

Foot-and-mouth disease and market access: challenges for the beef industry in southern Africa

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Focusing on the case of foot and mouth disease (FMD) in southern Africa – and specifically Botswana, Namibia, South Africa and Zimbabwe – this paper explores the economic, social and political trade-offs arising from different scenarios for gaining market access and managing and controlling FMD in support of beef production in southern Africa. A central question is: does the current approach, premised on the ability to separate a 'disease free' commercial sector from areas at high risk of FMD outbreaks because of the presence or proximity of wildlife (African buffalo particularly) through strictly enforced protection (formerly known as 'buffer') zones and movement control, make sense given new contexts and challenges? Are there other alternatives that benefit a wider group of producers, ensure food-safe trade, and are easier to implement, yet maintain access to important export markets and so foreign exchange revenues? Following an examination of the new contexts of disease dynamics and livestock trade in southern Africa, the paper explores a series of scenarios for market access including: trade with the European Union; direct exports to large retailers; export to emerging markets, particularly Asia; regional trade in southern Africa and domestic urban and rural markets. Given this assessment, the paper then asks: what makes most sense for the control and management of FMD in southern Africa?

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© Practical Action Publishing, 2010, www.practicalactionpublishing.org
doi: 10.3362/2041-7136.2010.010, ISSN: 2041-7128 (print) ISSN 2041-7136 (online)

Keywords: foot-and-mouth disease, southern Africa, markets, commodity-based trade, Botswana, Namibia, South Africa, Zimbabwe

Introduction

The presence of transboundary animal diseases, and the escalating costs of regulation and meeting export standards, is key to the future of livestock production in Africa (ALive, 2007; FAO, 2005; Nelson, 2005; Perry et al., 2005)¹ and especially meeting the high hopes of the 'livestock revolution' (Delgado et al., 1999). Focusing on the case of foot and mouth disease (FMD) in southern Africa – and specifically Botswana, Namibia, South Africa and Zimbabwe – this paper explores the trade-offs arising from disease control strategies directed towards promoting different scenarios for beef marketing and trade. A central question is: does the current approach, premised on the ability to separate a 'disease-free' commercial sector from other areas through strictly-enforced zones² and movement control, make sense given new contexts and challenges?

Conventional policy thinking holds that FMD-free countries are rich, while countries with FMD are not; without resources to control FMD and enter lucrative markets, FMD keeps countries poor, and the benefits of the livestock revolution cannot be attained. This, it is argued, is a vicious circle and one which justifies substantial public investment in disease control and eradication strategies, in order to gain area-based 'disease freedom'. However, the question arises: given limited resources and growing costs of meeting export standards, does it make sense to persist with the status quo and attempt to ensure area-based disease freedom? Indeed, given the presence of FMD infection in buffalo and other wildlife populations, is disease eradication even feasible? Given these constraints are there other alternatives that benefit a wider group of producers, ensure food-safe trade, and are easier to implement, yet maintain access to important export markets and foreign exchange revenues, enabling the integration of wildlife and livestock?

These questions respond to a series of contemporary policy dilemmas, all high on policy makers' agendas in southern Africa: how should animal diseases be managed in the context of expanding wildlife land-uses (and so more buffalo and other game) and redistributive land reform (and so more, smaller land units with mobile animals)? Should a country attempt to comply with very demanding and apparently ever-increasing international export standards or explore alternative markets and different interpretations of standards regimes? How should all this be implemented when veterinary services and regulatory authorities are weak and under-resourced?

This paper seeks to provide some preliminary answers to these questions – or at least a framework for thinking about them. The following sections offer some background on FMD and its control in southern Africa as it relates to the marketing of beef; explore the new contexts that are changing the status

quo, sketching potential new scenarios for marketing and disease control; and draw out the challenges for policy makers, concluding with a schematic matrix of future scenarios and trade-offs.

FMD in southern Africa

During the colonial era across southern Africa considerable investments were made in support of an emerging commercial beef sector. The combating of FMD was a major focus. As in Europe, this was a disease of key economic importance given its prejudicial impact on exports. Disease control has revolved around four integrated activities: separation, movement restriction, vaccination and surveillance. Despite very different contexts, approaches developed for European settings were transferred to southern Africa. But, unlike in Europe, FMD is endemic in almost all southern African buffalo populations, and the FMD viruses in southern Africa almost certainly evolved in association with buffalo.³ This has made the challenge of control very different to the experience in Europe, and indeed elsewhere outside sub-Saharan Africa. Since the colonial period, the very high disease control costs have, nevertheless, been regarded as justifiable to help establish and then protect a valuable beef export market (Scoones and Wolmer, 2007).

Across southern Africa, cattle- and sometimes game-proof fences have been erected to restrict the movement of cloven-hoofed animals. This is perhaps most dramatically illustrated by the Namibian Veterinary Cordon Fence (VCF, the 'red line') which runs the width of the country, separating it into FMD and contagious bovine pleuropneumonia (CBPP)-free and control zones. Only areas south of the VCF are able to access international markets for beef (Bishi and Kamwi, 2008). By 1980 Namibia had over 7000 km of stock and/or game fencing, all regularly maintained and patrolled and intended to constitute physical barriers to movement. In South Africa the Kruger National Park has had a game-proof fence along its western boundary since the 1960s to prevent contact between buffalo and cattle. Fencing remains a controversial issue in the region. For example, Botswana has controversially attempted to fence its border with Zimbabwe.⁴ Veterinary cordon fences have long attracted the ire of those concerned with their environmental impact (EIA, 2003), while those advocating transfrontier conservation areas argue for the removal of fencing to allow free movement of game (Osofsky et al., 2005).

In southern Africa animal movement control is administered through a permit system under authorization of the veterinary department. It is supported by livestock identification and traceability measures including branding, ear-tags and a networked database (in the case of Namibia) and micro-chipped reticular boli (Botswana's Livestock Identification and Trace Back System), and enforced with roadblocks. Biannual vaccination of cattle in proximity to infected zones populated by buffalo complements these other measures. This is done in conjunction with the ongoing surveillance of cattle in endemic

and/or high-risk areas (Thomson, 2008). In South Africa and Botswana, when FMD outbreaks have occurred in the designated FMD-free zone, they have sometimes been controlled by the compulsory slaughter of infected and in-contact animals when relatively small numbers of animals are affected (Moerane, 2008; Mapitse, 2008). This is not without controversy, especially over issues of compensation.⁵

These approaches have achieved considerable success over 60 years. Outbreaks have been rare and when they have occurred they have been quickly controlled and a successful beef export system has emerged. However, this situation is fragile and increasingly under threat. As the Zimbabwe case demonstrates, a breakdown in movement control, even for a short period, can result in major outbreaks which are very difficult to contain (Sibanda, 2008). Equally, concerns are increasingly being raised about the efficacy of regional FMD vaccination programmes.⁶ Establishing a regular vaccination programme that achieves high levels of herd immunity appropriate for the kinds of FMD in particular areas requires substantial investment in research and development, as well as in delivery systems. It is doubtful whether current vaccination programmes are adequate in these respects.

All of these measures have come at considerable cost over time. Estimates of Botswana's approach to ensuring traceability (the Livestock Identification Trace-Back System) indicate a cost of P150 million⁷ (Stevens et al., 2005).⁸ The cost of fencing is huge, with some planned investments separating livestock production and wildlife and conservation areas requiring many hundreds of kilometres of highly expensive fencing. With permit systems, surveillance and assurance systems being so critical, this requires substantial manpower investment from both the veterinary service and police. This has to be trusted and reliable too for it to be effective. The currently used biannual vaccination policy is also both expensive (at around US\$2 per shot for a multivalent vaccine) and time-consuming, as well as logistically challenging, especially with veterinary services running on declining budgets and with reduced capacity.

International funds have been allocated for increasing the capacity of veterinary departments in Africa to respond to FMD outbreaks. For example, through the FAO (Food and Agriculture Organization of the United Nations), the South African government has provided support to the Zimbabwean authorities for vaccination and fencing in the FMD-affected zone along the border with South Africa.⁹ Similarly, the European Union has provided aid support for FMD disease surveillance, control and eradication to the tune of millions of Euros.¹⁰ Often far exceeding any donor support, a significant proportion of the national commitment to veterinary departments is spent on FMD-related control measures.

The big question of course is whether this is the optimal use of these limited (and declining) resources, given the many other pressing demands on public funds. Such questions are rarely asked and almost never debated publicly. But, given the real opportunities of the global livestock revolution for Africa, given the changing market conditions and access requirements for the

red meat trade, and given the real challenges of disease control, now is probably the right time to raise such difficult questions. There are no easy and simple answers. Much depends on context and priorities. But what is clear is that the status quo cannot simply be accepted, and alternative scenarios and options need to be discussed.

Marketing histories

During the colonial period the meat industries of southern Africa were the recipients of massive government support in the form of price guarantees for producers and state control of marketing via statutory corporations (Scoones and Wolmer, 2007; Bishi and Kamwi, 2008; Sibanda, 2008). Relatively generous export-orientated marketing arrangements persisted in the post-Independence era when in 1985 Botswana, Namibia, and Zimbabwe (all members of the Africa, Caribbean and Pacific, ACP) group, negotiated a deal with the European Union (EU) for export of boneless beef under a generous reduced tariff, preferential access arrangement enabling the payment of premium prices to farmers.¹¹ Botswana's, Namibia's and Zimbabwe's quotas were 18,916, 13,000 and 91,000 tonnes respectively. Zimbabwe's quota, for example, generated around US\$50 million of much-needed foreign exchange each year. However, between 1995 and 2000 none of these countries beat its annual quota – with only Zimbabwe exceeding quota in one year. In the period 1994–2006, Botswana and Namibia fulfilled on average 55 per cent and 71 per cent of their quota respectively (ODI, 2007), while Zimbabwe lost its EU market from 2000.

Under the ACP preferential trade agreements, commercial beef producers gained price premiums (although price parity arrangements existed in Namibia and Zimbabwe). National treasuries gained significant foreign exchange earnings. Costs of compliance, however, fell largely to the state and so resulted in a diversion of resources away from alternative uses. Given the economies of scale required for exports to external markets, it is also largely a small select group of wealthier producers and support industries who are vertically integrated in the production chain that are able to participate at all (Hall et al., 2004; Perry et al., 2005).

However, in recent years the costs meeting the export standards demanded by the EU have been ratcheted ever upwards (Hall et al., 2004). Examples include the need to meet EU hygiene and slaughter standards with new abattoir facilities; demonstrate freedom from residues of drugs or other contaminants (Perry et al., 2005); and comply with new packaging standards.¹² The costs of compliance are escalating at the same time as increasing competition from other exporters, particularly in Latin America (notably Brazil and Argentina), whose large volumes push down prices.

There is increasingly a perception that the stringent standards applied to southern African exporters by the EU, above and beyond the standards

required by the *Office International des Epizooties* (OIE, which is responsible for setting global standards on animal health), amount to non-tariff barriers.¹³ This is symptomatic of the weak collective negotiating position of southern African exporters *vis-à-vis* the EU. For example, there has been a failure to negotiate the export of beef derived from vaccinated cattle (even if deboned) – something that Latin America has successfully negotiated using OIE ‘freedom with vaccination’ status.¹⁴

In such highly regulated export markets, there is often a distinction in practice between formal policy (which has an opportunity for flexibility and discretion) and the actual practices of inspection and approval, which tend to be much more restrictive. In the EU these two functions are separated, with the policy division (DG SANCO, the Health and Consumer Protection Directorate) in Brussels and the inspection body based in Dublin (the Food and Veterinary Office). The latitude that some Latin American exporting countries have been allowed until recently has been put down to the good relationships developed with both policy makers and inspectors, and the ability to make use of interpretative flexibility in the policy due to effective lobbying. This has proved harder for southern African countries, without the resources and collective negotiating power.

Yet, despite the ever more stringent sanitary and phyto-sanitary (SPS) requirements and the extra hurdles put in the way, preferential trade agreements, higher prices and historical market connections dating from the colonial era onwards mean that southern African countries still gear livestock trade towards the EU export market. The result is that these countries remain wedded to an approach to FMD control dictated by the EU. However, contexts are changing. These are having major impacts on markets and their functioning globally. As the next section shows, the long-standing tie-in to the European market – and associated disease control measures – may prove increasingly risky in the future for the southern African beef industry.

New dynamic contexts

A number of developments in recent years have major implications for this existing, rather fragile, status quo. This section traces seven of these political, economic, epidemiological, ecological, technological and policy contexts – exploring how each presents some major challenges for the beef industry in southern Africa, and why, together, they add up to a strong argument for a rethink.

Political challenges to colonial land use

As outlined above, most FMD control measures such as movement restrictions and – in particular – fence lines date from the colonial era. Yet the recent experience in Zimbabwe has shown how rapidly things, once assumed to be fixed forever, can unravel (Mavedzenge et al., 2008). Zimbabwe’s FMD

control measures had been premised on the ability to separate a 'disease free' commercial export sector from high-risk areas through strictly enforced zoning and movement control. Yet, in the context of widespread land occupations, then land reform and resettlement, the ability to enforce such a separation became increasingly problematic, both in practical and political terms. Zimbabwe's beef sector has, as a result, changed dramatically in just a few years (Mavedzenge et al., 2008). Before 2000 an annual average of US\$43 million had been generated from fresh beef and beef related by-products. However, there was a sharp decline of 93 per cent between 2001 and 2002 due to a major outbreak of FMD and subsequent suspension of exports to the EU market (Sibanda, 2008). The disruption to movement control and breaching of veterinary fencing accompanying the land reform programme, lack of funds for vaccines and weakening of veterinary capacity due to economic collapse meant that FMD was rampant from 2001, cutting off EU markets at a stroke. The financial and political costs of re-establishing the earlier status quo may prove substantial (Mavedzenge et al., 2008). Indeed, in 2007 Zimbabwe's Chief Veterinary Officer stated that the government had shelved plans to resume beef exports to the EU after Brussels introduced stringent pre-export requirements demanding that all cattle in the country be identified to the farm and dip tank of origin. Ear-tagging was regarded as too costly in the prevailing economic context (Sibanda, 2008).¹⁵

Across the region, the political and economic viability of beef production systems is coming under the microscope. In Namibia, for example, the political fragility of the FMD control solution is very evident (Bishi and Kamwi, 2008). The country's VCF very visibly separates the Northern Communal Areas from the predominantly white-owned commercial farms to the south. Although 70 per cent of the population live north of the line, it is the commercial farmers who enjoy most of the benefits of a well-funded veterinary service and access to lucrative export markets. The so-called 'red line' has symbolic political implications too. During occupation, South African forces used the fence to restrict the movement of both people and animals, facilitating their apartheid policy in pre-independence Namibia. With independence in 1990, the fence's apartheid legacy led to immediate pressure for its removal. However, the relocation of the fence north to Namibia's border with Angola was made difficult during the years of the Angolan civil war. Today peace and stability in Angola, the ongoing constraints on livestock marketing in the communal areas (high costs, limited market options, low prices, and loss of condition due to quarantine requirements) make it increasingly difficult for the government to justify the continued presence of the controversial fence. The fence both constrains land reform opportunities, as there are limited opportunities for redistribution north of the fence in the communal areas due to land pressure, and it restricts market opportunities by preventing movement of stock south. Shifting the VCF to the Angolan border to achieve OIE-recognized FMD freedom for the whole of Namibia has been considered, but the costs would be high; access to water, grazing and stock from Angola would be constrained,

with farmers having to give up a centuries-old system of transhumance across the border (Bishi and Kamwi, 2008).

Changing markets and trade agreements

With new developments in global markets, Europe may no longer be the obvious choice of export market. The ACP preferential trade agreements lapsed at the end of 2007, and negotiations for the terms of their replacement – Economic Partnership Agreements (EPAs) – with regional groupings continue with the EU (Stevens, 2007; Meyn, 2007a, b).¹⁶ Any trade protocol will probably be on less favourable terms for the former ACP exporters. Interim Economic Partnership Agreements have allowed preferential access to the EU market until full agreements are confirmed, with a reciprocal commitment to opening up to European imports. However, the trade-offs between these options remain controversial, with winners and losers across the region, and the future remains uncertain.

The other significant development in global beef markets is the intense global competition caused by the growth in South American exports. Volumes exported far outweigh anything southern Africa can offer.¹⁷ For example, in 2003 Botswana's world market share in beef was just 0.3 per cent (Mapitse, 2008). South American countries are competing with southern Africa for Asian and European markets, but are also exporting to southern African countries such as Angola and the Democratic Republic of Congo, where the region ought to have a competitive advantage.

This growth in supply is complemented by a change in patterns of global demand. The traditional sources of demand in Europe and North America are on the decline, but demands for red meat have expanded in the growing economies of the east (as well as the Middle East), notably China, where annual consumption of meat has risen from an average of 20 kg/person to 50 kg/person since 1985. Asian demand in particular has been the motor of the global livestock revolution, with growth in demand for meat strongly correlated with economic growth. The recent economic downturn may slow the livestock revolution, but with GDP growth and urbanization there will remain some strong hotspots of demand, particularly in Asia, but also increasingly parts of Africa. The price hikes of 2008, however, showed how rising prices (particularly for feedstuffs, given strong demand for grains for biofuels) may change the economics of export markets very rapidly. It is also unclear whether the growing demand will result in greater supply in Asia or whether this will be satisfied through imports from outside, including Africa. Global concern about climate change and the impacts of different agricultural practices may make meat derived from rangeland, rather than intensive feeding systems, a more acceptable product in certain markets and southern African producers may be able to capitalize on this.

Numerous uncertainties about future market conditions thus remain. But what is clear is that the international geography of the global meat industry

has changed and any opportunity for southern Africa to be highly competitive must be capitalized upon.

Changing public and private standards

Public and political concerns about food safety, zoonotic disease transmission and trade in animal products have risen up the agenda in Europe and North America in recent years. For example, outbreaks of BSE (Bovine spongiform encephalopathy) have highlighted the dangers to human health of poorly managed production and processing systems (Millstone and van Zwanenberg, 2006), while the H1N1 'swine flu' pandemic as well as H5N1 avian influenza have emphasized the potential dangers of zoonotic disease outbreaks (Scoones, 2010). Similarly, the impacts of the 2001 FMD outbreak in the UK on farmers' livelihoods and rural economies have been enormous, reinforcing the commitment to preventing the spread of FMD. While all these issues are of course distinct – with very different consequences and implications – the overall impact has been to increase awareness of animal disease and veterinary issues in policy circles and, with this, to emphasize the importance of implementing ever more stringent standards in the name of improving food safety and disease control.¹⁸

Increasingly, it is private standards, imposed by retailers, which set the trend, as they use independent certification systems to demonstrate regulatory compliance and communicate food integrity to their customers and gain an edge on their competitors. The global supply chains for the beef industry are complex, involving different chains of suppliers, wholesalers and retailers. But most imported meat ends up on supermarket shelves, and large supermarkets must ensure that this is safe for customers. They therefore will ensure that all steps in the chain are checked, with often highly complex HACCP (Hazard Analysis and Critical Control Points) procedures deployed. Increasingly this involves both harmonized base-line standards such as the GLOBALGAP farm assurance scheme¹⁹ and private label retailer standards built around a defined or discrete supply chain such as Marks and Spencer's 'Field to Fork' or Tesco's 'Nature's Choice' in the UK. Most supermarket buyers are not concerned with the disease freedom status of the country of origin, but with the safety of the meat they put on their shelves, and so the emphasis in private standard setting is directed at the product, rather than disease control systems overall. That said, traceability is often a key criterion allowing those retailers at the top of the supply chain to ensure that food safety – and increasingly other criteria – are guaranteed. Particularly in the UK, labels that tout traceability, organic/natural, socially responsible production, animal welfare and environment credentials are increasingly critical to regaining consumer confidence in the wake of BSE and other food scares and growing public and media interest in food provenance.²⁰

Thus in the global red meat trade private and public standards mix to give an often confusing – and sometimes contradictory – set of signals to

producers, and their national authorities. Keeping abreast of this fast-moving scene is not easy. New directives are regularly issued, and interpretations of complex requirements may not be straightforward. For example, a European supermarket chain may demand risk assessments and certification standards, which may not be the same as those required by European authorities or the OIE.

Presented with this bewildering and fast-changing scene, it is no surprise that exporters in southern Africa find it both challenging and frustrating. South American beef exporting countries have seemingly been better able to negotiate with the OIE and the EU with respect to the flexibility of SPS requirements.²¹ As many acknowledge, this is less to do with formal compliance arrangements, but more to do with relationships and trust. As several importing authorities in Europe (both public and private) commented in interviews, what is essential is that they have faith in the systems in place and with the people who are in charge. Clearly, as market options expand – to Asia or the Middle East for example – such challenges expand and become more complex. A much greater attention to diverse consumers across an array of supply chains is required, with different products targeted to each.

The changing structure of the beef industry

The beef industries across southern Africa evolved through a highly subsidized, state-supported set of interventions. This occurred across the value chain – from subsidization of production costs (notably veterinary support) to marketing. Market support traditionally focused on state-run (or later parastatal) meat marketing boards or commissions. In Zimbabwe, for example, the Cold Storage Commission was established in 1936 when the government took over the then failing Imperial Cold Storage Company. Since that time the CSC (originally Cold Storage Commission, later Company) has, despite support from the government, consistently made substantial losses (Sibanda, 2008; Scoones and Wolmer, 2007). In the face of wider economic collapse caused by price control, nearly everyone now admits that the partly state-owned company is in need of a major overhaul. Many agree the same applies to the Botswana Meat Commission. Despite earlier successes, the Botswana Meat Commission has operated at a loss for many years (Stevens et al., 2005).²²

In Botswana, Namibia and Zimbabwe, particularly following reductions in government support and liberalization of markets, there has been a growth in private abattoirs and market outlets. In South Africa a diversified, private sector industry has long existed, reflecting a larger and more sophisticated domestic market supporting a more complex value chain closely linked to Botswana and Namibia supplies and involving multiple processing, wholesaling and retailing players. While some of these new players are geared to the export trade, most concentrate on domestic and regional markets, with state-supported companies engaged in the preferential trade to the EU.

Disease contexts: changing epidemiology and ecology

Fast-changing disease contexts add to the complexity and uncertainty. The southern African setting for FMD control is particularly challenging because of the unique involvement of wildlife, especially buffalo but also antelope (Bastos et al., 2000; Thomson et al., 2003; Vosloo and Thomson, 2004; Thomson, 2008), which act as reservoirs and transmitters of infection respectively (Vosloo et al., 2009). With the expansion of game farming conservancies in ranching areas and the establishment of transfrontier conservation areas (TFCAs), risks of disease transmission have and will in future inevitably increase (Osofsky et al., 2005). Movements of buffalo and antelope into farming areas and resultant mixing with cattle have increased where movement controls and fence lines have broken down. The massive restructuring of land ownership that has occurred in Zimbabwe, for example, over the past decade has resulted in some major shifts in land use and increased possibilities of cattle-wildlife contact in some areas, reducing effectively to zero the prospects for immediate eradication.²³

Debates continue regarding the transmission mechanisms of FMD, and the status and role of different reservoirs of the virus in different animal populations. Equally, there is much dispute about the impact of vaccinated cattle in the dynamics of FMD transmission, making the design and implementation of vaccination campaigns contentious (Sutmoller and Olascoaga, 2003).²⁴ Major shifts in land use and the population dynamics of disease hosts will potentially have impacts on viral populations and their genetic make-up, as evolutionary processes respond.²⁵

Technological responses: antibody testing, vaccines and drugs

The southern African disease context is clearly very different from that in Europe, South America or south and south-east Asia; FMD in southern Africa is both virologically and epidemiologically a very different disease from that which exists elsewhere in the world, with the exception of East Africa. Unfortunately most scientific effort has been invested in developing technologies for other contexts. With testing for antibodies to non-structural proteins it is possible to differentiate vaccinated and non-vaccinated infected animals, and mobile field-testing kits have been developed, but these options are often too expensive or too difficult to apply.

Vaccination presents a particular challenge. As Perry and Sones (2007) point out, developing countries where FMD is endemic require vaccines that promote long-lasting immunity. Such vaccines optimally need to be thermostable, i.e. be less reliant on a cold-chain than conventional vaccines, given the likely available infrastructure. And, of course, they need to be affordable for cash-strapped veterinary services, if mass vaccination is to occur regularly.²⁶ A prophylactic strategy in a high-risk setting requires a somewhat different set of tools to those required for dealing with an outbreak in a FMD-free area, where the imperative is to induce a high level of immunity in the population

as quickly as possible. This requires the use of high potency and therefore even more expensive vaccine for which durable immunity is less vital.

In southern Africa vaccines are available commercially through the Botswana Vaccine Institute (BVI),²⁷ but producing vaccines that are appropriate for the diversity of geographic locations where cattle need to be protected from FMD remains a challenge.²⁸ Sadly, the resources devoted to developing better vaccines against the diverse strains of FMD in southern Africa are probably inadequate to the task.

Competing policy goals: beef or wildlife, both or neither?

Alongside these changing political and economic contexts, a new policy agenda is further complicating the traditional EU-export based livestock focus in southern Africa and its attendant veterinary regimes. This is the move towards wildlife and bio-diversity management which has increasingly been promoted as an alternative to cattle in southern Africa (Wolmer et al., 2004). In particular, recent years have seen the development of a network of high-profile TFCAs with a range of economic and political rationales alongside their conservation goals (Duffy, 2000; Wolmer, 2003). The idea – although this has not yet always translated into practice – is that contiguous protected areas in neighbouring countries will be joined to allow the free movement of migratory wildlife (and tourists) and establish ecosystem connectivity in the landscape.

However, re-establishing ecosystem connectivity and animal migration clearly has implications for animal disease control policy. As some advocates for TFCAs recognize: ‘corridors themselves, designed to (re)connect protected areas, can serve not only as biological bridges for wildlife, but also for vectors and their pathogens – so thorough assessments of disease risks should be made *before* areas with potentially different pathogen or parasite loads are joined.’ (Osofsky et al., 2005: 74).

Yet TFCAs have built up policy momentum in southern Africa and have begun to be established in the absence of appropriate veterinary policy frameworks. This development complicates southern African countries’ attempts to establish and protect FMD disease-freedom status which is potentially jeopardized by the cross-border movement of buffalo in particular, and adds a further layer of political contentiousness to efforts to fence borders and establish zonal controls. Practically speaking, FMD-freedom of many remote rural areas is not possible under this scenario, although other approaches might enable access of animal products derived from such locations to international markets (see below).

Scenarios for market access

Due to a combination of the seven changing political, economic, market, disease and technological contexts reviewed here, the southern African beef

industry faces some major challenges. How should the beef industry respond to these fast-changing contexts? In this section, six potential market access scenarios are presented. These are not mutually exclusive, and indeed for most settings must be approached in parallel. But the questions we posed at the beginning of this paper must be asked of each: which options give the best returns? Who wins and who loses from each option? And, given changing contexts, what is likely to be the most resilient option, or combination? This suggests, in turn, the need for some hard-nosed thinking about how market access options should influence disease control strategies, a subject which we turn to at the end of this paper.

Export to the EU

This is the threatened status quo that we have already discussed. It is, however, important to note that if the interim EPAs translate into more permanent deals for Botswana and Namibia, the favourable terms for their European exports will be extended and even partially improved upon. Indeed, during 2007 imports of beef into the UK from Botswana and Namibia increased by 84 per cent and 34 per cent respectively as they were able to take advantage of a down-turn in Brazilian, Argentinean and Australian imports (down 12 per cent, 32 per cent and 39 per cent respectively (NFU, 2008). This loss of market share by the major beef suppliers can be attributed to a variety of factors that include national herd contraction due to low profitability within the Brazilian beef sector, Australian droughts and strengthening of the Australian dollar which have hit productivity and foreign demand, and government intervention in Argentina that has limited export opportunities in order to fulfil domestic demand and curb rising prices. Following lobbying from domestic producers, the EU also restricted imports of Brazilian beef, citing FMD risk in the light of failures in the country's traceability systems.²⁹ Clearly circumstances underpinning world beef supply can change fast, providing short-term opportunities for some.

Direct export to large retailers

Increasingly it may not be formal, public policy that matters in the future. The commercial strategies of the private sector, especially large global retailers (Tesco, Walmart, Carrefour etc.) will be of increasing relevance to the southern African beef sector. There are several implications of this trend. One is that supply chains are becoming increasingly concentrated and vertically integrated. These supply chains may offer security of supply for producers, although producer prices may be squeezed with profits being reaped mostly at the retail end. Also these supply chains might further reduce market access to smallholder livestock producers, unless efforts are made to widen market participation. In southern Africa access to these international markets has to date been constrained due to poor marketing links, lack of volume, and

quality issues, as well as competition from alternative large-volume suppliers in Latin America. Relationships between suppliers (farms/abattoirs) and international retailers (e.g. European supermarkets) are relatively under-developed.

Within the region private sector retailers are, however, becoming more important players. There have been exports to South African retailers through connections between regional abattoirs and supermarkets, but these can be upset by changes in national policies (e.g. export levies from Namibia). Cross-border regional coordination of supply chains within southern Africa remains weak, with high transaction costs (border controls, customs/excise, export levies/duties etc.).

A second implication of the growth in power of large retailers is the proliferation of proprietary standards and assurance schemes for particular retailers (see above) or established by producers seeking to cultivate niche markets. Emerging southern African meat assurance and branding exercises include Farm Assured Namibian Meat (FANMEAT) which is a means of marketing free-range, hormone-free beef with guaranteed veterinary and animal welfare standards.³⁰ There are also attempts to build on the region's wildlife-rich reputation to develop green certification schemes, such as the recently shelved attempt by Namibia's MEATCO to market 'cheetah-friendly beef'.³¹

National and international regulatory frameworks have been slow to respond to the growing importance of private standards. In a recent submission to the World Trade Organization (WTO), the OIE highlighted 'serious concerns about the potential for private standards to have trade-limiting and trade-distorting effects'. By contrast, other government bodies appear to accept their importance and, in the case of the UK's Department for International Development and Department of Environment and Rural Affairs, they have 'agreed to work together with private-sector standard-setters, as we do with the public regulators, to increase opportunities for small-scale and poor farmers to meet their standards'.³² What is clear – whatever the pros and cons – large-scale retailers will remain an important influence in market chains and in standard setting, and positive and constructive engagement, on behalf of producers in Africa, will be critical.³³

Export to emerging markets, especially in Asia

As discussed above, demand for meat products from rapidly expanding economies in Asia is growing rapidly as populations become more affluent and diets change. This clearly offers opportunities for meat exporting countries. These are competitive markets, where bilateral deals based on political connections may be fairly transient in the face of global competition. While SPS requirements currently appear less than the EU, for example, trends are continuously upwards, and EU and private retailer standards are seen as the benchmark. For Middle Eastern and some Asian markets additional requirements for *halal* compliance are also required, meaning additional costs in

abattoirs, as well as inspections. Some interpretations of *halal* standards mean that farm-level production systems must be compliant, with no pigs being part of the system, for example.

With the high costs of entry into EU markets, and the decrease in preferential trade options, such markets may be the main high-value export market of the future. Winners, however, may be few and temporary given the volatility of such markets, and re-gearing industries to such markets may be costly in the long run.

As with the multinational retailers, currently there is only limited capacity in southern Africa to negotiate trade agreements with diverse markets in Asia and the Middle East. Parastatal marketing authorities are simply not geared up for this. Existing export arrangements with Asia are often ad hoc national efforts, and not backed up by systematic support at a regional level.

Regional trade, within SADC – and beyond

The growth in demand for meat in the Southern African Development Community (SADC) region (and in Africa more generally) suggests some positive market opportunities, and, potentially, a shift to higher value products as incomes increase. Importing countries include South Africa, Angola and the Democratic Republic of Congo. The demand for meat from Angola is a good case. Bolstered by rising oil revenues and an increasingly wealthy, and growing urban elite in Luanda, demand and price are high. Imports from Brazil as well as the southern African region have increased. Namibia in particular has benefited, but so too have other countries in the region, including Zimbabwe.³⁴

Regional trade, however, remains fragmented and uncoordinated, and many of the scale and integration potentials of regional groupings like SADC or COMESA (Common Market for Eastern and Southern Africa) have yet to be realized. Regional integration of production and marketing systems (e.g. from weaner production to feedlots to supermarkets) could be enhanced, lowering transaction costs, and so improving producer prices and offsetting low cost competition. Currently many barriers exist, reinforced by bilateral agreements with other exporters and divergent approaches to export/SPS issues. Investment in regional trade coordination remains weak, but can be enhanced by a focus on customs deals, removal of trade/tariff barriers (e.g. levies and duties), regional SPS agreements based on agreed certification processes, and investment in infrastructure including cross-border transport networks.

Domestic urban markets

Local markets are important, with demand increasing from an urbanized middle class. Domestic retailing through supermarket chains requires higher quality and improved food safety conditions. This growing market exists parallel to the still dominant market for beef which is low quality and cheap,

with as yet limited requirements for high-level food safety certification. The declining capacity and inefficiencies of the controlled, parastatal marketing operations is also contributing to this shifting in the pattern of marketing – with a move towards private sales and local abattoirs/butcheries. Small-scale farmers producing relatively low quality beef can benefit from this market, providing low cost supplies for a growing demand.

A focus on growing domestic urban markets may therefore be an important low-cost option. The policy implications of such a shift have been barely addressed, either at national or regional levels, and the opportunities of tapping into growing domestic markets have yet to be fully exploited.

Local markets in rural areas

Many sales from small-scale producers are locally slaughtered by butcheries based in rural service centres and small towns. In Botswana, for example, local butcheries have in recent years gained market share over the Botswana Meat Commission (BMC), taking an estimated 60 per cent of cattle sold in early 2007.³⁵ In Zimbabwe the shift has been an extreme one, with the Cold Storage Company (CSC) having 90 per cent market share in 1990 and only 4 per cent in 2006 (Mavedzenge et al., 2006).

Local marketing, processing and sales provide a good route to generating local economic growth, with less likelihood of price fixing through monopoly control of supply chains. Intense competition in the sector encourages price stability, which is good for both producers and consumers. National policies barely touch this area, except for the (sometimes rather arbitrary) imposition of health and safety regulations which are often based on out-dated colonial legislation. Food safety regulations need instead to be appropriate to this context and not undermine the market.

Scenarios for disease control

Given these different market access scenarios, what disease control approaches make most sense? Area-based disease freedom has long been assumed to be the only option. It certainly has merits, but also substantial costs and risks. The key question today is whether the changing contexts and marketing options outlined above require a shift from the long-assumed standard approach? Or are there other alternatives that benefit a wider group of producers, are easier to implement, yet capable of maintaining access to important export markets and foreign exchange revenues? The policy argument for safe trade based on area-based disease freedom is rooted in a traditional international policy network supported by well-funded and well-connected international institutions and commercial interests (Scoones and Wolmer, 2006). As such it reflects a particular set of interests and assumptions. But there are alternative views, with different implications for policy directions. Here we explore four of these, in addition to the standard approach.

As with the market access scenarios, these four disease control options are not mutually exclusive. Different options could easily run in parallel, in the same or different parts of a country. The four control options are:

- export zones with vaccination;
- compartmentalization;
- commodity-based trade;
- managing FMD for local trade.

Export zones with vaccination

This option maintains a modified status quo based on OIE acceptance that exports can take place from zones recognized as FMD-free with vaccination. An immediate impediment to implementing this option is that the EU does not accept this approach for southern Africa. This option is also technically challenging and expensive. It requires at least two vaccinations for all cattle annually which is expensive (around US\$2 per dose, plus substantial costs of delivery), and even then questions remain about the efficacy of regional vaccination programmes. In addition, the moratorium on exports post-outbreak is longer than if a stamping out policy is used. However, in areas where there is a high risk of FMD outbreaks because of the proximity of infected buffalo populations to commercial ranching, this may offer a good alternative if accepted by importers.³⁶

Compartmentalization

Compartmentalization entails the creation of mini-zones at farm level, intensive compliance with fencing (multiple fencing for game), quarantine (camps to regulate movement into the farm), traceability (from farm to destination) and biosecurity of the compartmentalized unit. High levels of investment are required, but these measures allow for compartments – individual farms or groups of farms – to comply with stringent export requirements to high-value markets.

Compartmentalization allows flexible opportunities, even in the face of wider challenges of disease control, as it allows individual enterprises to invest in achieving high-value market access in the absence of wider regional/national efforts. Theoretically it is compatible with wildlife-based land use options, although costs of biosecurity would inevitably increase. It requires private investment, with state veterinary oversight and approval/certification. It also requires bilateral negotiation between individual enterprises (compartments) and importers. Owing to the substantial private investment required it is likely to exclude poorer producers.

OIE discussions on compartmentalization are ongoing, but questions have been raised about its applicability to FMD due to aerosol transmission risks, and the OIE continues to exclude compartmentalization being applied for the management of FMD risk, although this may change in the near future.

Questions remain about whether a model developed principally for the pig and poultry sectors can be adapted for beef. Equally, there exist challenges of certification, in contexts where veterinary authorities have limited capacity or are not fully trusted by importers to guarantee high standards.

Commodity-based trade

An alternative option for disease control focuses on achieving access to markets by managing the specific risks associated with products rather than through achieving area-based disease freedom (Thomson et al., 2004). In practice, FMD virus contamination of products can be prevented by deriving products from healthy animals combined with processes such as cooking that preclude the possibility of the virus being present. In the case of beef, if bones and lymph nodes are removed, the risk of FMD transmission is extremely low (Thomson et al., 2009).³⁷ Potentially this is a win-win scenario – commercial producers can continue to produce for high-value markets, while the costs of veterinary provision are not as extreme or widely distributed as those required to achieve complete disease freedom for a zone. There is also scope for adding value through the processing of finished products – including de-boning, tinning or marketing of farm-assured produce, which should also provide further employment. The commodity-based trade option may be particularly important for poorer producers who may not be able to comply with other trading standards, but still may be able to benefit from the marketing of particular commodities at premium prices through the application of commodity-based quality and safety standards. Furthermore, this approach opens the possibility for sustainable and widespread utilization of products derived from wildlife because the principle is potentially equally applicable to products derived from all animals. Presently, the inability to exploit wildlife fully is a serious constraint to rural development in southern Africa.

Such a system, however, has certain market entry requirements, requires a capacity to negotiate with importers, as well as a degree of regional coordination of certification. Independent bodies at national and regional levels (rather than national veterinary authorities) would probably be required by importers to guarantee food safety. Such an approach would harmonize trade and food safety approaches in line with global SPS regulations, avoiding an anomalous focus on area-based disease freedom for certain animal diseases. As this approach gains support with key agencies and importing countries or regions (for example the OIE, the US Department of Agriculture and the EU have been considering the approach), prospects increase for this scenario to be an important route for high-value market access.³⁸

Managing FMD for local trade

The final disease management option is in some respects the simplest and is de facto what happens in much of Africa – that of responding to FMD

outbreaks as and when they occur and focusing on local trade rather than exports. Given that buffalo are prevalent in southern Africa, FMD outbreaks are inevitable as FMD is endemic in wildlife populations. The focus for livestock managers should therefore be on resilient indigenous stock and effective management of outbreaks to avoid FMD also becoming endemic in livestock populations. This is a relatively low cost option benefiting largely poorer, mixed crop-livestock farmers. It would be compatible with a move to more wildlife production, including transfrontier conservation areas, although appropriate veterinary policy frameworks would be required.

Challenges for policy in southern Africa: time for a rethink

As this paper has shown, political, economic, technical and policy contexts for livestock policy in Africa are changing very fast – and new marketing opportunities are opening up. Doing nothing is neither feasible nor profitable. Our analysis of changing contexts highlights some fundamental challenges to the assumptions that have dominated policy thinking and practice for decades. Thinking outside the box is required. Trade-offs have to be weighed up, costs and benefits need to be assessed, and the poverty and equity impacts of different scenarios have to be evaluated. As this paper has shown, these choices are not straightforward and are highly context-dependent, reliant on particular national circumstances and local political choices about development trajectory.

In other words, substantial investment in FMD control makes sense in some settings, but not in others (Perry and Rich, 2007). The question of what type of control measures – and how these are applied and where – is therefore critical in much of the developing world where FMD is common, as there are major trade-offs with significant distributional consequences at play. As this paper highlights, the good news is that a greater variety of responses to FMD (and indeed other former OIE List A diseases) exist than is often thought. Debates around freedom with vaccination, separation of the status of wildlife and livestock with respect to FMD, compartmentalization and commodity-based approaches have extended the range of scientifically-accepted options considerably, away from the expensive and often unattainable goal of ‘disease freedom’ through eradication. A central argument of this paper is that southern African countries need to capitalize on these changing contexts to undertake a fundamental rethink of policy.

What are the choices ahead? Figure 1 provides a schematic summary of the opportunities identified in this paper. Six market access scenarios intersect with five disease control options to offer a wide array of permutations.

This matrix identifies a series of overlapping policy options. These range from the high-value/high-risk and high-cost option of EU exports under an area-based disease freedom strategy (top left corner – the putative ideal) to a focus on relatively low value/high volume but low cost domestic marketing.

		Market access scenarios					
		High-value (forex)/ High risk/ Narrow group benefits			Low-value/ Low risk Wider group benefits		
		High-value export (e.g EU)	Direct export to large retailers	Export to emerging markets (Asia)	Regional trade in SADC	Domestic urban markets	Local marketing
Disease control options	High cost	Area-based disease freedom	The (high-risk, high-cost) status quo.				
	Export zones with vaccination	An existing option, comparable to South American competition.					
	Compartmentalization	An option to explore, for high-value exports, although technical questions and distributional consequences.					
	Commodity-based trade	A key option for a broad set of high-medium value markets – as yet not fully exploited, but requiring investment in product safety testing and certification. Overall lower cost and risk spread.					
	Low cost	Managing FMD					The default – high volumes, but lower unit values. An important element of the overall picture.

Figure 1. Market access and disease control: future opportunities?

The latter management option accepts the need to control but not eradicate FMD (bottom right corner – the assumed worst case scenario) which is the de facto situation in many poorer livestock producing areas. Area-based disease freedom currently remains the favoured option of most veterinary authorities, 39 regional policy makers and international institutions, while disease management and local sales is the default option when systems break down, as has occurred to a large extent in recent years in Zimbabwe. But, as the discussion so far has shown, the assumptions that the high-value/high cost option is necessarily the best – and the one that should be striven for – and the low value/low cost is automatically bad news are not upheld.

Perhaps more interesting for southern Africa than the extremes are the intermediate options, which are not often discussed yet offer considerable potential. New options are opening up for international trade under conditions of disease freedom with vaccination, a strategy pioneered by southern Africa's major international competitors from Latin America, and apparently accepted by global private sector importers. This may offer alternatives to very high cost and risky disease eradication pathways, if vaccination cost and

logistical issues can be addressed. However, the challenges of zonation, given shifts in land use, the demands for land reform and changing dynamics of disease ecologies may prove, in the long-run, too much and other alternatives will need to be considered.

One alternative, compartmentalization, offers an option for high-value production systems. With sufficient investment, high levels of biosecurity, surveillance, disease management, and traceability can be assured. But this option does not come cheap and may be only suitable for private investors who are assured of high prices for their products. These isolated islands of high-value production may also be a target of resentment and may be politically untenable, even if the basic technical and economic issues are addressed, although it is conceivable that smallholder producers could benefit from the emergence of a stratified production system whereby young weaners were sold on to compartmentalized farms.

Of all the options explored above, perhaps the most attractive centres on commodity-based trade, which shifts the emphasis away from managing diseases across geographic spaces (zones or countries) to a focus on the product which is to be traded, and ensuring that this product presents no more than an acceptable risk. Instead of complex and expensive area-based disease control measures (of movement control, fencing etc.), systems for product-based risk management, auditing and certification are needed. These need to focus on product safety rather than the disease setting from which the product is derived. While these new approaches will require investment in systems, procedures and skills, the challenges and costs of doing so are far lower than achieving (or continuing to achieve) area-based freedom in many circumstances. In addition, commodity-based trade can be more precisely geared to different targeted markets, working with different importers to assure particular standards. This allows a wider range of market options, across a broader spectrum. At a national or regional level, this allows for the spreading of risk across a greater diversity of markets with a lower cost disease control/safety assurance/risk management system. Given the uncertainties surrounding market, disease and other contexts, this potentially offers greater resilience in the system, as well as an opportunity to spread benefits to a wider array of beneficiaries.

All of these options are scientifically feasible and justifiable, and all have potential for delivering significant market returns of different sorts. Policy-making processes must deliberate on the alternatives and combinations through an in-depth analysis of costs, returns and trade-offs across policy objectives.

Future options, urgent choices

To conclude, we suggest that four big challenges lie ahead, indicating a variety of future options and some urgent choices for the southern African beef industry.

First, there is a need to recast the way technical and policy debates are framed. The assumption that what has always been must always be should be set aside in favour of a more forward-looking view. The implication of this assessment (and indeed many others – see Scoones and Wolmer, 2006; Perry and Sones, 2007), is that there is a need for a contextualization of scientific, technical and policy agendas; ones that start from particular African conditions and contexts not from generalized models from elsewhere.

Second, and following on from this, a reassessment of the objectives of transboundary disease control measures needs to be undertaken. Disease control should not be separated from poverty reduction and development objectives, and a firmer linkage in policy thinking and practice must be sought (Perry and Sones, 2007; Perry et al., 2002). What pathways to poverty reduction and 'pro-poor' economic growth are being sought at a national – or regional – policy level, and so what market options, and in turn what disease control/product safety strategies, make most sense? How, in other words, can they reduce poverty, increase growth and ensure safe meat is marketed? With a range of scientifically-accepted options for disease control/product safety assurance and an array of different market options available to livestock producers, the choice of what combination is not obvious. As Figure 1 illustrates, different options may exist in parallel, but not all are as effective for delivering poverty reduction and economic growth together. What combination makes sense will, of course, depend on the array of trade-offs discussed in this paper, but, it is often not the status quo.

Third, given these dilemmas, some hard thinking about how control measures for transboundary diseases are paid for must be undertaken in the southern African context. The long-running assumption has been that such measures are 'public goods' (sometimes international ones), that are appropriately paid for by the public purse – either nationally or through international aid support. As we have seen, this is insufficient and inadequate for the task. To complement this, private funds from the livestock industry are required to ensure that particular market options remain open. Private investment in disease control and product safety measures (including compartmentalization and commodity-based trade and the associated certification requirements of each) will be required.

Fourth, and finally, this discussion points towards the need for much more effective policy coordination and coherence, combined with a greater rigour in linking development objectives and commitments to poverty reduction. Simply accepting a standard technical line from a veterinary department or a trade ministry – based on long-held policy assumptions or guidelines and standards developed elsewhere – is clearly insufficient. A more rigorous, cross-sectoral impact assessment is required, often needing the bringing together of insights from epidemiology and economics (cf. Perry et al., 2001), but also, crucially, assessments of livelihoods, land use options and different people's own perceptions and priorities. In this sense, the choices are not simply technical ones, but political ones requiring

participatory deliberation and debate about trade-offs and consequences. An open, engaged policy process is the only way such complex and often intangible factors can be grasped in a holistic manner. But given the often closed, technically-driven way policy decisions are currently made around these issues, where particular interests and expertises dominate, a different way of doing business remains a major challenge.

Acknowledgements

The origins of this paper lie in collaboration with the Institutional and Policy Support Team of AU-IBAR (African Union/Interafrican Bureau for Animal Resources) and a series of training courses on policy processes held in Africa in 2005 and 2006. Some of the southern African participants subsequently became applicants with the STEPS Centre at the Institute for Development Studies (IDS) to a 'Livestock for Life' Wellcome Trust grant. This funded the research for this paper, and facilitated the diverse engagements in southern Africa, culminating in a major workshop in Pretoria in April 2008. The participants at this workshop provided essential feedback on the work. We would also like to acknowledge those who contributed the commentaries which follow this paper. More details on the overall project can be found at: <http://www.steps-centre.org/ourresearch/vetscience.html>

Notes

1. http://www.oie.int/eng/press/en_040720.htm [accessed 29 October 2009].
2. The old system of separate surveillance and buffer zones has been replaced by a protection zone system in OIE recommendations recently (OIE, 2009). The argument for an area-based approach to disease control, based on zonation, is however retained. Thus a protection zone is defined as 'a *zone* established to protect the health status of *animals* in a free country or *free zone*, from those in a country or *zone* of a different *animal health status*, using measures based on the epidemiology of the *disease* under consideration to prevent spread of the causative pathogenic agent into a free country or *free zone*. These measures may include, but are not limited to, vaccination, movement control and an intensified degree of *surveillance*', http://www.oie.int/Eng/normes/mcode/en_glossaire.htm [accessed 1 October 2009].
3. See for example Thomson, 1995; Brückner et al., 2002; Bastos et al., 2000; Vosloo et al., 2002; Bastos et al., 2001; Bastos et al., 2003a, b; Vosloo et al., 2006.
4. The plan was later abandoned (21 July 2007, Mmegi news), available from: www.mmegi.bw/2006/July/Friday21/10021162311096.html [accessed 29 October 2009].
5. However, areas can be removed temporarily from export zones to avoid large-scale stamping out, as happened in Botswana's *Selibe-Phikwe* outbreak. Also, new provisions of the OIE Terrestrial Animal Health Code, drawing on the 'containment zone' concept, makes it possible to create a temporary 'infected zone' within a formerly free country or zone which enables greater flexibility in outbreak management, avoiding the costs and controversies of stamping out strategies. For example, this was used recently by Botswana to manage the *Ghansi* outbreak.

6. This has arisen in particular with the repeated FMD outbreaks in Ngamiland in Botswana, despite intensive vaccination campaigns (see http://www.promedmail.org/pls/otn/f?p=2400:1202:3362980980453142::NO::F2400_P1202_CHECK_DISPLAY,F2400_P1202_PUB_MAIL_ID:X,41850) [accessed 1 October 2009]. There has as yet been no independent evaluation of vaccine quality and administration, but this is urgently needed if vaccination is to remain a central component of FMD control in southern Africa.
7. USD1 = P6.7, exchange rate US dollar to Botswana Pulas as of 1 April 2010.
8. Foot-and-mouth disease is not the only rationale for implementing such measures. Importing to the European Union, for example, requires traceability because of a range of disease risks. Foot-and-mouth disease, however, has become perhaps the main focus, especially since the European outbreaks from 2001.
9. See: 'US\$10m UN aid programme to assist FMD control in Zimbabwe', FMD News, 18 January 2007, see <http://www.alertnet.org/thenews/newsdesk/IRIN/b6ca91cb-9c53257e66afe518504cfc25.htm> [accessed 5 March 2010].
10. Such as the EU-SADC FMD Programme.
11. The ACP-EU Partnership is also known as the Cotonou Agreement and succeeded the Lomé Convention.
12. There has, for example, even been talk of a 'carbon tariff' being imposed by Europe on imported goods, see <http://news.bbc.co.uk/1/hi/world/europe/7201835.stm> [accessed 5 March 2010].
13. Particularly contentious is the stipulation that meat exported to the EU must be deboned even when it comes from areas with OIE FMD-free status (Moerane, 2008; Mapiitse, 2008). There is also justifiable confusion as to why – on top of quarantining and routine inspections of vaccinated animals prior to slaughter – a timed process of beef maturation with controlled pH and temperature, alongside deboning and removal of lymph nodes, should not be recognized as adequate for FMD deactivation (Mapiitse, 2008; Thomson et al., 2009).
14. The EU maintains that there are problems with SAT vaccines and they do not have appropriate strains in their banks.
15. See, 'Zimbabwe: Country 'unlikely' to resume EU beef exports', <http://allafrica.com/stories/200703050994.html> [accessed, 5 March 2010].
16. See, http://www.odi.org.uk/publications/briefing/bp_june07_EPAs2008.pdf; <http://blogs.odi.org.uk/blogs/main/archive/2008/04/08/5541.aspx>; http://ec.europa.eu/trade/wider-agenda/development/economic-partnerships/negotiations/index_en.htm#_sadc [accessed, 5 March 2010].
17. For example the Brazilians predicted that exports would rise to 1.67 million tonnes in 2008, despite on-going restrictions to Europe, see www.mercopress.com/vernoticia.do?id=12124&formato=HTML [accessed 5 March 2010]. Argentina and Uruguay are also major exporters of frozen beef, see www.ers.usda.gov/Publications/LDP/2007/09Sep/LDPM15901/LDPM15901.pdf [accessed 5 March 2010], with around 500,000 and 300,000 tonnes exported annually, representing around 20 per cent and 60 per cent of domestic production.
18. The current EU standards for the importation of fresh meat derived from domestic and wild ungulates can be found at http://ec.europa.eu/food/animal/animalproducts/freshmeat/index_en.htm [accessed 5 March 2010]. These exceed even the requirements of the OIE as specified by the OIE Terrestrial Code, http://www.oie.int/Eng/normes/mcode/en_sommaire.htm [accessed 5 March 2010].
19. The supermarket led GLOBALGAP (formerly EUREPGAP) is a pre-farm gate benchmarking standard covering agricultural production comprising environmental and labour standards protocols as well as food safety measures. See <http://www.globalgap.org/> [accessed 5 March 2010]. Increasingly, compliance with welfare and environmental standards are being added as control points.

20. UK based retailers such as Tesco are also starting to explore some form of carbon labelling for its suppliers which will throw up new challenges and opportunities for exporters.
21. They have successfully argued for exports with 'freedom with vaccination' status, for example, combined with aggressive marketing strategies. See, for example, the marketing campaign for 'Pampas Plains' Argentinean beef. <http://pampasplains.co.uk/> [accessed 5 March 2010].
22. However, fortunes may be changing. Botswana Meat Commission reported profits for the second year running, according to government reports. FMD News, 25 May 2007 www.gov.bw/cgi-bin/news.cgi?id=20070525&i=BMC_makes_profit_second_time_running [accessed 5 March 2010].
23. Efforts focused on eradication, such as the FAO-led GF-TADs Programme (The Global Framework for the Progressive Control of Transboundary Animal Diseases – http://www.fao-ectad-naïrobi.org/IMG/pdf/Global_Framework_for_TADs_Control.pdf [accessed 5 March 2010], apparently misunderstand this fact. Instead, policies must accept the reality of living with these infections until technologies appropriate for eradication become available.
24. As proposed by the SADC Livestock Technical Committee to the Africa Commission of the OIE in January 2009, one possibility de-links the categorization of wildlife and livestock populations with respect to FMD. This approach has been adopted by the OIE (Terrestrial Animal Health Code) in the case of highly pathogenic avian influenza, for example. For FMD SAT (South African Type) serotype infections, these are inherently infections of buffalo which in some localities have spilled over into and become endemic to cattle populations. In major parts of southern Africa, however, they are not endemic to cattle and the region has a long history of successfully preventing infection of cattle with these viruses.
25. Molecular genomic assessments of FMD SAT viruses have shown comparatively large phylogenetic variation, with the existence of a range of different lineages and topotypes (Bastos et al., 2003a, b). Across Africa, Sahle et al. (2007) for example, identified at least six lineages and 11 genotypes in SAT 1 isolates in the period from 1971 to 2000.
26. The escalating cost of vaccines is a major concern. Kolanye and Mullins (2000) calculate that between 1998 and 2000 Botswana spent over 5 million Pula per vaccination campaign, totalling over 10 million Pula a year, with costs increasing 31 per cent over this period. They suggest that a cost-benefit analysis be carried out to justify the continuation of this entirely publicly funded programme.
27. Currently-used vaccine contains antigens that are only partially purified (although the new BVI plant under construction will produce purified antigens and have considerably larger productive capacity in the near future). A more serious problem is to produce vaccines that are able to match the wide topotype diversity that occurs in southern Africa. The Onderstepoort Veterinary Institute in South Africa which formerly produced SAT vaccines has not done so for several years and it is uncertain when this situation will change.
28. Some researchers have looked towards recombinant vaccines as an alternative (van Rensburg and Mason, 2002), although these remain under development, with many questions raised about their appropriateness.
29. See <http://news.bbc.co.uk/1/hi/world/americas/7218965.stm> [accessed 5 March 2010].
30. The FANMEAT scheme's ability to persuade importers of the 'superior' nature of Namibian beef might account for the fact that Namibian market share in the EU has grown faster than Botswana's (Stevens et al., 2005). Although most Namibian meat imported by the UK is used in the hospitality trade the high welfare FANMEAT brand is of interest to supermarket chains too (Bowles et al., 2005).

31. See <http://news.bbc.co.uk/1/hi/world/africa/3632036.stm> [accessed 5 March 2010].
32. See 'Considerations relevant to private standards in the field of animal health, food safety and animal welfare', submission by the World Organization for Animal Health (OIE). G/SPS/GEN/822, 25 February 2008, Para 14 and DFID/DEFRA submission on agricultural product standards, September 2006.
33. For example, the establishment of 'challenge funds', www.challenge.funds.org [accessed 5 March 2010] such as the Business Linkages Challenge Fund (BLCF) supported by DFID.
34. However, the 2007 outbreak of FMD in Namibia has resulted in a cessation of formal trade to Angola, as the country imposed a blanket ban on imports, see: 'Angola: Government Bans Meat From Namibia' 28 November 2007, available from: <http://allafrica.com/stories/200711281111.html> [accessed 5 March 2010].
35. With the remaining 40 per cent going to the BMC (estimated 15 per cent to South Africa and 25 per cent to the EU). Interview, BIDPA, 9 February 2007.
36. See Scudamore (2007) for a commentary on consumer acceptance of vaccinated animals.
37. This issue is under consideration by the OIE and the results of an expert evaluation are expected shortly. Furthermore, if additional measures are applied either up- or down-stream of the slaughter house the risk can be rendered negligible (Thomson et al., 2009).
38. See <http://www.research4development.info/casestudies.asp?ArticleID=50278> [accessed 5 March 2010]; see also Rich et al. (2009).
39. A modification of the area-based freedom from FMD approach (with or without vaccination) is the possibility of gaining international approval for de-linking the status of domestic livestock from that of wildlife with respect to FMD SAT serotypes (see above).

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