



## Currently important animal disease management issues in sub-Saharan Africa

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### ABSTRACT

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The present international approach to management of transboundary animal diseases (TADs) is based on the assumption that most can be eradicated; consequently, that is the usual objective adopted by international organizations concerned with animal health. However, for sub-Saharan Africa and southern Africa more particularly, eradication of most TADs is impossible for the foreseeable future for a variety of technical, financial and logistical reasons. Compounding this, the present basis for access to international markets for products derived from animals requires that the area of origin (country or zone) is free from trade-influencing TADs. The ongoing development of transfrontier conservation areas (TFCAs), extending across huge areas of southern Africa, therefore presents a development conundrum because it makes creation of geographic areas free from TADs more difficult and brings development based on wildlife conservation on the one hand and that based on livestock production on the other into sharp conflict. Sub-Saharan Africa is consequently confronted by a complex problem that contributes significantly to retarded rural development which, in turn, impedes poverty alleviation. In southern Africa specifically, foot-and-mouth disease (FMD) presents the greatest problem in relation to access to international markets for animal products. However, it is argued that this problem could be overcome by a combination between (1) implementation of a commodity-based approach to trade in products derived from animals and (2) amendment of the international standards for FMD specifically (i.e. the FMD chapter in the Terrestrial Animal Health Code of the World Organisation for Animal Health [OIE]) so that occurrence of SAT serotype viruses in free-living African buffalo need not necessarily mean exclusion of areas where buffalo occur from international markets for animal products. This would overcome a presently intractable constraint to market access for southern African countries and enable conservation and livestock production to be more effectively integrated, to the benefit of both.

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### INTRODUCTION

It is well known that sub-Saharan Africa (s-SA) is one of the least developed regions of the world and it therefore follows that more effective development is the most urgent requirement of the subcontinent today. The fundamental question facing the veterinary fraternity is: What can we contribute to addressing the development issue of our region? It needs to be remembered that about 150 million of the world's 800 million rural poor live in s-SA. That defines the extent of the problem facing us and it is undeniable that not enough is being done to address the prob-

lem. On the other hand, what needs to be done to correct this situation and how to achieve it are much more difficult to establish. The reasons for that being so in the context of animal disease, together with alternative and more appropriate approaches, will be proposed here.

Our subcontinent has many natural and abundant natural resources, one of the most fundamentally valuable being our wildlife heritage. Unfortunately, in many regions of s-SA this heritage is a pitiful remnant of what it once was but, in parts of eastern and southern Africa, achievements in the field of conser-

vation have been remarkable. The transfrontier conservation area (TFCA)—defined as “The area or component of a large ecological region that straddles the boundaries of two or more countries encompassing one or more protected areas as well as multiple land-use areas”—initiative is an example of new ambitious ideas to conserve this resource, the objective in this case being to develop a large number of interconnected conservation areas that straddle the borders of many countries (because wilderness areas are largely located at the borders of countries in the region). Ultimately, it is hoped that in southern Africa alone about 120 million hectares will be covered by 13 TFCAs (Bengis 2005) although up to 20 have been proposed.

There is a problem in relation to TFCAs, however, that few conservationists acknowledge, i.e. how to achieve economic sustainability of these many large TFCAs? It is frequently glibly stated that tourism will provide the economic base for TFCAs without credible argument being supplied to support the viability of that idea. It is intuitively difficult to imagine that tourism alone will provide economic sustenance to millions of people—an estimated 1.2 million live within the borders of the Kavango-Zambesi (Kaza) TFCA alone—covering such an extensive area. Furthermore, the needs and livelihood traditions of people living within or close to TFCAs have often been overlooked, creating an inherently unstable political environment (Wolmer 2007). It seems obvious therefore that only a diversity of livelihood opportunities could hope to be adequate in relation to the future economic sustainability of TFCAs.

An unfortunate accompaniment of our wildlife heritage is a number of diseases of livestock—maintained and sometimes spread by wildlife—that have been a major trial for livestock farmers’ for centuries, although indigenous livestock have managed to adapt to some of them to a variable degree (Bengis, Kock, Thomson & Bigalke 2004). Such diseases, e.g. those caused by the SAT serotypes of foot-and-mouth disease (FMD) virus, African horsesickness, African swine fever, lumpy skin disease, Rift Valley fever (there is a long list), can be devastating to livestock (some are also zoonotic) and are therefore greatly feared in developed parts of the world. This has simply resulted in prohibition of imports of animals or products derived from animals from s-SA to developed parts of the world. Trade bans and resulting limitation of economic activity within the livestock sector are among the reasons why livestock farming in most of s-SA has not come close to levels of production that potentially exist.

As a consequence, countries in s-SA generally and southern Africa more specifically, where livestock production is generally more commercialized, are faced with a conundrum: conservation of our unique wildlife heritage will increasingly be penalized by limited access to international markets for commodities derived from livestock. This, paradoxically, also includes commodities that could be derived from wildlife through consumptive utilization.

### **PROBLEMS ASSOCIATED WITH PRESENT APPROACHES TO THE MANAGEMENT OF INFECTIOUS ANIMAL DISEASES IN SUB-SAHARAN AFRICA**

The fear of transboundary animal diseases (TADs—diseases that are able to spread quickly and affect a large number of animals over a wide geographic area in a short period of time), together with insistence that imports of animal products are derived from locations where TADs do not occur, have resulted in distorted policies in respect of disease management and trade in animal products. International organisations, supported by aid programmes have, for example, focused on attempts aimed at eventual eradication of animal diseases (sometimes euphemistically referred to as ‘progressive control’). However, with few exceptions, eradication of these diseases is currently impossible because they are maintained by free-living mammals and/or arthropods. Technologies to achieve eradication in such situations simply do not exist. The international veterinary fraternity, furthermore, seems to have short-sightedly espoused the medical approach to highly contagious human diseases such as smallpox, polio and measles, i.e. initiatives aimed at eradication based on mass vaccination and requiring enormous financial resources. It is true that in the case of rinderpest eradication has probably been achieved after many years of effort and at great cost but there are technical reasons why this approach was successful in this instance but unlikely to be similarly successful in most other cases. Quite simply, the vaccine used against rinderpest in the last several decades is unparalleled in terms of efficacy and affordability. It is furthermore clear in retrospect that wildlife were not able to sustain the infection once it disappeared from cattle populations, despite predictions to the contrary (Rossiter 2004). Diseases such as FMD and contagious bovine pleuropneumonia (CBPP) have been touted as the next appropriate candidates for eradication. In the case of CBPP (where wildlife are not directly involved) there

are reasons why, with presently available vaccine and strategies, this is doomed to failure (Thomson 2005). For the SAT serotypes of FMD the prospect for eradication in the foreseeable future approaches zero because SAT serotypes of FMD have evolved in a unique relationship with African buffalo (*Syncerus caffer*) populations (Thomson & Bastos 2004) and, therefore, eradication could only be achieved by extermination of buffalo populations or development of a mechanism that would free buffalo from infection with SAT serotypes. Neither option is presently possible on the scale required for ethical, logistical and financial reasons.

The fact is that the epidemiologies of most TADs, not to mention performance characteristics of vaccines and other control mechanisms, preclude any realistic prospect of success for eradication. Consequently, to continue down this well-trodden path makes little sense. Rather, while we await technologies that will make it possible for us to eliminate all or some TADs, it makes more sense to focus efforts on managing the impact of TADs because we will have to continue to live with most of them for years to come.

The reflex 'stamp out' reaction to outbreaks of TADs is another consequence of the fixation with freedom from TADs. The net result is that 'stamping out' (slaughter and disposal of all animals involved in TADs outbreaks, including in-contact animals) often results in large numbers of animals being destroyed with the consequence that the effects of human intervention frequently far outweigh the effects of the disease. In the process the livelihoods of many poor people may be destroyed with little overall benefit to the disease situation (Penrith & Thomson 2004; Scoones & Foster 2007).

It is argued here that the ingrained—but essentially irrational—idea that access to international markets for animal products can only be achieved through geographic freedom from TADs is in urgent need of correction. If that could be achieved prospects for future rural development in s-SA would improve remarkably.

### **MANAGING THE IMPACTS OF TADs**

It needs to be acknowledged that, certainly in southern Africa, TADs have been managed pragmatically and largely successfully in the past. The remarkable technical achievements of various components of 'Onderstepoort' over the last 100 years attest to this. However, a different type of problem confronts

us today—the need to apply available technologies to manage the impacts of TADs in circumstances where the diseases themselves cannot be eliminated or effectively controlled. In the past, management of animal disease was seen as an end in itself and the veterinary fraternity concerned itself very little with issues such as socio-economic development of rural areas or the environmental impact of animal disease management practices. These, however, are the modern imperatives which we need to help address, failing which our branch of science will become increasingly irrelevant or, more likely, usurped by others.

The animal disease which, in southern Africa, has had the greatest impact on trade in livestock commodities (animals and products derived from animals) is FMD; other TADs may occasionally be problematic but are not really significant at present. The underlying problem is that most healthy populations of African buffalo harbour SAT serotypes of FMD virus on a continuous basis (Thomson & Bastos 2004). This means that only localities where buffalo do not occur (or alternatively those few where the buffalo are free from infection with FMD virus) qualify for recognition as being free from FMD. This situation will obviously be worsened in future by the expansion of TFCAs because the inevitable consequence of their establishment will be that numbers and distribution of buffalo will expand.

### **INTERNATIONAL TRADE IN COMMODITIES DERIVED FROM LIVESTOCK**

When it comes to access to international markets for food products there are two sets of barriers that may preclude access for imported products; tariff and non-tariff barriers. The World Trade Organisation (WTO) was created by the UN to ensure that trade should be as free as possible without endangering the people, animals or plant life (or the environment generally) of the importing country. International guidelines and standards for ensuring this are the responsibility of the WTO's various standard-setting bodies. Non-tariff barriers are addressed by two agreements: The Agreement on Sanitary and Phytosanitary Measures (SPS Agreement) and the Agreement on Technical Barriers to Trade (TBT Agreement), the latter mainly concerning product specification, packaging and labelling. The SPS Agreement deals with standards for human food products and animal and plant diseases, i.e. measures to prevent their spread through trade. Standards for these issues are set by three separate international stand-

ard-setting bodies, viz. the Codex Alimentarius Commission, the World Organisation for Animal Health (OIE) and the International Plant Protection Convention (IPPC), respectively.

For so-called terrestrial animals (essentially mammals, birds and insects such as bees), the international standards are set by the OIE and contained in the Terrestrial Animal Health Code (TAHC).

In effect, standards for trade in products that contain animal tissues or secretions are governed by the Codex Alimentarius (i.e. standards set by the Commission) and the OIE's TAHC. However, the ground rules for these two sets of standards differ; those of the Codex Alimentarius define standards for the products themselves whereas the TAHC is based on the fundamental presumption that safe products can basically only be derived from countries, zones (regions of a country) or compartments where important TADs do not occur. Thus compliance with TAHC requirements requires demonstration that the locality of production (country, zone or compartment) is free from TADs that influence trade. This creates an enormous problem for many developing countries, especially those in s-SA, for reasons explained above. Fundamentally, the question is, is this fair and reasonable or might there be an alternative?

### **Commodity-based trade**

To overcome this problem a different basis for approaching trade in animal commodities was proposed. This is based on the fact that some commodities do not pose a significant risk of transmitting TADs because the causative agent is not present in those commodities or at least in amounts which enable transmission. So, for example, bovine milk does not contain the agent that causes bovine spongiform encephalopathy (BSE), even in cows suffering from the disease (OIE 2008). Furthermore, it has been known for millennia that processing of products produced from healthy animals—a fundamental departure point of human food safety is that only products from healthy animals may enter the human food chain—can decisively reduce the potential of products to transmit both human and animal pathogens which may inadvertently be present. On this basis, it was argued that a commodity-based approach could safely overcome the need to prove geographic freedom from TADs as the basis for access to regulated, high-value markets for products derived from animals (Thomson, Tambi, Hargreaves, Leyland, Catley, Van't Klooster & Penrith 2004).

The OIE, after initial opposition, has accepted the principle of commodity-based trade (CBT, [www.oie.int](http://www.oie.int)) but so far has not developed standards which would facilitate widespread application. Nevertheless, an *ad hoc* group has been constituted by the OIE which is presumably working on this issue. The African Union (Kurwijila 2007) and the Southern African Development Community (B. Hulman, personal communication 2008) have also endorsed the principles behind the CBT approach.

In the meantime, ways in which CBT could be applied to particular commodities have been under investigation outside the OIE. A publication soon to be published argues that beef derived from healthy cattle and from which the bones and major lymph nodes have been removed (so-called de-boned beef) holds low risk for transmission of FMD and a range of other TADs-causing agents (Thomson, Leyland & Donaldson, in press). Further processing of de-boned beef would obviously lower the risk of beef containing such pathogens.

The issue of how compliance with standards that will hopefully soon be forthcoming can be enforced has also been addressed. The problem is ensuring credible certification of commodities, especially those that have been processed (Thomson, Perry, Leyland, Catley, Penrith & Donaldson 2006). The argument advanced by that publication is that independent, third-party certification—as is increasingly being applied to international agri-business—holds considerable advantage although the issue remains controversial.

### **Present international standards required for recognition of a country or zone (region) as being free from FMD and their effects on southern Africa**

It is presently possible for countries that are members of the OIE to apply for recognition of its territory or part thereof (zone or region) as being free from FMD (officially, the FMD status of member countries is provided in the form of a 'list' on the OIE website ([www.oie.int](http://www.oie.int))).

In order to achieve this status, applicant countries need to prove that no outbreak of FMD has occurred in the country or zone for the last 1–2 years (depending on whether vaccination is employed as a control strategy or not) and also that both the domestic livestock and wildlife populations (i.e. all susceptible species) show no evidence of 'circulating FMD virus' for at least a year.

It has been demonstrated over many years that it is possible to prevent transmission of SAT viruses from buffalo to cattle by separation of buffalo and cattle populations, primarily through the use of fencing (such fencing also needs to prevent antelope crossing because they can act as intermediaries in the transmission of FMD from buffalo to cattle) (Sutmoller, Thomson, Hargreaves, Foggin & Anderson 2000; Vosloo, Thompson, Botha, Bengis & Thomson, in press). Vaccination of cattle kept adjacent to infected buffalo populations provides further protection. It has even proven possible, in the Kasane area of Botswana for example, to protect cattle populations which mix freely with infected buffalo from SAT infection over a 20 year period by vaccinating the cattle every 4 months (M. Letshwenyo, personal communication 2008). Admittedly, this system has broken down recently, probably due to the inability of the current vaccine to protect against one or more of the SAT2 topotypes circulating in buffalo populations.

It is therefore clear that the growing numbers and distribution of buffalo implicit in the development of TFCAs in southern Africa will increasingly constrain livestock production by limiting access for animal products manufactured in the region to international markets. This will constitute a significant obstacle to rural development in an area where it is desperately needed.

#### **Could a more appropriate system be devised without increasing the risk of FMD spread through trade commodities?**

It is accepted by the OIE that, in some circumstances, the status of domestic livestock in countries or zones in respect of TADs need not necessarily be influenced by the status of wildlife populations. So, for example, the status of a country's poultry industry need not be negatively influenced by the presence of highly pathogenic avian influenza (HPAI) and Newcastle disease viruses in wild birds (TAHC—[www.oie.int](http://www.oie.int)). It is argued here that this principle is equally applicable in the context of SAT serotype infections in southern Africa. Such provision would enable countries to establish domestic animal populations demonstrably free from circulating FMD virus without necessarily requiring infected buffalo to be excluded from the country or zone.

Combining the above principle (dissociation of FMD presence in buffalo from the FMD status of domestic livestock) with a commodity-based approach for specific commonly traded products would facilitate

trade in defined commodities produced in southern Africa that present an acceptably low risk for transmission of FMD (and most other TADs-causing infections) than the present system based exclusively on geographic freedom from FMD in both domestic and wild animal populations. For example and as explained above, there is good evidence that deboned beef produced from healthy cattle by conventional methods presents an acceptably low risk of spreading FMD and other TADs. If such beef were produced from cattle populations proven free from FMD virus, a safer trading system than that presently in operation would prevail but, at the same time, enable wider access to international markets. As a further measure, processing of the beef (i.e. beneficiation) would provide additional safe-guards. In this way a matrix of risk-reduction measures could be applied to ensure safe trade in products derived from animals.

What needs to be done to implement necessary changes implicit in this proposal for FMD?

1. The OIE (perhaps through the Regional Commission for Africa) be requested to amend Chapter 8.5 of the TAHC to accept the possibility that domestic livestock populations (cattle specifically) can be maintained free of infection with SAT viruses even when infected buffalo are present in the country or zone, i.e. the two species can be effectively sequestered from each other using physical (e.g. fencing) and/or immunological means (vaccination).
2. Development by the OIE of specific standards for commonly traded products derived from animals (such a de-boned beef and its derivatives) would ensure that products prepared from healthy animals according to processes that render the risk of FMD virus (or other TADs-causing agents) being inadvertently present, acceptably low (i.e. provide an appropriate level of protection as required by the WTO).

#### **CONCLUSION**

The basis on which animal health standards for trade in commodities derived from animals rests differs fundamentally from all other international standards applied to trade in goods and services. It is argued that there is no rational basis for the present approach to animal health standards based on the concept of geographic freedom of the area of production from important transboundary animal diseases. Adoption of a commodity-based approach by the relevant international standard-setting body

concerned (the OIE) would abrogate this dichotomy. It would also broaden access to international markets for all countries, especially those in southern Africa, without necessarily increasing the risk of spreading TADs. To become a reality this will require that the OIE develops product-specific standards for commonly traded commodities (both primary products and those that have been processed) and also develops appropriate ways through which attainment of those standards can be reliably certified.

More specifically, the current requirement for the area of production of animal products to be free from FMD creates a difficulty because transfrontier conservation areas are being created over vast areas of sub-Saharan Africa. This means that numbers and distribution of buffalo—the reservoirs of SAT serotype infections in southern Africa—will increase significantly in future. That in turn will make access to international markets for beef and other animal commodities more difficult and impede integrated rural development. Proposals are therefore made for amendments to the current FMD chapter of the OIE's Terrestrial Animal Health Code that will resolve this problem.

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