

Behavior of the bison and helminthoses

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Abstract: The purpose of this paper is to present some relations between European bison behavior and possibility of parasite infection based on observation done in the European Bison Breeding Centre of the Prioksko-Terrasnyj State Natural Biosphere Reserve. The knowledge of animals habits and their daily schedule is very important for applying proper anti-parasitic program. In captive conditions it is also necessary to estimate the epizootic situation of parasitic illnesses, a prediction of their tendency in time and elaborate the modern system of parasitic prevention.

Key words: European bison, anti-parasite treatment, captive condition

The characteristic of the bison's habitat

On the area of bison's enclosure are some important places as feeding stations, shelters, dens, sand hills for rolling about, object for scratching. Also usually bison are moving around along some patches, which are used every year. The forested areas are very important for bison for both reasons for grazing and for protection. In bison's habitat important is presence of sandy places where animals wallow and clean their skin. Usually those places are located on a slope and there are no vegetation because bison are using those places for many years. In such loose, dry ground or sand some invasion form of parasites could be easily found.

Some characteristic and often repeated behavior features like the habit to walk in single file (one after another), to roll about in the same places, to beat out the soil in resting spots, to scratch against the same trees, to bark trees and bushes, in combination to high body mass lead to significant changes of the enclosure area. Spots for with feeding platforms are practically without any vegetation and often very mud, which make favorable ecological conditions for reproduction of soil-transmitted helminthes. The natural water resources in such places are good source for liver fluke (*Fasciola hepatica*) invasion.

Worked out and applied management system similar to methods used for domestic animal has influence on bison's ethology connected with their moving on artificial the limited territory of the enclosure. High frequency and duration of animals stay on most often visited sites like feeding or resting places, where they spend the majority of day feeding, wallowing, scratching, lying, predetermine those sites to high epizootic danger concerning helminth

infection. Thus, at enclosed management system there is potential possibility to accumulate invasion as nematodes (geohelminthes – *Strongylidae*), and liver fluke, lancet fluke, tapeworm (biohelminthes – *Fasciola*, *Dicrocoelium*, *Moniezia*), which combination with favorable climatic conditions can cause helminthosis with clinical symptoms.

Actually the basic herd of European bison in Prioksko-Terrasnyj reserve is counting 56 individuals. In Breeding Center there are six pure European bison breeding groups kept in separate enclosures, one group of American bison and large enclosure with group of young bison. The total area of Breeding Center is about 200 hectares and it is fenced with net and electric wire. Smaller enclosures mostly of size between 25 and 50 ha are separated from each other. In Center there are also small enclosures (5 ha). From the moment of creation of Breeding Center up to now bison are living on the same areas, where until 1990 any program of prevention against parasites was not implemented. The area of breeding Center was seriously damaged during 80 years of bison breeding, the amount of food is much lower and during the history were observed serious very strong parasites invasion, mainly liver fluke and lancet fluke. Since 1990 animals are regularly treated against parasites and results are noticed in scatology inspection and necrotomy of animals. It was stated that since 1006 there was no serious problem with helminths in Breeding Center.

Parasite infestation depending on a season of year

Many animals parasites, especially those with short period of ontogenesis inside animal body as well as in the outer environment could demonstrate considerable fluctuations of the extensiveness and the intensiveness of invasion during various year seasons, In some period could be noticed the lower level of animal condition. Over year study conducted in Breeding Center for bison kept in Breeding Center found constantly 17 parasite species: 3 trematodes species, 2 cestodes species and 12 nematodes species.

During our study for the first time were revealed parasitizes: cryptosporidia (*Cryptosporidium parvum*), coccidiosis (*Eimeria zuernii*, *E. bovis*, *E. ellipsoidalis*, *E. bukidnonensis*), ticks (*Ixodes ricinus*) and larvae of flies.

Detailed list of helminths species found on bison in the Breeding Center

Fasciola hepatica (L., 1758)

Dicrocoelium lanceatum (Stilles et Hassal, 1898)

Paramphistomum cervi (Zeder, 1790)

Moniezia benedeni (Moniez, 1879)

Moniezia autumnalia (Kuznetsov, 1967)

Dictyocaulus viviparus (Bloch, 1782)

Ostertagia ostertagi (Stilles, 1892)

Ostertagia lirata (Sjoberg, 1926)

Cooperia oncophora (Racill, 1898)

Cooperia zurnabada (Linstow, 1906)
Haemonchus contortus (Rud., 1803)
Nematodirus helvetianus (May, 1920)
Oesophagostomum radiatum (Rud., 1803)
Trichocephalus ovis (Abildgaard, 1795)
Capillaria bovis (Schnyder, 1906)
Setaria labiato-papillosa (Alessandrini, 1838)
Bunostomum trigonocephalum (Rud., 1808)

The study of bison's scats were done during the whole year for purpose of obtaining the data about parasites intensiveness and distribution in different seasons. Results are presented on figure 1. So, the highest extensiveness of helminthes invasion within season was noted in summer (July – 97,4%, mainly strongilates in the gastrointestinal tract) and in winter (February – 100% for liver fluke) the periods. The results of three groups of parasite extensiveness are presented on Fig. 1.

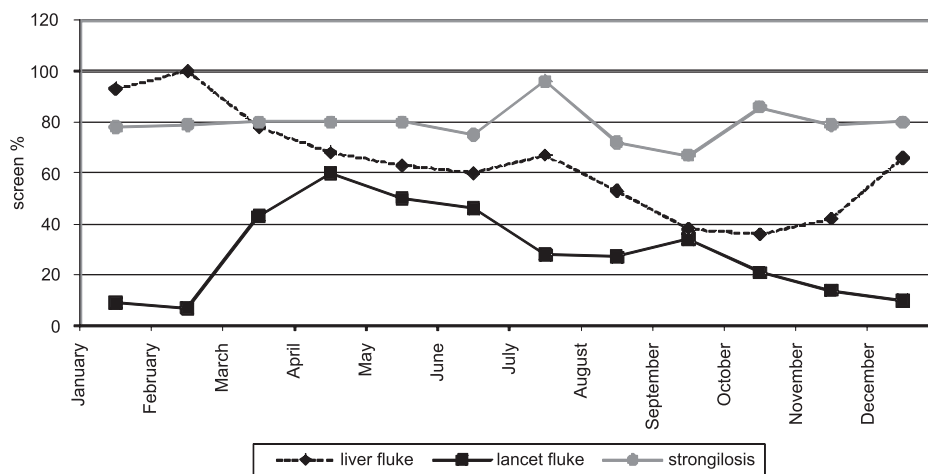


Figure 1. The extensiveness of three main parasite species during the year

The liver fluke (*Fasciola hepatica*) is always observed on the similar level which is probably associated with enclosure system of keeping the animals. Slightly increased invasion of liver fluke in the spring may be associated with wintering in an intermediate hosts, snails but relation is insignificant. Infection is more likely in the summer, when parasites eggs containing formed miracidia are excreted in feces in large numbers. They meet with intermediate hosts, most active in this period, which facilitates the spread of parasites. In addition, with the advent of green grass bison begin to intensively graze and move across the enclosure, which also affects flukes expansion.

In the digestive tract of bison's parasitize Nematodes genus *Chabertia*, *Trichostrongylus*, *Ostertagia*, *Cooperia*, *Haemonchus*, *Nematodirus*, *Oesophagostomum*, *Bunostomum*. The European bison are infested by larvae through contact with contaminated water from ponds and streams, pastures, waterholes, feeding places and in most often visited places where they wallow, scratch, rest etc. Constant and long-term use of enclosures creates potential and actual threat concerning accumulation of invasive material so it is impossible for a bison to avoid helminthes invasion.

The highest extensiveness and intensity of nematodes invasion has been registered in calves up to three years of age. Calves in Breeding center are born basically in May-June and in within one month they start to feed on a grass which results in infection. This is usually happens in feeding and resting places and waterholes. Thus, the main source of infection for young calves are infested adult animals spreading parasites. When calves get older extensiveness and intensity of infection decreases.

To prevent the spread of the parasite in bison enclosures cleaning is performed regularly: manure is cleaned and exposed to thermal processing, drinkers are kept clean thereby reducing the number of sources of potential infection. All animals are constantly provided high quality hay, mixed fodders, woody – branches, green fodder and mineral dieting that raises resistance of bison to the diseases and together with preventive treatments such as dehelminthization allows the release of bison from the most pathogenic helminthes.

Preventive maintenance against helminthosis in animals in breeding centers

One of the essential factors affecting numbers and condition of bison populations are the diseases caused by helminthes. They may in some cases lead to death of the animal, but much more often influence of helminthes on the population of host has indirect character. Decrease in resistance causes that the animals become more susceptible to infectious diseases. In addition productivity and fertility of infected animals decreases and the new born calves suffer from reduced resistance to infectious diseases and cold.

The degree of parasite invasion in wild natural population is unknown, except for cases of direct or indirect influence of human. Introduction to the parasite's ecosystem of new energy sources (feed, or its components) causes that they begin to spread through an intensive egg production and active movement. In this way, the intensity of infection of new food resources and new ecological niches (which are non infected animals) is growing. Thus, the main cause of bison helminthosis in breeding centers is their long-term stay in a limited space.

Another, the most dangerous parasites of ungulates are Trematodes, Nematodes and Monezias. In various ungulates species one could find

representatives of different groups of parasites of one kind or family. It is suggested to use the same preparation for dehelminthization in all hoofed animals species.

Preventive actions can be divided into a number of stages:

1. Analyze the existence of parasites. On the basis of these data critical number of animals, the list and scales preventive and necessity therapeutic measures are defined.
2. Designing of preventive actions.
3. Special veterinary actions.

The exact procedure will depend on the quality and quantity of the identified parasites and other factors.

Discussion

The maintenance of animals in the limited territory have changed the species composition of plants in the breeding center. As a result, in summer for the animals are available invaluable plants. This has also created favorable conditions for helminthosis distribution. In the years in which particularly large death rates were reported bison were feeding on poor quality forages, hay, silage characterized by bad ratio of nitrogen.

In this way, bad food, which coincided with the spring re-growth heavily exploited by animals, overpopulation in enclosures and invasion of parasites, has ensured that in the fifties there has been intense helminthosis in animals, which in some animals resulted in reduced resistance – an "open door" for infectious diseases. The most susceptible to the disease are young animals in whom together with the weakening, vital organs such as liver and gastrointestinal tract are damaged, as a result these animals are listless. Implementation of the full section of dead animals have revealed that the helminthosis itself contributed to the physiological weakening and death. To get out of this situation, we saw only one solution: system of natural sanitation on pastures to and carrying out of preventive and medical actions in the breeding center.

The most vulnerable to the parasites places in enclosures are feeding places, where the soil does not dry out practically (maintains constant moisture), in the ground droppings are collected which is also a source of infection. In this way, bison are infected with parasites during the spring, fall and snowless winter.

The general actions for prevention of helminthosis in the Breeding Center

For the problem decision the bison helminthosis in breeding center we undertake following actions:

1. The organizational-economic actions directed on the prevention of helminthosis which consist in livestock maintenance with the high-grade

forages, appropriate conditions of feeding, a watering place, the maintenance, meeting the requirements of zoo hygiene.

2. We carry out regularly measures on improvement of a condition of enclosures (clearing of pastures of wind fallen trees), we create cultural pastures, and also rationally use some pastures no longer than two years in raw.
3. Feed balanced in terms of protein, minerals and vitamins, taking into account the available feed and pasture supplements of micronutrients (salts of copper, cobalt, iodine and other)
4. All items containing feed are covered and raised.
5. Pens are kept clean: manure is regularly exported and neutralized. Fertilizer destined for export is a separate equipment not used for feeding
6. The young bison (as the most susceptible to the majority of helminthosis and other infections) are raised separately, there are improved pastures with preliminary dehelminthization of animals (in case of need).
7. All animals imported into the area undergo 30-day quarantine and dropping analysis. When parasites found locally in the resort, the animals are additionally dewormed.
8. At diagnostic statement it is necessary to consider, that helminthosis proceed with not expressed signs of illness, and more often – subclinical, without visible deviations in the general condition of animals. It depends on the general resistance of bison, their age, intensity invasion, maintenance and feeding conditions and other circumstances.
9. Bison prior to export, are subjected to testing for the presence of parasites and if necessary undergo dehelminthization. Each deworming recorded in "The diary of a Bison Breeding Center" and in veterinary certificate.

Before export of bison it is subjected helminthes-and scatology to inspection and inspection on other parasites, and, at detection helminthes or other parasites, dehelminthization conduct of animals. About carrying out dehelminthization we do a mark in "The diary Bison Breeding Center" and in the veterinary certificate.

Through these activities carried out systematically in the last few years, ensuring an adequate system for animal feed: at the beginning of the year and at the end of February and March, the animals are fed intensively, observed increase in the fertility of mothers – the young are born almost every year, which is different from the so-called natural calving period (once in 2–3 years). We managed to raise the condition of the bison, strongly reduce helminthes, exclude deaths from parasites, abortions and death ratio in calves.

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Zachowania żubrów i helmitozy

Streszczenie: Celem tej pracy jest przedstawienie pewnej relacji pomiędzy zachowaniami żubra oraz możliwością infekcji pasożytniczej oparte o obserwacje prowadzone w Ośrodku Hodowli Prioksko-Terrasnyj Centralnego Krajowego Rezerwatu Biosfery. Wiedza na temat zwyczajów zwierząt, ich dziennego rozkładu zajęć, najczęściej odwiedzanych miejsc jest bardzo ważna do zastosowania właściwych metod profilaktyki przeciw pasożytniczej. W warunkach utrzymania dzikich zwierząt w niewoli jest również konieczne oszacowanie sytuacji epizootycznej względem pasożytów aby z wystarczającym wyprzedzeniem czasowym zastosować odpowiednie działania profilaktyczne. W pracy przedstawiono najczęściej spotykane pasożyty oraz program ochrony zdrowia zwierząt stosowany w rezerwacie.
