

Supplementary feeding increases the severity and speed of parasitic infection in vulnerable European bison (*Bison bonasus*)

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Parasitic infections in wildlife are influenced by numerous factors, including those relating to management and anthropogenic interactions. One such form of management is supplementary feeding, which is used to reduce conflicts or support animal populations. It is also used in the conservation and management of European bison (*Bison bonasus*) to reduce damage to regenerating forest stands and agricultural crops in the winter, and to mitigate dispersal out of the forest. To determine the influence of supplementary feeding on parasitic load, we analyzed the dynamics, prevalence and infection intensity of blood-sucking nematode *Ashworthius sidemi* in two populations of European bison in NE Poland: Białowieża Primeval Forest (BPF) and Knyszyn Forest (KF). The populations differ in number and the type of management actions used. The BPF population is the largest in Europe (519 ind. in 2018) and are supplementary fed in winter in fixed locations with diversified intensity. Some parts of the population are not using supplementary feeding and seasonally migrate outside the BPF to meadow and agricultural areas. The population in KF numbers 158 ind. Almost all of the population do not use the supplementary feeding and from autumn until spring migrate to agricultural areas. *A. sidemi* was recorded for the first time in BPF in 2000 and quickly spread in European bison population. In KF it was recorded in 2009. We hypothesized that after the introduction of a new invasive parasite to the E. bison population in KF, a growth in *A. sidemi* prevalence and infection intensity will be observed due to the higher susceptibility of the animals to infection with a newly acquired pathogen. We also hypothesized that management practices, such as supplementary feeding in fixed location causing higher European bison densities and environmental contamination with the parasite eggs, will increase *A. sidemi* infection rates. We also presumed that different management strategies in these two localities would cause different *A. sidemi* dynamics. We performed parasitological necropsy of 67 free-living European bison of both sexes inhabiting KF. The collected nematodes were identified to the species level and the number of *A. sidemi* was counted. The results were compared to the previously studied parameters on infection in BPF in 161 supplementary fed and 17 non fed European bison. We found that prevalence was quite similar in all studied groups of animals: 93.9% of European bison were infected with *A. sidemi* in KF, 88.2% of non fed European bison from BPF, and 95.7% of supplementary fed *E. bison* from BPF. However, large discrepancies in the level of infection were recorded. The highest mean *A. sidemi* infection intensity was stated in supplementary fed European bison form BPF – 6020. Almost three times lower infection rates (2360) were recorded in European bison from KF, and the lowest (1017) were found among non

fed European bison from BPF. Tracking variation in the level of *A. sidemi* infection in European bison within 10 years from the appearance of the parasite in KF revealed the highest infection rates 9 years after the first appearance with a maximum value of 7,854 nematodes in one European bison during winter 2016/2017. To compare, the highest infection rates in European bison from BPF were recorded after 6 years from the first appearance and it was almost 6 times higher than in KF – 44,310 *A. sidemi* specimens in one European bison.

We conclude that supplementary feeding (in fixed locations) and herd size increases the severity and speed of *A. sidemi* infection in European bison. We supposed that fixing the location of supplementary feeding and increased winter densities of European bison in BPF are the main factors increasing the likelihood of parasite infection, because the animals reside for a few months on the parasite contaminated areas. An increase in herd size increases the probability of disease transmission; however, even large non-fed herds (as it is in KF), have lower risk of infection due to increased mobility and utilisation of large winter ranges. Our study shows that different management strategies have an impact on the spread and dynamics of pathogens in bison populations.

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