

## Coccidiosis: A Major Cause of Mortality in Poultry in Sri Lanka

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**ABSTRACT.** *Coccidiosis as a cause of death was confirmed in 17% of the total 1053 cases (2460 carcasses) examined at the Veterinary Research Institute, Peradeniya, during the period August 1990 to September 1992. Five species of coccidia namely, Eimeria tenella, E. necatrix, E. acervulina, E. brunetti and E. maxima were identified. E. tenella infection was the cause of mortality in 39% of cases and was common in birds below 45 days of age. E. necatrix was detected in 29% of the cases submitted, and was associated with up to 70% mortality in some affected flocks. The prevalence of E. acervulina, E. brunetti and E. maxima were 2.8%, 1.1% and 0.6% respectively. Mixed infections were detected in 27.3% of the cases.*

*Coccidiosis was more prevalent in layer birds (20.8%) than in the broilers (9.1%). The disease was diagnosed in 23.2% of chicks, 25% of growers and 15% of layers submitted for postmortems. In chicks caecal coccidiosis due to E. tenella was common (70.2%), whilst in growers (64%) and in the layers (76.3%) intestinal coccidiosis was common.*

*Coccidiosis was diagnosed in flocks of different sizes as well as in those managed under different conditions.*

### INTRODUCTION

Poultry farming constitutes a major livestock activity in Sri Lanka. The industry has shown a rapid growth during the past four decades (Wanasinghe, 1993) in spite of the difficulties faced in areas of health, marketing and management (Fonseka, 1987).

Although the improved poultry rearing systems are efficient, losses due to diseases still remain high. The major diseases that affect the industry have been identified as coccidiosis, Newcastle disease, Marek's disease, respiratory diseases and lymphoid leucosis (Wickramasinghe *et al*, 1992).

Coccidiosis had been diagnosed as an economically important disease in poultry during the past forty years in Sri Lanka (Seneviratna and Mahalingam, 1962; Rasiah and Kulasegaram, 1972; Kulasegaram, 1975; Wickramasinghe *et al*, 1992). For the first time, the species of coccidia present in poultry in Sri Lanka and its importance to the industry was shown by Seneviratne and Mahalingam in 1962. An indepth study was made by Rasiah and Kulasegaram (1972) by examining carcasses received for laboratory diagnosis. Since then, no study had been undertaken to observe the status of coccidiosis in the country even though reports from the field (Anonymous, 1994) suggest it as an important disease. This study was undertaken to determine the present status of coccidiosis as a disease entity among poultry in Sri Lanka.

## MATERIALS AND METHODS

### Subjects

Sick birds and carcasses submitted to the Veterinary Research Institute at Gannoruwa from different parts of the country, except the north and east, were used for the present study which was conducted during the period from August 1990 to September 1992.

Materials were received either directly from the farmers or through field veterinary surgeons. These were from poultry farms of different sizes and maintained under varying husbandry practices.

The number of sick birds or carcasses received for diagnosis from an affected flock varied from 1 - 20. The term "case" used throughout in this paper refers to each submission made by any one source, irrespective of the number of birds. A detailed history of each case presented was obtained using a structured questionnaire which included: the type of industry, type of bird, breed, age, feed, flock size, housing, vaccination and management conditions.

### **Disease diagnosis**

Sick birds submitted were subjected to a thorough anti-mortem examination. They were then sacrificed by injecting air into the jugular vein. All carcasses were subjected to a detailed postmortem examination. Standard techniques (Gorden, 1977) were used for diagnosis. For this purpose, the clinical symptoms, gross postmortem lesions and the histopathology of affected tissues were taken into consideration. Wherever necessary, materials were collected for bacteriological and virological examination.

### **Examination for Coccidia**

From each carcass, the intestinal tract was examined for coccidia irrespective of the cause of death. The entire intestine released from the mesenteries was removed from the bird. The serous surface of the unopened intestine was initially examined for the presence of gross lesions. The entire length of the intestine was then opened and observed for the presence or absence and type of exudate, thickening of the wall, reddening, white spots, petechial haemorrhages and coagulation necrosis.

Scrapings, both superficial and deep, were taken separately from different parts of the intestine and smears were made in normal saline for microscopical examination (x10; x40). Measurements were made of all oocysts detected (Read, 1978).

Identification of coccidia was based on the gross lesions produced, stage or stages of the parasite (schizonts and oocysts) present, and morphology of these stages, as outlined by Joyner and Long (1974).

## **RESULTS AND DISCUSSION**

### **Clinical Coccidiosis**

Coccidiosis was confirmed as the cause of death in 17% of the total 1053 cases (2460 carcasses) examined. Five species of coccidia namely *Eimeria tenella*, *E. necatrix*, *E. acervulina*, *E. brunetti* and *E. maxima* were detected. These appeared mostly as single infections; but in some, mixed infections were encountered (Table 1).

**Table 1. Prevalence of *Eimeria* species in chickens in Sri Lanka.**

Species	Number of coccidiosis cases*	Percentage
<i>E. tenella</i>	70	39.0
<i>E. necatrix</i>	52	29.0
<i>E. acervulina</i>	5	2.8
<i>E. brunetti</i>	2	1.1
<i>E. maxima</i>	1	0.6
Mixed	49	27.3

\* Diagnosed as the cause of mortality

Coccidial parasites were also detected in another 32 cases (3%) in which mortality was due to causes other than coccidiosis. However, no relationship could be found between the presence of coccidia and the other causes of mortality.

Coccidiosis has been observed as an important pathological condition in poultry from as early as the 1950's (Seneviratna and Mahalingam, 1962). In a study involving 206 cases, Rasiah and Kulasegaram (1972) found coccidia to be the foremost cause of mortality (17.1% of cases examined). Later reports involving analysis of postmortem examinations have shown that the prevalence of coccidiosis during the period 1960 to 1974 varied between 11% to 25%, with a mean of 15.3% (Kulasegaram, 1975). Except in 1962, in all the other years coccidiosis was reported to be the most important cause of mortality in chicks. Similar figures of 15-25% for coccidiosis was reported by Wickramasinghe *et al*, (1992) for the period 1975-1990.

The present study has confirmed the presence of five species of coccidia, namely *Eimeria tenella*, *E. necatrix*, *E. acervulina*, *E. brunetti* and *E. maxima*, identified in Sri Lanka by earlier workers. The identification of these common species agrees with the supposition made by Macpherson, (1978) that domestic poultry all over the world will be parasitized by the same species of *Eimeria*. However, the sixth species *E. mitis* reported by the earlier workers (Seneviratna and Mahalingam, 1962; Rasiah and Kulasegaram, 1972) was not encountered in this study. *E. mitis* in general does not produce gross lesions and its confirmation is based on much developed

molecular techniques (Saikiet *et al.*, 1988). Thus, the likelihood of missing *E. mitis* infection in this study cannot be under-estimated.

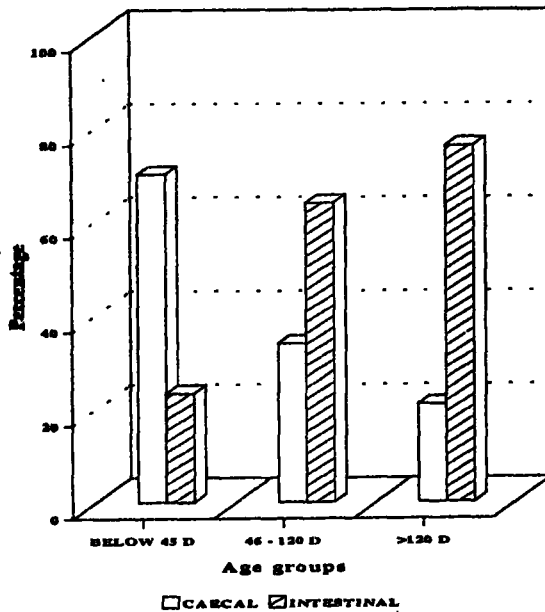
In the present study, *E. tenella* infection was confirmed in 70 (39%) cases and was common in chicks below 45 days of age. Both acute and chronic forms of the infection were seen with mortality up to 30% being detected in acute infections. *E. necatrix* was the second most frequent species in birds and was detected in 52 (29%) cases. It was easily diagnosed from the gross lesions, specially in acute cases. The small intestine was affected with maximum involvement in the middle region and in some acute outbreaks mortality up to 70% was recorded. Scrapings from the intestine, in both acute and chronic forms, showed large schizonts. Oocysts were present only in smears made from the caecal contents. This order of prevalence is not in agreement with the findings of Rasiah and Kulasegaram (1972) who reported *E. necatrix* to be the most prevalent followed by *E. tenella*. However, the same authors commented that ten years previous to their study *E. tenella* was much more prevalent than *E. necatrix*, suggesting that the pattern of coccidiosis in poultry does change with time. Such changes in the prevalence rates of coccidia species in poultry have been reported by other workers (Long, 1964; Vertommen, 1994).

*E. acervulina* was confirmed in 5 (2.8%) cases (Table 1). The affected birds were 1 and 9 months of age and mortality was low (<4%) in affected flocks. Postmortem examinations revealed creamish transverse bands on the serous surface of the duodenal area. Upon opening, the intestine was found to be thickened with mucoid enteritis. Smears made from the scrapings of the upper region usually showed large numbers of oocysts. *E. brunetti* was observed in two outbreaks (1.1%). The affected birds were between 1 to 2 months of age. Only one outbreak (0.6%) of *E. maxima* infection was encountered during this period, which occurred in 1-year-old birds. In 49 (27.3%) cases mixed infections were observed. In these, two or more species were involved, *E. tenella* being the most common. The rates of prevalence obtained for *E. acervulina*, *E. brunetti* and *E. maxima* in this study are similar to the findings reported earlier by Rasiah and Kulasegaram in 1972. In view of the wide area of the country serviced by this poultry diagnostic laboratory, the data obtained would be a reasonable index of the occurrence of this disease in the country.

**Relationship of coccidiosis with bird type, age and site**

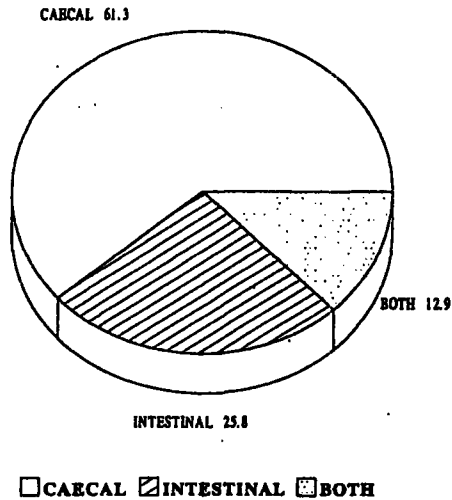
Of the total 1053 cases examined, 712 (67.6%) were from layer farms and 341 (32.4%) were from broiler farms. The prevalence of coccidiosis was found to be significantly higher ( $P < 0.0001$ ) in layers (20.8%) than in broilers (9.1%).

Of the layer-bird cases, 203 (28.5%) were of "chicks" (<45 days of age), 227 (31.9%) of "growers" (45-120 days of age) and 282 (39.6%) of "layers" (>120 days of age). Coccidiosis was diagnosed as a cause of mortality in 23.2% of chicks, 25% of growers and in 15% of layers. Both caecal and intestinal coccidiosis were encountered in all three age groups, but in varying proportions. Caecal coccidiosis was common in chicks (70.2%), whilst intestinal coccidiosis was common in growers (64%) and layers (76.3%) as shown in Figure 1.



**Figure 1. The Relationship between Age and Type of Coccidial Infection in Layers.**

Among the broiler birds too, both caecal and intestinal coccidiosis were diagnosed. As in layers, in birds up to 45 days of age, caecal coccidiosis was much more prevalent than the intestinal type (Figure 2).



**Figure 2. Types of Coccidiosis in Broilers.**

Among the layers, coccidiosis was noted to be the most important cause of mortality in poultry in spite of the improved management systems followed and wide use of coccidiostats in poultry feeds. A major reason for such high prevalence could be the development of resistance to the commonly used coccidiostats, as reported from other countries (Long, 1984; Vertommen, 1994). In Sri Lanka, as far back as 1972 Rasiyah and Kulasegaram suspected resistance in *E. necatrix* to coccidiostats used at that time.

Coccidiosis was more prevalent in chicks and growers than in layers. Similar observations have been reported from other countries (Jagadeesh Babu *et al*, 1974; Ghodasara *et al*, 1992). Among chicks (<45 days), caecal coccidiosis due to *E. tenella* was common; whilst intestinal coccidiosis due to other species was common in growers and layers. In the United Kingdom, *E. tenella* and *E. brunetti* have been reported to be common in chicks, whilst *E. acervulina* was exclusively found in older birds (Long, 1964).

#### Coccidiosis in flocks of different sizes

For this study, the farms from which the cases were received were divided into three categories based on the flock size: less than 500, 500 to 1000, and over 1000 birds. Coccidiosis was diagnosed as a cause of mortality in all the above categories (19.1%, 19.8% and 11.6%, respectively), but no significant association between coccidiosis infection and the size of flock was observed.

### Coccidiosis under different management conditions

Almost all (99.5%) cases submitted from both layer and broiler farms were managed under the deep litter system. Only 0.5% cases were from free-range system, and coccidiosis was not detected in any of these flocks. In the intensive system of management only two types of litter material, namely paddy husk and saw dust were used by farmers.

Feed used had been mostly from commercial feed manufacturers (94.1%), whilst few (5.9%) used own-mixed feed. Coccidiosis was diagnosed in 17.7% in commercial feed fed birds, whilst it was 12.4% in own-mixed feed fed group.

In conclusion, it may be said that coccidiosis still remains a major cause of mortality in poultry. The improved methods of rearing and wide use of coccidiostats have not changed the prevalence of this disease over the last four decades.

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