Besnoitiosis in Donkeys

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Besnoitiosis is caused by infection with protozoan *Besnoitia* spp, which are cyst-forming coccidian parasites that affect multiple host species worldwide. *Besnoitia bennetti* is the species known to infect equids and has been reported in horses and donkeys in Africa, Asia, and more recently, the United States and Europe. Equine besnoitiosis was first reported in 1927 in four horses from Sudan. Currently the only reported cases of equine besnoitiosis in North America have been in donkeys.

The life cycle of *Besnoitia* species involves both a definitive (predator) and intermediate (prey) host. Although a feline definitive host has been identified for *Besnoitia* species known to infect several types of wildlife, attempts to demonstrate a cat as the definitive host of *B. bennetti* (the species that is known to infect equids) have been unsuccessful, thus precluding researchers from elucidating the parasite's life cycle and mode of disease transmission in donkeys.

Clinical disease is characterized by a miliary dermatitis of pinpoint parasitic cysts in the skin, mucous membranes, and conjunctiva. The skin over the muzzle, nostrils, ears, perineum and medial thigh appears to be preferentially affected (Figure 1). One of the most unique features of besnoitiosis is the development of 'scleral pearls,' which are cysts on the sclera of the eye (Figure 2). Cysts have also been infrequently identified in the testicles, nasopharynx, larynx, trachea and esophagus of infected donkeys. Infected donkeys may also have generalized crusting dermatis, poor haircoat, and/or focal areas of alopecia. Often affected donkeys have a history of chronic dermatitis non-responsive to treatment with antibiotics, ointments, medicated baths, etc

In an epidemiologic investigation of besnoitiosis in donkey herds across the United States, young animals (average age 2 years) were at increased risk of infection when compared to older individuals. Sex and breed were not associated with developing besnoitiosis. The most common lesions in infected donkeys were cysts in the nostrils (94%), perineum (69%) and scleral pearls (81%). Some infected animals remain seemingly otherwise healthy, while others become cachexic and debilitated as a result of the disease. The reason for this difference in host response to infection is unknown, but similar clinical subtypes are observed with bovine besnoitiosis in European cattle herds.

The current gold standard for diagnosing besnoitiosis in donkeys is histologic identification of *Besnoitia* cysts within the skin of individuals displaying clinical lesions, generally achieved via skin biopsy. Antibodies against *B. bennetti* can be detected in blood via western blot and indirect fluorescent antibody testing (IFAT), and measuring titers in donkeys has been shown to be effective for identifying infected donkeys. While these assays are not yet available in the United States, they represent an effective and non-invasive method for screening individual donkeys and herd populations and would undoubtedly further our understanding of the epidemiology and transmission of besnoitiosis in the United States if available.

There are currently no known effective treatments for equine besnoitiosis. Treatment with the anti-protozoal medications ponazuril, trimethoprim-sulfamethozazole, and nitazoxanide have not been effective. The potential for natural recovery from besnoitiosis and the long-term

prognosis for infected animals remains unknown. The author has followed several infected donkeys for the past 5 years, none of which have spontaneously resolved. Although besnoitiosis has not yet been reported in horses in North America, cases have been described in Africa, and the potential for similar infections in the United States cannot be excluded as a possibility.

Figure 1: Besnoitia lesions in the nostrils of an infected donkey

Figure 2: Scleral pearls (arrow) in an infected donkey