

## **An analysis of symptoms of parasitic arthropod infestation on bison skin**

Joanna N. IZDEBSKA and Leszek ROLBIECKI

Department of Invertebrate Zoology, University of Gdańsk, Piłsudskiego 46, 81-378  
Gdynia, Poland, e-mail: Izdebska@sat.ocean.univ.gda.pl

### **Introduction**

Although up to now thirteen parasitic arthropod species of bison have been identified, five species of which present very high infestation levels, relatively few observations have been made of skin pathology and other symptoms associated with or resulting from infestations of these ectoparasites (Izdebska 2000b). The most commonly observed species on *Bison bonasus* include chorioptic mite *Chorioptes bovis* (Acaridida, Psoroptidae), at a prevalence of 54% and specific hair follicle mite *Demodex bisonianus* (Actinedida, Demodecidae), at a prevalence of 42% (Izdebska 1999, 2000a, 2000b, 2004b). High infestation parameters are also observed for ticks (Ixodida, Ixodidae) – *Ixodes ricinus* (34%) and *Dermacentor reticulatus* (primarily observed in Białowieża Primeval Forest on 92% of bison) (Izdebska 1999, 2000b, 2004a). The biting lice *Bisonicola sedecimdecembrii* (Mallophaga, Trichodectidae), which was observed on 42% of bison, is the most common insect and also the second most common specific bison parasite, following the hair follicle mite (Izdebska 1999, 2000b, 2003). The most spectacular symptoms were observed with infestations with ticks (Izdebska 2000b, 2004a) and chorioptic mites (Demiaszkiewicz 1991, Izdebska 2000b, 2004b), although single cases of *mallophagosis* were also observed (Izdebska 2000b, 2003).

### **Material and methods**

Observations of skin pathology on bison were conducted using material and data from a long-term study of parasitic arthropods of bison that was conducted from 1992 to 2004 in free-living wild herds of bison in Białowieża Primeval Forest, the Bieszczady Mountains, and captive-breeding centres in different parts of Poland. A total of 233 bison specimens were studied.



In order to confirm the parasite infestation and skin pathology, 5-cm wide strips of fur and skin were examined. Then skin samples were collected from 11 areas of the body: head (eyelid, cheek, nose, ear), front and rear groins, limbs, abdomen, and from areas near the anus and genitals. Skin mite infestations were collected from the samples using the etching or scaring away methods. Histological preparations were made from areas where pathology was observed. Scrapings were collected from areas where scabs, peeling, and other skin pathology were observed; these were then examined under a microscope.

## Results and discussion

The bison exhibited obvious symptoms of only four parasite species, namely chorioptic mites (*Ch. bovis*), ticks (*I. ricinus*, *D. reticulatus*) and biting lice (*B. sedecimdecembrii*).

The typical symptoms of chorioptic mange, which are described for domesticated hoofed mammals, were observed infrequently on the studied bison. Intense skin pathology covering all the skin was noted only once. In this case, the skin on the abdomen, groins, limbs, and neck exhibited flaking areas and callosities, the fur was thinning and there were bald patches and scabs. Local skin pathology was observed on some bison specimens on the legs, groins, abdomen, and neck, and large numbers of mites were present in these samples. However, on many bison specimens high parameters of mean intensity and density were noted; these were manifested by intensely yellow-orange flaking skin that was masked by an abundant fur layer. The presence of chorioptic mites was also confirmed by histological preparations. However, this method is not always very efficient due to the presence of dense, homogenous, eosinophils that cover the parasite infiltrations. In addition to the destruction of the epidermis structure, preparations also indicated lymphocytic-histiocytic infiltrations, especially, near the appendages. Similar pathology is observed in infestations of *Demodex* spp.

Infestations of bont tick *D. reticulatus*, which occur in bison ears, were always accompanied by yellow scabs and scaly flaking, both clear indications that the ticks were feeding. *I. ricinus* were collected most frequently from the front and rear groins, abdomen, anus area, neck and the base of the ear auricle. In the areas where the tick genus *Ixodes* is commonly found, tick-induced pathology was clearly visible on the collected skin samples and confirmed that earlier feeding had been intense. The skin where ticks attach is usually elevated and locally red and swollen.

The consequences of tick infestation vary for the hosts. These can include symptoms that affect the animal systemically (allergic reactions, emotional disorders, systemic poisoning or so-called tick paralysis, weakness) or just locally (skin pathology – swelling, itch, inflammatory infiltration, ulceration). Damage to the skin facilitates secondary infections. *I. ricinus* is a vector of disease for many domesticated hoofed animals, such as louping ill, Q-fever, sheep tick-fever, tularaemia, listeriosis, red water disease, and babesiosis (cattle, sheep, small ruminants). *I. persulcatus*, which has also been observed on bison, is responsible for spreading swine erysipelas and contagious equine encephalomyelitis, while *D. reticulatus*



spreads babesiosis, red water disease, listeriose, etc. The toxic, allergenic saliva of the ticks of the genus *Dermacentor* appears to have an especially powerful impact to play. With initial tick infestation, general inflammation and bloody haemorrhage appears at the site, skin infiltration is insignificant and leucocytic infiltration does not affect the inner skin layers. Due to host immunity, subsequent infestations cause strong local infiltrations and a rapid growth of connective tissue with intense eosinophil infiltration (Siuda 1991).

Infestations of biting lice *B. sedecimdecembrii* were usually asymptomatic and not very intense. The majority of the bison exhibited only single biting lice specimens, and rarely were several dozen specimens observed. Clear *mallophagosis* was confirmed in only two bison specimens in Białowieża Primeval Forest. It was interesting that much higher infestation parameters were confirmed in calves (intensity was almost three times higher). Young bison have smaller bodies, thus a higher level of infestation must have a more harmful impact on the host, and it was on calves that cases of *mallophagosis*, or local concentrations of biting lice, were noted. The most severe symptoms were observed on one young specimen that was culled in January 1997. As many as several dozen biting lice specimens per cm<sup>2</sup> were observed on its back and side. None were present on its head, neck, abdomen or groins, and only single specimens were noted on the legs. The skin on its back and side was peeling intensely, thickened, and the hair was thinning locally. The examination of skin scrapings and samples did not, however, indicate that skin mites (chorioptic or hair follicle mites) occurred in these areas. Biting lice probably caused intense itching, as the infected animal was observed rubbing hard against tree bark. During the examination of the dead host, the biting lice were still extremely mobile, which probably resulted from their high concentration. The bison was very thin and showed symptoms of exhaustion. However, the autopsy did not indicate pathological symptoms or the presence of internal parasites, thus, it is plausible to attribute this individual's symptoms to *mallophagosis*.

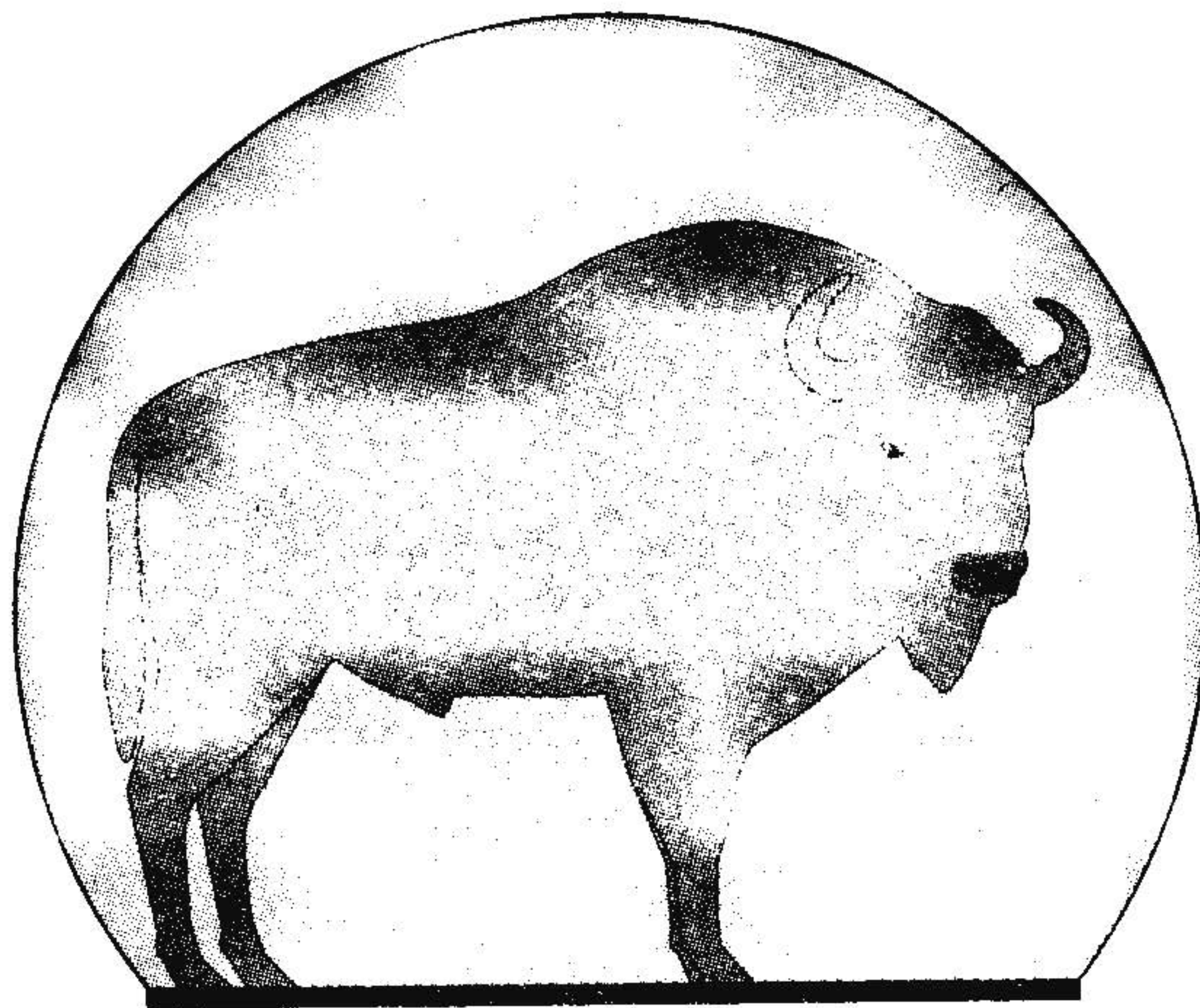
In conclusion, despite often high infestation parameters, parasitic arthropods rarely cause obvious symptoms on the skin of bison. Chorioptic mites are common and numerous on bison and seem to play the most important role although symptoms of infestation are most probably quiescent. An important role is also certainly played by ticks, which, even in winter (in connection with their diapause) are common on bison. Bont ticks are very numerous on bison ears (as many as several dozen specimens on each one). It is worth noting that the role of ticks as hematophagic parasites is not limited to only direct effects; by damaging skin they open pathways for secondary infections and are pathogen vectors. This aspect of the occurrence of parasitic arthropods on bison has yet to be fully investigated.



## Literature

- Demiaszkiewicz A. W. 1991. Przypadek świerzbu naskórnego u żubra *Bison bonasus* (L.) w Puszczy Białowieskiej. *Med. Wet.* 44: 547–548. [In Polish with English abstract]
- Izdebska J. N. 1999. Ectoparasites of the European bison in the free-living herd from the Białowieża Primeval Forest. International Scientific Conference: Health protection of free-ranging *Bison bonasus* in Białowieża Forest, Warszawa, 26–27 November 1999: 18–20.
- Izdebska J. N. 2000a. Zmienność adulti i form juwenilnych *Demodex bisonianus* (Acari, Demodecidae). [Variability in the adults and immature stages of *Demodex bisonianus* (Acari, Demodecidae)]. [In: Stawonogi pasożytnicze i alergogenne. A. Buczek and C. Błaszak, eds]. Wyd. KGM Lublin: 47–56. [In Polish with English abstract]
- Izdebska J. N. 2000b. Stawonogi pasożytnicze żubra jako potencjalny wektor patogenów. [Parasitic arthropods of European bison and their significance as potential pathogenic vectors]. [In: Stawonogi pasożytnicze i alergogenne. A. Buczek and C. Błaszak, eds]. Wyd. KGM Lublin: 57–64. [In Polish with English abstract]
- Izdebska J. N. 2003. *Bisonicola sedecimdecembrii* (Mallophaga, Trichodectidae) – wszoł, który przetrwał? *Bisonicola sedecimdecembrii* (Mallophaga, Trichodectidae) – Biting lice, which survived? [In: Stawonogi i żywicieli. A. Buczek and C. Błaszak, eds]. Wyd. Liber, Lublin: 105–115. [In Polish with English abstract]
- Izdebska J. N. 2004a. [Observations on the presence of ticks (Acari, Ixodidae) in European bison (*Bison bonasus*) in Poland]. [In: Stawonogi. Interakcje pasożyt-żywicieli (Arthropods. Parasite – host relationships). A. Buczek and C. Błaszak, eds]. Wyd. Liber, Lublin: 45–51. [In Polish]
- Izdebska J. N. 2004b. Przypadek utajonego świerzbu pęcinoowego *chorioptosis* u żubra w Puszczy Białowieskiej. Konferencja naukowa “Hodowla i ochrona żubrów w Polsce”, Białowieża, 3–4 czerwca 2004: 8. [In Polish]
- Siuda K. 1991. Kleszcze (Acari: Ixodida) Polski. Cz. I. Zagadnienia ogólne. PWN Warszawa–Wrocław: 1–285. [In Polish]





**European Bison Conservation**  
Białowieża 30.09–2.10.2004

# **Proceedings of the Conference “European Bison Conservation”**

**30 September – 2 October 2004**  
**Białowieża, Poland**

**Edited by**

**Małgorzata Krasińska and Katarzyna Daleszczyk**

**Mammal Research Institute, Polish Academy of Sciences**  
**Białowieża 2004**



## **“European Bison Conservation” Conference**

**Mammal Research Institute, Polish Academy of Sciences  
Centre of Excellence in Biodiversity Conservation and Mammal Research  
in European Terrestrial Ecosystems – BIOTER**

Director of the Institute: Prof. Jan M. Wójcik

Coordinator of the BIOTER project: Prof. Włodzimierz Jędrzejewski

funded under the 5th Framework Programme (Contract No. EVK2-CT-2001-80011)

in cooperation with

Białowieża National Park and Chair of the IUCN/SSC Bison Specialist Group

### **Organising Committee:**

Prof. Małgorzata Krasińska (Chairman)

Dr. Katarzyna Daleszczyk (Secretary)

Dr. Rafał Kowalczyk

Dr. Zbigniew A. Krasiński

Prof. Wanda Olech

Prof. Zdzisław Pucek

Dr. Małgorzata Tokarska

We are indebted to persons, who helped in correcting and translating of some of the texts: Prof. A. W. Demiaszkiewicz, Prof. J. Kita, Dr. M. Kolipiński, Dr. J. Lachowicz, Prof. M. Krasińska, Dr. K. Daleszczyk, Dr. R. Kowalczyk, and Dr. M. Tokarska.

ISBN 83-907521-4-X