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RISK FACTORS FOR WATER FOWL INFECTION WITH AVIAN INFLUENZA H5N1, WEST JAVA PROVINCE, INDONESIA

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Abstract. *The cross sectional study had been carried out in September to December 2006 at West Java Province, Indonesia. The objective this study was to identify the risk factor of H5N1 avian influenza virus of water fowl. 1,510 serum samples of water fowl from 118 farmers were collected. The H5N1 virus was tested by Haemagglutination Inhibition (HI) test from serum samples and the information risk was obtained from a questionnaire. The questionnaire included farmer's characteristics and farm management. Logistic regression model showed that an association with H5N1 virus infection risk at a 5% significance level was found for farming systems with odds ratio (OR) was 6.87,95% CI:1.29-36.54 for free ranged waterfowl (indoor/water fowl house with fence as the reference). There is no statistical significant difference in farming system between restricted ranged fowl (inside fence) and indoor water fowl house with fence.*

***Keyword**: Logistic regression, odds ratio, risk factors, avian influenza, H5N1*

1. Introduction

Avian Influenza (AI) disease nowadays become focus as its potential to cause flu pandemic for human being. To date, bird flu cases, especially in poultry farms has already world spread including Indonesia.

Avian Influenza disease in Indonesia had been detected since July to August 2003 in poultry and infecting human since mid 2005. To date in Indonesia, *avian influenza* in human already reaching 134 cases with total death numbering 109 people (KOMNAS FBPI, 14 May 2008).

From the beginning the spread out of AI disease, water fowl was considered as one animal species that carried the virus. Hulse-Pascal et al. (2005) stated that waterfowl which are duck, muscovy and swan were natural carrier for Type A Influenza. Inside waterfowl body, the virus usually at the steady state and did not showed disease symptoms nonetheless still excreting virus (virus shedding) along with its droppings.

Research conducted regarding the level of infection for AI virus in waterfowl had been done everywhere. LPAI surveillance in wild duck known for its prevalence about 60% in North America and about 0.4-2% in Canada (Olsen et al. 2006). Research in Thailand reported that 27% of backyard duck flocks positively infected by H5N1 (Songserm et al. 2006). Research done by Faculty of Veterinary Medicine IPB in Sumatera and Kalimantan, showed that duck farms in 9 (nine) provinces are positively infected by avian influenza virus with a variance of percentage ranging from 0% to 44.6% (Soejoedono et al. 2005). Testing in duck samples accepted in 2004 by Balai Besar Veteriner Wates was resulted in findings that 21% of samples given were positively infected by avian influenza virus (Prijono dan Walujo 2004).

Faculty of Veterinary Medicine IPB has cooperated with Directorate General of Live Stock; Ministry of Agriculture of Indonesia had been focusing the study of Avian Influenza in waterfowl, especially gathering information of waterfowl (duck, muscovy, and swan) capability as reservoir and transmitter of AI virus to chicken and other species.

Starting from the condition, research has been done to identifying various risk factors, coming from the farmer or the farming management and its effect of AI virus infections in waterfowl.

Logistic Regression models are brought to identifying the risk factors influencing the infections of H5N1 virus and to estimate each odds ratio for each risk factor. Result of this research should be one of basic data used in controlling of AI diseases in Indonesia.

2. Methods

This research is done with cross sectional study design by doing survey to waterfowl and farmer in West Java area. This study conducted in September through December 2006 at four districts which are: Indramayu, Cirebon, Bogor, and Sukabumi that are known having highly populated waterfowls. Five subdistricts in each district samples were selected randomly as surveyed area.

As much as 60 blood serum samples are taken from each subdistrict. Samples from each subdistrict were taken from at least 8 farmers, and from each farmer were taken maximum 10 waterfowl samples.

Blood serum then tested with Haemagglutination Inhibition (HI) test. Those tests were done to achieve positively or negatively infected by avian influenza virus H5N1.

Each farm examined was H5N1 positively test category if examination result with HI test was found AI antibody at least on 1 waterfowl tested. In contrary, if HI test result were showing no AI antibody on all samples taken, it means H5N1 negatively test category.

Each farmer owner was interviewed with questionnaire to get information about farmer characteristics and management. Human resources characteristics were include age, educational level, knowledge, farming objective, farming experience, other jobs besides farming as well as supervision. Farming management characteristics includes: farming system, numbers of waterfowl, housing system, feeding system, movement control, sanitation, reporting system, quarantine action and manure handling. Questionnaire for farming human resources is done by interview, while management characteristics data is done by observation and interview. Before surveying, all blood sample collectors and enumerators were trained.

Result data from this research is analyzed with $\chi 2$ independent tests to examine proportion difference from all data groups and Regression Logistic Model (SAS v9.1) to estimate Odds Ratio (OR) values (: Kleinbaum DG 1994).

3. Result and discussion

Survey result had collected 1510 serum samples from 118 farmers. Risk factors observed covering farmers knowledge, farming system, presence of other animal surrounding duck housing area, caring system for duck and other animals, housing type, sanitation (water fowl house, waterfowl run area, feeding equipment, watering area), manure handling and movement control. The estimation of Odds Ratio and its 95% confident interval for each risk factor is presented in Table 1 below.

Table 1. Risk factors association and AI virus infection

No	Risk Factors	Odds Ratio	95% CI
1	Knowledge		
	Poor	0.70	0.22 - 2.25
	Moderate	1.53	0.53 - 4.47
	Good	1.00	Reference
2	Farming system		
	Indoor/water fowl house with fence	1.00	Reference
	Restricted ranged fowl (inside fence)	2.39	0.32 - 18.02
	Free ranged waterfowl	6.39*	1.29 - 36.45
3	Presence of other animal farm surrounding housing area		
	Present	5.54	0.68 - 45.34
	Not Present	1.00	Reference
4	Caring system for duck farm and other farm animal		
	Freely join	1.07	0.18 - 6.47
	Separated housing with no spaces	0.89	0.11 - 7.06
	Separated housing with certain spaces	1.00	Reference
5	Housing type		
	Raised Floor	1.00	Reference
	Floor	0.58	0.05 - 6.65

6	Housing Sanitation		
	Clean	1.00	Reference
	Moderate	1.44	0.44 – 4.77
	Dirty	1.23	0.43 – 3.53
	Very dirty	4.33	0.50 – 37.26
7	Feeding equipment sanitation		
	Clean	1.00	Reference
	Moderate	7.89	0.95 – 65.85
	Dirty	4.69	0.50 – 37.97
8	Watering area sanitation		
	Clean	1.00	Reference
	Moderate	3.24	0.62 – 16.83
	Dirty	3.00	0.64 – 14.08
9	Water fowl run area sanitation		
	Clean	1.00	Reference
	Moderate	0.53	0.08 – 3.43
	Dirty	0.72	0.16 – 3.28
10	Manure handling		
	Without treatment	0.57	0.15 – 2.18
	With treatment	1.00	Reference
11	Movement control in farming area		
	Present	1.00	Reference
	Not Present	1.21	0.24 – 6.01

*) Showing significant association at α=0.05

Table 1 shows that risk factor related to waterfowl farming management which significantly influenced the infection of AI virus is farming system. Farmers who let their ducks in free range system have Odds Ratio 6.87 (CI 95%: 1.29 – 36.54) compared to ducks which are indoor/water fowl house with fence. The value was indicating that ducks in free range system are having chances serologically positive AI 87% (56% - 97%) higher than those that ducks which are indoor/water fowl house with fence. Meanwhile, there is no statistical significant association between risks factors came from farmer human resources with infection of AI virus.

In free range system, duck usually are taken out in the morning then are taken in the afternoon. Basically this is intended for the duck to find feed for its own. For this type, most of the farmers did not give any additional feed for their ducks.

Ducks that care free range could interact with other fowl surrounding the housing. At this interaction process, duck could infect by AI virus either by other fowls or from environment. Swayne and Halvorson (2006) stated that animal mixing often practiced in sector 4 farming. This condition makes AI transmission easier.

Risk for virus infection, mainly came from other duck that function as virus carrier. Swayne and Halvorson (2006) stated that H5N1 pathogenic strain only causing slight clinical symptoms in ducks, but this virus continuously shedding virus along with its feces and potentially spreading its pathogenically virus to other birds and human.

The risk of AI infection in fowl with free range system is coming from watering that also used by wild birds, or eat and sip from sources that contaminated by feces from wild birds which carries the virus (FAO 2004). In the other hand this caring type is also play risk in infecting other farm. Gilbert et al. (2006) stated that duck in free range allowed ducks to move from one area to another, is becoming a factor in spread out of Highly Pathogenic Avian Influenza (HPAI) H5N1.

Fences, which bordering farm area was an important factor in prevention of avian influenza spreading in sector 4. Farm's fence functions to prevent contact with human, other bird or other animal. Fence makes birds neither getting out from farm nor other animals entering farm area (Jeffrey 2006, USDA 2006).

4. Conclusion

Logistic regression model showed that an association with H5N1 virus infection risk at a 5% significance level was found for farming systems with odds ratio (OR) was 6.87,95% C1:1.29-36.54 for free ranged waterfowl (indoor/water fowl house with fence as the reference). There is no statistical significant difference in farming system between restricted ranged fowl (inside fence) and indoor/water fowl house with fence.

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