Periodic release of *Eimeria* species oocysts from chicken during daytime hours in a tropical environment

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Key words

Chicken - *Eimeria* - Periodicity - Humidity - Coccidia - Infestation - Feces - Cameroon.

Summary

Every two hours from 6 to 18 hrs, feces were collected from 62 native chickens in Dschang, Western Cameroon. Fecal *Eimeria* oocyst counts were made using a McMaster cell. Oocysts were most abundant at 16 and 18 hrs when air humidity was high. This particular timing of oocyst release was therefore considered adaptive for survival and transmission of coccidia and ideal for diagnosis.

■ INTRODUCTION

A number of parasites especially helminths discharge their dispersal stages with a distinct periodicity which often coincides with the right conditions for survival (2). Such periodicity has also been used for the proper timing of parasite diagnostic procedures (5). In order to document similar cycles in coccidia, the present study attempts to describe the every two hours' variation in fecal oocyst counts from domestic fowl naturally infested with *Eimeria* species.

■ MATERIALS AND METHODS

The study was conducted during the month of August 1995 in Dschang, a small locality in the Western Highlands of Cameroon, at an altitude of 1400 m. Temperature, relative humidity and rain fall varied from 15.4°C to 25.2°C, 64.3 % to 97.5 % and 0.4 mm to 50 mm, respectively. Sixty-two native village chickens (22 males and 40 females) were used in the experiment. They were taken from seven widely scattered households practicing traditional free range husbandry as described by Agbede *et al.* (1).

Each bird was isolated under a bamboo basket 45 cm in diameter and 25 cm high for 24 hrs (from 18 to 18 hrs) and given commercial chicken feed and water *ad libitum*. Within that period, feces were collected in individual plastic bags at 6, 8, 10, 12, 14, 16, and 18 hrs from each bird, and kept at 4°C in a refrigerator until microscopic examination was done within two weeks. The fecal samples collected at 6 hrs had been deposited overnight. The oocyst counts were made in a McMaster cell as described by Thienpont *et al.* (5). A total of 331 fecal samples were processed during the study. In the absence of complementary anatomo-pathological data from the host, no attempt at specific oocyst identification could be made (4).

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The mean number of oocysts per gram of feces (OPG) and total oocyst output for the different collecting periods were compared using ANOVA and the least significant difference test after the data had been transformed to $\log_{10}$ (x+1) due to wide variations. The significance level of the tests was set at 0.05.

■ RESULTS AND DISCUSSION

The highest oocyst total output and concentrations (statistically) irrespective of host sex were found in feces collected at 16 hrs (8461.82 OPG) and 18 hrs (10032.00 OPG) while the lowest counts were observed at 10 hrs (1095.24 OPG) and 12 hrs (2155.10 OPG) (table I).

Feces obtained in the later part of the afternoon would therefore seem more suitable for the detection of coccidial infestations in domestic fowl. It is customary to use feces deposited overnight (5). Given the relatively low oocyst counts in feces collected at 6 hrs, such a procedure might produce false negative results, withholding treatment, which might otherwise proved necessary. On the other hand, since oocysts are about 36 % less concentrated in the morning than in late afternoon fecal samples, positive morning samples would indicate a heavy infestation.

Oocyst counts and relative humidity (computed mean values) closely followed the same pattern of variation, decreasing from 6 to 10 hrs and increasing afterwards (figure 1). High air humidity is likely to maintain feces moist. Since adequate moisture is required for oocyst sporulation (2, 4), it is suggested here that oocysts released when humidity is high have a better chance of sporulating and becoming infective. The observed timing of oocyst discharge in the environment could therefore be an adaptive behaviour for parasite transmission. The species responsible for the noted pattern of temporal variation in fecal oocyst counts could not be identified. Testing with experimental monospecific infestations is needed, with a special consideration given to the recording and analysis of activity and other factors likely to influence excreta and oocyst discharge.

Table I

Temporal variations in the fecal concentration and output of Eimeria spp. oocysts in domestic fowls in Dschang, Cameroon

Time	n	Mean OPG ± std. dev.	Mean total oocyst output ± std. dev.
6 hrs	47	3059.6 ± 7006.3^{bc}	69835.8 ± 160981.6
8 hrs	35	1857.1 ± 5684.8^{bcd}	25795.4 ± 111643.7
10 hrs	42	1095.2 ± 2600.7^{d}	5932.9 ± 13565.3
12 hrs	49	2155.1 ± 5069.9^{cd}	24660.8 ± 66075.5
14 hrs	53	3645.3 ± 7798.1^{b}	39599.3 ± 117404.1
16 hrs	55	8461.8 ± 16300.3^{a}	98978.2 ± 358821.7
18 hrs	50	10032.0 ± 16354.0^{a}	84449.4 ± 216129.8

n = sample size; OPG = oocysts/gram of feces

a,b,c,d = means in the same column with dissimilar superscripts are significantly different ($P < 0.05$).

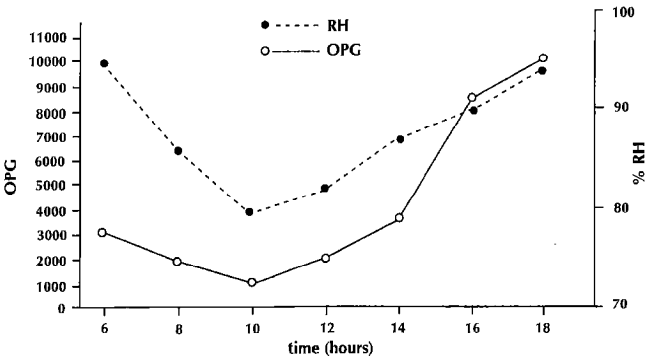

Figure 1: *variation in air mean humidity (% RH) and in fecal oocyst counts from domestic fowl naturally infested with* Eimeria *species (OPG = oocysts per gram of feces).*

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REFERENCES

1. AGBEDE G., DEMEY F., VERHULST A., BELL J.G., 1992. Prévalence de la maladie de Newcastle dans les élevages traditionnels de poulets au Cameroun. *Revue sci. techn. Off. int. Epizoot.,* **11** : 805-811.

2. BOCH J., SUPPERER R., 1983. Veterinarmedizinische Parasitologie. Berlin, Germany, Verlag Paul Parey, 533 p.

3. KENNEDY C.R., 1975. Ecological Animal Parasitology. New York, USA, John Wiley & Sons.

4. SOULSBY E.J.L., 1982. Helminths, arthropods and protozoa of domesticated animals, 7th ed. London, United Kingdom, Baillière Tindall, 809 p.

5. THIENPONT D., ROCHETTE F., VANPARIJS O., 1979. Diagnostic de verminoses par examen coproscopique. Beerse, Belgique, Janssen Research Foundation, 187 p.

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Résumé

Mpoame M., Tchoumboue J. Elimination périodique des oocystes d'*Eimeria* chez le poulet pendant la journée en milieu tropical

Toutes les deux heures de 6 à 18 h, les fèces de 62 poulets de race locale ont été prélevées à Dschang dans l'ouest du Cameroun. La numération des oocystes d'*Eimeria* dans ces fèces s'est effectuée à l'aide de la cellule de McMaster. Les oocystes étaient les plus abondants à 16 h et 18 h, lorsque le taux d'humidité de l'air était élevé. La période particulière de libération des oocystes est par conséquent considérée comme une adaptation pour la survie et la transmission des coccidies et comme idéale pour le diagnostic.

Mots-clés : Poulet - *Eimeria* - Périodicité - Humidité - Coccidia - Infestation - Fèces - Cameroun.

Resumen

Mpoame M., Tchoumboue J. Liberación periódica de oocitos de *Eimeria* spp. en pollos, durante el día, en un medio tropical

Cada dos horas, entre las 6 y las 18 hrs, se recolectaron las heces de 62 pollos criollos en Dschang, Camerún del oeste. Se realizaron conteos de oocitos fecales de *Eimeria* mediante la célula de McMaster. Los oocitos fueron más abundantes entre las 16 y las 18 hrs, cuando la humedad ambiente era más elevada. Este horario particular para la liberación de oocitos se consideró como un signo de adaptación para la supervivencia y la transmisión de la coccidia e ideal para el diagnóstico.

Palabras clave : Pollo - *Eimeria* - Periodicidad - Humedad - Coccidia - Infestación - Materia fecal - Camerún.