

Feasibility study for the establishment of FMD-free fresh meat producing cattle subpopulations in Zimbabwe

STDF Project Preparation Grant (STDF/PPG/550)

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Executive Summary

This report reflects the findings and recommendations following fieldwork and analysis under the Standards and Trade Development Facility (STDF) Project Preparation Grant (PPG) entitled "Feasibility study for the production of safe fresh beef from areas in Zimbabwe not free from FMD" (STDF/PPG/550). This PPG, requested by the Zimbabwean Department of Livestock & Veterinary Services (DLVS), was approved by the STDF Working Group in March 2016. The STDF contracted the Royal Veterinary College (RVC) to implement the PPG, which included a study tour to Katima Mulilo, Namibia. The purpose was to study the feasibility of the production of commodity-based fresh beef in establishments within areas not free from FMD in Zimbabwe.

Under the EU-supported Veterinary Governance Programme, implemented by the Inter-African Bureau for Animal Resources of the African Union (AU-IBAR), the DLVS obtained a grant for a pilot project to produce commodity based fresh beef, fit for export, from within a Foot and Mouth Disease (FMD) vaccination area in Southeast Zimbabwe, following the provisions of the World Organisation for Animal Health (OIE) Terrestrial Animal Health Code (TAHC) 2016, Article 8.8.22. This PPG (STDF/PPG/550) was intended to allow a feasibility study and ex ante socio-economic analysis of this pilot project, which could not be included in the pilot due to budgetary limitations. By helping to fully understand and evaluate the prerequisites and viability of commodity-based fresh beef production in areas not free from FMD, this feasibility study provides some important findings and recommendations of relevance to the AU-IBAR pilot. Foot-and-mouth disease is a highly infectious, transboundary disease with high morbidity but low mortality. Its impact is felt mostly in high producing intensive farming systems and strict regulations are in force to prevent its spread through importation of animal products into FMD-free countries. Countries wishing to access the often lucrative export markets in FMD-free countries expend significant resources to control FMD and to comply with OIE guidelines for export.

The epidemiology of FMD in Southern Africa is closely linked with one of Africa's highly prized "Big Five" wildlife species, the African Buffalo, which acts as a carrier of the Southern African Territories (SAT) serotypes. Previous control measures in Zimbabwe (and elsewhere) have included vaccination and surveillance zones around national parks and game fencing to keep cattle and buffalo apart. However, the government's inability to maintain these fences and to provide consistent coverage and frequency of FMD vaccination of cattle, contributed to a rise in the number of FMD outbreaks. As a result, Zimbabwe lost its export quota for beef to its main market, the European Union (EU), in 2003.

More recently, the southern African governments' recognition of the value of wildlife tourism has led to the establishment of transfrontier conservation areas (TFCAs). These areas are established through removal of national park fences and the incorporation of communal land to provide safe bridges for free migration of wildlife species including buffalo. This has led to the promotion of an alternative, non-geographical approach to FMD control and the production of FMD safe beef for export, so called commodity based trade (CBT) beef, as outlined in Article 8.8.22 of the TAHC.

Fundamental prerequisites for the production of CBT beef in an endemic FMD area include: (i) regular and sustained vaccination; (ii) an operational individual livestock identification and traceability system (LITS); and (iii) enforceable movement control measures. These elements should be the foundation of an official national FMD control programme, which in turn is supported with

sustained and sufficient investment in veterinary staff, vaccines and logistical capability to deliver them. In addition, a market must exist which accepts the principles of producing CBT beef within an endemic FMD area. Likewise, livestock production systems must yield sufficient livestock off take to support the CBT beef value chain. The study tour to Namibia highlighted the importance of these fundamental requirements.

Having previously produced and exported beef within the region and internationally, Zimbabwe could potentially produce CBT beef, fit for export, in FMD endemic southeastern region. Nevertheless, the work carried out under this STDF PPG has shown that certain core capacities and conditions need to be in place to effectively realize this potential in a manner that is feasible and sustainable. It has also demonstrated the existing AU-IBAR pilot project was a useful starting point however, it requires updating to meet the current OIE TAHC requirements of CBT beef. Cattle are required to spend 30 days prior to slaughter in a veterinary controlled quarantine station because there are free roaming African buffalo in the area. Options of a suitable quarantine station need to be explored, either utilizing a government run facility in Mwenezi district or upgrading a local private feedlot. Likewise, local private abattoirs need to be upgraded to meet CBT export requirements (for maturation and deboning and deglanding) or carcasses could be transported under veterinary licence to existing deboning facilities in Bulawayo. In addition, vaccination levels within the vaccination zone are currently inadequate and there is currently no obligatory LITS in use. Moreover, there is no current market at present for CBT beef from Zimbabwe, while current levels of local beef production are also unlikely to meet potential export market requirements in quality or quantity.

If a future pilot project goes ahead, the study carried out under this PPG recommends that a smaller area and cattle sub-population should be selected. The exact number of cattle involved should be dependent on the budget available, as well as agreed partnerships between DLVS and concerned stakeholders to deliver the capacity required for the CBT beef production requirements. Partnerships must be explored with private feedlot and quarantine owners to develop existing infrastructure to meet veterinary quarantine standards. These costs would need to be compared with the additional transport, increased capacity and management costs of utilizing the government facility in Mwenezi district. The existing livestock identification system used by commercial farmers, although not electronic, would be adequate for individual identification within a pilot project. The required upgrading of facilities to allow CBT beef processing at local private abattoirs, or at a separate processing facility in Bulawayo (used previously for beef exports to the EU), must be negotiated. Markets must be identified to establish the likely demands of quantity and quality, and to estimate likely returns from export sales. Participating local livestock producers must be consulted and supported to deliver the cattle to meet these markets demands.

For the production of CBT beef beyond the pilot project, a number of additional steps must be taken to build a foundation of regular vaccination coverage, individual animal identification, and enforceable movement control across the wider vaccination zone. This would require a significant and sustained investment in the capacity of the veterinary services. Apart from securing sufficient vaccine supplies to provide twice-yearly FMD vaccination, the veterinary staffing levels at the local district level need to be improved to deliver vaccination and disease surveillance. Staffing levels of Livestock Production and Development officers also need to be improved to support farmers with production extension services. A nationwide electronic LITS is also required and would support livestock disease management, beyond just FMD. The LITS would also reinforce movement control

and police clearance, support vaccination and diptank records and would facilitate the return of lost or stolen stock to farmers. An improvement in productivity and a change in livestock keepers' behaviour is required to improve the quality of cattle marketed and the off take rate. Finally, of critical importance, a market for CBT beef from an FMD endemic area in Zimbabwe needs to be found or developed in order to provide adequate return on the investment required to deliver it.

To conclude, the fieldwork conducted under this PPG has provided a valuable opportunity to assess, rethink and inform the design and scope of the AU-IBAR pilot project, in particular the technical aspects of producing CBT beef. The findings and recommendations are also likely to be of use to inform and guide the government's plans to implement the OIE commodity-based beef standard, as part of its new national FMD strategy and official control programme. As such, it is hoped that this work will help to positively impact the success and sustainability of future considerations for CBT beef production and export opportunities in Zimbabwe.

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Abbreviations

ACP-EU	African, Caribbean and Pacific – European Union
AEZ	Agro-ecological zone
AU-IBAR	Inter-African Bureau for Animal Resources of the African Union
BVI	Botswana Vaccine Institute
CBT	Commodity based trade
CSC	Cold Storage Company
DLVS	Department of Livestock and Veterinary Services
DVO	District Veterinary Officer
EU	The European Union
FAO	Food and Agriculture Organisation of the United Nations
FAOSTAT	Food and Agriculture Organisation of the United Nations Statistical Database
FMD	Foot and mouth disease
GDP	Gross Domestic Product
GNP	Gonarezhou National Park
LITS	Livestock Identification and Traceability System
LMAC	Livestock and Meat Advisory Council
OIE	World Organisation for Animal Health
OVI	Onderstepoort Veterinary Institute
PPG	Project Preparation Grant
RVC	Royal Veterinary College
SAT	Southern African Territories
TAHC	The Terrestrial Animal Health Code
TFCA	Transfrontier Conservation Area
SPS	Sanitary and Phytosanitary Measures
STDF	Standards and Trade Development Facility
WHO	World Health Organisation
ZIMSTAT	Zimbabwe National Statistics Agency

1. The Project Proposal and Methods

This is a feasibility study for the establishment of Foot-and mouth (FMD)-free fresh beef producing cattle subpopulations in Zimbabwe. The Zimbabwean Department of Livestock and Veterinary Services applied for a grant under the EU-supported Veterinary Governance Programme, implemented by the Inter-African Bureau for Animal Resources of the African Union (AU-IBAR). The grant is to fund a pilot project to produce commodity based fresh beef, fit for export, from within a Foot and Mouth Disease (FMD) vaccination areas, following the provisions made in the World Organisation for Animal Health (OIE) Terrestrial Animal Health Code (TAHC) 2016, Article 8.8.22. However, it was not financially possible to include a socio-economic analysis in this pilot project. Therefore, this project preparation grant (STDF/PPG/550) was made to conduct a feasibility study and ex ante socio-economic analysis of this aforementioned pilot project. The initial country visit was undertaken during October and November 2016 and included a visit to the district of Chiredzi in Masvingo Province, in the south-east. Discussions were held with a variety of stakeholders in Harare. A field visit was undertaken to visit stakeholders including District Officers of the Rural Council and Veterinary and Livestock production services in Chiredzi town, abattoirs and feedlots, community leaders and individual farmers in Chiredzi, Mahenya and Malipati. Furthermore, discussions were held with stakeholders involved in community conservancies and the Gonarezhou National Park. Details are given in Annex 1.

After analysis and discussion of the findings, a follow up study tour as part of the PPG took place in June 2017. The tour was conducted with DLVS staff to visit Katima Mulilo in the Zambezi region of Namibia, where the local abattoir had produced a “form of CBT beef” until 2016. The three-day study tour was hosted by the Namibian Department of Veterinary Services. It began with a meeting of around 25 key stakeholders which included members from the Likwama Farmers Union, Simbule Livestock Marketing, Regional Meat Board, ZAMCo, meat traders and representatives from the Regional Council. It was followed by a visit to observe ear tagging and FMD vaccination at the Malimina crush pen, where a selection of farmers were also interviewed. The NamLITS (Namibian Livestock Identification and Traceability System) was demonstrated at the office of the State Veterinarian and visits were also made to the currently inactive quarantine station and associated MeatCo “CBT Abattoir”.

2. Background

Zimbabwe is a land locked country in Southern Africa, bordered by Zambia to the northwest, Mozambique to the northeast, east and southeast, South Africa to the south and Botswana to the southwest. It lies in a tropical savannah region with a range of annual rainfall from below 450 mm to over 1000 mm. The end of the dry season and start of the rainy season is usually October-November. The total land area is 39 million hectares (390,000 km²); 85% of that is agricultural and 13% is designated as national parks (Figure 1). Approximately 10% of the total land area is arable and 0.25% is permanent cropland, with 200,000 ha under irrigation. Agricultural output contributes to 20% of national GDP, with livestock products making up 25% thereof.



Figure 1: Map of Zimbabwe showing national parks Source Expert Africa (<https://www.expertafrica.com/zimbabwe/reference-map>)

2.1 Human Population

The human population of Zimbabwe was estimated at 15.6 million in 2015, 33% more than in 2002 and double that of 35 years ago (Figure 2). Approximately 42% of the total population are under 14 years-old. The overall population density in 2015 is 37.7 people per km² with 68% living in rural areas compared to 86% in 1965. The poverty headcounts at the national poverty line is 72.3% of the total population and 84.3% of the rural population. The distribution of poverty in Zimbabwe is described as being predominantly rural, most common in communal and resettlement areas and more concentrated in the drier areas of the country, but there is increasing poverty in urban areas.

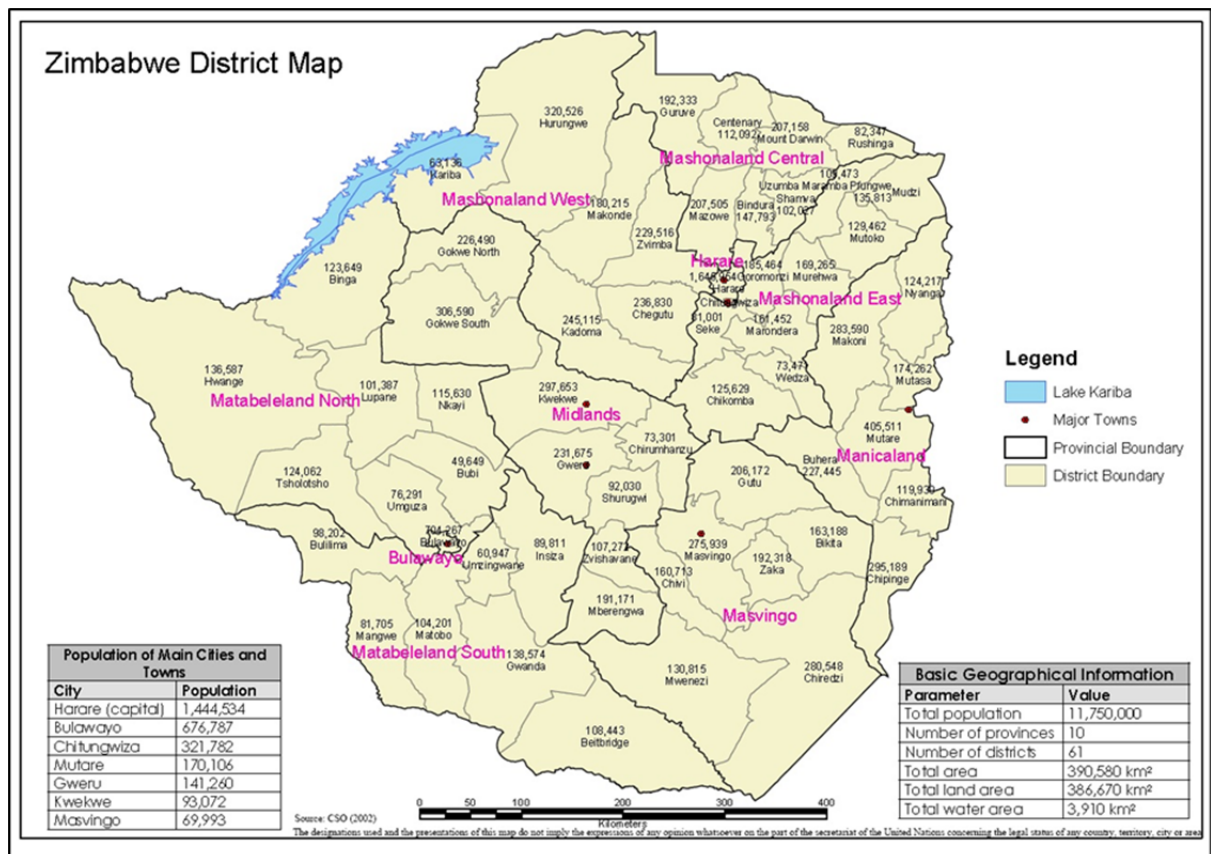


Figure 2: Zimbabwe district and population map for 2002. Source OCHA (<http://reliefweb.int/map/zimbabwe/zimbabwe-district-map-2002>)

2.2 Meat production and consumption

More than 90% of the national beef cattle population of 5.5 million head reside in the smallholder farming areas. Data from FAOSTAT show beef production grew from 73,720 tons in 1998 and peaked at 108,000 tons in 2001 but since then it has hovered just above or below the level of 100,000 tons, with 2013's production at 103,750 tons. Despite the country's slaughter capacity of 1.5 million head of cattle, current utilisation is approximately only 18% with a national slaughter offtake rate of 5.3%. This is due to low productivity levels and consequently low off take.

Historically, over 70% of domestically consumed meat was beef, followed by poultry, pig meat and small ruminant meat. Annual beef consumption was reportedly as high as 13 kg per capita in the 1980's, when the human population was half of what it is today. Figures from ZIMSTATS Poverty, Income and Consumption Expenditure Survey 2011/12 show more recent figures suggesting a shift away from beef and an urban concentration in consumption of both beef and chicken (Table 1).

Table 1: Consumer expenditure and per capita consumption figures of meat (ZIMSTATS)

	Beef	Chicken	Fish	Pork	Sheep and Goat
Per capita consumer expenditure on meat	35%	32%	17%	3%	2%
Per capita consumption of meat (kg)	48% (4.3)	41% (3.4)	7% (0.7)	4% (0.3)	n/a
Rural per capita consumption (kg)	2.10	1.53	0.44	0.14	n/a
Urban per capita consumption (kg)	9.14	8.27	1.13	0.73	n/a

2.3 Agro-Ecological Zones

Zimbabwe is divided into five Agro-Ecological Zones (AEZ) based on rainfall, land surface and soil types and climate (Table 2 and Figure 3). Approximately 65% of Zimbabwe (AEZ IV and V) receives <600 mm of rain per annum and historically have been utilised for ranching cattle and wildlife reserves. Extensive and semi-extensive livestock production systems in these zones are considered low input - low output; they depend almost entirely on natural grazing but production output is generally low. Approximately 70% of communal farms are located in zones III, IV and V, with livelihood dependence on livestock as high as 86%. These zones are also utilised for wildlife production and protection.

Table 2: Classification and distribution of Agro-ecological Zones in Zimbabwe

Agro-Ecological zone	Description of farming type and average annual rainfall	Area km²	% Land Area
I	Specialised & Diversified farming region (>1000 mm)	7000	1.8
IIA&B	Intensive farming region (750-1000 mm)	58,600	15
III	Semi-intensive farming region (650-800 mm)	72,900	18.7
IV	Semi-extensive farming region (450-650 mm)	147,800	37.8
V	Extensive farming region (<650 mm)	104,400	26.7

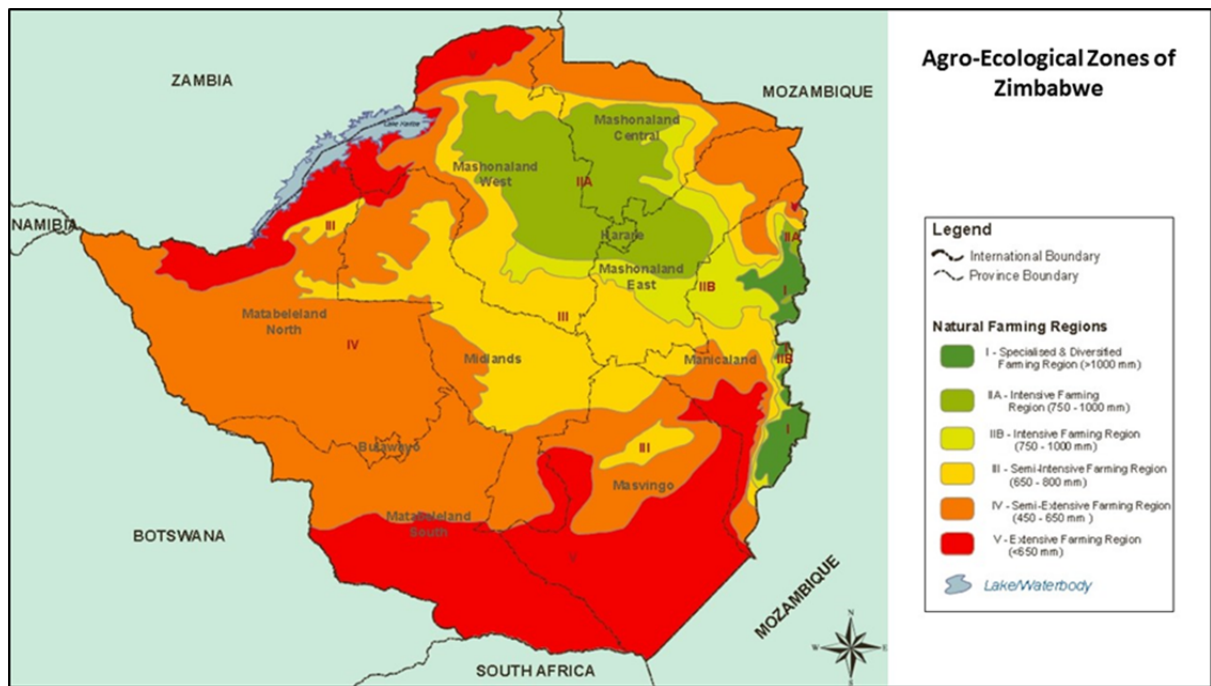


Figure 3: Agro-ecological Zones of Zimbabwe. Source OCHA

(<http://reliefweb.int/map/zimbabwe/zimbabwe-agro-ecological-zones-map-administrative-boundaries-05-oct-2009>)

2.4 Land redistribution and classification of farms

The Government's Land Reform Programme, which began in 2000, had by 2011 resulted in transfer of land to nearly 170,000 households. Three major farming sectors evolved from this process as follows: **Original Communal farmers** who have access to on average 2.1 ha of arable land and share communal grazing land, **A1 farmers** who have been resettled out of congested communal areas and have an average of 5 ha of self-contained arable land and communal grazing land of 6-20 ha and **A2 farmers**, who are commercial farmers, either peri-urban farmers or small, medium or large scale farmers with farms ranging from 15-2000 ha. Commercial A2 producers are the major source of meat and dairy products sold within formal marketing channels. The A1 farms in Masvingo cover 1.2 million ha and are on average 37 ha each. These are mixed farms including a self-contained cropping area and communal grazing land.

2.5 Production Systems

Ruminant production systems in sub-Saharan Africa are often classified into two main groups: 1. Traditional, which includes pastoral, agropastoral and mixed and 2. Non-traditional, which includes ranching and dairy.

Pastoral systems exist in zones with less than 400 mm per year which are considered too arid for cropping. In areas with rainfall between 400 and 600 mm, agropastoralism is practiced, in which rain-fed cultivation contributes to up to 50% of household revenue.

Traditional mixed systems are further subdivided into tropical highland or tropical lowland systems. Highland systems are either mixed or smallholder dairy systems. The highlands typically have good soils and climatic conditions more favourable to cropping and to temperate (exotic) livestock breeds, and equally have a higher human population density. Lowland systems are divided (according to rainfall, length of crop growing period, cropping pattern and mean temperature during the growing

period) into semi-arid, sub-humid and humid. In the higher rainfall areas, livestock production is more intensive and specialised and at least 60% of all livestock production occurs here.

Non-traditional systems include ranching, which are generally commercial enterprises, characterised by grazing within fenced areas that delimit tenure. They usually have options to intensify the supply of water and feed and are typically located in the arid and semi-arid zones. Dairy systems are usually integrated with subsistence crops, with livestock contributing to 30-80% of gross farm income. Most mixed, ranching and dairy systems are dependent on external inputs such as finance, supplementary feeding, irrigation, labour and veterinary interventions but being in semi-arid regions, they are vulnerable to droughts and climatic variations.

2.6 FMD

The Disease

Foot-and-mouth disease is a highly infectious, transboundary disease, with high morbidity (up to 100%) but low mortality and is caused by an aphthovirus of the Family *Picornaviridae*. It is listed by the OIE TAHC as a reportable disease and was the first disease for which the OIE established a list stating country's disease status. Although there are several strains, only the Southern African Territories (SAT) serotypes are known to be present in Zimbabwe. Within these serotypes, several topotypes (location specific) exist. Clinical signs include fever and blister like lesions on the tongue, lips and oral mucosa, on the teats and interdigital skin and coronary band of the hoof. The disease affects cattle, swine, sheep, goats and other cloven-hoofed ruminants including wildlife. The virus is present in the blister fluid, saliva, nasal discharges and exhaled air, milk, semen, urine and faeces and all other secretions and excretions. It is transferred by direct and indirect contact between animals, the latter usually through secretions carried on objects or infected animal tissues whilst aerial transmission is also possible under suitable conditions of high humidity and low air turbulence. Infected animals may excrete the virus for up to four days before showing clinical signs. Intensively reared and exotic breeds are more susceptible than extensively kept traditional breeds. Death usually occurs only in young animals. A suspected diagnosis of disease is made based on clinical signs and confirmation is made through the prescribed laboratory tests listed in the OIE TAHC.

Buffalo (*Syncerus caffer*)

The endemicity of FMD in Southern Africa is linked to the SAT serotypes (1, 2 and 3), which are believed to have originated from a "SAT X" serotype, which had co-existed within the African buffalo (*Syncerus caffer*). Buffalo are reservoirs of the disease with mild or subclinical infections, maintaining the virus and causing spill over into livestock populations. The precise detail of transmission from buffalo to livestock is still unclear but SAT2 is the most commonly detected serotype in livestock outbreaks. Two transmission theories are proposed. 1. FMD virus carrier buffalo persistently shed and spread infection among buffalo and cloven hooved animals through direct and indirect contact, 2. Mini-epidemics occur in buffalo calves and they lose maternal antibodies, develop acute infections, shed high levels of virus and recover to become carriers. Carrier buffalo maintain the virus between these calf epidemics. The Buffalo calving season runs from December through to February.

Prevention and Control

Most knowledge of the control of FMD is based on research conducted by higher income countries typically FMD-free countries, whose focus is on maintaining their FMD-free status through disease prevention and outbreak control. As a result, evidence based interventions to control FMD, with an understanding of the contextual challenges (such as wildlife reservoirs and under-resourced veterinary services) in endemic countries is lacking.

Prevention hinges on surveillance which is aimed at early detection of clinical signs, followed by diagnosis and characterisation of the virus. The OIE classifies FMD free areas (either whole countries or zones within) as those free without vaccination and those free but with vaccination. Within country zoning exists in endemic countries; vaccination zones are established around high risk area and a zone of active surveillance exists beyond. Measures to maintain these zones in Southern Africa have included i) the construction and maintenance of game or buffalo fences to separate cattle from buffalo, ii) cattle fences to separate vaccinated at risk cattle in the vaccination zone from those in the adjacent surveillance zone and iv) intensive surveillance of cattle in the vaccination and surveillance zones and routine inspection of cattle in FMD free zones (Figure 4).

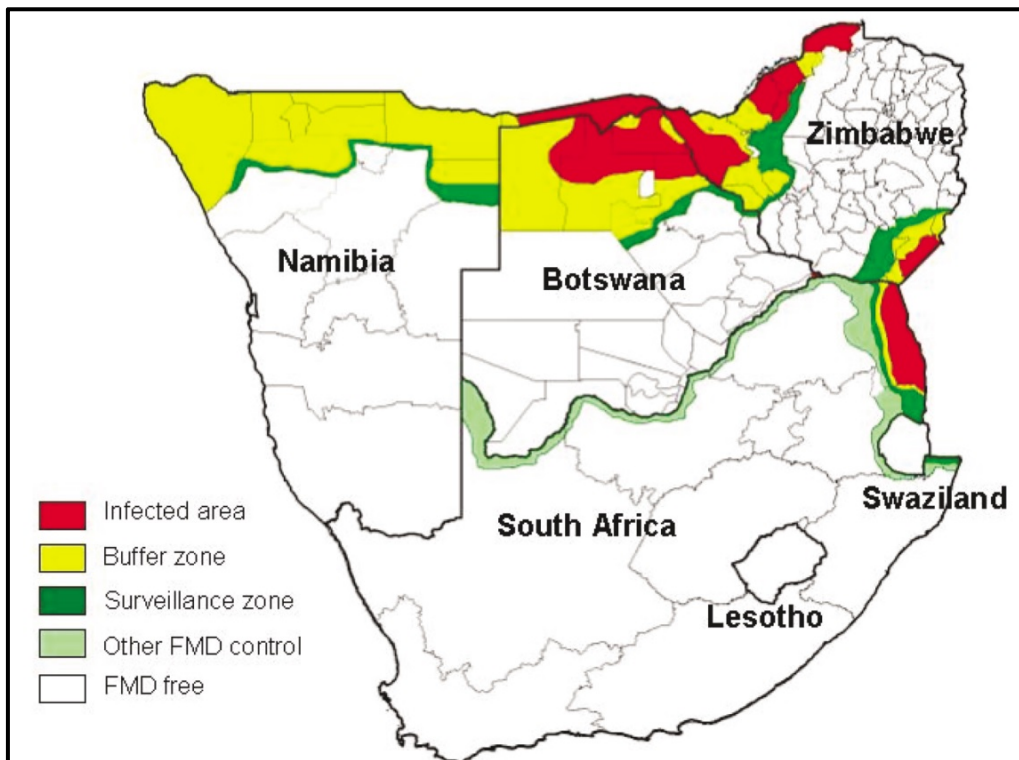


Figure 4: Map of FMD control zones in Southern Africa. Source Perry et al. 2003

Since movement of incubating or infected animals and their products is a major cause of spread, stringent movement restrictions exist both between countries and between zones, as well as strict on-farm biosecurity measures.

Control measures during outbreaks depend on the country or zone status but will include humane destruction and appropriate carcass disposal of infected, recovered and susceptible contact animals, appropriate surveillance, strict quarantine and movement control and thorough disinfection of facilities and transport vehicles. Endemic countries or zones will vaccinate susceptible populations, but vaccines must be protective against the identified serotype. Of the 180 OIE member states, only 60 are officially recognised as free of FMD, with or without vaccination.

Trade

The World Trade Organisation encourages trade across the globe, whilst putting measures in place to mitigate potential problems arising from free trade. With respect to trade in animal commodities and animal products, control measure focus on the safety of food of animal origin for human consumption and its potential to cause disease in humans and animals in the importing country. The WTO's agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement)

encourages WTO members to base their sanitary measures on international standards, guidelines and recommendations, where they exist. The SPS Agreement references the OIE for standards relating to animal health and zoonoses. Members of WTO are encouraged to use the OIE standards and the OIE's Terrestrial Animal Health Code to assure the sanitary safety of international trade in terrestrial animals and their products.

Historically the TAHC has set out trade guidelines based on the geographical distribution of a few key listed diseases, putting the pressure on countries to eradicate and declare themselves free of disease and so benefit from export trade. With respect to FMD, Chapter 8.8 sets out the terms of defining and classifying countries or zones according to their disease status. It also provides recommendations for importation of animals and their products from countries within the various classifications. The FMD progressive control pathway, created by the FAO, aims to assist countries to achieve a Free-of-FMD status. More recently however, the OIE has recognised the difficulty countries have in achieving progress along this pathway (particularly those in sub Saharan Africa). In response to pressure from various actors in the region, it has included a non-geographic approach to certain diseases including FMD. This includes the concept of commodity based trade (CBT), which provides a system to ensure safety of the animal product irrespective of the disease status of the country of origin.

However, beyond these recommendations, individual countries apply further import standards (such as animal welfare or organic or free range production) and negotiate independent bilateral trade agreements with individual exporting countries.

Conservation

Historically, in keeping with international, geographically based transboundary animal disease control measures, drastic steps were taken in Southern Africa to separate cattle populations from buffalo. These have included buffalo eradication from some areas and the electric game fencing of National Parks and private game reserves to keep buffalo within them. In areas where free roaming buffalo populations exist, game fences have been erected across entire countries (e.g. Namibia and Botswana) to create buffalo free zones.

National governments of Southern Africa have been keen to develop the wildlife conservation industry, recognising the value this brings through ecotourism. Buffalo are one of Africa's "Big Five" game species (and highly valued as hunting trophies) and attract large numbers of international tourists, photographers and hunters to the region each year. Confining wildlife to fenced national parks is now considered by many as outdated. An essential part of the conservation of wildlife, and biodiversity is ensuring free access to wide areas of grazing and water sources through natural migration, especially during times of drought. It also allows free mixing and breeding of populations of endangered species, such as black rhinoceros and African wild dog, widening their gene pool.

These ideas have led to the creation of Transfrontier Conservation Areas (TFCAs) in Southern Africa, which usually aggregate large National Parks across borders and include areas of private or community conservancies and communal farm land. Zimbabwe has several of these and the one of interest to this project is the Great Limpopo Transfrontier Conservation Area (35,000 km²) made up of the Gonarezhou (Zimbabwe), Limpopo (Mozambique) and Kruger (Republic of South Africa) National Parks and the Sengwe Corridor of communal land in the south-east. (Figure 5).

However, these TFCAs give free movement of wildlife over large geographic areas, which is at odds with international standards of control of transboundary animal diseases. The concept of safe CBT beef from FMD endemic areas is an attempt to lift geographic barriers, conserve wildlife and

biodiversity whilst improving livelihoods of livestock farmers who live alongside buffalo inhabited conservation areas.

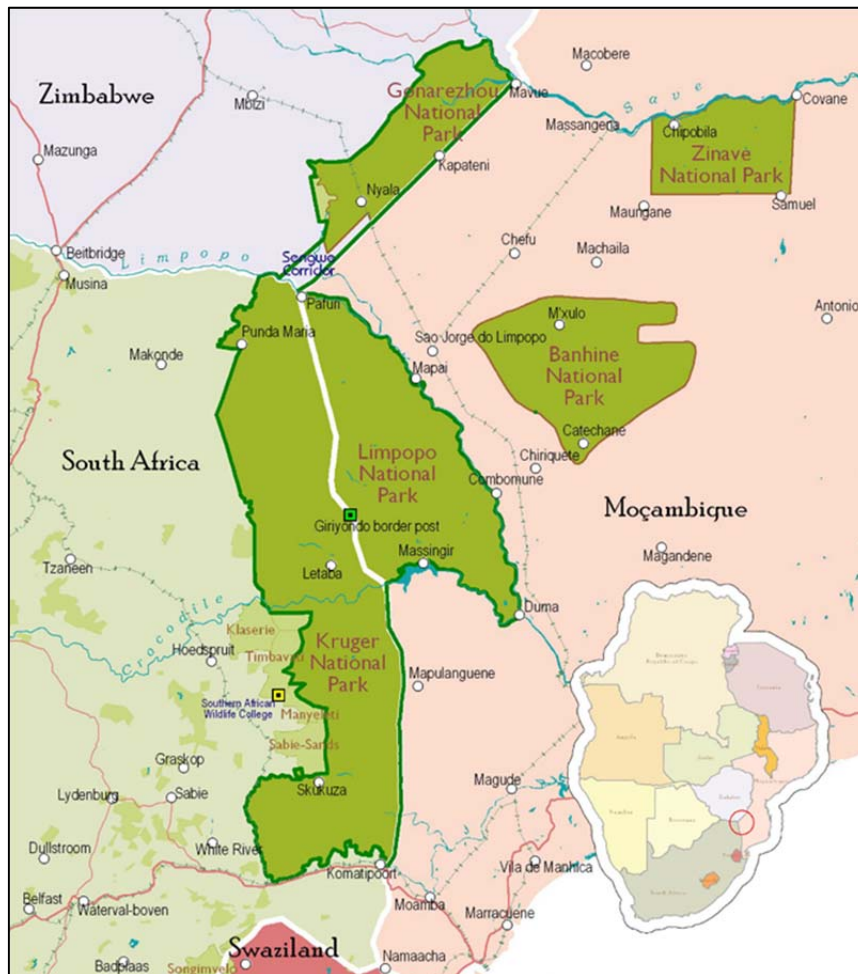


Figure 5: Great Limpopo Transfrontier Conservation Area. Source SANParks https://www.sanparks.org/conservation/transfrontier/great_limpopo.php

Impact of FMD

The disease is frequently referred to as the most economically significant livestock disease in high, middle and low income countries. Although the disease has relatively low mortality, the high number of animals affected in an outbreak, the economic consequences of outbreaks in FMD controlled areas and restricted access to lucrative markets of endemic countries are reasons argued to elevate the disease’s significance against other more fatal ones. In most Southern African countries, the impact on productivity is felt mostly in intensively farmed commercial herds of purebred exotic cattle. On the other hand, smallholders and pastoralists with more resistant indigenous cattle breeds may argue that the disease is not a priority and that there are many other diseases of greater mortality and impact requiring veterinary intervention. Their experience of impact is mostly through loss of draught power especially when outbreaks occur during tilling or harvest seasons, and the imposed restrictions on movement and marketing of livestock during quarantine. At a national level, export markets close as a result of FMD outbreaks and costs of control and eradication programmes consume a significant portion of veterinary services budget.

2.7 Export History

Between 1985 and 2001, Zimbabwe, Botswana, Namibia and Swaziland exported boneless beef to the European Union (EU) under the African, Caribbean and Pacific (ACP) – EU Partnership, whereby they were exempt from most import duties within certain quota limits. Zimbabwe’s quota was set at 9,100 tonnes, which over the six-year period of (1995-2000 inclusive) was only exceeded once in 1995. The most important beef export market for Zimbabwe in the late 1990’s was the EU, making up over 94% of the total value of exports. The bulk of the EU’s imports from Southern African countries were of the higher value/graded meat products. Part of the ACP-EU agreement was that Zimbabwe was to comply with OIE standards for export, namely that barriers needed to be constructed and maintained between buffalo and cattle. Exports from Zimbabwe to the EU ceased after the FMD outbreaks of 2001 and 2002.

Prior to the land reforms of 2000-2003, the Zimbabwean beef industry was geared to export with over 60% of commercially produced beef going to export markets, yet 90% of the local market was for cheap lower grade beef cuts and the latter remains so. The Cold Storage Company (CSC), originally a parastatal and subsequently wholly government owned in 1992, held the exclusive licence to export to the EU. They owned the only export certified abattoirs and meat deboning processing plants. Of the carcasses passing through CSC, 40% were exported to the EU. 6% to the region and the remaining 54% was consumed in the domestic market. Exports to the EU were not without challenges and because of unpredictable local markets supplies, they were unable to take advantage of full quota allowances and negotiate the higher priced forward contracts.

2.8 Recent economic history and current currency shortage

During the early 1990’s Zimbabwe embarked on an Economic Structural Adjustment programme designed by the IMF and World Bank. In the late 1990’s the first land reforms took place, where large commercial farms were converted into smallholder communal farmlands and production levels subsequently changed. A second wave of land redistribution occurred in 2000 contributing to a decline in production of tobacco, the country’s major foreign exchange cash crop. Due to a mixture of political instability, economic sanctions, a failing tax system and unbudgeted expenditures, Zimbabwe’s national debt rose to over 100% of its GDP. In response the government introduced a policy of monetization, printing money to pay for expenditure. Hyperinflation ensured reaching a peak in 2008/2009, which resulted in the “dollarization” of the economy, where the United States dollar replaced the Zimbabwean dollar as the local currency in 2009. In 2016, currency shortages have been experienced with banks limiting the amount of cash withdrawals. The shortages are blamed on the falling exports against the rising need for imported goods and capital “flight”, with currency leaving the country with emigration or foreign transfers.

2.9 AU-IBAR Pilot Project proposal

The pilot project had an original budget of \$200,000, which was reduced to \$100,000 at the end of 2016. The project’s overall goal is to integrate the smallholder farmers and other emerging cattle producers into the beef export value chain. Its specific objective is to explore the feasibility of the CBT concept in the production and marketing of fresh beef in an FMD vaccination area. The broad project area is the recently revised FMD vaccination area (Figure 6) of approximately 80,000 ha around the Gonarezhou National Park, which holds approximately 285,000 cattle. The distribution of cattle per district included in the vaccination zone is show in Table 3.

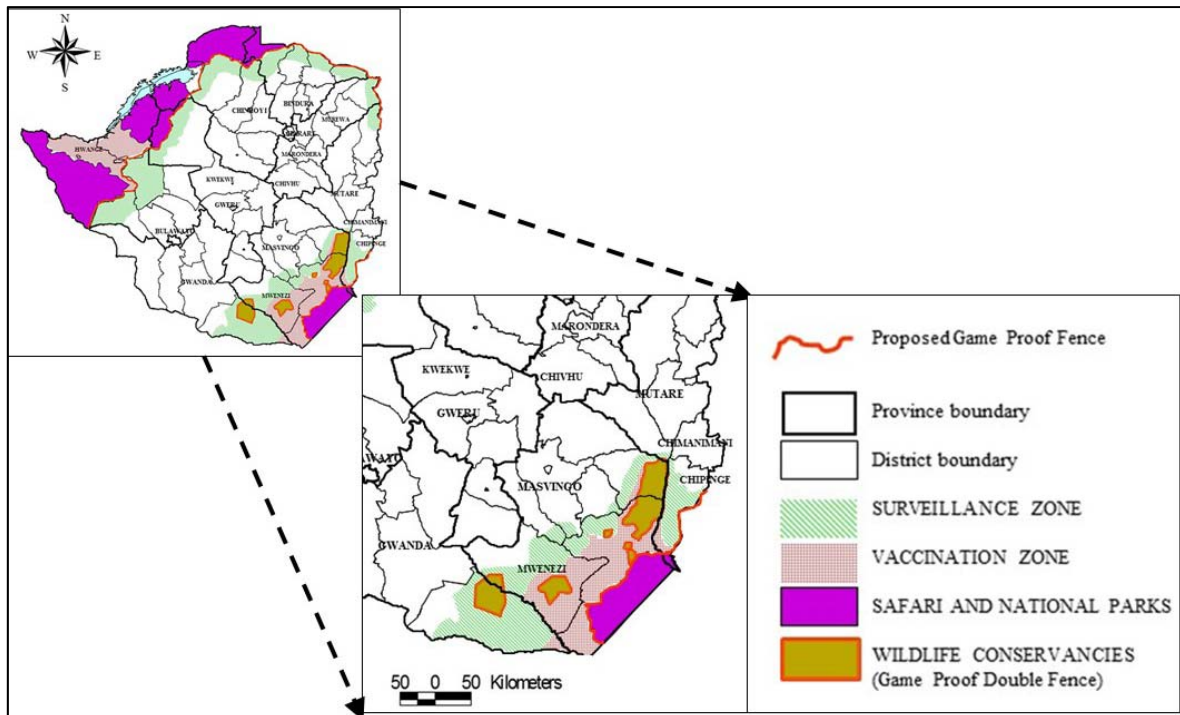


Figure 6: Map of proposed vaccination zone for CBT project

Table 3: Estimated cattle populations for the districts included in the vaccination zone

District	Chiredzi	Mwenezi	Bikita	Chipinge	Beitbridge	Total
Estimated cattle population	90,000	70,000	25,000	75,000	25,000	285,000

The AU-IBAR project will focus on a subpopulation of 30,000 cattle (10.5% of the vaccination zone cattle) which it plans to slaughter through the CBT guidelines. The project states that it will be reliant on a robust animal health service delivery system which would include extension and advisory services on health, husbandry and production efficiency and an intensive animal disease control and surveillance system. It goes on to describe the ways in which it plans to comply with the provisions within Article 8.8.22. These include the following:

1. Strict adherence to an official regular 6-monthly FMD vaccination programme.
2. Individual animal identification, registration and traceability of candidate cattle supported by electronic databases.
3. Animal movement record keeping to confirm animals intended for slaughter have been resident for three months in the vaccination area. This will require computerised record keeping by the farmers and veterinary services to include movement, surveillance, vaccinations and slaughter.
4. Vaccine effectiveness will be assessed by pre and post vaccination monitoring.
5. Surveys for virus identification will be conducted in support of outbreak control.
6. Farmer and abattoir compliance.

7. Veterinary public health officers within participating abattoirs to provide ante and post-mortem inspections and monitoring of the meat maturation process.

3. Current Situation (based on fieldwork under the PPG)

3.1 Climate and environment

The fieldwork was conducted in October and November 2016, just before the start of the summer rainy season, at the tail end of the current El Niño cycle, which is considered as the worst to date, leaving an estimated four million people in need of food aid. Veld (natural grazing) conditions were extremely poor with depleted grazing in communal farming areas (Figure 7) as well as within the Gonarezhou National Park (Figure 8).



Figure 7: Aerial view of Chiredzi District communal farm lands just outside the national park



Figure 8: Aerial view of vegetation cover within Gonarezhou National Park

The AU-IBAR pilot project area (Figure 6) lies entirely within an agro-ecological zone 5, considered unsuitable for cropping and more suited for extensive livestock production and game. The land redistribution and farm classification process of 2000 resulted in A1 type farmers being allocated land which included communal grazing and a self-contained portion of land for own use, which has been used primarily for cropping. This has led to a reduction in available grazing land alongside an increased human population and increased stocking rates.

3.2 Producers

The smallholder farming sector owns 90% of the country's cattle, 98% of the goats and 80% of the sheep. The significance of livestock to livelihoods is evidenced by ownership figures which show 55% of households in the communal areas own cattle, more than 70% own goats and over 80% have chickens. It is significant to appreciate the numbers of non-cattle livestock groups as these are alternative sources of income and will affect the producer's need to sell cattle. Table 4 below shows livestock numbers for the Masvingo province for 2014/15 and an extrapolated figure to estimate the population in Chiredzi district. Poultry figures were not available.

Table 4: Livestock census figures 2014/15 for Masvingo province and cattle of Chiredzi, with extrapolated estimates for further livestock groups

	Cattle	Goats	Sheep	Pigs
Masvingo Province	1,007,165	398,115	16,589	25,435
Chiredzi	170,700	67,480 e	2,811 e	4,311 e
e = extrapolated estimate				

Data from Chiredzi District Veterinary Office for all 108 district dip tanks for the months of January, June and September 2016 are summarised in Table 5 below.

Table 5: Cattle figures from dip tanks in the district of Chiredzi

Cattle data from Chiredzi dip tanks	Current Census	Stock Owners	Births	Total Deaths	Sold	Slaughtered	Off take rate (%)
Jan '16	176,235	18,004	1,245	328	1,714	439	1.2
June '16	170,804	17,890	1,415	176	894	360	0.7
Sep '16	170,700	18,279	1,470	209	975	252	0.7

These figures give us an average herd size of 9.6 cattle per stock owner. Off take rates (defined as the proportion live animals sold or for slaughtered) are much lower than the official figure of 8.5% from the Department of Livestock Production. Given that these figures were collected during the end of an El Niño cycle and moving into the dry season, it is assumed that destocking may have taken place already in light of the recent severe drought conditions.

An understanding of local producers' views on their cattle and current problems was achieved through discussions with community members, either as individual farmers or groups of farmers, committee members of the local Livestock Development Trust and individual speculative livestock buyers. All farmers in the district were either A1 or A2 and used mixed crop and livestock production systems. There was no pastoralist production system in the area. From discussions with local farmers, average herd sizes (including this season's calves) were 12 in Malipati and 8.5 in Chilonga, which corresponded with the average from dip tanks records in Table 5. Although only a small sample of farmers were interviewed, calving rates reported were surprisingly high (ranging from 70-100%) compared to the official figure of 54.2% for the district. Although data on calf mortality rates were not included in discussions, the official figure for the district is 7.8%. Due to the running of herds together during the day, breeding was unmanaged and bulls may breed with several generations of offspring.

Major cattle problems currently experienced by farmers included a lack of grazing, poor market access (with hard bargaining speculative cattle buyers their only option) and a range of diseases including tick borne diseases (heartwater, theileriosis, anaplasmosis) blackleg and lumpy skin disease (in a wet year). FMD was only a problem in the sense that outbreaks disrupted movement and market access and routine control measures limited options of live sale.

It was clear that cattle were primarily a source of capital and a wealth indicator. Cattle were their only source of draught power, they provided milk (for home consumption only) and served social requirements such as lobola (bride fees) for marriage or paying compensation or fines. Most farmers would only sell cattle in times of significant need. Cattle were sold to meet significant costs; those commonly mentioned were school fees, hospital fees, funeral costs, agricultural inputs, emergency home repairs and (significantly in the current climate) food supplies for the family. Sales of smaller livestock filled the small demands for cash and were also used to barter. Individuals usually chose old oxen and old cows to sell, sometimes aged seven years or more. They were reluctant to sell them as younger animals whilst they remained productive and functional. One individual pointed out that an old drought ox was essential to train younger oxen to take to the harness. Young oxen were sold in favour of young heifers, as the latter provided breeding stock. During the past year, some farmers

reported having to sell heifers so as to buy food. Abattoirs were also seeing a higher proportion of pregnant slaughters this year (Sabie Meats reported over 2000 in the last 12 months).

Farmers were asked why cattle were not sold when they had reached their prime of condition and the money kept for times of need or for reinvestment into buying more heifers to breed, or steers to grow. Their answers included issues regarding the country’s history of hyperinflation in 2008, the current shortage of cash availability from banks, high bank charges and no interest on savings, no easy access to local banks, a cash and barter economy in rural areas and the fact that “money in your pocket is easily spent”. For these reasons they concluded that they would rather hold onto cattle than sell them in their prime at the end of the rainy season, despite acknowledging the risk of holding them through the dry season, with the inevitable loss of condition and potential need to sell if a lack of natural resource availability threatened starvation and loss.

3.3 Market Channels

The current flow of livestock from producers to the end markets is complex but in turn offers opportunities to improve access to the smallholder (Figure 9). Smallholder farmers in the project area, who own 90% of the cattle have a variety of choices, but not all are always available to all communities. A recent report by the Zimbabwean Association of Abattoirs reported 10,200 cattle were bought by member operators during May 2016. Of these cattle, 7% were bought at district council auctions, 56% from smallholder farming areas (usually via a middleman or agent) and 36% from individuals at the abattoir gate. Grading was as follows: Super 13%, Choice 2%, Commercial 45%, Economy 32% and Manufacturing 3%. The Department of Livestock Production and development, on the other hand, reported annual slaughter figures of approximately 260,000 cattle/ annum or 21,700/ month during the period 2011- 2014.

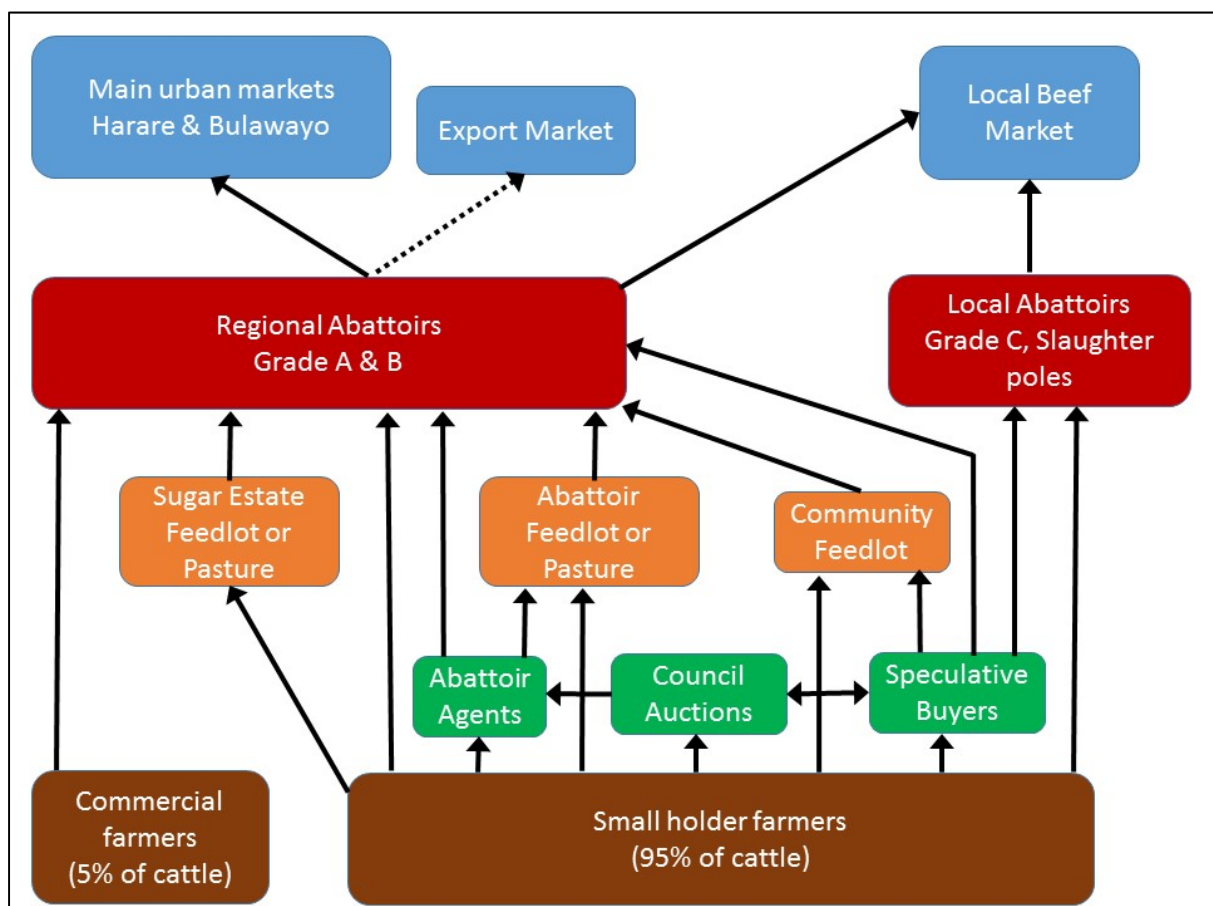


Figure 9: Market channels for flow of cattle from farmers to markets

The market channels shown in Figure 9 can be described in more detail as follows:

- There was always some private trading between farmers either as sales, barter or lobola (bride price).
- Farmers can sell direct to the abattoirs, but require a movement permit and police clearance certificate, which can be time consuming and costly for the sale of just one individual animal.
- Speculative cattle buyers (middlemen) are either local members of the community or those who travel widely across the district. They are the most common and available although not necessarily the most popular channel for farmers to sell to. They purchase and gather enough cattle for which movement, police permits and transport is arranged for the whole consignment for slaughter. Transport is often negotiated with abattoir owners who will provide this free of charge if there are more than 30 cattle and distance is not more than 150 km. Buyers may also sell onto community feedlots and source cattle from Council Auctions
- Similarly, agents who have loose arrangements with abattoirs, source cattle for specific abattoirs for slaughter or admission to abattoir feedlots.
- Rural District Councils provide formal auctions with weighing, inspection and holding facilities in an attempt to formalise trade, ensure movement permits etc. are in order and discourage illegal sales of stolen animals. However, they charge a levy to the buyer of 10.5% of the sale price. Farmers claim that buyers offer low prices to accommodate the levy. In some areas, these auction facilities have gone out of use.
- Private abattoirs and Tongaat Hulett sugar estate have feedlots for 60-90 days of finishing or areas of leased pasture grazing, on which cattle will take over 90 days to finish. Capacities varied from 12,000 cattle at Tongaat Hulett (with potential to expand) to 2,000 at abattoir owned abattoirs. Abattoirs selectively buy cattle presented for slaughter, that they consider would benefit from finishing. Sellers are offered a live animal price to consider. Speculators also scout for cattle which are for sale which may be suitable for finishing. The feedlot entrants are processed with double ear tagging, worming and an FMD vaccine course of two vaccines four weeks apart, during which animals are kept in a separate quarantine section. This usually fits in with an induction period prior to feeding a pen fattening ration.
- More recently, community led feedlots have arisen, supported by private companies (Tongaath Hulett) and NGO's and Livestock Development Trusts (FAO and EU funded). In the case of community feedlots, farmers have the option to sell direct to the feedlot association or join the association. As members they put animals through the feedlot and have the costs (feed and small levy) deducted off their sale price. The latter may either be a live sale to the abattoir or the final price of cold dressed slaughter weight. Some community managed feedlots are struggling with the risk associated with feed prices and are opting to sell to the abattoir feedlots to avoid risk. Some have lacked skilled management and caused rifts in communities due to feelings of exclusion. Others lacked ongoing support, having been started with subsidised rations but became unprofitable having to source full priced feeds. Tongaat Hulett and some Livestock Development Trust (LDT) and NGO feedlots have claimed success with community managed feedlots, after investing in ongoing support and inter-farmer mentoring schemes. The LDT has one in Malipati and another in Davata and plans an additional four. These were started with FAO subsidised Survival rations at \$8.00/50 kg bag and profits from each cycle were used to buy feed for the next cycle. However, with current

feed prices this is becoming difficult to achieve without ongoing subsidised support. (See Inputs Section below.)

- Private feedlots (owned by abattoirs or Tongaat Hulett) offer a similar option of contract feeding, again where the cost of feed or a set fee is deducted off the sale price. Pasture finishing is used when environmental conditions allow.

3.4 Inputs (Farmers and Feedlots)

The price of grains is controlled centrally by government to support local farmers. In August 2016 the Grain Marketing Board was paying maize producers at \$390/ton, which kept market prices elevated. Private grain merchants were offering \$340-360/ton. Locally produced maize is only sufficient to cover demand for approximately one third of the year. Maize imports from Zambia are arriving in Harare at \$350-360/ton but given the region wide drought, supplies are intermittent. Imports from as far afield as Mexico were \$400/ton. The Stockfeed Manufacturers Association maintains that the current pricing structure is neither viable nor sustainable. Grain prices have a greater impact on non-ruminant production, which is highly dependent on grain feeding. Smallholder farmers relied primarily on sweet veld grazing and stover with generally no supplementary feeding required.

However, in the current environmental conditions where natural grazing conditions were extremely poor, some farmers were resorting to buying "Survival" rations from National Foods (\$14.00/50 kg). Further inputs include mandatory dipping at District Veterinary Office managed dip tanks, which have a cost recovery charge to the farmer of \$2.00/animal/year. Veterinary drugs are in very short supply within Chiredzi district. Veterinary Health inspectors and Extension workers have little or no drugs available to farmers at the dip tanks. Farmers who wish to purchase drugs to use themselves have to travel to Chiredzi town.

Feed inputs for feedlot cattle vary depending on available feed sources. Beef Pen fattening rations from National Foods were currently priced at \$15.25/50 kg, the price in 2012 averaged at \$10.42/50 kg. Feedlot cattle consumed approximately 10 kg of feed per day, which at current Pen Fattening prices would cost \$3.05/day. A year ago it was reportedly \$2.60/day and based on 2012 figures it would have cost \$2.08/day. Reported Average Daily Gains of 1.2-1.4 kg were expected, again depending on age and condition of the animal on admission and the feed type.

Tongaat Hulett has its own feed mill with a capacity of 42,000 tons per year. It produces feed for own use and for sale to the public. It relies on by-products from its sugar mill (molasses and bagasse), discounted urea (fertiliser for cane) and salt (imported in exchange for sugar from Botswana). In addition to own grown maize and sorghum, it has a contract with local farmers to buy locally produced sorghum. This is all milled and mixed with a concentrate premix from Berghaan Feeds. Current costs for the different feed types were reported as follows: Survival feed \$7.50/50 kg, Induction feed (Crude Protein (CP) 9.5%) \$10.00/50 kg and Pen Fattening (12.6% CP) \$11.50/50 kg.

Some other abattoir feedlots bought in Pen fattening rations from National Foods but due to recent price increases, they were tending to mill their own feeds using National Food premixes, locally sourced molasses and cane tops and chicken litter. With current feed prices, many expressed concern that "from the bag" feeding did not add up.

Additional inputs for feedlots include ear tagging (\$1 if using simple unregistered tags or \$2 if using Livestock Identification Trust (LIT) tags), deworming (\$4) and FMD vaccination (2 vaccines @ \$2 each).

3.5 Abattoirs

Historically the abattoir industry was dominated by the Cold Storage Company (CSC) which was established in 1992. Its abattoirs were the only ones to hold licences to process EU exported beef was processed. They had a total of five abattoirs with capacities of 450-600 head a day, with three cold storage distribution centres in Harare, Gweru and Mutare. To provide a steady supply to the abattoirs, they managed ranches and feedlots with total capacities 13,000 head and 40,800 head respectively. In addition, they set up district level auction sites to collect cattle sourced from commercial and small holder farmers, either for slaughter or further finishing. With the closure of the lucrative EU export market, CSC became a less viable operation, unable to rely on the domestic market alone. It consequently downsized, closing down most of its operations. They still have an active abattoir in Bulawayo with a slaughtering capacity of 600 head a day. Of the four other abattoirs, three remain dormant and one is no longer workable. Of the seven original ranches, one is still active serving the Bulawayo abattoir and another in Mwenezi is leased to Tongaat Hulett.

With the closure of CSC's operations, private companies became more involved to service the domestic market. Many of the CSC auction sites were acquired and managed by the local Rural District Councils and gaps were filled by private auctioneers like CC Sales. Private abattoirs serving local communities in the Chiredzi area now include Sabie Meats, Koala Park and MC Meats. They supply locally but their main markets are in urban centres especially Harare and Bulawayo. Tongaat Hulett operate a small abattoir for their own cattle and supply to local butchers and supermarkets. Private abattoirs have also diversified into feedlot and grazing finishing as outlined above.

3.6 Domestic Markets

There are currently two active domestic beef markets, a local market offering often ungraded beef to local mainly rural consumers and a high value market, serviced by regulated abattoirs providing graded meat to urban centres such as Harare and Bulawayo. In the past, the export market operated alongside this.

Currently the Zimbabwean beef industry is under pressure at both ends with high inputs costs and low consumer buying power. With the current environmental conditions, farmers are struggling to finish cattle on grass alone. They are buying survival rations or, more commonly, they sell poor conditioned cattle to speculators or feedlot owners or community feedlot systems. The rising cost of finishing in feedlots from Commercial grade to Super is currently not viable for those without access to cheaper raw materials and the ability to mill their own feeds. Community feedlots are struggling to make a profit unless they are in receipt of subsidised feeds. In addition, cattle are often presented in such poor condition that it would take too long and be too costly to reach Super grade. Based on a Cold Dressed weight, abattoirs are currently paying \$3.00/kg for a Commercial grade carcass and \$3.10 for a Super. The margin between the grades has reduced because demand has eased. It was reported that during the years of export, the high prices achieved for the export Super grade cuts, subsidised the cheaper cuts and created a wider margin between Super and Commercial prices. Due to small margins, some feedlot operators, in particular community managed feedlots are opting to finish at Commercial grade, using less costly inputs and/or less time to do so. Consumers' buying power has been eroded and they are choosing cheaper cuts or other options of cheaper poultry and pork. Most of beef the market demand is for Economy or Commercial grades, hence the lower price achieved for Super grades at the abattoir. The Super market has peaks of demand around the holiday season of Christmas, New Year and Easter and in general the largest demand for Super comes from Harare.

The current situation of consumers' lower buying power and low productivity of producers results in an even balance of supply and demand within the domestic market.

3.7 Export Markets

Despite the [Phakalane Declaration](#) of 2012, in which member countries of the Southern African Development Community (SADC) resolved to adopt commodity based trade as additional regional standards for trade with particular reference to FMD, little progress had been made in opening regional markets to regular trade in CBT beef.

Foreign enquiries for beef exports continue to come in from Angola, the Democratic Republic of Congo (DRC), Nigeria, Ghana, the Middle East, China and Hong Kong. The Department of Economics and Markets was unaware of any enquiries specifically relating to "CBT beef". Some small quantity, informal exports to countries such as Angola, DRC and Libya have been successful despite FMD. These are based on bilateral negotiations between trading partners, which include consideration of the similar disease status and control measures and comparative level of veterinary services. Tanzania has reportedly strong exports to China and are supported by Chinese investment in infrastructure.

Zimbabwean export prices are not considered competitive, primarily due to the costs of imported inputs. In addition, neighbouring countries have fluctuating currencies and importers take advantage of weaker currencies against the USD, which puts Zimbabwe at a disadvantage. Angola currently cannot meet the consumer demand for beef and with Luanda being one of the most expensive capitals in the world, Angola is less price sensitive than other countries within the region. However, the Angolan and DRC markets are reportedly unreliable and exporters have been faced with customers unable to access funds and produce full payment on delivery. Enquiries from the Middle East, Hong Kong and China usually go cold once the question of FMD and exclusion from the EU markets is raised. In addition, China was reportedly very price sensitive and is looking for high quantities of lower value cuts, whilst the Middle East imposed specific requirement relating to weight, age and sex of the animal which were deemed too difficult to meet consistently. The higher cost of beef in the UK is also considered by Zimbabwe as amenable to absorbing the costs of Zimbabwean beef, however the obstacle of FMD as well as other additional standards on animal welfare and preference for organic or grass fed beef, stand in the way. Countries in East and the Horn of Africa, producing beef through low cost pastoralist, grass fed systems have a price advantage when it comes to exports. Tanzania reportedly has a strong flow of beef exports to China, which are supported by Chinese investment in infrastructure.

Beyond these challenges, the question of small communal farmer productivity and supply capacity for the export market is questionable.

3.8 Veterinary services and FMD control

Zimbabwe's veterinary services are delivered under the Department of Livestock and Veterinary Services (DLVS), led by the Principal Director (Chief Veterinary Officer and OIE Delegate), through three Directorates namely, Livestock Production and Development, Tsetse control and Veterinary Services. The latter was formed by merging Veterinary Field Services (epidemiology and provincial services) and Technical Services (laboratories and veterinary public health). Field Services are delivered by Provincial Veterinary Officers (PVO) who are responsible for the District Veterinary Officers (DVO) within each province. The DVO is responsible for managing the Animal Health Management Centres (AHMC), which in turn manage the dip tanks through Vet Extension Officers (VEO), Animal Health Inspectors (AHI). Both VEOs and AHI hold diplomas in Animal Health, the AHI position is a promotion position. Staffing levels are currently below full capacity, with some districts

without a DVO and some abattoirs had no official meat inspector, whilst some employed their own. Currently in Chiredzi District, four of the twenty-seven VEO positions and two of the five AHI positions are reportedly vacant. The Livestock Production and Development Office in Chiredzi reported 14 Extension Worker positions, 2 livestock specialist vacancies, and all 4 senior supervisors as vacant. They had no vehicle or means of transport and had no budget apart from salaries for the past 5 years.

Dip tanks as Epidemiological units

From an epidemiological perspective, a Veterinary Services managed dip tank serves as an epidemiological unit. Each dip tank serves approximately 1,500-2,000 animals, primarily cattle but some small ruminants too. Dipping is a government subsidised service with a cost recovery fee of \$2.00/head/year. A local community committee manages the dip tank with the supervision of a Dip Attendant. The latter is a government employee who receives on the job training from the Veterinary Extension Worker who in turn oversees a number of dip tanks (usually 5-6) in a designated area.

The dip tank attendant plays a vital role in passive surveillance. They observe cattle for obvious clinical signs, check farmers' stock cards, check movement permits for newly acquired animals, register new animals, births and deaths and update and maintain a dip tank stock record. They alert the Veterinary Extension Worker if any suspicious clinical signs are seen and can chase up farmers who have not attended the dipping session.

Dipping is mandatory and is done every week in the wet summer tick season and once a fortnight in the dry season. The Nyambongwe dip tank (Chekenyere Animal Health Management Centre) located in the original surveillance zone, was visited to observe the dipping process and the dip attendant at work. The current attendance rate was reported as approximately 50%. This was reportedly because it was a low tick burden season and many cattle were emaciated and exhausted from the drought and farmers on the periphery of the catchment were reluctant to bring them in. Some farmers had little cash and had not paid dipping fees. In reality, dip attendants did not have the means to physically follow up non-attendees. Figure 10 shows a selection of cattle present for dipping.



Figure 10: Cattle attending Nyambongwe dip tank

Livestock Identification and registration

Cattle branding for dip tank registration is mandatory. They are identified by branding a letter (district reference) and number (dip tank reference) on the left hindquarter to identify at which dip tank the animal is registered. On the left forequarter they have an inverted V if originating in the FMD Vaccination Zone or an inverted F if from the surveillance zone (Figure 11). There is no mandatory individual animal identification system. Each farmer keeps a stock card which lists his current stock (Figure 12). These are checked by dip attendants who update them and transfer the details to the dip register. New animals from a different dip tank, need a movement permit which is checked before they are registered on the stock card.



Figure 11: Dip tank identification branding

**VETERINARY FIELD SERVICES
STOCK CARD**

VFS No 768997

NUMBER:
83-113642 F-83

BOOK NUMBER: 96/H8B/12/5

DISTRICT: CHIRAZOZI

KRAAL: VIL - 5

TANK: NYABONJWE

DATE	QUARTERLY CENSUS						REMARKS	DATE	DIPPED					REMARKS
	Cattle	Dogs	Sheep	Goats	Donkeys	Pigs			Cows	Bulls	Halfers	Oxen	Calves	
								C.	B.	H.	OX.	CV.	Total	
								1	1	=	=	=	2	Still
								1	1	=	=	=	2	SPK 12/5/2015
								1	1	=	=	=	2	18/1/15
								1	1	=	=	=	2	18/2/15
								1	1	=	=	=	2	18/3/15
								1	1	=	=	=	2	18/4/15
								1	1	=	=	=	2	18/5/15
								1	1	=	=	=	2	18/6/15
								1	1	=	=	=	2	18/7/15
								1	1	=	=	=	2	18/8/15
								1	1	=	=	=	2	18/9/15
								1	1	=	=	=	2	18/10/15
								1	1	=	=	=	2	18/11/15
								1	1	=	=	=	2	18/12/15

Figure 12: Farmer's stock card

An individual animal identification and registration system exists but is used on a voluntary basis. The Livestock Identification and Traceability System (LITS) is centrally managed from a database in Harare by the Livestock and Meat Advisory Council (LMAC). It was originally used for the EU export system and was also used by commercial farmers for management purposes. It costs \$20.00 as a one off registration fee and then \$2.00/tag (\$0.75 of that is import duty and tax). It consists of a 10-digit unique number on twin tags (one for each ear), one as a flap tag and the other a button tag (Figure 13). Tags are supplied on request, the farmer tags the animals and returns the completed registration forms, which are processed into the data base. All records of deaths, movements and sales should be submitted to update records. In time it is hoped to decentralise this system with local District Veterinary Offices dealing with the registration of forms submitted from tagging at dip tanks by Veterinary Extension Workers.



Figure 13: Ears tags used in the Livestock Identifications and Traceability System (LITS)

A radio frequency identification (RFID) or electronic ear tag system with central data base registration is also being investigated and is currently being trialled elsewhere in Zimbabwe for the individual identification of cattle. It is intended to be combined with an electronic stock card kept by farmers.

Movement control

A national permit system exists to move cattle between provinces, districts and sub-districts and dip tank zones (approximately 5km's apart). A Vet Extension Officer (VEO) may issue permits for movement between dip tanks, Animal Health Inspectors (AHI) issue permits for intra-district movements, District Veterinary officer for inter-district and Provincial Veterinary Surgeon for interprovincial movements.

The cost of a permit is \$10.00 per consignment irrespective of number of cattle, although commonly this does not exceed the capacity of truck and trailer (30 adult cattle). Issuing a permit requires a visit and inspection by the appropriate official veterinary officer and the capacity to perform these duties promptly is often lacking, leading to delays. In addition, capacity to fully enforce the movement regulations may be challenged at times. Infringements of these regulations can result in serious consequences which include the right to destroy animals originating from areas of high risk. Permits are checked at dip tanks when a new animal is presented without the local tank's brand mark. However, without individual identification this system is open to abuse. Veterinary Services staff expressed concern that it is not always possible to know or trace what happens to the animals after the permits are issued. In addition to the movement permit, a police clearance certificate is required which again requires a visit by the police to where the animals are kept. Capacity in transport and personnel for this is lacking especially in rural area with long distances to cover. As a result, this system is cumbersome especially for those wishing to sell one or two animals for

emergency cash. It is argued that the movement control permit system is the greatest obstacle preventing farmers from gaining direct access to markets. As a result, farmers are forced to sell individual cattle at lower prices to local speculators who will amass a full consignment of cattle before getting the necessary movement and clearance paperwork. Some farmers may consider resorting to bribes, forging documents or chancing movement without documentation and in turn unravel the FMD control measures.

Vaccination

Trivalent (SAT 1, 2 & 3) vaccines are sourced from the Botswana Vaccine Institute (BVI), who is the only supplier for the region. Vaccines require a cold chain and multidose bottles need to be discarded 24 hours after first broached. Supply issues involve constraints in local Veterinary Services budget and staff, and long lead times (up to 3 months) required from BVI for orders. Vaccines should be administered 2-3 times a year to maintain immunity. In April 2016, the Chiredzi District Veterinary Office last vaccinated 45,000 cattle of the 90,000 estimated to be in the new vaccination zone with a single dose. The previous vaccination programme was exactly a year before with the same degree of coverage in the same area, to the North-East of the district. Farmers in the Malipati area to the south of the district recalled the last FMD vaccine was given in 2014. Cost of vaccines is \$2.00 with an additional cost of \$0.10 to cover the delivery and administration of vaccine.

Outbreaks

Primary FMD outbreaks recorded over the 70-year period from 1931-2001 numbered only 87, on average 1.24 outbreaks per year. The recent increase in outbreak occurrences are blamed on inadequate vaccination coverage, lack of fencing National Parks and uncontrolled or illegal movement of cattle (Figure 14 and Table 6).

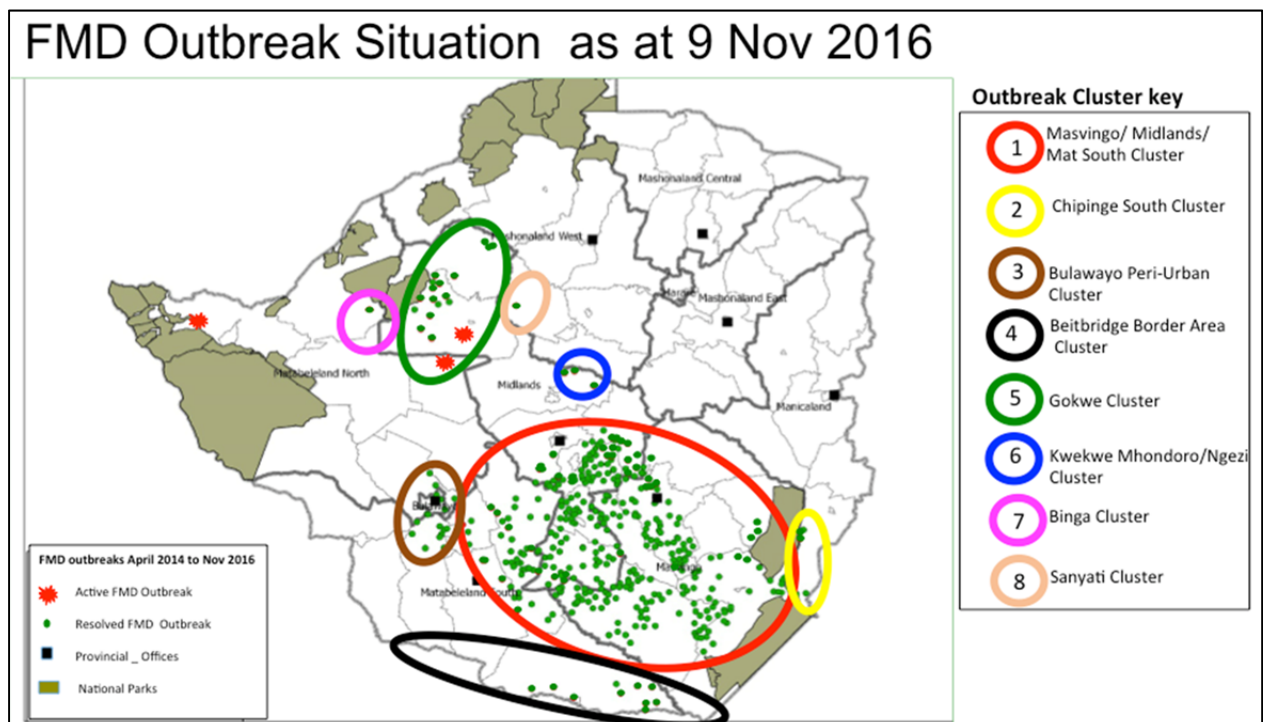


Figure 14: Outbreak situation for FMD 2016. Source DLVS

Table 6: Outbreaks of Foot and Mouth Disease since 2005. Source OIE, World Animal Health Information Service (WAHIS)

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
No of Foot and Mouth Disease outbreaks	17	0	5	1	6	9	5	11	9	87	150

The Chiredzi District Veterinary Office reported that most primary outbreaks occurred from April to June. This fits in with the 3-4 months after the buffalo calving season, although farmers report most contact with buffalo is at the end of the dry season (September-October) when farmers are more likely to move into the GNP in search of grazing and water. During the period of January – April 2016 six outbreaks were reported in the SE lowveld area and on this basis a total of more than 20 for the year could be projected.

Outbreak response includes ring vaccination of cattle in the affected surrounding dip tanks (on average a total of 4 dip tanks/ 20,000 cattle). In addition, movement control is applied through imposing quarantine restrictions on movement of cattle out of the affected area. However, ring vaccination is often incomplete due to inadequate resources. Repeated attempts at controlling outbreaks deplete resources for routine control and vaccination.

Surveillance and Laboratory capacity

The DLVS has a central veterinary laboratory (CVL) in Harare and three more at a provincial level. Preliminary diagnosis of FMD is conducted using RT-PCR on epithelial samples. Serology ELISA tests are also performed at the CVL using reagents from BVI and Pirbright Laboratory (UK). Samples are sent for confirmation of diagnosis to BVI and OVI (Regional OIE FMD Reference Laboratories). The CVL however, is challenged by staff shortages and budget constraints affecting transport capacity, equipment upgrades and inadequate supplies and materials.

Fencing

During the years of export to the EU, buffalo proof fencing (funded by the EU) was in place around national parks in areas where there were no natural barriers (primarily Hwange and Gonarezhou National Parks). This consisted of metal (cut railway line) uprights and high tension steel cabling to prevent buffalo movement, yet allow movement of kudu, elephant and smaller game species. In addition, all private conservancies and game reserves are still required by law to have game proof fencing. This is typically a single 2.4 m high meshed fence to keep kudu from jumping and is electrified on both sides. As part of the original FMD vaccination programme, the Vaccination Zone was fenced with a barbed wire cattle fence and cattle grids on roads to prevent natural movement into the surveillance zone. The Veterinary Services Department had the responsibility of inspecting and maintaining both the buffalo fences and zonal fences.

The current situation is that the cattle fences between vaccination and surveillance zones are no longer in place and many of the cattle grids are filled in with soil. None of the original buffalo fence remains around Gonarezhou National Park (GNP). In 2000, during the land redistribution period, a local Shangaan community (whose predecessors had been evicted from GNP when it was established) moved into the Chitsa area in the north-east of the GNP and settled in an area of approximately 3000 ha. The area was considered by the community as highly favourable for agricultural purposes and, although national parks are protected against human settlement by law, a settlement agreement was reached. However, as a result of increasing tensions arising from crop

damage from wildlife and incursions of livestock into the national park, it was decided by GNP and the Frankfurt Zoological Society in 2011 to resort to fencing as a solution. A fence was erected to provide a further 6000 ha to the community, but created a barrier stretching from the Save River to the north and Rhunde River to the south and beyond for a total distance of approximately 65 km (Figure 15). This was the only section of the GNP which had fencing during the field visit in 2016.

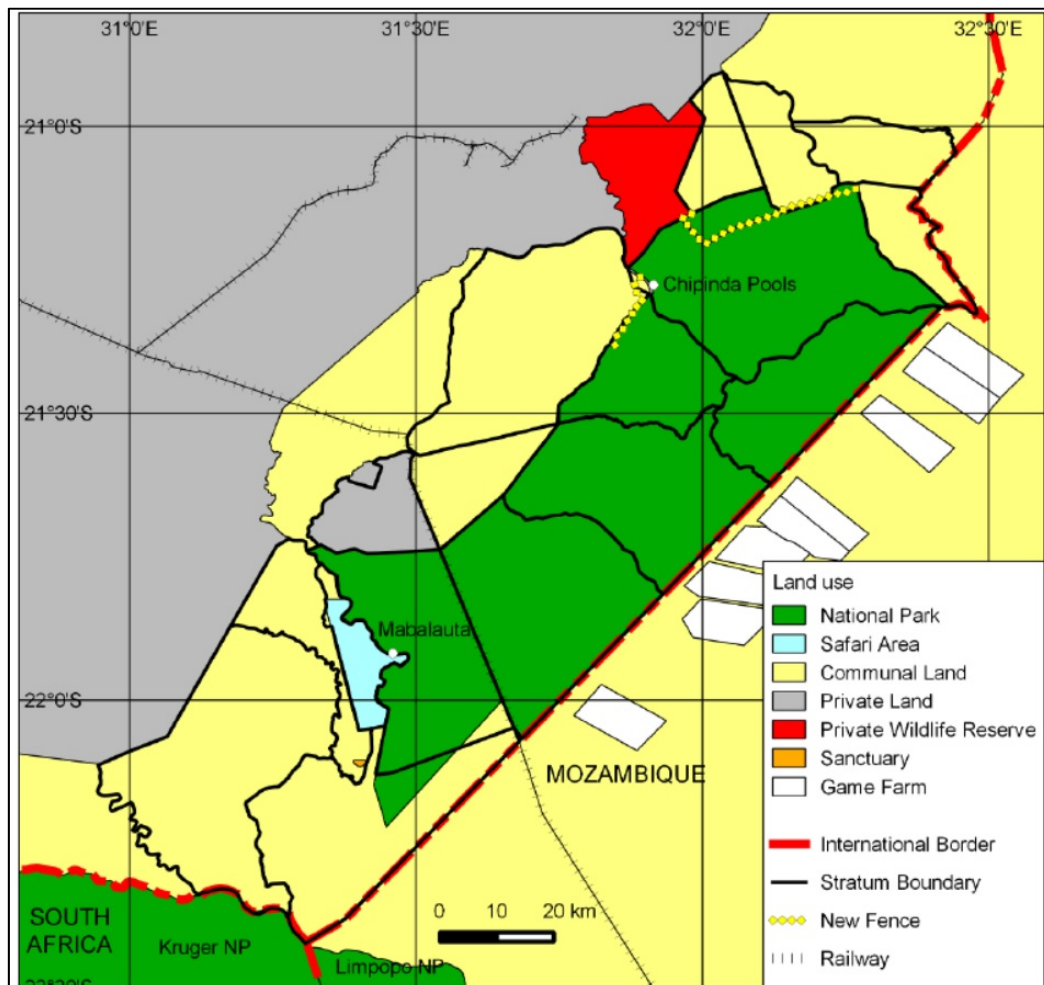


Figure 15: Gonarezhou National Park and fence

3.9 Conservation

The Gonarezhou National Park (GNP) together with the Sengwe Corridor forms part of the Great Limpopo Transfrontier Conservation Area. As mentioned above, the fencing of the GNP is no longer complete and there is free movement of wildlife including buffalo beyond the conservation area. In addition, despite being aware of the risk of FMD from buffalo, farmers will move livestock into GNP when grazing and water are in short supply. Figure 16 below shows collared sub-adult female buffalo movement beyond the national park boundaries whilst Figure 17 shows estimated cattle distribution from aerial survey results in and around GNP.

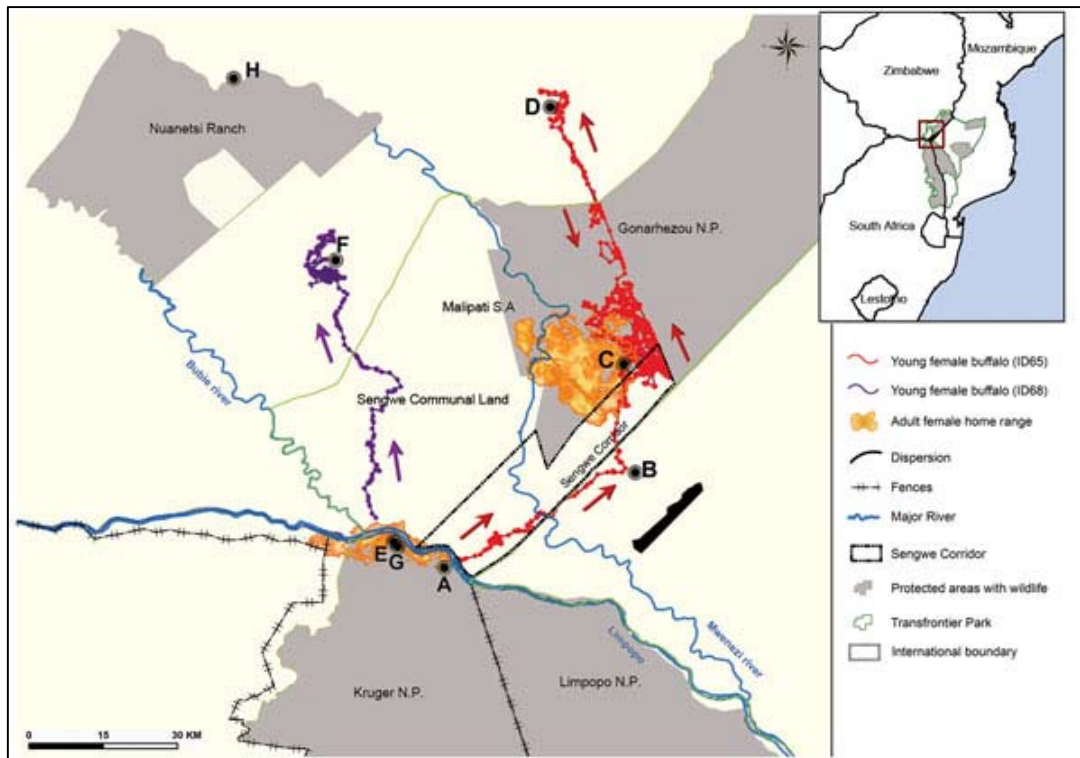


Figure 16: Long distance movement of three sub-adult female buffalo. Source Caron et al., 2016

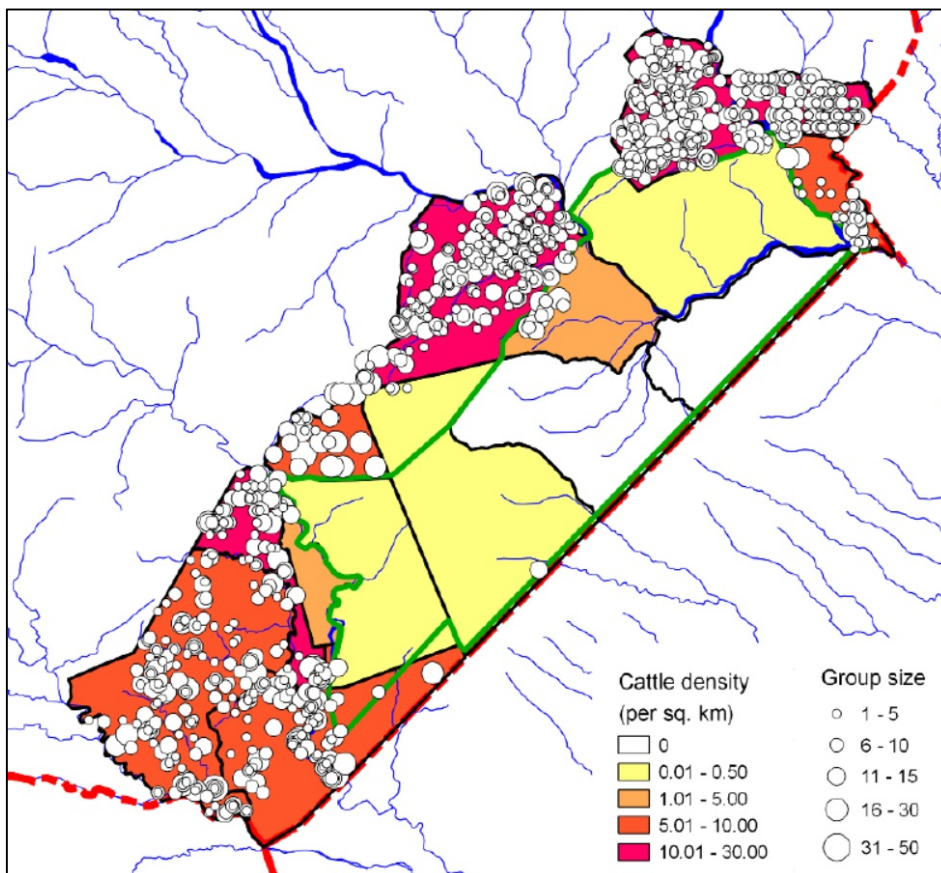


Figure 17: Cattle densities and distributions in and around Gonarezhou National Park (NP borders in green). Source Aerial Survey, GNP 2013.

As a result, conflict occurs between farmers and conservation authorities over natural resource usage. In addition, veterinary services struggle to manage FMD without the control of buffalo movement and with farmers choosing to accept the risks in search of grazing and water. Some resolution has been found by taking a Community Based Natural Resource Management approach. Some communal farm areas adjacent to GNP have been developed through initiatives such as the Communal Areas Management Programme for Indigenous Resources (CAMPFIRE) and Wildlife in Livelihood Development (WILD) into the Jamanda and Naivasha community wildlife conservancies (Figure 18). These present alternative livelihoods for communities based on sustainable commercialisation of the wildlife product and conservation experience through Private-Public-Community-Partnerships.

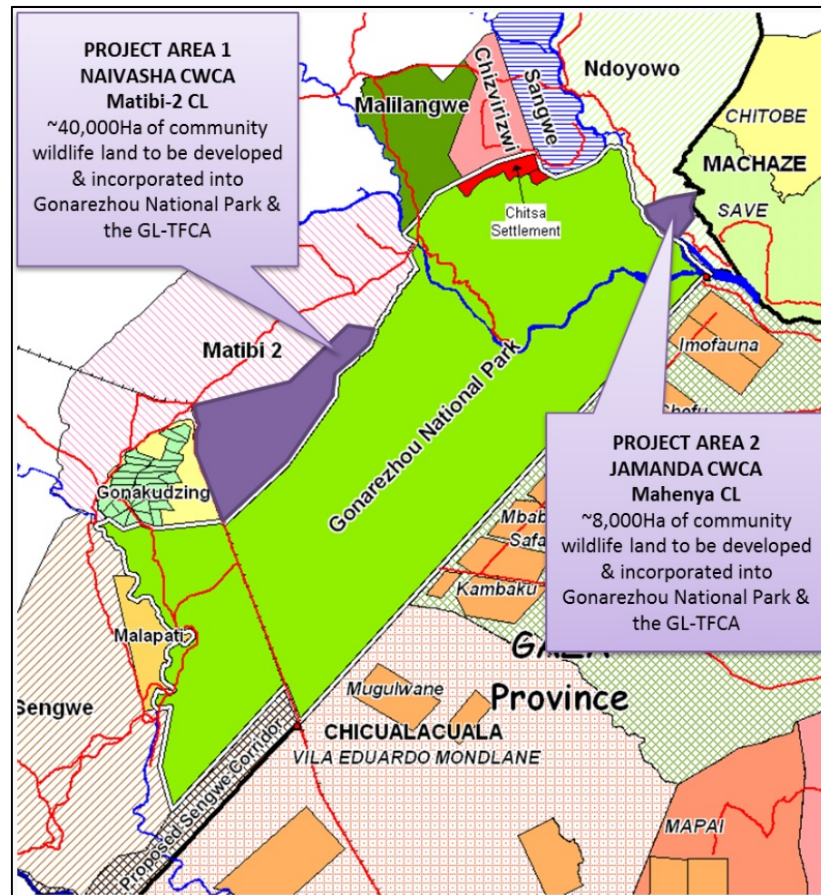


Figure 18: Community Wildlife Conservancies bordering Gonarezhou National Park. Source www.wild-africa.org

4. Analysis and Conclusions from field work in Zimbabwe

4.1 Understanding 8.8.22

The updated OIE's TAHC 2016 has guidelines for producing beef from FMD infected countries as outlined in Article 8.8.22 thereof (Box 1).

OIE TAHC 8.8.22

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 and water buffaloes 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 kilometer 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 and water buffaloes 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.

The updated Clause 1c of the TAHC 8.8.22 has specific significance to areas with free roaming buffalo, such as the AU-IBAR pilot project area. The OIE's definition of FMD occurrence includes those animals with or without clinical signs of disease, which can be confirmed as positive by blood testing. This therefore would include carrier state buffalo and it would be impractical, if not impossible to check whether buffalo that have ventured "with 10 km of an establishment" are positive or negative for FMD. By virtue of this, the option of a quarantine station (1.c, TAHC 8.8.22) remains the only one for beef being produced in an FMD vaccination area in which there is uncontrolled buffalo movement and the AU-IBAR project will need to be updated to incorporate this.

4.2 CBT fundamentals

The production of CBT beef for export, from an FMD infected area, must be supported by a solid foundation, based on the following prerequisites:

1. Regular and sustained vaccination programme.
2. Permanent individual animal identification and enforced movement control measures.

3. Production systems with the capacity to produce beef that meets export market requirements, including quantity, consistent supply, quality, other non-CBT standards (welfare, grass fed, organic etc.)
4. A market must exist or be developed that accepts and has a demand for CBT beef.

The aforementioned prerequisites of vaccination, identification and control measures form part of an official FMD control programme, which in turn requires the support of sufficient and sustained investment in national veterinary services (including for staffing, vaccines and logistical capability).

While Zimbabwe has an official FMD control programme, this programme has not yet been endorsed by the OIE. Several limitations in Zimbabwe's official FMD control programme were noted by the OIE in 2015. These included limited resources and vaccine availability for maintaining routine vaccination coverage and to control outbreaks, little attempt to mitigate cattle-buffalo contact and poor movement control resulting in mixing of cattle from different risk areas. The current situation with vaccine coverage within Chiredzi (as reported by the DVO) was that less than 50% of the cattle population had been vaccinated at half the minimum frequency required. Whilst bilateral trade agreements can be established without an OIE endorsed FMD control program, this could limit the number of available trading partners and therefore impact on the achievable price for export beef.

Finally, the existence of an export market for CBT beef is essential. At present, there appears to be little enthusiasm amongst regional trading partners to trade in CBT beef. Zimbabwean beef is more expensive to produce than beef from neighbours, making competing on price difficult. Current production systems are low input and low output, with little commercialisation of herds. Consequently, offtake is limited, and often only to meet urgent needs, resulting in inconsistent throughput at abattoirs. Cattle are usually sold at the end of their productive life and therefore the meat is of low quality and the potential to improve and finish animals through the feedlots is limited.

4.3 The AU-IBAR Pilot project prerequisites

As currently designed, the AU-IBAR pilot project is to take place within the "FMD vaccination area" containing some 285,000 cattle, which (it is assumed) will be "subject to a robust animal health service delivery, adhering to the regular 6-monthly official FMD vaccination programme". It is clear that, in the short term, this is currently not achievable given the resources available to the Veterinary Services.

A cattle registration, identification and traceability system is required to ensure individual identification of animals and the clear recording of movement within the CBT system. Although an individual livestock identification and traceability system (LITS) exists, it is not mandatory at present. Therefore, investment is needed to support the use of an LITS for the identification of individual animals. This will not only fulfil the requirements for CBT beef production but also facilitate more accurate record keeping of stock cards and vaccinations. It will also address some of the current challenges in identifying individual animals on movement permits and police clearance certificates.

Effectiveness of vaccination is expected to be assessed by pre and post vaccination monitoring to assess levels of protective immunity. Laboratory capacity to fulfil this is questionable and capacity building will be required to facilitate this.

Participating abattoirs will need to comply with CBT guidelines with Veterinary Public Health Officers (VPHO) conducting pre and post slaughter inspections and the maturation of meat, as per 8.8.22 clause 2.b. Currently, abattoirs in Chiredzi are Grade B only and are not certified or equipped to process meat for CBT export. The VPHO are not trained or always equipped to conduct the maturation checks for CBT beef. Deboning and deglanding facilities are also required at the abattoir

before safe dispatch of the fresh meat and these are not currently available. Alternatively, carcasses could be transported under veterinary certified transport for processing in existing facilities in Bulawayo.

In view of the prerequisites and capacity gaps discussed above, several concerns were raised during the fieldwork in Zimbabwe (discussed in detail in the Conclusion section below). The primary conclusion was that, as currently designed, the original AU-IBAR pilot project will need updating since it does not comply with Clause 1c of the 2016 TAHC 8.8.22 (see Box 1 above). This was discussed with DLVS and the option of a 30-day quarantine station, as per Clause 1c, was to be investigated. In this context, the DLVS arranged a study tour, with the Department of Veterinary Services in Namibia to Katima Mulilo in the Zambezi region in June 2017, to visit key stakeholders in local beef production and the quarantine station and abattoir.

5. Study Tour to Katima Mulilo, Namibia

5.1 Background

The town of Katima Mulilo lies close to the Zambezi River in the eastern half of the Zambezi region (Figure 19), situated in the middle of the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA). The region is dominated by unfenced, flat terrain with deep sandy soils and seasonally flooded plains, which contain heavier more fertile soils. Local small-scale farmers dominate the area but have limited opportunities for crop agriculture and most land is used for livestock agriculture.

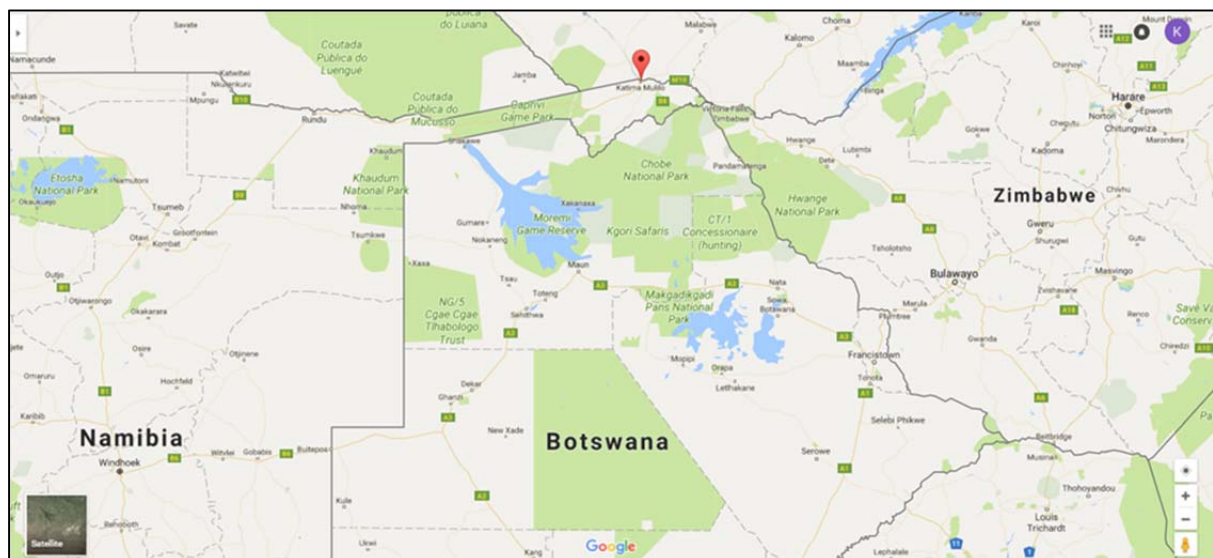


Figure 19: Katima Mulilo in Namibia's Zambezi region

The region is part of Namibia's FMD Infected Zone due to the high number of free roaming African buffalo that coexist with the cattle herds. (See Figure 20 below.)

As is the case in Zimbabwe, cattle are kept for financial and social capital, agricultural traction, milk and manure production. Cattle are mainly sold to meet expenses, such as for family education and health, but also to purchase alternative food for home consumption. Off-take estimates in the literature are around 10% and this was confirmed through interviews with local farmers. Younger cattle are sold to neighbours for breeding, but the majority are sold as older animals for slaughter at the end of their productive life. Most farmers sold direct to each other or at slaughter poles or abattoirs; agents played a limited role.

5.2 FMD control

Namibia has been regionalised into FMD zones through the use of a livestock and game proof cordon fence, creating a FMD free zone without vaccination to the south and a protection zone to the north, with the Caprivi (now Zambezi) region as the remaining Infected zone in the north east (Figure 20).

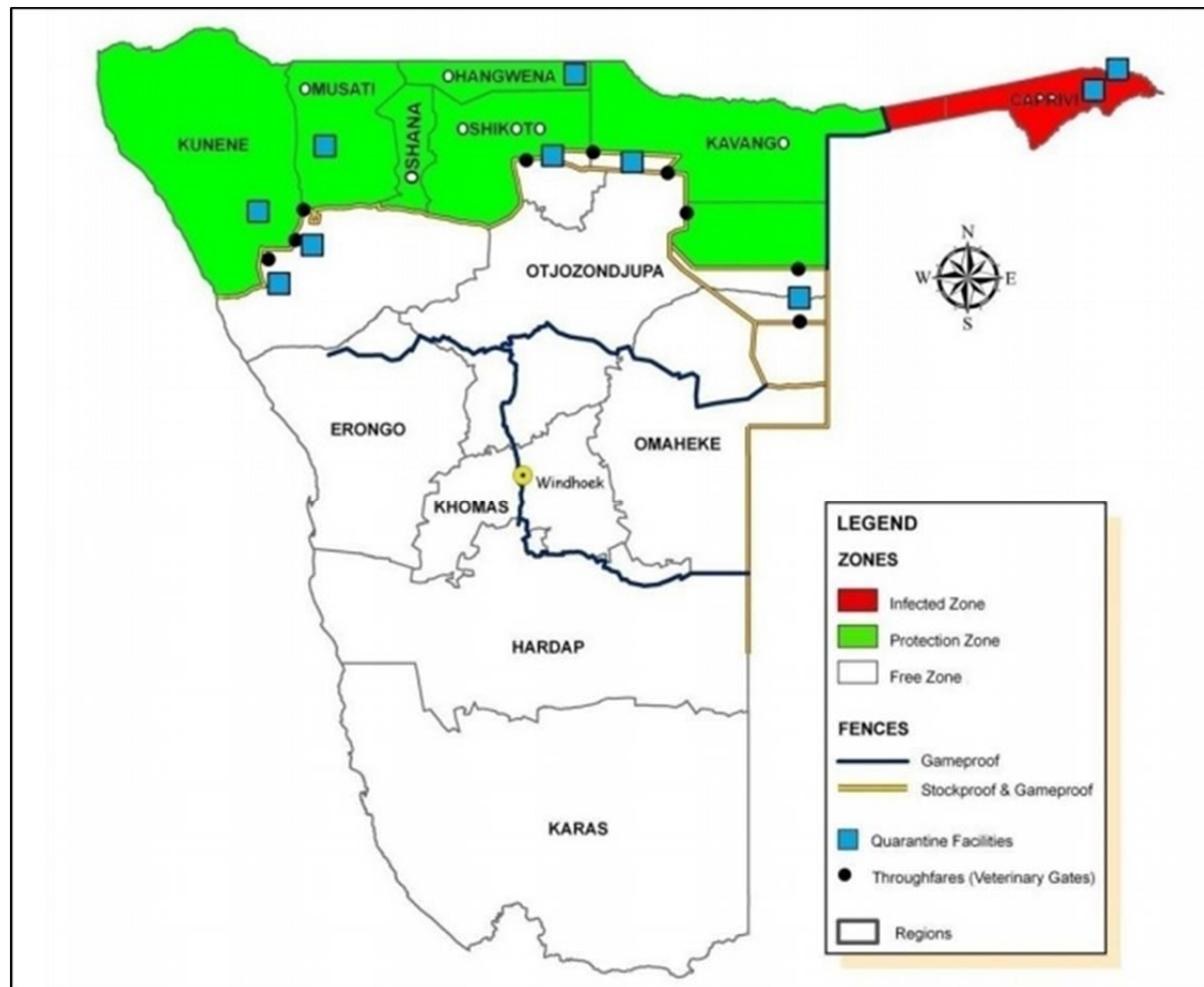


Figure 20: FMD Zones in Namibia (Source: [European Commission: Food and Veterinary Office Ares\(2013\)2607579 - 09/07/2013](#))

The Namibian Veterinary Services' FMD control programme is officially endorsed by the OIE. At its foundation is the Namibian livestock identification and traceability service (Nam-LITS). The system uses radio frequency identification (RFID) tags combined with visual unique numbered tags (Figure 21). All farmers are required to register for a unique farmer or herd number, which is linked to a village location. All cattle must be tagged before the age of 6 months. The LITS also provides the backbone for the movement permit system. Farmers' stock cards contain the numbers of their individual cattle and all movement permits issued by the DVS are linked to the individual identification numbers. All changes of ownership, deaths/slaughter as well as vaccinations are recorded against the individual ID number by the DVS using the Nam-LITS database. Movement permits are not be issued unless all details of the farmers' records and vaccinations are up to date on Nam-LITS. New ownership or transfer of sale must be supported by a valid movement permit. The Nam-LITS record is used as an indicator of farmer compliance and can be used to support Agri-Bank loan applications. DVS claims a 99% uptake rate of Nam-LITS by farmers. Farmers who were

attending an FMD vaccination day at Malimina cattle crush, east of Katima Mulilo were asked about the system. They were all in favour of it, saying it was free, it provided a means of confirming ownership and as a result it reduced cattle theft and improved the return rate of lost cattle. Some farmers still use their own personal brands in addition for identification purposes.



Figure 21: Nam-LITS ear tags, from left to right: visual and circular (RFID) tag, RFID reader and visual tag in ear.

The DVS provides free but mandatory FMD vaccination three times a year using the trivalent SAT 1, 2 & 3 vaccine from the Botswanan Vaccine Institute. Farmers, when asked, expressed a willingness to participate and an overall satisfaction regarding the vaccination programme. They also used the vaccination attendance as an opportunity to have other health issues addressed by veterinary services staff. There have been no recorded new outbreaks of FMD in Namibia since July 2015. The recorded new outbreaks over the recent years are presented in Table 7 below; all outbreaks were identified as SAT serotypes (Source OIE, World Animal Health Information Service (WAHIS)). The DVS reported that outbreaks in Zambezi region were commonly associated with free roaming African buffalo or cattle from neighbouring Zambia and Botswana.

Table 7: New FMD outbreaks as reported via the OIE’s World Animal Health Information Service

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 (till June)
New FMD outbreaks	33	1	1	4	1	3	2	31	0	0

5.3 MeatCo Abattoir

Until 2016, the abattoir at Katima Mulilo was run as a parastatal company; the Namibian government owned the fixed assets and leased the operational side to MeatCo, a dominant, national semi-private meat marketing company. The abattoir practiced a form of CBT beef production, to fit with the then current OIE TAHC guidelines. It processed vaccinated cattle through quarantine camps for 21 days (later 30 days), with fortnightly inspections for FMD lesions. The abattoir had overnight holding facilities to allow further pre slaughter “mouthing” examinations, a Halal slaughter/deglarding facility, two chillers/maturation units, a deboning and packaging unit, plate freezers and 21 day holding freezers. The whole carcass was deboned and meat was sorted and boxed according to individual cuts before labelling and freezing. This CBT process allowed frozen

beef cuts to be sold in Namibia in the FMD free region in the south of the country and exported to South Africa and on a smaller scale to the DRC, Angola and Zimbabwe. MeatCo also owned meat processing plants elsewhere in Namibia, giving the option of further processing the lower quality meat into “Russians” (frankfurters), polony and similar processed cooked sausages and meats.

The abattoir closed early in 2016 citing high operational costs and losses due to the forced closure during FMD outbreaks, after which exports to South Africa would be temporarily suspended. Reported losses amounted to 43 million Namibia Dollars or 3.44 million USD in 2015 (exchange rate approximately 1 NaD = 0.08 USD at the time). In addition, they faced the challenges of low offtake rates and poor quality livestock from local farmers. As a result, the abattoir would close during the poor grazing months of August till October, when off-take and body condition and live weights of cattle were especially low. When the abattoir was functional, approximately half the slaughtered cattle in the region passed through this formal channel, the other half through the informal market. Farmers mentioned that prices via the abattoir were not sufficiently high enough to attract them. They complained that sometimes grazing in the quarantine camps was poor and their livestock lost condition.

5.4 Critical Take-home message from Katima Mulilo, Namibia

The CBT beef production system was built on a foundation of a well-subscribed individual animal identification system, which facilitated recording of FMD vaccinations, workable movement permits and the prevention of informal sales between farmers. In addition, the DVS had an OIE endorsed FMD control programme of obligatory, regular, three times a year vaccination. Yet, in spite of these strengths, other factors in the value chain negatively impacted capacity to produce and export CBT beef in Namibia. In particular, MeatCo's failure was attributed to high running costs, low outputs due to low quality meat, low throughput (low farmer off take) and FMD outbreaks, the latter contributing to the loss of export markets.

6. Overall conclusions and recommendations

Work carried out under this PPG indicates that the production of CBT beef in the southeastern region of Zimbabwe, i.e. the FMD endemic area bordering Gonarezhou National Park, remains a valid proposal, provided that a number of preconditions are met. Three of the most fundamental prerequisites for the production of CBT beef in an endemic FMD area, like the southeastern part of Zimbabwe, include: (i) regular and sustained vaccination; (ii) an operational individual livestock identification and traceability system (LITS); and (iii) enforceable movement control measures. At the same time, the identification and existence of a market that is willing to pay premium prices for CBT beef from Zimbabwe is paramount, as is the capacity of stakeholders in the value chain to meet the market's requirements, including those of quality and quantity.

While a cost benefit analysis was set up as part of this report, in view of the findings outlined above as well as the uncertainties and data gaps in costs of developing infrastructure to meet the updated OIE TAHC, and the potential export prices hoped to be achieved, the cost benefit analysis was not fully completed. Based on new information that may become available in the future, it is hoped that this cost benefit analysis could be completed.

Based on the findings of this PPG, it is recommended that the AU-IBAR pilot project is amended to ensure that it is compliant with the updated OIE TAHC and includes an area and cattle population which is feasible based on the current level of capacity and resources in the veterinary services, as well as existing infrastructure / facilities.

The following are considerations for the way forward:

1. A scaled-down version of the AU-IBAR pilot project could be considered, based on a smaller subpopulation of cattle within the original vaccination zone. Several factors will determine the location and size of the project area and cattle numbers.
 - I. The area will ideally contain the main abattoirs in and around Chiredzi.
 - II. A suitable partner must be found within the vaccination zone to develop an existing feedlot quarantine infrastructure into a veterinary quarantine station, which complies with OIE's guidelines and is under the control of the veterinary services. The option of using the government quarantine station in Mwenezi district should be explored and costed as an alternative.
 - III. The total catchment area will depend on available resources to purchase and deliver the required vaccines (\$4.20/head/year) and identification tags (\$1.11/head), and to develop laboratory capacity to maintain the necessary surveillance.

The area, number of dip tanks and the number of cattle involved will depend on available budget and partnerships between the DLVS and other interested stakeholders, e.g. abattoirs, feedlots, feed suppliers, livestock identification tag suppliers, international donors (e.g. EU) and NGOs who operate locally.

2. A system of individual livestock identification and traceability, managed by the Livestock and Meat Advisory Council, currently exists. This system was used for export cattle to the EU in the past and is still used by commercial farmers for management purposes. This system would be adequate for use in a future CBT beef pilot project. However, in the longer-term Zimbabwe would benefit considerably from the introduction of a countrywide standardised electronic system (as used in Namibia). Such a system could be linked to farmers' stock cards, dip tank registers, vaccination registers, movement permits and police clearance certification systems.
3. There are two options to consider concerning carcass processing for CBT beef:
 - I. Abattoirs in Chiredzi require upgraded facilities to meet CBT beef export standard requirements, to hold carcasses for the full period of maturation and to facilitate deboning and deglandng of carcasses. Abattoir owners can be approached to gauge their interest and ability to make the investments required, or to identify opportunities to negotiate partnerships with other stakeholders. Full staffing and retraining of VPHOs is needed to facilitate certification that abattoir are compliant with TAHC 8.8.22. In addition, standard operating procedures for decontamination and disinfection of transport vehicles will need to be facilitated.
 - II. Carcasses could alternatively be securely transported under veterinary supervision and certification to an existing local deboning and deglandng facility in Bulawayo (previously operational with CSC during the previous period of exports to the EU). An assessment of the facilities and costing of any updating and refurbishment will be necessary.
4. Additional market research is required to determine potential interest in CBT beef from Zimbabwe. This should include consideration of other market requirements such as quality,

quantity, consistency of supply, conservation friendly, etc. Private sector stakeholders must be encouraged to investigate market opportunities directly themselves. This research should ideally be undertaken now, before any future projects, as evidence of an external market for CBT beef will assist to gain interest and commitment from potential private sector investors and partners.

5. On the basis of the market research results, a review is advised to identify the support required by farmers to meet the export market demands and preconditions, both in terms of quantity and quality of livestock produced. Such support may include access to information, training through extension services, as well as access to subsidised infrastructure and equipment. In addition, research is required to investigate the local culture and livestock keeping behaviour and to explore ways to shift from need-based selling of cattle and incentivising greater off take rates. If options of mobile banking and transactions exist, such as M-Pesa in East Africa, this may be useful in encouraging this process.

In order to realize potential for the production of CBT beef in Zimbabwe in the medium to longer term, provided export markets are identified, it is clear that concerted efforts, combined with significant and sustained investment, are needed to rebuild capacity in the veterinary services and the livestock value chain as a whole. Apart from securing sufficient vaccine supplies to provide twice-yearly FMD vaccination, veterinary staffing levels at the local district level must be improved to deliver adequate vaccination and disease surveillance. Staffing at the level of Livestock Production and Development officers also need to be improved to support farmers with production and extension services. A nationwide electronic LITS is required to support livestock disease management, beyond just FMD. The LITS would also reinforce movement control and police clearance, support vaccination and diptank records and would facilitate the return of lost or stolen stock to farmers. An improvement in productivity and a change in livestock keepers' behaviour is required to improve the quality of cattle marketed and the off take rate. Of critical importance, a market for CBT beef from an FMD endemic area in Zimbabwe needs to be found or developed, in order to provide adequate return on the investment required to deliver it.

Bibliography

- AU-IBAR 2013. Are there opportunities for African countries to strengthen trade in animal products in compliance with International Sanitary Standards? : AU-IBAR.
- BARNES, J. I. 2013. Economic Analysis of Land Use Policies for Livestock, Wildlife and Disease Management in Caprivi, Namibia, with Potential Wider Implications for Regional Transfrontier Conservation Areas. *Technical Report to the Wildlife Conservation Society's AHEAD Program and the World Wildlife Fund*. WCS/WWF.
- BARRETT, J. 1992. The Economic Role of Cattle in Communal Farming Systems in Zimbabwe. *ODI Pastoral Development Network Paper 32b*. London, UK: ODI.
- BRAHMBHATT, D. P., FOSGATE, G. T., DYASON, E., BUDKE, C. M., GUMMOW, B., JORI, F., WARD, M. P. & SRINIVASAN, R. 2012. Contacts between domestic livestock and wildlife at the Kruger National Park Interface of the Republic of South Africa. *Prev Vet Med*, 103, 16-21.
- BRITO, B. P., JORI, F., DWARKA, R., MAREE, F. F., HEATH, L. & PEREZ, A. M. 2016. Transmission of Foot-and-Mouth Disease SAT2 Viruses at the Wildlife-Livestock Interface of Two Major Transfrontier Conservation Areas in Southern Africa. *Front Microbiol*, 7, 528.
- CARON, A., CORNELIS, D., FOGGIN, C., HOFMEYR, M. & DE GARINE-WICHATITSKY, M. 2016. African Buffalo Movement and Zoonotic Disease Risk across Transfrontier Conservation Areas, Southern Africa. *Emerg Infect Dis*, 22, 277-80.
- CFUZ 2015. Livestock Sector Overview: 2014-2015. *Submission to the 2015 Mid Tern Review Discussion*. Commercial Farmers Union of Zimbabwe.
- COMESA 2008. Commodity-based Trade in Livestock Products: New Opportunities for Livestock Trade in the COMESA Region. *POLICY BRIEF Number 1 May 2008*. Common Market for Eastern and Southern Africa, Comprehensive African Agriculture Development Programme.
- DABORN, C., DENORMANDIE, N. & HUNT, T. 2009. Tool for the evaluation of Performance of Veterinary Services, Zimbabwe. Paris, France: OIE.
- DAFF 2014. VETERINARY PROCEDURAL NOTICE FOR FOOT AND MOUTH DISEASE CONTROL IN SOUTH AFRICA. *In: DEPARTMENT OF AGRICULTURE, F. A. F. (ed.)*. Republic of South Africa.
- DION, E., VANSCHALKWYK, L. & LAMBIN, E. F. 2011. The landscape epidemiology of foot-and-mouth disease in South Africa: A spatially explicit multi-agent simulation. *Ecological Modelling*, 222, 2059-2072.
- DUNHAM, K. M., WESTHUIZEN, E. V. D., WESTHUIZEN, H. F. V. D. & NDAIMAN, H. 2013. Aerial Survey of Elephants and other Large Herbivores in Gonarezhou National Park (Zimbabwe) and surrounding areas. Parks and Wildlife Management Authority and The Frankfurt Zoological Society.
- FAO 2004. Zimbabwe: Country report on the state of the world's animal genetic resources. *In: TAWONEZVI, P. (ed.)*. Food and Agriculture Organisation of the United Nations.
- FERGUSON, K. J., CLEVELAND, S., HAYDON, D. T., CARON, A., KOCK, R. A., LEMBO, T., HOPCRAFT, J. G. C., CHARDONNET, B., NYARIKI, T., KEYYU, J., PATON, D. J. & KIVARIA, F. M. 2013. Evaluating the Potential for the Environmentally Sustainable Control of Foot and Mouth Disease in Sub-Saharan Africa. *EcoHealth*, 10, 314-322.

IAN SCOONES, NELSON MARONGWE, BLASIO MAVEDZENGE, FELIX MURIMBARIMBA, MAHENEHENE, J. & SUKUME, C. 2011. Zimbabwe's Land Reform: A summary of findings. Brighton, UK: Institute for Development Studies.

IFAD. 2016. *Rural Poverty: Zimbabwe* [Online]. The United Nations International Fund for Agricultural Development (IFAD). Available: <http://www.ruralpovertyportal.org/country/statistics/tags/zimbabwe> [Accessed 22/09/2016].

JEMBERU, W. T., MOURITS, M., RUSHTON, J. & HOGEVEEN, H. 2016. Cost-benefit analysis of foot and mouth disease control in Ethiopia. *Preventive Veterinary Medicine*, 132, 67-82.

JORI, F., BRAHMBHATT, D., FOSGATE, G. T., THOMPSON, P. N., BUDKE, C., WARD, M. P., FERGUSON, K. & GUMMOW, B. 2011. A questionnaire-based evaluation of the veterinary cordon fence separating wildlife and livestock along the boundary of the Kruger National Park, South Africa. *Prev Vet Med*, 100, 210-20.

JORI, F., CARON, A., THOMPSON, P. N., DWARKA, R., FOGGIN, C., DE GARINE-WICHATITSKY, M., HOFMEYR, M., VAN HEERDEN, J. & HEATH, L. 2016. Characteristics of Foot-and-Mouth Disease Viral Strains Circulating at the Wildlife/livestock Interface of the Great Limpopo Transfrontier Conservation Area. *Transbound Emerg Dis*, 63, e58-70.

JORI, F. & ETTER, E. 2016. Transmission of foot and mouth disease at the wildlife/livestock interface of the Kruger National Park, South Africa: Can the risk be mitigated? *Prev Vet Med*, 126, 19-29.

KNIGHT-JONES, T. J., ROBINSON, L., CHARLESTON, B., RODRIGUEZ, L. L., GAY, C. G., SUMPTION, K. J. & VOSLOO, W. 2016. Global Foot-and-Mouth Disease Research Update and Gap Analysis: 2 - Epidemiology, Wildlife and Economics. *Transbound Emerg Dis*, 63 Suppl 1, 14-29.

KNIGHT-JONES, T. J. & RUSHTON, J. 2013. The economic impacts of foot and mouth disease - what are they, how big are they and where do they occur? *Prev Vet Med*, 112, 161-73.

KOCK, R., KOCK, M., DE GARINE-WICHATITSKY, M., CHARDONNET, P. & CARON, A. 2014. Livestock and buffalo (*Syncerus caffer*) interfaces in Africa: ecology of disease transmission and implications for conservation and development. In: BURTON, M. M. A. J. (ed.) *Ecology, Evolution and Behaviour of Wild Cattle: Implications for Conservation*. Cambridge University Press.

L'ELEVAGE, I. D. 2013. Livestock Sector Analysis and Development of an Investment Framework from Smallholder Livestock Production in Zimbabwe (Draft final report). Institut de l'Elevage, CA17 International.

LMAC 2015. Livestock Market Update. Harare, Zimbabwe: Livestock and Meat Advisory Council.

MAMID 2015. National Livestock Policy. Harare, Zimbabwe: Ministry of Agriculture, Mechanisation and Irrigation Development.

MAREE, F., KASANGA, C., SCOTT, K., OPPERMAN, P., CHITRAY, M., SANGULA, A., SALLU, R., SINKALA, Y., WAMBURA, P., KING, D., PATON, D. & RWEYEMAMU, M. 2014. Challenges and prospects for the control of foot-and-mouth disease: an African perspective. *Veterinary Medicine: Research and Reports*, 119.

MAVEDZENGE, B. Z., MAHENEHENE, J., MURIMBARIMBA, F., SCOONES, I. & WOLMER, W. 2006. Changes in the Livestock Sector in Zimbabwe following Land Reform: The case of Masvingo Province. Brighton, UK: IDS.

MIGUEL, E., GROSOBOIS, V., CARON, A., BOULINIER, T., FRITZ, H., CORNÉLIS, D., FOGGIN, C., MAKAYA, P. V., TSHABALALA, P. T. & DE GARINE-WICHATITSKY, M. 2013. Contacts and foot and mouth disease transmission from wild to domestic bovines in Africa. *Ecosphere*, 4, art51.

- OTTE, M. J. & CHILONDA, P. 2002. Cattle and small ruminant production systems in sub-Saharan Africa: A systematic review. *Livestock Information Sector Analysis and Policy Branch, FAO, Agriculture Department*. Rome: Food and Agriculture Organisation of the United Nations.
- PERRY, B. D., RANDOLPH, T. F., ASHLEY, S., CHIMEDZA, R., FORMAN, T., MORRISON, J., POULTON, C., SIBANDA, L., STEVENS, C., TEBELE, N. & YNGSTRÖM, I. 2003. The impact and poverty reduction implications of foot and mouth disease control in southern Africa, with special reference to Zimbabwe. Nairobi, Kenya: International Livestock Research Institute (ILRI).
- RICH, K. M. & PERRY, B. D. 2011. Whither Commodity-based Trade? *Development Policy Review*, 29, 331-357.
- SADC 2012. The Phakalane Declaration On Adoption of Non-Geographic Approaches for Management of Foot and Mouth Disease. SADC.
- SATOTO 2014. Development of Export Opportunities for Beef Products from the Zambezi Region. SATOTO Livestock Projects with contributions from the Meat Board of Namibia and TAD Scientific.
- SCOONES, I., MARONGWE, N., MAVEDZENGE, B., MURIMBARIMBA, F., MAHENEHENE, J. & SUKUME, C. 2011. Zimbabwe's Land Reform: A summary of findings. Brighton, UK: Institute for Development Studies.
- SCOONES, I., BISHI, A., MAPITSE, N., MOERANE, R., PENRITH, M. L., SINANDA, R., THOMSON, G. & WOLMER, W. 2010. Foot-and-mouth disease and market access: challenges for the beef industry in southern Africa. *Pastoralism*, 1.
- SCOONES, I. & WOLMER, W. 2006. Livestock Disease, Trade and Markets: Policy Choices for the Livestock Trade in Africa. *IDS Working Paper 269*. Brighton, UK: Institute of Development Studies.
- SCOONES, I. & WOLMER, W. 2007. Land, Landscapes and Disease: The Case of Foot and Mouth in Southern Zimbabwe. *South African Historical Journal*, 58, 42-64.
- TAVIRIMIRWA, B., MWEMBE, R., NGULUBE, B., BANANA, N. Y. D., NYAMUSHAMBA, G. B., NCUBE, S. & NKOMBONI, D. 2013. Communal cattle production in Zimbabwe: A review. *Livestock Research for Rural Development*. Volume 25, Article #217, 25.
- THE WORLD BANK. 2015. *Country Data: Zimbabwe* [Online]. Available: <http://data.worldbank.org/country/zimbabwe> [Accessed 22/09/2016].
- THOMSON, G. 2009. Currently important animal disease management issues in sub-Saharan Africa. *Onderstepoort Journal of Veterinary Research*, 76, 129-134.
- THOMSON, G., TAMBI, E. N., HARGREAVES, S. K. & PENRITH, M. L. 2004. International trade in livestock and livestock products: The need for a commodity-based approach. *The Veterinary Record*, 155, 429-33.
- THOMSON, G. R., B., P., LEYLAND, T. J., CATLEY, A. P., PENRITH, M.-L. & DONALDSON, A. 2006. Certification for regional and international trade in livestock commodities: the need to balance credibility and enterprise. *Veterinary Record*, 159, 53-57. *Veterinary Record*, 159, 53-57.
- THOMSON, G. R., LEYLAND, T. J. & DONALDSON, A. I. 2009. De-boned beef - an example of a commodity for which specific standards could be developed to ensure an appropriate level of protection for international trade. *Transbound Emerg Dis*, 56, 9-17.
- THOMSON, G. R., PENRITH, M.-L., ATKINSON, M. W., ATKINSON, S. J., CASSIDY, D. & OSOFSKY, S. A. 2013. Balancing livestock production and wildlife conservation in and around Southern Africa's transfrontier conservation areas. *Transboundary and Emerging Diseases*, 60, 492-506.

UP 2014. Foot-and-Mouth Disease. *FMD SA Bulletin 4*. Department of Veterinary Tropical Diseases (OIE Collaborating Centre), University Of Pretoria.

WEAVER, G. V., DOMENECH, J., THIERMANN, A. R. & KARESH, W. B. 2013. Foot and mouth disease: a look from the wild side. *J Wildl Dis*, 49, 759-85.

WEAVER, J., D’ALESSIO, F. & QUYEN, T. T. X. 2014. PVS Gap Analysis Mission Report, Zimbabwe. Paris, France: OIE.

ZIMSTAT 2012. Zimbabwe Population Census: Masvingo Provincial Report. Harare: Population Census Office.

Annexes

Annex 1: List of Stakeholders Interviewed

Stakeholders		
Organisation	Location	Name
Department of Livestock and Veterinary Services	Harare	Dr Unesu Ushewokunza-Obattolu
		Dr Josphat Nyika
		Dr Bothwell Makodza
		Dr Chenjerai Njagu
Department of Economics and Markets	Harare	Mr Chipunze
District Veterinary Office	Chiredzi	Dr John Makwangudze
		Mr Mhizha
District Livestock Production Office	Chiredzi	Mr Siziba
FAO	Harare	Dr Patrick Otto
		Dr Frank Chinembiri
EU Livestock Development Project	Harare	Alice Peslin
		Anton Van Engelen (Consultant)
Koala Park Butchery, Abattoir and feedlots	Chiredzi	Mr Kobus Raath
		Mr Ferdie Haasbroek
Sabie Meats	Chiredzi	Mr Neil van der Merwe
		Mr Chapisa
Tongaat Hulett	Triangle	Mr Ian Middleton
Cold Storage Company (CSC)	Harare	Mr Chinogaramombe
Local community feedlot farmers group	Chilonge	X 15 individual
Local farmers group, headman, dip attendant, extension officer	Nyambongwe	X 22 individuals
Local farmers, individuals	Malipati	X 4 individuals
Livestock buying agents	Chiredzi	Mr Valemo, Mr Matsika
Chilo Gorge Safari Lodge	Mahenya	Mr Clive Stockill
Jamanda community wildlife conservancy	Mahenya	Mr Simbena
		Mr Ndlovu
Livestock and Meat Advisory Council (LMAC)	Harare	Dr Beffa
		Mr Sukume
		Mr Renneth
Parks and Wildlife Management Authority	Harare	Dr Doris Tom
		Dr Tendaupenga
Greater Mapungubwe Transfrontier Conservation Area	Harare	Patience Gandiwe
GOAL (NGO)	Harare	Annie Foster
		Priscilla Dembetembe
Gonarezhou National Park/ Frankfurt Zoological Society	via Skype	Dr Hugo van der Westerhuizen
TAD Scientific at KAZA Workshop	Victoria Falls	Dr Gavin Thomson
		Dr Mary-Lou Penrith
Assistant District Administrator	Chiredzi	Mr Ndeya Nyede
Executive Officer of Rural District Council	Chiredzi	Mr Chenjerai Zanamwe