Fluorosis Confirmed in an Endangered Patagonian Huemul Deer Population Resulting from a 2008 Volcanic Eruption

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In Argentina, only 350 - 500 endangered huemul (Hippocamleus bisulcus) remain, and these are additionally fragmented into some 50 subpopulations along 1,850 km of Andean mountains.1,2,3 The most recent evaluation of IUCN indicates that the populations are declining.4 The Chilean volcano Chaitén erupted in 2008, depositing a large amount of ashes over Chile and Argentina.5 These ashes were considered chemically innoxious based on water leachates. Moreover, fluoride levels in surface water and plant material were determined to be safe. Based on clinical signs like osteopathologies, we analyzed bone samples of wild huemul at about 80 km from this volcanic eruption in the Los Alerces National Park. Fluoride concentrations were measured using isothermal distillation and direct potentiometry using an ion selective electrode ORION 94-09. In this study, we show that these ashes caused fluorosis even many years after the eruption, with bone fluoride levels reaching up to 2979 ppm, whereas the levels prior to the eruption averaged less than 50 ppm, similar to levels reported in the Lago la Plata area some 250 km further south.6 Although water leachates of ashes revealed low fluoride levels, ruminants - a major component of this ecosystem - are shown conversely to be susceptible to fluorosis. This likely resides in ruminant food processing: a) mastication and ash size reduction, b) thorough and repeated mixing with alkaline saliva, c) water-soluble extraction in the rumen, and d) extraction in the acidic abomasum. These results may partially explain the numerical decline noted around the years 2010-2011 for this monitored huemul population.

Figure 1. Examples of pathological alterations in the vertebral column of a huemul with fluorosis: asymmetries, eroded articular surfaces, or exostoses.