Veterinary research – a South American theme

Peter Green considers the plight of the huemul and brocket

There are about 47 distinct species of deer surviving across the globe today, excluding the musk deer[1,2] although taxonomists differ about the status of some closely related species. We are probably all very familiar with our Old World species: deer like the roe, the red, the fallow, reindeer and European elk. We have also become familiar with some newcomers: muntjac, Chinese water deer, sika, even Père David's, as England was the centre of salvage when this species was extinct in its native range. White-tailed deer, American elk, moose and mule deer in the USA figure prominently in deer research literature and in hunting media, but what about the deer of South America? How many of us can instantly recognise a huemul, or a brocket or a pampas deer?

Two fascinating academic papers about two of these species have crossed my desk recently.

There are two species of huemul or Andean deer found along the spine of the Andes mountains: the slightly smaller northern huemul or 'taruka' (*Hippocamelus antisensis*) and the larger Patagonian huemul (*H bisulcus*). Both now only exist in isolated pockets, both are endangered in the wild. They are stocky, short legged deer with simple bifurcated antlers. The northern species is about the size of a big roe deer and the southern huemul gets to about fallow doe sized. There is almost no published description of any clinical examination of living southern or Patagonian huemul deer, which are confined to southern Argentina and Chile; in fact, only 6 deer have ever been captured examined and marked in Argentina. This

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Southern Andean or Patagonian huemul (*Hippocamelus bisulcus*)

species is in real trouble, as there are fewer than 1,500 remaining in the wild, equally distributed between Argentina and Chile, and they are split up into many sub-populations that are isolated from each other. Moreover, examinations of bones from dead animals or skeletal remains found in the mountains of Argentina and Chile reveal a shocking fact: the majority of deer in these populations appear not to survive beyond about 3 or 4 years old because of widespread bone disease.[3,4] The Argentinian government and National Park Authority recognises the critical status of this deer and has a conservation programme in place to protect the deer, but despite good implementation of this work, deer numbers continue to decline.

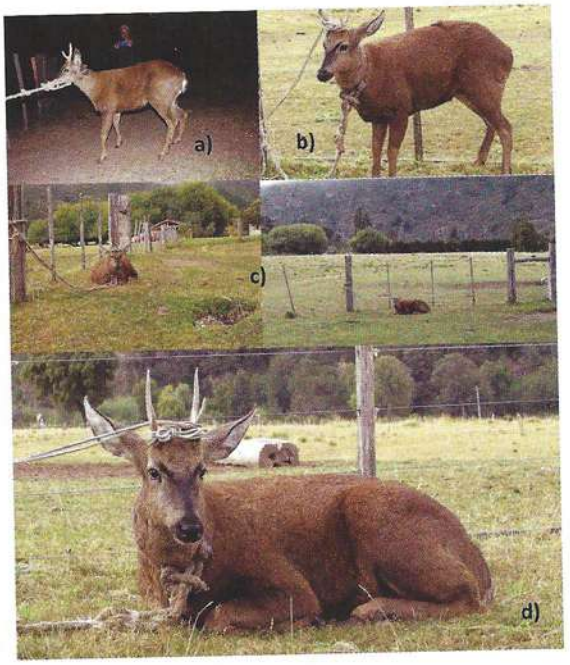


Figure 1.
The young Patagonian huemul was captured and tied to a fence post. Despite this treatment, he was remarkably docile

The recent paper[5] describes the sad case of a young huemul buck that surprised everyone by turning up in a mountain valley in Argentina where they are rare. It is assumed that young males disperse in the same way as in other deer species and there is plenty of high-altitude mountain scrub to provide suitable wildlife corridors through the mountains. The deer was initially harried by local farm dogs, but local people intervened and managed to rope the deer, keep the dogs away and tie the buck to a fence post. They also recognised what it was and realised how important and endangered these deer are, so they immediately contacted the wildlife authorities. From the few live capture experiences, it appears that Patagonian huemul are surprisingly docile and this buck was no exception. He simply accepted his restraint, lay down and waited for the wildlife team to arrive, which was not until the following day. There was a further delay in sorting out sedation, but eventually the buck was sedated for translocation to a suitable mountain area where other huemul are protected.

Unfortunately, almost exactly 24 hours after being captured by the farmers, the buck died before he could be released. Post mortem examination later revealed disappointing results. This buck was less than 3 years old and had severe bone disease, especially of the skull and jaw. There was bone pathology in the spine and the shoulder blade, but the most severe pathology was in the head, where the bones were thickened, but soft and spongy and where tooth roots were exposed and teeth broken and fragmented (figures 2 and 3 overleaf). These changes were exactly the same as the bone disease reported in other populations of Patagonian huemul, although there had been no knowledge of this disease in this local population; the nearest known diseased deer were 400km further north in the Andes of Argentina and 275km south in the mountains of Chile.

What causes this bone disease? It seems almost certain that the problem is severe selenium deficiency[4]. Such trace element-related disease is uncommon in wild animals and begs the question: 'How could a wild animal evolve and develop over millennia if it cannot cope physiologically with the environment in which it is living?' The answer, of course, is that this is wholly down to the influence and impact of humans. Patagonian huemul were once abundantly and widely distributed amongst the foothills of the southern Andes and in past centuries were the main source of meat for indigenous people. But with relentless increases in population and the development of settled farming, all the fertile land of the foothills has been taken for livestock and for crops. The huemul have been forced up into the infertile mountain scrubland, where selenium (and iodine) are severely deficient. Similar bone disease has been reported in ungulates living in deficient regions of New Zealand.

This is sobering – perhaps no amount of protection by National

Brazilian dwarf brocket deer (*Mazama nana*)

Parks or conservation efforts will save the Patagonian huemul in the high mountains of the southern Andes. It needs the valley floors, the grass of the foothills and the trace elements they harbour in order to survive, but displacing farmers for the sake of a few deer is not a popular prospect.

The second paper[6] that caught my eye is equally interesting. The South American brocket deer are something of a nightmare for taxonomists. Based upon classical anatomical classification, there are 7 species, but as we investigate genomic data more thoroughly this may need to be revised. Like the muntjac species, the number of chromosomes varies considerably between the brockets, even within an accepted species like the red brocket (*Mazama americana*), where females with 26, 21 and even 34 pairs of chromosomes have been recorded[2]. Some species are endangered, others relatively abundant. All of them are small deer, corresponding in both size and ecological niche to the muntjacs of Asia. They have simple spike-like antlers and are generally solitary. At first glance you might mistake them for muntjac.

The Bella Vista Biological Sanctuary is a wildlife reserve on the borders of Brazil and Paraguay where a population of endangered dwarf brocket deer or pygmy brocket (*Mazama nana*) are protected. The local name for this deer is the 'bororó'; it is about the size of our familiar Reeves muntjac and similar in colour. The deer breeds well in this sanctuary of about 2,000ha, which surrounds an important hydroelectric installation on the Paraná river. Despite the breeding success, there have been regular outbreaks of fatal disease in this wild population and in the colony kept on the site as part of a small zoo open to the public. In 2015 and 2016 deer died with signs of haemorrhagic disease and because such outbreaks had been occurring irregularly since 1995, vets from the University of Santa

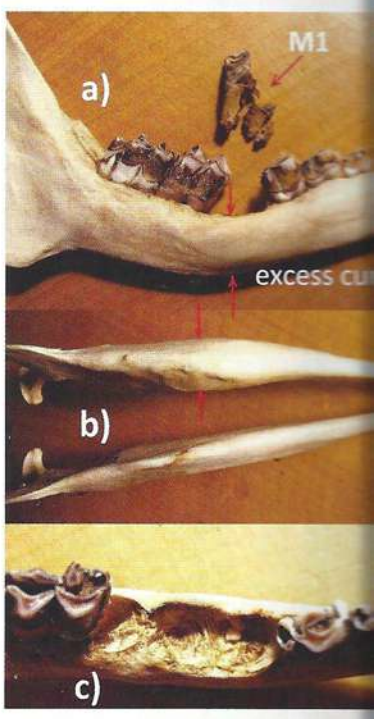


Figure 2

Catarina were called in to investigate. They performed careful post mortem examinations, took samples from both living deer and victims of the outbreak and screened all their samples for a variety of pathogens. There are at least three recognised causes of haemorrhagic disease in deer worldwide: Adenovirus Haemorrhagic Disease (AHD), Epizootic Haemorrhagic Disease (EHD) and Bluetongue Virus (BTV). Only EHD and BTV have been reported in Brazil, although the vets looked for all three and for anything new.

The results were interesting: the dwarf brocket deer were dying from severe infection with Bluetongue Virus (BTV), which was detected in blood samples and recovered from tissues (figure 4). By comparing samples from healthy deer before and after the outbreaks, the vets concluded that few infected deer survived the disease because there were almost no seropositive animals remaining in the population. What was most interesting is that no fewer than 5 different BTV serotypes were isolated from the sick and dying deer: types 3, 14, 18, 19, and 22.

All BTV viruses are spread by biting midges. There are at least 27 BTV serotypes identified worldwide and several cause disease in cattle and sheep in Brazil, but these five serotypes had not previously been detected in the country. Although there are cattle farms within 1km of the boundary of the Bella Vista Biological Sanctuary, there were no reports of cattle being affected when the deer were dying. This suggests that the serotypes that cause disease in brocket deer do not adversely affect cattle and perhaps vice versa - but this is not to say that cattle could not be a reservoir for the deer serotypes and deer for the cattle types.

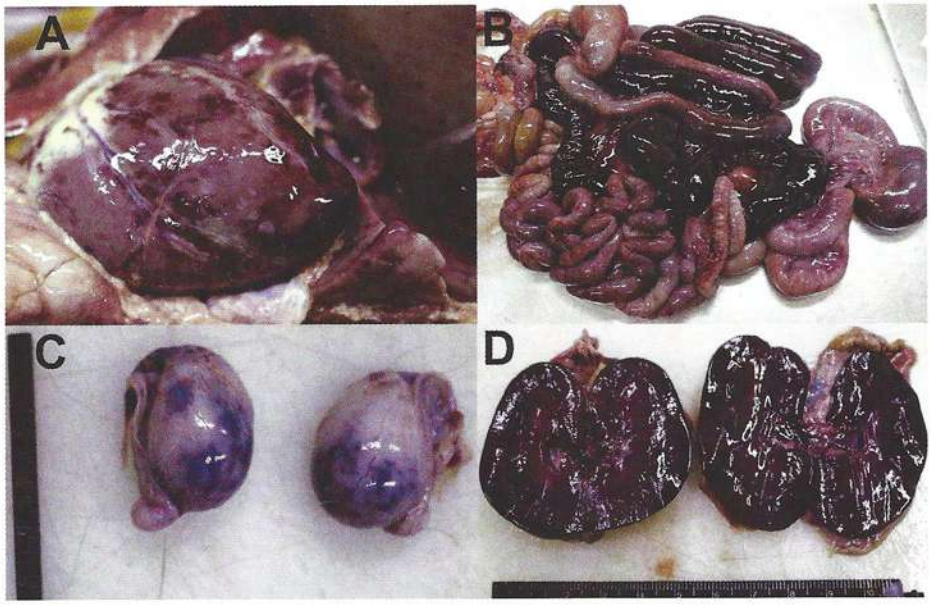
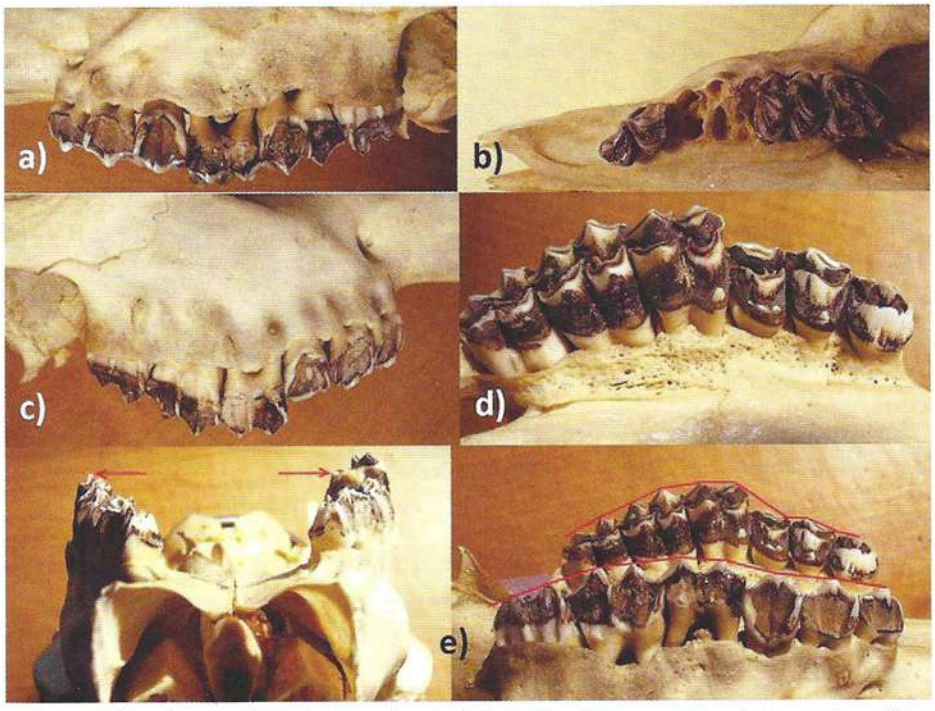


Figure 4.
The post mortem findings in the dwarf brocket deer killed by BTV.
A = heart B = bowels C = testes D = kidneys

Because BTV is currently present and causing disease in Europe, these results have some practical applications for vets in the UK. In France during the summer of 2018 there have been 28 outbreaks of BTV in cattle and sheep,[7] all with serotypes 4 and 8, which were types not involved in the Brazilian deer deaths. BTV type 4 has also been reported from Italy, Spain, Portugal and Switzerland. And, crucially, BTV type 3 caused disease in 2016 in Tunisia, then was detected in an outbreak of disease in Sicily in 2017 and then in Sardinia in 2018.[7] BTV type 3 was one of the serotypes that killed the Brazilian dwarf brockets.

The epidemiologists tell us that the increasing likelihood of hot summers also increases the likelihood of infected midges bringing BTV to the UK, as occurred in 2007. If this spread includes BTV type 3, then it seems possible that deer may be affected. The post mortem findings in the Brazilian deer were so striking that no trained deer manager or veterinary surgeon could miss them.



Figures 2 (left) and 3 (above). The bones and teeth of the skull and jaws were severely diseased, a pattern of pathology that appears to affect up of 80% of some Patagonian huemul populations

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