

Hazard identification

The disease hazards associated with the translocation of LDE from Cameroon to South Africa were initially determined by a perusal of the World Organisation for Animal Health's (OIE) World Animal Health Information Data-base (WAHID – available on-line at www.oie.int). This enables comparison between the animal health status of two countries in relation to specific animal diseases (for both livestock and wildlife) for trade purposes. The data-base is based on regular reporting by member countries to the OIE as part of the OIE's routine reporting procedures (Cameroon & South Africa are both members of the OIE and therefore have specific reporting obligations in that respect). The period reviewed on the website service was January to December 2012.

The diseases of concern listed by the website in respect of trade between Cameroon and South Africa include all diseases of terrestrial animals. The list was therefore reduced to only OIE listed diseases that are potentially able to infect antelope generally or eland specifically. These diseases are shown in Table 1; divided into probable-, possible- and unlikely hazards (OIE classification). The sixth column in Table 1 indicates three diseases – caprine arthritis/encephalitis (CAE), contagious bovine pleuropneumonia (CBPP) and contagious caprine pleuropneumonia (CCPP) – for which there is no technically-based indication for antelope generally being susceptible.

Of the 25 diseases listed in Table 1, 15 are directly transmitted and 11 indirectly (for LSD both mechanisms are probably applicable), i.e. where arthropods are exclusively or partially responsible for transmission. In the case of indirectly transmitted infections the distributions of potential competent vectors in addition to the disease itself requires consideration.

Table 1 indicates that the 'probable disease threats' (OIE classification) are confined to lumpy skin disease (LSD) and trypanosomosis. The OIE website shows that currently both LSD and trypanosomosis are a cause of clinical disease in Cameroon while that is not the case for wildlife in South Africa. However, the OIE distribution map for LSD in the period July to December 2012 also shows that clinical LSD in cattle was distributed throughout southern Africa. Furthermore, LSD is recognised as being endemic to sub-Saharan Africa and the Middle East (Tuppurainen et al., 2013) and in recent years has been an increasing cause of epidemics in cattle in South Africa. Moreover, no geographically-associated immunological or biological variation between LSD viruses have been described. Therefore, importation of this agent through the agency of eland from Cameroon (it is assumed for this investigation that LDE are susceptible because they are bovid; there is no specific information available on the susceptibility of LDE to LSD) could not significantly alter the LSD situation in South Africa. Consequently, contrary to the OIE listing, LSD cannot represent a significant hazard associated with this proposed importation.

Likewise, the potential vectors of trypanosomosis (tsetse flies – *Glossina* spp) are only present in a small part of kwaZulu-Natal. Furthermore, the practice in South Africa regarding the movements of wildlife out of that area to other parts of South Africa, is not controlled by the Competent Authorities, i.e. provincial and national

animal health directorates in South Africa (D. Cooper, personal communication, 2010). Consequently this purported hazard is not actual.

Among the other diseases listed in Table 1, only peste des petits ruminants (PPR), CBPP and CCPP are clearly exotic to South Africa. PPR is currently spreading in Africa and Asia – therefore its current distribution cannot be ascertained with certainty. For that reason PPR should be considered a probable risk in respect of importation of LDE into South Africa. This is despite the fact that the susceptibility of LDE to infection with PPR virus is not established.

For CBPP and CCPP, there is no objective scientifically founded information to indicate that antelope of any species are potentially susceptible to these infections. Therefore they should not be considered to represent significant hazards.

Although caprine arthritis/encephalitis (CAE) has not been diagnosed in South Africa, the infection has, with only a few exceptions (e.g. Australia & New Zealand), been spread around the world by goats of European origin (Werling & Langhans, 2004). There is also no clear association between this infection and antelope (Werling & Langhans, 2004). Serological evidence suggests that the infection may be present in South Africa among goats of European origin but that evidence is not conclusive (Werling & Langhans, 2004). CAE therefore, like CBPP and CCPP, does not represent a significant disease hazard in relation to this proposed trade.

The position of South Africa in respect of *Brucella melitensis* infection is not clear although the disease has occurred in the country in the past, including in association with wildlife (S. Strydom, undated; http://www.savc.org.za/pdf_docs/Brucella_melitensis.pdf). Furthermore, South Africa has imported large numbers of live sheep for many years from Namibia where *B. melitensis* continues to be prevalent (www.oie.int – see WAHID). However, because this is a controlled disease in South Africa and because the Directorate of Animal Health (DAH) is clearly intent on eradicating the infection from the country, *B. melitensis* needs to be a consideration in respect of this proposed translocation. The same consideration is applied in the case of possible *Brucella abortus* infection in this group of LDE.

All the other disease listed in Table 1 occur in South Africa and therefore do not represent a hazard from the perspective of introduction.

Foot and mouth disease (FMD) is shown in Table 1 as representing (in the opinion of the OIE) an unlikely hazard related to export of animals from Cameroon to South Africa. This, in all probability, is an underestimate of the potential risk. That is because although FMD is endemic to parts of South Africa in and around the Kruger National Park (KNP) and also the country is no longer recognised by the OIE as having a large FMD-free zone (the recognition of the former FMD-free zone was withdrawn by OIE in February 2011), it is generally accepted that most of the surface area of South Africa is free from FMD. The disease is endemic in Cameroon with serotypes A, O, SAT1 & SAT2 and having been identified (Bronvoort et al., 2004); more recently occurrence of SAT3 has also been described (<http://www.ars.usda.gov/GFRA/presentations/Session3/3.3CAMEROUN.pdf>).

Serotypes A and O do not occur in South Africa and furthermore intra-typic variants of SAT 1-3 viruses (genotypes and therefore subtypes) prevalent in Cameroon and South Africa are likely to differ (see below). The reported occurrence of SAT3 in Cameroon is unexpected because this serotype does not normally occur in Central and West Africa. Introduction of novel sero- and genotypes of FMD viruses into South Africa by cloven-hoofed animal imports from Cameroon consequently is a distinct possibility. Moreover, considering the influence of FMD on international trade generally this disease needs to be considered as a significant potential hazard.

It is possible that the same issue (immunological or other biological variation in the infective agent) could apply to a number of other disease agents endemic to South Africa and listed in Table 1. Such variation has been shown to occur in heartwater, bluetongue, Rift Valley fever (RVF) and theileriosis. For that reason these diseases will be considered as possible although unlikely disease risks even though they are endemic in South Africa.

Bovine tuberculosis occurs widely in South Africa and therefore does not present a serious hazard as far as importation is concerned. Biological variation within these agents, although detectable, has not been shown to be epidemiologically important. However, these bacterial agents are included in the list of hazards because both are zoonoses and are also 'controlled diseases' in South Africa.

Theileriosis does not pose a significant hazard in regard to the proposed translocation of LDE because (1) the only species of *Theileria* that naturally infects eland is *T. taurotragi*, a benign infection in both eland and cattle (Lawrence & Williamson, 2004) and (2) the parasite also occurs widely in southern Africa, i.e. is not exotic to South Africa. The OIE WAHID database (www.oie.int) for Cameroon indicates that theileriosis last occurred in that country in September 2009 and that both livestock and wildlife were affected (although which species of *Theileria* and which animal species were affected is not indicated). No unusual disease events were reported by Cameroon to the OIE in 2009. Furthermore, the distributions of the two common pathogenic and economically important *Theileria* species (*T. parva* & *T. annulata*) do not occur in the vicinity of Cameroon (see WAHID – www.oie.int). For these reasons theileriosis is discounted as a significant disease hazard in this case.

A foreign parasite that could be introduced to South Africa is the ixodid tick *Amblyomma variegatum* which is widespread in other parts of Africa, including Cameroon, but does not occur in South Africa. That tick therefore also represents a potential hazard. *Amblyomma variegatum* is an efficient transmitter of heartwater (although less efficient than *A. hebraum* which is endemic to South Africa – Norvall & Horak, 2004) and is often associated with the occurrence of dermatophilosis (*Dermatophilus congolensis* infection – Zaria & Amin, 2004).

Bearing the above discussion in mind, the only probable disease/parasite hazards are the following:

- *Amblyomma variegatum*
- FMD (controlled disease in South Africa)
- PPR

Other diseases possibly deserving of specific risk mitigation, despite the hazard being identified as unlikely (i.e. to forestall possible later criticism/argument), are:

- Bovine tuberculosis (BTB – controlled disease in South Africa)
- *Brucella abortus* infection (controlled disease in South Africa)
- *Brucella melitensis* infection (controlled disease in South Africa)
- Heartwater (*Ehrlichia ruminantium* infection)
- RVF

The other diseases listed in Table 1, for reasons given above and summarised in Table 2, represent negligible risk in respect of this proposed importation. For that reason they will not be considered in respect of release and exposure assessments or requiring specific risk mitigation.

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