



Price Responsiveness of Cattle Supply in Botswana

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Summary: Botswana's cattle and beef sector has performed poorly in recent years and has not fulfilled its potential as a contributor to economic growth and development, especially in the rural areas. Recent proposals for restructuring the industry and improving its competitiveness have included a recommendation to raise prices to match those in the region, in the expectation that farmers would respond positively to this price incentive by raising productivity and production levels. The effectiveness of such a proposal depends on the responsiveness of farmers to price incentives. This short paper summarises the results of various pieces of research published on this topic in Botswana over the past 20 years. While there are various ways of approaching the analysis, and some uncertainties over data quality, most researchers conclude that price matters, and that farmers do respond positively to higher prices by increasing cattle sales. However, there is a wide range of estimates over the magnitude of this response, which suggests a need for continued research on the topic.

Price Responsiveness of Cattle Supply in Botswana

Recent proposals for restructuring the cattle and beef industry in Botswana aimed at restoring the competitiveness of the sector have included proposals to raise prices to export parity levels. Besides restoring profitability to cattle producers and providing a market-related price signal, the expectation is that higher prices will contribute to restoring the viability of the beef and cattle sector by stimulating increased production (through improved productivity and higher offtake) and thereby addressing the low-throughput problem that has bedevilled BMC in particular. The 40% average producer price increase announced by BMC in early 2006, while still below export parity levels, is aimed at partially addressing this problem.

Questions have been raised, however, about how responsive Botswana cattle producers are to price, and whether there would in fact be a positive supply response to higher prices. Doubts about supply response are generally framed in terms of the dominance of "traditional" cattle producers farming on communal land, who, it is sometimes argued, do not view cattle rearing as a commercial activity, and only sell cattle to meet a money income target. Higher prices could, therefore, lead to reduced supplies from such farmers because they would need to sell fewer cattle to meet an income target. This effect would be reinforced by the traditional status of cattle as a store of wealth and determinant of social status; i.e., cattle are viewed more as an investment commodity than a consumption commodity. Countering this, is the argument that many traditional cattle producers are poor, and their need for higher incomes would give them an incentive to sell more cattle (which is now a more lucrative activity).

Responses to cattle price changes can be divided into investment demand and consumption demand. A higher price may result in higher investment demand, in anticipation of even higher prices in future, or if more utility is derived from a higher stock of cattle than from greater income, in which case cattle supply would fall. By contrast, higher consumption demand would result in increased supplies to benefit immediately from higher prices.

The issue of supply response is ultimately an empirical question, and there is a range of studies that provide some insight as to how cattle farmers respond to higher prices. The crucial empirical question is the level of the price elasticity (of supply). If it is negative, then cattle supply goes down when the price rises. If it is positive, but

between zero and one, then supply is price-inelastic (i.e., cattle supply rises in response to higher price, but less than proportionately). If it is positive but greater than one, then supply rises more than proportionately with price. If investment demand is greater than consumption demand, then the supply elasticity will be negative. It should also be noted that short-term and long-term elasticities may differ, and even if investment demand dominates in the short term, in the long term increased cattle stocks would lead to greater supplies.

One of the earliest empirical studies on this question in Botswana was by Ndzingo, Marsh & Greer (1984). Contrary to expectations, this study found a very high short-term price elasticity of 3.76, but no long-term price response.

A second study by Rodriguez (1985), on cattle supply response in Zimbabwe, provided some comparative data on southern African countries, as shown below.

Country	Product	Price Elasticity	
		Short-run	Long-run
Botswana	Cattle	0.3	2.6
Swaziland	Cattle	-1.1	n/a
Zimbabwe	Beef	-0.3 to -0.6	2.6

These results show that short-term elasticity is relatively low (and may even be negative), but that long-term elasticity is high, with very similar figures for Botswana and Zimbabwe. This would imply that cattle supply would increase more than proportionately in the long-run, e.g., a 40% price increase would in the long-run increase supply by over 100%. These results suggest a pattern of investment demand dominating in the short term, but leading to greatly increased supplies with consumption demand dominating in the long term.

A third study carried out by Fidzani (1993), analyzed the differing price responsiveness of small, medium and large cattle herders. This work supports the argument that that cattle farmers respond positively to price incentives, with an average supply elasticity across all groups of farmers of 0.653¹. Furthermore, small farmers have a higher supply elasticity than those with medium-sized herds.

A fourth study carried out by von Bach, van Renen & Kirsten (1998), analysed supply response in all SACU member countries. Unlike the three previous studies, this one did not find any response of cattle supply to prices in Botswana (only rainfall and herd size were significant determinants of cattle supply). Similar results were found in the other SACU countries.

The most recent study was carried out by BIDPA (2006), as part of a much larger study formulating a development strategy for the beef and livestock sector in Botswana. This analysed the factors determining the supply of cattle to BMC. The results indicate similar pattern to that of Rodriguez (1985), with a negative short-term price elasticity but a positive medium-term price elasticity. However, the elasticity results are somewhat low, with cumulative elasticity for cattle of 0.3. Nevertheless, the study concludes that as BMC prices have fallen over time (in real terms), this is

¹ Due to lack of access to the original work, these figures are those referenced in von Bach, van Renen & Kirsten (1998). It is not clear whether these figures refer to short or long-term elasticities.

one of the factors that has caused cattle sales to BMC to fall, and that “it is possible for BMC to stimulate cattle marketing by increasing producer prices at a rate that is higher than the inflation rate”. The magnitude of the elasticity coefficient (which is lower than that found in the studies quoted above), would, however, indicate that a substantial price increase would be necessary to induce a significant increase in cattle supplies to the BMC, and that the price increase to date should not be expected to lead to a dramatic increase in cattle supplies to BMC.

In conclusion, four of the five studies discussed above conclude that cattle producers respond positively to prices in terms of increasing marketed supplies. Nevertheless, the estimates of responsiveness (elasticity) cover a wide range, making firm conclusions regarding the magnitude of the response hard to reach. Also, more recent studies, with longer data series and more sophisticated analytical methods, suggest a smaller supply response than the earlier one. Furthermore, the technical aspects of data analysis in this field are complex, and the data poor – especially with respect to the supply of cattle to entities other than the BMC – again making firm conclusions somewhat difficult to reach.

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