UNIVERSITI MALAYSIA KELANTAN

The Occurrence of Coccidiosis in Quails (*Coturnix japonica*) at Different Ages.

By

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DECLARATION

I hereby declare that the work embodied in this Report is the result of the original research and has not been submitted for a higher degree to any universities or institutions.

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I certified that the Report of this final project entitled "The Occurrence of Coccidiosis at Different Ages of Quails" by Abdul Ra'uf bin Zaidee, matric number F14A0002 has been examined and all the correction recommended by examiners have been done for the degree of Bachelor of Applied Science (Animal Husbandry Science), Faculty of Agro Based Industry, University Malaysia Kelantan.

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ABSTRACT

The southeast Asia is believed to be the origin of Japanese quails breed. It is extensively used as table birds and pet birds. In Malaysia, quails are reared as meat for protein source. Many reasearch studied about coccidiosis and quails, but none of them are specifically focus on occurence of coccidiosis in different quails breed at different age. This study will focus on finding of the effect of different quails breed towards coccidiosis occurence, alongside the effect of quails age against the occurence of coccidiosis. Different type of breed may be affected differently, and the occurence of coccidiosis may vary with different age of quails. Total of 70 faecal sample were collected from two groups of different ages of quails. The oocysts of *Eimeria* were observed and the oocysts per gram(OPG) of faeces were calculated. It was hypothesized that OPG varied with different ages of quails. This research contributes information related to the occurrence of coccidiosis that would vary with the different ages of quails.

Keywords: Japanese quails, ages, OPG, coccidiosis

ABSTRAK

Asia Tenggara dipercayai merupakan habitat asli burung puyuh dari baka puyuh Jepun. Baka in digunakan secara meluas sebagai baka pemula dalam penternakan puyuh dan juga digunakan sebagai haiwan peliharaan. Di Malaysia, puyuh diternak bagi mendapatkan dagingnya yang kaya dengan sumber protin. Terdapat banyak kajian berkenaan penyakit koksidia dan puyuh, tetapi tidak ada satupun kajian yang benar-benar fokus terhadap kemunculan koksidia dalam puyuh yang berbeza umur. Kajian in akan fokus kepada pencarian tentang kesan umur puyuh yang berbeza terhadap kemunculan koksidia. Baka puyuh yang berbeza dijangka akan terkesan secara berbeza, dan kemunculan koksidia juga berbeza mengikut umur puyuh yang berbeza. Sejumlah 70 sampel tinja akan di ambil daripada dua kumpulan puyuh yang berbeza umur. Oosista bagi *Eimeria* akan dilihat menggunakan mikroskop dan oosista setiap gram (OPG) tinja akan dikira. Secara hipotesisnya OPG akan mempunyai perbezaan, mengikut kepada perbezaan umur burung puyuh. Kejian ini bakal menyumbang informasi berkaitan dengan kemunculan koksidia yang berbeza mengikut umur puyuh yang berbeza. Kajian ini menunjukkan bahawa puyuh dari baka Jepun boleh dijangkiti koksidiosis jika dipelihara secara intensif. Walaubagaimanapun, pengurusan lading yang baik di samping rawatan, boleh mengawal jangkitan ini dengan lebih berkesan.

Kata kunci: Puyuh Jepun, umur, OPG, koksidia

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OPG	Oocyst per gram
SPSS	Statistical Package for Social Science

LIST OF SYMBOL

%	Percentage
mL	Millilitre
cm	Centimetre
cm^2	Centimetre square(area)

CHAPTER 1

INTRODUCTION

1.1 Background of study

Quail is one of the poultry livestock which are raised and demanded by people worldwide. It is common small ground-nesting bird in family Phasianidae. In Latin, it is called Coturnix. The scientific name is *Coturnix coturnix*. The body was covered with some types of colours. They available in black, brown, grey and sometime white. Farmers usually make quails as business because it is easy to handle, and have lesser diseases than other livestock. Quails does not require vaccination as chickens. In worldwide, quails are raised commercially for their meat and eggs. All type of weather, almost suitable for quails business.

There are up to 130 species of quails that available worldwide (TwoCrows, 2014). Among those popular varieties of quails, the most popular breeds is the Japanese Quails, or also known as the commonly name; Coturnix Quails. If the eggs production is more focused than meat production, then Bobwhite Quails can also being raised, other than Coturnix Quails. The Japanese Quails are easy to raised, and most important, it is fast growing livestock animal.

Nowadays coccidiosis is one of the most important diseases worldwide. Phylum: Apicomplexa is the protozoa which caused this disease, undergoes a direct life cycle with transmission between hosts by resistant oocysts. The parasite grows in the host, and multiplies intracellularly in epithelial and sub epithelial cells, usually in the gut inducing enteritis (Gordon and Jordan, 1982).

As a result of mild to severe exposure the flocks that have been infected usually show a marked decrease in food and water consumption and birds become depressed. As a result of the disruption of the intestinal mucosa where minimal absorption is taking place, the decreased in weight gains can occur. As the host is trying to flush the organism from the body, it may result in Diarrhoea, which may induce dehydration. During the latter stages of infection lesions of the intestinal mucosa and loss of pigmentation may also become apparent (Conway, and Mckenzie, 1991).

Age considered as one of the most crucial factors in coccidiosis. Chicken at all ages can be affected by *Eimeria* spp. However, higher rate of coccidiosis is usually can be found in young ages birds. Older birds have lower rate of coccidiosis infection as they have developed the immunity towards the disease when they were young. Higher coccidiosis rate has been determined in >10 weeks age groups (Khaled Kaboudi, 2016).

Sharma et al. (2015) reported that broilers in the age group of 31–45 days have recorded higher prevalence of coccidiosis. This might be correlated with the existence of high number of oocysts in the litter. A probable reason resulting in the increased incidence of the disease, may be that the birds have not gained immunity against coccidiosis during the period between 31 and 45 days of age, while maternal immunity protected the birds of age group 0–15 days. Older birds are less affected probably due to enhanced immunity with passage of age.

Due to their similar lesions coccidiosis may be hard to distinguish from blackhead and salmonellosis. Hemorrhagic anemia syndrome and other intestinal diseases may be confused with intestinal coccidiosis. Definite diagnosis identification of the coccidia organisms is made from the microscopic examination of scrapings of the digestive

tract that should be done by an Avian Lab. Before making diagnosis and treatment recommendations, consideration of flock history and lesions must be considered since it is common for healthy birds to possess some coccidian (Kindschi, 2010).

Research and development about quails are vastly carried out to improve the production of quails in order to fulfill the demand for its meat and eggs. Eventhough quails are insusceptible to almost any disease, but there is also some disease which can attack the flocks.

As we know, quails has become one of the main livestock product worldwide, then it is important to ensure the product that being imported and exported internationally is free from any diseases. It is true that there are anticocidial products in the market, but it would be more efficient if we can identified which breed have better immune system against coccidiosis, because if we use it in a long-term period, soon the disease will develop resistance against this drugs. In addition, not only the breed, but also the age of quails will give variation in the occurence and severity of coccidiosis desease. Thus, it is interest to study the effect of different ages of quails on the occurence of coccidiosis.

1.2 Problem Statement

Researches regarding to the effect of the coccidiosis towards the poultry animals especially chickens are massively available nowadays. However, the occurence of the *Eimeria* spp. at different ages is still in question. Since the infection of the diseases is spread through the manure, by determining which ages affected the most by coccidiosis can minimize the risk of this diseases contribute greatly in the quail production industry.

1.3 Objective of study

1. To observe coccidiosis in two different stage of age in quails breeds.
2. To determine which age of quails are affected the most by *Eimeria* spp.

1.4 Scope of study

This study comprises coccidiosis observation in two different group of age of quails. The aim is to compare the quails' immune system against *Eimeria* parasites in term of different ages. This will enable the identification of age of quail that have greater immune system against coccidiosis.

1.5 Expected Results

The oocyst counts that indicate the occurrence of coccidiosis may vary with the different age of quails.

1.6 Significance of study

The significance of this study is to observe the survival rate against coccidiosis disease between two different stage of age by observing the faeces distribute by the animals. With this study, we can can identify which growth stage of quails affected the most by coccidiosis disease, and at what age they can become immune to the disease . This study indirectly will help the production of the *Coturnix japonica* quails, expecially in Malaysia, in term of controlling the diseases by giving more attention to the right stage of age when rearing quails. This study will also be a references for farms practice.

1.7 Limitation of study

This study will only focused on naturally the infected farm with coccidiosis. The infection will not be induced. The occurence and severity of coccidiosis disease may vary with the age of the quails. There may be scarcity of naturally infected farms with different age of quails for the collection of faecal samples.

CHAPTER 2

LITERATURE REVIEW

2.1 Background of Quails

Quails, is about 130 species, which is a small short-tailed birds. It is classified under the family of Phasianidae and also family Ordontophoridae. There are two type of species classifications, which are Old World quails, and New World quails. Old World quails have roughly about 95 species, in class Phasianidae, under two subfamilies; Phasianidae or Perdicinae. Around 32 species of New World quails resembles the Old World partridges. Quails prefer the environment of open country and brushy borders. Hen can lay about 12 eggs, while the male will incubate. Their appetite is tend towards seeds but also eats leaves, roots and some insects (Mondry, 2016). Old World quail have weaker bills than the New World forms. One of the popular breed is Bobwhite. It scientific name is *Colinus virginianus.* It inhabit about 20 races, from Canada to Guatemala. Some other breeds are, California quail, and Gambel quails. The common quail in Europe, Asia and Africa is the most common quails, *Coturnix coturnix* (Sanchez-Donoso et al., 2012). Lately, in this two decades period, growth of poultry industry has develop in a fast pace.

Table 1: Scientific classification of Coturnix Japonica

Kingdom	Animalia
Phylum	Chordata
Class	Aves
Order	Galliformes
Family	Phasianidae
Subfamily	Percidinae
Genus	*Coturnix*
Species	*Cortunix japonica*

The Japanese quails are extensively used as table birds and pet bird, since the last few decades (Ratnamohan, 1985). Japanese Quails (Coturnix Quail) migrates between Asia and Europe which are from pheasant family and are migratory birds. The southeast Asia is believed to be the origin of these breed. Back in history, in the old testament of the bible, the reference to quails can be traced back. It is also said that the quails were caught by the Egyption on a large number for meat from their farmland. But records of these birds being domesticated before 12th century is not available. In twelfth century is the first written record on the domestication of quails in Japan can be dated. It is also believed that after eating quail meat, a Japanese Emperor got cured from tuberculosis. Afterwards, raising quail extensively for meat and egg started by the Japanese people. The population of quail in Japan increased extensively by the mid twentieth century. This type of breed have been much interested by American since 1960 (Ernst, 1978). They are also known as Japanese quail since Japanese people tamed and bred these wild birds in captivity. These birds were taken to all over south east Asia as well as central Asia from Japan.

Japanese quail are inexpensive to keep and are hardy birds that thrive in small cages. They are affected by common poultry diseases but are fairly disease resistant. In about 6 weeks Japanese quail will mature, and full egg production are usually in 50 days of age. Hens should lay 200 eggs in their first year of lay with proper care with only 2 to 2½ years life expectancy. The adult male quail will weigh about 100–140 g if the birds have not been subjected to genetic selection for bodyweight. The females weighing from 120–160 g, are slightly heavier (NSW Department of Primary Industries, 2006). Light tan feathers with black speckling on the throat and upper breast characterised the females. The males have breast feathers, cloacal gland and rusty brown throat. cloacal gland is a bulbous structure on the upper edge of the vent that secretes a white, foamy material. the reproductive fitness of the males can be assess by this unique gland (NSW Department of Primary Industries, 2006).

Generally, Japanese quails inhabits eastern Asia, including Japan, Korea and China (Hoffmann, 1988), parts of Russia (Johnsgard, 1988) and as well as India (Finn, 1911). During winter, they migrate to China, South-Eastern Asia, the extreme North-Western coast of Africa, and a SubSaharan band North of Congo and including the Nile River valley from Egypt to Kenya. A small population has been found in Angola. This quails are also found in Nigeria, Kenya, Tanzania, Malawi, South Africa, Mozambique, and Namibia as well as parts of Madagascar. According to the East Coast Economic Region secretariat, the demand for quail has soared 20-25% each year since 1995 (“Malaysia-Farming Quail,” 2009).

2.2 Quail production in Malaysia

The private sector enterprise is a major catalyst that drive the huge growth of quail production sector, and it has grew into a progressive, organised and well developed industry. The poultry production is essential part of livestock industry in Peninsular Malaysia with yearly production of meat and eggs of domesticated birds that valued at RM4.1 billion. In providing the protein needs for the population, the particular contribution of the poultry sector has reflected by the great percentage share of the total livestock value added. Poultry farming in 2003 has contributed 55.4% to livestock value, while beef and pork contributed 22.5%. Chickens, ducks, geese, turkeys and quails are actually resemble the term poultry generally. However, in Peninsular Malaysia chickens and ducks are the main product in poultry industry. There is no major production of turkeys, geese or quails (Arshad, & Kaur, 2007).

2.3 Coccidiosis in Quails

Table 2: Scientific classification of *Eimeria* spp.

Phylum	Apicomplexa
Class	Conoidasida
Order	Eucoccidiorida
Family	Eimeriidae
Genus	*Eimeria*

Parasitic disease of the intestinal tract of animals caused by coccidian protozoa is known as coccidiosis. The disease spreads by the ingestion of infected faeces containing the sporulated oocyst from one animal to another. In severe cases the primary symptom is diarrhoea, which may become bloody. Most animals infected with coccidia are asymptomatic. wide variety of animals can affect by coccidiosis, such as birds and livestock, and they are usually species-specific (Ettinger, and Feldman, 1995).

The importance majority of the coccidia in domestic animals belong to the genus *Eimeria*. Out of 25 genera recognized under the Family: *Eimeriidae* of the Phylum: Apicomlexa, the genus *Eimeria* is one of them. From Japanese quails, various species of *Eimeria* such as *E. tsunodai*, *E. uzura*, *E. bateri* has been isolated (Teixeira, Teixeira, and Lopes, 2004). From California quails, *E. Lophortygis* and *E. Okanaganensis* were described, while *E. crusti*, *E. oreortygis* are described from mountain quail (Duszynski, and Gutierez, 1981) and *E. conturnicis*, *E. bateri* are described from grey quail (Tsutsumi, 1972).

E. tahamensis in Arabian quail (Amoudi, 1987), and also from bob white quail, we get *E. colini*, *E. lettyae* (Ruff, 1985). In such cases, asymptomatic conditions may adopt subclinical and chronic forms (Teixeira, Teixeira, and Lopes, 2004). Nowadays, quail coccidiosis and control measures become a major problem in all countries (Mehlhorn, 2008).

2.4 Life Cycle of Coccidiosis in Japanese Quails

Coccidial parasites are belonging to the phylum Apicomplexa. Sporulated oocysts were ingest by quails (the parasite 'egg') from contaminated litter, and the parasites invade the cells of the intestinal wall when these oocyst pass into the intestinal tract. The formation of new oocysts which are shed in the faeces lead by several cycles of replication that occur. the oocysts sporulate and become infective depending on environmental conditions (including temperature and humidity). The cycle takes up 4 to 6 days. The potential for massive replication during the intracellular phase will combined with the short, direct, life-cycle, makes a serious intensive farming conditions problem (Kheysin, 2013).

After just 21 days live in the host animal a single sporulated oocyst will turn into 23 million oocysts. Each of one sporulated oocyst that divides into 8 sporozoites, can divide into 120,000 first-generation merozoites (a total of up to 960,000), during asexual division. Each of these merozoites can asexually divide again into 30 second-generation merozoites. The second-generation merozoites with the result 48 million will pair up for sexual reproduction to produce up to 23 million oocysts. Eventually the production of more oocysts which are passed out with the feces into the environment is the infectious results of coccidiosis. It can go on to infect other chickens. A single oocyst throughout its lifecycle can end up destroying several thousand cells in the gut is one of the problems with coccidiosis. The bird will not have any ill effects if a bird eats a few oocysts. If a few thousand cells in the gut are destroyed, eventually, it will become improve the immune system. However, millions of cells in the gut are destroyed if the bird eats large numbers of oocysts. This causes them to stop eating and adopt a hunched posture with ruffled feathers which display an incredibly painful for the birds (Jackson, 2001).

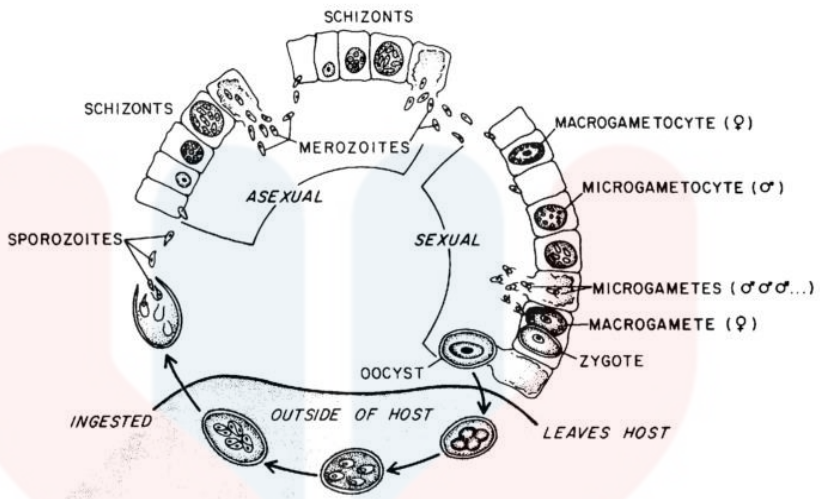


Figure 1 Life cycle of *Eimeria* species (Foreyt, 1990)

The ability of the gut to absorb nutrients was reduced by the damage to the gut wall resulting in weight loss and diarrhea. The damage to the gut wall can be so severe in severe coccidiosis especially where *E. tenella* is involved, resulting the bird bleeds into its gut causing blood in the bird's droppings and undergo pale comb and wattles which characterized as anemia. The natural balance of bacteria in the gut can also disrupt by this gut damage thereby allowing harmful bacteria to take over and causing blood poisoning by crossing the damaged gut wall (Jackson, 2001).

We can differentiate species of *Eimeria spp.* are from one another by structure of endogenous stages, location of endogenous stages in the host species of host, structure of oocysts, and cross immunity. By far the oocyst structure describe as the most commonly used criterion for differentiating species. 2,644,736 morphologically different oocysts are possible for *Eimeria* estimated conservatively by Levine (1978). However, number of eimerian species that may have morphologically indistinguishable oocysts has never being calculated (Fayer, 1980).

2.5 Transmission and Occurrence of *Eimeria* Infection

The occasional finding of oocysts in the caecal contents up to 7.5 months demonstrated that there was a steady escape of oocysts, but before oocysts have completed their development, birds stricken with severe coccidiosis may die (Conway, and Mckenzie, 1991). In poultry management coccidiosis could be regarded as omnipresent (Soulsby, 1982). The only natural method of transmission is through the ingestion of viable sporulated oocyst. Oocysts may continue to shed from both diseased and recovered birds.

The main mechanical transmitters in disseminating oocysts are human beings, which could be transmitted by manure attach to shoes or by utensils carried from one pen to another. Mechanical vectors of this disease include flies, beetles, cockroaches, rodents, pets and wild birds (Reid, 1978). In shaded soil, oocysts may survive as long as 86 weeks. Destruction of oocysts assists by sunlight. Oocysts can be killed in incubator temperature that held for several days, so baby chicks have no danger during hatchery. Oocysts are so invulnerable toward disinfectants that they survive a tough attempt to kill them.

There are a lot of infectious clinical signs of coccidiosis in birds. The examples are droopiness and listlessness, loss of appetite, loss of yellow colour in shanks, pale combs and wattles, ruffled, unthrifty feathers, huddling or acting chilled, blood or mucus in the faeces, diarrhoea, dehydration, and even death. Poor feed digestion, poor weight gain, and poor feed efficiency conclude as the other signs include. Some signs can reflect other diseases. For example, gut disease (necrotic enteritis) also causes bloody diarrhoea (Ettinger, and Feldman, 1995).

2.6 Clinical Signs and Gross Lesions of Coccidiosis

Few young quails presented diarrhoea, weakness and small blood spots in the upper small intestine (jejunum and ileum) during the first week of life. Later, faeces will softened at the 14th day and in quails that been necropsied, an increased cecum were seen at the 21st days. A number of quails had diarrhoea, which will disappear soon, starting from 35th to the 42nd days (Teixeira, Teixeira, and Lopes, 2004).

2.7 Effect of Poultry Age on the Occurrence of Coccidiosis

It is believed that age of the birds can affect the occurrence of coccidiosis disease in the flock. In growers and younger birds the prevalence rate of coccidiosis was high compared with adult birds (Lawal et al., 2016). This approved by the study from Omer et al, who reported that coccidiosis is prone to all ages of birds are, but younger birds are more easy to be infected compare to older birds.

This statement were convinced by the studies from Amare et al. (2012), Etuk et al. (2004), and Dakpogan (2013), where all claim that adult birds has high prevalence rates than other age brackets, as the immune system that immature in young birds cause them susceptible to infection even with the *Eimeria* species that lower or less of pathogenic strain. In addition, young bird can have higher mortality rates in an *Eimeria* outbreak since they are not immunized against coccidiosis, as reported by Chapman et al. (2012). Similarly, coccidiosis outbreak can affect young chicks and growing birds in commercial poultry farms greatly, as usually for several weeks during the brooding period, they are kept under deep litters of saw-dust.

Moreover, every age groups of bird possessed high risk infection with coccidian in a unmanaged poultry farm settings where various age groups of birds are reared in the same deep litter pen as observed by Lawal et al. (2016).

2.8 Microscopic Examinations of Coccidiosis

Fresh smear preparations that are usually adequate in confirming a diagnosis can demonstrate the parasitic stages. For demonstration of the parasite, a standard parasitological technique from intestinal mucosa scraping can be used efficiently (Conway, and Mckenzie, 1991). By softening of faeces in duodenum, small intestine and more clearance in caecum, with thickening of mucosa and light haemorrhage in caecum, it can represent gross pathological lesions. Severe hyperplasia of epithelial cells with construction of intestinal gland cavities in small intestine and caecum with presence of developmental stages of parasite in epithelial layer lining of intestinal glands will characterize the histopathological lesions. Eosinophils and presence of oedema between the muscle fibres in small intestine and caecum represent that there was infiltration with inflammatory cells (Conway, and Mckenzie, 1991).

Significant number of oocysts will be reveal through the microscopic obervation of a native preparation of intestinal content (superficial mucosal layer) in one observation field. In broiler breeder flocks, commercial vaccines are used against the immunization coccidiosis. Chickens will develop immunity to the respective parasitic species if exposed to the natural effect of a moderate number of oocysts in their environment.

2.9 Economic Importance of Coccidiosis

Whenever young animals that had been bred under poor sanitary conditions and more likely within intensive breeding are having digestive problem, coccidiosis is suspected. In small livestock animal, sudden death during the weaning period will lead the potential coccidiosis disease. Determination of subclinical coccidiosis propose by a poor growth rate in a suitable epidemiological setting (Chartier, & Paraud, 2012). In growing quail coccidiosis has a huge physiological impact as it produces changes in the levels of plasma pigment and lessen weight gain. Both egg productions and fertility reduces by Coccidial infection of quail in the production (Ruff, 1985)

There are very few reports on economic losses due coccidiosis (Oyekole, 1984). A favourable condition for the occurrence of coccidiosis increased by the crowding of birds under mass production methods creates. Losses due to this form of the disease are heavy and cannot be estimated (Gordon, and Jordan, 1982). It is not very harmful for a mild coccidiosis infection that kept under control, and actually necessary for creating immunity in free ranging birds and replacement flocks. However, weight loss, egg production reduced; morbidity and mortality can occur as a result of the disease (Lillehoj, and Trout, 1993).

CHAPTER 3

METHODOLOGY

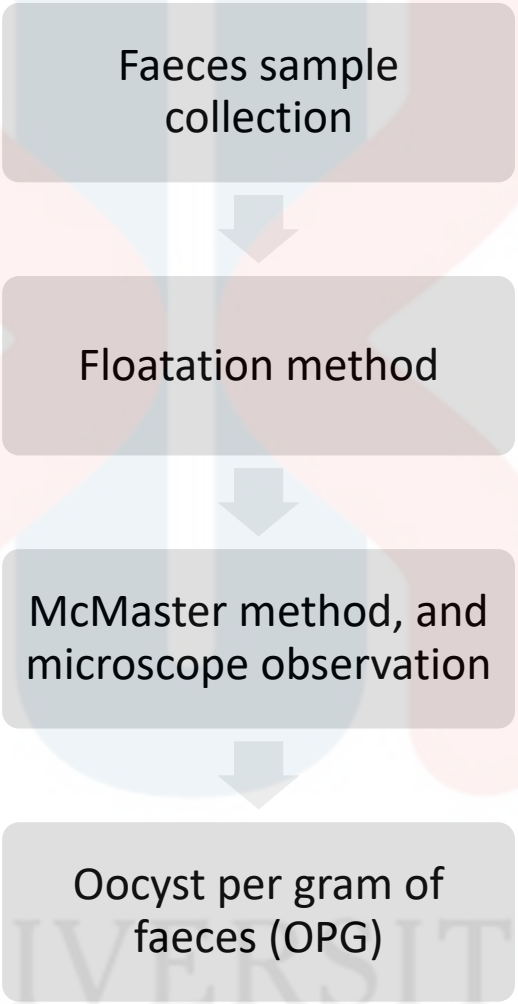
3.1 Experimental Design

In this experiment, the breed that used was the Japanese quails from Double Gold farm, situated at Ayer Lanas, Kelantan.

In this experiment, the quails were grouped into two different aged groups to observe oocyst of coccidia in their faecal samples. The two aged groups are from day-old to 14 days old, and from 14 days old to 28 days old. Five fresh sample of faeces from each groups were collected daily for 28 days. The quantity that required for each sample is about 1 gram each. Those quails were under the same feeding managment, housing management and same environmental conditions.

After sampling, the faecal sample were mashed into particles according to their sample identification in laboratory. The sample then were dissolved in saline water which act as the floatation agent. After 1 or 2 minutes, the water samples will be taken from the surface of the solution and put into McMaster slide. The slide was observed under the microscope, and determined the *Eimeria spp.* oocyst counts.

Diagram 1: Chronological flow of the study



3.2 Materials

3.2.1 Faecal Sample

The faeces samples were collected from Double Gold farm (Japanese quail farm) at Ayer Lanas, Kelantan. The samples were collected everyday at the farm. To avoid the sample from contaminated, collector used sanitary gloves and the samples were directly stored into sealed plastic bags. The faeces that freshly collected were brought to the lab directly for the determination of oocyst counted in faecal samples.

3.2.2 Chemicals

The only chemicals that are needed to prepare floatation solution are table salt (Sodium Chloride) and water bath.

3.2.3 Equipment

The equipment used were sampling plastic bags, beaker, test tubes, gloves, McMaster slides, dropper, sieve and microscope.

3.3 Procedure

3.3.1 Faecal examination

An important method for investigating worm infections and for guarding effective worm control programmes is through faecal experiment. Faecal examination methods are described either qualitative or quantitative. Quantitative methods provide an indication of the levels of infections, whereas qualitative methods give information on the species present. In figuring the health status of a herd and determining the best treatments and control measures, both can be the important tools. When involving the centrifugation and the use of flotation fluids, the examination of faeces for parasitic eggs may differ from a simple direct smear to more complex methods (MAFF, 1986).

3.3.2 Floatation method

Floatation method was used as it enables the recovery of large numbers of eggs that debris-free, without the aid of a centrifuge. In this experiment, the floatation fluid that used was saline water. The saline water was prepared by mixing 400 grams sodium nitrate with 1000mL of water. But, when using this solution, there is one precaution that have to follow, which is cannot left the solution longer that 20 minutes, or else it may form crystals and distort the eggs. Saline water was used because it is less likely to impair development and hatching than other flotation fluids used. Therefore, the oocyst counting technique can be done. This method are commonly used in conjunction with the McMaster technique to detect numbers of oocysts.

The faecal sample that have been mashed were dissolve into the saline solution. It was left for one or two minutes. Then the particles were filter, and the sample in liquid form was left. The water sample will be taken from the surface, and put into McMaster slide. After that observation under the microscope were done.

3.3.3 McMaster Oocyst Counting Technique

McMaster method is another method for determining the number of nematode eggs per gram of faeces in order to estimate the worm burden in an animal. The advantage of this method is it is a quick method. It is because the eggs are floated free of debris before we started the counting. While the disadvantage is it can only be observe with the aid of a special counting chamber. The McMaster technique uses a counting chamber that will enables a known volume of faecal suspension (2 x 0.15 ml) to be examined under the microscope. The number of eggs per gram of faeces can be calculated if we know the weight of faeces and the volume of flotation fluid

that are used to prepare the suspension. The McMaster chamber consist of two compartments, each with a grid engrave on the surface. Much of the debris will sink when suspension of faeces was filled in flotation fluid, while eggs float to the surface. They can easily be seen and those under the grid counted.

The grid dimensions of chamber is 1 cm x 1cm = 1cm^2, while the volume of liquid below the grid is 0.15 ml. As we know that 15 ml is the total volume of the original aqueous suspension of faeces, plus the volume of the sample examined is 0.15 ml, the number of oocysts in the faeces can be calculated by using the this equation;

$\left({}^{15}/_{0.15}\right)$ x N (where N = the number of oocysts counted in the chamber).

For example, when N = 1, the sensitivity per sample is 100 oocysts. Thus, when faeces sample weighed 1 gram, the oocyst count is 100 OPG of faeces (Haug, Williams, & Larsen, 2006).

3.3.4 Statistical Analysis

The occurrence of *Eimeria* species in Japanese quail under different two different housing systems were determined by a formula (Umar & Department, 2014);

$$\text{Occurrence} = \frac{Positive\ samples}{Total\ samples\ analysed} \times 100$$

Data were analysed using descriptive statistics. The data were presented as means ± standard deviation. The comparison of data then were analysed using the t-test and Chi-square method through Statistical Package for Social Science (SPSS) program.

4.0 RESULTS

4.1 General Observation During Sampling

During sampling activities, several mortalities were occurred in the flock. The birds at an early age have minor mortality, which can be affected by environmental factors, such as temperature that is not suitable, and space that is not enough for rearing. As the birds are getting older, the mortality rate remains constant. It was observed that some quails were having diarrhoea.

Figure 2 Quails in floor cage system, at 7-day old

Figure 3 Quails in floor cage system, at 7-day old

4.2 Result of Floatation Technique

4.2.1 Occurrence

The occurrence percentages of *Emeria* infection that have been recorded in both different groups of ages were shown in Table 4.2.1. High occurrence percentage of the *Eimeria* disease was recorded in both different age groups. A group aged from 14 days to 28 days had 100% occurence.

Table 4.2.1: Occurrence of *Eimeria* spp oocyst in Japanese quails at age Day-old to 14-day old, and 14-day old to 28 day old in Double Gold Farm, at Ayer Lanas, Kelantan.

Age of Quails	Sample Size	Positive Sample	Occurrence (%)
Day-old to 14-day old	70	51	72.86
14-day old to 28 day old	70	70	100
Total	**140**	**121**	**86.43**

Chi-square (x^2) = 2.723, df = 1, p-value > 0.05

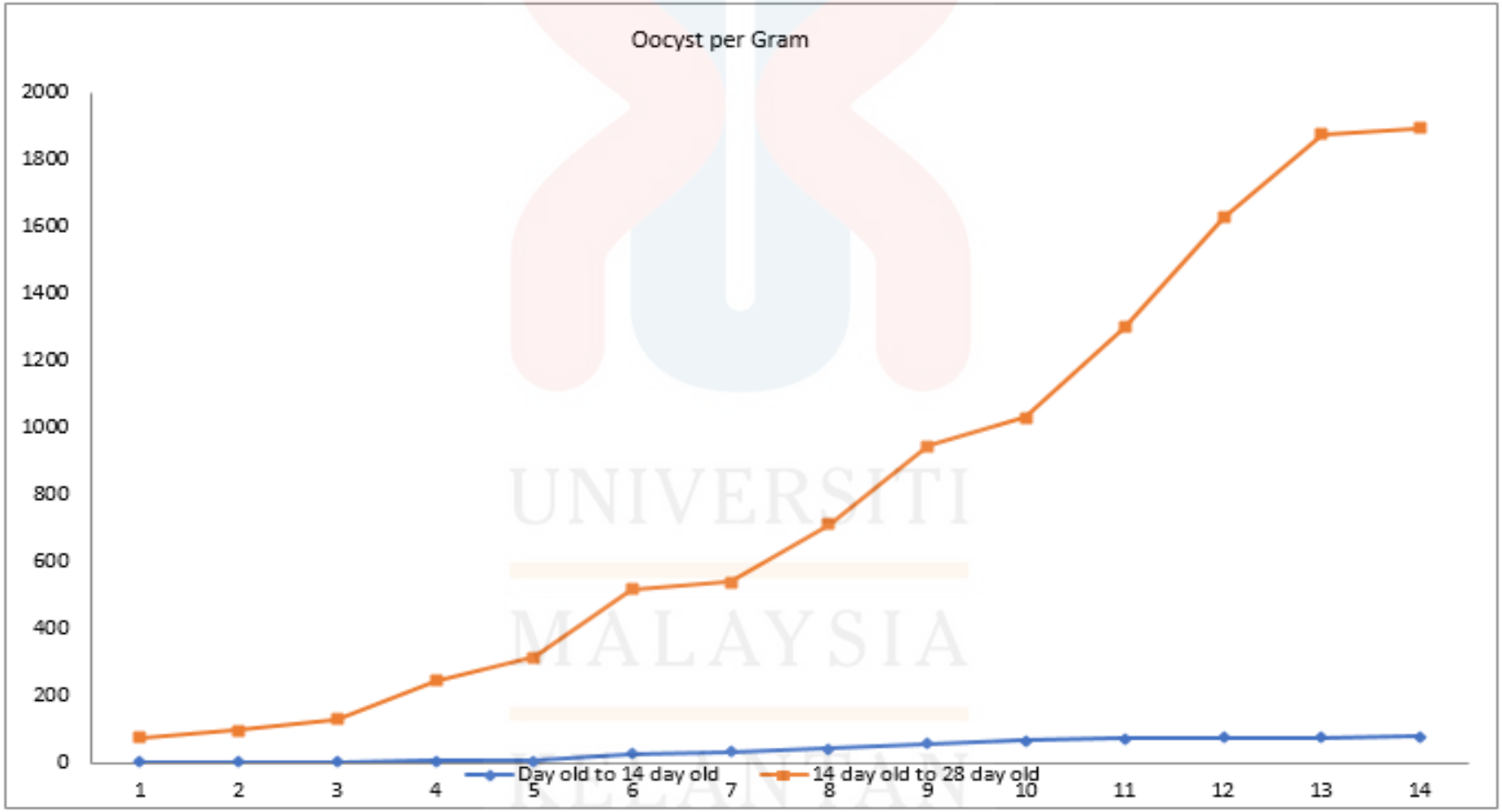
4.2.2 Oocyst per Gram

Table 4.2.2: Oocyst per gram of *Eimeria* oocyst in Japanese quails at Day-old to 14-day old, and 14-day old to 28 day old in Double Gold Farm, Ayer Lanas, Kelantan.

	Day-old to 14-day old	14-day old to 28 day old
Oocyst per Gram (OPG)	3732.86±3156.85[a]	80715.71±65264.34[b]

The oocyst per gram that has been recorded in day-old chick to 14 days old quails is significantly lower ($p < 0.05$) than 14 days to 28 days old quails. The result is indicated in Table 4.2.2. The oocyst per gram count for quails age from day old to 14-day old recorded lower results compare to oocyst count from 14-day old to 28 day old quails, based on Graph 4.1.

Graph 4.1: Oocyst per gram of *Eimeria* oocyst in Japanese quails at age range from day old to 14-day old, and 14-day old to 28-day old in Double Gold farm, Ayer Lanas, Kelantan.



CHAPTER 5

5.0 Discussion

The occurence of coccidiosis in different age of quails were examined. Based on the results that have been collected, it shows that the birds that being reared in the farm are mostly affected by *Eimeria* disease. This can be proved by the determination of oocyst in faecal samples of quails in this experiment.

The overall occurence of *Eimeria* infection in this study is 86.43%, which is high compare to a study of coccidiosis in quails by Umar (2014). Based on his study, he managed to record only 45.75% occurence of *Eimeria* infection in 10 quails farms in Nigeria. This proved that the quails in Double Gold farm has severe infection compared to the farm in Nigeria as study by Umar (2014). The results also indicates that *Eimeria* infection is a problem to the farmers in the study areas.

Both groups of different age show differences in the number of occurence of coccidiosis disease. The group ranged of age from day old to 14-day old have significantly lower occurence percentage of the disease compared to group with range age from 14-day old to 28 day old. Quails aged from day old to 14-day old had 72.68% occurence while quails in 14-day old to 28 day old group recorded 100% occurence. The high occurence in the 14-day old to 28 day old quails group can be affected by some factors. The most suspected factors are because the owner of the farm did not practicing a proper sanitation in his farm, as the prevention method is the best way to decrease infection rate of coccidiosis (Ortlieb, 2006).

In addition, Ortlieb (2006) also stated that it is best to feed the birds with drugs (medicine). The drugs can be added in the quails' feed and it purpose is to control the coccidia growth in birds' digective tract. These prevention method are not applied in the farm, resulting in high occurence of coccidiosis disease in Double Gold farm in Ayer Lanas. In addition, the high percentage of infection in Double Gold farm may be caused by varies factors such as condition of the farm's environment, and seasonal fluctuations in biotic factors (Nematollahi *et al.,* 2009). In addition, other animals and insects can also been incriminated as mechanical vectors (Reid, 1978).

Furthermore, based on Graph 4.1, the number of oocyst observe are increasing as the quails grow. At the early age, which is from day 1 to day 3, the quails in the farm were observed with none clinical sign of *Eimeria* disease. However, starting from day 4, the *Eimeria* spp. start to appear when observed under microscope. The number of oocyst observe increase, as young quails are more susceptible towards coccidiosis disease as stated by Ortlieb (2006).

The oocyst per gram (OPG) counted in faecal sample from quails age ranged from day old to 14-day old is significantly lower than the feacal sample collected from quails with age ranged from 14-day old to 28 day old. In Graph 4.1, it shows a big different of these two quails' age groups. Besides, both groups recorded increment in the number of oocyst per gram counted, the 14-day old to 28 day old group recorded higher results. This may caused by improper sanitary process in the farm. It is possible that the accumulation of oocysts in the litter is high due to the lack of good management practice in sanitation aspect.

Eventhough the OPG increase, but mortality are low in the farm, as the birds have build resistance towards the infection (Lillehoj, and Trout, 1993). The mortality rate in the farm is low. The mortality recorded during the faecal samples collection in

the farm in both groups of ages are similar. As the quails grow, the mortality rate in the farm remains constant. Birds that survive may become 'healthy carriers' of coccidia disease and can affect non-infected birds (Holmes, 1936). The results of oocyst count keep increasing may because of the birds have been infected by other type of *Eimeria* species as immunity is only specify to one species, while at least four different species of coccidia can infected this birds (Ortlieb, 2006). Coccidia are very easy to be transmitted from one bird to another, whenever a birds eat oocyst that have been shed in dropping from infected birds.

According to this experiment, the occurence of coccidiosis varies with different ages of quails. The accumulation of the oocysts lead to higher occurence of coccidiosis. It will be beneficial if the proper management and proper sanitation to prevent from sources of infection containing oocysts from coccidiosis is practiced in the quails farm.

CHAPTER 6

6.0 Conclusion and Recommendation

6.1 Conclusion

This study shows that the number of occurrence of coccidiosis in quails from day old to adult are increase as the quails grow. The mortalities of the quails are observed in both stage of age, which may be due to no vaccination to the quails, and bad sanitary management in the farm. However, the oocysts were observed in the faecal sample collected from quails from day old to 14-day old is significantly lower than the faecal sample collected from quail from 14-day old to 28-day old. It is suggested quails need proper management and vaccination from young until it reach maturity. Improper managemen in the farm may lead to unacceptable high number of coccidiosis infection in the flock, then may cause severe mortalities to the birds. Avoid overcrowded in flock, keep dry litter, and keep feed and water supply away from droppings are ways to prevent coccidiosis infection. It is advisable to use anticoccidial drugs according to the recommendation and recommended withdrawal period from the food and/or drinking water of quail. Vaccination to prevent coccidiosis is also suggested.

6.2 Recommendation

From the study the recommendation prescribe that, proper management of the farm, including the proper sanitary before entering new flock, and proper feed and water management should be applied in all quails farms. Furthermore, further studies should be conducted by raising quails by our own to gain specific data and determine the mortalities factor by necropsies. Other than that, a proper control measures must be taken with emphasis on avoiding water spillage, and proper stocking density frequent disposal of litter material should be instituted in the quail farm.

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APPENDICES

Figure 4 Quails in floor system, at aged of 18 days

Figure 5 With the owner of Double Gold farm