

## SUBCLINICAL COCCIDIOSIS IN ANGORA RABBITS, A FIELD SURVEY IN HIMACHAL PRADESH, INDIA.

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**ABSTRACT** : Eight species of coccidia were identified in 180 (57.3%) out of 314 faecal samples or topotypes from four commercial rabbitries in Kangra Valley of Himachal Pradesh. Mixed infections were common and 82% of the infected animals harbored 2-4 *Eimeria* species. *Eimeria magna*, *E. perforans* and *E. media* were the predominant species while *E. irresidua*, *E. stiedai* and *E. intestinalis* were less common, and *E. piriformis* and *E. coecicola* were relatively

rare. *E. exigua*, *E. flavescens* and *E. vej dovskiyi* were not recorded in the present study. The level of infection based on the oocyst output data, was found to be related to management practices. The intensity of infection assessed by oocyst per gram of faeces (OPG) was higher in big private farms ( $0.05 - 80 \times 10^3$ ) in comparison to small Government farms ( $0.3 - 16.5 \times 10^3$ ).

**RÉSUMÉ** : Coccidiose chez le lapin angora : enquête de terrain en Himachal Pradesh, Indes. Huit espèces de coccidies ont été identifiées dans 180 échantillons de fèces (57.3%) sur les 314 récoltés dans quatre élevages organisés de la vallée de Kangra en Himachal Pradesh (Indes). Les infections multiples sont fréquentes et 82% des animaux infectés sont porteurs de 2 à 4 espèces d'*Eimeria*. *Eimeria magna*, *E. perforans* et *E. media* sont les espèces prédominantes tandis que *E. irresidua*, *E. stiedai* et *E. intestinalis* sont moins

fréquentes, et que *E. piriformis* et *E. coecicola* sont relativement rares. Dans cette étude, *E. exigua*, *E. flavescens* et *E. vej dovskiyi* n'ont pas été identifiées. Le niveau d'infection établi à partir de l'excrétion d'oocystes se révèle lié aux pratiques d'élevage. L'intensité de l'infection démontrée par le nombre d'oocystes par grammes de fèces (OPG) est plus élevé dans les grandes fermes privées ( $0.05 - 80 \times 10^3$ ) que dans les petites fermes d'Etat ( $0.3 - 16.5 \times 10^3$ ).

### INTRODUCTION

Angora rabbit farming for wool is fast becoming an economically attractive enterprise of North Western Humid Himalayan region in India. The Kangra valley of Himachal Pradesh has an estimated population of over 7,000 Angora rabbits in unit sizes ranging from 20 to 400 animals maintained in different managemental practices. Coccidiosis caused by different species of protozoan parasite, *Eimeria* is one of the important diseases of rabbits and is a major cause of morbidity and mortality (LEBAS *et al.*, 1986). In commercially reared rabbits coccidiosis occurs in subclinical form leading to growth retardation and altered feed conversion (PEETERS, 1981). In India, coccidiosis is a major impediment in rabbit production and the most common parasitic disease affecting all age groups of Angora rabbits (RAI *et al.*, 1985). Prevalence of different coccidial species of domestic rabbit has been reported earlier (SANYAL and SRIVASTAVA, 1986 ; JAIN, 1988 ; MEITEI *et al.*, 1988 ; CHANDRA and GHOSH, 1990). However, information on coccidial species of Angora rabbits is scanty. The present investigation was conducted to study the prevalence of coccidial species and to assess the magnitude of subclinical infection in Angora rabbits

with special reference to the organized farms in the Kangra valley of Himachal Pradesh.

### MATERIALS AND METHODS

The animals were German Angora breed of either sex, belonging to different age groups *viz* weaners (< 6 weeks), growers (6 - 24 weeks) and adults (> 24 weeks) from two Government and two private rabbitries located in and around Palampur, in the Kangra Valley (H.P.). These animals were housed individually in all-wire cages (60 x 40 x 40 cm) supported by angle-iron supporters about 90-100 cm above the concrete floor. Commercial pelleted feed and water was given *ad libitum*. Faecal pellets were collected individually from naturally infected rabbits in various rabbit farms and properly numbered for examination in the laboratory. The faecal suspension was triturated using glass mortar and pestle, strained through a sieve and filtrate was used for oocyst per gram of faeces (OPG) counts as per McMaster technique (SOULSBY, 1982). A suspension of these faecal samples was prepared in 2.5% (w/v) potassium dichromate solution for sporulation of oocysts at 28°C in a B.O.D. incubator. The species identification was made by exogenous study based on sporulation time,

**Table 1 : Prevalence of coccidiosis among Angora rabbits in organized farms in Kangra valley, Himachal Pradesh, India.**

| Type of farm<br>(N° of animals/farm) | No. of animals infected / examined<br>(% infected) |                  |                 |                   | OPG <sup>(1)</sup><br>(range x 10 <sup>3</sup> ) |
|--------------------------------------|--|------------------|-----------------|-------------------|--|
|                                      | Weaners  | Growers          | Adults          | Total             |  |
| Private farm N° 1<br>(72)            | 22/28<br>(78.6)                                    | 18/32<br>(56.3)  | 6/12<br>(50.0)  | 46/72<br>(63.9)   | 0.05 - 80.0                                      |
| Private farm N° 2<br>(390)           | 30/72<br>(41.7)                                    | 32/78<br>(41.0)  | 26/36<br>(72.2) | 88/186<br>(47.3)  | 0.05 - 40.8                                      |
| Government farm N° 1<br>(44)         | 15/15<br>(100)                                     | 15/15<br>(100)   | 6/6<br>(100)    | 36/36<br>(100)    | 4.3 - 16.5                                       |
| Government farm N° 2<br>(40)         | -  | -                | 10/20<br>(50)   | 10/20<br>(50)     | 0.3 - 3.75                                       |
| Grand total<br>(546)                 | 67/115<br>(58.3)                                   | 65/125<br>(52.0) | 48/74<br>(64.9) | 180/314<br>(57.3) | 0.05 - 80.0                                      |

(1) OPG : number of oocysts per gram of faeces.

morphology and morphometry of sporulated oocysts purified after centrifugal flotation (CATCHPOLE and NORTON, 1979 ; MAFF, 1984). The data on prevalence of various species of coccidia was recorded during the period June to September, 1994.

The necropsy examination of rabbits which died in these farms during the study period was also carried out for enumeration of oocysts of various coccidial species.

## RESULTS AND DISCUSSION

Faecal examination of 314 toptypes revealed ubiquitous coccidial infection with various *Eimeria* species in 180 Angora rabbits. The overall prevalence in the study area was 57.3%, while the infectivity at

individual farm holdings ranged from 47.3 to 100% (Table 1). No marked change in the infectivity rates between different age groups was evident. The mean prevalence data in weaners, growers and adults was 52.0, 45.5 and 66.7% respectively in private farms as compared to 100, 100 and 61.5% in Government farms. In order of preponderance, *E. magna* was the most common (39.4%) followed by *E. perforans* (16.7%), *E. media* (16.7%), *E. irresidua* (13.3%), *E. stiedai* (6.1%), *E. intestinalis* (3.3%), *E. piriformis* (3.3%) and *E. coecicola* (1.2%). *E. exigua*, *E. flavescens* and *E. vej dovskiyi* were not recorded in the present study. Mixed infection with two or more species was common and associated with either mildly pathogenic coccidia viz. *E. perforans* and *E. media* or moderately pathogenic *E. magna*. Species identification was based on morphological characteristics of sporulated oocysts of *Eimeria* (n=20)

**Table 2 : Oocysts per gram of faeces (OPG) of coccidia infected Angora rabbits in four organized farms in Kangra valley, Himachal Pradesh, India.**

| Type of farm         | N° of positive animals<br>(n) | N° of animals with OPG |                                    |                                    |                                    |
|----------------------|-------------------------------|------------------------|------------------------------------|------------------------------------|------------------------------------|
|                      |                               | 0 - <10 <sup>2</sup>   | 10 <sup>2</sup> - <10 <sup>3</sup> | 10 <sup>3</sup> - <10 <sup>4</sup> | 10 <sup>4</sup> - <10 <sup>5</sup> |
| Private farm N° 1    | 46                            | 2                      | 26                                 | 8                                  | 10                                 |
| Private farm N° 2    | 88                            | 8                      | 46                                 | 26                                 | 8                                  |
| Government farm N° 1 | 36                            | 16                     | 5                                  | 5                                  | 10                                 |
| Government farm N° 2 | 10                            | 0                      | 6                                  | 4                                  | 0                                  |
| Total                | 180                           | 26 (14.4)              | 83 (46.1)                          | 43 (23.9)                          | 28 (15.6)                          |

Data in parentheses indicate per cent animals

taken together with sporulation time of the oocysts. On the basis of OPG counts ( $0.3 - 16.5 \times 10^3$ ) recorded from the two Government farms, an epizootiological picture suggestive of a relatively well controlled "coccidiasis" situation was apparent in Government owned farms presumably due to established practice of medication with coccidiostats. On the contrary, higher oocyst outputs ( $0.05 - 80 \times 10^3$ ) often resulted in clinical cases in private holdings. The main clinical symptoms were diarrhoea, anorexia, progressive loss of condition and emaciation before death. The OPG counts of coccidia-infected Angora rabbits in different farms are shown in Table 2. In general, 70% of the infected animals had OPG counts ranging from  $10^2$  to  $10^4$ . In the present study, the OPG counts were found to be lower in the two Government small-scale farms.

During the period of study, detailed necropsy examination of the 28 rabbits, mostly weaners, revealed predominantly intestinal coccidiosis (93 %) due to *E. magna*, *E. intestinalis*, *E. media* and *E. irresidua* while hepatic coccidiosis caused by *E. stiedai* accounted for 7% of the infection. Examination of mucosal smears revealed active endogenous developmental stages and oocysts. Hepatomegaly and enlargement of bile ducts were commonly associated with hepatic coccidiosis.

More than 25 *Eimeria* species have been described from the rabbit. However, only 11 species were isolated in pure culture and are well characterized (COUDERT, 1989 ; COUDERT *et al.*, 1993). Among these species *E. media* and *E. coecicola* are difficult to identify when in a mixture with other species. In European countries, *E. intestinalis* and *E. stiedai* are considered to be the most pathogenic coccidial species in rabbit (LEBAS *et al.*, 1986). In India, *E. magna*, *E. media* and *E. perforans*, are the main cause of intestinal coccidiosis in rabbits (SANYAL and SRIVASTAVA, 1986 ; KRISHNA and VAID, 1987 ; JAIN, 1988 ; MEITEI *et al.*, 1989 ; CHANDRA and GHOSH, 1990). The results of the present study suggest that coccidiosis constitutes an economically important disease among Angora rabbits in North Western Humid Hymalayan region of India. RAI *et al.* (1985) earlier reported coccidiosis as a major killer disease while investigating the cause of mortality in rabbits. They reported that the coccidiosis as the most common protozoan disease encountered in rabbits causing acute as well as chronic infection in all age groups and was responsible for 4.6% of the total mortality during 1982-83. In the epizootiology of rabbit coccidiosis in North Western Humid Hymalayan region, KRISHNA and VAID (1987) earlier reported an outbreak of intestinal coccidiosis due to *E. perforans* in weaner Angora rabbits leading to 4-5% mortality in these animals. However, it is interesting to note that moderately pathogenic *E. magna*, *E. media*, *E. perforans* and *E. irresidua* constitute the predominant coccidial fauna of this economically important host. The potentially pathogenic species, *E. intestinalis* and *E. stiedai* are less predominant in this region. The

pathogenic aspects of rabbit coccidiosis have been studied by different workers (COUDERT *et al.*, 1979, 1993 ; LEBAS *et al.*, 1986 ; PEETERS *et al.*, 1987). Scanty information is available regarding the pathogenic effect of individual species of *Eimeria* in Angora rabbits in India (SINGH, 1986 ; SANYAL and SHARMA, 1990). Therefore, there is a greater need today to understand the various factors related to epidemiology of sub-clinical and clinical parasitism of eimerians in rabbits. Although, there is no correlation between OPG and the severity of the disease in rabbit (COUDERT, 1989), this parameter provides an indication of the degree of contamination in the farm in relation to managerial practices. In the present study, the OPG was found to be lower in small-scale farms than the large scale farms (Table 1). Also the significance of the "crowding phenomenon" (BRACKETT and BLIZNICK, 1952) and other intercurrent infections in the context of *Eimeria* infection needs elucidation. Presently, investigations are being carried out to study the interaction between dietary aflatoxins and experimental *Eimeria* infection as earlier reports (MAKKAR and SINGH, 1991) have pointed out to a possible association between these two conditions in Angora rabbits.

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