

Anthelmintic resistance in strongylid nematodes parasitizing wild equids (Equidae): the first finding of resistance in the Askania Nova Biosphere reserve, Ukraine

Vitaliy A. Kharchenko¹, Tetiana A. Kuzmina¹, Natalya S. Zvegintsova²,
Natalya I. Yasinetska²

1 I. I. Schmalhausen Institute of Zoology NAS of Ukraine, vul. B. Khmelnytskoho, 15, Kyiv, 01030, Ukraine; 2 F. E. Falz-Fein "Askania Nova" Biosphere Reserve, 13, vul. Parkova, Askania-Nova, Khersonska obl., 75230, Ukraine

e-mails: vit@izan.kiev.ua (Vitaliy A. Kharchenko); taniak@izan.kiev.ua (Tetiana A. Kuzmina)

Anthelmintic resistance in nematode parasites of livestock, including domestic horses, is widespread throughout the world. Regarding domestic horses, the resistance in nematodes – small strongylides (Cyathostominae) to benzimidazole anthelmintic (BZ) drugs is the biggest problem nowadays. In Europe, the BZ-resistance in cyathostomes of domestic horses was detected in many countries, including Ukraine. However, no data on the presence of BZ-resistance in wild equids have been published to date. The purpose of our work was to study the manifestations of the BZ-resistance in domestic and wild equids kept in the Askania Nova Biosphere Reserve, Ukraine.

The Biosphere Reserve "Askania Nova" is situated in the steppe zone of South Ukraine (46°29' North and 33°58' East). Six species of equids: wild Przewalski's horses (*Equus ferus przewalskii*), donkeys (*E. asinus*), Turkmen kulans (*E. hemionus*), plain zebras (*E. burchelli*), mountain zebras (*E. grevyi*), domestic horses and Shetland ponies (*E. caballus*) are kept in large enclosures of the Reserve under semi-free conditions. Regular monitoring studies of the level of infection of all these equid species are performed twice a year by the coprologic McMaster method (Herd, 1992) with sensitivity of 25 eggs per gram of feces (EPG). According to the results of coprological examination, animals are treated with anthelmintics; mostly the benzimidazole drugs of various producers containing albendazole are used. Coprological data (EPG values) collected before and after anthelmintic treatments of various equids from 2009 to 2017 were re-analyze using the WAAVP protocol for the Fecal Egg Count Reduction Test (FECRT) (Coles *et al.*, 2006).

The FECRT for BZ drug "Albendazole-10%" (ZooVetPromSnab, Ukraine) was performed in March 2019 on four species: domestic horses and ponies, donkeys, plain and mountain zebras. All animals were examined on presence of gastrointestinal parasites; the most infected animals (n=90) were dewormed by the "Albendazole-10%" in dosage of 0.75 g per 10 kg of body weight. Coprologic examinations of all animals were performed on the 0 Day (before treatment) and on the 14th day after treatment. The FECRT was performed according to the WAAVP protocol.

The preliminary results of long-term monitoring studies (2009 to 2017) revealed a decrease of efficacy the BZ drugs in wild and domestic equids. The first signs of presence of BZ resist-

ance were detected in plain zebras dewormed with “Vermidan” (albendazole, 10%); the efficacy of treatment was 50–80% in some animals. However, FECRT was not performed to approve the presence of BZ resistance.

The results of FECRT showed a decrease of treatment efficacy in all species of equids analyzed. In domestic horses the average efficacy of “Albendazole-10%” was 66.4% (20.5–100%); in ponies – 61.1% (12.8–100%); in donkeys – 45.2% (11.2–100%). In wild equids, the results of FECRT also approved presence of BZ resistance; in plain zebras the treatment efficacy was 74.3.4% (20–100%); in mountain zebras – 72.7% (22.3–100%).

Eleven species of cyathostomes were found in horses with approves BZ resistance – *Cyathostomum catinatum*, *Cylicocyclus nassatus*, *C. ashworthi*, *C. leptostomus*, *Cylicostephanus calicatus*, *C. goldi*, *C. longibursatus*, *C. minutus*, *Coronocyclus labiatus* and *C. labratus*. Species diversity was very low – from 4 to 6 species were found per one host.

Our results are the first detection of BZ resistance in strongylids of wild equids. Detailed studies of presence of anthelmintic resistance in other wild equids (Przewalski’s horses and kulans) are necessary to identify BZ-resistant species in various species of equid hosts.