The Next Frontier for Recovering Endangered Huemul (Hippocamelus bisulcus): How to Avoid Recurrent Misdiagnoses of Health Status

Werner T. FLUECK and Jo Anne M. SMITH-FLUECK

1National Council of Scientific and Technological Research (CONICET), Buenos Aires; Argentine National Park Administration, Bariloche, Argentina; Swiss Tropical and Public Health Institute, University Basel
2Laboratorio de Teriogenología "Dr. Héctor H. Morello", Facultad de Ciencias Agrarias, Univ. Nac. Comahue, Cinco Saltos; DeerLab, 8400 Bariloche, Argentina

*Corresponding author: wtf@deerlab.org

There remain only 350 - 500 huemul in Argentina, fragmented into some 50 subpopulations along 1,850 km of Andean mountains. No groups are documented to be recovering, rather the process of local extinctions is continuing. The difficult accessibility to remote locations of extant huemul has hindered research; thus, only in 2016 was a first female captured and marked, with six more being marked in 2017. Evaluations of intact cases, besides the 7 marked deer, were based on a few animals that died soon after confinement or were found freshly dead. Although few, these examined animals could serve as highly valuable case studies to reveal important sanitary issues. Instead, a high incidence of misdiagnosing the health status raises the question about what strategies to consider in order to minimize these diagnostic errors and consequential inappropriate treatments, and thereby reduce any unfavorable consequences. Here we present several cases involving misdiagnoses, then add our corresponding alternative interpretations. Case 1: a female found in a delicate state and taken to a pen for veterinary supervision died soon after. Based on a subsequent necropsy, it was reported that she likely died from intoxication from plant consumption (Astragalus sp.). However, our subsequent analyses showed clear signs of osteopathological processes in the mandibular and maxillary bones, and moreover, columnar and appendicular lesions. Additionally, bone fluoride levels reached 2209 ppm, explaining the lesions resembling fluorosis, most likely explained by the high fluoride concentrations in volcanic ashes deposited from the 2008 eruption of Mt. Chaitén. Case 2: a male in the same region was found in a delicate state and taken to a pen for supervision. He died soon after. The veterinarians who performed the necropsy did not report any health problems. However, our subsequent analyses also showed this second case to have clear signs of osteopathological processes in the mandibular and maxillary bones, and in vivo photos clearly show an affected mandibula (park bureaucracy has not yet allowed an evaluation of the skull). This deer also had very high bone fluoride levels, even reaching 2979 ppm. Case 3: a male from another region was cornered by dogs in the evening, then roped and attached to a post by the farmer. Authorities, who were contacted, arrived in the afternoon of the next day. After sedation, the male was evaluated by veterinarians. Considered healthy, he was thus translocated to another site nearby for release, where he died shortly after, not recovering from the drug. Although the carcass was initially left at the site of death, it was later removed and buried elsewhere. In contrast to the veterinarian report, the subsequent recovery and necropsy of the carcass revealed skeletal health issues, particularly severe in the mandible and maxilla. Case 4: a female in another region, immobilized to be marked, was evaluated by a team of veterinarians. The animal was considered healthy and apt for release. However, photos of the animal before capture, during immobilization, and later after her release indicate that she had a swelling on the left mandibular site. These types of swellings frequently indicate underlaying osteopathological processes. Case 5: a population in Chile was recently evaluated for the
status of the trace mineral selenium (Se). Given the samples with values below the detection limit were removed from analysis, the population was considered to have adequate Se levels. However, when all values were included, a re-analysis determined that at least 75% of the values were indeed in the deficiency range. Moreover, that population was shown to have numerous cases of advanced osteopathy compatible with Se deficiency. The prevalence of this osteological disease pattern has been shown to be at least 57% in remains of dead adult huemul, and 86% among recently examined live adults. Additionally, the impact from volcanic ashes containing high amounts of fluoride also has been described for livestock and other wild ungulates. Reducing diagnostic errors is an important goal because of its associated morbidity and potential preventability. These repeated cases of diagnostic errors reported here are nontrivial given the few opportunities to evaluate live specimens of this highly endangered species. Aftermaths of failed diagnosis include a reduced life expectancy, when the alternative could be to take a debilitated individual to a rehabilitation center. Furthermore, at the current precarious state of this species, individuals under controlled conditions can provide useful opportunities to answer numerous research questions. Given the repeated evidence of osteopathy occurring in huemul over a broad geographical range and the high prevalence found in both dead and live huemul, it is essential that live huemul be examined utmost professionally. Special attention must be given to the hitherto described pathophysiology among huemul, which requires a thorough inspection of the oral cavity.