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Short communication

# Serological studies to determine the occurrence of Johne's disease and mycoplasma infection in the Northern-East Polish population of European bison (*Bison bonasus*)

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## Abstract

A serological study of twenty three European bison (*Bison bonasus*) derived from Northern-East Poland for the seroprevalence of *Mycobacterium avium* subsp. *paratuberculosis*, *Mycoplasma bovis*, *Mycoplasma mycoides* subsp. *mycoides* SC, *Mycoplasma agalactiae* and *Mycoplasma capricolum* subsp. *capripneumoniae* was conducted. Only specific antibodies to *M. bovis* were detected in two animals (8.7%) which were connected with the clinical signs and macroscopic anatomopathological lesions.

**Key words:** bison, *Mycobacterium avium* subsp. *paratuberculosis*, *Mycoplasma* spp.

## Introduction

*Mycoplasma bovis* is responsible for pneumonia, arthritis and mastitis in cattle also in Poland (Nicholas 2011, Dudek and Bednarek 2012). The first study performed on free-living European bison (*Bison bonasus*) either healthy or balanoposthitis from the Białowieża Forest (Poland) showed four positive results for anti-*M. bovis* specific antibodies (Thiede et al. 2002). Other studies confirmed a contribution of *M. bovis* to the respiratory and reproductive disorders in American bison (Janarghan et al. 2010, Register et al. 2013). Mycoplasmas such as *Mycoplasma mycoides* subsp. *mycoides* Small Colony variant (*MmmSC*), *Mycoplasma agalactiae* or *Mycoplasma capricolum* subspecies *capripneumoniae* (*Mccp*) are also connected

with pleuropneumonia, arthritis or mastitis in ruminants (Corrales et al. 2007, Awan et al. 2010, Nicholas 2011). Our previous studies showed a lack of seropositive animals for *MmmSC* and *M. agalactiae* in Poland (Dudek et al. 2012) but such examinations have not yet been performed in the Polish population of European bison. Additionally, in Poland no case of *Mccp* infection has yet been demonstrated yet. *Mycobacterium avium* subspecies *paratuberculosis* (MAP) is the causative agent of Johne's disease, an economically important infectious disease in domestic and wild ruminants worldwide (Ott et al. 1999, Forde et al. 2012). MAP still infects approximately 2% of cattle and remains present in 6% of cow herds (Sztejn and Wiszniewska-Łaszczych 2011). Despite the lack of data on MAP infection in European bison, the bacteria was

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identified in American bison and was characterised as a separate „bison” MAP biotype (Whittington et al. 2001).

The aim of this study was to evaluate the occurrence of specific antibodies against MAP, *M. bovis*, *MmmSC*, *M. agalactiae* and *Mccp* in the European bison from the North-Eastern Poland.

## Materials and Methods

Twenty three blood sera were collected from European bison either immobilized or eliminated on the basis of Polish Authority decisions. The animals, aged from 10 months to 20 years, originated from the Białowieża Forest (BF), Knyszyńska Forest (KF) and Kiermusy in North-Eastern Poland. Sacrificed animals were subjected to routine necropsy. To determine antibodies against the specific pathogens the following commercial tests were used: ELISA *Mycobacterium paratuberculosis* Antibody Test Kit (IDEXX Paratuberculosis Screening, France), ELISA kit manufactured by Bio-X Diagnostics, Belgium (*M. bovis*), complement fixation test (CIRAD, France), competitive ELISA kit (IDEXX, France) and latex agglutination test (BoviLAT) of AHVLA (UK) production (*MmmSC*), verification ELISA kit manufactured by IDEXX, France (*M. agalactiae*) and latex agglutination test (CapriLAT, AHVLA, UK) for *Mccp*. All results were calculated according to the manufacturer's instructions.

## Results and Discussion

From a total of 23 sera, no specific antibodies against MAP, *MmmSC*, *M. agalactiae* and *Mccp* were detected despite respiratory and/or reproductive lesions observed in 13 of 14 animals. However, two bison gave positive results for *M. bovis* antibodies. The first result originated from the bison aged 20 years from BF. It was eliminated due to poor body condition, including clinical signs of severe respiratory disorders in 2011. The necropsy revealed intrabronchial pneumonia, pleuritic adhesions, uterus tumor and vesicular ovary cyst. The second positive serum was intravital collected in 2012 from a 5 year-old bison from KF with no clinical respiratory and reproductive disorders.

Our previous (Bednarek et al. 2012) and most recent study, carried out on cattle from the Podlaskie province of Poland where BF and KF are situated, showed 92 positive sera for *M. bovis* (78%) from a total of 118 samples (Dudek and Bednarek 2012). For comparison, the occurrence of anti-*M. bovis* specific antibodies observed in the present study for the Euro-

pean bison samples was only 8.7%. An occasional contact of the seropositive bison with the breeding cattle here is taken into consideration, but cannot completely be excluded. Due to a deficiency in the diagnostic material, isolation of the bacteria was not performed what could be confirmed the *M. bovis* complicity in an infection taken into consideration based on clinical signs and visible lesions observed in the first seropositive bison suggested a potential mycoplasmal source of the infection. Since some studies confirmed that *M. bovis* is responsible for the respiratory and reproductive disorders in American bison (Janarghan et al. 2010, Register et al. 2013), the positive results for *M. bovis* reported in the present study in the two bison may suggest the possibility of the previous infection of these animals or their contact with a infectious agent. These bison were not in a close contact which would enable to spread the infection. Research using the in-house Elisa intended for detection of *M. bovis* specific antibodies in bison sera demonstrated significant great compliance with the results obtained with the commercial assay manufactured by Bio-X Diagnostics, Belgium. The difference concerned only two samples. However, as a qualitative assay, the results were identified by both tests very similarly (Register et al. 2013). Therefore, the two positive results obtained in this study using this commercial assay seem to be reliable. The aim of the study was to present the negative results towards ruminant paratuberculosis. The range of bison age was from 10 months to 20 years. The general rules of monitoring of paratuberculosis in herds recommend testing for animals older than 24 months. The authors presented the results of four individuals aged from 10 months to 14 months; the presence of antibodies against MAP is not detectable at this age. Taking into account the epizootic situation of the studied group of animals, it can be assume that these young individuals are negative. Further studies based on a more differential and numerous pool of samples are required to monitor the health and welfare of the European bison in Poland.

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