Pak. j. sci. ind. res., vol. 37, no. 8, August 1994

PREVALENCE OF COCCIDIOSIS IN BROILERS ON TWO FARMS IN BANGLADESH

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(Received October 2, 1993; Revised April 25, 1994)

Litter oocyst counts and lesion scoring of naturally infected chicken were carried out to study the prevalence of coccidiosis in broilers on two farms in Bangladesh. Except in one crop, the pattern of weekly litter oocyst counts and the rate of infection were very similar on both the farms. Oocysts were normally detectable in litter early at two weeks with gradual increase to reach a peak at five weeks (9-22 x 10^3 per gramme of litter) and then declined. Although the rate of infection was higher at six weeks, in most cases the severity of lesions was almost equal both at 4 and 6 weeks, and mostly *E. acervulina* and *E. tenella* were responsible for these lesions. Five pathogenic species of *Eimeria* were detected in this study. *Eimeria acervulina* was the commonest and found in upto 80% birds examined at 6 weeks. With *E. tenella, E. maxima, E. brunetti* and *E. necatrix,* these rates were 70, 40, 30 and 20% respectively. *E. tenella, E. maxima* and *E. brunetti* occurs on and from 2 weeks whereas *E. acervulina* and *E. necatrix* never before 4 weeks. Coccidiosis was more prevalent during cold months of the year.

Key words: Coccidiosis, *Eimeria,* Lesion score, Litter oocysts.

Introduction

Coccidiosis has been identified as a major chicken disease in Bangladesh with a degree of seasonality in its occurrence [1]. Because of the economic importance of chicken coccidiosis uninterrupted control measures using in-feed medication has been universally accepted, especially, in broilers. This is not, however, the case in Bangladesh where sanitary practices alongwith tactical use of sulphonamides have been adopted which in most cases are inadequate [1]. Sanitary barriers are not efficient enough to exclude indirect contamination of premises which together with the residual contamination practically make it a permanent risk of infection for birds. This paper describes the present status of chicken coccidiosis in Bangladesh with reference to the most prevalent species, especially, at different broiler age and seasonal variation in its occurrence. In addition, a method of forecasting a possible outbreak is suggested.

Materials and Methods

Enumeration of litter oocysts. Two broiler farms, one each at Mymensingh and Sylhet were included in this study. Both the farms were adopting the commonly used sanitary practices and were using sulphaclozine sodium salt (Esb3, Ciba-Geigy) in drinking water at 9,10 and 11 days, and at 19, 20 and 21 days for controlling coccidiosis. Weekly litter samples were collected from five broiler crops in Mymensingh and three in Sylhet during the period from March 1990 to April 1991. On each occasion, five samples each of approximately 50 g collected randomly without any predetermination, were mixed thoroughly. The number of oocysts per gramme of litter was counted by following the method of Long and Rowel [2] with few modifications. Ten gramme of litter from the collected sample was allowed to soak in 100 ml of water for 24 hrs at refrigerator, mixed thoroughly by vigorous shaking in a screw capped bottle and seived through a tea strainer to remove the coarse particles. After centrifugation at 1100 g for 5 mins the supernatant was discarded and the sediment was resuspended in 100 ml of saturated sodium chloride solution. Two chambers of a McMaster counting slide were filled with the suspension after thorough mixing. The oocysts were allowed to float for 3-5 mins and counted by using a x6 eyepiece and x10 objective.

Lesion scoring. Lesion scoring of naturally infected chickens were carried out at 2, 4, 6 and 8 weeks. On each occasion 10 chicken randomly selected were killed, the whole intestine including the caeca was removed and examined for lesions due to coccidia. A 0 to + 4 criteria were used for scoring lesions [3]. After gross examination, mucosal scrapings were examined microscopically to differentiate species by studying the developmental stages. As *E. mitis* and *E. praecox* do not produce any detectable gross lesion, these two species were excluded.

Results and Discussion

The details of litter oocyst count and overall rate of infection as detected by the lesion scoring are presented in Fig. 1 and 2, and the mean score of lesions with different *Eimeria* species is shown in Table 1. Oocysts were first detected in litter mostly at two weeks (0.2-2 x 10^3 per gramme) which gradually increased to reach a peak at 5 weeks (9-22 x 10^3 per gramme) except in one crop in which there were two peaks, one at 4 and

the other at 5 weeks. With one exception, the rate of infection was highest at 6 weeks but severe lesions were seen both at 4 and 6 weeks and mostly *E. acervulina* and *E. tenella* were responsible for these lesions. Amongst the 5 species *E. acervulina* was the commonest and was recorded in upto 80% of birds examined at 6 weeks. With *E. tenella, E. maxima, E. brunetti* and *E. necatrix* , the rates were 70, 40, 30 and 20% respectively. Peak litter oocyst at 5 weeks and highest rate of infection at 6 weeks, as observed in this study, was also observed by Long *et al* . [4]. The deviation of this general pattern, as observed in some cases, was possible due to a relatively large number of residual oocysts, breach in the commonly used sanitary practices and subsequent use of sulphonamides. Change in the environment might have also a role to this effect. This indicates that inspite of thorough cleaning of the premises after each crop and the use of fresh litter, few residual oocysts are enough to build up a large number by recycling in a short period of time. Chicks normally develop a level of immunity after primary infections with *Eimeria* [5] which in addition to the destruction of oocysts by bacterial action and ammonia production in the litter [4], and the use of sulphonamides were possibly responsible for subsequent reduction of oocysts after a peak at 5 weeks.

Detection of *E. acervulina* as the most prevalent species in this study is in agreement with that of Long *et al* . [4]. Detection of *E. tenella* as the second most prevalent species bears special significance, as outbreaks of this species may cause substantial economic loss. The lower reproductive potential of *E. necatrix*, which normally takes a longer period of time to accumulate sufficient number of oocysts in litter to be picked up by the birds may explain why this species was the least common one. The relatively higher prevalence of *E. maxima*, the most immunogenic species, was probably because of the notable intraspecific immunological variations [6]. It is evident from Table 1 that *E. acervulina* and *E. necatrix* affect relatively older birds whereas *E. tenella* and *E. maxima* and to some extent *E. brunetti* can occur at any time during the period of 8 weeks.

In this study coccidiosis has been found to be more prevalent during the cold months (Nov. to Mar.) of the year, although the seasonality in occurrence was not very marked. Karim and Trees [1], however, reported a higher occurrence during the hot and humid months of the year on the basis of information obtained through questionnaire. This probably reminds us to be cautious in interpreting the data obtained through questionnaire. The higher rate of infection in one crop in Sylhet (Table 1) during Apr.-Jun. period was possibly because of the presence of a large number of residual oocysts and also because of unfavourable weather conditions. This further indicates that should the conditions become favourable for the development of oocysts or the birds suffer a stress, an outbreak of clinical coccidiosis is very likely and in such case this may occur at any time of the year.

Johnson and Reid [3] described the method of lesion scoring of birds after infection with a single species of *Eimeria*. The authors abandoned their attempt to score lesions in

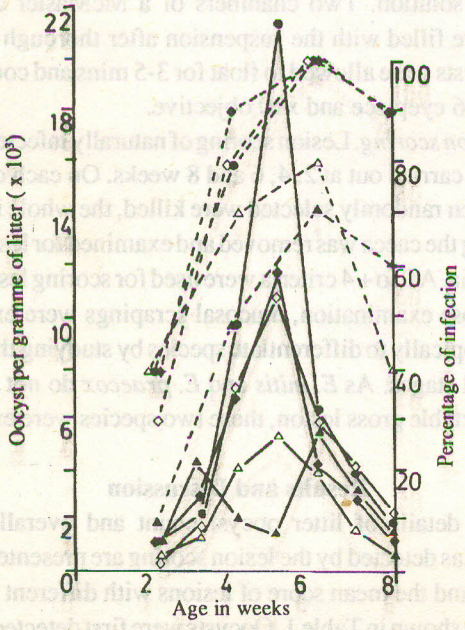

Fig. 1. Litter oocyst and percentage of infection in broilers in Mymensingh.

Legend: (•) March 14 - May 9; (Δ) May 9-July 3; (Δ) July 10-Sept. 4; (♦) Nov. 11-Jan. 6; (◊)Jan. 6-March 3; (—) Litter oocyst; (---) % of infection.

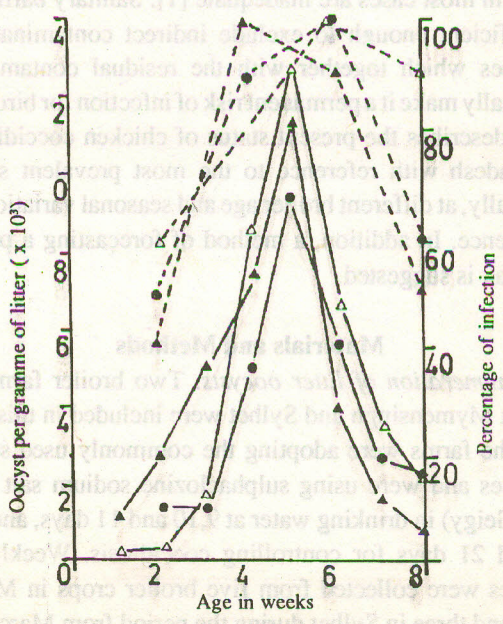

Fig. 2. Litter oocyst and percentage of infection in broilers in Sylhet.

Legend: (•) April 14 - June 9; (Δ) July 10-Sept. 4; (Δ) Feb. 5-April 2; (--) Litter oocyst; (---) % of infection.

TABLE 1. MEAN LESION SCORE OF NATURALLY INFECTED CHICKEN*.

Species	Age (Wks)	Mymensingh					Sylhet		
		Mar. 14–May 9	May 9–July 3	July 10–Sep. 4	Nov. 11–Jan. 6	Jan. 6–Mar. 3	Apr. 14–June 9	July 10–Sep. 4	Feb. 5–Apr. 2
E. tenella	2	+1 (3)	–	+1(1)	+1(1)	+1(2)	+1(5)	+1(3)	+1(3)
	4	+1(3)	+1(5)	+1.33(3)	+1.5(2)	+1.3(7)	+1(4)	+2(4)	+1(3)
	6	+1(7)	+1(6)	+1(2)	+1.25(4)	+1.3(4)	+1.33(6)	+1(4)	+1(6)
	8	+1.25(4)	+1(1)	+1(1)	+1(3)	ND**	+1(3)	+1(1)	+1(4)
E. acervulina	2	–	–	–	–	–	–	–	–
	4	+1.5(4)	+1(1)	+1.5(2)	+1.67(3)	+1.67(2)	+1.75(4)	+1.3(3)	+1.25(4)
	6	+1(8)	+1.75(5)	+1.33(6)	+1.75(8)	+1.63(8)	+1.75(6)	+1.25(8)	+1.63(8)
	8	+1(7)	+1.4(4)	+1.5(4)	+1(8)	ND	+1.75(4)	+1(4)	+1.17(6)
E. maxima	2	+1(2)	+1(1)	+1(2)	+1(1)	+1(2)	–	+1(1)	+1(2)
	4	–	–	–	+1.5(4)	+1(2)	+1(1)	–	+1(1)
	6	+1(4)	–	–	+1.25(4)	+1(2)	–	+1(2)	+1(3)
	8	+1(1)	–	+1(1)	–	ND	–	+1(1)	+1(2)
E. brunetti	2	–	–	+1(3)	+1(2)	–	–	+1(2)	+1(1)
	4	–	+1(1)	+1(2)	–	–	–	+1(1)	+1(1)
	6	–	+1(3)	+1(3)	–	+1(1)	+1(2)	–	+1(1)
	8	–	+1(3)	–	+1(2)	ND	–	+1(1)	+1(1)
E. necatrix	2	–	–	–	–	–	–	–	–
	4	+1.5(2)	–	–	–	–	+1(1)	–	+1(1)
	6	–	–	+1(1)	+1(1)	+1(1)	+1(2)	+1(1)	+1(1)
	8	+1(1)	–	+1(1)	+1(1)	ND	–	–	+1(1)

* 10 chickens examined each time, figures in bracket indicate % of infection. ** Not done, the chickens were slaughtered one day before sampling.

chicken with mixed infection. By including microscopical examination of mucosal scrapings and studying the developmental stages, we have succeeded in differentiating species in naturally infected chickens even with mixed infections. *E. acervulina* can be differentiated relatively easily by its characteristic lesions in the duodenum and anterior part of the small intestine. Except with exceptionally large doses of oocysts, which is an unlikely situation in natural infection, *E. tenella* do not occur outside the caeca, and *E. brunetti* which normally affect the posterior part of the gut, do not affect the caeca. *E. necatrix* although invade the caeca during its sexual phase of the life cycle, produced main pathology in the middle third of the small intestine and except in very heavy infections do not produce any major lesion in the caeca. However, because both *E. maxima* and *E. necatrix* produce almost similar lesions in the middle third of the small intestine, special attention is needed for scoring lesions caused by these 2 species. Presence of larger schizonts (approximately 64/49 µm) at mucosal scrapings would indicate an infection with *E. necatrix*, and a smaller schizonts (approximately 10/8 µm) and the presence of large yellowish oocysts would indicate an infection with *E. maxima*. At least 5 slides were examined before excluding the presence of developmental stages of *E. maxima* to lesion score of *E. necatrix* and vice versa. However, mixed infection with these two species, although can be detected, would be very difficult to lesion score but not a single case of mixed infection with *E. necatrix* and *E. maxima* were seen during the period of this study.

Conclusion

The results of the present study suggest that a litter oocyst count exceeding a thousand oocysts per gramme of litter is an indication of a possible outbreak of coccidiosis during the following week. Therefore, it is suggested that weekly monitoring of litter oocysts would give an indication and can be used as a valuable guide in forecasting a possible outbreak. This will in turn allow the growers to take appropriate measures to prevent a loss due to coccidiosis.

Acknowledgment. The authors would like to thank the authorities of the Bangladesh Livestock Research Institute for financing this study.

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