CHAPTER 1 INTRODUCTION

1.1 Background of Research

Intestinal parasitism is a major stress factor leading to malnutrition and lowering of performance and production efficiency of livestock. This is particulary true in the case of poultry. Coccidiosis is an intestinal infection caused by intracellular protozoan parasites belonging to the genus *Eimeria* resulting in intestinal lesion, diarrhea, enteritis and death. It can be caused by any of the species of *Eimeria* individually or in combination. The three most common species that affect the poultry industry are *Eimeria tenella*, *Eimeria maxima*, and *Eimeria acervulina*. The different species of *Eimeria* affect different areas of the gastrointestinal tract, *E. tenella* attacks the cecum, whereas *E. maxima* and *E. acervulina* attacks the mid and upper regions of the intestinal tract, respectively (Duffy *et al*., 2005).

E. tenella is one of *Eimeria* species that cause disease in chicken caecal coccidiosis form that causes bloody diarrhea, weight loss, decreased egg production and cause of death (Shierly, 1993). Generally, the infection cause by *E. tenella* is an acute infection. The bloody diarrhea occured in 4-5 days after infection (Mufasirin *et al.,* 2012).

The chicken infected with *Eimeria* also have no appetite in food. This loss appetite causing decreased weight gain, feed efficiency and serious dehydration. All the damage caused by coccidiosis can inhibit the developing of poultry farm

and decrease the production of animal protein, therefore prevention of coccidiosis in chickens need to get more attention (Tabbu, 2006).

The prevention of coccidiosis can be done by sanitation of the cage and coccidiostat given on the feed of chicken. The number of drug resistance cases in the strain of coccidia cause the anticoccidia drugs be ineffective and threaten the poultry industry economy (El-Sadawy *et al*., 2009). But nowadays, the prevention and eradicate of coccidiosis also can be done by vaccination to stimulate the chicken's immune system.

Vaccination for coccidiosis is much better than adding coccidiostat in feed ransum because the vaccine do not cause residues in meat. Vaccination can be one of appropriate control against coccidiosis, the vaccine given according to the administered dose of *E. tenella* that can induce immunity but does not cause clinical symptoms. When chickens are infected with low numbers of *Eimeria* parasites, protective immunity is induced after two to three consecutive infections (Joyner and Norton, 1973; Long *et al*., 1986). Vaccination against coccidiosis using live attenuated oocyst, that is giving together with food or drinking water, turns out giving good results to suppress the coccidiosis infection in broilers. Although the result of vaccination can not completely prevent the coccidiosis infection, but if it is supported by an optimal management aspects, the incidence of coccidiosis infection can be reduced and easily treated (Tabbu, 2006).

On the field case, chickens infected with *Eimeria* develop protective immunity against re-infection by the homologous parasite (Lillehoj and Trout, 1993 ; Allen and Fetterer, 2002). The chicken that have the immunity called

immunized chicken. The immunized chicken give different performance with non immunized chicken against coccidiosis. The performance of the chicken can be determined by body weight gain, feed consumption and feed conversion.

The feed conversion is really importance in poultry. The function of feed conversion is to know the quality of the feed and the conditions in which the animal is kept. Feed conversion calculated by counting the total amount of feed consumed divided by the body weight gain in the same period. The lower the feed conversion rate, the higher the profits of the farmers.

Based on the background above, The objective of this research was to know the comparative performance between non immunized and immunized *Eimeria tenella* in broiler chicken by comparation of the feed convertion, feed consumption and body weight gain between each groups. This research was expected to provide information and knowledge to the poultry farm and can be one of the control of coccidiosis in order to overcome the economic losses and animal welfare.

1.2 Identification of Problems

1. Is there a decrease in performance (feed consumption, body weight gain and feed conversion) in non immunized *E. tenella* broiler chicken?
2. Is there an increase in performance (feed consumption, body weight gain and feed conversion) in immunized *E. tenella* broiler chicken?
3. Is there any difference of performance in non immunized and immunized *E. tenella* broiler chicken by feed consumption, body weight gain and feed conversion?

1.3 Theoretical Base

Coccidiosis is a problem in poultry farm especially broiler chicken's farm. Coccidiosis is an intestinal disease caused by protozoa genus *Eimeria* (Allen and Fetterer, 2002). *Eimeria* include in the Phylum *Apicomplexa*, Class *Sporozoa*, Subclass *Coccidia*, Ordo *Eucoccidiae*, Subordo *Eimeriina*, Family *Eimeriidae*, Genus *Eimeria* (Levine, 1995 ; Soulsby, 1982).

There are nine *Eimeria* spesies that have been recognize to infect chickens : *E. praecox, E. brunetti, E. mivati, E. acervulina, E. hagani, E. mitis, E. necantrix, E. maxima* and *E. tenella* that is one of the pathogen spesies in broiler (Soulsby, 1982). Each species has its own characteristics with respect to prevalence, site of infection, pathogenity, and immunogenity (Rose and Long, 1980). All species, however, parasitise the epithelial cells of the intestinal lining causing pathological changes varying from local destruction of the mucosal barrier and underlying tissue (often assosiated with some degree of inflamation in endothelial lesions), to systemic effects such as blood loss, shock syndrome and even death (Vermeulen *et al*., 2001)

Eimeria tenella is one of *Eimer*ia species that cause disease in chicken caecal coccidiosis form that causes bloody diarrhea, weight loss, decreased egg production and cause of death (Shierly, 1993). The life cycle is complex, consisting of both sexual and asexual stages. Infection occurs when sporulated oocysts ingested by a susceptible host release sporozoites that invade the epithelium and eventually cause the enterocytes to rupture. Oocysts are released with the faeces and the disease is transmitted among chickens through ingestion of

infective oocysts during feeding. Infected chickens display reduced feed intake, bloody diarrhea and hampered weight gain (Gilbert *et al*., 2011). Microorganism such as *Eimeria sp*. attack and damage the gut. The damage gut can be a pathway for other toxins and also limits the transport and passage of nutrients into the host, resulting in reduced weight gain.

According to Joyner and Norton (1980) that cited by Hasan (2009), infection with 1×10^4 to 1×10^5 oocyst/chicken can cause the pathologic effects in chickens. The infection with doses 1×10^3 to 1×10^5 oocyst/chicken show increase number in oocyst production.

On the field case, Chickens infected with *Eimeria* develop protective immunity against re-infection by the homologous parasite (Allen and Fetterer, 2002). The immunity generated by *Eimeria* is a specific immunity (Hasan, 2009). The immunity said to be good if the *Eimeria* can not succesfully complete the life cycle in the intestine of chickens and caused no clinical sign. Infection with various dose of *Eimeria* oocyst can result the difference pathogenicity level changes in flock (Hasan, 2009).

The immunity system divided into two groups, active immunity and passive immunity. Active immunity refers to the process of exposing the body to an antigen to generate an adaptive immune response: the response takes days/weeks to develop but may be long lasting—even lifelong. Active immunity is usually classified as natural or acquired. Passive immunity refers to the process of providing IgG antibodies to protect against infection; it gives immediate, but short-lived protection—several weeks to 3 or 4 months at most (Baxter, 2007).

There are four type of vaccines depending on the nature of the vaccine antigens. There are live attenuated vaccines, killed or inactivated vaccines, sub-unit vaccines and toxoid. Subunit vaccines can be further subdivided into those where the antigen is produced using recombinant DNA technology and those based on normal bacteriological growth processes (Baxter, 2007).

The best type of vaccines that can be used to against coccidiosis is active vaccines, that can induce immunity in the form of a live vaccine (Yunus, 2001). The characteristics of live vaccines should be easy to get, inexpensive, and stable in extreme weather and non pathogenic. In addition, the effect of the active vaccines must be durable (Baratawidjaya, 2006).

1.4 The Aims of Research

1. To know whether there is any decrease in performance (feed consumption, body weight gain and feed conversion) in non immunized *E. tenella* broiler.
2. To know whether there is any increase in performance (feed consumption, body weight gain and feed conversion) in immunized *E. tenella* broiler.
3. To know performance difference between non immunized and immunized *E. tenella* broiler.

1.5 The Outcomes of the Research

1. The research can be used as an information about the advance of vaccination on broiler for *E. tenella* infection.
2. The research can be used as a reference for further research in poultry againts coccidiosis.
3. The research can be used as the featuring to increase the production of poultry farm in Indonesia, particularly in terms of providing meat by prevent the disease coccidiosis in broiler chickens.

1.6 Hypothesis

1. The performance in non immunized *E. tenella* broiler chickens decreasing in body weight gain and feed consumption, but increasing at feed convertion.
2. The performance in immunized *E. tenella* broiler chickens increasing in body weight gain and feed consumption, but decreasing at feed convertion.
3. There are different performance between non immunized and immunized *E. tenella* in broiler chickens.