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Measurement of competitiveness in smallholder livestock systems and emerging policy advocacy: An application to Botswana

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ABSTRACT

Farm level cross sectional data of 556 randomly selected livestock producers were used to investigate the competitiveness of smallholder beef farmers in Botswana. The results show the presence of inefficiency, with about 74% of the variation in actual profit from maximum profit (profit frontier) between farms mainly arising from differences in farmers' practices rather than random variability. Further the mean profit efficiency level of 0.58 suggests that there is a substantial scope to improve beef profitability in Botswana. Significant profit efficiency drivers include, among others, education, distance to market, herd size, access to information and access to income from crop production. Considering the importance of livestock sector for wealth creation and poverty eradication in the rural areas where poverty is more pronounced, there is a need for appropriate development strategies and policies directed towards addressing these factors. In particular there is need to invest in market infrastructure in order to improve market access, hence profit efficiency of smallholder livestock farmers.

Introduction

As a consequence of harsh climate and relatively poor soils, Botswana's agriculture is dominated by livestock production, which accounts for over 80% of the agricultural sector's output. Crop production is both risky and unprofitable. Beef dominates the livestock sector, as it is one of the country's major foreign exchange earners and contributes about 57% of agricultural value added (Food and Agriculture Organisation (FAO) and Ministry of Agriculture (MoA), 2013). In addition, the beef sector is one in which many indigenous Botswana participate in, and so it is important for wealth creation and poverty reduction especially in the rural areas. For this reason livestock policy has tended to favour the beef sector at the expense of others such as small stock.

Botswana's livestock production is dualistic in structure in that it includes both commercial and traditional/communal systems of production. The division between the two is based on land tenure, and not so much on herd sizes or any other criteria. The communal system of production is found in the communal/tribal land areas where animals graze in open rangelands with no defined property rights to grazing resources, and few fences. Conversely, the commercial system of keeping livestock is found in the freehold and leasehold land, and is characterised by fenced farms and owners' exclusive rights to grazing resources. The majority of livestock (cattle and small stock) are found in the communal system, holding 88% of cattle and 98% of small stock (sheep and goats) in 2011. In terms of productivity, the commercial sector performs slightly better than the communal sector. For example, in 2011 the mortality rate was 1.6% in the commercial sector, but 6.6% in the communal sector. The off-take rate in the commercial sector was 13.5% in that year, while it was 6.9% in the communal sector. Similar comparisons can be made for livestock birth rates: 54.4% for the commercial sector and 38.9% for the communal sector, however this is compromised by the high mortality mentioned above (Statistics Botswana, 2013).

Past studies of Botswana's beef competitiveness or profitability have investigated performance under various projected price regimes and trade agreements (Botswana Institute for Development Policy Analysis (BIDPA), 2006, Jefferis, 2007; ODI, 2007), enterprise budgeting (BIDPA, 2006; FAO and MoA, 2013; Panin and Mahabile, 1997), estimating multifactor productivity and technical inefficiency (Irz and Thirtle, 2004;Thirtle et al., 2000) and exploring the beef value chain (Bahta et al., 2013; FAO and MoA, 2013).

Limitations of these studies include that they either failed to account for farmers' management-related adjustments to farm budgets in the presence of broader economic change, and/or that

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with very limited household data there was an assumption of technical efficiency in terms of input use and the production technology employed. Hence, efficiency has not been estimated, nor examined for its actual and potential influence on competitiveness and the factors affecting it. A further limitation of past work is the common treatment of the co-existing production systems: FAO and MoA (2013) demonstrate substantial differences in profitability across different technological models, but the analysis was based on a deterministic treatment of constructed household types rather than estimated from representative data.

The study that most comprehensively measured Botswana's livestock sector's competitiveness is the 2006 BIDPA study. It measured competitiveness at the macro level using trade-related data and aggregate production. Its trade-related indices fail to take into account productivity or efficiency at the farm level, a gap the present study attempts to fill. A second limitation of the BIDPA study is that it used a Computable General Equilibrium (CGE) model to measure the impacts of various economic shocks such as changes in export prices and import tariffs on the whole economy, and in particular the beef sector. Such a model does not illuminate what should happen at the farm level in order to improve productivity or efficiency. According to Van Wijk (2014) farm households differ in many respects and recognising this variability is key to designing policies to help poor farmers mon one hand, and contribute to sector competitiveness on the other. Macroeconomic models fail to address these issues at farm level and hence may not provide for appropriate policy recommendations for help poor farmers. Microeconomic models such as the one presented in Section 'methodological approach' offer additional insight because they try to disentangle the causes of low competitiveness which macroeconomic models cannot, but which are important as they contribute to overall aggregate competitiveness.

The livestock production system, especially in the communal sector, operates within a complex system. It is characterised by multiple activities such as off-farm employment, crop production and other activities as a strategy to reduce risk (droughts and diseases) associated with livestock farming. This can have significant implications in terms of efficiency and hence productivity as farmers do not devote sufficient time to their livestock enterprises. In addition, in some areas, especially in the western sand veldt zone of the country, crop production areas are remote from livestock grazing areas and this makes it difficult for farmers to use complementary inputs such as labour. Livestock production areas are usually also located far from areas where there are opportunities of formal employment or other off farm economic activities. As a result the majority of farmers are able to visit their farms only at weekends, and hence the term "weekend farmers" is often applied to beef producers in Botswana. Such risk mitigation issues are difficult to deal with at macroeconomic level and this is a further contribution of the current study.

Attempts have been made to improve macroeconomic models, such as the CGE model used by BIDPA, largely through the incorporation of microeconomic-behaviour into macroeconomic analysis. These improvements entail the use of real households/producers instead of representative households/producers groups (Bourguignon et al., 2003; Briones, 2014). Such improvements make it possible to capture within-group differences in a manner not possible with macroeconomic models. An Ethiopian example is provided by Little et al. (2014) in that despite recent growth in exports, macroeconomic assessments fail to appreciate the constraints to increasing market off-take rates and the microeconomic incentives faced by pastoralist households. Microeconomic models based on household level data attempt to deliver a deeper understanding of individual farm circumstances than do representative farms, and hence take into account differences in individual farms and production systems.

To fill the gaps identified above, the current study employs the relative profit efficiency approach (Delgado et al., 2008a,b) using farm level cross sectional survey data from the ILRI/ACIAR/MOA project.[1] The data was collected in three districts (Southeast, Chobe and Central) of Botswana. The survey assembled detailed information on costs and returns of livestock production encompassing different farm sizes across the selected districts. The information collected enabled the researchers to identify determinants of profitability, or profit efficiency (Delgado et al., 2008a,b). The identification of the determinants of profitability/profit efficiency will assist in determining policy options needed to enhance profitability of beef production and hence competitiveness at farm level.

While it is recognised that competitiveness has many definitions and hence different measures, the present study uses profitability analysis to measure competitiveness at farm level. The appropriateness of this approach rests on the fact that the present study measures efficiency at farm level, and other measures of competitiveness are related to profitability. The general objective of this study is therefore to measure competitiveness of beef production in Botswana using profitability as a yardstick. Its specific objectives are to identify the determinants of profitability, efficiency drivers and the overall profit efficiency of beef production in Botswana.

The paper is organised as follows: Section 'literature review'; Section 'methodological approach' presents methodological approach used in the study, followed by the description of the study area, data and estimation procedure; Section 'results and discussion' provides the results and Section 'conclusions and policy implications' concludes with major findings and their policy implications.

Literature review

Definition of competitiveness

Competitiveness is an ambiguous concept so can be defined in several ways and addressed from different perspectives (Agriculture Canada, 1991; Kennedy et al., 1998; Latruffe, 2010). As noted by Latruffe (2010) competitiveness can be measured at three levels. These are the microeconomic level, where competitiveness is measured at a single firm/farm level; meso-economic level where it is measured at commodity or sector level and finally at macroeconomic level where it is measured at aggregate or country level.

According to Banse et al. (1999) there is no simple measure or definition of competitiveness that has gained universal acceptance. Several definitions of competitiveness relate in one way or another to profitability. Agriculture Canada (1991) defines competitiveness as the sustained ability to profitably gain and maintain market share. Latruffe (2010) defines competitiveness as the ability to sell products that meet demand requirements in terms of price, quality and quantity and at the same time ensure profits over time that enable the firm to thrive. Kennedy et al. (1998) define competitiveness as the ability of a business profitably to create and deliver value at prices equal to or lower than those offered by other sellers in a given market. In agribusiness, a competitive firm/farm is one that has the ability to produce and sell quality products in a given market at a profit. Thus, to be competitive requires that the farm not only sells, or attains a given market share, but it must also do this at a profit for its continued existence. This calls for

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