

Wildlife Domestic Animal Disease Interface – Hard or Soft Edge?

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Written records of the transmission of diseases between species are almost as old as civilization itself. There are classical examples such as anthrax and tuberculosis, with relatively more recent reporting of the role of multiple wild and domestic hosts in the epidemiology of diseases such as influenza (birds-mammals), rabies (mammal – mammal) and Foot and Mouth Disease (buffalo – impala – kudu - cattle), as well as the improved understanding of the complex vector-host relationships of many diseases (African Horse Sickness, African and Classical Swine Fever, trypanosomosis, theileriosis, Rift Valley Fever). Land use (in support of the development of human society) has in part, been influenced by disease risk at this interface and the current landscape in South Africa is a good example. Here land parcels are usually fenced from each other according to government, commercial, private or community interests, and often according to the regulatory framework for disease control – creating the so-called *hard edge* between animal populations. This is similar to landscapes seen in most so-called developed nations. The situation in Eastern Africa is significantly different with large tracts of land much as they have always been since pre-ice age, without a clear land use policy and landscaping, the main landscape influences being climatic. Here there are much larger numbers of small scale farmers, traditional pastoralists, and wilderness areas with wildlife and livestock often mixing on a continuous or seasonal basis – *the soft edge*. These wildlife ecosystems are attractive for tourism and have been the basis of strong industries in Kenya and Tanzania, but this has not compensated for their weak agricultural sectors. There continues to be a sporadic need for food aid to sustain the growing population in times of drought. The belief that this form of land management is ecologically sound has even influenced some of the recent thinking in Southern Africa, with the development of Peace Parks and larger transboundary wildlife management areas, whereas ironically in East Africa there is a move to develop a more commercial approach to wildlife and livestock management, similar to what is now, a highly developed industry in the south. Looking at the advantages and disadvantages of the different land management scenarios, from a disease perspective continues to challenge our thinking but both regions can learn from each other.

In terms of disease control, the policies in the south have worked effectively within the framework of international trading (sanitary) regulations to prevent the spread of certain infections and this has enabled a strong livestock economic sector to grow, whilst in the east, livestock (and wildlife) disease is widespread and uncontrolled, constraining commercial development and international trade. Although, in the more open systems, the actual impact of these diseases at a smallholder or pastoral level is minimal and it is unlikely the majority of farmers would in reality benefit from a strong exporting industry. There are exceptions to this, for example in Somalia where the majority of the population is dependant on livestock and there is a large live animal (international) trade. Removal of the rinderpest and RVF threat would be very beneficial to this community. What is best for the respective regions depends entirely on the perspective of the proposed beneficiary but it is likely to be more complex than we have hitherto thought, and more so as the objectives of development philosophy change .

Perhaps the over-riding concern is the increasing intensity at which the human species, as a result of its population explosion (along with its domesticated animals), is interacting with what is left of the natural world. This is resulting in an apparent increase in so-called emerging or novel diseases. Recent examples are Hendra Virus (Human - Equid) a novel morbillivirus; “lion” distemper, and emergence of a well known morbillivirus of dogs, in a wild felid possibly through a hyena link; and SARS, involving most likely a human – civet interface. Although to prove these associations after the fact is difficult. In addition, in the era of so-called globalization, pathogen dispersal is more dependent on communication pathways than distance, through an increase in trans-continental movements of people and animals, particularly by air. This is most probably resulting in more frequent introductions of pathogens to new host populations with predictable results. The scenario with FMD type O viral movements between Asia, South Africa and the UK is an example and the current West Nile Virus epizootic in the USA, which might be a case of the introduction of an infected mosquito, person or horse through air transport (possibly from Israel according to one source) or through infected migrant bird species. This is also influencing our thinking when dealing with wildlife and livestock (trade) introductions to countries for exotic pet, commercial or conservation purposes.

Much of the hype surrounding disease in this “communication” age, leads us to believe that the plague of plagues is about to emerge and wipe us all off the planet, but what is the reality on the ground? When it comes to the veterinary field and the wildlife-livestock interface we have some interesting and contemporary problems under investigation. Examples are the Bovine tuberculosis epidemic in the Kruger National Park, the affect of badger population control methods on TB incidence in cattle in the UK, rinderpest virus persistence amongst cattle and wildlife in the Somali ecosystem of East Africa, West Nile Virus in the New World and research on Foot and Mouth Disease, with topo-typing of viral strains, improving traceability of disease outbreaks (and therefore significance of wild hosts). The epidemiological study of these diseases has been greatly enhanced with modern molecular diagnostic technology, of which some of the most exciting work has been undertaken here in Onderstepoort.

Globally, the importance of these interface diseases, relates to our (mis)perceptions on food safety and the effect of disease on global trade in animals and their products. This is in fact consistent with the general emphasis in global health on human and zoonotic diseases, which attract the most media attention, finance, research and control effort. Whether we opt for a hard or soft edge these concerns are likely be driving forces in the future direction we take in animal and land management.