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COCCIDIOSIS OF THE WILD BOAR (SUS SCROFA L.) IN CZECHOSLOVAKIA

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Abstract. Coccidians of the species *Eimeria debliecki* Douwes, 1921 and *E. perminuta* Henry, 1931 were first found in Czechoslovakia in *Sus scrofa* L. in the reservation Květov. Infection with *E. debliecki* was more frequent than that with *E. perminuta*, and the number of oocysts of the former was two to three times higher than that of the latter. Studies on the rate of infection of animals older than one year revealed that the number of oocysts was lowest in February, highest in July. Suckling pigs born in the year of our investigation, acquired first infection in the summer months. Sporulated and unsporulated oocysts were found in the digestive system of *Geotrupes stercorarius* L.

Swine coccidia were first described by Douwes (1920, 1921) from Denmark; this list was completed by Henry (1931), Yakimov et al. (1926, 1936) and Boch, Pezenburg and Rosenfeld (1961). Baštář, Kuchařová and Zajíček (1954) recorded coccidia from domestic pigs in Czechoslovakia. In Hungary, Pellérdy (1965) studied their incidence in the hog, and in Germany, Boch and Lucke (1961).

MATERIAL AND METHODS

The description of the reservation Květov has been given in an earlier paper (Zajíček, Páv 1972). Additional food for the wild boar population in the reservation (250 individuals) is provided throughout the year at three different sites (3 feeding troughs). Each trough is visited regularly by 60 to 70 animals of different age. Fresh faeces were collected each month for a period of 12 months from the surroundings of the feeding troughs and used for coprological examination (15 fresh faecal samples at each collection). The faeces were examined by Breza's flotation method (Breza 1959) and McMaster's counting chamber was used for oocyst counts (per 1 g of faeces—E.P.G.). Oocysts from the faeces of the older animals were evaluated separately from those of the juveniles collected around the individual troughs. The average of these values indicated the incidence and dynamics of coccidiosis in the reservation.

The length of time needed by the oocysts for sporulation was estimated in a 2.5 % solution of $K_2Cr_2O_7$ mixed with 1 % of chloramin at various temperatures.

RESULTS

The faecal samples contained oocysts of the coccidian species *Eimeria debliecki* Douwes, 1921 and *E. perminuta* Henry, 1931. The morphology and measurements of

these oocysts were consistent with the data in the literature. The oocysts of *E. debliecki* completed sporulation within 11 days at 16—18 °C, within 7—9 days at 18—24 °C. Sporulation of the oocysts of *E. perminuta* lasted 13—15 days at 16—18 °C, 11 days at 18—24 °C.

Post-mortem examination of the intestinal tract of hunted animals revealed the presence of both coccidians in smears of the mucosa of the central part of the small intestine. Macroscopically distinct pathological changes in the intestinal mucosa indicating the presence of coccidians, were not observed. In both faeces and smears, the oocysts of *E. debliecki* were more numerous than those of *E. perminuta*.

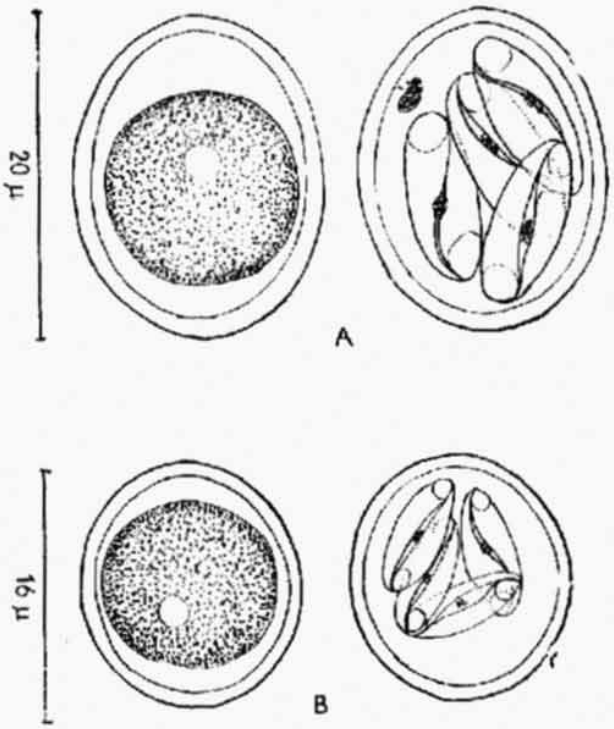

Fig. 1. A. *Eimeria debliecki* Douwes, 1921. B. *Eimeria perminuta* Henry, 1931.

The number of oocysts of *E. debliecki* expelled by animals older than one year is shown in Fig. 2. The curve of incidence in all groups examined was almost identical showing only slight differences in the individual months. The average value of all three curves illustrating the incidence of oocysts in the three sites under consideration indicates the incidence of oocysts in the reservation. According to this estimation, the number of oocysts expelled with the faeces increased in the autumn months until December and then started to decrease. The minimum of incidence occurred in February. From then onwards, the incidence increased regularly each month reaching its maximum in July. In August, the number of oocysts started to decrease until September. The moderate increase in October attained only slightly higher values than those found at the beginning of our observation. In suckling boars born in the winter of 1970, an occasional oocyst was found as late as in July of the following year. The number of oocysts in these animals increased until October without ever reaching the values observed in the older animals.

The number of oocysts of *Eimeria perminuta* expelled by animals older than one year is shown in Fig. 2. The incidence of oocysts was as regular as that of the foregoing species with slight differences in the individual months. The curve of average findings decreased in the autumn down to the lowest values in February. A vehement increase of oocyst incidence started in March and, after a moderate decrease in May, this reached its maximum in July. A new decrease in oocyst incidence starting in August attained only slightly lower values than those observed at the beginning of our investigation. In these juveniles, an occasional oocyst of *E. perminuta* was found as late as in August and September. Oocyst incidence was extremely low in October.

The presence of sporulated oocysts was confirmed in the soil around the feeding troughs. In addition to these we found that both sporulated and unsporulated oocysts are capable of passing undamaged through the intestinal tract of coprophageous beetles. Oocysts of *E. debliecki* were found in the contents of the gut of *Geotrupes stercorarius* L. (in 10 of the 117 beetles examined, i.e. in 8.54%). On the other hand, oocysts of *E. perminuta* were not found in *G. stercorarius*. We also were unable to obtain

evidence of the passage of oocysts through *Geotrupes vernalis* L., *G. stercorosus*, aberr. *monticola* (Heer.), *Aphodius sticticus* Panz., *A. ater* Degeer, *A. fimetarius* L. and in members of the genus *Quedias* L. and *Creophilus* L. Bejšovec (1963) observed a passive transmission of oocysts of different coccidian species, especially bird and mouse coccidians, after these had passed the gut of carnivorous birds. Dung beetles frequently ingested by the wild boar, contribute considerably to the distribution of infection and that also during their flight to more distant places.

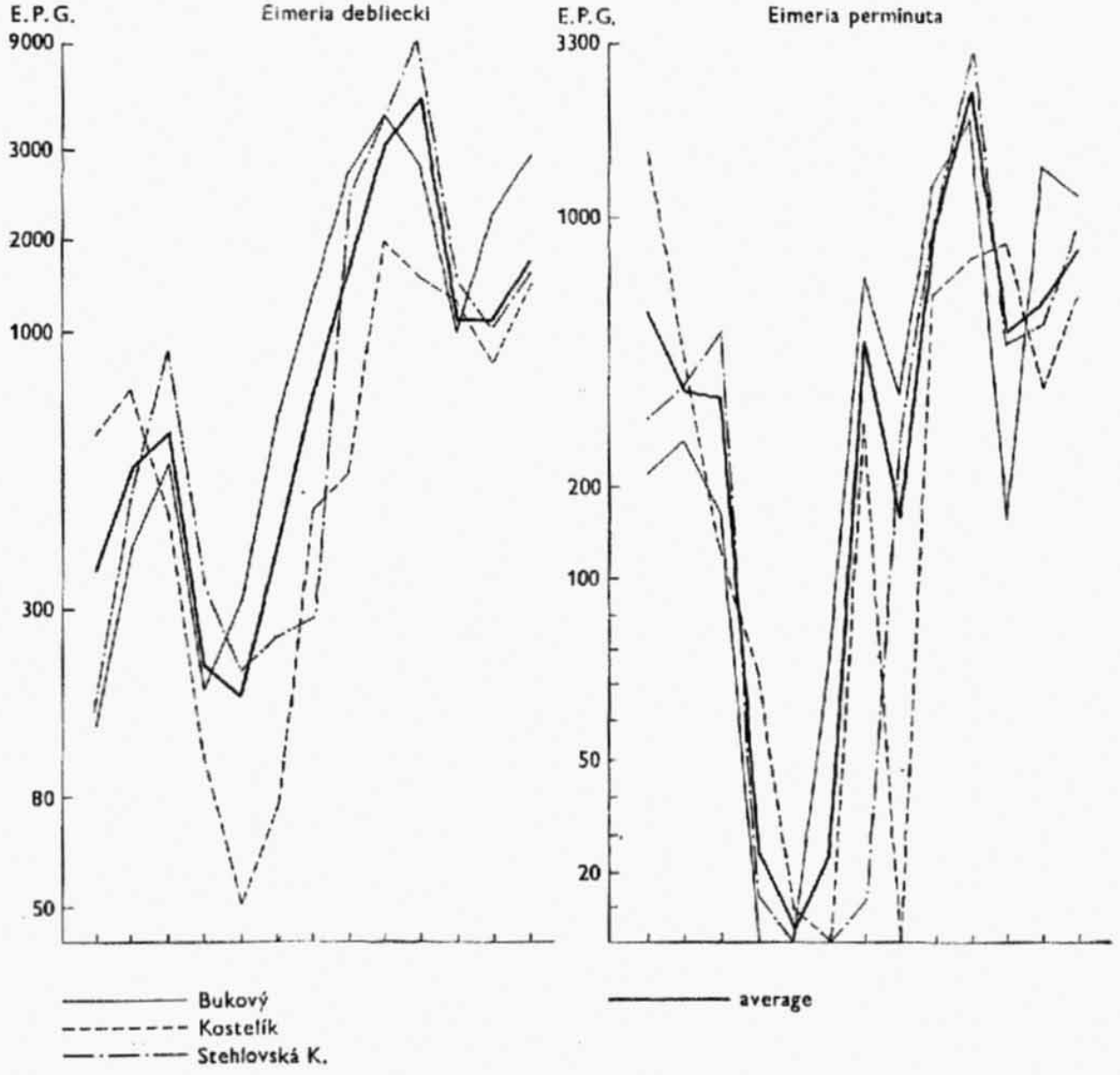

Fig. 2. Mean faecal oocyst counts (E.P.G. = Equivalent per gram) during the 12 month-period of examination (from October 1969 to October 1970).

DISCUSSION

Boch and Lucke (1961) recorded from Germany frequent infection of the wild boar with coccidians of the species *Eimeria scabra*, *E. debliecki*, *E. polita* and *E. perminuta*. Infection with the same coccidians except *E. polita* has been recorded also from the

U.S.S.R. by Yakimov and Matikasvili (1932, 1942). In Holland, Zwart, Strik and van Hafften (1967) found *E. suis* (= *E. debliecki*) in the wild boar. Pellérdy (1965) recording only infection with *E. polita* and *E. scabra* in the boar from Hungary assumed, however, the possibility of infection with *E. debliecki*. Baštář, Kuchařová and Zajíček (1954) reported infection of swine with the species *E. debliecki* from Czechoslovakia.

In the case under consideration, the wild boar population living in the fence in area of the reservation was provided regularly with additional food placed in feeding troughs. Epizootological conditions for the development of coccidiosis were, however, similar to those described by Avery (1942) for the survival of oocysts of *E. debliecki* and *E. scabra* in the soil. In the year of our observation, the ground was covered with snow from November till the end of April preventing the game animals from contact with the source of infection. From this point of view, the curve illustrating the incidence of oocysts in the faeces is most interesting. This curve reached its minimum in the months during which conditions of the external environment were most unsuitable for oocyst sporulation. On the other hand, the snow-covered ground prevented the possibility of reinfection. This may have been the reason for the very late occurrence of the first oocysts in the juveniles. According to our results, the rate of infection was highest in animals aged 3 years and above. This may be explained by the voracity of these animals and by their habit of digging deep in the moist soil near the feeding troughs, in which the incidence of sporulated oocysts was highest. We have been unable as yet to find a satisfactory explanation of the higher incidence of *E. debliecki* as compared with that of *E. perminuta*. As a result of our study we suggested various measures for controling the incidence of coccidioses of the wild boar in the reservation such as the hardening of the soil around the feeding troughs and the setting up of separate troughs for juveniles and older animals.

КОКЦИДИОЗ У ДИКОГО КАБАНА (*SUS SCROFA* L.) В ЧЕХОСЛОВАКИИ

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Резюме. Кокцидии видов *Eimeria debliecki* Douwes, 1921 и *E. perminuta* Henry, 1931 впервые обнаружены в Чехословакии у дикого кабана *Sus scrofa* L. в заповеднике Кветов. Животные были поражены паразитом *E. debliecki* чаще чем *E. perminuta* и количество ооцист первого паразита в два-три раза превышало количесвто ооцист второго. Исследования по плотности поражения у животных старше одного года показали, что количество ооцист самое низкое в феврале, а самое высокое в июле. Поросята-сосунки, рожденные в том-же году, когда проводились наши исследования, впервые поражались в летние месяцы. Ооцисты со спорами и без спор обнаружены в пищеварительной системе жука *Geotrupes stercorarius* L.

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SOLITARY LIVER GRANULOMAS IN MAN CAUSED BY CAPILLARIA HEPATICA (BANCROFT, 1893) IN CZECHOSLOVAKIA

Systematic histology of liver nodules (mostly calcified) from Šikl's Department of Pathology, Medical School, Charles University, Plzeň (found mainly in postmortem of farm labourers), and from the Department of Pathology, Psychitrical Clinic, Dobřany, disclosed subcapsular lesions of a remarkably similar character. Our studies were performed from 1960—1970. The lesions represented foci of encapsulated liver necrosis, apparently nonconfluent except along the margins of the individual foci. Histology showed a structure of infiltrated liver parenchyma in the necrosis, a small area of which was completely destroyed and replaced by an accumulation of exudate cells. Most of the foci were calcified, the necrotic tissue was considerably resorbed and, at the surface, transformed into bone tissue together with the encapsulation. Evidence was obtained from a series of sections that the stripes of necrotic lesions are interconnected and apparently of parasitic origin. It took ten years to find remnants of a filiform nematode, which were difficult to identify, in the necrotic centre; these were occupying a small area in one of the foci. In view of the localisation in the liver and in spite of its considerably indistinct structure we suggest that the worm is *Capillaria hepatica* (Bancroft, 1893), a parasite of the liver of rodents.

Re-examination of a relatively fresh granuloma taken in postmortem with suspicion of tumorous metastasis into the liver, disclosed the presence of *Capillaria hepatica* at the beginning of autolysis. A whitish nodular formation (30 mm in diameter) was arising