



A quantitative value chain analysis of policy options for the beef sector in Botswana



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ABSTRACT

The liberalization of beef exports in Botswana is hotly debated among policy makers and relevant value chain actors. While some policy makers argue that such a move might increase prices for producers and make beef unaffordable for consumers, others suggest an open market would reduce the profitability of the beef sector in Botswana. At the same time, these impacts will be mediated by the presence of animal disease and the availability of sufficient feed and water. In this paper, we constructed an integrated system dynamics (SD) model that captures the feedbacks between the biological dynamics of cattle production, the economics of animal and meat marketing and trade, and the impacts that environmental pressures such as rainfall and animal disease have on the system. We used this model to run a series of scenarios associated with market liberalization and animal health shocks to quantify their impacts throughout the value chain, taking into account the feedbacks between biology, markets, and environment on the value chain itself. This approach allows for a holistic evaluation of policy options on different chain actors and whole chain performance, and provides a knowledge base for prioritizing interventions. Model results suggested that although disease control policies benefit all value chain actors, gains from market liberalization come at the expense of substantial losses to Botswana Meat Commission (BMC) and its contracted feedlots. They also suggest that combining market liberalization policy reforms with better animal disease controls greatly improved the financial performance of all value chain actors.

1. Introduction

Livestock, especially cattle, make significant contributions to the livelihoods of farmers in Botswana (BEDIA, 2010). Cattle provide draught power, meat, and milk as well as being a cash-convertible, inflation-resistant asset. About 3% of Botswana's GDP is due to beef exports, with cattle accounting for most of the agricultural share of GDP. Cattle also provide important employment opportunities for rural households in Botswana, especially in communal lands (Mahabile et al., 2005) and represent one of the few enterprises well suited to the arid physical environment.

An important dimension of the cattle sector in Botswana is its significant reliance on export markets: 50% of offtake is destined for export. Over 80% of Botswana's beef exports go to the European Economic Area (EEA) under preferential trade arrangements, and to South Africa (van Engelen et al., 2013). Both markets are served at high cost. For instance, accessing EEA markets requires a cattle traceability system to comply with EU market requirements, while both markets mandate the control of diseases such as Foot and Mouth Disease (FMD)

(Scoones and Wolmer, 2008). Exports from Botswana are managed by the Botswana Meat Commission (BMC), a government parastatal enterprise that enjoys a monopsony in the purchase of cattle for export and a monopoly in the sale of exported beef (van Engelen et al., 2013). This allows BMC largely to determine beef prices in the country (BIDPA, 2006). An important implication of this managed trade has been a historical inability to fill preferential EU beef quotas allocated to Botswana, which is compounded by the reliance on an open grazing oxen system which produces an animal of the desired weight at ages more advanced than that of the international market standard (Ransom, 2011).

Historically, BMC has maintained its purchase prices below export parity, leading to prices in all market channels that are below those likely to be observed in a freer market (Jefferis, 2007). Divergences from market prices have varied over time: in the 1970s, producers received 70% of the price received by BMC but by 2000, this had declined to 30% (d'Allonnes, 2006). The cause of this decline has not been investigated rigorously, but contributing factors include low prices that lead to low offtake of export quality cattle from producers, which

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reduces the capacity utilization of BMC and thus reduce its profitability and raise the level of government subsidy (Stevens and Kennan, 2005). According to BIDPA (2006), reforms of the EU's Common Agriculture Policy (CAP) have resulted in beef price declines in the EU since 1999, impacting the profitability of Botswana's beef exports and reducing BMC's capacity to pay high prices. Despite BMC increasing the prices paid to producers from 2005 (d'Allonnes, 2006; Favretto et al., 2014), recent fieldwork by the authors suggests widespread dissatisfaction among producers and continued low levels of offtake for export by BMC.

Reforms of the managed trade system, both in terms of the changed roles for BMC and the diversification of export markets, have seen heated debate among Botswana's policymakers and beef industry stakeholders in recent years. Some policymakers suggest that such changes would increase prices for producers, but make beef unaffordable on domestic markets. Other commentators suggest that an open market and higher prices to producers would reduce the profitability of the beef sector in Botswana (BOPA, 2011, 2013). In particular, market liberalization that allows export of live weaners to South Africa could lead to the reduced supply of weaners and young cattle to BMC's commissioned feedlots, leading to a further reduction in Botswana's exports to the high value European market.

Since 2014, preferential quotas have been replaced by Economic Partnership Agreements (EPAs) that allow the duty-free, quota-free export of beef from Botswana to the EU. However, a number of factors conspire against the beneficial use of these market access developments. First, Botswana experienced outbreaks of FMD in 2011–2012 that restricted exports and caused industry disruption. Second, recent ratification of free-trade agreements between the EU and the Central American countries and Colombia, which have significantly lower production costs than does Botswana, is potentially problematic for Botswana once these new competitors complete implementation of the EU risk assessment protocols within the next 2–3 years. Export markets aside from the European ones are therefore of significant strategic importance for the long-term sustainability of the Botswana beef sector. Some studies suggest, however, that market diversification would not allay concerns related to the profitability of beef production and trading (Stevens and Kennan, 2005), while the high-cost model operated in Botswana might reduce the competitiveness of Botswana's beef in other export markets.

In this paper, we examine policy options for market reforms and government investments in the beef sector in Botswana. Our approach couches these impacts within their feedbacks associated with presence of animal disease and the availability of sufficient feed and water. First, we assess the impact of partial market liberalization through the removal of BMC purchasing control so as to enable the export of live weaner cattle. Second, we examine the effects of investments in disease control (specifically FMD) as a means of enabling access to high-value markets. Of particular interest in our analyses are the within-chain distributional effects throughout the value chain from different policy changes and their feedbacks with the natural environment, including the effects on profitability and decision-making for producers, intermediaries, retailers and domestic market actors, and BMC itself. The surplus generated by BMC is an important variable in our analysis because its surplus must be statutorily transferred to producers in the form of higher purchase prices for cattle. This supports the principle that increased producer profits are a policy objective for Botswana, and so forms a key measure of policy impact. Our analysis captures both the magnitude of these variables associated with policy scenarios, and the flows which transfer them between market actors.

The complex array of market and policy features of Botswana's beef industry, and the underlying cycles of livestock production suggest against a static treatment of liberalization (e.g., Cooksey, 2011). A methodological advance is offered by the use of system dynamics (SD) tools to analyze the entire value chain quantitatively, simulate the dynamic impact of various policy options, and account for underlying

cycles and feedbacks in production and marketing systems (Rich et al., 2011). Our model captures the feedbacks between the biological dynamics of cattle production, the economics of animal and meat marketing and trade, and the impacts of environmental pressures such as rainfall and animal disease have on the system. SD tools are particularly relevant in this context given the lags inherent in livestock production, and thus in measurable production responses to incentives, including those associated with policy reforms. Such lags, and the large number of interactions among the variables in question, can increase uncertainty and volatility and this is less able to be captured by other modeling methods. In a developing country setting such as Botswana, understanding such impacts, particularly among smallholder producers, can improve the design of successful policies both for adding value to livestock production and for economic growth and development more generally.

2. An overview of Botswana's cattle production, market structures, and marketing channels

Botswana is home to about 77,000 cattle producers who collectively own about 2.64 million head of cattle. A large proportion of producers are smallholders: 50% of producers maintain herd sizes of less than 20 head, 75% less than 40 head, and 96% of herds have less than 150 head (van Engelen et al., 2013; CSO, 2010; World Bank, 2006). Some 85% to 90% of cattle in Botswana are raised on communal lands, with the remaining 10% to 15% held in cattle holding enterprises that are considered commercial. The differences between the commercial and traditional sectors are mainly based on land tenure, and not on herd size or any other criteria such as management procedures. Traditional cattle systems graze on open (unfenced) pasture range lands which are customarily shared, while the commercial sector's cattle graze on fenced pasture range lands where owners have exclusive grazing rights (Bahta and Malope, 2014).

Botswana is one of the few African countries to export beef to high-value international markets. According to the UNCOMTRADE database, the export value of Botswana's beef in 2014 was approximately \$115 million, making it Africa's largest beef exporter: Namibia's beef export value was about \$70 million in the same year. In total, from 2010 to 2014, although the export value of beef from Botswana was lower than Namibia from 2011 to 2012, Botswana's cumulative export value was USD 35.5 million more than Namibia. However, Botswana's share of global beef exports is relatively small compared to beef producers like Argentina, Paraguay, and Uruguay, and major players like Brazil and Australia, and its exports are not growing. According to the UNCOMTRADE database, the total cumulative export value of beef from Botswana from 2010 to 2014 was about 10%, 11%, 8%, 2%, and 2.2% of that of Argentina, Paraguay, Uruguay, Australia, and Brazil, respectively, for the same period. Even if Botswana were to double or triple its beef production, it would remain a small player. The barriers to expansion include institutional aspects such as disease management and BMC market power, and the inherent physical, institutional and social nature of grazing systems. The dynamic nature of the effects of these institutional constraints of grazing systems on value chain actors is widely recognized, in terms of the incentives for sustainable management of communal grazing lands. They lead to unhealthy herds, poor quality of animals and meat, depressed calving rates, and elevated mortality in those communal grazing areas. Privately-owned grazing lands do not face these problems because the benefit of any investment is internalized, essentially by fencing (Mahabile et al., 2005).

A variety of cattle trading channels, both domestic and export, are present in Botswana (Bahta, 2013). Van Engelen et al. (2013) shows that BMC's purchases represent around 57% of offtake, at 180,000 head (equivalent to 28,000 metric tons of boneless beef). These cattle were purchased from large ranches, feedlots, BMC agents, and smallholder producers. Of this number, about 90% were exported (mostly to the EU and South African markets), with the remaining 10% sold to "modern

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