THE APPLICATION OF BIOSECURITY AND SPREAD VIRUSES DETECTION OF *AVIAN INFLUENZA* IN 3 AND 4 CHICKEN FARM SECTOR IN PADANG CITY

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Abstract

Bird flu is usually called *Avian influenza* is an infectious disease caused by H5NI virus naturally found in wild waterfowl with no symptoms of illness, while in the domestic chicken it causes severe illness that cause death. The spread of avian influenza can occur due to the spreading of infection from infected chickens to those vulnerable chickens in which this interaction is very large because the chickens are in one cage. The action of chicken eradication is not suitable from the purpose of avoiding bird flu *(Avian influeza*) pluque, the application of biosecurity is an effort to anticipate how to make chicken farming sustainable. Biosecurity is implemented to secure chickens from bird flu *(Avian influenza*) by securing the environment and the people involved in the sycle of maintenance synergical with the community The application of biosecurity to control the spread of bird flu (*Avian influenza*) so that the transmission can be minimized. The laying hens farming in City of Padang are at level 3 in the application of biosecurity, while the chickens are at level 4. Vaccination has been carried out 100 percent of laying hens while 98,8 of the chickens at level 4 were not vaccinated. From the process of chicken blood serum samples was continued to the laboratory analysis, and the results showed that the bird flu virus (*Avian influenza*) did not cause disease in laying hens farm sector 3, the chickens farming in sector 4 was continued without a thorough extermination to avoid the epidemic. But actually, chicken farming can be continued applying biosecurity against the bird flu *(Avian influenza*).

Keywords. Chicken farming, *Avian influenza*, bio-security.

1 INTRODUCTION

Bird flu or *Avian influenza* is an epidemic disease among birds. Since it prevailed worldwide in 2003, poultry farmers have been under constant threat from loss of domestic birds due to the disease. The source of the disease is influenza virus H5N1 carried naturally by wild birds. Infection of domestic birds with H5N1 viruses leads to two types of diseases, low pathogenic form and highly pathogenic form. The infection of domestic birds with highly pathogenic form spreads rapidly over a poultry farm and causes domestic birds serious sicknesses that eventually lead to death. In practice, spotcheck is conducted to detect infection of domestic birds with H5N1 viruses. If one bird in a farm is detected positive for infection, all the birds in the farm are disposed of. Primary factors for outbreak of bird flu include avian influenza virus as source of disease, poultry as host, and environment as medium. In a production process on a poultry farm, the entire population of domestic birds is kept constant at the manageable capacity by supply of new healthy birds for vacancies. After intrusion of influenza virus, some infected birds die at an early stage of infection, and some others live longer. However, regardless of being alive or dead, infected birds are the sources of infection, unless they are completely removed from the entire population. Efforts have been made against the spread of bird flu, but none of them has so far prevailed, which is due to inappropriate vaccination and inadequate to the weak biosecurity in farm areas (WHO, 2005). Biosecurity is the action for the security of the livestock based on the security environment and the people involved in the maintenance cycle. For example, vaccination is an effective measure to reduce the risk of infection both for human and for domestic animal (Breytenbach,

2005). Quick and correct decisions should be made to prevent further spread of the disease so that the losses for poultry farmer would be minimized. Company that operates a poultry farm under sound biosecurity is able to survive and still be in production. Implementation of biosecurity by poultry farms against *Avian influenza* seemed to have increased after decline in poultry industri in 2005. (WHO, 2007).

Avian influenza is an acute, highly contagious disease with a predilection for the respiratory, digestive and nervous systems of a variety of both domestic and wild bird species (Alexander 2000, Swayne & Suarez 2000). Over the last decade, *Avian influenza* has emerged as an animal disease of concern for veterinary and human health organizations across the world (Jutzi 2005, World Health Organization 2006). This is primarily be- cause of its ability to cause illness and death in poultry and humans, disrupt poultry trade, threaten the food security of resource-poor countries and the high costs associated with control measures (Horimoto & Kawaoka 2001, Campitelli et al. 2002, McLeod et al. 2004). The main epidemiological features of *Avian influenza* that contribute to these concerns include the large number of possible virus strains, the presence of a wild bird virus reservoir which represents a constant, uncontrollable source of infection and, the inherent ability of the virus to convert to high virulent strains once it is transmitted to other species as a result of mutation or re-assortment. Adding to these complexities, infection with avian influenza viruses produces variable clinical manifestations that are often indistinguishable from endemic poultry diseases (Swayne and Suarez 2000, Elbers et al. 2007). In domestic poultry, the disease presents in two clinical forms: low pathogenic avian influenza (LPAI) which is generally associated with recent introduction of viruses from a wild bird reservoir, and a more severe form, highly pathogenic avian influenza (HPAI), associated with viruses of the H5 and H7 subtypes that have acquired virulence as a result of adaptation (Swayne & Suarez 2000).

Avian influenza remains as a huge and complicated problem influencing the overall poultry sector and causing concerns about human health in Indonesia. Since it was first detected in poultry in 2004, until September, 2007, approximately 13.5 million chickens of poultry have been depopulated. A total of Rp 3.040 billion (USD 324,000) was given as compensation to those who owned the depopulated poultry and were willing to cull their poultry to prevent transmission of bird flu (*Avian influenza*). Bird flu has infected poultry in 31 out of 33 provinces in Indonesia. USDA-FAS (2007).

The studies concerning the application of biosecurity in poultry farms have not yet been attempted. The research aims at development of a system that will provide effective control strategies. To this end, one must investigate action in the implementation of biosecurity by chicken breeder as well as real evidence about the actual event on the breeder at the time of the bird flu. One must investigate the Government's action in the case of bird flu, especially in terms of coordination, guidance and supervision, regulation and last enforcement of the sectors directly related to the handling of bird flu. The avian influenza virus mutation in Indonesia is now at the concerned level (Deptan, 2007). As well as some other areas in Indonesia, bird flu is endemic to the city of Padang, West Sumatra Province. This is due to the fact that the city is located in a path trough North Sumatra, Jambi and Riau. From the description above a variety of ideas will be presented to a management plan for sustainable development in a paper titled 'The application of biosecurity and spread viruses detection of *Avian influenza* in 3 and 4 chiken farm sector in Padang City"

2. MATERIAL AND METHODS

The material used in this study were samples of laying hens as many as 130 blood samples taken from 5 layer chicken farm sector 3 in the second district in the city of Padang, which is as many as 90 samples Pauh district and subdistrict Kuranji many as 40 samples

The methods used in this research are method of survey, observation or investigation that is critical to obtain a good description of a problem in the study area. Data were collected by using a technique based on direct interviews of respondents prepared questions in the questionnaire.

To determine the extent to which the application of biosecurity at the farm sector 3, then take as many as 5 people owners of respondent firms laying chicken farms sector 3. Retrieval study respondents conducted by purposive sampling of companies laying chicken farms that have populations above 15,000. Based on these criteria that have earned 3 subdistrict company laying chicken farms over 15 000 animals, namely: (1) Firdaus Ranch chicken, and chicken Afdefead Ranch, (2) Jumaidi Kuranji Farm in the District, (3) Chicken Ranch and Livestock Berial, Nanda chicken in the of Koto Tangah.

The number of respondents and the population of chicken laying third sector in the city of Padang on each farm can be seen in Table 1.

Table.1 . Location and number of respondents

No	District	Name farm	Amount Rresponden	Population(chick)
1	Pauh	Firdaus Farm	2	80.000
		Afdefead Farm	2	30.000
2	Kuranji	Jumaidi Farm	2	66.000
3	Koto Tangah	Berial Farm	2	19.000
		Nanda Farm	2	15.500

Source : Dinas Peternakan Kota Padang

The Working Procedure

Blood sampling performed in chickens using a syringe through a brachial vein in the ventral bottom of wing, with a sampling technique as follows:

- Prepare the necessary equipment such as sterile 3 ml syringe, cotton, alcohol, labels and sterile vials. Blood sampling is done through the wing (*brachial vein*).
- After the blood out, the syringe immediately drawn to a limited volume so that there is large room for the formation of serum. Allow the syringe at room temperature (25^oC) with 45^o tilted position until the serum is formed (*at least 2 hours*) and keep it away from direct sunlight.
- After the serum is formed, immediately separate them with blood clots and enter into a vial that has been labeled.
- For shipment to the laboratory in a styrofoam insert vial (former site of an active vaccine) or a closed plastic vial upright position and make sure (no reverse).

In the blood sampling to obtain serum, the precautionary principle should be applied as easily damaged and contaminated serum.

Laboratory examination

Serological test is a test that uses serum as the sample. The main principle is a serological test antigen reacting with the appropriate antibodies. Antibodies are immune substances released by white blood cells to recognize and neutralize the antigen (good germs viruses or bacteria) that exist in the body.

Serological test is a method used to view the picture in the body's antibody titer in chickens. Application of this serologic test is less than 4 goals, one of which is to monitor the results of vaccination. In the process, farmers began to realize the need for serological testing even more so with the many types of disease or vaccination tight schedule.

The Serum collection technique

Precautionary principle should be applied in decision-serum. Serum samples are damaged is futile because they interfere with the process and reading the results of serological tests. Some of the factors causing damage to the serum is sunlight, high temperature, pH and metal contamination. Serum good shooting technique, namely:

- Prepare the necessary equipment (sterile syringe, cotton alcoholic, labels and sterile vials). Syringe 3 ml. Routes depending on size of chicken blood sampling, the DOC through the heart *(intracardial*) whereas large chicken wings can be via the *brachial vein*

Figure 1. Blood sampling can be done through the wing vein blood samples brachialis

- Blood of collection performed at random. The number of samples of at least 0.5% of the population or 15-20 samples / enclosure. While the number of samples to test IBD maternal antibodies suggested 18 samples / flock of healthy chicks aged 1-4 days (pre-vaccination). In battery cages, samples taken from chickens at the bottom, middle, upper and diagonal direction. Samples taken from the postal cages in each corner and middle of the cage
- Take as much as 1-2 ml of blood of for adult chickens. Then the syringe immediately drawn to a limited volume so that there is large room for the formation of serum. Allow the syringe at room temperature (25^oC) with a flat position or standing up serum formed (*at least 2 hours*), keep it away from the hot temperatures are also direct sunlight. blood of serum that comes out about 0.75-1 ml per 2 ml blood
- After the serum is formed, immediately separate them with blood of clots and enter into a vial that has been labeled. Place the serum at a temperature of-20oC or freezer (lasting 2-5 years), serum can also be stored at 2 - 8^o C but only lasting 3-5 days
- In order to shipment to the laboratory in a styrofoam insert vial (former site of an active vaccine) or sealed plastic. Make sure the vial upright position / not inverted. Then enter the marina filopur filled cooler or an ice cube with a ratio of 1: 3.

Figure 2. Separation of serrum from blood sample of chickens

3. RESULT AND EXPLANATION

Poultry conditions in Padang

Padang city with an area of 694.96 km ² in 2008 had a population of 6,239,081 poultry of chickens. Type of poultry that has been developed in the city of Padang is a free-range chicken, chicken *(broiler and laying hens*) and ducks as shown in Table 2

Table below shows that the population is high enough chicken laying after broiler. Layer breeder chicken in the city of Padang generally use seeds from a strain of Isa Brown and Lohmann obtained from Charoen Pokphand, Mabar, and Japfa Comfeed, so that seeds which they obtained was of good quality.

Table 2. Poultry Population in the city of Padang in 2007 and 2008

No	Type of Poultry	Population in Year			
		2007	(%)	2008	(%)
1	Buras chicken (Native)	424.417	7,11%	425.333	6,82%
2	Broiler	4.981.212	83,48%	5.199.678	83,34%
3	Layer)	512.880	8,59%	561.928	9,01%
4	Duck	48.724	0,82%	52.142	0,83%
	Total	5.967.233	100%	6.239.081	100%

Source: Department Agriculture, Animal Husbandry, Platation, Forestry City of Padang, (2009)

Cage systems used in the laying chicken breeders Padang generally use open house system or open cage systems, the area fenced with chicken farms have a single entrance. Feed used in livestock feed is generally made and arranged themselves according to needs, but the raw materials are imported from the trust. This is done to maintain the quality of feed materials used as feed material are not assured quality will be one of the agents that cause disease

The health of management in laying chicken farms in the city of Padang is still not good when seen from the application of biosecurity is still low, thus laying chicken farms in the city of Padang is included in the category of sector 3. It can be seen from the maintenance system that still uses the open cage systems and cage arrangement of locations that are still not based on standards issued Permentan 2008. Homes of farmers are still in the area of farm location and the distance between the cages close enough.

Marketing of egg production has been marketed outside the province such as Lubuk Linggau, Pekanbaru to the island of Java. In terms of marketing, farmers using the system

transfers to the cage using land transportation such as trucks that have been disinfectants first before entering the farm. This measure is intended to prevent the entry of germs from the transport and vehicle use, because the vehicle could be one of the vectors in the spread of disease.

Bird flu (*Avian influenza*) spread to the chickens in Padang

Bird flu or *Avian influenza* H5N1 outbreak in chickens in the city of Padang first occurred on January 14, 2006 was found positive in village chickens in Ujung Gurun Padang of the Padang Barat District in the deaths of approximately .9 chickens. Then on February 16, 2006 found again positive cases of bird flu in the district as much as 15 chickens Kuranji Padang.

The number of chicken deaths 172 chickens until May 2007, incidence of bird flu outbreak in 2008 was still three district namely on 31 May in the Village of Sungai sapiah District Kuranji much as 125 chickens, Village of Koto Luar Pauh district as much as 14 chickens and Village Gunuang Sariak Kuranji about District 274 chickens

The cases begining from the above the spread of bird flu H5N1 in the city of Padang on the increase. This can be seen on the results of the testing results of a rapid test. Until April, 2006 Chicken flu was recorded positive of the last 477 chickens recorded in the District recorded in Nanggalo and distribution until the year 2007 increased to seven Districts. The number of chicken deaths tail 172 until May 2007, incidence of bird flu outbreak in 2008 was still three district namely on 31 May in the Village of Sungai Sapiah District Kuranji much as 125 chickens, Village of Koto Luar Pauh district as much as 14 chickens and Village Gunuang Sariak Kuranji about District 274 chickens

In the fact of the year 2009 increased again one district that previously had not affected the District Bungus Teluk Kabung. With chicken deaths recorded by the Department of agriculture, livestock farming and forestry 33 chickens Padang included into the areas of contracting bird flu or *Avian influenza* (*endemic*) to 10 districts in the city of Padang. However in 2010 is still a chicken, didn't reported positive cases of bird flu in other animals including humans. So as an organization the Office area of agriculture, animal husbandry and forestry plantations Padang trying to do the handling and control of bird flu that is not contagious to humans.

Figure: 4. Rapid test to chicken

To handling and control of bird flu in chickens in the city of Padang limited depopulation

In 2006 *Avian influenza* H5N1 virus spreads to 8 (*eight*) districts and cities in West Sumatra, namely Kabupaten Agam, Padang Pariaman, Tanah Datar, Sijunjung, Dharmasraya, Padang, Bukittinggi, Padang Panjang in the overall number of cases as many as 12,944 cases and up to the end in 2009 there has been cases of *Avian influenza* were 38 cases

The basis of Table 3, the chicken in the form of domestic poultry depopulation is maintained by the community. The most prominent area is the Eastern District of Padang, Kuranji, West and Padang Pauh. *Avian influenza* incidence in 2006-2009 due to the application of biosecurity that are did not done because it is still classified in sector 4. This is because the public generally maintain free-range chicken is not for commercial purposes but it just a funny, so the farmers are still maintaining the traditional way is to let the chickens roam around and not doing vaccinations. *Food and Agriculture Organization* (FAO) recommend to perform a mass extermination *(stamping out*) of chicken in tackling outbreaks of bird flu (*avian influenza*) to avoid the risk of HPAI spread of humanity. Reality in the field shows the ideal prevention method for dealing with bird flu is to apply the mass extermination (Mc Grane 2007).

Meanwhile, according to Breytenbach (2005) biosecurity is a security measure against the cattle through the security environment and the people involved in the maintenance cycle. This is more emphasized in the 2008 Regulation of the Minister of Agriculture has issued a standard application of biosecurity for poultry in residential areas

In the farm sector 3 in the city of Padang which is a farm that has a sizeable population and are already implementing some parts of biosecurity in order to anticipate the entry of bird flu can be minimized. Visible on the serological test in which birds have low sera positive only two chicken, meaning that biosecurity has a very vital role in the prevention of bird flu virus or *Avian influenza* and other diseases Biosecurity is an integral concept that affects the success of livestock production systems, especially in reducing the risk and consequences of the entry of infectious and noninfectious diseases. If properly implemented biosecurity and true then livestock productivity, economic efficiency and production will be reached

Table 3. Positive cases of bird flu (*Avian Influenza*) H5N1 in Padang

No	Date	Adress (District)	casesto	The number of bird in depopulation
1	14/01/06	Padang Barat	1	9
2	16/02/06	Kuranji	1	15
3	20/02/06	Pauh	1	100
4	28/02/06	Padang Selatan	1	15
5	15/03/06	Padang Timur	1	350
6	15/03/06	Koto Tangah	1	18
7	27/02/07	Padang Barat	2	32
8	12/03/07	Lubuk Begalung	1	35
9	12/03/07	Padang Barat	3	15
10	13/03/07	Padang Timur	2	15
11	23/03/07	Kuranji	2	15
12	13/04/07	Padang Barat	4	10
13	08/05/07	Padang Barat	5	50
14	30/05/08	Kuranji	2	125
15	26/06/08	Pauh	2	14
16	26/09/08	Kuranji	3	274
17	17/04/09	Bungus Teluk Kabung	1	33
18	16/12/09	Koto Tangah	2	10
19	31/12/09	Koto Tangah	3	78
	Total		38	1.213

Source: Department of Agriculture, Livestock, and Forestry Plantation Padang, (2009)

Situation of poultry farms in Indonesia, especially in the city of Padang different poultry farms in developed countries. Farm location in the city of Padang is not centralized, but spread out in various places. In addition the various types of farm businesses, from the farm household scale, small-scale farms to industrial scale. The situation is very difficult for the application of stamping out policies to tackle the spread of bird flu *Avian influenza*, so the Department of Agriculture, Livestock, and Forestry Plantation Padang City adopted a policy of depopulation methods are limited or selective culling poultry. In its implementation, the Department of Agriculture, Livestock, and Forestry Plantation Padang since the first outbreak of bird flu avian influenza until the end of 2009 has limited depopulation of positive poultry bird flu avian influenza as many as 1213 individuals (Table 3). Depopulation is carried out by slaughter of infected chickens in accordance with the procedures that apply cutting chicken, then chicken that has been slaughtered immediately buried at a depth of 1.5 meters or burned (Department of Agriculture, 2008).

Serologic Test Results of Blood Samples Chicken

1. Serologic Test

Serologic test conducted with the aim of diagnosing a disease attacks more quickly and efficiently. The recently of serological testing increasingly popular by breeders. Moreover the difficult to identification the disease increasing. By doing serological tests, ranchers increasingly convinced in determining the type of disease affecting chickens.

Serological test is a test that uses serum as a sample. The main principle of serological test is an antibody reacting with the appropriate antigen. Antibodies are immune substances released by white blood cells to recognize and neutralize the antigen (*the germs of both viral and bacterial*) that exist in the chicken body.

Serological test is a method used to see a picture of antibody titers in the body of chicken. To application of serological tests have several purposes, one of whom is to monitor the results of vaccination.

In the process, farmers began to realize the need for serological tests especially with the increasing number of diseases or crowded vaccination schedule. Through serological testing, implementation revaccination became more precise. In addition, the results of serological tests can also be used as an affirmation of a disease diagnosis. Antibody titers of viral diseases such as bird flu (*Avian influenza*) H5N1 can be known through serological tests.

2. Laboratory Test Results

Of the 50 samples taken and tested in the laboratory Veterinary Investigation Center Regional II Bukittinggi, obtained the following results:

Table 4.. Result of Laboratory Test

No	Diagnosis	Amount	Percentage
1	AI low Seropositif	2	4%
2	AI Seronegatif	18	36%
3	AI Titer hightAntibodi	18	36%
4	AI Titer low Antibodi	11	22%
5	AI Titer zero Antibodi	1	2%
Total		50	100%

Source: Research result, 2010

The results of laboratory tests on samples obtained by 2 *Avian influenza* seropositive Low. This means that the test serologically positive chickens are exposed to *Avian influenza* but never got the vaccine so that the *Avian Influenza* H5N1 virus can still be protected

Avian influenza sera negative total of 18 samples showed there are 18 samples from negative Serologic testing of *Avian influenza* infection. Furthermore, high titers of antibodies *Avian influenza* means the possibility of a total of 18 samples of chicken were infected with avian influenza, but the antibodies that have the chicken was still very high and can protect from avian influenza viruses *Avian influenza*

Avian influenza H5N1 antibody titers low of 11 samples showed there were 11 samples that had antibodies *Avian influenza* H5N1 is low and a sample that has zero antibodies against avian influenza virus, this means that there is a sample which had no antibodies or immune to the disease *Avian influenza* or bird flu of titers

4. CONCLUTION AND RECOMMENDATION

Conclusions

Poultry farm biosecurity system in the city of Padang at level 3 and 4, where the chickens kept in an open and traditional. Laying hens at biosecurity level 3 not yet been infected with bird flu outbreaks because it has been implemented vaccination 100%. The location of the cage and the strategic location of the chicken farm far from dense human settlements. In the farm sector have traditionally 4 chickens infected with bird flu *Avian influenza* H5N1 and never tested positive, but people still raise chickens under the guidance of animal husbandry department, maintenance of control.

Recommendation

1. It is recommended that further research be done so that the bird flu *Avian influenza* H5N1 disease can be overcome and the chicken farm produce results that are free of bird flu in order to create a harmonious development with sustainable environment,
2. Recommended to the company's chicken farms in order to further raise awareness that biosecurity is very important. Discipline in the application of biosecurity significant effect on the health of livestock and livestock products consumer.

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