTION

In recent decades Avian Influenza has become one disease that has spread world wide and once endemic in several countries, including Indonesia¹. The epidemic has negative impact in terms of social and economic development, such as in the livestock sector, and tourism. Another aspect that should be noticed is the impact on the conservation area status of wild birds, especially waterfowl which is considered as a natural reservoir of avian influenza

viruses.

Previous research in 2008 proved that some species was positive with antibody of H5N1. The following research was conducted to complement data in other species. It aims to determine seroprevalence of Avian Influenza subtype H5N1 in species namely *Nycticorax nycticorax* or Night Herons. Night Herons which belongs to waterfowl species in Pulau Dua Sanctuary Banten is potentially infected by H5N1. Finally, it is expected to obtain some other proposes including biosafety and biosecurity information.

II. BASIC THEORY

Indonesia belongs to migratory bird path. It leads to the interaction between wild bird migratory, resident and domestic poultry. Cases of Avian Influenza in Indonesia is quite high. One of the suspects that emerged was a correlation between the status of Indonesia as the path of migratory birds with avian influenza expansion².

Pulau Dua Sanctuary, Banten is a ecosystem that holds hundreds of wild birds, precisely the type of resident waterfowl which belongs to line and migratory birds. Also, there are poultry farms around the sanctuary. Previous research in 2009 where 13 % of 57 samples of *Bubulcus ibis* showed positive results to H5N1 antigen after tested by serology method³.

Serology is diagnosis method to analyse antibody. In this case, serology can be implemented through

Hemagglutination Inhibition. This test which works with red blood cell is to determine antibody in serum by H5N1 virus standard¹.

III. MATERIALS AND METHODS

Fieldwork was conducted by taking blood samples of Night Heron. It continued to laboratory test by using Hemagglutination Inhibition¹.

IV. RESULTS AND DISCUSSION

Based on samples collected at Pulau Dua Sanctuary, there are nine dominant species being resident including *Nycticorax nycticorax*, *Ardeola speciosa*, *Bubulcus ibis*, *Egretta garzetta*, *Egretta intermedia*, *Casmerodius albus*, *Ardeacinerea*, *Ardea purpurea*, and *Phalacrocorax sp.*. Populations in these ecosystems can be classified into several sub-locations which is located in west, central and north. As shown in Figure 1, there are some species live in each sub-location⁴.

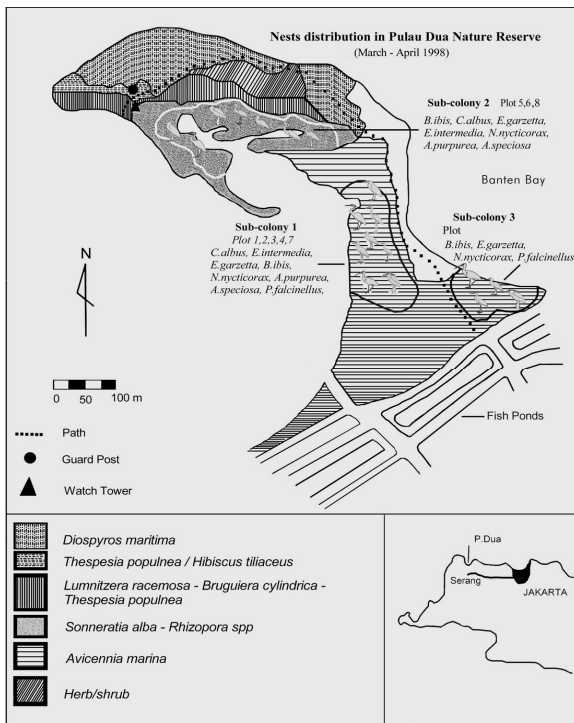


Figure 1. Map of Pulau Dua Sanctuary
 (Sources: Wetland Indonesia)

Wetland is place where waterfowl spend most of

their time, especially for foraging. The habitats of waterfowl covers field rice, ponds and beaches. Nearby (+500 meters), the settlement has opened poultry farm including chicken, duck. At day, those farm forage food around rice fields and ponds as Herons and other birds do in evening as shown in Figure 2.



Figure 2 Rice Field Around Pulau Dua Sanctuary
 Above: water fowl foraging in the area of rice fields.
 Below: domestic poultry roam the fields the same area

In this research, 56 samples were tested consists of 5 adults and 51 juveniles. The results of serologic tests showed that 20% of adult is positive with H5N1 antibody with the average titer reaching $2^{0.8}$. Meanwhile, 9.8% of juvenile showed positive results with the average titer reaching $2^{0.23}$. The average value of all samples tested titer at $2^{0.28}$. Overall the positive samples is 10.7%. Geometric Mean Titer (GMT) is 0.28 which is shown in Tabel 1. The formula of GMT can be seen as below:

$$\text{Log}_2 \text{ GMT} = \frac{(\text{Log}_2 t_1)(S_1) + (\text{Log}_2 t_2)(S_2) + \dots + (\text{Log}_2 t_n)(S_n)}{N} \quad (1)$$

information

N: number of sampel (serum)

Q: antibody titers at the highest dilution (end point)

S: The number of samples with titers

N: The number of antibody titers at N sample

Table 1. Serologic Test with GMT

Sample	Σ	Result + (%)	GMT
Juvenile	51	9,8	0,23
Adult	5	20	0,8
Total	56	10,7	0,28

The average of titers of H5N1 antibody can be classified as low antibody titers. The low antibody titers according to WHO⁵ may be caused by several factors, including: the tendency of infection in wild birds caused by Low Pathogenic Avian Influenza Virus with a small amount of infection of the virus; virus transmission occurred not directly, but through the environment; period of infection may in long time that can make reduction of antibody titer.

Avian Influenza could be transmitted through water and other objects contaminated with the virus. This is in contrast to influenza infection in mammals (humans, pigs, horses) that mainly occurs through droplets from the nose and mouth. Avian Influenza could survive in the environment. Virus which is transmitted directly will be more virulent than the one which is transmitted through the environment⁶.

The cycle of infection among birds generally occurs through fecal-oral chain, meaning that the virus can be transmitted through the digestive tract. The case of infected tigers at a zoo in Thailand after eating the infected birds is evidence that Avian Influenza subtype H5N1 can be transmitted through the gastrointestinal tract⁷.

Water is a medium that may cause transmission. H5N1 demonstrated a good ability to maintain its structure in nature, especially in the water. In general, virus has the ability to survive for 4 days at 22°C, and more than 30 days at 0°C. Habitat for waterfowl that live in wet areas would be a possibility for transmission through water⁵.

Based on the origin of the positive samples, 50% came from the west and 50% came from the east. It

showed that the spread occurred equally between the two subcolonies where Night Herons live. In this case the transmission that occurs can be classified into intraspecies and interspecies. Intraspecies transmission consists of the transmission between individual and between parent and child. Interspecies transmission may happen between the Night Herons and other waterfowl and domestic poultry.

The transmission between individuals may occur if this species live in a colony and foraging in the same place. Habitat contaminated by the virus is one cause of intraspecies transmission. One of the three main activities of Night Heron is caring for children. When parents feed children with contaminated food, transmission will be occurred to children.

Another possibility is interaction between domestic poultry and Night Herons. Banten is one of three provinces that has the highest recorded cases of H5N1 after Jakarta and West Java. Surveillance of domestic poultry in Banten showed a high degree. In general, there may be indirect transmission between from wild birds to domestic poultry⁶.

Department of Health Report indicates evidence relation between the existence of outbreaks in poultry and wild birds. It reported a high prevalence of H5N1 in poultry which located in path of migratory birds seasonally. High prevalence was also recorded in the livestock industry which uses the open cage. Other reports told that epidemics of H5N1 have regional distribution according to the movement of migratory birds⁹.

V. CONCLUSION

Nycticorax nycticorax in Pulau Dua is positive with antibody of Avian Influenza subtype H5N1 Geometric Mean Titer is 2^{0.28} which is relatively very low. Following research in molecular biology is recommended to conduct in order to obtain more information on the virus strain and phylogenetic relationships. Research on poultry farms around sanctuary is also recommended.

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[PROCEEDING INTERNATIONAL SEMINAR ON SCIENCE TECHNOLOGY INNOVATION 2012 UNIVERSITY OF AL AZHAR INDONESIA, JAKARTA OCTOBER 2- 4 2012 SEROPREEVVAALLEENNCCEE OF AVIAN INFLUENZASUBTYPEH5N1 INNYCTICORAX NYCTICORAX, PULAU DUA SANCTUARY, BANTEN](#) Edwinnata Bustami¹, Dewi Elfidasari¹, Sri Murtini²
[1Biology Department, Faculty of Science and Technology, University of Al Azhar Indonesia](#) Jakarta [2Department of Animal Diseasee and Veterinary Health, Faculty of Veterenary Medicine, Bogor Agricultural University, Bogor](#) E-mail: edwinnata@gmail.com Abstract -Wild waterfowl is known as natural reservoir of Avian Influenza subtype H5N1. Pulau Dua Sanctuary, Banten is a place for Waterflow resident.This study aimed to determine the prevalence of H5N1 in Night Herons (Nycticoraxnycticorax) through Serology Test. Observation on the habitat and behavior of NightHeronswas done to analyze the interactionsthat accoured in that area. A total of 56 serum samples consisted of 51 samples of juvenile and 5 sample of adult birds were examinedthroughHaemagglutination Inhibition in order to indentify antigen of H5N1. Result showed that 10.7% tested positive for H5N1 antibodies where 20% for adult and 9.8% for juvenile.Geometric Mean Titter is 20,28which is relatively very low. The result provedthatNycticorax nycticorax in Pulau Dua Sanctuary hasantibody of AI virsus subtype H5N1. Keywords - H5N1, Waterfowl, Haemagglutination Inhibition, Nycticoraxnyxticorax I. INTRODUCTION n recent decades Avian Influenza has becomed one disease that has spread world wide and once endemic in several countries, including Indonesia1. I The epidemic has negative impact in terms of social and economic development, such as in

the livestock sector, and tourism. Another aspect that should be noticed is the impact on the conservation area status of wild birds, especially waterfowl which is considered as a natural reservoir of avian influenza viruses. Previous research in 2008 proved that some species was positive with antibody of H5N1. The following research was conducted to complement data in other species. It aims to determine seroprevalence of Avian Influenza subtype H5N1 in species namely *Nycticorax nycticorax* or Night Herons which belongs to waterfowl species in Pulau Dua Sanctuary Banten potentially infected by H5N1. Finally, it is expected to obtain some other proposals including biosafety and biosecurity information.

II. BASIC THEORY

Indonesia belongs to migratory bird path. It leads to the interaction between wild bird migratory, resident and domestic poultry. Cases of Avian Influenza in Indonesia is quite high. One of the suspects that emerged was a correlation between the status of Indonesia as the path of migratory birds with avian influenza expansion.

2. Pulau Dua Sanctuary, Banten is an ecosystem that holds hundreds of wild birds, precisely the type of resident waterfowl which belongs to line and migratory birds. Also, there are poultry farms around the sanctuary. Previous research in 2009 where 13 % of 57 samples of *Bubulcus ibis* showed positive results to H5N1 antigen after tested by serology method.

3. Serology is a diagnosis method to analyse antibody. In this case, serology can be implemented through SEROPREVALENCE OF AVIAN INFLUENZA

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SEROPREVALENCE OF AVIAN
INFLUENZA SUBTYPE H5N1
IN NYCTICORAX NYCTICORAX,
PULAU DUA SANCTUARY,
BANTEN

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SEROPREVALENCE OF AVIAN INFLUENZA SUBTYPE H5N1 IN *NYCTICORAX* *NYCTICORAX*, PULAU DUA SANCTUARY, BANTEN

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Keywords - H5N1, Waterfowl, Haemagglutination Inhibition, *Nycticorax nycticorax*

I. INTRODUCTION

In recent decades Avian Influenza has become one disease that has spread world wide and once endemic in several countries, including Indonesia¹. The epidemic has negative impact in terms of social and economic development, such as in the livestock sector, and tourism. Another aspect that should be noticed is the impact on the conservation area status of wild birds, especially waterfowl which is considered as a natural reservoir of avian influenza

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