

Endoparasites of the beaver *Castor fiber* (L.) in northeast Poland

J. DRÓZDZ, A. W. DEMIASZKIEWICZ, J. LACHOWICZ

W. Stefański Institute of Parasitology, Polish Academy of Sciences, ul. Twarda 51/55, 00-818 Warszawa, Poland

Summary

In 1998–2000 full helminthological examinations of 43 caught or shot beavers in north-eastern Poland were made. Besides necropsies, also coproscopical examinations of 136 faecal samples from beavers caught in spring and autumn have been done. In examined beavers were found *Eimeria sprehni*, *Stichorchis subtriquetrus*, *Echinococcus granulosus* larvae, *Trichostrongylus axei* and *Travassosius rufus*. The trematode, *S. subtriquetrus*, localised mainly in the caecum was found in as many as 40 necropsied beavers (extensity 93 %), and in 15 of them there were massive invasions (193–736 specimens). The nematode, *T. rufus*, localised mainly in the stomach, was found up to 27 examined animals (63 %). In nine beavers were found massive invasions of them (150–3352 specimens). These two species of helminths are the most dangerous parasites of beavers in Poland. The three others species were met very rarely.

Key words: endoparasites; beaver; Poland

Introduction

The history of the beaver in Poland in the last century is an example of great success emanating from the protection and breeding of this animal (Dzieciolowski and Goździewski, 1999, 2000). Thanks to the reintroduction of beavers into new areas of the country and their protection, we have been able to see their population rise to 10000 individuals spread out in most districts of the country since 1997. The current population originated from only a few beavers that survived the World War II in Poland. Despite these huge achievements in beaver breeding in this country, there is still a lack of detailed research regarding the state of health of these animals. There is only one publication (Joszt, 1964) on the issue of beaver helminthofauna, in which the discovery of four species of helminths was reported from four necropsied beaver specimens obtained from a beaver research farm in Popielno. The parasites were *Stichorchis subtriquetrus*, *T. capricola*, *A. castoris*, and juvenile cestodes that proved impossible to categorize to the species le-

vel. The trematode *S. subtriquetrus* occurred in three out of the four beavers necropsied.

The beaver research farm at Popielno has played a significant role in the beaver restoration program in Poland. The total of 300 beavers, born on the farm, has been introduced into a new territory of the country. These introductions, together with the migration of beavers from neighbouring countries into Polish territory, led to the aforementioned population surge in beavers in 1997. In the light of these data, it is vital to find out the influence the current beaver population in northwest Poland has on helminth infections in the animals on the beaver breeding farm at Popielno, as well as that of beavers migrating into out territory from neighboring countries. The beaver population in northwest Poland, which makes up 25 % of the entire population in this country, is the largest (Dzieciolowski and Goździewski, 2000). It is the oldest and most clustered population in this country, serving as a source from which beavers can be caught and introduced into other parts of the country. As a result of this, we carried out this study from 1998 to 2000. Data were collected from 43 necropsied beavers that had been either caught or shot in the Suwałki region, in the Mazury region and near Białystok. Apart from work involving animal necropsy, 136 samples of faecal material were collected from caught beavers during the spring and autumn periods.

Material and Methods

In this work, 43 free-living beaver specimens from Suwałki region, Mazury, and the vicinity of Białystok, were investigated. Among the animals necropsied, 25 were adults and 18 young (≤ 1 year old). Material from 15 beaver specimens was also used in two preliminary studies (Drózd et al., 2000 a, b). The majority of the beaver originated from the Suwałki region. Animals for necropsy were obtained from beaver either caught or shot. They were later subjected to full helminthological examination, excluding the head. The gastrointestinal tract was divided into the following parts: oesophagus, stomach, small intestine, cae-

cum, and large intestine. Their contents, as well as mucus scraped from them, were sedimented. The sediment was divided into small portions that were placed in Petri dishes and observed under a microscope. Any parasites observed were collected and preserved. Trematodes were preserved in 75 % ethyl alcohol. Some specimens were later stained in aluminum carmine, fixed in Canada Balsam and mounted on microscope slides. Nematodes were preserved in a mixture of 75 % ethyl alcohol and 5 % glycerol. After evaporating the alcohol, temporary slides of nematodes in glycerol were made, and permanent slides of selected ones, in a solution of Four Berlese were prepared. The specimens were then observed under a microscope and identified to the species level. Besides this, 136 samples of faecal material collected from caught beaver in the Suwałki region and Mazury during spring and autumn were examined. The faecal material was prepared by means of the flotation method, using a saturated solution of sodium chloride. Decantation and Baermann methods were also employed. For the subsequent methods, 3 and 5 g of faecal material were used.

Results

The following species of helminths were found in material obtained from necropsied animals: *S. subtriquetrus* (Rudolphi, 1814), *E. granulosus* (Batsch, 1786) larvae, *T. axei* (Cobbold, 1879) and *T. rufus* (Khalil, 1922). The trematode *S. subtriquetrus*, which mainly inhabits the caecum, occurred in 40 necropsied beavers (93 % infection); 15 of which were heavily infected (193 – 736 individuals). Mean infection intensity by this trematode was 149 individuals. No apparent differences in infection level with this trematode were observed between young and adult beaver. Infection extensity with *S. subtriquetrus* among the young was 89 %, and 96 % among adults. Five cysticerci of the cestode *E. granulosus* were detected in the liver of one beaver.

In this work, we found the nematode *T. rufus* for the first time in Poland. It was mainly found in the stomachs of the animals investigated. This nematode was noted in 27 dissected beaver, which gives an infection prevalence of 63 %. Massive infection by this nematode (150 – 3352 individuals) were found in 9 beaver, and the mean infection intensity detected was 468 individuals. Differences in infection extensity by this nematode were apparent between young and adult beaver. While young beaver had an infection level of 39 %, an 80 % infection was noted for adult ones. Mean infection intensity by this nematode among young beaver stood at 129 individuals and 587 among adults. In the small intestine of 6 beaver, single cases of *T. axei* were found.

The 136 faecal samples collected were prepared using the Baermann, flotation and decantation methods. Results of faecal examination obtained from the Baermann method were all negative. The flotation method, on the other hand, revealed ova of *T. rufus* in 19 samples (14 %). It also revealed oocysts of *E. sprehni* (Yakimoff, 1934) in 4 sam-

ples (3 %) taken from young beaver. In one sample, the oocysts occurred in massive numbers (in one microscope field of view, 50 – 70 oocysts noted under the 16 x objective). In 3 remaining samples that were positive, the oocysts occurred singly. The decantation method revealed ova of *S. subtriquetrus* in 70 samples (51 %). A distinct difference was noted in the extent to which the parasite was detected with the aforementioned method in spring (42 %) and autumn (89 %) periods. The most dangerous beaver parasites in northwest Poland have proven to be *S. subtriquetrus* and *T. rufus*, which have caused extensive variations in disease manifestation.

Discussion

A comparison of the helminth fauna of beaver from the experimental farm at Popielno, (Joszt, 1964) with those from free-living beaver in northwest Poland, it becomes apparent that only one helminth species *S. subtriquetrus* has survived, and is still the dominant parasite among gastro-intestinal parasites of beaver in this country. Free-living beaver have increased their helminth fauna with *T. rufus*, which is a cosmopolitan parasite occurring both in *Castor fiber* as well as in *Castor canadensis* (Borkova and Potekhina, 1953). It is probable that it was spread into Polish territory through migrations of *C. fiber* from counties bordering Poland in the east. The larval form of *E. granulosus* has been reported in many mammals, but this is the first time they have been noted in *C. fiber*, *T. axei*, which is a common parasite of wild (Drózdź, 1966; Drózdź *et al.*, 1989, 1992) and domestic ruminants is widespread in Poland, but has not yet been noted officially in *C. fiber* and *C. canadensis*. We, however, possess the unpublished work of Potekhina and Belaeva, where the discovery of this nematode in 1954 in beaver living in the Belorussian part of the Białowieża Primeval Forest is mentioned. Reports of earlier discovery of *T. capricola* in beaver in Poland (Joszt, 1964), and the appearance of *T. axei* in the present work, prove the possibility of cross-transmissions of these helminths between wild and domestic ruminants and beaver.

Faecal analysis using the flotation method to reveal the presence of *T. rufus* in beaver is less efficient. The fact that faecal examinations showed only 14 % infection by this parasite, while necropsy results revealed 63 % infection, is a clear indication of how inefficient the former is at detecting *T. rufus* infection in the beaver investigated.

The decantation method revealed ova of *S. subtriquetrus* in 70 samples (51 %). A clear difference was noted in degrees of detecting the parasite during the spring (42 %) and autumn (89 %) periods, using the aforementioned method. The necropsy method, on the other hand, revealed similar, very high infection levels by this trematode in both seasons. Based on this, it can be assumed that only assessments undertaken in autumn reflect the actual infection picture by *S. subtriquetrus* in these rodents. Overall, one can say that helminth fauna of beaver in northwest Poland is poor, and that only two helminth species: *S. subtriquen-*

trus and *T. rufus* seem to be notorious causers of disease.

Acknowledgements

Authors wish to express their gratitude for Prof. dr hab. R. Dzieciolowski from Department of Forest Zoology and Hunting, faculty of Forestry, Warsaw Agricultural University, and MSc. Ing. J. Gozdziwski from Polish Hunting Association in Suwałki for their help in organisation of these examinations.

This study was supported by State Committee for Scientific Research of Republic of Poland No. 50103040051.

References

BOROVKOVA, A. M., POTEKHINA, L. F. (1953): *Travassosius rufus* Khalil foun in beavers in Russia. *Tr. Vses. Inst. Gelmint. im. Skrjabina*, 5: 73 – 74

DRÓZDŹ, J. (1966): Studies on helminthes and helminthiases in Cervidae. II. The helmith fauna in Cervidae in Poland. *Acta Parasitol. Pol.*, 14: 1 – 13

DRÓZDŹ, J., DEMIASZKIEWICZ, A. W., LACHOWICZ, J. (1989): The helminth fauna of free-ranging European bison, *Bison bonasus* (L.). *Acta Parasitol. Pol.*, 34: 117 – 124

DRÓZDŹ, J., DEMIASZKIEWICZ, A. W., LACHOWICZ, J. (1992): The helminth fauna of roe deer *Capreolus capreolus* (L.) in a hunting area inhabited by red deer, elk and European bison (Borecka Forest, Poland) over the yearly cycle. *Acta Parasitol.*, 37: 83 – 88

DRÓZDŹ, J., DEMIASZKIEWICZ, A. W., LACHOWICZ, J. (2000a): *Travassosius rufus* (Trichostrongylidae) - new for Poland nematode of beavers and comments about helminthofauna of these animals. *Wiad. Parazytol.*, 46: 365 – 368

DRÓZDŹ, J., DEMIASZKIEWICZ, A. W., LACHOWICZ, J. (2000b): Internal parasites of free living beavers (*Castor fiber*). *Dzial. Nauk. PAN*, 10: 58 – 59

DZIECIOŁOWSKI, R., GOZDZIEWSKI, J. (1999): The reintroduction of European beaver, *Castor fiber*, in Poland. In BUSHER, P. E. and DZIECIOŁOWSKI, R. M. (Eds.): *Beaver protection, management, and utilization in Europe and North America*. Kluwer Academic/Plenum Publishers, New York, Boston, Dordrecht, London, Moscow

DZIECIOŁOWSKI, R., GOZDZIEWSKI, J. (2000): Numbers and distribution of beaver *Castor fiber* L. in Suwałki region. *Ochrona Przyr.*, 57: 111 – 120

JOSZT, L. (1964): The helminth parasites of European beaver, *Castor fiber* L., in Poland. *Acta Parasitol. Pol.*, 12: 85 – 88

RECEIVED FEBRUARY 2, 2002

ACCEPTED JULY 23, 2002

