EXPLORING MARKET OPPORTUNITIES FOR COMMODITY-BASED TRADE (CBT) OF BEEF FROM NGAMILAND, BOTSWANA:

Towards Harmonization of the Livestock and Wildlife Sectors

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Final Report

Prepared by

Dr. Mark Bing, Vetswana Botswana
Mr. Clive Marshall, Marshall Cattle Services
Mr. Mokadi Masedi, North West Integrated Farmers Association

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ABBREVIATIONS AND ACRONYMS

AHEAD	Animal & Human Health for the Environment And Development (based at Cornell University)
BMC	Botswana Meat Commission
CBT	Commodity-Based Trade
CCP's	Critical Control Points
CDM	Cold Dressed Mass
CSC	Cold Storage Commission (of Zimbabwe)
DRC	Democratic Republic of Congo
DVS	Department of Veterinary Services
FAO STAT	Food and Agriculture Organization of the United Nations Statistical Program
FMD	Foot and Mouth Disease
GAP	Good Agricultural Practices
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis & Critical Control Points
KAZA TFCA	Kavango Zambezi Transfrontier Conservation Area
MCA	Millennium Challenge Account
MEATCO	Meat Corporation of Namibia
NCA	Northern Communal Areas (communal areas north of the VCF, Namibia)
OIE	World Organisation for Animal Health
SADC	Southern African Development Community
SAT	South African Territories (serotypes of FMD viruses)
SOP	Standard Operating Procedure
TAHC	Terrestrial Animal Health Code (of the OIE)
VCF	Veterinary Cordon Fence
WAHIS	World Animal Health Information System (of the OIE)
WWF	World Wildlife Fund
WTO	World Trade Organization
ZR	Zambezi Region of Namibia

GLOSSARY OF TERMS

Carabeef: Beef derived from the water buffalo (*Bubalis bubalis)*. All Indian states regulate the slaughter of cattle *(Bos taurus* and *Bos indicus breeds*), with some states allowing no slaughter of any bovine, others permitting slaughter of male animals only with regulation, while others permit regulated slaughter of any animal. The beef products derived from water buffalo (the focal species in the dairy industry in India) are termed carabeef.

Commodity-based trade (CBT): An array of alternatives that can be used to ensure the production and processing of a particular commodity or product are managed so that identified food safety and animal health hazards are reduced to appropriate risk levels (Thomson et al., 2013). *There is thus a shift of focus to safety of the production process and thus product instead of on the disease status of the geographical area of origin.*

Compartment: An animal subpopulation contained in one or more establishments under a common biosecurity management system with a distinct animal health status with respect to a specific disease or

specific diseases for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade (OIE, 2017).

Competent authority: The veterinary authority or other government authority of a member country having the responsibility and competence for ensuring or supervising the implementation of animal health and welfare measures, international veterinary certification and other standards and recommendations of the Terrestrial Animal Health Code and of the Aquatic Animal Health Code of the whole country (OIE, 2017).

Equivalence: The state wherein the sanitary or phytosanitary measures applied in an exporting country, though different from the measures applied in an importing country, achieve, as demonstrated by the exporting country and recognized by the importing country, the importing country's appropriate level of sanitary or phytosanitary protection. A determination of the recognition of equivalence may be with respect to a specific measure or measures related to a certain product or categories of products, or on a systems-wide basis (World Trade Organization Sanitary and Phytosanitary Handbook Training Module: Chapter 4).

Full mouth: Relative term for cull cattle, i.e. those headed to slaughter, describing the age of the animal. Sometimes seen in cattle market reports and abbreviated as FM = full mouth (>4 ½ years). Older animals classified as BM=broken mouth (at least two teeth lost due to age) or SM = smooth mouth (oldest age class - lost several teeth, others worn down). (http://www.cowboyway.com/HowTo/CowAgeTeeth.htm and http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=3640).

Hazard Analysis & Critical Control Points (HACCP): A systematic approach to food safety management based on recognized principles which aim to identify hazards that are likely to occur at any stage in the food supply value chain and to put into place controls that will detect them / prevent them from happening.

Manufacturing grade beef: Lowest grades of beef from older cattle. Beef from mature slaughter cows and bulls seldom used for trimmed retail cuts; instead used for grinding and further processed beef products (http://www2.ca.uky.edu/agcomm/pubs/id/id108/08.pdf and http://hereford.org/static/files/0212_CullCows.pdf).

Progressive Control Pathway for Foot and Mouth Disease Control (PCP-FMD): A development tool, with a stepwise approach to improving FMD control in FMD-endemic countries (FAO/OIE/EU-FMD, 2011).

Piosphere: First described by Lange (1969) as the effect of livestock grazing in semi-arid savannas, where livestock have to move between water points and grazing areas, giving rise to a patchwork of distinct zones around boreholes that are denuded, with an area of bush encroachment surrounding this, with perennial grasses remaining peripherally – i.e. a zone of ecological impact focused around a livestock watering point, particularly in dry areas (Andrew, 1988). *This patchwork pattern is obvious to anybody who flies by plane over Botswana (M. Bing, personal observation).*

Terrestrial Animal Health Code (TAHC) of the OIE: Sets out standards for the improvement of animal health and welfare and veterinary public health worldwide, including those needed for safe international trade in terrestrial animals and their products (OIE, 2017).

World Organisation for Animal Health (OIE): The intergovernmental organization, based in Paris and older than the United Nations, responsible for improving animal health worldwide, recognized as a reference organization by the World Trade Organization (OIE, 2017).

EXECUTIVE SUMMARY

Livestock production and wildlife conservation are in conflict in Botswana's Ngamiland District due to the prevalence of animal diseases that can be spread by wildlife – specifically foot and mouth disease (FMD). International trade standards for livestock commodities have required that production areas be free from FMD. In southern Africa, 85% of the cattle population is raised in areas where FMD is present. This situation restricts market access and constrains investment for livestock farmers who share the land with wildlife (Thomson et al., 2017). Furthermore, vast disease control fencing systems have been erected to separate wildlife from livestock to maintain disease-free production areas. Fencing is incompatible with the habitat connectivity needed to permit the migration of wildlife critical for long-term population viability, which is also relevant to the fact that Ngamiland lies at the heart of the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) – Africa's largest conservation landscape.

Recently, however, international sanitary trade standards adopted by the World Organization for Animal Health (OIE) were amended to remove certain restrictions on the trading of beef derived from areas where wildlife maintain FMD viruses. These standards were revised to include incorporation of quarantine systems into risk management for deboned beef from locations not recognized as free from FMD (Article 8.8.22, Terrestrial Animal Health Code [TAHC]). Thus, implementation of CBT approaches to managing disease risk in the context of recent OIE changes offers the potential for improving market access (to regional markets, at a minimum), and thereby livelihoods, for Ngamiland farmers.

In addition, the trade of beef between two nations, based on issuance of an export permit and an import permit agreeable to both parties concerned, is also possible. The simplest permits provide for an acknowledged state of equivalence. For example, even during active FMD outbreaks, the Democratic Republic of Congo (DRC) has allowed imports of whole carcasses from a private abattoir in northern Botswana (Ngamiland Abattoirs) because the FMD status in both the DRC and Ngamiland are the same. This was reinforced recently by a statement made in Namibia during an OIE Regional Commission for Africa conference. Dr. Gideon Bruckner, President of the OIE Scientific Commission on Animal Diseases, stated that **"member countries should acknowledge official disease status and not impose strict import requirements on countries of equivalent status"** (Meat Board of Namibia, 2017. January Newsletter - http://www.nammic.com.na/index.php/library/send/9-meat-chronicle/157-meat-chronicle-issue-01-2017).

While exporting beef from areas not free of FMD, like Ngamiland, has been a challenge in southern Africa, this has not been the case for India. India is now the largest exporter of beef (carabeef) by volume in the world, with annual exports of approximately 2 million tonnes to its trading partners in the Middle East, Africa and Southeast Asia. This is possible even though India is not free of FMD and has no FMD-free zones (https://www.ers.usda.gov/webdocs/publications/37672/59707_ldpm-264-01.pdf?v=42543 and https://www.fas.usda.gov/data/india-s-agricultural-exports-climb-record-high). Such CBT approaches to beef trade are now starting to be applied, albeit at a small scale, in the FMD-endemic areas of northern Botswana.

A number of regional beef importing countries with data published on the OIE WAHIS website have endemic FMD. Thus, no technical barriers to trade should exist (apart from those of price paid versus cost of production, and beef quality) as beef from FMD-endemic areas of Botswana is produced under equivalent disease status, re- these FMD-endemic places:

- Middle eastern countries: Egypt, **Kuwait**, Oman, Qatar, Saudi Arabia and the UAE;
- Far eastern countries (and an administrative region): Malaysia, **Vietnam**, China and Hong Kong;
- African countries: Algeria, **Angola**, **DRC**, Ethiopia, Kenya, **Mozambique**, Tanzania, Uganda, Zambia and Zimbabwe.

Like India, all the Botswana Meat Commission's (BMC) export abattoirs have halal slaughter certification, giving them potential access to middle eastern countries and Malaysia. The countries in **bold** above have already developed MOUs with Botswana's Department of Veterinary Services (DVS) to receive beef and beef products from Ngamiland. Other countries are being investigated.

Furthermore, in a meeting with Botswana's Department of Veterinary Services (DVS) in April 2017, the Director stated that in reference to CBT specifically, there is "no barrier of trade to any regional country with equivalence or otherwise," and that Botswana was demonstrating the safety of Ngamiland beef to other nations, evidenced by the EU accepting Botswana's protocols to move beef from Ngamiland into the FMD-free zone, which should enable trade to wherever a market can be established.

Trade barriers are, however, often created by pressured Competent Authorities of the exporting countries whose requirements go over and above the OIE guidelines necessary for exporting beef from FMD-endemic areas. This is often driven by stringent regulations of importing countries which are importing beef from the exporting country's FMD-free zones, even though processes undertaken are auditable by the importing country. Namibia, with no currently functional export abattoirs in the Northern Communal Areas (NCA), has placed itself in a position where no beef can be exported from the NCA, and the Meat Corporation of Namibia (MeatCo) therefore has had to cross-subsidize the beef for sale in the local market to prevent the illegal movement of this meat into the FMD-free zone (European Union export zone). This, even though more than 60% of Namibia's cattle are in the NCA – i.e., 1.6 million vs. 1.2 million in the FMD-free zone (MeatCo, 2016. Statistics Annual Report – https://www.meatco.com.na/files/files/Meatco%202016%20Annual%20Report%20print_20160602.pdf) , where productivity is low (and can be improved), and where range degradation is the highest. Politics therefore can create a trade barrier.

Botswana, on the other hand, is producing deboned beef in its Maun export abattoir. The acceptance of deboned, matured product following CBT processes into its FMD-free "EU" export zone has played a significant part in facilitating regional acceptance for the product that is currently available in Ngamiland. CBT beef is already being exported from the Maun BMC abattoir to DRC, Kuwait, Vietnam and Mozambique (albeit in small volumes), and there has been live export to the DRC and Zimbabwe within the last four years – as well as whole carcasses exported to the DRC from a private abattoir in Ngamiland. That said, the recent FMD outbreak at Lake Ngami on 21 September 2017 has led to a slaughter and movement ban on all cloven-hoofed animals and their products within and around the entire district until further notice (Ministry of Agricultural Development and Food Security, press release). While CBT approaches are gaining wider acceptance, the fact that all activity has been shut down highlights that there is still work to do to harmonize FMD disease/outbreak management with a bona fide CBT approach. In short, there is a need for a more pragmatic approach that better aligns disease management with livestock trade promotion, thereby ensuring minimal market disruption.

A barrier to regional market penetration of CBT beef from Ngamiland (as is relevant for Namibia's NCA too) is that **the quality of beef is poor**. Free-range, communally grazed animals have over the years created piospheres (Lange, 1969) around watering points, so that cattle must move upwards of 30km (in most cases) between watering points and grazing areas. A severe reduction in palatable grasses,

increases in toxic plants, bush encroachment, and biodiversity losses are occurring (UNDP, 2016), so that the time taken to market oxen off the range is increasing. Furthermore, quality is seasonably variable and the meat tends only to be useful for manufactured food products (rather than retail cuts of beef). **This type of beef is thus competing in the same market category as India's carabeef**, which will do little to improve the rural livelihoods of farmers in Ngamiland as the prices offered in international markets are low. Carabeef is used principally in meat processing, and is exported as a high volume, low cost product, which is the opposite of what Ngamiland beef needs (i.e., high value niche-marketed products).

Free-range beef is recognized internationally as being tougher than feedlot finished beef, and for this reason should be marketed under two years of age (connective tissue fibers develop after two years of age and that significantly affects texture – see http://extension.wsu.edu/impact-reports/beef-tenderness/). A more competitive free-range product is possible from Ngamiland, but would only be likely with better grazing management. Free-range beef also needs to be marketed early if it is to compete with finished feedlot animals (http://www.tandfonline.com/doi/abs/10.1080/00288233.1998.9513346).

While Ngamiland is seriously overstocked and experiencing significant rangeland degradation, the overall cattle herd size is relatively small on a global scale (approximately 350 000 to 450,000 head). As such, a **high-quality niche-marketed product** needs to be developed in **the medium to long term** to increase revenues to farmers. To achieve uniformity of saleable high quality product, it is recommended that feedlots be considered, to diversify Ngamiland's production system. DVS sees no issue with the development of feedlots within existing quarantine facilities, or in fenced farms which can be compartmentalized.

Ngamiland has two private export abattoirs (permission for two more has also been granted), and is serviced by one BMC export abattoir in Maun. BMC Francistown (which is considered an export facility for Ngamiland) provides another potential facility. As such, there may be no need for further abattoir development. However, slaughter capacity needs to be examined further. BMC's marketing strategy of paying more for heavier animals, however, encourages people to market cattle later: marketing older cattle is not improving beef quality and supply.

A CBT approach allows for the development of a quality assurance scheme, as the HACCP procedure that needs to be followed from "farm to fork" to assure the importer of negligible FMD transmission risk can also be utilized to improve livelihoods in the rural farming community.

Historically, the production of older steers can be demonstrated going back more than one hundred years. A lack of investment in FMD-endemic areas, apart from the building and maintenance of cordon fences to protect an export market to Europe in terms of FMD-free unvaccinated beef, has meant that the environmental degradation caused by unmanaged free-range cattle in these areas is now severe. With climate change models predicting increasing temperatures and aridity, as well as increased tourism possibilities next to park boundaries, a change in the production system for cattle is needed. Moreover, the eradication of tsetse fly and contagious bovine pleuropneumonia in Ngamiland within the last ten years, as well as changes to the OIE's TAHC in 2015, indicate that the time is right for production system diversification in Ngamiland.

A change in marketing system focus from steer to weaner production will need an educational push, and presents an opportunity to introduce farmers to the better prices for animals that can come with farmers' improvement of their management. An approach that links education and improved

production, herding, and rangeland management, as has been seen in the U.S., would allow rural impoverished communities to better care for their cattle and the rangeland upon which they exist. In the long term, with the improved grazing conditions that can be created by better management of cattle herds, both agriculture-focused and wildlife-based tourism opportunities in areas peripheral to protected areas like national parks may become possible.

Research from a Millennium Challenge Account (MCA)-funded beef market study in an FMD-endemic area of Namibia (http://www.wcs-ahead.org/kaza/2014_zambezi_project_technical_booklet_final.pdf) and our own findings have demonstrated that a lack of a uniform quality product in the Zambezi Region of Namibia and in Botswana's Ngamiland is a significant barrier to exports. Today, the FMD-endemic areas of both Namibia and Botswana may need to look to the Australian export model, which sees the breeding herd being kept on the range, and the feeder herd being finished on grain for a period of between 90 and 120 days. This assures a product that can compete with that supplied by the biggest exporters of top quality product – those in Latin America. Thus, it is recommended that a feedlot approach be developed in quarantine facilities in Ngamiland (informed by adequate cost / benefit analysis, and SOPs) to facilitate marketing of younger animals, so that the product is competitive and assured. Poorer quality older breeding cows and old steers can still be marketed locally.

Southern Africa is not an island and carabeef is already being exported from India to Angola, Namibia, Mozambique and Tanzania for the manufacturing sector. Brazilian beef enjoys good market penetration in Angola and Mozambique. Namibia's NCA and Botswana's Ngamiland need to compete with these products, in terms of both the cheaper manufacturing grade beef cuts (from older free-range breeding cows), and in terms of grain finished weaners that have the ability to compete with the Brazilian product. Section 6 of this report outlines the possibilities of diversifying Ngamiland's cattle Industry in a practical manner, by opening trading relationships with its beef deficient partners.

Although feedlots increase the value of cattle, such a system is expensive and any SOP that is produced to feed cattle in any establishment or quarantine needs to be discussed between the feedlotter and the Competent Authority, to ensure continuity across the supply chain, following principals of CBT. Only once rangeland degradation and management of cattle in these areas are improved will a competitive, free-range beef product be able to emerge.

Any solution in Ngamiland needs to revolve around the changes to the OIE's standards on trade. Botswana's DVS, export abattoirs, marketing agents, supply chain processors and farmers can work together so that the needs of all entities can be met, and rules and guidelines understood to reduce the risk of FMD transmission via beef produced to negligible. In India, farmers take more responsibility for the control of FMD, ensuring herds are adequately vaccinated and biosecure, as active disease severely affects livelihoods. Ngamiland's farmers need to play an active role in FMD control, by herding cattle and kraaling them at night (which also reduces human-wildlife conflict). With an aging farming population that has relied on government support, and a geographical approach to FMD control to prevent FMD outbreaks, education of farmers about the beef value chain and available markets (with an emphasis on making them more accountable for the health of their own herds) will be one of the most difficult tasks to achieve. Working together, however, stakeholders can ensure an integrated beef supply chain, which over time can yield better production processes and diverse, higher quality products.

1. INTRODUCTION

Livestock production and wildlife conservation are in conflict in Botswana's Ngamiland District due to the prevalence of animal diseases that can be spread by wildlife – specifically foot and mouth disease (FMD). International trade standards for livestock commodities have required that production areas be free from FMD. In southern Africa, 85% of the cattle population is raised in areas where FMD is present. This situation restricts market access and constrains investment for livestock farmers who share the land with wildlife (Thomson et al., 2017). Furthermore, vast disease control fencing systems have been erected to separate wildlife from livestock to maintain disease-free production areas. Fencing is incompatible with the habitat connectivity needed to permit the migration of wildlife critical for long-term population viability, which is also relevant to the fact that Ngamiland lies at the heart of the Kavango Zambezi Transfrontier Conservation Area (KAZA TFCA) – Africa's largest conservation landscape.

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2. ASSESSMENT OF APPROACHES TO BEEF PRODUCTION AND MARKETING IN NGAMILAND TO HELP INFORM THE DISPARITY OF EXPORT PERFORMANCE COMPARED TO PARTS OF INDIA

2.1 Overview of Ngamiland formal cattle trade and beef production, 1898 to today

Maun before BMC 1965

- At the turn of the 19th to the 20th century, cattle from Ngamiland were sourced predominantly for the British Army to supply the Boer War. By the 1940s, in response to increased demand for meat in the copper belt mines of Northern Rhodesia (now Zambia), Southern Rhodesia (now Zimbabwe) and the Congo (now the Democratic Republic of Congo - DRC), beef exports to these markets began, especially from Ngamiland (Darkoh and Mbaiwa, 2002).
- Two major trading companies controlled the supply of oxen. R.A. Bailey and Ngamiland Trading Company formed the Ngamiland Cattle Exporters Association and conducted live trade of cattle through Kazungula to the Northern Rhodesian Cold Storage Commission in Livingstone.

Maun 1965 to 1983

- With Independence in 1966 and the development of the Botswana Meat Commission (BMC) Act in 1965, the trade from Ngamiland changed with the cattle supply being diverted into the Botswana quarantine system, to facilitate overseas exports.
- Ngamiland cattle were taken to Makalamabedi for 21 days before being trekked to Dukwe quarantine south of Nata. From there, they were loaded onto trucks to the railhead in Francistown, eventually being slaughtered at the Lobatse plant.

Maun Abattoir 1983 to 1995

- After the prolonged period needed to tackle the 1977 FMD outbreak, BMC commissioned a new abattoir in Maun. The BMC Maun abattoir never reached its 20,000 head per annum capacity during this initial period; its best year was 1987, recording 18,651 head.
- Throughout this period, the abattoir was supplied by the three major cooperative structures: Maun Cooperative, Ngami Cooperative and Okavango Cooperative.

Maun 1995 to restocking

- In February 1995, Botswana experienced a major outbreak of contagious bovine pleuropneumonia (CBPP) after 56 years of freedom from the disease. The outbreak was eventually confined to Ngamiland District. CBPP was eradicated by applying a stamping-out policy that was implemented in April 1996, resulting in the slaughter of 320,000 cattle.
- The Maun abattoir was closed indefinitely in 1996 due to a shortage of cattle supply (only reopening again in 2010).
- By the end of 1997, a restocking exercise introduced 70,000 cattle into Ngamiland and saw delivery of good numbers of cattle from commercial producers in Botswana and Namibia.
- Botswana was declared CBPP-free by the OIE in 1998.
- By 2004, growing numbers of quality oxen with excellent carcass weights were regularly sent to BMC Francistown.
- In 2007, Zone 2 in north western Ngamiland contributed over 25,000 head, which represented over 50% of BMC Francistown's throughput for the year.

Maun 2007 outbreak

- In October 2007, an FMD outbreak in the Habu area of Zone 2c in Ngamiland saw a ban on livestock movement from the north west to Francistown. The government stepped in, allowing branding pledges for producers, with funding to assist producers to service loans.
- Pressure was placed on BMC to reopen BMC Maun. It reopened again in April 2010.

Maun 2011 live trade

- In 2011, the Matsiloje FMD outbreak established a precedent for the live trade of cattle on the basis of "status of equivalence" to Zimbabwe.
- The live trade program in Zone 2 focused on the removal of full mouth oxen only. A price of BWP 8/kg live weight was paid. On 7 November 2011, live trade started at Tsau in Zone 2c.
- By the end of 2011, 3,248 head had been exported to Bulawayo, Zimbabwe.
- In excess of 8,000 head were exported by the end of the first quarter of 2012.
- Trade terminated in June 2012 over Zimbabwe's Cold Storage Commission's (CSC) rising indebtedness to BMC.

Maun abattoir 2010 to present day

- Serious water sanitary issues have, from time to time, inhibited slaughter (these have since been addressed with an upgraded filtration system at Maun abattoir).
- Initially, the production process was based on cooking and shipping the product to Lobatse Cannery. Maun has a cooker but no cannery. This process, along with some local consumption, carried on until the adoption by the Department of Veterinary Services (DVS) of the CBT process and the delivery of product into the FMD-free zone ("Green Zone") of Botswana.
- BMC Maun now regularly slaughters 120 head per day.

Maun commercial developments

- In 2014, due to the build-up of cattle numbers and BMC's inability to get on top of herd growth, a license was issued to a commercial venture, Ngamiland Abattoirs.
- Ngamiland Abattoirs has been given permits to export carcasses to the DRC under the status of equivalence. The abattoir slaughtered in excess of 14,000 head in 2016 and, with recent CBT processes audited by DVS, it is thought that access to other markets will follow.
- A second commercial abattoir has been licensed near Toteng and is under construction.

Conclusions

When investigating the development of the organized, formal cattle trade from Ngamiland, there are some stark realities:

- From as far back as 1898 until today, disease, whether it was Nagana, CBPP or FMD, has played a major role in what could be developed in terms of a herd structure in Ngamiland.
- The continual interruptions of commercial supply have without doubt made Ngamiland a continual "fire sale" beef economy, where traders could take periodic advantage of windows of opportunity emanating from a period of disease stability.
- In such an environment, it is unlikely that any cattle producers have anything more than a short-term view of beef production, and that significant investments in improved genetics, animal husbandry and intensive production systems are prohibitively expensive, principally due to the continual financial risks involved. Therefore, it can be seen that for the entire time of organized cattle marketing, the oxen production system has been prevalent.

Livestock production systems within and near most transfrontier conservation areas (TFCAs), as is the case with Ngamiland, are currently traditional, that is, not based on modern livestock farming practices (Thomson et al., 2013). If however, a more efficient livestock production system is developed, it will inevitably need to be founded on at least a degree of intensification to deliver larger volumes of better quality product that are price-competitive in at least some potentially accessible markets (Thomson and Penrith, 2016). In a traditional communal herd structure, however, it is likely very little will change without specific initiatives aimed at modernizing production systems. Unlike the commercial "Green Zone" of Botswana, to date very few interventions have taken place in Ngamiland to drive herd demographic change.

2.2 Production and marketing comparison: India and Ngamiland

The meteoric success of Indian carabeef internationally has been well documented (FICCI, 2014; Landes et al., 2016). Despite not being free from FMD and having no FMD-free zones, India maintains massive export volumes with huge market acceptance of a low value product. Ngamiland has the opportunity to emulate some of India's success with the acceptance of CBT principles by its trading partners, while it has every possibility of accessing higher-end markets where beef (versus carabeef) is preferred and quality is required. Table 1 below seeks to compare the situation in India to that of Botswana, specifically Ngamiland.

Table 1: Comparison of beef production and marketing strategies in India to that of Ngamiland, Botswana.

CHARACTERISTIC	INDIA	BOTSWANA (Ngamiland)
Animal Type	Water buffalo (dairy animal)	Beef cattle
Offtake	In India, the majority of water buffalo marketed as carabeef are either excess male calves produced from the water buffalo milk herds, or older non-productive females. Average male slaughter age 4 years, females older. Current exportable product of 1.85 million tonnes in 2016.	In Ngamiland, the cattle are predominantly marketed from a communal herd structure. The animals are mostly full mouth oxen aged 5 years and over or cull cows of similar age. Last year, BMC Maun and Ngamiland Abattoirs slaughtered over 34,000 head with very little export.
Female production system	The average sized Indian herd is less than five animals, and these animals are the entire livelihood of the people that own them, being used for milk and draught power. Young males are fattened, where there are sufficient feed resources, for carabeef.	Many female cattle are a source of milk for the owners, so the calves are kept separated from the cows and remain in the villages or near the water points when the cattle go out to graze. This increases grazing pressure close to the calf kraals, as the cows come back to their calves, and are milked before being left with them for the night and taken out the following morning.
Male production system	The carabeef industry is integrally linked to the recycling of crop residues, with small herds being family managed so production is intensive.	Free-range grazing which changes seasonally from good nutrition during the rainy season to sub-maintenance during the dry season. Production is extensive with severe range degradation.
Owner responsibility for FMD control	Greater owner responsibility for FMD biosecurity. FMD is devastating to dairy animals, and can cause severe poverty due to a drop in milk production. The Indian state is unable to assist with financial support for farmers whose cattle/buffalo are affected by the disease, so owners appear to be very vigilant, and value chain operators (specifically at abattoir level) ensure cattle/buffalo from source herds are adequately vaccinated.	Little owner responsibility for FMD biosecurity as fences to separate buffalo from cattle are maintained by DVS, and cattle are biannually vaccinated for free, taking the onus off the owner. Presentation rates when vaccination falls within the rainy season are poor, and this affects market access. Vaccination can only be done by the Competent Authority (DVS).
Biosecurity	Biosecurity in India is easier to maintain as herds are stall fed and supervised most of the day, and intensively fed on crop residues.	In free-range extensive production systems, with large numbers of elephant to damage fences, and no active herding, biosecurity is very poor around cattle. Cattle access to Cape buffalo (the reservoir of SAT FMD viruses) around shared water points, especially in the dry season, can result in FMD outbreaks in kraals.
Government involvement in FMD control	FMD-endemic area, with types O, A and Asia 1 being present.	FMD-endemic area, with SAT serotypes being maintained by wildlife (no official OIE designation). Government of Botswana

CHARACTERISTIC	INDIA	BOTSWANA (Ngamiland)
	There is a FMD control scheme in place (FMD-CP), as well as a Government of India (GOI) Assistance to State for Control of Animal Diseases (ASCAD) scheme.	(GoB) responsible for biannual vaccinations and maintenance of veterinary cordon fences (GoB expense).
Vaccination coverage	Vaccination is usually performed by the State, but in some areas the abattoir owners, where the cattle are marketed, provide the vaccine to ensure that the herd from which the beef is derived remains FMD-free.	Vaccination twice a year (May and October). Preventing the cattle herd from becoming infected with FMD falls principally on DVS. Vaccinating during these periods can result in very low levels of coverage, which will cause market disruption to those markets requiring a 75% of herd coverage level.
Prevalent FMD strains	Types O, A and Asia 1 FMD, quite debilitating to livestock.	Types SAT 1, 2 and 3 are prevalent in Botswana and carried in the indigenous Cape buffalo populations. Livestock impacts clinically less severe than in Asia.
Vaccination success	The task at hand for India is a large one, with India targeting 195 million FMD vaccinations in the 2016-2017 period alone, of which 172.16 million were achieved by December 2016.	Currently struggling to attain the 75% coverage needed for any South African market access. Of the cattle targeted for vaccination in 2016 only 65% coverage was attained.
Slaughter system	Slaughter permitted in certain states only, dependent on the number of non-Hindus in the area (Hindus hold cattle sacred for religious reasons). Some states ban all bovine slaughter, others the slaughter of female animals. Others are tolerant of any slaughter. Nationally, all slaughter requires a certificate before it can be carried out.	Cattle in Ngamiland are slaughtered either through the formal market structure (of BMC and Ngamiland Abattoirs) or informally in villages where there is a slaughter slab or registered abattoir, or under a tree for local consumption or religious reasons (weddings and funerals).
Slaughter capacity	Domestic consumption of beef is less organized than exports, being under the banner of Food Safety and Standards Authority of India (FSSAI). There are approximately 40,000 abattoirs licensed by municipal authority, providing 25,000 unregistered corner shops with principally frozen wet carabeef. Unlike export associated facilities, local beef slaughter facilities lack sufficient infrastructure for the hygienic production of beef.	Local councils are developing three new slaughter houses in Seronga, Gumare and Sehitwa. Currently, for local consumption, animals are slaughtered by local butchers / meat is inspected at registered slaughter slabs. If slaughtered for religious reasons (weddings and funerals), ritually slaughtered animals do not require meat inspection. DVS is driving at eventually having only registered slaughter facilities where animals can be slaughtered and meat inspected for local consumption. The price paid by local butchers is the lowest price paid for cattle, with prices sometimes being half what would be obtained from BMC.

CHARACTERISTIC	INDIA	BOTSWANA (Ngamiland)
Local Markets	30% of carabeef produced in India is consumed locally, as it is the second cheapest product after chicken.	In Ngamiland, chicken is more expensive than beef, where a similar 30% of beef production is estimated to be consumed locally. As with India, the slaughter and preparation of beef for the local market is less formal than that required for export.

Sources of information:
http://malaya.com.ph/business-news/business/ph-among-top-markets-indian-carabeef
http://ficci.in/spdocument/20331/Overview-of-The-Indian-Buffalo-meat-value-chain.pdf
http://www.fao.org/docs/eims/upload/299829/an358e00.pdf
https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Livestock%20and%20Products%20Annual_New%20Delhi_India_8-31-2016.pdf

2.3 Summary

India is an FMD-endemic country and its FMD surveillance / testing is generally not recognized by developed country markets that typically require FMD-free status as well as product traceability. Despite this, it has succeeded in negotiating with other importing nations, through a set of guidelines agreed to between trading partners, based on use of CBT principles for carabeef. In doing so, it has become the largest beef exporter by volume in the world. FMD control policies are in place and FMD has been declared eradicated in some areas, as India is following the Progressive Control Pathway for Control of FMD (PCP-FMD – FAO/OIE/EU-FMD, 2011).

If India can achieve exports of its product, then there is no technical reason why Botswana cannot negotiate with its own trading partners and provide similar assurances to that of India. Botswana is already exporting to Mozambique, Vietnam and Kuwait based on CBT approaches, and can export live cattle to Zimbabwe and carcasses to DRC, based on a status of equivalence.

The challenge for Botswana lies principally in reducing reliance on fencing (i.e. geographic-based management) as a control measure, and moving towards aligning FMD management with non-geographic, CBT-based approaches to managing trade risk that are accepted by its trading partners. Moreover, to reduce FMD risk, it is critical to ensure as great a proportion of cattle are vaccinated biannually as possible, as well as to follow the specific standards of the OIE's TAHC article 8.8.22.

3. PREVIOUS INVESTIGATIONS UNDERTAKEN BY BMC, MEAT BOARD (NAMIBIA) AND OTHER ENTITIES FOR EXPORT OF CATTLE AND BEEF PRODUCTS OUT OF FMD-ENDEMIC ZONES IN NAMIBIA AND BOTSWANA

Control of FMD has historically focused on geographic separation of wildlife (buffalo, in particular) and livestock. The need to establish disease-free zones to facilitate international trade of beef resulted in countries such as Botswana and Namibia erecting vast fencing systems to maintain production areas free of FMD for the export market. In 2012, a SADC/AHEAD meeting in Gaborone helped pave the way for developing alternative approaches for managing disease risk (e.g. CBT) not completely dependent on veterinary cordon fencing. A key outcome of the meeting was *The Phakalane Declaration on Adoption of Non-Geographic Approaches for Management of Foot and Mouth Disease* which was adopted by the SADC Livestock Technical Committee. It called for the adoption of CBT and other non-geographic

approaches for FMD management as additional (i.e. alternative) regional standards for trade in animal products (http://www.wcs-ahead.org/documents/phakalane_declaration.pdf).

In 2011, a four-year study entitled "*Development of Export Opportunities for Beef Products from the Zambezi Region (ZR)*" was implemented by the Meat Board of Namibia in collaboration with a wide range of partners. The project successfully demonstrated that a commodity-based, value-chain approach to beef production is effective in ensuring foot safety and FMD risk management in areas where FMD is endemic in wildlife (Figure 1). The system was also shown by formal quantitative risk assessment to provide an acceptable level of protection (related to FMD), or ALOP, to importing countries (SATOTO et al., 2014). Despite this, the project faced skepticism from key stakeholders, including DVS Namibia, with calls for additional research into whether deboned beef from an FMD-endemic zone was safe (Meat Board of Namibia, 2014). In the end, "the lack of acceptance of the HACCP/CBT process by policy makers, decision takers and buyers has therefore been identified as the project's reason of failure of outcome**"** (SATOTO, 2013).

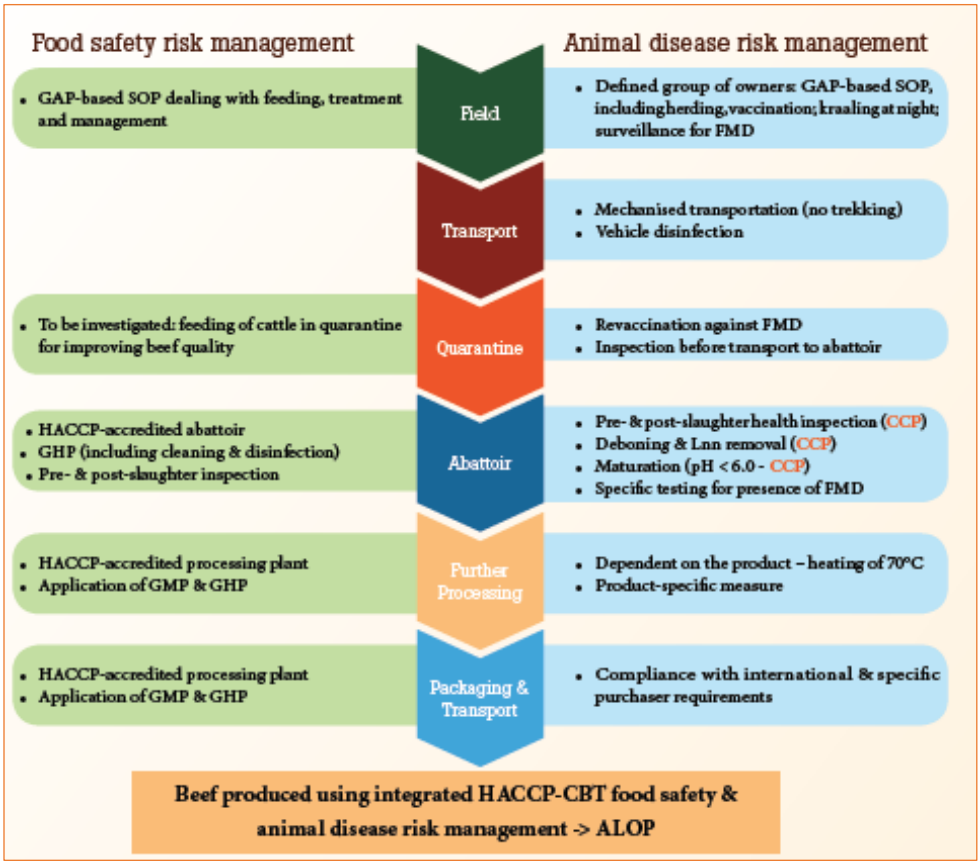

Figure 1: Integrated value chain management system developed for the Zambezi Region, Namibia (http://www.wcs-ahead.org/kaza/2014_zambezi_project_technical_booklet_final.pdf).

Although the study identified markets, and the safety of an integrated value chain process was demonstrated, some key stakeholders, including DVS Namibia, failed to accept the process. Since the completion of the study:

- The export abattoirs at Katima Mulilo and Osha Kati have been closed down, which dictates that export of beef from the Zambezi Region and Namibia's NCA is no longer possible, as it does not fulfil all the requirements of Article 8.8.22 of the TAHC (OIE, 2017).
- Mobile abattoirs are however functional, and are used for slaughtering for local consumption.
- MEATCO has also developed a Meat Markets for Africa (known as MeatMa) brand for sale into the NCA (https://www.meatco.com.na/about-us/meatma/128/).
- Namibia unfortunately never upgraded its quarantine facilities (as per Mandate 2.3 of the MCA Investment Project) due to FMD outbreaks occurring during the period of the research project. It had planned to upgrade 11 quarantine camps, reducing entry barriers, increasing the off-take of cattle by 5% to 10%, and constructing 3 feedlots at Etunda in Omusati Region, Rundu (Vungu Vungu) in Kavango Region and Katima Mulilo in the Zambezi Region. This was intended to create a change in population dynamics of the herd, so that farmers could sell 1.5 year old animals rather than 4 year old animals, resulting in an increase in net profits to the farmer of NAD 735 per head, which would have resulted in 37,500 new entrants in the large stock marketing sector (http://www.mcanamibia.org/files/files/mca_full.pdf).

Despite the failure to implement CBT in Namibia thus far, Botswana has started to incorporate the approach and is applying it to enable export to Kuwait, Vietnam and Mozambique. The work done to secure a market for CBT beef from Zambezi Region can be mimicked and can be implemented in Ngamiland.

4. POTENTIAL FUTURE BENEFITS ENABLED BY OIE TAHC ARTICLE 8.8.22

The following provides an overview of potential future benefits enabled by OIE TAHC Article 8.8.22, with a focus on potential market opportunities offered by other African countries already acting as net importers of beef, as well as other markets, such as within Asia.

By focusing on the safety of the beef product out of Ngamiland, as opposed to the status of FMD in the area, beef is currently being exported out of the FMD-endemic area of Ngamiland to the FMD-free zone of Botswana, as well as to Mozambique, Vietnam and Kuwait.

The current and encouraging approach of DVS is to debone beef at BMC Maun export abattoir, and mature it under a set of protocols that have been scrutinized and accepted by its EU trading partners. This beef is then exported into the FMD-free zone (green zone), where it is sold at a cheaper price, which allows more cattle from the FMD-free zone to be exported to the more lucrative EU market, as some of the local consumption of beef is replaced by Ngamiland beef. Acceptance of the procedure by the EU has allowed more easy penetration of Botswana's Ngamiland beef into regional and international markets such as Mozambique, Vietnam and Kuwait. That said, the recent FMD outbreak at Lake Ngami on 21 September 2017 has led to a slaughter and movement ban on all cloven-hoofed animals and their products within and around the entire district until further notice (Ministry of Agricultural Development and Food Security, press release). While CBT approaches are gaining wider acceptance, the fact that all activity has been shut down highlights that there is still work to do to harmonize FMD disease/outbreak management with a bona fide CBT approach. In short, there is a need for a more pragmatic approach that better aligns disease management with livestock trade promotion, thereby ensuring minimal market disruption.

4.1 Marketing opportunities to countries with equivalent FMD status now possible

A number of regional beef importing countries with data published on the OIE WAHIS website have endemic FMD. Thus, no technical barriers to trade should exist (apart from those of price paid versus cost of production, and beef quality) as beef from FMD-endemic areas of Botswana is produced under equivalent disease status, re- these FMD-endemic places:

- Middle eastern countries: Egypt, **Kuwait**, Oman, Qatar, Saudi Arabia and the UAE;
- Far eastern countries (and an administrative region): Malaysia, **Vietnam**, China and Hong Kong;
- African countries: Algeria, **Angola**, **DRC**, Ethiopia, Kenya, **Mozambique**, Tanzania, Uganda, Zambia and Zimbabwe.

Like India, all the Botswana Meat Commission's (BMC) export abattoirs have halal slaughter certification, giving them potential access to middle eastern countries and Malaysia. The countries in **bold** above have already developed MOUs with Botswana's Department of Veterinary Services (DVS) to receive beef and beef products from Ngamiland. Other countries are being investigated.

As noted, Botswana has in the last year exported Ngamiland deboned beef from Maun BMC export abattoir to Mozambique, Vietnam and Kuwait. The consignment to Mozambique was discounted, as the quality was poor. Mozambique and Angola have asked for the development of a more uniform and better finished product, to compete with imports from Brazil.

4.2 Botswana's Competent Authority's commitment to CBT will drive beef value chain diversification

At a KAZA-AHEAD-FAO hosted CBT workshop held at Victoria Falls in November 2016 (http://wcs-ahead.org/kaza_ahead_fao_workshop_2016/kaza_ahead_fao_workshop_2016.html), delegates from Botswana, Zambia and Zimbabwe indicated strong support for implementing CBT pilot projects in their respective countries (KAZA/AHEAD/FAO, 2017). Further, Botswana's DVS has instituted the following steps since the OIE's TAHC changes in 2015:

- It has developed and is implementing a livestock traceability system in Ngamiland (the Botswana Animal Information and Traceability System, or BAITS). Tags were donated by UNDP, but uptake has been slow. Biannual vaccination of FMD vaccine is linked to the cattle tagging, and cattle movement between zones and/or to export abattoirs beyond 2018 will be restricted to vehicles only. Permits are printed by computer and not manually produced, as per OIE guidelines on traceability.
- CBT beef slaughtered, deboned and processed in the BMC Maun export abattoir has been exported to Mozambique as noted, although Mozambique has asked for a better quality feed-finished product. Export and Import permits have been negotiated, via the relevant Competent Authorities of each country.
- As noted, CBT deboned beef from the Maun abattoir has been exported to Kuwait and Vietnam within the last 3 months.
- DVS has said it is willing to enter into CBT agreements with any importing country that a market can be found in.
- Ngamiland Abattoirs (privately owned) is exporting half carcasses (bone in) on an equivalence basis to Lubumbashi in south eastern DRC, and has an export licence to do so, as well as a permit to transit through Zambia. DVS has recently started inspection procedures to set up a HACCP procedure for this abattoir to export CBT beef to other markets.

- South Africa is due to inspect the BMC Maun and Francistown abattoirs for resumption of exports to South Africa. South Africa stipulates a 75% baseline in field biannual FMD vaccination before any exports can resume. South African supermarket chain Woolworths imports from Namibia a grass-fed commercial beef product marketing it as savanna beef, and once an acceptable vaccination percentage is reached in Ngamiland, brand development through a Woolworths-branded product can be considered.

Thus, encouragingly, DVS of Botswana is already setting in place procedures that support CBT approaches.

4.3 Balancing marketing with production for regional trade

Figure 2 below (Scoones et al., 2008) outlines the importance of CBT to FMD-endemic areas of southern Africa. Accordingly, CBT now allows "for a broad set of high-medium value markets – as not yet fully exploited, but requiring investment in product safety testing, and certification" (Figure 2). The key to achieving this is **diversification of the production system of beef cattle in Ngamiland,** which will provide a broader, more resilient base for success.

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

Figure 2: Market access and disease control: future opportunities (Scoones et al., 2008).

Accordingly, weaner production (which will require an educational push to be more broadly adopted by farmers) will allow for a greater offtake of animals, especially as it will run in parallel to steer production.

This is because not all people may be willing to market weaners. By placing weaner production into the formal marketing of beef in Ngamiland, offtake of animals during periods of drought can increase, as there will be a subsector of cattle not dependent on range forage that are being fed to produce a more uniform product for sale at higher value. Higher values in the market will feed backwards into the cattle supply chain, so that the value of cattle in Ngamiland can increase, and drive commercial production forward. Weaners are also easier for farmers to transport, as many large steers end up wild and dying of old age in Ngamiland, as they are not handled often, not herded, and become feral, especially around permanent water sources like Lake Ngami.

For the first time, there is an opportunity to develop a more complex and robust marketing strategy for FMD-endemic Ngamiland, with the private sector driving competition with the public sector abattoirs. Low value markets can still be exploited for aging steers and old cows, which will still provide the majority of cattle for local consumption.

4.4 Feedlot development now less financially risky with CBT

OIE's TAHC Article 8.8.22 allows for trade in beef from areas not free from FMD provided cattle have been kept in an establishment for the past 30 days, and FMD has not occurred within a 10km radius of the establishment during that period, *or the establishment is a quarantine station*. During FMD outbreaks, the supply chain from *a quarantine station* could thus theoretically not be disrupted. Consequently, the economic cost implications to establishments serving as quarantines as well as feedlots are lowered, which will allow a better quality product to be developed as well as for diversification of the beef value chain, which will confer greater resilience.

4.5 Quality assurance will assist with reducing environmental degradation

The value chain approach, applying HACCP principles that incorporate food safety and animal disease risk management, lends itself to an educational drive that will form part of a Beef Quality Assurance Scheme, which can yield at the highest level a *Wildlife Friendly Beef* product. With fewer veterinary fences needed over time with progression of CBT, improved management of livestock-wildlife conflict and increased options for seasonal wildlife movements become part of the tiered approach.

Farmers could voluntarily sign up to the (to be developed) Quality Assurance Scheme. At entry level, as long as he or she agreed to be held accountable to established management, animal welfare and environmental procedures outlined in that sector of assurance, he or she would receive a premium price. By improving management, and linking work / effort to production, the farmer could move up the rating scale, incentivized by price. On the other side, consumers (e.g., Ngamiland Tourism, and possibly Woolworths South Africa) could then choose to pay premiums on the best quality products, which will hopefully drive beef producers to perform better.

WILDCRU's lion guardianship program (encouraging kraaling of cattle at night, for example) and Cheetah Conservation Botswana's livestock guardian program, as well as other nongovernmental organization-developed commitment schemes, can be tied into the program, linking farmers and conservation organizations at a grass roots level.

5. NGAMILAND'S APPROACH TO BEEF PRODUCTION AND MARKETING

Ngamiland's traditional production system (oxen system) is based on selling mature cattle to abattoirs. Until recently, BMC was the main institution involved in formal cattle slaughter and marketing. Today, however, Ngamiland cattle producers have access to several export abattoirs; two private abattoirs (one of which will be open soon), BMC Maun, and potentially BMC Francistown (which is considered an export facility for Ngamiland). Some product is now being exported, with the remainder being consumed domestically.

5.1 Private export abattoirs in Ngamiland

Ngamiland Abattoirs

- Current capacity of 80 head per day; 14,000 head slaughtered in 2016.
- Exporting through Zambia to DRC (whole bone-in carcasses).
- Currently adopting CBT processes for greater market access.
- Currently pays lower live weight prices for cattle than BMC Maun.
- Obliged to slaughter cattle for Maun's domestic market.

Claremont Farming

- Near completion, with a built capacity of 80 head per day.
- Likely to build a small feedlot to service high-end customers in DRC.
- Likely to develop a cooking plant to process cooked meat to go into South Africa.
- Obliged to slaughter cattle for Maun's domestic market.

5.2 Government export abattoirs that service Ngamiland

BMC, Maun

- Capacity of 120 head per day; 20,000 head slaughtered in 2016.
- Cattle deliveries controlled by quota committee. Not ideal as it is inflexible; cannot take into account the condition of cattle in different areas or producers' current financial needs.
- Sporadic use of live trade through Makalamabedi as and when CSC Bulawayo has funds. Trade inhibited by poor state of quarantine infrastructure.

BMC, Francistown

- Capacity of 400 head per day.
- Currently underutilized and consideration being given to shutting it down.
- Although it is currently EU export eligible, Francistown's EU kill is slaughtered in Lobatse, making Francistown abattoir irrelevant to EU exports.
- Francistown future lies in the development of offtake scenarios servicing the non-EU exporting zones of Botswana.

With the current herd size and the possible addition of Francistown, as well as the development of two private commercial abattoirs, there may be no need for any further abattoir development. However, slaughter capacity needs to be examined further.

5.3 Domestic consumption

The adoption and certification of the CBT process by Botswana's DVS has been a substantial breakthrough in the marketing options for Ngamiland cattle. Volumes are currently unavailable from BMC. However, one can see a scenario whereby Maun product replaces the consumption of EU eligible product in Botswana. This, however, would confine Ngamiland to low prices for the foreseeable future, and the model does not currently work during an FMD outbreak.

5.4 Current regional exports

Angola

- Huge potential market.
- The product is in direct competition with Argentina, Brazil, Paraguay and Uruguay.
- Product has only been sourced from EU feedlot kill (due to inconsistent quality of Maun product) and has developed an excellent reputation.
- No market has been developed for manufacturing grade beef which is delivered cheaply from Brazil, etc.

Democratic Republic of Congo

- First product in the form of whole carcasses under status of equivalence.
- Some live trade in the form of young heifers in 2012.
- Conducting business difficult due to the lack of a formal banking process.

Mozambique

- The first consignment of beef exported to Mozambique was discounted as the quality of product delivered was described as "terrible."
- Mozambique has expressed a desire for a better finished feedlot product so that product supply and consistency can be maintained.

Zimbabwe

- From 2012, sporadic live trade in the form of full mouth oxen to CSC Bulawayo.
- Trade inhibited by a lack of CSC cash liquidity.
- There is, however, large commercial demand.
- Further political restrictions in place on the commercial sector's importing.

5.5 International markets

Small quantities of product have been sent to Kuwait and Vietnam from Maun. While this is a breakthrough, future volumes will depend on price and will be benchmarked against carabeef landed costs.

5.6 Tourism market in Ngamiland

Indications are that tourism companies in Ngamiland are importing 150 tonnes per annum of deboned hind quarter cuts from the EU export **/** FMD-free zone, principally due to the lack of availability of a **local** uniform quality product.

6. REGIONAL AND OTHER MARKETS FOR CBT BEEF FROM NGAMILAND

Ngamiland has four distinct options for exports from its FMD-endemic zone:

- Exports of cured, processed, cooked or salted dried beef, as happens with cooked beef from Maun BMC to Lobatse BMC cannery.
- Equivalence trade in beef, as happens with the DRC.
- CBT of deboned beef, as happens from the FMD-endemic zone to the FMD-free zone in Botswana.
- Live exports of FMD vaccinated animals through quarantine (again, based on equivalence).

Some countries require halal slaughter. The BMC Maun plant slaughters halal, whereas the two private abattoirs do not, limiting their export destinations to non-Muslim countries. It should be noted, however, that halal practiced in one market may not be complementary to others. For example, Malaysia and Saudi Arabia require electrocution and no penetrative stunning mechanism.

6.1 Cooking and processing beef in Ngamiland

- A cooking and processing plant for beef is going to be built in Ngamiland.
- Cooking and processing is expensive (economically as well as in terms of expertise required, which is lacking in Ngamiland), and the products produced (unless processed into packaged cold meats such as pastrami, cooked beef, and sausages) generally sell for less than chilled beef would off the same carcasses.
- The BMC Cannery in Lobatse produces the ECCO range of tinned beef, but the cooking plant in Maun, as mentioned above, does not have a cannery.
- Value addition via processing beef into salamis, sausages, and other processed vacuum-packed meat cuts could be viable in Maun, and would diversify the industry.
- Theoretically, cooking plants can remain open for slaughter, canning and export (less market disruption during FMD outbreaks).
- Any cooked and processed products could be exported anywhere in the world, with no marketing disruption. (Tinned or vacuum-packed cooked cooled and frozen products are rendered incapable of transmitting FMD to other susceptible animals by the cooking process.) Only low value beef is used in this process, so while it creates greater market access it cannot be considered as price pull.

6.2 Equivalence and CBT trade in beef

- When countries develop export and import licences for live animals or beef, they are based in-part on a set of protocols that are usually linked with the perceived epidemiological risk and consequences of introducing FMD.
- Because FMD transmission is measured epidemiologically by its potential transmission to pigs, it follows that populations of people that eat and keep domestic pigs, and feed swill containing the leftover food from humans, may have a higher chance of transmitting FMD virus into their pig population. So, even though FMD is endemic in these areas, they may show a higher degree of caution in importing beef from Ngamiland.

Tables 2 to 4 below, separate potential trading partners for Ngamiland into three categories (Asia, Middle East, Africa), as each has specific epidemiological factors that would affect trade and need to be

taken into consideration. For each table, MT refers to metric tonnes and CWE to carcass-weight-equivalent. Sources of information: https://www.indexmundi.com/agriculture/?commodity=beef-and-veal-meat&graph=imports and http://www.oie.int.

Table 2: Asian countries / administrative units that Ngamiland could consider as trading partners for CBT beef.

COUNTRY	BEEF IMPORTS 1000 MT CWE 2017	FMD STATUS	HALAL	NGAMILAND EXPORTED TO
China	950	Endemic with control program	No	No, but large importer of carabeef
Hong Kong	475	Endemic with control program	No	No, but imports carabeef
Malaysia	220	Endemic with control program. Sarawak and Sabah provinces FMD-free	Yes, Malaysian government needs to approve halal facility	No, but exports from South Africa continued despite South Africa not having FMD-free status
Vietnam	60	Endemic	Yes	Yes, deboned beef

Of note:

- Vietnam imported 662,000 metric tonnes (MT) carcass-weight-equivalent (CWE) carabeef from India in 2015, with most imports entering at Haiphong, a port 100 km from Hanoi. Most carabeef and other beef imports that enter Vietnam are known not to be consumed there, but a growing affluent middle class has increased beef consumption from 3.5kg of beef per capita in 2008 to 4.5kg per capita in 2014. https://www.mla.com.au/globalassets/mla-corporate/prices--markets/documents/os-markets/red-meat-market-snapshots/mla_india-supplier-snapshot-carabeef_may-2015.pdf
- High quality imports into Vietnam from USA, Brazil and Australia are assuming more importance since the development of hotels, western restaurants and Asian-themed restaurants such as King BBQ.
- Eight x 40t consignments of Ngamiland beef have been exported from BMC Maun to Vietnam since 2016, and there is a possibility of competing with higher-end products, should grain-finished beef be produced in Ngamiland. Vietnam has a 15% import duty on beef and 5% on live Imports, which mostly come from Australia. https://www.usmef.org/beef-shortage-surging-consumption-bring-more-imports-to-vietnam/
- Malaysia is a massive importer of poorer quality carabeef from India with small amounts of beef imported from Australia, New Zealand and Brazil. The majority of the population are Muslim, and any imported beef needs to be certified by the Malaysian authorities, must bear a Malaysian Quality (MS) or Safety mark (S), be certified as halal by JAKIM (Islamic Development Foundation of Malaysia), as well as be approved by the Malaysian DVS. http://agritrade.iift.ac.in/html/Training/Market%20study/Malaysia.pdf
- China and Hong Kong have the highest imports from Australia, primarily brisket, blade, and shank. The prevalence of forequarter cuts as the principal cuts is because these are relatively cheaper and tastier cuts than hindquarter cuts like rump and fillet.
- China and Hong Kong, though FMD-endemic have a massive pig population, so CBT trade with these countries (which would develop the market for forequarters, usually dumped or

discounted into local or South African markets) could prove more challenging. The Vietnam market can be further developed, as well as the Malaysian market for forequarter.

Table 3: Middle eastern countries that Ngamiland could consider as trading partners for CBT beef.

COUNTRY	BEEF IMPORTS 1000 MT CWE 2017	FMD STATUS	HALAL	NGAMILAND EXPORTED TO
Egypt	300	Endemic	Yes	No, imports carabeef
Oman	28	Endemic	Yes	No, imports carabeef
Kuwait	52	Endemic	Yes	Yes, deboned beef
Saudi Arabia	175	Endemic	Yes	No, imports carabeef
UAE	60	Endemic	Yes	No, imports carabeef

Of note:

- Middle eastern countries are relatively affluent, and all FMD-endemic. Halal slaughter is a mandatory requirement, and the absence of pigs reduces the possibility of FMD outbreaks from beef exported from Ngamiland. BMC Maun is already exporting to Kuwait, and a better quality product is likely to compete with Australian imports to satisfy the increased demand for high quality cuts of beef.
- Trends in the Middle East are a reduction in live trade and an increased proportion of high-end meat imports. Australia exports over 10,000 tonnes of high-end cuts to Saudi Arabia. https://www.mla.com.au/prices-markets/overseas-markets/

Table 4: African countries that Ngamiland could consider trading partners for CBT (illustrative).

COUNTRY	BEEF IMPORTS 1000 MT CWE 2017	FMD STATUS	HALAL	NGAMILAND EXPORTED TO	PROBLEMS
Algeria	90	Endemic	Yes	No	
Angola	40	Endemic	No	Yes	Previous BMC exports downgraded to manufacturing beef
DRC	No figures available	Endemic	No	Yes	Whole and half carcasses and deboned beef
Mozambique	No figures available	Endemic	No	Yes	One consignment sent and downgraded to manufacturing grade
South Africa	40	One FMD vaccination zone only	Depends on chosen distributor	Previously	Market only available with 75% vaccination coverage
Zimbabwe	No figures available	Endemic	No	Yes	Accepts live animals through quarantine

Of note:

- Algeria, Angola, DRC and Mozambique are all export destinations for cheap carabeef. Recent exports of deboned beef from Maun BMC abattoir have been discounted to manufacturing grade in Mozambique, and Angola desires a product that can compete with Brazilian imports. Both of these can be met by weaner production in Ngamiland, especially as Namibia has recently opened the Zambezi Region up for passage of deboned beef from Botswana to Angola.
- Exports to South Africa are currently suspended, but are theoretically possible if

Ngamiland's vaccination rate (biannual) is above 75%. Farmer compliance with biannual vaccinations directly affects access to this market. CBT principles between South Africa and Botswana have been agreed upon. Woolworths South Africa is promoting the FAN MEATS quality-assured Savanna Beef from Namibia. This represents high-end cuts of beef that are being sold at a premium in Woolworths South Africa. In the long run, once a Quality Assurance Scheme has been established in Ngamiland, it should be possible to sell to Woolworths South Africa, which would help to drive farmer prices upwards.

- Zambia and Zimbabwe have problems with beef imports, even though as countries they are desperately short of beef. Zambeef seems to control supply in Zambia. In Zimbabwe, CSC controls the market Imports, and owes BMC several million USD after cattle were sold to it. Political concerns currently preclude inclusion of these two markets in this model.

6.3 Farmer-assured wildlife friendly beef

As has been stated previously, the development of protocols that are required to produce CBT beef, especially a grain-finished product, lend themselves to a Farmer Assurance Scheme. Such a scheme that involves reducing the epidemiological risks of contact with FMD (ideally 100% vaccination of cattle twice a year as well as well as herding or kraaling at night) could be applied. Initially, a small number of willing farmers could be trained and assisted to herd cattle, manage grazing, and be taught how to better manage resources. The beef currently imported into Ngamiland to satisfy the tourism market's needs (in excess of 150 tonnes per annum) could be replaced by beef from local cattle from the developing Farmer Assurance Scheme. The win-win situation of better resource utilisation on the edges of wildlife areas may then lend itself to tourism in these areas, once some of the range degradation has been reversed.

As more members join the Farmer Assurance Scheme, and more product becomes available for sale, integration of the product into a Woolworths South Africa market is envisaged, as the Farmer Assurance Scheme would be epidemiologically sound enough to demonstrate the reduced risk of this Farmer-Assured Beef in terms of transmitting the FMD to South Africa. Woolworths SA currently has Farmer-Assured Namibian Beef (FAN MEATS) products in South African supermarkets.

7. SUMMARY OF NGAMILAND FARMER ENGAGEMENT

A questionnaire (see Appendix) was delivered to over 100 people in western Ngamiland, of which 101 responded. The questionnaire was prepared in English, translated into Setswana, and was completed verbally for those people who were illiterate (15% of farmers in Ngamiland are illiterate and 51% only have primary education, so literacy is limited www.statsbots.org.bw/annual-agriculture-survey-report-2014), or was handed to farmers who filled it out and returned it. Project team member Masedi gathered people at the local kgotlas and asked questions and listened to opinions during the distribution of the survey in order to ascertain the needs of the local cattle producers. Any other relevant comments were documented.

7.1 Demographics of people responding

96% of farmer respondents were from the villages of Nokaneng, Habu and Gumare. Twenty-five to 50% of respondents were paid-up members of the North West Integrated Farmers Association (NWIFA) that covers Zones 2A, B, C and D. The NWIFA represents over 1000 farmers, although paid-up membership is small, mainly due to people not having the money for membership fees. NWIFA has an annual field day

which is well attended (two thirds of farmers questioned said they attend), and the Committee speaks to members through regular kgotla meetings, the preferred mode of communication. Lack of cell phone coverage precludes the use of SMS or Whatsapp as a form of communication between farmers, and between farmers and their association. Seventy-five % of farmers meet for farmers association meetings at least three times per year. Most farmers in this area (the questionnaire backs-up the statistics) are older than 50 (an aging farming population as has been seen in statistical analyses of Ngamiland - www.statsbots.org.bw/annual-agriculture-survey-report-2014).

7.2 Animal husbandry

All respondents were from the non-fenced communal grazing area adjacent to the western Delta perimeter buffalo fence. Eighty-two % of respondents said that they do not herd their cattle, and 44% do not keep their cattle penned at night. Herding of cattle is difficult, as the piosphere effect (Lange, 1969) creates very thick areas of *Terminalia* and mopane woodland on the edges of the water points, so herding on foot is considered dangerous due to the presence of elephant and lion in the farming areas, and farmers are older. Four farmers have recently been killed by elephants in the area when trying to retrieve cattle, so the farmers do not believe that herding is possible. Only 5% of farmers pay labour to care for their cattle, and the rest employ family and manage the cattle themselves.

The largest reported cause of cattle mortality was drought, with 84% of respondents reporting that drought was the biggest killer of cattle in their area, followed by predators (8.3%), disease (5.2%) and old age (1%). Unfortunately, heartwater ticks (*Amblyomma variagatum*) were accidentally introduced into Tsubu Village with goats from the southeast of Botswana, and have spread. These are three-host ticks, with an intermediate host that is either reptiles (water monitors, tortoises), birds (Guinea fowl, francolin, sandgrouse, plovers, dikkops) or small mammals (mice, rats, porcupine, scrub hares), and heartwater disease in now causing mortality in cattle, sheep and goats. Local farmers are reluctant to dip cattle regularly to control the disease. Eighty-six % of farmers reported that they had lost more than 20% of their cattle during the drought of 2015 / 2016 and, significantly, 30% of respondents reported losses between 40 and 70% of their herds. These reported losses render any statistics on cattle numbers in Ngamiland irrelevant, as actual numbers of cattle may now be 30% less than at the end of 2016. When farmers were asked what would be the greatest incentive to improve husbandry of cattle, 89% said better water provision, whereas 5.6% cited better prices and an equal percentage noted a bull subsidy as being important. All respondents said that if they received better money for their cattle, they would invest more money in husbandry and management. Forty-seven % of farmers said they would like to sell weaner cattle, as they are easier to transport.

7.3 Current prices and markets

Eighty % of farmers pay between BWP 200 to BWP 300 to transport a cow to Maun abattoirs. The current price offered by local butchers is BWP 10 per kg. hot dressed mass (paid within 2 to 3 weeks, transportation costs paid by the butchers), whereas BMC pays BWP 18 per kg. during the rainy season (when carcass quality is better) and BWP 12 per kg. when the carcass quality is poor in the dry season. Ngamiland Abattoirs pays BWP 10 per kg. during the rainy season and BWP 8 per kg. in the dry season. Although Ngamiland Abattoirs pay less, farmers prefer to sell to them as they are paid within 48 hours of slaughter, and do not have to wait for up to 3 months to get their money, as is the case with BMC. Ngamiland Abattoirs sends out buyers who procure cattle for them, or farmers can slaughter their own cattle there, and are charged a slaughter fee of BWP 300 to BWP 380 per animal (regardless of

detention or condemnation for *Cysticersus bovis*, beef measles). Eighty-eight % of farmers stated that BMC Maun would be their preferred point of sale if they were paid on time.

Farmers are price sensitive, and most respondents (89.2%) stated that an adequate price for a slaughtered ox would be between BWP 7000 to BWP 8000 per Ox. All respondents said they would welcome another export abattoir, and would welcome live trade in cattle. This cohort of farmers stated they would like an export abattoir in their zone, at Nokaneng, as it will reduce the cost of transportation of live cattle to the market, and reduce cattle theft.

7.4 Relationship with DVS

DVS is seen by farmers not to control FMD very well. Farmers expect DVS to repair fences in a timely manner, prevent buffalo contact by culling any buffalo that come through the fence, and vaccinate cattle twice a year (in the dry season when cattle are easier to round up for vaccination).

7.5 Discussion

Ngamiland Farmers are price sensitive, and would like to see greater returns for their cattle. It is a travesty that so many cattle, utilizing limited natural resources, should die due to environmental conditions such as drought (which is expected with greater frequency due to climate change) in the 21st century. With limited export opportunities, there is little option other than death of livestock for these farmers during drought.

Water provision in the western Okavango Delta area has always been an issue, as when the annual flood recedes in October there are no water sources available for cattle. Thus, cattle have to walk long distances between grazing and water, which reduces beef quality dramatically. Provision of better water supplies (boreholes), together with an educational push that ensures herding and rangeland management occur in areas of water provision, would help will improve beef quality in western Ngamiland.

Farmers in the western delta would like a local export abattoir to reduce the cost of transport. Weaner production and competition in the transport industry could also halve the cost of transport. Competition for cattle by the existing abattoirs that can service Ngamiland (i.e. Ngamiland Abattoirs, Claremont Farming, BMC Maun, and BMC Francistown) is probably adequate, especially with the advent of live trade by BMC into Zimbabwe. However, further examination of slaughter capacity would be worthwhile.

Currently, the BMC pricing system favors larger oxen, so people retain cattle longer, and provided the prices for weaners were reasonable most farmers would consider selling these, both from a perspective of ease of transport and ease of management (older steers often become too large to handle and go feral within the Okavango where they are shot, or become feral at Lake Ngami). The removal of many of the large steers out of the system will assist in the percentage of FMD vaccination coverage improving, and reduce the epidemiological risks of transmission.

Farmers feel that DVS does not support them, and fails in its mandate to control FMD, but the DVS would be more successful in vaccination programs if all cattle were presented for vaccination (which is impossible without herding and kraaling at night).

A solution to the impasse between farmers and the DVS, especially with the advent of the recent FMD outbreak at Lake Ngami on 21 September 2017, would include taking the following into account:

- More in-depth discussions with farmers need to be undertaken (capacity building) so that they better understand the beef value chain in Ngamiland. Prior to the publication of Article 8.8.22 of the TAHC of OIE, trade in beef was impossible during FMD outbreaks, as entire zones were mandated as non-movement zones. Any marketing of cattle therefore becomes impossible, which has resulted in low beef prices long term (buyers' market dictated by local consumption only), and little investment in the industry.
- Article 8.8.22, including the use of quarantine, allows for a change in how DVS responds to FMD outbreaks. DVS (which needs to protect the EU market in the FMD-free zone) needs to work out an epidemiologically sound action plan for FMD control that involves the timely placement of movement restrictions until the extent of an FMD outbreak has been determined, and a vaccination and circumscribed non-movement (sub-)zone needs to be demarcated. Genuine CBT principles will allow fairly rapid resumption of exports so that interruptions to business enterprises are minimized.
- Farmers must realise that in order to get any price increases, they need to have a greater role in herding, and kraaling at night. Cattle could thus be more reliably presented for vaccination (approaching 100%), which would reduce risks of FMD outbreaks. Farmers participating in early diagnosis will contribute to more effective responses.
- CBT protocols and education involving DVS, the private sector and the Department of Animal Production as partners, creating an easy platform for communication, will improve husbandry practises in Ngamiland.

The Ngamiland farmers interviewed have indicated a need for change. The next step would be to explain CBT and market access for CBT products to the farmers, so that they will have a better understanding of the key role they play in reducing the incidence of FMD in their areas.

8. RECOMMENDATIONS

8.1 Direction of approach

The focus of this analysis has been to find effective ways of reducing the overburden of cattle in Ngamiland through increasing market access. This should be done to reduce environmental impact through reduced stocking rates, combined with efforts to improve animal husbandry practices, such as herding. At the same time, this approach can only be successful if there are significant increases in cattle values created by opening other avenues to markets for both live cattle and CBT product. Increases in household incomes and poverty reduction are possible, with the added effect of reducing the need to supplement incomes through poaching of wildlife.

Increases in stock values were previously achieved with the Live Trade intervention of 2011, whereby local prices within Ngamiland effectively doubled (BWP 4.00 per kg. live weight to BWP 8.00) for the period of the program, but slumped back once again after the program stopped. This clearly indicates that the over-supply of cattle / the failure to create demand to drive offtake have caused environmental and social ills currently affecting Ngamiland and its producers. With the advent of CBT, markets could be maintained in certain parts of a diversified sector as long as the entire value chain of beef stakeholders

understand each other's roles and cooperate. A FMD outbreak would thus not need to close markets completely.

A barrier to regional market penetration of CBT beef from Ngamiland (as is relevant for Namibia's NCA too) is that **the quality of beef is poor and/or seasonably variable**. Free-range, communally grazed animals have over the years created piospheres (Lange, 1969) around watering points, so that cattle must move upwards of 30km (in most cases) between watering points and grazing areas. A severe reduction in palatable grasses, increases in toxic plants, bush encroachment, and biodiversity losses are occurring (UNDP, 2016), so that the time taken to market oxen off the range is increasing. Furthermore, quality is seasonably variable and much of the meat tends only to be useful for manufactured food products (rather than retail cuts of beef). **This type of beef is thus competing in the same market category as India's carabeef**, which will do little to improve the rural livelihoods of farmers in Ngamiland as the prices offered in international markets are low. Carabeef is used principally in meat processing, and is exported as a high volume, low cost product, which is the opposite of what Ngamiland beef needs (i.e., high value niche-marketed products).

Free-range beef is recognized internationally as being tougher than feedlot finished beef, and for this reason should be marketed under two years of age (connective tissue fibers develop after two years of age and that significantly affects texture – see http://extension.wsu.edu/impact-reports/beef-tenderness/). A more competitive free-range product is possible from Ngamiland, but would only be likely with better grazing management. Free-range beef also needs to be marketed early if it is to compete with finished feedlot animals (http://www.tandfonline.com/doi/abs/10.1080/00288233.1998.9513346).

While Ngamiland is seriously overstocked and experiencing significant rangeland degradation, the overall cattle herd size is relatively small on a global scale (approximately 350 000 to 450,000 head). As such, a **high-quality niche-marketed product** needs to be developed in **the medium to long term** to increase revenues to farmers. To achieve uniformity of saleable high quality product, it is recommended that feedlots be considered, to diversify Ngamiland's production system. DVS sees no issue with the development of feedlots within existing quarantine facilities, or in fenced farms which can be compartmentalized.

Historically, the production of older steers can be demonstrated going back more than one hundred years. A lack of investment in FMD-endemic areas, apart from the building and maintenance of cordon fences to protect an export market to Europe in terms of FMD-free unvaccinated beef, has meant that the environmental degradation caused by unmanaged free-range cattle in these areas is now severe. With climate change models predicting increasing temperatures and aridity, as well as increased tourism possibilities next to park boundaries, a change in the production system for cattle is needed. Moreover, the eradication of tsetse fly and contagious bovine pleuropneumonia in Ngamiland within the last ten years, as well as changes to the OIE's TAHC in 2015, indicate that the time is right for production system diversification in Ngamiland.

A change in marketing system focus from steer to weaner production will need an educational push, and presents an opportunity to introduce farmers to the better prices for animals that can come with farmers' improvement of their management. An approach that links education and improved production, herding, and rangeland management, as has been seen in the U.S., would allow rural impoverished communities to better care for their cattle and the rangeland upon which they exist. In the long term, with the improved grazing conditions that can be created by better management of cattle

herds, both agriculture-focused and wildlife-based tourism opportunities in areas peripheral to protected areas like national parks may become possible.

8.2 Possible holistic long-term solution for Ngamiland and other non-EU zones

Increase offtake

- Create feedlot capacity at Makalamabedi and Sese.
- Use Francistown slaughter capacity for CBT beef and <u>not</u> for EU compliant cattle.
- Use the Angolan price as the benchmark slaughter price.
- Price "trickledown "effect of raising live weight values for young cattle above that of an ox slaughtered in Maun.
- Create demographic change of the zonal herds of 2,3b and 4a.
- Reduce oxen and increase females.
- Raise offtake by diversifying the herd structure to produce more marketable animals.
- Feedlot males to Francistown, cull cows to Maun abattoirs.

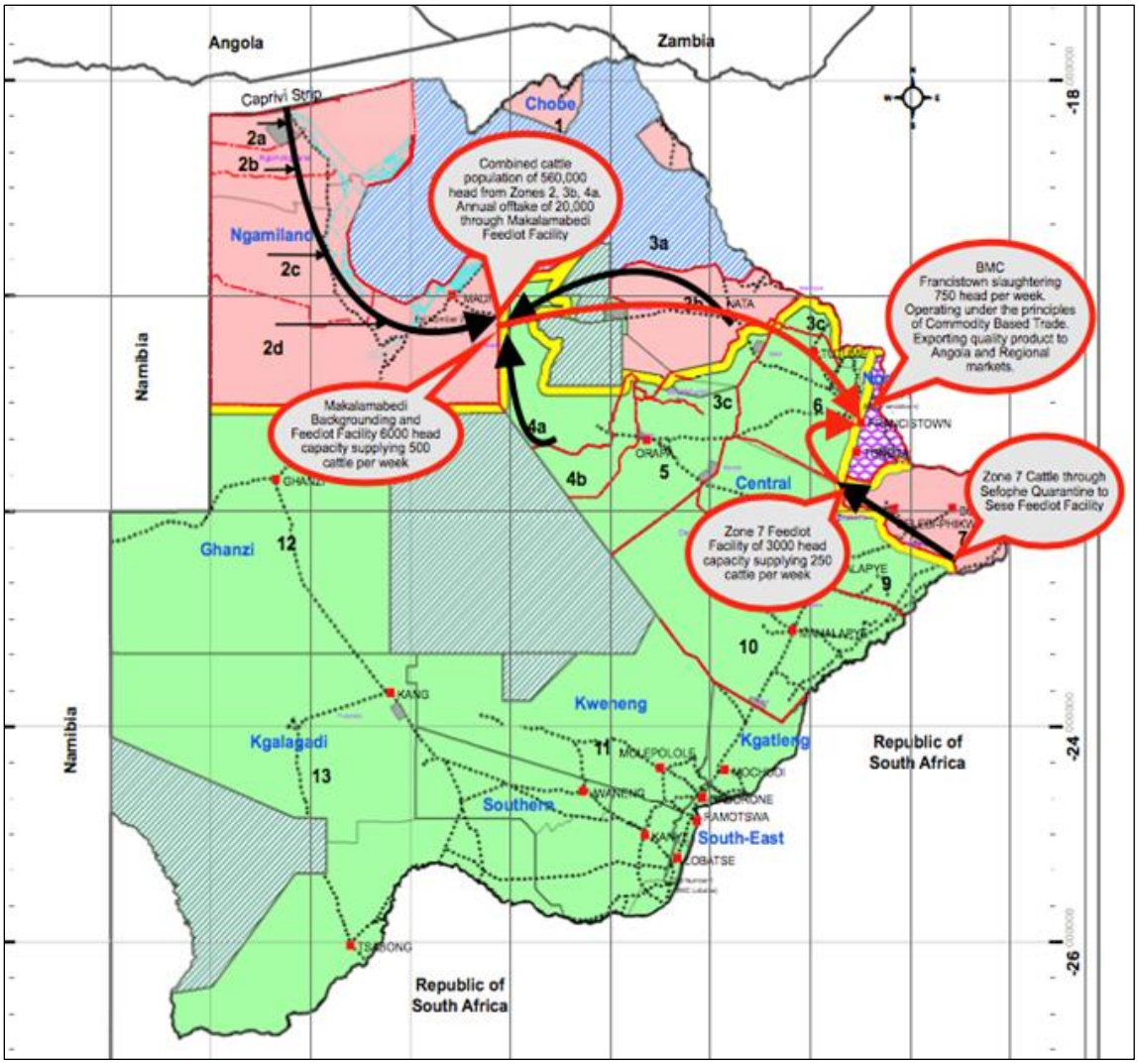

Figure 3: Integrated non-EU offtake scenario.

Vaccination and tagging

- Producers will vaccinate and tag if price is preferential (which will help DVS as the current rate of tagging and vaccination is poor and quarantined animals will need proof of vaccination, and need to be transported on a BAITS electronic permit).
- Develop process whereby only vaccinated cattle can be purchased.
- Link this to the BAITS ear tag for identification.
- Develop feedlot protocols to protect the facility but also to certify 100% vaccination coverage.

Outputs

- Increasing cattle values of young animals ensures increased husbandry.
- Preferential price of weaners increases stock herding.
- Most importantly, increased awareness of the importance of vaccination as opening access to market at preferential prices.
- Increased zonal vaccination could mean increased regional access to South Africa.
- Increased access to South Africa means more marketing options and potentially better prices and returns.

Feedlotting of non-EU weaners

- Increasing revenues and offtake from the important wildlife areas between Shakawe, Maun, Nata and Rakops.
- Utilizing all current abattoir infrastructure with no need for expansion of slaughter capacity.
- Creation of a brand (e.g."Ngamiland Gold") based on veld-reared, feed-finished, young cattle.

Outputs

- An end to apologising for Ngamiland product quality.
- Young feed-finished product slaughtered in Francistown for high-end CBT markets.
- Slaughter capacity within Zone 2 utilized to reduce oxen impact during transition to basically a cull cow operation, delivering predominantly manufacturing grade beef (rather than retail cuts of beef) to the Green Zone for internal consumption and to lower end regional markets.

Increased offtake created using preferential CBT prices has the potential to create the environment to drive change, increasing household incomes and decreasing wildlife-human conflict.

EDUCATIONAL PUSH >>>>>>>>>> **combined with** >>>>>>>>>>>> **PRICE PULL**

Note that a feedlot in the Botswana sense implies:

- Smaller than 5,000 animals in total in two facilities (induction and finishing areas).
- Utilising locally produced hay or silage, and utilising feedlot manure on these fields.
- No use of hormones.
- Appropriate use of antimicrobials for treatments.

Thus, the finished product has only spent up to 90 days being fed, in a system of good agricultural practices.

9. CONCLUSION

During this investigation the authors have had a chance to review Ngamiland beef production from as far back as the turn of the 20th Century. Apart from the period between the establishment of BMC Maun in 1984 to the outbreak of CBPP in 1995, the overriding impression has been that for more than 100 years Ngamiland has operated in a manner not conducive to any form of commercial beef herd development. It has continually been stricken with periods of marketing uncertainty which gives rise to a lack of investment and a feeling of helplessness amongst producers, to the point whereby cattle are deemed a financial burden rather than an asset. That 86% of Ngamiland farmers interviewed admitted that drought is the biggest cause of mortality in the 21st century is telling of the horrendous lack of market access.

Regardless of the circumstances that have prevailed up to now, with the new possibilities offered by CBT principles, the time may have come to move Ngamiland out of the FMD doldrums and bring beef forward as a valuable contributor to household incomes and GDP. It is very clear that while this is the desired direction, implementation of the required changes in the livestock sector is going to be extremely challenging, and that **education, finance and market development** are the key areas of concern.

We must never lose sight of the fact that many communal producers will be reluctant to follow new production principles without understanding why they are necessary, and what the eventual benefit for the extra effort will be. Over the years in Botswana it has been shown time and again that communal producers will change and will deliver, if they understand the rules of the game and can see the goal. The authors do not believe that Ngamiland is any different.

Diversification of the beef value chain must be the goal, so that initially cattle numbers can be reduced, while an educational drive is undertaken to improve the rangeland, so that better quality cattle can be produced. Grain feeding of a cohort of the cattle population is essential, and this will create jobs and help reduce losses in drought.

At the center of CBT is the need to apply a set of rules to a value chain (in this case for beef) to yield products safe for export. Rules worked out by DVS, which understands their practical implications for farmers, are essential. A successful outcome would be to produce sought-after farmers-assured products based on CBT principles. Farmers who want to better themselves could adopt CBT, with long-term improvements in terms of poverty alleviation and sustainable livelihoods being the result.

APPENDIX

Ngamiland farmers questionnaire

Q1.	**What is the name of your farmers association?**				
	98 respondents 96.1% NWIFA 3.9% other				**98**

Q2.	**Approx. how many farmers does your association represent?**			
	A. 100+	B. 1000+	C. 1000	
	B. 7	B. 8	C. 83	**98**
	7.1%	**8.2%**	**84.7%**	

Q3.	**Approx. what percentage of farmers in your area is part of your association?**			
	A. 0 -30	B. 30-50	C. 50+	**98**
	A.63	B. 27	C. 8	
	64.3%	**27.6%**	**8.2%**	

Q4	**Estimate the average age of the farmers in your area/association?**			
	A. 0-30	B. 30-50	C. 50+	**101**
	6	37	58	
	5.9	**36.6**	**57.4**	

Q5.	**Do you have an annual field day?**		
	A. Yes	B. No	
	66	33	**99**
	66.7%	**33.3%**	

Q6	**Which FMD zones do your farmers fall under?**				
	A2A	A2B	A2C	A2D	
	2	0	95	1	**98**
	2.0%	**0**	**96.9%**	**1.0%**	

Q7.	**How many times do you meet in a year?**				
	A.2	B.3	C.4	D.4+	
	16	40	7	35	**98**
	16.3%	**40.8%**	**7.1%**	**35.7%**	

Q8.	**How do you communicate with other members?**					
	A. kgotla	B. letters	C. social media	D. Email	E. BTV/Radio	
	97	1	0	0	0	**98**
	99%	**1.0%**	**0**	**0**	**0**	

Q9.	**What is the average price you pay for transport per animal in your area to Maun?**				
	A. P200-300	B. P300-400	C. P400-500	D. P500+	
	19	79	-	-	**98**
	19.4%	**80.6%**			

Q10. What is the price you receive per kg for cattle sold to local butcheries?

A. P10	B. P12	C. P15	D. P16-18	
87	8	1	11	**107**
81.3%	**7.5%**	**0.93%**	**10.3%**	

Q11. What is the price you receive per kg for cattle sold to BMC?

A. In the rainy season	B. In the dry season
P18/kg	**P12/kg**

Q12. What is the price you get from Ngamiland Abattoirs?

P10/kg	**P8/kg**

Q13. What percentage of the total cattle in your area died in the last 2 years?

A. 10%	B. 20%	C. 20-40%	D. 40-70%	
4	16	61	34	**115**
3.5%	**13.9%**	**53%**	**29.6%**	

Q14. Name the slaughter facility most important for your cattle farming business

A. BMC	B. Ngamiland Abattoirs	C. Local Butcheries	
87	11	1	**99**
87.9%	**11.1%**	**1.0**	

Q15. What percentage of farmers herd their cattle in your area?

A. None	B. 30%	C. 60%	D. 60%+	
82	3	1	14	**100**
82%	**3%**	**1%**	**14%**	

Q16. What % of farmers lock all their cattle up at night?

A. None	B. -30%	C. 30-60%	D. 60+	
48	5	4	42	**99**
44.4%	**5.1%**	**4.0%**	**42.4%**	

Q17. Rank in order of importance (1= most important, 4 =least important) frequent cause of the death of cattle in your area.

A. Drought	B. Old age	C. Disease	D. Predators	
82	1	5	8	**96**
85.4%	**1.0%**	**5.2%**	**8.3%**	

Q18. Would additional markets for live cattle sales outside of Ngamiland benefit you?

A. Yes	B. No	
96	0	**96**
100%	**0%**	

Please explain how farmers might benefit or why there would be no benefit for farmers.
(farmers selling directly to the markets instead of the government going in between)

Q19. At what stage would you prefer to sell your animals?

A. Young animals	B. Older animals	C. Both	
46	7	45	**98**
46.9%	**7.1%**	**45.9%**	

Q20. Would you invest more (either on labour or money) in cattle management and husbandry if you were offered best prices?

A. Yes	B. No	
98	0	**98**
100%	**0%**	

Q21. What would you consider to be the best incentive for farmers to improve their animal husbandry?

A. Reliable provision of water	B. Better prizes	C. Bull subsidy	
64	4	4	**72**
88.9%	**5.6%**	**5.6%**	

Q22. Who looks after your animals?

A. Workers	B. Yourself	C. Yourself & workers	D. Nobody	
4	64	10	1	**79**
5.1%	**81.0%**	**12.7%**	**1.3%**	

Q24. What would you consider to be an adequate price for your animals?

A. P5000	B. P6000	C. P7000	D. P8000	
14	7	32	48	**101**
13.9%	**6.9%**	**31.7%**	**47.5%**	

Q25. What grade would you award the DVS in controlling FMD? (with 70%+ being best)

A. 25%	B. 40%	C. 50%	D. 70%+	
44	5	29	17	**95**
43.3%	**5.3%**	**30.5%**	**17.9%**	

Q26. Would an additional privately operated abattoir in your zone be beneficial to the cattle farming industry?

A. Yes	B. No	
93	0	**93**
100%	**0%**	

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