Viral and Bacterial Diseases in Broiler Chicken Farms at the Area of Banyumas District

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Abstract. Efforts to control viral and bacterial diseases in poultry broiler should always be done by various efforts. Maintenance of strict management, implementation and administration of vaccines and bio security program are some efforts that are often done by farmers in order to eliminate viral and bacterial diseases. The purpose of this study was to determine the type of pathogenic viruses and bacteria that often infect broiler chickens and how to make efforts to control the broiler chicken farms in the subdistricts of Kedungbanteng and Baturraden, district of Banyumas. The research method was survey on broiler chicken farmers in the areas of Baturraden and Kedungbanteng of Banyumas district. Gradual cluster sampling was used in this study. 11 broiler chicken farms with various breeds were involved. The current study found that types of bacterial disease that infected broiler chicken farms in the subdistricts of Kedungbanteng and Baturraden were Chronic Respiratory Disease (CRD) and Colibacilosis, whereas viral diseases that infected were the Infectious Bursal Disease (IBD/Gumboro) and New Castle Disease (ND), although the prevalence rate was low. The efforts to control the main virus diseases, IBD and ND, succeeded in pressing the two diseases sould be implemented.

Key Words: viral disease, bacterial disease, broiler chicken farm

Introduction

The system of broiler chicken rearing in Banyumas district is generally very intensive, with the density range of 8-12 heads of chicken per square m. The chickens are housed in colony shelters during the time period of chicken life from DOC up to the time of harvest (slaughter). That is a must that firm rearing management should be applied in the intensive system of rearing, including health management. During the rearing period, it is expected that the growth rate of chicken is high; therefore, firm feeding and health management control should be applied, because the threat of disease emergence can happen at any time. The increases of rearing intensity and chicken size in each unit of chicken house can increase the incident of respiratory tract disease (Sainsbury, 2000), the density of 15 birds/m^2 increasing the susceptibility to the other diseases (Darminto, 1996). Respiratory tract infections are of paramount importance in the poultry industry because high mortality may occur in poorly managed cases (Roussan et al., 2008) and causing catastrophic economic losses (Dekich, 1998; Garmyn et al., 2009).

The efficient and effective efforts to suppress the incident of disease are by means of bio security and vaccination applications. The success of these efforts to prevent the outburst of the diseases in broiler chicken can only be attained if the bio-security and vaccination programs are conducted comprehensively and consistently, and the application of vaccination is complete, in time, and the way the vaccine is given and the dose of the vaccine are right. Dekich (1998) reported that preventive medicine is the key for economical control of disease in integrated broiler companies, and includes quarantine-eradication, controlled-exposure, and preventive feed medication. The poultry farms usually have already possessed bio-security and vaccination programs, beginning from house preparation, DOC rearing, up to ready-to-

harvest bird rearing. These programs are arranged based on the information and recommendations from the Core Farm as the partner and consultant of small-holder farms, and from other veterinarians (usually from veterinary medicine manufacturers. The decision of applying the program is based on the situation and condition of chicken diseases of the given region therefore.

There is no certain program that can be used as a common program (guidance) for all regions. Different climates, house conditions and densities may require different kinds of vaccination programs. The practical and effective vaccination program needs some considerations as follow (1) the expected protection level, (2) immunity status of animal, (3) the type of viruses of the given region, (4) relationship to other diseases, and (5) the way the vaccine is given and the evaluation of immunity responses (Pattison, 1990). The efforts of applying the bio-security program are conducted via tutorials (trainings) are held by the Core Farm through its technicians, who routinely come to the poultry houses of farmers in order to control the rearing, case management, and to give suggestions of increasing their productions and suppressing the cases of diseases. However, generally the suggestions of bio-security system improvement that is conducted by the Core Farm via the consulting agents is not yet fully implemented. The obstacles and handicaps of implementing the program that generally emerge is the limiting ability of farmers to prepare bio-security facilities, for example limiting abilities to build proper surrounding fences, to prepare hygienic drinking water, to give healthy house environment, to prepare rubbish bin, vaccine, dead bird, and other waste disposals. In addition, disinfectant pool and other facilities are not yet available. The purposes of this study was to know the kinds of viral and bacterial diseases that often infect broiler chiken, and to find the way of controlling the diseases in the farms of broiler chicken at Kedungbanteng and Baturraden areas of Banyumas district.

Materials and Methods

Survey on the broiler chicken farmers at the sub-districts of Kedungbanteng and Baturraden Banyumas district was conducted in this study. Gradual Cluster Sampling was applied as the method of sampling. Sample collections were conducted by means of chronological cluster sampling, on the basis of available regions (1) the first sample population consisted of all villages in the sub-districts of Kedungbanteng and Baturraden. Five villages out of the available villages from each of two sub-districts were taken by means of purposive sampling on the basis of broiler chicken population in the given region, (2) From the selected villages, several villages were taken again by purposive sampling, on the basis of broiler chicken population, (3) Further, the second samples were called as the third samples that consisted of the chosen villages. Finally, a list of broiler chicken farmers from the selected villages was made. This list represented the skeleton of sampling, from which the samples of broiler chicken farmers were selected randomly, from whom the observations and interviews were conducted. The required data included the data of farmer and broiler chicken populations, data that related to management aspects such as: breeding, feeding, housing, health, and bio-security, and survailant data of viral and bacterial disease occurrences in broiler chicken; the times of occurrence, the level of mortality, and the efforts to overcome the disease. Descriptive analysis were applied with SPSS 16.

Results and Dicussion

Farm management

The number of broiler chicken farms in Banyumas district were spread around some regions in the district. Compared to the

population of layer chicken, the number of broiler chicken in the district was greater. The name of broiler chicken farms with various breeds in this study presented in Table 1. This study found that eight breed of chicken (MBA1, MB202, CP707, Super Chic/MAA, Manggis, Platinum, CP and AS) were reared in eleven locations of broiler chicken farms.

Housing. Generally, the farms used permanent, open system houses although the posts of the houses were made of wood or bamboo. The floor model of all the houses was in the form of stage with the reasons that the contours of the land surfaces were not level, high humidity and wet environment because some of the houses were built on rice fields. It was also believed that the stage type of floors make more healthy chicken. The height of the floors ranged between 100-150 cm above soil surface. There was no concrete house. Whereas the roofs of the houses generally were made of tyles (clay), zinc, or palm leaves. The size of the houses ranged from 25-30 m long and 5-6 m wide, longitudinally faced to the direction of East to West.

Feeding and drinking. Generally the farms used ready-to-use feeds that were produced by commercial factories, in the form of crumble. This choice was made on the basis of considerations that for small-holder farms, ready-to-use feed was more practical and efficient relative to those of home-made feed. However, the reverse was true for commercial, large farms. The model of feeders and drinking waterers were hanged gallons, therefore, the method of feeding was manual. Mountain water with the characteristics of crystal clear and clean, without color and smell, was used as drinking water. This case happened because all sampled farms were located on the moderate height of mountainous areas, with the average height of more than 500 m above sea level with unpolluted, clean water springs that were found here and there. The drinking water was given adlibitum, without limitation of water volume and drinking time, therefore, chicken were able to access the water freely at any times. However, this method of drinking has some weaknesses for example the excessive drinking that may cause the litter to be wetter. The ideal drinking method is the using of automatic waterers in which the flow of drinking water is controlled by nipples.

Health management

Biosecurity program. The bio-security program that was applied in the broiler chicken farms at the sub-districts of Kedungbanteng and Baturraden in general was not conducted comprehensively and consistently. The application of the program was just limited in the forms of limiting in-and-out human traffic, expelling predators, making surrounding fences, and implementing disinfection program. However, the implementation was not yet conducted firmly. The limitation of foreigners who came to the farm was often ignored, the existences of unproper surrounding fences and wild animals, and even kampong chiken were sometimes found scavenging around the farm environment. In order to save the broiler chicken from the infections of diseases, therefore, should be applied firmly.

Poultry must have a healthy and functional intestinal tract to maintain the excellent feed efficiency that is required by modern production standards (Robert and Porter, 1998). The specific meaning of bio-security is all efforts in order to prevent or protect a certain area of poultry farm from various kinds of pollutions, and from the infections of infectious diseases. In order to make sure that the program yields good results and profitable, comprehensive and integrated efforts are needed initiated from the levels of handling, monitoring, and controlling. FAO (2004) classified the poultry industry based on the level of biosecurity in controlling HPAI outbreaks, namely: (1) sector-1 with high

biosecurity standard; (2) sector-2 with medium to high biosecurity standard; (3) sector-3 with medium to low biosecurity standard; and (4) sector-4 with low biosecurity standard.

Especially to break down the virulences of AI in Indonesia, the steps to be conducted is via 9 strategies of; increasing bio-secirity, vaccination program, limited depopulation in the infected areas, controls toward poultry traffics, poultry products and by-products, survailance and tracing, restocking, stamping out in the new infected areas, public awareness, monitoring and evaluation (Naipospos, 2004). The firm bio-security implementation becomes a must to prevent the easily-spreading infectious, zoonosis diseases that can cause high mortality, especially AI, because the disease is hard to eradicate if it has been spreading in the whole area of a farm. It is better that farmers spend more money for the application of biosecurity system in theirfarms in spite of facing the risk of great loses due to the spreading of AI disease.

The main handicap of implementing bio-security system at the level of small-holder farmers is the existence of great amount of additional money that should be paid, therefore, the provit may decrease. Thus, the bio-security system was applied, however, it wass not implemented firm enough, there were tolerances here and there in many cases. To support bio-security implementation, disinfectation is needed, namely the use of disinfectant chemicals to kill micro organisms outside the animal body surrounding house environment. Provided that the use of disinfectant is not execcive, in proper dose and is conducted regularly using a correct procedure, it can suppress the micro organisms around the housing area. Nort and Bell (1990) reorted that all disinfectants being used should fulfill some conditions as follow; (1) effective in killing bacteria and othe micro organisms, (2) non toxic for human being, (3) effective for moderate amount of organic materials, (4) does not cause any damage and does not leave any spot, (5) easily solute in water, (6) is able to penetrate into the narrow spaces of materials, and (7) easily found in markets and it is cheap.

Vaccine program. There were four kinds of vaccines that were used by broiler chicken farmers at Banyumas district, namely ND, IBD, AI, and IB. Not all of the vaccines were given to their birds, for example, there were only two farmers who gave AI vaccine, and there was only one farmer who gave IB vaccine. Table 2 showed that there were 2 vaccines that were almost always used by all broiler chicken farms in Banyumas, namely ND dan IBD. The considerations were (1) both diseases had high prevalences at those areas, (2) the outcome caused by the 4 diseases if they attacked the farms were very great loses, and (3) the diseases were very infectious. The three mentioned factors caused the farmers did not want to speculate by not giving the both vaccines to their birds.

Newcastle disease (ND) is one of the highly contagious viral diseases of poultry which causes huge economic losses to the poultry industry. The disease is complicated due to different pathotypes and strains of the virus that may induce enormous variation in the severity of disease (Parimal et al., 1997; Ullah et al. 2004). ND and infectious bronchitis (IB) are the most common respiratory diseases of chickens. Infectious laryngotracheitis (ILT) occurs on a sporadic basis and is generally limited geographically. All three diseases are caused by viruses. There are no economical treatments for such virus infections, but avirulent virus in modified live vaccines are used as a method of prevention in chickens (Dekich, 1998). Newcastle disease pose serious threats to the broiler chicken industry because they have the potential to cause severe economic losses in terms of high mortality, poor growth or loss of productivity, and extra costs of medication for secondary infections (Ganesh and Raghavan, 2000; Alexander, 2001; Kumar et al., 2003; Munir et al., 2009).

Immunization against ND, the 2 economically important viral diseases of broiler chickens, is a common practice (Kumar et al., 2003; Munir et al., 2007). The combined use of immuno stimulating drugs and vaccines could improve the efficacy of vaccines (Tayade et al., 2006; Munir et al., 2007; Yin et al., 2007; Munir et al., 2009).

There are two kinds of gumboro (IBD) disease, clinic and sub-clinic. The clinic kind of IBD is more often found to attack 3-7 week old chicken that can cause death up to 20-50% in layer chicken. This clinic form is known to be more virulent in layers, relative to that in broilers. The sub-clinic form of gumboro is characterized by phenotipically no symptoms of disease in the infected birds, however, the burse is damage that can cause immune suppression. Further impacts are the occurrences of sensivity to other diseases of the given birds, and failure of vaccination. The sub-clinic form often occurs in the 1-10 day old chicken, and the mortality is low. The sub-clinic form is very important, because the IBD viruses can enter immune system of young chicks, therefore, the infection agents that attack the birds can mimic the viruses, ecoli, that cause respiratory disorder, and viruses that cause anemia in the chicks. The early disturbance of the immune system due to IBD viruses does not heal; therefore, immune suppression occurs permanently (Lukert and Saif, 1991). Lee et al. (2011) suggest that reduced protein concentration of starter diets can lead to significant losses in broiler performance when using a vaccination program to prevent coccidiosis.

Especially for AI, although based finding this study (Table 3) there were only 2 farmers who used the vaccine, however, the interviews indicated that many of them were very anxious about the attack of the disease. There are not many broiler farmers who vaccinate AI to the birds, because the disease more often attacks layers than broilers. The implementation of AI vaccination highly depended on the recommendations from government or the related institutions. As it has been known, AI disease spreads out to many regions in Indonesia since the end of 2003, therefore, currently, in general the farms of layers have been preventing the disease via vaccination and bio-security program. Due to short life of broiler chicken, however, only few farmers did the vaccination. Ilham and Iqbal (2011) reported that the implementation of HPAI vaccination would be more eff ective in independent farms since the risk of this disease was single-handedly borne by farmers. Apart from that, the implementation of HPAI vaccination would also be more eff ective in farms that had never been infected by HPAI. Overall, HPAI vaccination would be more eff ectively implemented through supporting biosecurity measures in poultry farms. The implementation of vaccination by the farmers depends upon its costs which also includes production impacts of vaccination, the expected economic loss in the case of an outbreak, and the perceived probability of an outbreak (Hinrichs et al. 2010). Dharmayanti and Darminto (2009) found that Indonesian strains bare unique characteristics that have caused the high number of outbreaks both in animal and human cases with high mutation rates on its main glycoproteins. The outbreak of highly pathogenic avian influenza (HPAI) virus subtype H5N1 has threatened global health with a massive outbreak in poultry flocks together with a significant number of cases of human infection (Cox and Uyeki, 2008; Hartawan et al., 2010). Damayanti et al. (2004) concluded that based on the clinicopathological the outbreak of poultry disease in East and West Java were attributed to highly pathogenic avian influenza.

The infectious diseases

The infectious diseases found in broiler farms at the Kedungbanteng and Baturraden

sub-districts of Banyumas district presented in Table 3. The present study found six diseases (CRD, Colibacilosis, IBD, Snot, ND and Asites) and the number of infected farm presented in Table 4.

Table 4 showed that there were 6 kinds of diseases that were found in the broiler farms, namely CRD, Colibacilosis, IBD, Snot, ND and Asites. If the diseases were grouped based on the kinds of its causing agents, the viral diseases were IBD and ND; and the bacterial diseases were Colibacilosis, Snot and CRD, whereas the disease that was caused by mismanagement was Asites. This findings informs that the efforts to control dangerous diseases such as IBD and ND can be said to be successfully conducted by farmers, as indicated by small number of birds that were infected by the (only 3 farms that were infected by IBD, and even only one farm that was infected by ND). This success because of the vaccinations that had been conducted regularly against the two diseases (Table 2). Table 2 showed that all farmers had conducted ND vaccination, whereas for IBD, although not all of the farmers did vaccination, however, most of them (8:11) vaccinated their birds. Alam et al. (2002) reported that infectious bursal disease is one of the most important viral disease of poultry usually affects young chickens of 3-6 weeks. Hygienic management and proper vaccination are main way of control of this disease. Among viral poultry diseases, infectious bronchitis (Cavanagh and Naqi, 2003) is acute, highly contagious and economically important diseases of chickens and in most countries, control of this disease is largely through the vaccination. Talebi et al. (2005) study the effects of current routine vaccination routes (spray, eye-drop and drinking water) of live vaccines against infectious bronchitis (IB) on performance and humoral immune responses of broiler chickens. The study indicated that vaccination significantly affects performance of the broiler chickens and effects on weight gain and FCR, did not differed significantly among these routes.

Results of present study (Table 4), the interesting case was the finding of diseases that very easily attacked the birds, namely CRD and Colibacilosis. Some of the farmers said that CRD and Colibacilosis in fact, often attacked their birds, even there were farmers who said that CRD was a cage disease, because the disease almost at all periods of rearing, the disease emerged, generally since the age of birds of 3 weeks or older, the disease began to attack the birds. The attack happened continuously, that caused primarily, respiratory tract disturbances. Glisson (1998) revealed that bacterial pathogens play an important role in causing respiratory disease in domestic poultry species. Diseases of the respiratory tract are a significant component of the overall disease incidence in poultry.

The occurance of the disease on fields is rarely found to be individual disease, but it is often accompanied by complication with other diseases such as *Escherichia coli*, therefore, then it is called CRD complex. The disease rarely attacks adult birds, more often attacks the youngs, with low inyury number. In adult birds, the mortality is low, but in young broilers, the mortality can reach 30 percents (Frazer, 1986). The cause of the disease is *Mycoplasm bacteria*, that consists of three pathogenic species, namely: *Micoplasma gallisepticum*, *M melegridis* and *M Synoviae*. The characteristic of mycoplasm bacteria is gram negative.

For the infected birds, the syndromes are; the productions of viscous liquid from the nose, foamed liquid from the eyes, and the swollen of periorbital sinus, snored breath, and nodded or shaken head to dispose the nasal liquid. The patients seem depression, weak, decrease of appetite that can cause body weght decrease, and the color of feces is greenish. The anatomy, pathological syndromes that can be identified are the occurances of dirty exudate from respiratory tract, nose sinus, bronchus, lungs,

Table 1. The broiler chicken farms at the Kedungbanteng and Baturaden sub-districts of Banyumas district

Name of farm	Location	Breed of chicken
Sudar Farm	Melung village, Kedungbanteng	MB A1
Agus Farm	Melung village, Kedungbanteng	MB 202
Mustika Farm	Karangsalam village, Baturaden	CP 707
MAA Farm	Kutasari village, Baturaden	Super Chic/MAA
Said Syudi Farm	Kutaliman village, Kedungbanteng	Manggis
Cartono Farm	Karangsalam village, Baturaden	Platinum
Muslikhun Farm	Karangsalam village, Baturaden	CP
Iim Farm	Karangsalam village, Baturaden	AS
CV. Mustika	Kutaliman village, Kedungbanteng	CP
Sofan Farm	Kebumen village, Kedungbanteng	CP 707
Rasito Farm	Melung village, Kedungbanteng	AS

Table 2. The kinds of vaccines that wer used by farmers

No.	Kind of Vaccine	Ratio
1.	ND	11/11
2.	IBRD	8/11
3.	AI	2/11
4.	IB	1/11

Table 3. The infectious diseases found in broiler farms at the Kedungbanteng and Baturraden sub-districts of Banyumas district

Name of farm	Location	Kind of viral disease
Sudar Farm	Melung village, Kedungbanteng	IBD, ND
Agus Farm	Melung village, Kedungbanteng	CRD, Colibacilosis, Asites
Mustika Farm	Karangsalam village, Baturaden	CRD, Snot
MAA Farm	Kutasari village, Baturaden	Colibacilosis
Said Syudi Farm	Kutaliman village, Kedungbanteng	CRD, Colibacilosis
Cartono Farm	Karangsalam village, Baturaden	CRD
Muslikhun Farm	Karangsalam village, Baturaden	-
Iim Farm	Karangsalam village, Baturaden	Colibacilosis, CRD, Snot
CV. Mustika	Kutaliman village, Kedungbanteng	Colibacilosis, CRD, Snot
Sofan Farm	Kebumen village, Kedungbanteng	Colibacilosis, IBD, CRD
Rasito Farm	Melung village, Kedungbanteng	Colibacilosis, IBD, CRD

Tabel 4. Frequency of kind of disease in broiler farms at the Kedungbanteng and Baturraden sub-districts of Banyumas district

Kind of disease	The number of infected farm	Ratio
CRD	8	8/11
Colibacilosis	6	6/11
IBD	3	3/11
Snot	2	2/11
ND	1	1/11
Asites	1	1/11

and air bag. The color of the exudate is light yellow, cheese-like. The membrane of air sac becomes thick and dark, with cheese-like exudate on it. The spread of the disease is via

direct contact between healthy and ill birds.The diagnoses of this disease are based on clinical syndromes, the anatomy-pathological change, and epidemiology data. In the laboratory, the diagnoses are based on the isolation of bacteria, serology test and histopathology test. The CRD is often misunderstood as ND, IB, snot and cholerae.

The prevention to CRD is via house sanitation, and separation of young birds from the adults, i.e., by keeping the cleanliness of houses, and regular disinfectation of houses and their implements. The infected birds can be cured with antibiotics; basitrasin eritromisin, tetrasiclin, tilosin, spectinomisin and lincomisin through drinking water, feed, and injection. The second disease that was often found in broiler farms in the sub-districts of Kedungbanteng and Baturraden was Colibacillosis, that was reportd by 6 farmers out of 11 sample farmers. This bacterial disease was often reported also to occur in several regions. Although the disease often emerges, because of its lethalless effect and is not easy to spread out, therefore, in general the farmers in doing the control of the disease is only by means of environmental and drinking water sanitations. However, it was understood via this study that the control of Coli disease was not fully success, therefore, farmers should keep their eyes to the disease.

Conclusions

The bacterial and viral diseases that infect broiler chicken in the farms at Kedungbanteng and Baturraden sub-districts of Banyumas district are Chronic Respiratory Diseases (CRD) and Colibacilosis, and Infectious Bursal Deseasis (IBD/Gumboro) and New Castle Disease (ND), respectively. However, they are of the low prevalence level. Other diseases that found in low prevalence level are Snot and Asites. The efforts to control viral diseases especially IBD and ND have been conducted properly and successfully in order to reduce the occurances of both diseases.

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