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CHAPTER 1 INTRODUCTION

1.1 Background

Broiler chicken is a kind of livestock that many developed as a source of animal protein supply and the most rapid growth, it because of broilers are the result of cultivation that use the technology advanced so that has the properties favorable economic (Syahbuddin, 2005).

Nowadays there are a lot of diseases that can attack chicken easily. One of them is coccidiosis. Coccidia are common protozoa parasites, they are present in all most type of chicken and Turkey flocks (Badran, 2006). Coccidiosis is one of the most pathogenic intestinal diseases caused by different *Eimeria* species belonging to phylum *Apicomplexa* (Nalbangtoglu *et al*., 2008). Heavy infection of coccidia cause serious disease and will kill many chickens.

E.tenella is one *Eimeria* species that cause disease in chicken caecal coccidiosis form that causes bloody diarrhea, weight loss, decreased egg production and cause of death (Mc Dougald and Reid, 1991; Shierly *et al*., 1995; Shierly, 1996). Coccidiosis cause the greatest loss compared with other chicken diseases and estimated to reach 800 million dollars/year (Allen and Fatterer, 2002). In Indonesia, coccidiosis is one of chicken disease which almost always appear in every chicken breeding period (Tabbu, 2006). Chicken of all ages can be infected coccidiosis but 4-16 weeks old chickens are the most commonly easily to get infected.(Badran, 2006).

Since every flocks is at risk from coccidiosis, all the 30 billion chickens reared worldwide annually must be protected by prophylactic chemotherapy with

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specific drugs (most common) or by vaccination (increasing importance) (Shirley and Johnson, 2001). On the other hand the development of anticoccidial resistance has threatened the economic stability of the poultry industry (Tabbu,2006). Although there has been little effort by the pharmaceutical industry to develop new anticoccidials, the mountaining problem of drug resistance of *Eimeria* has prompted major research efforts to seek alternative means of control through vaccination. Some vaccines that have been tested are vaccines in the form of attenuated whole oocyst (Shierly *et al*., 1995; Shierly, 1996). These vaccines can only be used for chickens under 2 weeks old because chickens under 2 weeks old can not digest oocyst (Yunus, 2007).

Eimeria infection in chickens primarily confined to the intestinal track and the gut associated lymphoid tissue (GALT) which serves as the first line immune defense against colonization by this organism (Lillehot *et al*., 2000). GALT serves three functions in host defense against *Eimeria* processing and presentation of antigens, production of intestinal antibodies (primarily secretary IgA), and activation of cell-mediated immunity (Ganguly and Waldman, 1980; Brandtzaeg *et al.*, 1989; Neutra *et a.l,* 1996 and Yun *et al.*, 2000). Studies revealed three phenomena responsible for immunity against *Eimeria* infections. First, the actual passage and presence of parasites in the lamina propria to induce immunity. Second, the sporozoite seems to be the most important parasite stage for immunity and third cytotoxic, T cells are necessary to inhibit parasites (Jeurissen *et al*., 1986).

Vaccines typically need time (weeks or months) to produce protective immunity in an individual and may require several doses over a certain period of time to achieve optimum protection. A different type of immunity, called passive immunity. When the antibodies are introduced into the animal's body, the "loaned" antibodies help prevent or fight certain infectious diseases. There are two types of passive immunity which are natural passive immunity and artificial passive immunity. Natural passive immunity is the protection provided by the mother, artificial passive immunity when antibodies are given as a medication to a non immune individual.

Immunity elicited in one animal can be transferred to another animal by injecting the recipient animal with serum from the immunited animal. The protection offered by passive immunization is short lived, usually lasting only a few weeks or months. On the other hand it helps protect right away cause producing an immune response within hours (2-3 hours) or days, faster than active vaccine. Such immunity is species specific and possibly directed against the sporozoite stage. It has been shown recently that extracts from the various doses of sporozoites of ***E. tenella*** containing no viable parasites can be used to successfully vaccinate against the infection. The effector mechanism of protective immunity induced by live infection or by extract vaccine. By given the role of serum antibody in protective immunity.

Serum is the liquid fraction of clotted blood. It is depleted of cells, fibrin, and clotting factors. Serum differs from plasma in that anti coagulant is never added to the blood after collection from the animal. Serum is prepared by centrifuging until

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the clot and remaining blood cells are separated from the liquid phase. The serum removed and stored frozen pending futher processing. Serum is very complex supplement containing mostly proteins, but also growth factors, hormones, amino acids, glucose, trypsin inhibitors, and lipids. Animal serum is an excellent source of nutrients for cells in culture because it contains proteins, lipids, salts, vitamins, minerals, amino acids and other components necessary for growth. When stored and handled correctly, the performance characteristics of serum can be maintained for many years.

Improperly storing and thawing serum products can decrease not only the immediate and long-term stability, but also their effectiveness. Growth promotion data demonstrate that serum maintains its growth characteristics throughout its shelf life if stored correctly.To effectively preserve the integrity of animal serum, it should be stored frozen and protected from light. The recommended storage temperature is -10 to -40 °C. At temperatures below -40 °C, the bottles may become brittle resulting in an increased risk of breakage. Multiple thaw/freeze cycles should be avoided as they will hasten the degradation of serum nutrients and can induce the formation of insoluble precipitates. Furthermore, serum should never be stored in “frost-free” freezers. These appliances occasionally warm themselves to avoid internal ice deposits and are detrimental to the clarity and stability of frozen serum products.

Based on a reasons above, the passion study is to do a further research in vaccination for coccidiosis case in broiler chicken. Especially to know passive immunity particulary rise up passive immunity with various dose of sporozoite

on coccidiosis infection. Some indicators of the presence of protective immunity in coccidiosis can be represented in oocyst production, pathological anatomy changes, and clinical changes.

1.2. The Formulation of Problem

1. Is there immunity in coccidiosis infection broiler chickens after the administration of serum of infected chicken by ***E. tenella*** sporozoites ?
2. What is the optimal dose of ***E. tenella*** that can be given to form immunity after the administration of passive immunity?

1.3. Theoretical base

The obligate intracellular apicomplexan parasites cause devastating diseases in humans and domestic animals. Well-known members of this phylum are *Plasmodium falciparum*, *Toxoplasma gondii*, *Cryptosporidium parvum*, *Theileria annulata* and ***E. tenella*** (Mehlhorn, 2008; Morrison, 2009). The poultry intestinal disease known as coccidiosis is caused by *Eimeria* spp. such as *Eimeria acervulina*, *Eimeria necatrix*, ***E. tenella*** and *Eimeria mivati*. The most pathogenic species, ***E. tenella***, provokes a haemorrhagic diarrhea in young chickens, leading to a loss of weight and appetite, resorption problems, bacterial secondary infections and often also to the bird's death (Chauhan and Roy, 2007; Mehlhorn, 2008; Shirley ***et al.***, 2007).

It has long been known that infection with any of the species of *Eimeria* can induce a potent protective immune response in the host that is exquisitely specific to each species of parasite (Beach and Corl., 1925; Edger, 1958). It was observed that if fowl immunized by ***E.tenella*** when given an additional infection

with *E.necatrix*, produced precipitates in the serum that reacted with antigents of both the species (Rose and Long, 1962). Solid immunity to any species occurred after infections but some species like *E.tenella* and *E.maxima* are so highly immunogenic that an intake to of only few oocysts can induce almost complete immunity to homologous challenge (Devies *et al.*, 1963). The authors used irradiated oocysts such thas sporozoite invasion of the intestinal epithelium was unaffected but that subsequent merogonic development was inhibited.studies supporting the notions that the asexual stage appeared to be more functionally immunogenic than the sexual stages or sporozoite stage indicated that even among the asexual stages, some are more effective than others at inducing (McDonald *et al*., 1988; Tomley, 1994).

Various efforts have been done to deal with this disease but nothing have fully worked out until now. Preventive action using anti parasite causes resistance and left residual substance, both in meat and eggs. Preventive actions by giving vaccine or serum for chickens is now being developed. Vaccine through passive immunity provides immediate protection. This study aims to determine the number of sporozoites dose in ***E. tenella*** which affect the passive immunity level of broiler chickens most effectively judged by the clinical symptoms, oocyst production, and histopathological changes view in broiler chickens.

1.4. The Aims of Research

1. To investigate how's passive immunity in broiler chickens after the administration of serum of infected chicken by various doses of ***E. tenella*** sporozoites

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2. To investigate the number of sporozoites doses in ***E. tenella*** which the most effective affect on passive immunity level for broiler chicken infected coccidiosis.

1.5. The Outcomes of the Research

1. The research can be used as an information that has ability to induce sporozoite in passive immunity level
2. The research can be used as a reference to increase development of poultry farm in Indonesia, especially as prevention of coccidiosis in broiler chicken

1.6. Hypothesis

1. Administration serum of infected chicken by ***E. tenella*** sporozoites provided the formation of passive immunity in coccidiosis infection broiler chicken.
2. There is the optimal dose of ***E. tenella*** that can be given to form immunity after the administration of passive immunity.

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