TOWARDS IMPLEMENTATION OF COMMODITY-BASED TRADE OF BEEF IN THE KAZA TFCA

Opportunities for Integrating Livestock Agriculture and Wildlife Conservation

Victoria Falls, Zimbabwe
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PROCEEDINGS

Organised by the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) Secretariat, in collaboration with the Animal & Human Health for the Environment And Development (AHEAD) Programme and the Food and Agriculture Organization of the United Nations (FAO)

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ABOUT THE REPORT

The Proceedings of the KAZA workshop "Towards Implementation of Commodity-Based Trade of Beef in the KAZA TFCA: Opportunities for Integrating Livestock Agriculture and Wildlife Conservation" was prepared by Diane Skinner and the AHEAD Programme team who drew on contributed presentations and papers as well as discussions at the workshop.

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ABOUT THE TOPIC

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ABBREVIATIONS & ACRONYMS

AHEAD	Animal & Human Health for the Environment And Development
CBNRM	Community-Based Natural Resource Management
CBT	Commodity-Based Trade
COMESA	Common Market for East and Southern Africa
CVO	Chief Veterinary Officer
DVS	Department of Veterinary Services
EU	European Union
FANR	Food, Agriculture and Natural Resources Directorate (SADC)
FAO	Food and Agriculture Organization of the United Nations
FMD	Foot and Mouth Disease
GFSI	Global Food Safety Initiative
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
HACCP	Hazard Analysis Critical Control Points
IRDNC	Integrated Rural Development and Nature Conservation
KAZA TFCA	Kavango Zambezi Transfrontier Conservation Area
NCA	Northern Communal Areas (Namibia)
NGO	Non-Governmental Organisation
OIE	World Organisation for Animal Health
PCP	Progressive Control Pathway
SADC	Southern African Development Community
SAT	South African Territories (FMD serotypes)
SPS	Sanitary and Phytosanitary
TAHC	Terrestrial Animal Health Code (OIE)
TBT	Technical Barriers to Trade
TFCA	Transfrontier Conservation Area
WCS	Wildlife Conservation Society
WDA	Wildlife Dispersal Area
WMA	Wildlife Management Area
WWF	World Wildlife Fund

EXECUTIVE SUMMARY

Livestock production and wildlife conservation within the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) are both important contributors to rural economic development. However, conflict between these two land uses is common due, in part, to the prevalence of animal diseases – particularly foot and mouth disease (FMD) – that can be transmitted between wildlife and livestock. The prevailing approach to managing FMD in southern Africa was designed on a geographic basis, grounded in the use of extensive disease control fencing systems. This strategy has proven disastrous for migratory wildlife over the decades, and now works against the long-term goals of establishing sustainable Transfrontier Conservation Areas (TFCAs) by perpetuating significant socioeconomic inequities faced by livestock producers living alongside wildlife who are prevented from accessing profitable export markets. This land-use conundrum is relevant in other parts of the Southern African Development Community (SADC) region as well, and requires an innovative and sectorally integrative approach to conflict resolution in the context of TFCAs, which represent a *conservation and development* paradigm embraced by SADC Member States.

New developments in the global regulatory framework for beef production and trade present an unprecedented opportunity to re-evaluate how to best manage risks from diseases like FMD in ways that are positive for both livestock agriculture *and* wildlife conservation, while also providing confidence to beef importing countries that the products they are buying pose minimal threats to their own agricultural sectors. It is in this context that a workshop entitled "Towards Implementation of Commodity-Based Trade of Beef in the KAZA TFCA: Opportunities for Integrating Livestock Agriculture & Wildlife Conservation" was held from 3-4 November 2016 in Victoria Falls, Zimbabwe. The workshop brought together 117 participants from the livestock agriculture and wildlife conservation sectors from the five KAZA TFCA partner countries and further afield, including government officials, representatives from affected farming communities and the private sector, researchers, NGOs, International Cooperating Partners and colleagues from regional and international regulatory bodies.

In TFCAs like KAZA, understanding the impacts of FMD control methods on the wildlife resource is essential if we hope to optimize the potential for rural communities to trade in products derived from livestock as well as to benefit from the non-consumptive or consumptive use of wildlife resources. In order to minimize the prevailing negative cross-sectoral impacts, it is necessary to develop a wider range of management options for FMD so that practical progress can be achieved under the unique circumstances related to the wildlife / livestock interface in many SADC countries, especially when it comes to TFCAs like KAZA.

Due to the excellent work that many in the region have done over the years – including on drafting and disseminating the 2012 *Phakalane Declaration on Adoption of Non-Geographic Approaches for Management of Foot and Mouth Disease (https://www.wcs-ahead.org/phakalane_declaration.html)*, the world is now thinking differently. Africa's recommendations for changes to the Foot and Mouth Disease Chapter of the OIE's Terrestrial Animal Health Code were unanimously adopted at the OIE (World Organisation for Animal Health) World Assembly in May 2015. This newly attained policy flexibility means that, for the first time in several generations, the poorest livestock farmers living closest to wildlife are no longer excluded from global beef markets, and environmentally devastating veterinary fencing is no longer the only option for managing FMD in southern Africa.

It is clear that the 2015 revisions to the OIE Terrestrial Animal Health Code have led to a genuine tipping point in regards to resolving the more than half century-old conflict between (a) international beef trade policy based on FMD control fencing in the southern African context and (b) the migratory needs of free-ranging wildlife in the region and beyond.

There is now an unprecedented possibility of access to new beef markets for southern African pastoralists as well as for an unlocking of the potential for restoring migratory movements of wildlife and thus enhancing prospects for long-term wildlife population viability within individual countries as well as in transboundary landscapes like the KAZA TFCA. This new flexibility represents a true 'win-win' for sustainable and diversified land use and livelihoods.

The path ahead is not about "removing all fences," but this new, more flexible policy environment represents a vitally important opportunity for the wildlife and livestock sectors to work together on collaborative land-use planning. A comprehensive approach has to take into consideration that there is now the option to realign or remove specific fences impacting important wildlife corridors, also known as wildlife dispersal areas. With the 2015 changes of the OIE Code, beef export market access can be attained utilizing new meat-processing value chain-based approaches, also known as commodity-based trade (CBT), regardless of whether buffalo or other wildlife live in or near a particular locality or not.

Neither the livestock nor wildlife sectors should seek to dominate the other. Instead, it is time to make land-use decisions that will be socially, ecologically and economically sustainable for generations to come. The delegates assembled at this November 2016 forum agreed that these ideas must be progressed, and that there is much work to do to move firmly into an implementation phase in terms of the ideas discussed together in Victoria Falls. *Meeting KAZA's key poverty alleviation objective demands nothing less*. The rural poor, the frontline stewards of the KAZA TFCA, must be beneficiaries of new and sustainable approaches to land-use management and of more diversified and resilient livelihood opportunities – opportunities that can benefit from both livestock and wildlife.

The workshop provided a robust, interactive opportunity to explore the "how" – how does southern Africa in general, and KAZA specifically, take advantage of the new opportunities now made available for more diversified, resilient land use and livelihoods through CBT of beef? Which KAZA countries are ready to try? What public-private partnerships are needed? What technical assistance or resources are required? Which markets should be targeted? During the workshop, working groups (see Annex 3 appendices) began to answer these questions, and the following steps were among those agreed upon:

- finalization of draft regional guidelines ("Guidelines on Mechanisms for Applying Commodity-Based Approaches to Management of Foot and Mouth Disease Risk for Beef Exporting Enterprises in Endemic Areas of Sub-Saharan Africa"), shared for workshop delegates' review.

- implementation of one or more studies to evaluate potential markets for CBT beef that could be produced by KAZA farmers (keeping in mind the potential for CBT to help mitigate conflict at the livestock / wildlife interface – and thus the potential for 'wildlife-friendly' beef).

- reinvigoration of the Animal Health Sub-Working Group of the KAZA Conservation Working Group, in partnership with the SADC Livestock Technical Committee, so that these issues can continue to be worked on regionally, post-workshop.

- initiation of robust self-assessments within each KAZA country, to review (i) the potential opportunity offered by CBT, including an evaluation of constraints or gaps related to conceptual understanding, risk perception, technical capacity, human and financial resources, as well as governance and an enabling regulatory environment, and (ii) political willingness among ministries overseeing livestock, wildlife, trade and finance to work together, and collaboratively with the private sector and civil society, to foster sustainable economic development that draws upon the region's unique cultural and environmental comparative advantages.

- exploration of new ways to work on regional solutions, tapping into SADC and other regional expertise and agreements, to break-down often self-imposed trade barriers – and evaluation of how to take advantage of the economies of scale that genuine collaboration along the beef value chain can unleash, including ideas like regional abattoirs and/or mobile abattoirs, based on specific socioeconomic contexts in different parts of KAZA.

In summary, consensus on the ways forward among the sectorally diverse attendees was exciting and encouraging, and much progress was made. The assembled delegates recognized that their work at the forum and their commitments to next steps were clearly aligned with key objectives of KAZA as enumerated in the KAZA TFCA Treaty (2011), including to promote and facilitate "the harmonisation of relevant legislation, policies and approaches in the area of transboundary animal disease prevention" and to improve "the livelihoods of local communities within and around the KAZA TFCA and thus contribute towards poverty reduction."

Workshop participants at Victoria Falls Safari Lodge, Zimbabwe, 3-4 November, 2016.

INTRODUCTION

In 2016, the KAZA Secretariat, in collaboration with AHEAD (Animal & Human Health for the Environment And Development – a programme of Cornell University and the Planetary Health Alliance) and FAO (the Food and Agriculture Organization of the United Nations), with additional support from The Rockefeller Foundation and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), hosted a workshop: *"Towards Implementation of Commodity-Based Trade of Beef in the KAZA TFCA: Opportunities for Integrating Livestock Agriculture and Wildlife Conservation."* The workshop was held from 3-4 November 2016 in Victoria Falls, Zimbabwe, immediately following the State of KAZA Symposium. It brought together 117 participants from the livestock agriculture and wildlife conservation sectors from the five KAZA TFCA partner countries and further afield, including government officials, representatives from affected farming communities and the private sector, researchers, NGOs, International Cooperating Partners and colleagues from regional and international regulatory bodies.

The Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) is a joint conservation and development initiative of the Southern African Development Community (SADC) and the countries of Angola, Botswana, Namibia, Zambia, and Zimbabwe (Figure 1). One of the objectives of KAZA as listed in the KAZA TFCA Treaty (2011) is to "promote and facilitate the harmonization of relevant legislation, policies and approaches in the area of transboundary animal disease prevention, surveillance and control."

Figure 1: The Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA). Adapted from Peace Parks Foundation website.

However, within KAZA, wildlife and livestock production are in conflict due in part to the prevalence of animal diseases – especially foot and mouth disease (FMD) – that can be transmitted

between wildlife and livestock. International trade standards for livestock commodities have historically required that production areas be free from FMD. This situation restricts market access and constrains the success of livestock owners who share the land with wildlife. In addition, attempts to meet international standards related to "freedom from disease" under currently applied policies for addressing FMD have had significant negative repercussions for free-ranging wildlife, largely related to disease control fencing.

Fortunately, new developments provide a possible solution to this land use conflict. Scientifically sound and equally effective non-geographic (i.e. non-fence based) approaches to managing risks from diseases like FMD now exist. Commodity-based trade (CBT) approaches focus on the safety of the beef production process, rather than on the animal disease situation in the locality of production. This food safety-type approach offers the potential for export of meat products that can be shown to be safe from animal diseases for importing countries, while also diminishing the need for at least some of the veterinary fencing currently aimed at separating livestock and wildlife and constraining southern Africa's vision for TFCAs. It's critical to note that international sanitary trade standards as overseen by the World Organisation for Animal Health (OIE – i.e. the relevant international standard-setting body) were amended in 2015 to remove certain restrictions on the trading of beef derived from areas where wildlife maintain FMD viruses (see Box 1).

Thus, CBT approaches in the context of recent changes to international sanitary trade standards provide a new opportunity for beef production that is compatible with wildlife conservation, which could be a 'win-win' for sustainable and diversified land use and livelihoods.

The two-day workshop provided an opportunity to:

- Review these new developments and updates to international sanitary standards for trade in beef that don't completely rely on landscape-fragmenting fencing;
- Discuss revised draft "Guidelines for Implementing CBT-type Approaches";
- Assess potential sites amenable to CBT projects and resource needs; and
- Find collaborative ways forward to inform policy responses that support resilient, diversified livelihoods based on wildlife and livestock.

Box 1: Provisions of Article 8.8.22 in the OIE's Terrestrial Animal Health Code dealing with recommendations for the importation of fresh meat (excluding feet, head and offal) from cattle located in FMD infected countries or zones with an official control programme for FMD including compulsory vaccination of cattle

Veterinary Authorities should require the presentation of an *international veterinary certificate* attesting that the entire consignment of *meat*:

1. comes from animals which:
    a. have remained, for at least three months prior to *slaughter*, in a *zone* of the *exporting country* where cattle are regularly vaccinated against FMD and where an *official control programme* is in operation;
    b. have been vaccinated at least twice with the last *vaccination* not more than six months, unless protective immunity has been demonstrated for more than six months, and not less than one month prior to *slaughter*;
    c. were kept for the past 30 days in an *establishment*, and that FMD has not occurred within a 10 kilometre radius of the *establishment* during that period, or the *establishment* is a *quarantine station*;
    d. have been transported, in a *vehicle* which was cleansed and disinfected before the cattle were loaded, directly from the *establishment* of origin or *quarantine station* to the approved *slaughterhouse/abattoir* without coming into contact with other animals which do not fulfil the required conditions for export;
    e. have been slaughtered in an approved *slaughterhouse/abattoir*:
        i. which is officially designated for export;
        ii. in which no FMD has been detected during the period between the last *disinfection* carried out before *slaughter* and the shipment for export has been dispatched;
    f. have been subjected to ante- and post-mortem inspections within 24 hours before and after *slaughter* with no evidence of FMD;
2. comes from deboned carcasses:
    a. from which the major lymphatic nodes have been removed;
    b. which, prior to deboning, have been submitted to maturation at a temperature greater than + 2 °C for a minimum period of 24 hours following *slaughter* and in which the pH value was less than 6.0 when tested in the middle of both the longissimus dorsi muscle(s).

OPENING SESSION

Mr. Mbiganyi Frederick Dipotso, Programme Manager for the KAZA Secretariat, moderated the opening session and introduced four dignitaries, each of whom delivered opening remarks.

Dr. Morris Mtsambiwa, Executive Director of the KAZA Secretariat, asked workshop participants to introduce themselves, following which he delivered opening remarks. He noted that one of the key objectives of KAZA, as outlined in the Treaty, was to "promote and facilitate the harmonisation of relevant legislation, policies and approaches in the area of transboundary animal

disease prevention, surveillance and control." He noted that the recent amendment of international sanitary standards through the OIE's Terrestrial Animal Health Code opened-up new economic opportunities for rural livestock-keepers and helped to reduce conflict between wildlife conservation and livestock production in the KAZA region, particularly in Wildlife Dispersal Areas (WDAs), which are so critical to the long-term sustainability of the KAZA TFCA. He urged workshop participants to engage deeply with the issues put forward at the workshop and to find practical ways to resolve outstanding challenges.

Dr. Unesu Ushewokunze-Obatolu, Principal Director for the Department of Livestock and Veterinary Services in Zimbabwe's Ministry of Agriculture, Mechanisation and Irrigation Development, officially opened the workshop. She noted the importance of the agricultural sector in the KAZA partner countries, but also drew attention to the growing economic importance of wildlife in the region. These two sectors have major complementarities as well as potential conflicts, and it is critical to find a balance that reduces risk at the interface. She drew attention to the role of smallholder farmers, who can and do play a vital role in conserving wildlife, but who must also have opportunities to benefit economically from individually owned assets, such as livestock. She called upon workshop participants to examine how markets within SADC could benefit from an expansion of CBT in beef, and informed the group that Zimbabwe was working with the private sector and others to evaluate the implementation of the revised OIE standards.

Opening session dignitaries together with session moderator Mr. Fred Dipotso, KAZA TFCA Programme Manager.

Mr. Rui Lisboa, KAZA Liaison Officer for Angola, gave opening remarks on behalf of the KAZA Coordinating Country, Angola. He thanked Zimbabwe for hosting the meeting and drew attention to the great potential in the region to expand intra-regional trade, for the benefit of local communities.

Dr. Steve Osofsky, Professor at Cornell University's College of Veterinary Medicine and Coordinator of the AHEAD Programme, welcomed participants and gave a summary of the objectives, expectations, and anticipated deliverables of the workshop. He gave a brief history of the AHEAD program's evolution since 2003. He paid particular attention to the collaborative development with regional stakeholders of the important *Phakalane Declaration on Adoption of Non-Geographic Approaches for Management of Foot and Mouth Disease*, put forward by the SADC Livestock Technical Committee in 2012. He noted that wildlife and livestock represent critical economic growth opportunities for the countries of KAZA. Dr. Osofsky drew attention to

the 2015 revisions of the OIE Terrestrial Animal Health Code, an update that now provides a flexible policy environment in which to explore mechanisms to ensure that livestock farmers living closest to wildlife are no longer excluded from global beef markets, and that environmentally devastating veterinary fencing is no longer the only option for managing FMD in southern Africa. He emphasized the importance of multisectoral coordination and collaboration in land-use planning and development of economic opportunities related to the livestock and wildlife resources in KAZA, in order to ensure system resilience and diversified and sustainable livelihood opportunities. With major shifts in the policy environment having occurred, the workshop was intended to explore how southern Africa in general, and KAZA specifically, could take advantage of new opportunities, and to discern what mechanisms, technical assistance, partnerships, research and additional policy changes might be needed to move forward to practically implement commodity-based beef trade. Dr. Osofsky closed by commending the KAZA Secretariat for enabling the workshop to be held under its auspices, and thanking donors and other partners, including FAO, Cornell University's College of Veterinary Medicine, the Wildlife Conservation Society (WCS), GIZ, and the Rockefeller Foundation.

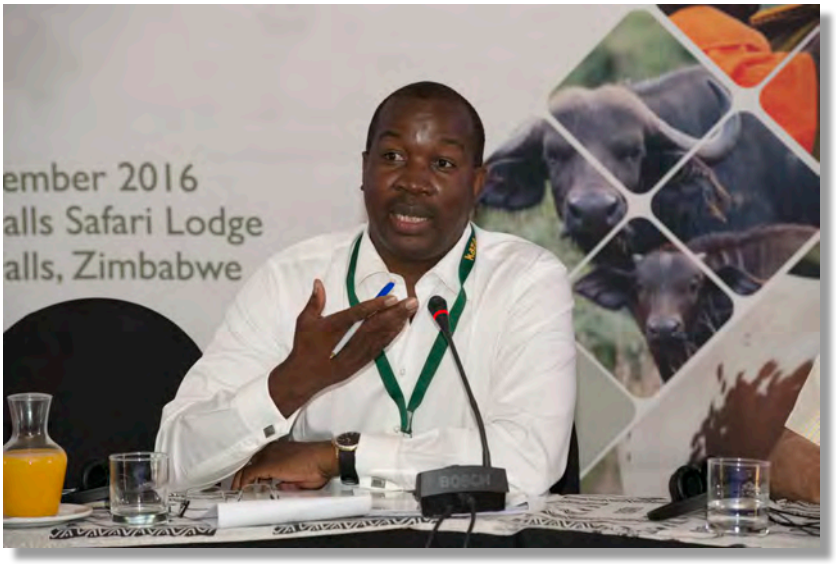
SETTING THE SCENE

Dr. Steve Osofsky, AHEAD Coordinator, chaired the first session of the workshop. Five presentations laid out the history and complexities of livestock production in southern Africa in the context of FMD, the relative advantages offered by multispecies systems, particularly for the KAZA landscape, and the non-geographic (non-fence-based) FMD management approaches to mitigation of FMD risk that are now possible as a result of changes in the OIE's Terrestrial Animal Health Code. Two question and answer sessions provided further detail and discussion on key issues.

Presenters reiterated how both livestock agriculture and nature-based tourism contribute significantly to local, national and regional economies and provide a strong incentive to explore win-win opportunities that combine both systems in the development of TFCA landscapes such as KAZA. Highlighting the critical challenges posed by disease to long-term TFCA success, several presentations noted that since the late 1950s, management of FMD has been achieved through a paradigm of geographic separation of livestock and wildlife by fencing. This approach has had negative impacts for both ecosystems and people. Fragmented landscapes have reduced rangeland productivity and sustainability, impacted wildlife populations directly and indirectly, and disrupted ecological processes and functions. At the same time, socioeconomic impacts have been largely negative, with benefits accruing to the commercial agricultural sector, while smallholders, particularly those living alongside wildlife, have been further marginalized without access to significant economic opportunities from livestock production, while also suffering the bulk of negative impacts from human-wildlife conflict.

Non-geographic management of FMD within the KAZA TFCA presents an opportunity to reduce production costs (reduced capital and recurrent expenditure), and to ensure that economic opportunities are more equitable, particularly when it comes to livestock owners living alongside wildlife. It opens the door to multispecies systems which can integrate livestock production and wildlife-based land use. Multispecies systems can maximize benefits from both nature-based tourism and livestock production. Such systems can also diversify risk, enhance resilience to climate change, and reduce reliance on primary production for wealth generation.

The KAZA region is a vast and complex TFCA with only 22% of the land area covered by state protected areas. Non-geographic management of FMD represents a unique opportunity to restore large-scale ecosystem resilience in the KAZA region, with its important wildlife populations, tourism attractions, and predominantly agropastoralist rural population.



Dr. Moetapele Letshwenyo, OIE Sub-Regional Representative for Southern Africa, addresses delegates on Day 1 of the CBT workshop.

In 2015, the OIE made significant changes to Articles 8.8.12 and 8.8.22 of the Terrestrial Animal Health Code. These changes open the door to non-geographic management of FMD, through use of official control programs, quarantine facilities, and pre- and post- slaughter risk mitigation. In providing an OIE perspective, Dr. Moetapele Letshwenyo (OIE Sub Regional Representative for Southern Africa) noted that the OIE operates as a standard-setting organization with the world's Directors of Veterinary Services as primary representatives and decision-makers. He indicated that further changes to the Terrestrial Animal Health Code are pending and that southern African voices with experience and knowledge on FMD management will be critical in these ongoing dynamic processes.

Despite these important changes in the OIE's Terrestrial Animal Health Code, political and practical barriers remain, both within countries and across borders. Regional coordination between KAZA countries, particularly with regard to veterinary standards, vaccination and disease control, is essential if the KAZA partner countries are going to take advantage of new opportunities. Such coordination could also have impacts on other disease issues, not only FMD. A long-term regional research strategy is required, one that includes field research on outbreaks, as well as research into the management implications of the Eurasian and SAT lineages of the FMD virus.

The KAZA Treaty (2011) provides mechanisms to support coordination and collaboration, in particular the Animal Health Sub-Working Group of the Conservation Working Group, although such coordination requires resources. National committees could also prove useful, such as the (currently inactive) multi-stakeholder Ad Hoc Committee on Fencing in Botswana.

An adaptive, rather than reactive, approach to FMD management is required if KAZA partner countries are to reach convergence among science, policy and the needs of livestock producers and natural resource managers on the ground.

REGIONAL PERSPECTIVES

Two sessions of the workshop focused on regional perspectives, both within and outside the KAZA region. Session II was chaired by Dr. Gaolothe Thobokwe, SADC FANR Programme Officer for Livestock, while Session III was chaired by Dr. Michael Flyman, Chief Wildlife Officer for the Department of Wildlife and National Parks in the Botswana Ministry of Environment, Natural Resources, Conservation and Tourism. The 10 presentations in these two sessions provided perspectives from Tanzania, the Great Limpopo TFCA, Botswana, Namibia, and Zimbabwe, as well as shared results from research conducted on risk assessment and elephant movements in relation to siting of veterinary cordon fences.

In Zimbabwe, as elsewhere in KAZA, FMD is not the only disease of concern, particularly for the largely smallholder population in the area. While the government has an agricultural strategy focused on growth and poverty alleviation, and is open to implementation of non-geographic management strategies for FMD, these strategies require institutional support, capacity building, strengthening of veterinary services, and mechanisms for traceability.

Botswana's Ngamiland region in particular holds significant potential for implementing CBT in beef products. The area is part of the Khaudum – Ngamiland WDA, one of six such WDAs identified as part of the KAZA Master Integrated Development Plan. Despite the large elephant population, an important conservation and tourism asset for Botswana, rural communities in the area suffer from high unemployment, increasing poverty, and rangeland degradation. The high density of elephants also results in high levels of human-elephant conflict. Fences, designed to separate buffalo and cattle, are restricting wildlife movements across the WDA. Research has shown that elephants tend to break fences at the same points over and over again, which could allow for some strategic adjustment of fences in those areas, to allow elephant movement and open tourism opportunities in other parts of KAZA. Simulating different scenarios of fence realignment or decommissioning of fence sections, through circuit theory modelling, could help inform management decisions regarding fences and WDAs.

In Namibia's Zambezi Region, despite the success of the conservancy model of community-based natural resource management (CBNRM), it is clear that wildlife-related activities cannot meet all livelihood needs, and the need for a diversified economy is a reality. Support has been provided to farmers in the region on rangeland management, which has generally been successful, but has been undercut by prolonged disruptions to livestock marketing activities during and following FMD outbreaks. There has been no trade with South Africa since 2007, and the abattoir in Katima Mulilo, without a consistent throughput, has recently been closed. An area in the region has, however, been set aside for community development and this represents the first time that communities have been allocated rights over grazing in this locale. This was enabled as part of the Government of Namibia's Programme for Communal Land Development (PCLD), with funding from the EU and KfW, which aims to integrate rural communities into the mainstream economy by providing farmers with secured land rights and farm infrastructure. But ultimately, success will depend upon sustainable markets for livestock.

Research in Tanzania provided insights into the dynamics of FMD in that country, where FMD appears to be more prevalent in cattle in agropastoralist systems rather than among rural smallholders. The main drivers of outbreaks were related to cattle herd size and the number of

new acquisitions. Wildlife-specific factors were not significant. The variety of FMD serotypes presents major constraints to a vaccine-led approach.

In the Great Limpopo TFCA (South Africa-Mozambique-Zimbabwe), research on managing risk at the point of production through producer protocols provided insights into the challenges associated with ensuring good agricultural practices. Mechanisms are needed to ensure equitable participation, to build skills and capacity, and to enable market access.

Two important research studies were also highlighted, both from Namibia's Zambezi Region. Samples from carcasses processed through a CBT approach at the Katima Mulilo abattoir were tested, and it was determined that the risk of FMD spread was negligible. Secondly, a quantitative risk assessment exercise was undertaken, modelling different risk mitigation methods. It was determined that reduction of risk of FMD virus transmission through beef products derived from the Zambezi Region can be achieved, at levels equivalent to those of the geographic-based management approach, through CBT-based management procedures.

These important regional perspectives provided useful insights into the opportunities as well as challenges faced in implementing CBT in the KAZA region. CBT pilot projects have demonstrated success in implementing official controls and managing risk. Cross-border livestock movements require further investigation, and consistency across KAZA partner countries in meeting the OIE standards would help in facilitating intra-KAZA trade. New mechanisms for ensuring equitable participation by a range of primary producers are critical, including extension services on quality and sanitary standards.

Political and market barriers to CBT remain, but risk assessment models can serve as objective and transparent tools to influence trade decisions, and training in risk analysis is critically needed to allow better science-based policy decisions. The research and decision-making process should be widened beyond veterinary services to include both producers and consumers, to ensure that solutions are based on science, and are technically, financially and politically implementable, meeting the needs of both farmers and downstream industries, such as abattoirs. Marketing 'wildlife-friendly' beef represents a competitive advantage for KAZA.

In the KAZA region, separation of wildlife from livestock is neither practical nor necessarily desirable. To maximize benefits from tourism, which is a large contributor to GDP, and livestock, which is a critical contributor to individual and household incomes, KAZA countries need to engage in an open and honest discussion about any remaining reservations regarding implementation of CBT. Mechanisms exist in SADC and other regional economic organizations to manage trade restrictions and resolve potential conflicts.

WHICH WAY, MARKETS?

The fourth and fifth sessions of the workshop focused on markets. Session IV was chaired by Dr. Misheck Mulumba, Research Institute Manager for the Agricultural Research Council in South Africa. Session V was chaired by Dr. Mokganedi Mokopasetso, Chief Veterinary Officer of the Botswana Vaccine Institute. Six presentations in these two sessions provided perspectives from national production and marketing organizations, and examined India's comparatively important beef industry.

Significant private sector investments, as well as improvements in infrastructure, have allowed India's beef industry to expand dramatically over the last 20 years. As an FMD-infected country, India complies with the OIE Terrestrial Animal Health Code and exports deboned, deglanded (water buffalo) meat (including halal meat) to 65 countries. The beef industry is adjunct to the dairy industry and all parts of the animal are used in diversified products, such as pet food. Most of India's meat is exported to Asia, although there is a market in Africa – and China and Russia are emerging as potential markets. While there are important differences between India and southern Africa, the Indian story represents an important proof of concept for the success of CBT.

Markets are a key constraint to CBT of beef in northern Botswana. Despite strategic management of FMD, the Maun abattoir has operated at an annual loss of US$ 3 million. Export opportunities to South Africa and Angola cannot be realized because CBT beef is not accepted in those countries from that area. Access to markets outside of southern Africa are also limited by transport routing challenges, as CBT beef cannot be transported through Namibia, but must go through Maputo in Mozambique. The reasons for transit through Namibia being blocked generated wide-ranging discussion. It was argued that in some cases the issues go beyond science (because matured deboned beef is a very safe product as far as FMD is concerned). This problem results in a huge opportunity cost for livestock production and small-scale farmers in northern Botswana. Likewise, in Namibia, despite investment in a levy fund and mentorship program and support from the commercial livestock industry as well as investment into the Katima Mulilo abattoir, the lack of access to markets has hampered attempts to implement CBT of beef in the Zambezi Region.

Zambia has produced beef using commodity-based approaches for many years. A robust cold chain from abattoirs in FMD areas provides beef to local markets as well as Katanga Province in the Democratic Republic of Congo. Value addition is achieved through the production of many cooked products, and market links are enhanced through a network of 120 stores and an ongoing relationship with Shoprite. As part of a diversified company (Zambeef), CBT in beef is growing in Zambia.

For local markets within FMD-infected zones in KAZA, rugged mobile abattoirs, developed to (for example) service small farms in the U.S. and the game industry in South Africa, may provide a solution to communal farmers' logistical and financial constraints. The concept offers some promise for rural communities that need a small abattoir to slaughter livestock intermittently, and where the erection of traditional bricks-and-mortar facilities has been a stumbling block due to expense.

Markets require consistent supply in reasonable volumes, as well as fixed quality standards. KAZA partner countries could work together and engage in a number of strategies to achieve these needs and satisfy markets. As a region, KAZA could develop guidelines for practical implementation of CBT that meets OIE standards – in fact, draft guidelines prepared under the auspices of FAO, TAD Scientific and AHEAD were shared for the consideration of all delegates (see below). It is important to signal to the market that the region is conscious of the FMD threat, is serious about dealing with it, and has a practical roadmap to move forward. Innovative solutions, such as mobile abattoirs, could not only reduce risks, but also provide opportunities for synergy with the wildlife industry.

PROGRESSING IMPLEMENTATION OF COMMODITY-BASED TRADE OF BEEF AND BUILDING STRONGER BRIDGES BETWEEN THE AGRICULTURE AND WILDLIFE CONSERVATION SECTORS

Chaired by Dr. Osofsky, the final substantive session of the workshop was focused on progressing implementation of commodity-based trade of beef and building stronger bridges between the agriculture and wildlife conservation sectors.

Two documents were provided to the workshop participants and presented at the meeting. A working draft of "Guidelines on Mechanisms for Applying Commodity-Based Approaches to Management of Foot and Mouth Disease Risk for Beef Exporting Enterprises in Endemic Areas in Sub-Saharan Africa" was provided and summarized at the workshop. These guidelines, originally developed with support from the AHEAD Programme, now integrate the relevant updated provisions of the OIE Terrestrial Animal Health Code (TAHC). Eradication of FMD (particularly where the SAT serotype is endemic) is not realistic, and eliminating all buffalo would have major implications for the wildlife sector and natural ecosystems. Being able to trade in products derived from cloven-hoofed livestock is of course important in the SADC region, where livestock production is often the most important form of agricultural activity.

The OIE's updated TAHC now provides various alternatives to geographic management of FMD, including sanitary risk mitigation measures along value chains (e.g. CBT). Beef enterprises aspiring to export beef to other parts of the region or further afield have several options to consider, depending on their circumstances:

1. FMD-free zone with vaccination (TAHC Article 8.8.3)
    - challenging in areas with SAT viruses due to the considerable antigenic variation of the SAT viruses
    - separation of animal populations of different FMD status where wildlife is involved requires fencing
2. Compartments free of FMD (TAHC Article 8.8.4)
    - suitable for intensive production systems e.g. dairy, pig & poultry production, feedlots
3. Compliance with TAHC Article 8.8.22 without quarantine option
    - problematic in areas with free-ranging wildlife (African buffalo)
4. Compliance with TAHC Article 8.8.22 with quarantine option
    - removes requirement for no FMD infection within 10km radius
5. Processing beef to destroy any potential virus present (TAHC Article 8.8.31)
    - achieved through heating, canning, salting or drying
6. Risk management along value chains, i.e. CBT
    - compliance with Article 8.8.22 (with or without quarantine) with additional upstream and downstream risk mitigation measures
    - no standard available so must be based on risk assessment
    - suitable for areas where free-ranging wildlife (African buffalo) occur
    - integrates food safety and animal disease risk management measures along value chain through application of HACCP (hazard analysis critical control points) and CBT systems (Figure 2).

Fundamental to the HACCP system are the critical control points (CCPs) that focus risk management and monitoring of food safety / biohazard risks at defined points along the value chain. A strong hazard analysis critical control points (HACCP) system, with support and inputs from veterinary services as well as strong private-public sector cooperation, is critical for implementing a commodity-based approach to FMD risk management and is outlined in the draft guidelines.

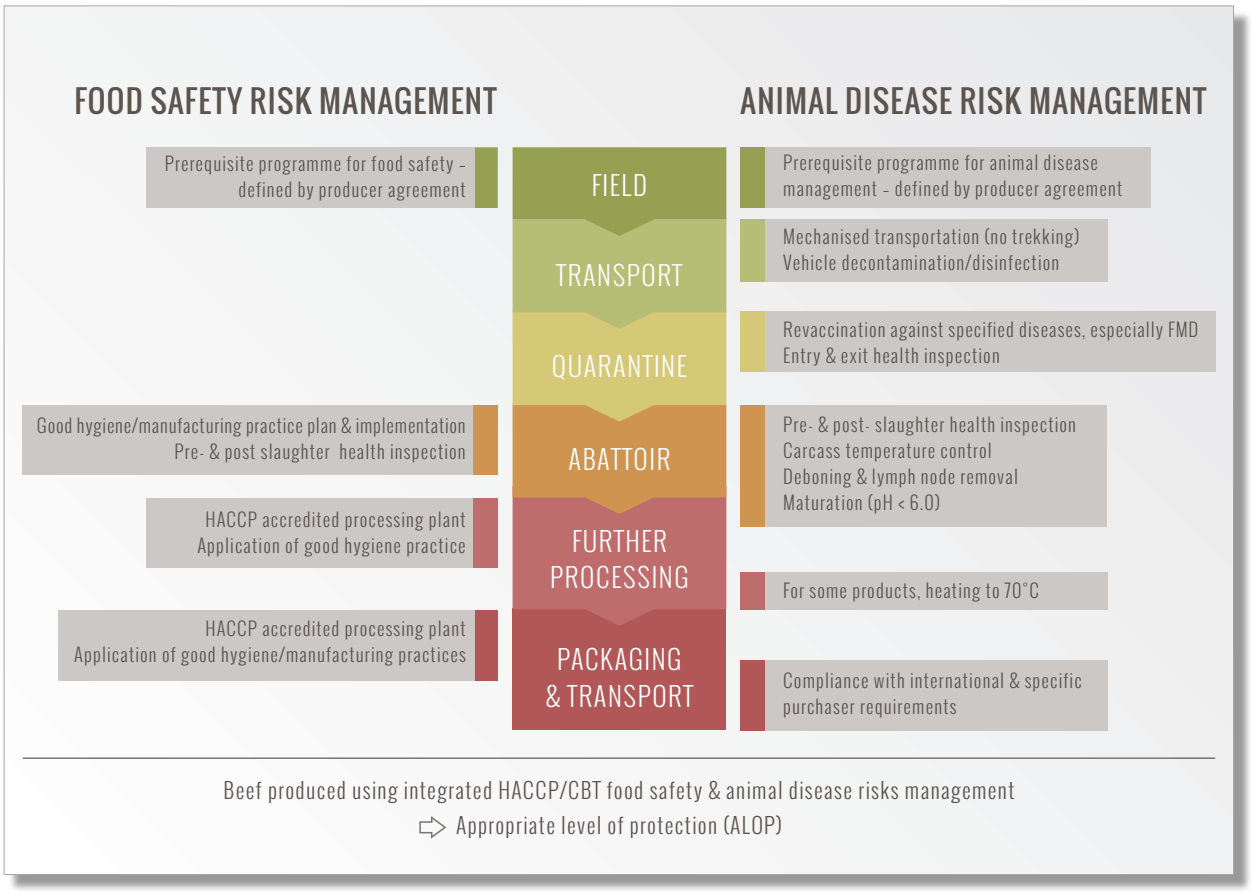


Figure 2: Parallel application of food safety and animal disease risk management measures along a value chain for beef production (Thomson and Penrith, 2015).

The paper "Towards Alignment of Disease Management and Livestock Trade Promotion in FMD-Endemic Areas of Sub-Saharan Africa: Pragmatic Approaches to Doing Better" outlines the variety of mechanisms by which a CBT approach, combined with conventional disease control measures, can manage risks associated with trade in products from areas of known FMD presence. A guideline on the management of South African Territories (SAT) serotypes of FMD in southern Africa is also in development. HACCP provides an ideal mechanism for beef value chains situated in extensive rangeland areas, such as those in the KAZA region, and allows for the integration of traditional risk mitigation methods.

The challenge at hand is the practical and sustainable application of these various approaches to produce and export beef from FMD endemic areas of southern Africa. If successful, it will become

important to find ways to safeguard the interests of smallholder farmers from commercial interests, including through protection of grazing rights.

Dr. Gavin Thomson, right, responding to questions on FMD management and practical application of CBT.

Southern Africa cannot compete with, for example, South America with regard to beef production and exports, but the region does have a clear comparative advantage, which is its wildlife. Southern Africa's large charismatic species can generate major earnings from nature-based tourism. The diverse mix of species allows for a diverse rangeland grazing succession. In the KAZA agropastoral landscape in particular, mixed wildlife-livestock systems have many advantages, and the agriculture and conservation sectors would clearly benefit from coming together to work towards a common vision and goals for the future.

Having established a common understanding of the opportunities that exist, and of the issues that remain, participants broke into groups representing each KAZA partner country to consider the practical implications of working to roll out commodity-based approaches to FMD risk management. Each country considered a set of questions, and the full outputs of these working groups are available in Annex 3.

CLOSING SESSION

A summary panel discussion, moderated by Dr. Osofsky, brought together Dr. Unesu Ushewokunze-Obatolu, Dr. Moetapele Letshwenyo, Dr. Karen Ross (independent consultant), Dr. Cyril Taolo (Deputy Director for the Department of Wildlife and National Parks, Botswana), Dr. Yona Sinkala (Director for the Department of Veterinary Services, Zambia), and Dr. Boitumelo Mogome-Maseko (Executive Manager of Compliance for the Botswana Meat Commission), who considered the major outcomes of the workshop.

Rural communities in the KAZA TFCA have been historically marginalized from the livestock economy, in large part due to the threat of FMD. New approaches and regulations around CBT approaches to FMD risk management open new opportunities for these communities to benefit from mixed wildlife-livestock systems. It is critical that countries internalize the new standards and establish official control programmes. Due to the dangers of different interpretations of the standards, adoption of regional guidelines (such as those presented at the forum) was recommended. Challenges at the community, national and regional levels remain complex but not

insurmountable, and the pathway ahead is increasingly clear, especially if the KAZA partner countries work together as a region and utilize the existing SADC mechanisms for coordination and cooperation.

Commodity-based approaches to managing FMD risk are critical to achieving KAZA's vision, which at its heart has both conservation and development (i.e. poverty alleviation) objectives. The links between successful wildlife conservation and improved community livelihoods are clear, and CBT must be implemented alongside other KAZA initiatives to achieve the TFCA's vision.

Next steps to follow the workshop were outlined for participants (see Box 2 below and Executive Summary above). Attention was drawn to the regional guidelines that had been distributed and comments were invited on these. These guidelines are being developed with the goal of broad circulation in the public domain. The meeting proceedings would ideally be circulated in early 2017, and presentations would be made available as PDFs, with authors' permissions, on the AHEAD website as well. Proposals for studies into CBT beef market opportunities for KAZA producers (demonstrating interest in the mitigation of conflict at the livestock / wildlife interface) were invited, as a small amount of funding is available to further understanding of market dynamics. AHEAD would also work with the KAZA Secretariat to investigate the reinvigoration of the Animal Health Sub-Working Group of the Conservation Working Group.

Dr. Osofsky thanked the participants for their deliberations at the workshop and for their many years of work on these important issues. He again expressed gratitude to the organizations that had supported the workshop.

Mr. Mtsambiwa made closing remarks on behalf of the KAZA Secretariat, thanking participants for their commitment to the KAZA process, and for their open and constructive deliberations. He also thanked the organizing committee, venue staff, and supporting organizations. Nidhi Ramsden and Shirley Atkinson received special thanks for all of their organizational efforts.

Finally, Dr. Ushewokunze-Obatolu made closing remarks on behalf of the host country, Zimbabwe. She noted that the discussions at the workshop demonstrated genuine commitment to sustainability, conservation and improved rural livelihoods.

Box 2: Summary of Next Steps

Next steps agreed to included (but were not limited to):

- finalization of draft regional guidelines ("Guidelines on Mechanisms for Applying Commodity-Based Approaches to Management of Foot and Mouth Disease Risk for Beef Exporting Enterprises in Endemic Areas of Sub-Saharan Africa"), shared for workshop delegates' review.

- implementation of one or more studies to evaluate potential markets for CBT beef that could be produced by KAZA farmers (keeping in mind the potential for CBT to help mitigate conflict at the livestock / wildlife interface – and thus the potential for 'wildlife-friendly' beef).

- reinvigoration of the Animal Health Sub-Working Group of the KAZA Conservation Working Group, in partnership with the SADC Livestock Technical Committee, so that these issues can continue to be worked on regionally, post-workshop.

- initiation of robust self-assessments within each KAZA country, to review (i) the potential opportunity offered by CBT, including an evaluation of constraints or gaps related to conceptual understanding, risk perception, technical capacity, human and financial resources, as well as governance and an enabling regulatory environment, and (ii) political willingness among ministries overseeing livestock, wildlife, trade and finance to work together, and collaboratively with the private sector and civil society, to foster sustainable economic development that draws upon the region's unique cultural and environmental comparative advantages.

- exploration of new ways to work on regional solutions, tapping into SADC and other regional expertise and agreements, to break-down often self-imposed trade barriers – and evaluation of how to take advantage of the economies of scale that genuine collaboration along the beef value chain can unleash, including ideas like regional abattoirs and/or mobile abattoirs, based on specific socioeconomic contexts in different parts of KAZA.

ANNEXES

Towards Implementation of Commodity-Based Trade of Beef in the KAZA TFCA: Opportunities for Integrating Livestock Agriculture and Wildlife Conservation

Victoria Falls, Zimbabwe
3-4 November 2016

ANNEX 1: AGENDA

PROGRAMME AGENDA

TOWARDS IMPLEMENTATION OF COMMODITY-BASED TRADE OF BEEF IN THE KAZA TFCA

Opportunities for Integrating Livestock Agriculture & Wildlife Conservation

A KAZA Workshop, in collaboration with AHEAD & FAO

Victoria Falls, Zimbabwe – 3-4 November 2016

State of KAZA Symposium &/or Arrival Day – 2 November 2016		
17:30-18:30	Registration	
Day One – 3 November 2016		
TIME	**SESSION/ACTIVITY/PRESENTATION TITLE [SESSION CHAIR]**	**PRESENTER**
07:30	Registration	
	WELCOME & WORKSHOP OVERVIEW [Master of Ceremony: F. Dipotso]	
10:30	Welcome and Introductions	M. Mtsambiwa
10:50	Opening Remarks, KAZA Secretariat	M. Mtsambiwa
10:57	Opening Remarks, Host Country	Zimbabwe
11:06	Opening Remarks, Coordinating Country	Angola
11:15	Purpose of the Workshop: Why Are We Here?	S. Osofsky
11:23	Understanding the Objectives, Expectations & Anticipated Deliverables	S. Osofsky for P. Otto
	SESSION I: SETTING THE SCENE [Chair: S. Osofsky]	
11:30	Rural Development & Conservation in Southern Africa's TFCAs: The Ecological and Socioeconomic Importance of Integrating Livestock Agriculture & Nature-Based Tourism	D. Cumming
11:45	What the 2015 Changes in the OIE Terrestrial Animal Health Code FMD Chapter Mean for More Harmonized Land Use	M. Letshwenyo & G. Brückner
12:00	Complexities of the FMD Situation Confronting KAZA and Other TFCAs	G. Thomson & M.-L. Penrith
12:15	Q&A Session	
12:30	GROUP PHOTO & LUNCH	
13:30	A Perspective on Fencing in KAZA: Enhancing Harmonization between the Wildlife and Livestock Sectors to Secure Functional and Productive Rangelands / WDAs	R. Taylor
13:45	What Does the Non-Geographic Approach to FMD Management Mean for Conservation Success in KAZA?	A. Nambota & P. Bewsher
14:00	Q&A Session & Panel Discussion	
	SESSION II: REGIONAL PERSPECTIVES [Chair: G. Thobokwe]	
14:30	Evidence-Based Options for Foot and Mouth Disease Management in Tanzania	T. Lembo et al.
14:45	The Role of Risk Analysis in Meeting International Standards of Equivalence: A Case Study from the Zambezi Region	G. Fosgate
15:00	Prospects for a Commodity-Based Trade Approach in Northern Botswana: Is there a Win-Win for the Livestock and Wildlife Sectors?	L. Modisa
15:15	Reconciling Conflicts between Livestock Production & Wildlife Conservation in Zimbabwe: Expanding Options for Rural Development	U. Ushewokunze-Obatolu
15:30	Lessons Learned in Terms of Implementation of the Commodity-Based, Value Chain Approach Demonstrated by the Zambezi Region Abattoir Pilot Project	A. Toto & B. Manda
15:45	Q&A Session	
16:00	TEA BREAK	

	SESSION III: REGIONAL PERSPECTIVES (cont.) [Chair: M. Flyman]	
16:15	Herding for Health: Commodity-Based Trade in the Great Limpopo TFCA	J. van Rooyen
16:30	The Impact of European Union (EU) Sanitary and Phytosanitary (SPS) Standards and Technical Barriers to Trade (TBT) on the Botswana Beef Industry, with Particular Reference to Ngamiland	R. Grynberg
16:45	The Importance of a Diversified Economy for the People and Wildlife of the Khaudum-Ngamiland WDA	T. McNutt
17:00	Potential Impacts of Strategic Fencing Realignments for Reducing Human / Elephant Conflict and Enhancing Conservation Success	A. Songhurst, G. McCulloch & A. Stronza
17:15	Diversifying and Integrating Community-Based Natural Resource Management to Include Rangeland Management in the Zambezi Region	K. Nuulimba & D. Muema
17:30	Q&A Session	
17:45	ADJOURN	
19:00	DINNER AT LODGE – All Participants	

Day Two – 4 November 2016		
	SESSION IV: WHICH WAY, MARKETS? [Chair: M. Mulumba]	**PRESENTER**
10:00	A Taste of India: Value-Added Meat Processing & Market Access Despite FMD - Thoughts from One of the World's Largest Beef Exporting Countries	G. Brückner for C. Thota
10.15	From Where the (Water) Buffalo Roam: India's Rise as a Major Exporter of Bovine Meat	S. Osofsky for P. Birthal
10:30	The Utility of Mobile Abattoirs	T. Bergh
10:40	Q&A Session	
	SESSION V: WHICH WAY, MARKETS? (cont.) [Chair: M. Mokopasetso]	
11:00	A Perspective from the Meat Board, Namibia	P. Strydom & A. Boshoff-De Witt
11:15	A Perspective from the Botswana Meat Commission (BMC)	S. Ghanie
11:30	A Perspective from Zambeef	F. Lupindula
11:45	Q&A Session	
12:00	TEA BREAK	
	SESSION VI: PROGRESSING IMPLEMENTATION OF COMMODITY-BASED TRADE OF BEEF AND BUILDING STRONGER BRIDGES BETWEEN THE AGRICULTURE AND WILDLIFE CONSERVATION SECTORS [Chair: S. Osofsky]	
12:15	Overview of Updated Draft "*Guidelines on Applying Commodity-Based Approaches to Management of Foot and Mouth Disease Risk for Beef Exporting Enterprises in Endemic Areas in Sub-Saharan Africa*"	M-L Penrith & G. Thomson
12:30	Towards Alignment of Disease Management and Livestock Trade Promotion in FMD-Endemic Areas of Sub-Saharan Africa: Pragmatic Approaches to Doing Better	G. Thomson & M-L Penrith
12:45	The Comparative Economic Advantages of Multi-Species Systems: What's at Stake?	R. Taylor & D. Cumming
13:00	Q&A Session	
13:15	Breakout Group Session I by Country (introduced by S. Osofsky): *Are you ready to pilot / implement the Guidelines in your own country? What are the Challenges? Can these be overcome? Where are the opportunities?*	
14:00	LUNCH	
15:00	Breakout Group Session II by Country (introduced by S. Osofsky): *Might your country plan on further pursuing value-chain approaches to producing beef / related products in the near future? If so, over what time frame? If so, where specifically, and what types of resources / technical assistance would be most helpful? What coordination is needed regionally, including within the TFCA context? And what needs to be done in terms of securing potential destination markets within Africa or beyond?*	

16:00	Report Back to Plenary, WORKING TEA BREAK	
16:45	Summary Panel Discussion	TBD
17:15	NEXT STEPS, CLOSING REMARKS AND ADJOURN	S. Osofsky, M. Mtsambiwa, U. Ushewokunze-Obatolu
18:00	DINNER ON BANKS OF ZAMBEZI RIVER – All Participants	

ANNEX 2: ABSTRACTS

TOWARDS IMPLEMENTATION OF COMMODITY-BASED TRADE OF BEEF IN THE KAZA TFCA

Opportunities for Integrating Livestock Agriculture & Wildlife Conservation

A KAZA Workshop, in collaboration with AHEAD & FAO

ABSTRACTS

3-4 NOVEMBER 2016

VICTORIA FALLS

ZIMBABWE

Rural Development and Conservation in Southern Africa's TFCAs: The Ecological and Socio-Economic Importance of Integrating Livestock Agriculture and Nature-Based Tourism

David H. M. Cumming

Percy Fitzpatrick Institute, Biological Sciences, University of Cape Town, South Africa, Tropical Resource Ecology Programme, Biological Sciences, University of Zimbabwe, Zimbabwe, and AHEAD (Animal & Human Health for the Environment And Development) Regional Technical Consultant. Email: cumming@icon.co.zw

The TFCAs in southern Africa comprise large landscapes that include both farmlands in which livestock agriculture is crucial to smallholder livelihoods and wildlife conservation areas that are the foundation of nature-based tourism. Central issues are how tensions between alternative land uses can be reduced and how win-win solutions to both peoples' livelihoods and conservation of biodiversity within TFCAs can be achieved. Answers to these questions rest partly on the long-term ecological sustainability of TFCAs, the relative values of livestock and wildlife to household, local and national economies, and how these values may influence national rural development policies.

There is a sound ecological basis for integrating wildlife and livestock production systems across TFCAs that rests on the need to capitalise on the inherent spatial and temporal heterogeneity within these large, semi-arid and arid savanna landscapes. This is best achieved by managing a full range of mammalian herbivores including livestock. Furthermore, given appropriate policies, returns from land-use systems that combine livestock and wildlife may prove greater at local, national and regional levels than either system alone.

The potential contribution of the livestock and nature-based tourism sectors to local, national and regional economies indicates that nature-based tourism contributes more to regional GDP than livestock, despite the biomass of large wild herbivores comprising only about 10% of the total large herbivore biomass of southern Africa, with livestock comprising the other 90%. A key problem that remains to be resolved is that of ensuring that the ecological and economic benefits of nature-based tourism cascade down to the household level.

What the 2015 Changes in the OIE Terrestrial Animal Health Code FMD Chapter Mean for More Harmonized Land Use

Gideon K. Brückner[1] and Moetapele Letshwenyo[2]

[1]President OIE Scientific Commission for Animal Diseases, South Africa; [2]OIE Sub-Regional Representative for Africa, Botswana. Email: gkbruckner@gmail.com

The amended Chapter 8.8 of the OIE Terrestrial Animal Health Code on *Infection with foot and mouth disease virus*, which was adopted by the OIE World Assembly of Delegates at the 83rd General Session of the OIE in 2015, contains significant changes to the previous versions. The most important related to the theme of this conference, are those changes allowing either transport of animals from infected countries to free countries or transport of fresh meat of cattle from infected to free countries. In contrast to previous versions of the *Terrestrial Code*, animals in an infected country intended for slaughter and then export of the fresh meat, can either be kept in an *establishment* as defined in the *Terrestrial Code*, and where no infection occurred within a 10km radius or alternatively in a *quarantine* station where close proximity to infected animals cannot be ruled out such as for example contact with African buffalo. This would further facilitate trade by applying the provisions of the *Terrestrial Code* for trade in safe commodities such as fresh meat from infected countries.

African buffalo (*Syncerus caffer*) are now also clearly identified as the only known established carrier animals of the foot and mouth disease virus. Further amendments to the current chapter are under discussion between the OIE Scientific and Code Commissions of which the most important for Africa being the possibility of allowing the establishment of FMD free *compartments* with vaccination which could further assist to facilitate trade in countries not having the resources to establish FMD free zones.

Complexities of the Foot and Mouth Disease Situation Confronting the KAZA and other TFCAs

Gavin R. Thomson[1,2] and Mary-Lou Penrith[1,2]

[1]TAD Scientific, Pretoria, South Africa; [2]Department of Veterinary Tropical Diseases, University of Pretoria, Onderstepoort, South Africa. E-mail: gavin@tadscientific.co.za

The FMD problem confronting most of southern Africa results from inadequate recognition of the fundamental evolutionary and epidemiological differences between SAT serotype FMD and the Eurasian serotypes, the latter mostly prevalent in other regions of the world. This has resulted in international guidelines on the control of FMD and sanitary standards governing trade in commodities and products derived from cloven-hoofed animals being based on Eurasian serotype FMD, rendering them inappropriate for southern Africa in some cases.

Practical peculiarities of SAT virus infections include their unique association with African wildlife, modes and rates of transmission in extensive rangeland systems, vaccine efficacy that is compromised by exceptional antigenic diversity within SAT serotypes, differences concerning the biological significance of persistent infection in buffalo in contrast to cattle and the propensity of SAT serotype infections for causing mild disease or subclinical infection in both wildlife and livestock. The result is that SAT serotype FMD, unlike the situation for Eurasian serotypes elsewhere in the world, is impossible to eliminate from regions where large concentrations of wildlife are present such as southern Africa's TFCAs. These factors already complicate FMD management in southern Africa and will increase in significance when TFCAs become more fully operational.

The details of these interactions and their likely consequences are the focus of this presentation.

A Perspective on Fencing: Enhancing Harmonization Between the Wildlife and Livestock Sectors to Secure Functional and Productive Rangelands in the KAZA TFCA

Russell D. Taylor

WWF in Namibia, Namibia. Email: rtaylor@wwf.na

Over 40 years ago the European Union (EU) engaged the three southern African KAZA countries of Botswana, Namibia and Zimbabwe in treaties aimed at promoting economic and rural development through preferred market trade agreements. The livestock sector was a major benefactor of these agreements with participating countries receiving lucrative returns for beef exports to EU markets. Compliance with stringent veterinary and health standards resulted in significant negative consequences for wildlife populations and their associated migration and movement routes following the establishment of disease-free livestock export zones and adjacent disease surveillance areas through the construction of wildlife-proof fences that separated wildlife from livestock. Given the need for large herbivores to move seasonally in response to rainfall and food production in arid and semi-arid environments, fences have had direct and devastating impacts on wild herbivores and more indirectly on livestock production systems. These impacts either foreclosed or severely limited other economically competitive land use options. This includes the ability to respond to greater climatic variability, declining livestock productivity, market failures and social disruptions amongst the rural poor. The emergence of linked wildlife and cattle production systems complementing agro-pastoral systems should allow improved range management, conservation agriculture and commodity based trade (CBT) providing market access for cattle based on non-geographic approaches to disease control. Collectively these measures have the potential to drive an entirely new rural development paradigm, enhancing the sustainable use of natural resources and nature-based tourism through a multispecies-based economy and land use.

What Does the Non-Geographic Approach to FMD Management Mean for Conservation Success in KAZA?

Andrew Nambota[1] and Paul Bewsher[2]

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As the largest TFCA in the world, KAZA faces the challenge of sustaining, and where necessary, restoring the landscape dynamics that underlie this significant multiple use conservation area, a critical measure against which the success of the TFCA will be assessed. To be deemed a functional, successful conservation programme, the KAZA TFCA should provide a platform through which habitat connectivity can be maintained and fragmentation avoided. Most of the KAZA TFCA is characterized by free-ranging wildlife, especially within the ecologically contiguous areas along the Kwando and Zambezi rivers, as well as along vast portions of the border between Botswana and Zimbabwe. It is possible for wildlife to move hundreds of kilometres without being obstructed by fences, yet there are areas where veterinary fences are used to control the movement livestock and wildlife, and these veterinary fences have proven to be one of the most significant constraints to wildlife movement within the KAZA TFCA landscape. A significant achievement that can make wildlife conservation and livestock production more compatible is the recent acceptance of commodity-based trade (CBT) standards in FMD control zones by the OIE. By becoming integrated into the value chain, the primary beneficiaries within the KAZA TFCA – the communal small-scale farmers – can find value in both livestock and wildlife that share the broader landscape.

This paper looks at how non-geographic approaches to disease control can contribute to the conservation success of the KAZA TFCA. Further the paper seeks to look at possible models within the KAZA TFCA that promote and facilitate increased compatibility between wildlife conservation and livestock production. Cognisant that livestock forms an integral part of the social and cultural fabric of communities, and certain livestock areas form an important component of rural livelihoods, it is crucial to investigate non-geographic approaches to disease management, since these are deemed an essential way in which a balance between wildlife and livestock management can be found. Through the KAZA TFCA Programme, it is possible for the five partner countries to grow rural economies through the promotion of safe livestock production via the use of CBT, while also sustaining and restoring the unique landscape that makes this an important wildlife area – for the region, for the world, and for the communities that pay the opportunity costs of living with wildlife.

Evidence-based Options for Foot and Mouth Disease Management in Tanzania

M. Casey[1,5], R. Reeve[1], H. Auty[1], P. Hamblin[3], D. Haydon[1], R. Kazwala[2], T. Kibona[2], D. King[3], A. Ludi[3], A. Lugelo[2], V. Mioulet[3], D. Mshanga[4], K. Parekh[3], S. Parida[3], D. Paton[3], S. Cleaveland[1], and **T. Lembo**[1]

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Our research in northern Tanzania has demonstrated that foot and mouth disease (FMD) has important consequences for livestock-dependent communities, and that disease control has the potential to improve livelihoods. However, designing effective control strategies is complicated by the co-existence of susceptible livestock and wildlife species, including large populations of African buffalo (*Syncerus caffer*). We investigated drivers of infection and outbreak risk in livestock in wildlife-livestock interface areas through analysis of pan-serotypic and serotype-specific antibody levels of livestock and adjacent buffalo, in conjunction with household questionnaire data and case-control outbreak analysis. Older livestock were more likely to be FMD seropositive and cattle more than small ruminants. The production system was another predictor with lower seroprevalence for smallholder systems than agro-pastoralists or pastoralists. No wildlife-related predictors were significant. Case-control data from agro-pastoralist areas revealed that herd size and acquisitions of new livestock were significant risk factors for outbreaks in livestock. Again, measures of potential contact with buffalo or with other FMD susceptible wildlife did not increase the likelihood of FMD in livestock. Serotype-specific serological analyses showed different patterns of serotypic dominance amongst livestock and buffalo: O and SAT1 were the most prevalent serotypes in cattle and buffalo, respectively, while SAT2 and A were the least prevalent. Our results demonstrate the potential of disease control targeting cattle rather than wildlife, such as cattle vaccination, to reduce FMD impacts in Tanzania. The results also suggest that control strategies that rely on separation of wildlife and livestock, such as veterinary cordon fences, would have little impact on disease risk while infection circulates widely among cattle populations.

The Role of Risk Analysis in Meeting International Standards of Equivalence: A Case Study from the Zambezi Region

Geoffrey T. Fosgate[1], Mary-Lou Penrith[2,3] and Gavin R. Thomson[2,3]

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Article 8.8.22 of the OIE's Terrestrial Animal Health Code provides an international standard for the safe importation of chilled or frozen deboned beef from FMD infected countries or zones. The objective of this investigation was to perform a quantitative risk assessment to determine whether different risk management scenarios provide 'equivalence' in terms of FMD risk reduction. A quantitative, stochastic risk assessment was conducted for the Zambezi Region using three independent scenarios, *viz*. 1) application of Article 8.8.22 quarantine option (Q-OIE), 2) theoretical application of Article 8.8.22 10 km FMD free radius option (R-OIE) and 3) a value chain system (VCA) created using HACCP and commodity-based trade (CBT) principles. Analyses were conducted independently for different cuts of beef and exposure assessment was based on swine consuming waste beef in the importing country. Estimated probabilities of infection of swine were descriptively similar for all risk management options and lowest for the most valuable cuts of beef. For example, the probability (range) that a box of fillets would cause FMD virus infection in exposed swine in the importing country was 5.7x10-7 (0, 3.5x10-1), 4.4x10-7 (0, 1.8x10-1), and 4.6x10-7 (0, 3.3x10-1) for the Q-OIE, R-OIE, and VCA scenarios, respectively. A risk management system based on integration of HACCP and CBT approaches along a defined beef value chain documented equivalence with existing international trade standards. This system has the potential to benefit resource poor cattle farmers and offers a system whereby both wildlife conservation and commercial beef production can be accommodated in FMD endemic areas.

Prospects for a Commodity Based Trade Approach in Northern Botswana: Is there a Win-Win for the Livestock and Wildlife Sectors?

Letihogile G. Modisa

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Botswana stands at the top of the Progressive Control Pathway (PCP) of the OIE having successfully cleared more than 85% of the country from foot and mouth disease (FMD). The main thrust of Botswana's success was geographic separation, which was premised on fencing grazing areas so that cattle of different status and indeed reservoir wildlife do not mix so as to prevent the spread of disease.

Costly as the exercise has been, we have had access to lucrative markets, especially in the EU. At the livestock / wildlife interface, Botswana is faced with serious challenges making geographical separation a nightmare particularly due to damage of fences by elephants. Addressing the interface challenge entails, in part, moving more towards vaccination and individual animal identification as components of more cost effective control measures.

Commodity Based Trade (CBT) remains the only viable option for the co-existence of the beef and the wildlife sectors in this part of the country. Botswana has the necessary infrastructure and know-how to comply with all of the requirements of successful CBT, and will be in a position to give guarantees on the safety of such products in any market. This will yield good returns to the farmers whilst improving coexistence with wildlife.

Reconciling Conflicts Between Livestock Production and Wildlife Conservation in Zimbabwe: Expanding Options for Rural Development

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Existing to satisfy basic food and nutritional security as well as livelihood resilience, livestock keeping is highly integral to agriculture's economic and socio-economic development interests. As livestock in general, and cattle in particular are notably the biggest user of natural resources they tend to be expansionist, often negatively impacting on natural resources through land degradation and biodiversity loss. While being important to environmental nutrient recycling, unchecked, livestock can also be a significant contributor to water and air pollution. Vast tracts of land are needed to satisfy feed needs. Agricultural expansion also increases the interphase of wildlife and livestock, resulting in increased pressure for animal health management. Among the major animal and zoonotic disease risks resulting from an expansion of the interphase are trade-sensitive transboundary animal diseases, and others of public health significance. Livestock raising therefore directly challenges environmental conservation policy in terms of production space required for feed and food crops, access to feed and water, safety and security including biosecurity for the livestock and their human keepers and the downline impact of these on viability and market access. There is therefore need for careful balancing of interests of public policies in support of the agricultural and environmental objectives of rural development.

This presentation outlines the basis of relevant conflicts, providing actual and other workable suggestions for some of them, towards harmonization of policies for sustainability of agriculture, natural resource conservation and tourism.

Lessons Learned in Terms of Implementation of the Commodity-Based, Value Chain Approach Demonstrated by the Zambezi Region Abattoir Pilot Project

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Since 2008, Namibia's Zambezi Region, which lies at the centre of the Kavango-Zambezi Transfrontier Conservation Area, has experienced limited access to fresh beef markets due to sanitary barriers relating to the increasing frequency of occurrence of foot-and-mouth disease (FMD) outbreaks in cattle. Smallholder farmers who raise livestock in the region are dependent on cattle sales to meet a variety of daily needs as well as for potentially providing an opportunity to step out of poverty. FMD outbreaks result in immediate suspension of export certification and imposition of animal movement restrictions throughout the region. These measures hurt farmers as they disrupt livestock marketing activities, often for several months.

A pilot study investigated technical feasibility of the commodity-based value chain approach in mitigating FMD risk related to importation of fresh beef produced from Zambezi region. The commodity-based value chain approach, instead of determining market access based on disease status of the area of origin, focuses on the process by which beef is produced. Results of the pilot study indicate that fresh beef produced under the commodity-based value chain approach presents a negligible risk of introducing FMD virus to importing countries. The remaining constraint is to convince the market that implementation of the World Organization for Animal Health's standard, Article 8.8.22 using the commodity-based value chain approach, renders fresh beef a safe commodity.

Herding for Health: A Community-Driven Approach with Commodity-Based Trade as a Catalyst for Enhancing Wildlife-Livestock Compatibility

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Landscapes where pastoralist communities and wildlife interact symbolises a complex of challenges and opportunities of significant importance to conservation in Africa. This wildlife-livestock interface represents multiple risks to all present: the spread of transboundary animal diseases and important zoonotic pathogens; various forms of human-wildlife conflict, such as predation and poaching; competition for natural resources, like grazing; and silo-structured governance systems that need to interact at multiple levels. These risks hinder both the development of a robust wildlife economy that is compatible with agricultural practises and rural development, and the successful establishment of transfrontier conservation areas.

The recent development of new trade standards (Article 8.8.22, TAHC-OIE) for beef produced in FMD infected areas allows for non-geographic, commodity-based trade (CBT) approaches in beef. We argue that an integrated value chain approach to CBT can serve as a catalyst to align efforts at multiple levels by multiple stakeholders to address wildlife-livestock compatibility, but must include all farmers and must be tested. As such, the Herding for Health model aims to empower communities through collective action and traditional risk mitigation (herding and kraaling) to comply with prerequisite programs and biodiversity conservation agreements. Trade standards are addressed through integrated risk management along the red meat value chain. Market access is facilitated by mobile abattoir technology and conservation-community collaboration in the form of access and benefit sharing models which also promote sustainable enterprise development linked to ecosystem services. This community-driven approach unlocks incentives for conservation-community-government involvement at the wildlife-livestock interface that are both pro-poor and pro-conservation.

The Impact of European Union (EU) Sanitary and Phytosanitary (SPS) Standards and Technical Barriers to Trade (TBT) on the Botswana Beef Industry, with Particular Reference to Ngamiland

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This paper considers the implications of EU Sanitary and Phytosanitary (SPS) Standards and Technical Barriers to Trade on the overall costs and benefits of Botswana selling beef to the EU under existing arrangements as they pertain to FMD management as well as other measures such as limitations on the use of growth hormones, antibiotics and other measures permitted in a market such as South Africa. The cost-benefit analysis shows that there is a benefit to Botswana of continuing the market access into the European Union, however, that result is highly dependent upon the price assumptions made regarding the future price of beef. Should prices not be sustained then the net value of market access may become negative even when the counter-factual is based on exports to South Africa. The economic benefits of preferential EU market access were not transferred to Batswana cattle farmers, but rather absorbed by the economic inefficiency of the Botswana Meat Commission, which stands between the farmer and the EU market.

The study concludes that the cost of compliance with EU standards has greatly impacted the Ngamiland region where FMD outbreaks have been continual since the last decade and resulted in substantial real income decreases, with Ovaherero cattle farmers of Ngamiland seeking the right of return to their traditional homeland in Eastern and Central Namibia. While commodity-based trade (CBT) will allow greater market access for Ngamiland farmers, it will also create greater regional competition in the cattle industry, which may create a degree of fear amongst producers.

The Importance of a Diversified Economy for the People and Wildlife of the Khaudum-Ngamiland WDA

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The Khaudom-Okavango "Wildlife Dispersal Area" (WDA) in Ngamiland, northwest Botswana, is one of five areas identified by the KAZA Large Carnivore Coalition as integral to maintaining large carnivore population connectivity in the KAZA landscape. This KAZA WDA focuses on Botswana's epicenter of FMD and includes the fenced international boundary between northeastern Namibia and Ngamiland. Botswana's livestock disease control policy historically has focused on eradication of disease by erecting fences that separate livestock from wildlife. This approach has primarily served to protect the commercial beef interests of farmers outside of Ngamiland at the expense of Ngamiland's entire farming sector and broader economy. Wildlife based tourism is the region's most important economic driver and contributes 10-12% of the country's GDP. But most rural communities in Ngamiland are situated in livestock grazing areas, historically intended to be isolated from the wildlife in Wildlife Management Areas (WMA's). They consequently have had no opportunity to benefit from wildlife. At the same time, the value of cattle is very low primarily due to the Red Zone-associated difficulty in accessing domestic, regional and international markets. Importantly, the fence-to-separate approach can never succeed in co-existence with Botswana's important wildlife-based economy – especially as related to Africa's largest elephant population which ranges throughout the Ngamiland district. An integrated approach to Ngamiland's economy must be developed that includes commodity-based trade (CBT) beef and embraces, rather than focuses on eliminating, wildlife in western Ngamiland. This is the only way forward that will facilitate ecosystem connectivity from northeast Namibia (Khaudom and associated areas proposed by KAZA) through Ngamiland to the Okavango Delta (and beyond), as proposed by the broader KAZA landscape.

Potential Impacts of Strategic Fencing Realignments for Reducing Human / Elephant Conflict and Enhancing Conservation Success

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The Okavango Panhandle is a central part of the regional elephant range and a key part of two Wildlife Dispersal Areas (WDA) within the KAZA TFCA, namely the Kwando River and the Khaudom-Ngamiland. A major management issue under consideration in KAZA is the position of fences i.e. northern buffalo fence and the Namibia-Botswana border fences and the impact these may have on wildlife movement and human-wildlife conflicts within WDAs. It is important to ensure that migration routes across WDAs in KAZA are left open for dispersal but also to assess the potential impacts of adjusting fence alignments. Evidence from elephant movements (a wide ranging species) across fences and international boundaries can contribute to motivating policy change for fence re-alignment and/or removal in the context of KAZA objectives, in particular the viability of WDAs.

To gain a greater understanding of elephant movements in the Okavango Panhandle, the Ecoexist team deployed 40 satellite collars on elephants (15 females and 25 males) in 2014 and 2016. This data shows that the fences appear to be restricting female and some male elephant movement out of the eastern Panhandle. Data from collars deployed on the Namibian side also indicate these fences are restricting movement of elephants into the eastern Panhandle. The north-south movement of elephants between NG13-NG11-NG12 is essential for the eastern Panhandle population.

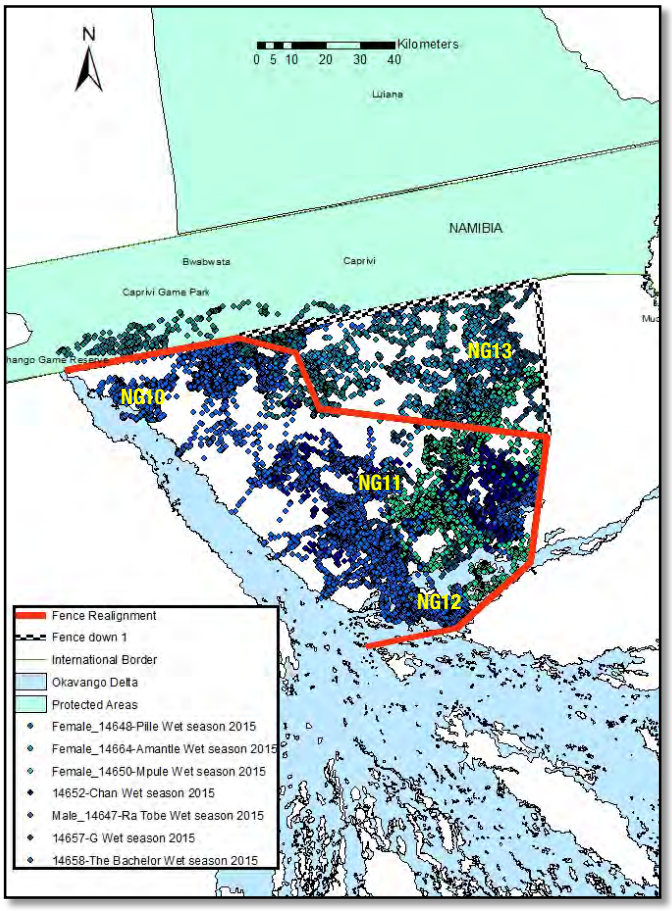

Fig. 1. Proposed fence realignment (red line) across wet season elephant range between NG11 and NG13

A northern-buffalo or Botswana-Namibian border fence realignment around NG11, which has been suggested by some in the past, would therefore place a barrier directly across these migration routes (Fig. 1). Consequences of such a realignment are likely to be that a) the fence gets broken repeatedly; or b) elephant's may be restricted from moving out of NG11 into NG13, which will affect the natural migration north during the rains and natural alleviation of pressure on resources and people in NG11 during that time. Higher concentrations of elephants in NG11 year round could exacerbate conflicts between people and elephants.

One option could be to remove part of the Botswana-Namibian border fence and part of the northern buffalo fence to allow wildlife movement back and forth, but still restrict cattle movement into high end tourism areas and across borders (Fig. 2). The likely increase in movement of buffalo into community areas i.e. NG10, NG11 and NG12 would obviously warrant adoption of the CBT model to negate associated negative FMD implications. Simulating different scenarios of fence realignment or decommissioning of sections of fences will allow us to predict the consequences of such management decisions and give us data to help inform management decisions regarding fences and WDAs.

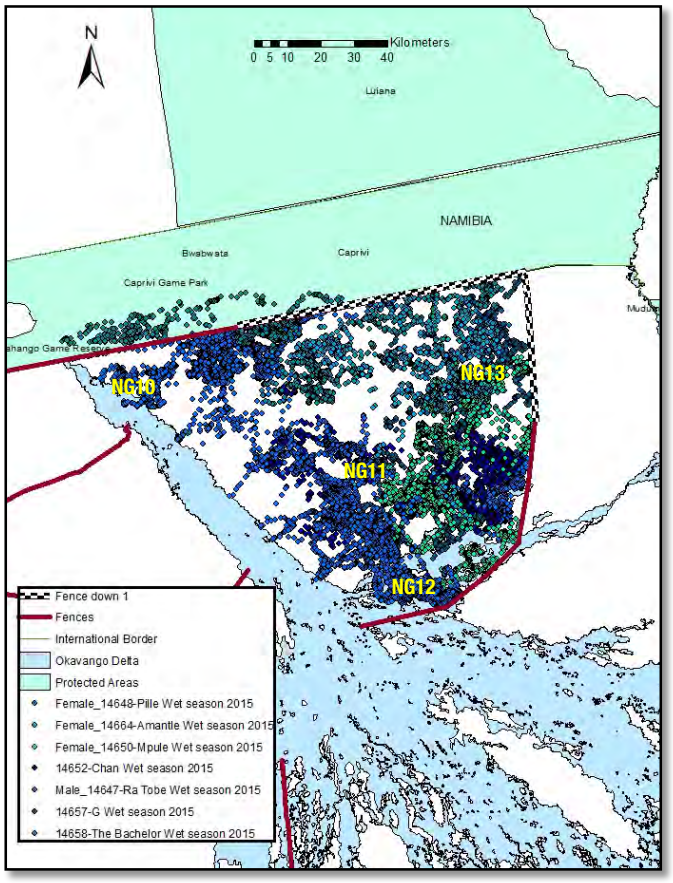

Fig. 2. Proposed section of fence to remove (black and white line), to increase movement of wildlife across the Kwando WDA whilst still restricting movement of cattle.

Diversifying and Integrating Community-Based Natural Resource Management to Include Rangeland Management in the Zambezi Region

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Namibia is internationally renowned for its progressive approach to Community-Based Natural Resource Management (CBNRM). Its CBNRM approach has focussed heavily on wildlife and more recently expanded to include forestry, high value plants and inland fisheries management, though each sector remains governed by its own laws and institutional frameworks. As one of its critical priorities, local NGO, IRDNC aims to further integrate other sectors and resources, such as rangeland governance, and to diversify and integrate multiple natural resources into integrated sets of local institutions and management systems. In Namibia's Zambezi Region, key wildlife corridors and portions of a lease held by a farmer's cooperative have been identified as focal sites where integrated approaches can strengthen natural resource (including grazing) governance. IRDNC's vision is that livestock farming and conservation would come to be regarded as compatible forms of land use, despite endemic Foot and Mouth Disease (FMD) outbreaks which have led to the closure of the Katima Mulilo abattoir.

This presentation will provide an overview of IRDNC's efforts to promote a more integrated approach to support conservation and development (with a particular focus on strategies to improve rangeland management) that hold promise as an alternative model for communal natural resource and agricultural governance. The success of initiatives such as these, where communities are positioned to benefit from both livestock and wildlife, will hinge upon the development of Commodity-Based Trade (CBT) to market beef to countries neighbouring the Zambezi Region.

A Taste of India: Value-Added Meat Processing & Market Access Despite FMD – Thoughts from One of the World's Largest Beef Exporting Countries

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The saga of Indian meat exports is a success story of six decades of development through the different phases of an initial period, the low volume long years (learning period), and then growth and surge periods. This development has corresponded with sourcing meat from poorly managed domestic slaughter houses, modern public slaughter houses, modern private slaughter houses and modern integrated abattoirs cum meat processing plants which are world class facilities and well managed and regulated.

The success of Indian meat has been due to the totality of the factors involved in animal production, processing and utility. Indian meat exports have been largely of buffalo meat (more than 95 percent), and buffaloes have been a triple purpose animal (milk, meat and draught). This has led to the selection of breeds for muscle development resulting in leanness of the carcass. Thus buffalo meat has low fat, low cholesterol and higher protein. Buffaloes produce tender meat by virtue of their docile habits, slow movement and other energy saving characteristics.

Raising of buffaloes in small holder situation under mixed farming conditions with natural grazing and supplemented with diets of crop residues and agro-byproducts has been a most desirable system. The animals have no risk of hormone or drug residues, and their rearing presents no negative animal welfare implications. Dairy sector development by the Government of India with the large scale 'Operation Flood' programme and cattle and buffalo breeding programme has ushered in a 'White Revolution' contributing for sustainable buffalo production. Leather sector prospects have also complemented buffalo production and utility. Effective ante-mortem and post-mortem inspection, adequate chilling of carcasses and deboning and deglanding and freezing have ensured foot and mouth disease risk-free status in more than 75 countries where Indian meat is exported. Strict compliance with OIE provisions of Article 8.8.22 has assured the risk -free quality of Indian meat even when India was in the process of OIE endorsement for FMD-CP prior to May 2015, placing India as the world's largest buffalo meat exporter with volumes of 2.4 million tons valued at over USD 5 billion in 2014.

Attributes of buffalo meat popularity and success of meat exports include: economical (reasonable) cost; desirable compositional characteristics (lean meat of higher quality protein, lower fat and cholesterol, desirable fatty acids, minerals and vitamins); safe meat and desirable public health aspects; ethical and traditional considerations, etc. In a recent study it has been opined that buffalo meat could provide a safer and healthier alternative to cow meat (Giordano et al. 2010). India's water buffalo meat industry is contributing to global food security.

From Where the (Water) Buffalo Roam: India's Rise as Major Exporter of Bovine Meat

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In recent years, India has emerged one of the largest exporters of bovine meat, mainly buffalo meat, despite buffalo being valued mainly for milk. Meat is an adjunct product, produced by slaughtering young calves and unproductive adults, both male and female. Between 1999-2001 and 2013-2015, India's bovine meat exports increased more than six-fold from 0.31 million tons to 1.95 million tons, lifting the country's share in global bovine meat exports from 5% to about 20%. The rapid growth in India's bovine meat exports is on account of several factors, domestic as well as international. India's cost of bovine meat production is much less compared to that of the other major exporting countries. India's buffalo meat is free from antibiotics and other chemicals used for fattening, low in fat and cholesterol, and being lean blends well with other value-added products. Expanding global demand for beef, particularly in the developing countries, coupled with rising beef prices in major producing and exporting countries, created an opportunity for Indian exporters to invest in modern export-oriented slaughterhouses and thus export low-priced buffalo meat. India's export destinations are primarily the developing countries in south-east and middle-east Asia – these being geographically closer to India extends the advantage of low shipping costs. Consumers in the middle-east have a strong preference for *halal* meat, and India is capable of fulfilling this requirement.

The Utility of a Mobile Abattoir

Tertius Bergh

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The delivery of services has become the most important driver of the modern day economy. It is therefore not surprising that services to communities have come in the form of a mobile unit. We have been introduced to the mobile phone, which has revolutionised the communications industry.
Mobile clinics, libraries with Internet education, and many more developments can be mentioned, with the result that far-off communities now have access to the services necessary to improve and enlighten their lives.

Mobile abattoirs are no different and this concept has already been introduced for some years in the USA. Lately countries like Australia and Canada has discussed the concept widely and have praised its possibilities in servicing the small scale farmer. The South African Department of Agriculture accepted the concept around 2013, and has already built a unit to service the community of Soweto that lies within the confines of a greater metropolis. Namibia is the latest country to adopt the concept.

A developing continent like Africa still has vast open land where subsistence and small scale animal farming is a reality and where this is the wealth and currency of the population. The challenges of drought conditions and inadequately resourced farming enterprises are of course quite real. Therefore, when diseases like foot and mouth becomes an inhibitory factor due to large-scale quarantine when an outbreak occurs, the devastating effects upon these communities have been clear.

The company Mobile Abattoirs has taken up the challenge mainly to service the fast growing game industry, recognizing that an approved slaughter facility (abattoir) is needed to ensure a controlled environment where slaughter and meat inspection can be carried out. The concept has, however, caught the attention of communities that need a small abattoir to slaughter livestock intermittently, and where the erection of traditional “bricks-and-mortar” facilities, has been a stumbling block due to expense. The mobile abattoir concept was developed for rugged African conditions: not only is it easily deployed and lightweight, but it also seems to be a perfect answer to implementing the now OIE-approved concept of commodity-based trade.

The unit is not meant for large-scale slaughter, and it surely will have its challenges in adverse weather conditions, but mobile abattoirs will be able to change the face of animal protein harvesting in rural Africa.

Commodity-Based Trade of Beef – A Noble Idea?

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Risk associated with the practical implementation of commodity-based trade (CBT) for beef was recently evaluated in the Zambezi Region of Namibia. The project was mainly funded by the Millennium Challenge Account, a support program of the USA. Access to markets for beef produced from this region, where FMD is maintained by the abundant wildlife population, is restricted by inflexible international sanitary standards as well as the limited quantities of quality beef available for trade. The project showed that the risk of FMD virus transmission is negligible if specifically designed risk mitigation measures developed by the project are applied, i.e. a combination of measures applied at critical control points along the value chain with an associated prerequisite programme. The problem is, however, that this approach is not accepted by importing country competent authorities despite clear demand. That precludes the possibility of improving the socio-economic circumstances of marginalised cattle producers in areas where wildlife and livestock are both important elements of rural development. Broader acceptance of FMD risk mitigation along value chains would assist the Meat Board of Namibia in developing an integrated approach incorporating finishing of weaners on irrigated pastures and application of strict sanitary and hygiene standards enabling the manufacture of safe and healthy products.

Which Way Markets? Lessons Learned from Around the World: A Perspective from the Botswana Meat Commission

Stephen Ghanie

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The Botswana Meat Commission (BMC) is the sole exporter of beef from Botswana. It operates three export abattoirs, with one of them situated in Maun, Ngamiland District, a foot and mouth disease (FMD) affected, with-vaccination area. The abattoir has a slaughter capacity of 120 cattle a day sourced from the district's cattle population of 300,000 head. The average cold dressed mass (CDM) is 220 kg.

Despite the slaughter being sourced from healthy animals and meat undergoing a maturation process, access to better paying markets poses a serious constraint to the Maun operation due to the district's FMD status. The abattoir makes an income loss of $14,390 weekly. The result is that Ngamiland farmers are paid less at $1.87 per kg of CDM, whereas their counterparts in the FMD free-without-vaccination zones earn $2.21 for non-EU export product, and $2.69 for EU eligible product within a similar carcass grade.

The overall economic impact for the Ngamiland farmer and the cattle sector's employees is not favourable, particularly in an area where farming inputs are already higher than for other districts in Botswana.

Which Way Markets? Lessons Learned from Around the World: A Perspective from ZamBeef

Felix Lupindula

Zambeef Products Plc, Zambia. Email: flupindula@zambeef.co.zm

One of the largest suppliers of beef in Zambia. 7 beef abattoirs and 3 feedlots with capacity to slaughter 100,000 cattle per annum (p.a.) and feedlot 30,000 grain fed cattle p.a. Process over 7.9 million chickens and produce over 39 million eggs p.a. One of the largest piggeries, pig abattoir and pork processing plant in Zambia. One of the largest chicken and egg producers in Zambia. Capacity to slaughter over 100,000 pigs p.a. Produce full range of cooked, smoked and processed meat products. Dairy farm with over 2,600 dairy cattle, with 900 currently lactating, and producing over 7.4 million liters of milk p.a. Milk pasteurized and homogenized in milk processing plant. Further value added in producing yoghurt, drinking yoghurt, cheese, butter and milk-based juices. Milk/dairy processing plant producing over 12.3 million liters of dairy products p.a. From the Beef Cattle Perspective, livestock population is high in Southern, Western, Eastern, and Central Zambia. Most livestock is on the Zambezi and Kafue Plains (traditional cattle). Commercial cattle raised on the Plateau area in Mid South and Central Zambia. Beef consumption is high in cities along the line of rail and Copperbelt. Disease challenges include foot and mouth disease (FMD), East Coast fever (ECF) and contagious bovine pleuropneumonia (CBPP). Zoning of beef cattle and distant markets compels movement of cattle to markets.

Have a technical and environmental department in place. Implementing Food Safety System Certification 22000. System consists of HACCP and Pre-requisite programs. Global Food Safety Initiative (GFSI) prior to FSSC 22000. Before any stock movement, test for ECF and FMD. For pork, we test for African swine fever (done at government lab).

One of the largest stock feed producers in Zambia, with a capacity of 13,750 tons p.m. Supplying all Zambeef internal requirements (33%) and 3rd parties in Zambia and the region (67%). Largest tannery in Zambia, with a processing capacity of 100,000 hides p.a. One of the largest shoe plants in Zambia, with a processing capacity of 80,000 pairs p.a. Tannery and shoe plant to add further value to the by-product of the beef abattoir division (cattle hides). Producing wet blue leather, finished leather, industrial footwear and protective leather clothing. Wheat mill with a capacity to mill 30,000 tons of wheat p.a. Adds value to the wheat from the Zambeef farms. Meat processing plants with a capacity to process over 700 metric tons (M.T.) of processed meats per month (p.m.).

Overview of Updated Draft "Guidelines on Mechanisms for Applying Commodity-Based Approaches to Management of Foot and Mouth Disease Risk for Beef Exporting Enterprises in Endemic Areas in sub-Saharan Africa"

Mary-Lou Penrith[1,2] and Gavin R. Thomson[1,2]

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Guidelines for beef exporting enterprises located in areas not free of foot and mouth disease (FMD) or where routine vaccination against the disease is necessary were developed in early 2015. These have now been updated to accommodate further changes to the relevant international sanitary standards made in May 2015. The Guidelines have also been expanded to potentially apply to the whole of sub-Saharan Africa. This presentation focuses on the application of these guidelines in situations where eradication of FMD is unachievable because of unique features of SAT serotypes, including maintenance by wildlife.

The guidelines cover five situations for which international sanitary standards are available on trade related to FMD and a sixth option for which there is no international standard as yet. Specifically the approaches, which can be mutually reinforcing if combined, are (1) zones free of FMD with vaccination, (2) compartments free of FMD, (3) compliance with Article 8.8.22 of the OIE *Terrestrial Animal Health Code* without the option of quarantine, (4) compliance with Article 8.8.22 incorporating the quarantine option, (5) processing beef to destroy any virus present, and (6) achievement of acceptable risk mitigation along value chains using a HACCP-based system. The latter approach facilitates efficient auditing of FMD risk management, enabling more reliable sanitary certification.

Invited Paper: Towards Alignment of Disease Management and Livestock Trade Promotion in FMD-Endemic Areas of Sub-Saharan Africa: Pragmatic Approaches to Doing Better

Gavin R. Thomson[1,2] and Mary-Lou Penrith[1,2]

[1]TAD Scientific, Pretoria, South Africa; [2]Department of Veterinary Tropical Diseases, University of Pretoria, Onderstepoort, South Africa. E-mail: gavin@tadscientific.co.za

Citation

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Abbreviations

AHEAD – Animal & Human Health for the Environment And Development
ALOP – appropriate level of protection
COMESA – Common Market for Eastern and Southern Africa
EAC – East African Community
FAO – Food and Agriculture Organization of the United Nations
FMD – foot and mouth disease
HACCP – hazard analysis critical control points
OIE – World Organisation for Animal Health
SADC – Southern African Development Community
SAT – South African Territories (serotypes of FMD viruses)
sSA – sub-Saharan Africa
TAHC – Terrestrial Animal Health Code (of the OIE)

…A one-size-fits-all approach to FMD risk mitigation associated with international or regional beef trade is clearly unrealistic and unnecessary. The diversity of internationally recognised risk mitigation measures now available for beef production is therefore a welcome development, albeit currently insufficiently exploited. This development also potentially enables FMD risk mitigation to be tailored to individual value chains whether they be large and complex with multiple components or applicable to small individual business enterprises….

Background

For FMD-endemic areas of sub-Saharan Africa (sSA), access to international and some regional markets for commodities and products derived from cloven-hoofed animals has long been impeded by sanitary standards aimed at preventing the spread of FMD through trade. However, recent amendments to international sanitary trade standards provide more flexibility and thereby improve trade opportunities. Because disease risk management options can appear complex and therefore difficult to navigate by non-specialists, guidelines to assist beef-producing enterprises located in FMD endemic areas of southern Africa were recently published (Thomson & Penrith, 2015). Subsequent changes to the sanitary standards require that the guidelines already need to be updated, and that process is underway.

International standards related to FMD for trade in animal commodities and products raise particular difficulties in countries where SAT serotypes of FMD viruses (SAT 1, 2 & 3) are endemic. The reason is that the epidemiological features of SAT serotype FMD differ in some respects from those of the other major lineage of FMD viruses, the Eurasian serotypes (O, A, C and Asia 1). Current sanitary trade standards are based primarily on the behaviour of Eurasian serotype FMD.

Briefly, distinguishing features of SAT serotype FMD include:

- Their unique co-evolution with and maintenance by African buffalo (*Syncerus caffer*);
- Frequency of mild disease and inapparent infection of both wildlife and livestock caused by SAT viruses;
- Differences in modes and rates of transmission of the two major lineages, including the epidemiological significance of persistent infection in African buffalo;
- Vaccine efficacy that is compromised by exceptional antigenic diversity within SAT serotypes, and duration of immunity to SAT vaccination that has also been shown by some experimental work to be unusually short-lived.

The net result of these differences is that SAT serotypes are more difficult, if not impossible, to eliminate on a regional basis other than by eradication of buffalo (Thomson et al., 2015). Buffalo eradication, however, is untenable for ecological, economic and moral reasons. Additionally, some commonly accepted approaches to FMD management need to be re-evaluated in light of the differences listed above. The FAO, together with the Southern African Development Community (SADC) and others is therefore engaged in developing guidelines that could improve the management of SAT serotype FMD on a regional basis in southern Africa.

The interplay between the realities of the epidemiology of SAT serotype FMD, international sanitary standards, and wildlife conservation initiatives such as the transfrontier conservation area (TFCA) movement constitutes only one aspect of the complex FMD problem in sSA; another is the need to facilitate generation of improved financial return from livestock production, primarily cattle production, in areas where both livestock raising and wildlife conservation overlap. Livestock constitute the only tradable resource of large numbers of people – possibly as many as 10 million in southern Africa alone – living in rural areas of the subcontinent where rates of poverty are among the highest in the world. There have consequently been longstanding attempts, in southern Africa particularly, to access foreign beef markets as a foundation for rural development. However, the usual approach, creation of FMD-free zones, is particularly difficult where large numbers of free-living wildlife are present or where pastoralism is widely practised, such as in parts of East Africa and the Horn of Africa. Where FMD-free zones have been established, an inequitable situation often results in which livestock producers in the free zones benefit from access to high value markets while those outside those areas, usually a majority, are excluded not only from export markets but even from domestic markets.

Rural development in many areas of southern and eastern Africa is highly dependent on wildlife, primarily as a unique and priceless natural resource but also as a source of foreign income generated by tourism; that income is increasingly more lucrative for countries of the region than are livestock industries. On the other hand, livestock are important culturally and financially to many rural

communities in sSA. Furthermore, only limited amounts of the income derived from wildlife-based enterprises have tended to benefit local residents, while in contrast income derived from trade in livestock generally accrues directly to livestock owners. That situation – compounded by human-wildlife conflict including the loss of crops and livestock to wildlife; competition for grazing and water; and animal diseases transmitted directly or indirectly by wildlife and the resulting trade impacts (especially in the case of FMD) – are the major contributors to the current conflict between livestock and wildlife interests in many localities.

For the above reasons, achieving a balance in respect to the vital contributions of both domestic and wild animal resources to rural development in sSA is a complex but nevertheless crucial issue for the future of the subcontinent.

This document concentrates on sanitary aspects of beef production and trade as a means of contributing to the need for balanced rural development in sSA.

Features and consequences of trade in animals and animal products produced in sub-Saharan Africa

Most cloven-hoofed livestock production in arid- or semi-arid regions of sSA (i.e. the larger part of the sub-continent) is based on traditional low input systems resulting in production limited both in quantity and quality. Such systems are currently often inadequate to satisfy local demand, never mind supply export markets with exacting sanitary and other quality standards. Consequently, some countries have attempted to increase production by allocation of more and more land traditionally devoted to wildlife conservation to livestock production. The wisdom of that approach is questionable.

A concomitant desire on the part of many countries of the region is to gain access to beef export markets by following the examples set by Botswana and Namibia through creation of large FMD-free zones from which beef can be exported. However, establishment of such zones in countries where large numbers of wildlife are present can often only currently be achieved by elimination of buffalo which in many situations would undermine if not destroy vital tourism industries, quite apart from being ecologically disastrous. Furthermore, despite access to EU beef markets over many decades, the competitiveness of the Botswana and Namibian beef industries has been in decline for a number of years (UNCTAD, 2013; Botswana Parliamentary Report, 2013; Thomson et al., 2013a). This is reflected by the simple fact that both of these countries are only able to compete in EU beef markets through tariff protection (Thomson et al., 2013a).

The example of India moreover – which has the largest share by volume of global beef trade, despite not being free from FMD and having no FMD-free zones – provides an illuminating lesson because the beef production system in India is, like in sSA, characteristically 'low input' but nevertheless successful in accessing profitable markets (Landes et al., 2016).

An obvious requirement for sSA is therefore systems that enable more effective and efficient beef production, including in areas where pastoralism is common and/or where livestock production and wildlife conservation need to co-exist. That, as stated above, has been aided by 2015 amendments to international sanitary standards for achieving acceptably safe trade as defined by Article 8.8.22 of the World Organisation for Animal Health's (OIE) Terrestrial Animal Health Code (TAHC) (http://www.oie.int/index.php?id=169&L=0&htmfile=chapitre_fmd.htm). There are a number of options

whereby beef can be safely produced in accordance with international sanitary standards and exported from locations that are not situated in a FMD-free country or zone as explained in the existing guidelines (Thomson & Penrith, 2015 – in the process of being updated). Essentially the options are:

- Use of compartmentalisation – covered by Article 8.8.4 of the TAHC;
- Application of Article 8.8.22 that provides a series of risk reduction measures, including two options under clause 1.c,
    - ensuring that FMD infection has not occurred within a radius of 10 km of the establishment from which the cattle or water buffalo are derived within the last 30 days (see Thomson et al., 2013a who show that this is difficult to prove in practice in locations where wildlife susceptible to FMD are present), **or**
    - ensuring that the animals spent the last 30 days prior to slaughter in a quarantine station or that the 'establishment' from which the cattle are derived qualifies as such.

Box 1: Provisions of Article 8.8.22 in the OIE's Terrestrial Animal Health Code dealing with recommendations for the importation of fresh meat (excluding feet, head and offal) from cattle located in FMD infected countries or zones with an official control programme for FMD including compulsory vaccination of cattle

Veterinary authorities should require the presentation of an international veterinary certificate attesting that the entire consignment of meat:

1. comes from animals which:
    a. have remained, for at least three months prior to slaughter, in a zone of the exporting country where cattle are regularly vaccinated against FMD and where an official control programme is in operation;
    b. have been vaccinated at least twice with the last vaccination not more than six months, unless protective immunity has been demonstrated for more than six months, and not less than one month prior to slaughter;
    c. were kept for the past 30 days in an establishment, and that FMD has not occurred within a 10 kilometre radius of the establishment during that period, or the establishment is a quarantine station;
    d. have been transported, in a vehicle which was cleansed and disinfected before the cattle were loaded, directly from the establishment of origin or quarantine station to the approved slaughterhouse/abattoir without coming into contact with other animals which do not fulfil the required conditions for export;
    e. have been slaughtered in an approved slaughterhouse/abattoir:
        i. which is officially designated for export;
        ii. in which no FMD has been detected during the period between the last disinfection carried out before slaughter and the shipment for export has been dispatched;
    f. have been subjected to ante- and post-mortem inspections within 24 hours before and after slaughter with no evidence of FMD;
2. comes from deboned carcasses:
    a. from which the major lymphatic nodes have been removed;
    b. which, prior to deboning, have been submitted to maturation at a temperature greater than + 2 °C for a minimum period of 24 hours following slaughter and in which the pH value was less than 6.0 when tested in the middle of both the longissimus dorsi muscle(s).

We also contend that alternative systems based on risk-mitigation along value chains and shown by risk analysis to provide a level of overall risk mitigation at least equivalent to an existing international sanitary standard merit additional attention (Thomson et al., 2013b). It needs to be recognised that equivalence is a fundamental component of the World Trade Organisation's Agreement on the Application of Sanitary and Phytosanitary Measures (Article 4) as well as of the OIE's Terrestrial Animal Health Code (TAHC). Despite that fact, countries in sSA as well as potential regional or international trading partners inexplicably ignore the obvious opportunities so provided. Furthermore, the range of available risk management alternatives are not mutually exclusive, i.e. they can potentially be combined to increase flexibility.

The technical strengths and weaknesses of these alternatives have been pointed out in the guidelines for beef enterprises mentioned above. However, what is often not appreciated is that the choice of the most appropriate FMD-risk management option depends not only on the technical merit of the risk mitigation system or systems employed; it also depends crucially on the demands of target markets (sanitary and other quality demands) and the costs of compliance with those demands. The latter is often fundamental in the determination of profitability.

Pragmatic approaches to doing better

If the foregoing is correct, a one-size-fits-all approach to FMD risk mitigation associated with international or regional beef trade is clearly unrealistic and unnecessary. The diversity of internationally recognised risk mitigation measures now available for beef production is therefore a welcome development, albeit currently insufficiently exploited. This development also potentially enables FMD risk mitigation to be tailored to individual value chains whether they be large and complex with multiple components or applicable to small individual business enterprises.

It is widely accepted that beef value chains are largely defined by the nature of the commodity or product (for example chilled half-carcasses as opposed to frozen boxed beef cuts) and the demands of target markets, which can vary widely. The latter aspect has arguably been insufficiently exploited in southern Africa because most countries set the EU beef market as a target, it being an international price leader with unambiguous standards. However, the sanitary standards demanded by EU beef markets are amongst the highest in the world and escalate continuously; therefore, cost of compliance can be prohibitive (Rich, 2009). On the other hand, there are many less demanding markets as has been amply demonstrated by the success of India (Landes et al., 2016).

The crucial point is that beef can be rendered 'safe' just as effectively by cheaper and more practical methodologies than those prescribed by the European Commission (Thomson et al., 2013b). One of the most promising is risk mitigation focused on critical control points, analogous in principle to the HACCP (hazard analysis critical control point) system, universally accepted for management of food safety (FAO, 2011; Thomson et al., 2013b).

Specific issues important for sub-Saharan Africa

With few exceptions, beef production in sSA has two fundamental characteristics: (1) application of traditional low-input systems that supply at best modest quantities of a quality that is generally not favoured by high-value markets and (2) necessary mobility required by both livestock and wildlife in

arid or semi-arid environments. Those features, however, create difficulties for the management of contagious diseases like FMD as well as compliance with traceability standards central to food safety assurance.

Clearly, it is necessary that more efficient livestock production systems be developed that will inevitably need to be founded on at least a degree of intensification to deliver larger volumes of better quality product that are price-competitive in at least some potentially accessible markets. Without clarity on market access standards that are not prohibitively expensive or logistically complex, there will be no incentive for investment in improved livestock production (Thomson et al, 2013a). Progress in that direction has been achieved in the recent past through increasing availability of alternatives for sanitary risk management that are easier to apply in the context of livestock production systems in sSA, although veterinary authorities and trading partners have been slow to accept the new standards. The reasons for that are unclear but possibly relate to perceived rather than actual risk and the reluctance of public sector officials to change long established practises.

Two specific requirements are necessary for progress: (1) wider acceptance of the relatively new non-geographic approaches to management of animal disease risk (value chain-based approaches already having been long accepted in the field of food safety) and (2) creation of methodologies whereby non-geographic sanitary standards are effective in low input systems so that the 'free on board' cost of the product is competitive across a broader range of markets. That is eminently possible because effective, simple and relatively cheap methods are available for management of FMD trade risk (sometimes referred to as achievement of an appropriate level of protection – ALOP). Essentially, matured beef (i.e. where a pH below 6 is assured), from which the bones and visible lymph nodes have been removed, is internationally recognised and scientifically proven to be a 'very safe product', irrespective of origin (Paton et al., 2010). Therefore, with additional up- and down-stream risk mitigation, beef and beef products can be produced that present 'negligible risk', i.e. the highest possible level of sanitary risk mitigation, even in locations not recognised as free from FMD.

The cost of compliance with sanitary trade standards is crucial when it comes to regional and international trade and in this respect *the greatest need is at a regional level because sSA cannot expect more distant markets to accept commodities and products that they are unwilling to trade among themselves*. As it is, the level of intra-regional trade in sSA is far below that of other economic regions of the world and that's an impediment to regional economic integration and economic progress (Rich, 2009; UNCTAD, 2013). That issue relates directly to the objective of the recently signed SADC-COMESA-EAC[1] (Tripartite) Free Trade Area Agreement.

Without further progress such as outlined in this document, regional integration of the livestock sector in sSA, and with it balanced rural development, will have an uncertain future.

Conclusion

The animal disease and resulting production and trade problems associated with cloven-hoofed livestock in sSA are in many respects unique, making home-grown solutions indispensable. Through

[1] Southern African Development Community; Common Market for Eastern & Southern Africa; East African Community

the agency of SADC, international agencies and other stakeholders, this has to a considerable extent now been made achievable through the acceptance by international standard-setting bodies of more flexible non-geographic sanitary standards, particularly in respect of beef trade. However, more needs to be done in the subcontinent – *administratively*, *technically* (in solidifying agreement on effective and cost-efficient non-geographic sanitary standards) and *in a business sense* – if such new solutions are to be implemented. Progress in these three domains would facilitate balanced rural development and regional economic integration while reducing conflict between the beef sector and conservation of the region's irreplaceable and economically vital wildlife resources.

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The International Comparative Economic Advantages of Multispecies Systems: What's at Stake?

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The economic and financial outcomes of land use in large semi-arid landscapes in southern Africa have largely been driven by narrow sectoral approaches that have invariably focused on livestock, especially subsidized cattle production for export markets. Market failures, overstocking, bush encroachment, disease constraints, and droughts on commercially managed land have led to the widespread collapse of these systems. Southern Africa is unable to compete effectively in international beef markets. However, its charismatic wildlife provides an unmatched comparative advantage in nature-based tourism. Farmers have accordingly responded by switching to wildlife production using nature-based tourism as the economic driver. Equally, in communal agro-pastoral systems, where livelihoods remain precarious, there is an urgent need to diversify land use options. These options can increasingly combine wildlife with cattle production given new and emerging non-geographic approaches to disease management, notably management of foot and mouth disease (FMD) at the wildlife-cattle interface. Market access through the use of commodity-based trade (CBT) will allow communal cattle producers to sell livestock at market prices to abattoirs in disease-infected zones, providing financial and economic value addition that benefits producers, processors and markets. In such a scenario, wildlife adds further value to agro-pastoral systems in which nature-based tourism, trophy hunting and cropping for protein consumption are complimentary land uses. Moreover, markets for beef should allow for improved range management and livestock health improvements that are compatible with wildlife. For example, night kraaling on fallow fields avoids predation by wild carnivores whilst improving soil fertility under a conservation agriculture regime for crop production. However, policy shifts and new frameworks, especially those for veterinary disease control, will be needed to realize these new opportunities.

ANNEX 3: WORKING GROUP OUTPUTS

ANGOLA WORKING GROUP

Are you ready to pilot / implement the Guidelines in your own country?

- Yes

What are the Challenges? Can they be overcome?

- Human resources not fully adequate
    - Motivate people to study livestock sciences
- Improve official FMD control program at Veterinary Services (implementation of Article 8.8.22)
    - Strengthen Vet Services with human resources, training programs, harmonization programmes with neighbouring countries
- Infrastructure development
    - Improve slaughter establishments, electricity and water facilities, finish demining (70% completed), communications, quarantine stations
    - In buffalo zone, need to build quarantine establishment supervised by Veterinary Services e.g. Luiana, Cuando Cubango Province
- Livestock censuses have not been undertaken together with censuses of wildlife since independence (KAZA buffalo population 10,816 head in Rivungo Municipality-Luiana Luengue last census, 2016, of cattle = 35,000)
    - Advocate to the government to allocate funds- planned for 2017
- Marketing of animals
    - Improve roads to better access markets; improve cold storage facility
- Exploit the DRC market
- Lack of livestock policy
    - AU-IBAR VET-GOV- technical assistance (under development)
- Lack of private company for marketing beef

Where are the opportunities?

- Local market consumption
- Democratic Republic of Congo market

Might your country plan on further pursuing value-chain approaches to producing beef / related products in the near future?

- Yes

If so, over what time frame? If so, where specifically, and what types of resources / technical assistance would be most helpful? / What coordination is needed regionally, including within the TFCA context? / And what needs to be done in terms of securing potential destination markets within Africa or beyond?

- Time frame
    - Requires multi-sectoral consultation in Angola

- Resources
    - Human, financial resources, materials, capacity-building
- Coordination
    - Strengthen collaboration between other vet services (e.g. Zambia and Namibia and with SADC Livestock Technical Committee)
- Securing markets
    - Explore market opportunities like Cape Verde, Sao Tome, Equatorial Guinea

BOTSWANA WORKING GROUP

Are you ready to pilot / implement the Guidelines in your own country?

- Yes

What are the challenges? Can they be overcome?

- Business model
    - Imposition of 6-month closure of abattoir associated with an FMD outbreak
    - Profitability of the businesses along the value chain
- Markets
    - Lack of market – need to define and identify markets
    - No access to Angola market
    - Landlocked country
    - Local market prefers meat with bone in it, so the demand is lower for Ngamiland meat
    - Negative perceptions of CBT / 'red zone'
    - Lack of foreign investment
- Knowledge and ownership of the process
    - Are the communities ready?
    - Buy-in / ownership of the CBT process by local farmers
- Capacity
    - Abattoir capacity in Ngamiland is insufficient
    - Water availability and watering points are insufficient
- Regulatory / bureaucracy
    - Bureaucracy stifles engagement by private sector – government changes are needed
    - Autonomy of BMC abattoirs – delay in payment of farmers
- Stakeholder partnership in process
    - Private sector

- Farmers (although different interests of different farmer groups)
- Possible unintended consequences
  - CBT could encourage extension of cattle range in wildlife areas (but status quo will not work for wildlife long-term)
  - Livestock and wildlife sectors need to work collaboratively

Where are the opportunities?

- Marketing wildlife-friendly beef – unique proposition of Ngamiland
- Provides a focus for collaboration between agriculture and environment sectors
  - serves the same client, with socioeconomic benefits to marginalized populations
  - opens space for discussion of realignment of fences while not undermining their purposes
  - helps to realize the vision and goals of the TFCA
- Adds value to game ranching industry and opens up more tourism opportunities
- Starts addressing challenges to trade (inter- and intra- country)
- Decreased human-wildlife conflict, land degradation and poaching
- UNDP Sustainable Land Management project in Ngamiland is an existing project with a multi-stakeholder forum

Might your country plan on further pursuing value-chain approaches to producing beef / related products in the near future?

- Yes

If so, over what time frame? / If so, where specifically, and what types of resources / technical assistance would be most helpful? / What coordination is needed regionally, including within the TFCA context? / And what needs to be done in terms of securing potential destination markets within Africa or beyond?

- Ngamiland
- Marketing and business model / plans
  - Research and identify market(s)
  - Proper business plan, including analysis of capacities along the value chain
  - Public-private (community) partnerships
  - Branding and messaging about the positive impacts of CBT products (wildlife friendly, free range, etc.)
  - Strategy for accessing foreign investment
  - Marketing strategy
- Collaboration, governance, institutions
  - Frequent meetings between DVS & Department of Wildlife and National Parks
  - Form multi-disciplinary committee on CBT, based on the mandate of the various documents (e.g. Okavango Delta Management Plan, Integrated Development Plan, National Development Plan)
  - Resuscitate ad hoc committee on fences (with appropriate KAZA representation)
  - Frequent meetings between DVS's of KAZA Partner Countries

- "Rule book"
    - outlines the policies and principles of CBT as practiced in Botswana
    - developed in multi-stakeholder fashion
    - outlines roles and responsibilities of all stakeholders
    - outlines minimum standards / rules and best practices
    - can be provided to foreign investors
- Education, awareness and capacity
    - Articulate the vision / value proposition of CBT for both wildlife and agriculture
    - Communicate this vision to local audiences (e.g. politicians) and markets (wildlife-friendly beef)
    - Short-, medium- and long-term education and awareness strategy
    - Sensitize farmers, illustrate benefits and use participatory methods of engaging the communities from the start (materials need to be developed in Setswana and need to make use of available media platforms such as radio)
    - Improve management practices of farmers – control of movement, etc.

Gaps
- CBT value chain operation
- Institutional (political, administrative) buy-in for CBT value chain
- Link between CBT and conservation needs to be clearly articulated for and recognized by the farmers – requires institutional capacity by NGOs / public-private partnerships

NAMIBIA WORKING GROUP

Are you ready to pilot / implement the Guidelines in your own country?
- Whether CBT is feasible depends entirely on the way in which FMD outbreaks, which are likely to increase, are managed

What are the challenges? Can they be overcome?
- Mismatch in approaches
    - FMD outbreak control (geographic) vs application of CBT for trade (non-geographic) i.e.- outbreak control based on movement control, containment, cessation of trade
    - Only when outbreak is under control, can trade commence
        - Use Quantitative Risk Assessment (QRA) to inform FMD management
- Scepticism towards CBT
    - Veterinary authorities in general still maintain CBT poses a threat (appears DVS wants status quo to continue)
    - Are we going to embrace the findings from the Zambezi Region pilot, or maintain status quo despite the body of scientific evidence?

    - Chief Veterinary Officers need some assurances
    - Identify exactly what authorities' concerns are & determine whether additional research needed to assure: e.g. -
        - QRA needs to be completed & published in scientific literature
        - Making available study design of experimental FMD infection study carried out at University of Pretoria
        - Conduct QRA of introduction of FMD virus from Zambezi Region into FMD-free Zone
- Abattoir throughput (viability):
    - With increased FMD outbreaks in Zambezi Region, current FMD outbreak management is the biggest constraint to consistent abattoir throughput
        - Results in non-viable market system (abattoir), which impacts any attempt at successful implementation of trade based on CBT approach
    - Distance further than 55km from abattoir, farmers less likely to trade formally (instead use informal trade)
    - Carcass quality / body condition during late dry season is generally too poor for farmers to trade
    - Need to look at landscape level to deal with throughput levels i.e. which is the nearest facility in region vs. only focusing on one country, then work out protocols that are accepted by all countries
    - Cannot have trade without an abattoir - logical approach is to have mutual agreements between countries, e.g. Botswana & Namibia
- Current FMD outbreak management protocol
    - Imposition of a minimum 6-month blanket movement ban across the entire Zambezi Region means abattoir is not viable - under those conditions, a pilot effort & CBT in general cannot be considered
    - DVS currently considers resource limitations as well as multiple risk factors (such as movement of cattle between Angola & Zambia) as reasons for maintaining the conventional approach
    - Blanket movement ban over vast area not necessary & OIE Code does not require this. Can set up smaller containment zone & abattoir can continue to operate (specific ways forward must come from countries, not OIE). But Partner Countries need to recognize and use an appropriate outbreak control strategy. Incubation period is 14 days. For purposes of OIE Code, double the incubation period. Code requires setting up containment zone. Two incubation periods (14 days x 2) = 28 days. Not six months.
    - Meat Board commissioned new report, which suggests an alternative FMD outbreak management protocol with a much-reduced impact on trade. Has been tabled and discussed but needs to be implemented. Used it to adapt outbreak controls, but when the FMD outbreak happened, DVS did not implement it per their own standard. Not yet accepted.
        - First step for discussing possibility of CBT pilot is adoption of Meat Board commissioned report & its possible implications on FMD outbreak management & outcomes, which will determine whether a CBT initiative is viable (based on profitable abattoir / market system)
- Export / trade issues
    - Angola & South Africa refusing beef products form Zambezi Region
    - Share requirements for in-transit consignments
    - Include trade experts in negotiations, not just veterinarians
    - Focus efforts on how to increase trade, not stop trade e.g. India

- Collaboration
    - Create platform for transboundary collaboration for veterinarians to enable discussion of issues of mutual interest
    - Abandon isolation between ministries (trade & agriculture) & collaborate more, including multi-sectoral approach
- Education, awareness, capacity
    - Lack of universal awareness of official OIE standards for FMD-infected zones
    - Carry our stakeholders with us in terms of implementation, including farmers
    - Presentation to get government buy-in given to Cabinet on Economic Affairs & to top management of National Planning Commissioner, Minister of Agriculture & Minister of Trade
    - Sensitize farmers, traditional authorities and regional councils to potential benefits of CBT in unlocking market opportunities

Where are the opportunities?

- Tremendous if DVS & Tripartite Regional Economic Communities accept & allow CBT approach to move forward (including backwards integration & better quality products & markets for livestock producers)
- Unique opportunity at KAZA level to work as a collective

Might your country plan on implementing value-chain approaches to producing beef?

- Yes

If so, over what time frame? / If so, where specifically, and what types of resources / technical assistance would be most helpful? / What coordination is needed regionally, including within the TFCA context? / And what needs to be done in terms of securing potential destination markets within Africa or beyond?

- Timeframe
    - All agriculture stakeholders from Namibia met to discuss the future of the Northern Communal Areas (NCA) in connection with enhancing livestock production & marketing; CBT was one of the approaches discussed. As a result, the group is planning on conducting a market feasibility study within the NCA. Hope to finish by January 15. Results will help inform the development of the livestock programme that will direct livestock activities within the NCA for all actors involved in the livestock value chain.
- Resources
    - Results from the marketing feasibility study will help determine resources required
    - Legal & financial
- Coordination
    - SADC to coordinate DVS's as subgroup under Livestock Technical Committee subcommittees
- Securing markets
    - Potential for pooling 5 countries together (within FMD infected zones) & look to export jointly
        - Larger catchment area for livestock, reduces potential supply issues if one area shuts down, use one central abattoir that meets international standards

ZAMBIA WORKING GROUP

Are you ready to pilot / implement the Guidelines in your own country?

- Yes
-

What are the challenges? Can they be overcome?

- Wildlife trade developed in line with conservation
- Some conflict: open range versus national parks
- Land use planning to support multispecies ecological management
- Increasing dialogue
- How to manage the wildlife corridors
- Infrastructure
- Defining the interface and how to manage it (identifying critical control points) – capacity and resource issue
- Community disease management at local level – veterinary support to enhance the capacity of herdsmen
- CBT risk management for FMD and other diseases
- Use of models to develop integrated wildlife/livestock management
- Develop regulations that will enable implementation
- Identify infrastructure to enable realistic goals for CBT
- Using FMD platform to include other disease risks and antibiotic residues
- Observe international best practices
- Awareness of the non-geographic risk management approach
- Re-orientation of human resources in the new risk management approach
- Governance issues at national level

Where are the opportunities?

- Markets
    - Regional Markets SADC and COMESA
    - Democratic Republic of the Congo
    - Angola, Mozambique
    - Great Lakes: Burundi, Rwanda
    - South Africa, Egypt
    - Wildlife trade
    - Comparative advantage in terms of accessibility
    - Risk related to markets / cultural issues
    - Preference for chilled meat compared to frozen
    - Trading Blocks / Trade Zone- duty free
    - Ambition is there

- Competitors
    - Brazil, Argentina, Namibia, Botswana, South Africa
    - India, Zimbabwe
    - Stock feed
    - Day old chicks
    - Deboned meat- important in Zambia context
- Development
    - Partnership for integration of land use for wildlife and livestock in order to allow for sustainable growth of wildlife
    - Access to grant money to allow for wildlife and livestock to grow at the same time
    - Livestock rearing is culturally embedded in KAZA community
    - Forage is plentiful, concentrate, soya, grass, maize bran
    - Domestic markets are undervalued because of perception
    - Yellow is cheaper but tastier – demystify local perception
    - Understand local vs. export
    - Local beef 85% – changing perception
    - Export 15%
    - Wildlife trade should not endanger free-ranging wildlife
- KAZA & opportunity for Zambia
    - Holistic approach
    - Climate change – pressure to like livestock that are climate friendly
    - Organic conservation
    - Animal welfare
    - Free range – no fences
    - EU has pressure on welfare standards
    - Zambia has comparative advantage

Might your country plan on implementing value-chain approaches to producing beef?

- Yes

If so, over what time frame? / If so, where specifically, and what types of resources / technical assistance would be most helpful? / What coordination is needed regionally, including within the TFCA context? / And what needs to be done in terms of securing potential destination markets within Africa or beyond?

- Harmonization of policy at national level – target 07/2017
- Human capacity is there but need financial and technical support
- Creation of governance for sustainable livestock and wildlife trade system
- Creation of dedicated coordination unit

- Awareness at all levels
- Development of the CBT implementation model
- Seed money to engage a consultant and undertake stakeholder consultations
- Regulations to support implementation
- Political goodwill is available

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Are you ready to pilot / implement the Guidelines in your own country?

- Zimbabwe is ready to pilot CBT but has a lot of preliminary work to do
    - Want to pilot in the Lowveld initially, then can be transferred to KAZA area, in the northwestern side of the country
    - The Lowveld has smallholder farmers surrounding Gonarezhou National Park and several conservancies, all of them with buffalo
- Zimbabwe is not exporting any beef; it is only catering for domestic market
    - Cost of beef in Zimbabwe is relatively high in comparison with other regional prices, and it is in U.S dollars
    - There have been some FMD outbreaks in the northeastern side and the Lowveld, being controlled by movement restriction and vaccinations
- In the Lowveld there is a quarantine facility and other structures like feedlots, council sale pens which can be used as quarantine facilities after sprucing them up
- There are two locally registered abattoirs in the Lowveld which can be quickly upgraded to CBT-required standards
- The KAZA region lacks abattoirs and quarantine facilities, however the concept of mobile abattoirs could be capitalized upon here - would help minimize cattle movements, which increase risk of FMD spread

What are the challenges? Can they be overcome?

- As there are free-ranging buffalo present, quarantining of the slaughter stock will be mandatory
- Vaccination of the cattle will also be required, so funding of vaccine procurement will be required
- Appropriate transporting system, can be sorted out by ensuring adherence to OIE guidelines
- Deboning is not currently being practiced, but abattoirs can be upgraded or the carcasses could be transported to places with deboning facilities following OIE guidelines
- Veterinary staff to monitor adherence to the guidelines - structures are already there, need strengthening only

Where are the opportunities?

- There is an opportunity for public-private partnership to spruce-up the infrastructure
- There is a large cattle population of high quality in the Lowveld
- There is a large local beef market in Bulawayo and Harare

- Due to the presence of a number of conservancies and previous enquiries for wildlife meat, excess wild animals could be slaughtered as well
- A meat processing plant could also be established for value addition

Might your country plan on implementing value-chain approaches to producing beef?

- Yes

If so, over what time frame? / If so, where specifically, and what types of resources / technical assistance would be most helpful? / What coordination is needed regionally, including within the TFCA context? / And what needs to be done in terms of securing potential destination markets within Africa or beyond?

- Possible markets
    - SADC
    - COMESA

ANNEX 4: LIST OF PARTICIPANTS

TOWARDS IMPLEMENTATION OF COMMODITY-BASED TRADE OF BEEF IN THE KAZA TFCA

Opportunities for Integrating Livestock Agriculture & Wildlife Conservation

A KAZA Workshop, in collaboration with AHEAD & FAO

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