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Measuring factors that can influence cattle supply response to the market in Namibia: Case study from Omaheke communal farmers

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The study examined the factors that can influence the supply of cattle to the market in Namibia, with a specific focus on four communal areas of the Omaheke Region. A total of 100 cattle farmers were interviewed and the weighted least square (WLS) model was applied to analyse the data. The study found that the number of cattle owned, cost of production inputs, accessibility to market information, accessibility to local markets and rainfall have a strong influence on the sales volume. The study strongly recommends the formation of cattle marketing groups that can be employed to lower transaction cost, increase bargaining power, access to information and participation in formal markets. There is a need to improve access to institutions and to remove current distortions in the livestock marketing in Namibia. The study shows that there is an inverse relationship between source and information and volume of sales. When the barrier to source of information increases, the volume of sales decreases. The current policy advice should focus on the effects of policy distortions and adequate attention should be given to the serious, embedded institutional deficiencies that limit many communal farmers from taking advantage of market opportunities.

Key words: Supply factors, cattle marketing, weighted least square.

INTRODUCTION

Cattle farming is the main agricultural production sector in Namibia with an annual estimated value of US\$128 million, of which weaner exports contribute approximately US\$57 million (at an exchange rate of US\$ 1/NAM\$ 7.05). The last animal census performed in Namibia on national level was in 2006, and the official population of cattle was estimated at 2, 4 million (First capital ptv limited, 2010). The main beef producer regions are located in the Omaheke, Otjozondjupa and Kunene regions (Coetzee, 2009; Mushendami et al., 2008). The Omaheke communal areas are rich in livestock and account for 52% of the 394 475 cattle found in the southern communal area (DVS, 2006). Although the Omaheke region is rich in cattle resources, cattle

marketing in communal areas remains challenging and is characterised by unorganised, poor supply chain management, low off-take, high transportation cost, and difficult market access due to poor infrastructure (Fitter et al., 2001). Furthermore, the lack of skills, information and organisation are among the challenges (IFAD, 2003; Mushendami et al., 2008; Mendelsohn, 2006).

Kruger and Lammerts-Imbuwa (2008) reported that the market off-take in northern communal areas was only 2%, compared to 20% from South Cordon Fence of communal farmers and around 25% from the commercial farmers. Mendelsohn (2006) estimated that 70% of all live exports of cattle were from communal areas. Thus there is huge potential for communal farming areas to contribute to the Namibian gross domestic product (GDP). Understanding the factors that can influence the supply of cattle from communal areas will contribute to the development of appropriate strategies and policies for improved marketing systems for the communal farmers.

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This knowledge will benefit the farmers, public service providers, financial institutions and policy makers.

The marketing situation in Namibia exhibits a number of diverging issues. For most communal farmers, access to a network of good roads might not be the only problem, as there are other barriers related to institutional factors, such as a lack of access to markets (Mendelsohn, 2006). Understanding these issues requires a methodology that will facilitate the inclusion of all the different situations or types of situations to ensure a well representative sample. The categories are formulated according to common trends that are characteristic of the different situations and should be thought of in relation to those observed in literature. These can be listed as: little or no marketing, farm gate sales, organised transportation and active sales (Kruger and Lammerts-Imbuwa, 2008; Mendelsohn, 2006).

Labys (1973) classified five general categories of factors that can influence the supply of cattle to markets. These factors are economic, ecological, technological, institutional and uncertainty. Economic determinants involve the process of acquiring inputs and the disposal of the product in the market (Labys, 1973). The ecological determinants, such as rainfall and other climatic factors, have a positive impact on the availability of beef animals to be marketed (Carbera et al., 2007). Technological or technical improvement shifts the production function upwards and enables farmers or producers to find it profitable to increase output at the same ratio of product-to-factor prices (Tomek and Robinson, 1972). According to Teweldemedhin (2009), the determinant in the institutional category relates to the intervention of structures (both public and private) and their programs. Uncertainty involves price uncertainty; political developments (within the country, neighbouring countries and globally); availability of export markets; exchange rate; fluctuations in currencies; and environmental and climatic conditions (Mushendami et al., 2008; Kuvare et al., 2008; Mendelsohn, 2006).

The most common categories of production costs for the beef cattle industry may include purchased feed and supplements; raised feed; grazing; cattle; indirect; and interest costs (Ricketts and Rawlins, 2001). In the beef cattle industry, production costs constantly fluctuate due to weather conditions; feedstuff and input prices; animal performance; domestic and export markets; technology; and agricultural policies. The Meat Board (2007) reported that Namibia's on-hoof marketing of cattle and export of chilled and frozen de-boned cuts and frozen de-boned cuts to South Africa has been on a declining trend since 2005. This decline can be associated with the high feedlot input costs which lead to low weaner calves prices (Meat Board, 2007). Mushendami et al. (2008) and Mendelsohn (2006) concluded that total production costs increase as a result of high transaction costs and the income realised decreases with an increase in distance from service and information centres.

With regard to environmental and climatic conditions, communal farmers in Namibia are confronted with a harsh, uncompromising natural environment, incipient drought, and progressive natural degradation (Mushendami et al., 2008; Kuvare et al., 2008; Carbera et al., 2007; Mendelsohn, 2006). This factor could also be a major contribution to the decline of supply to the market.

Makhura (2001) identified access to market information as an important determinant of market participation. The proximity to market information can influence production costs and, consequently, supply response (Mendelsohn, 2006). Mendelsohn (2006) also indicated that both ownership and off-farm income have a great influence on effective participation in the marketing system. The majority of farmers in Namibian communal areas depend on off-farm sources for additional income and valuable safety nets. Off-farm income is a good injection for livestock farming (Teweldemedhin and Kafidi, 2009) and greatly influences livestock disposals. Access to other sources of income, such as from social grants and employment, may stop farmers from selling their cattle to meet their daily needs and production costs (Nthakheni, 2006). Remote locations with poor road conditions result in high costs of moving livestock to markets and hinder marketing efficiency (Mendelsohn, 2006). The shortcomings of infrastructure seriously impede the physical flow of livestock to the market (Mendelsohn, 2006). The major problems identified by Mendelsohn (2006) hindering market participation in communal areas of Namibia are the lack of adequate transport and poor marketing infrastructure.

The level of producer education and awareness play a great role in market participation. Stroebel (2004) emphasised the importance of strengthening awareness creation of marketing issues in the extension service. With regard to education, producers who are literate are able to interpret market information and adopt new technologies to meet the market demands (Nthakheni, 2006). Communal farmer production objective may be geared towards keeping cattle as sources of milk, blood, dung, meat, security or status, and therefore sold ad hoc when the need for cash arise rather to maximise income (Mendelsohn, 2006). In light of the above, the purpose of the study was to determine the factors that can influence the supply of cattle to the market from communal farming areas of the Omaheke Region.

METHODOLOGY AND DATA ANALYSIS

Study area

The study was carried out in four communal areas of the Omaheke Region, which are Epukiro, Otjinene, Otjombinde and Aminius. The Omaheke Region is one of Namibia's 13 political regions, demarcated by the second delimitation commission of 1988, and is located in the eastern part of the country (National Planning Commission, 2006). Namibia is divided into four FMD control zones: an infected zone, a buffer zone, a surveillance zone, and a

free zone. The Omaheke Region falls within the free zone (Kruger and Lammerts-Imbuwa, 2008). Namibia has a total land area of 84,612 km², and the Omaheke Region occupies 10.3% of the country's total land surface (NPFS, 2007). The Omaheke Region occupies the eastern central part of Namibia bordering onto Botswana, and cattle ranching is the dominant economic activity (Coetzee, 2009).

Sampling

Using purposive sampling, 100 cattle farmers were interviewed using open-ended questionnaires in the four communal areas of the Omaheke Region during September 2009 and October 2009. Using records kept by farmers associations, a sample of 25 farmers who sold cattle four times or more yearly were deliberately selected per each of the four communal areas and interviewed. Following Leedy and Armrod (2000), the respondents were chosen on the basis that they are involved in cattle marketing and that they are "typical" of a group or that they represent diverse perspectives on an issue.

Data collection and analysis

Questionnaires were administered by trained enumerators in the vernacular OtjiHerero language under the supervision of the researcher. The questionnaire obtained this information from the sampled farmers: family size, number of cattle owned (asset), number of cattle sold yearly, amount of money spent yearly on buying inputs for cattle farming, access to market information; accessibility to local and export markets, access to loan, and off-farm income. After testing was done for possible heteroscedasticity, normality and autocorrelation, the model found that there is high correlation among the variables. As a result, instead of using ordinary least square (OLS), the study applied weighted least square (WLS) using the package statistical product and service solutions (SPSS) version 16 of 2010, the purpose was to remedy the heteroscedasticity problem and the dependent variable was weighted. The model was written as follows: Sales (each farmer) = f(average producers' price; average cost of input, that is, cost of supplements, fuel, feeds, vaccination, etc.; average rainfall; access to market information; accessibility to markets; average family sizes; other sources of income; number of cattle owned). Table 1 indicates the expected sign in relation to a variable.

RESULTS

Table 2 presents the results of the determinants of market supply among the communal farmers in the study area. The overall explanatory power is quite high at 95%. Except for OINCOME, ACCEXPO and FSIZE (not significant as reported in Table 2), all other variables were found to be statistically significant at a 1% significance level.

The positive estimated coefficients indicate that scale effects dominate proximity effects, resulting in a positive coefficient and significance. The 1% significance level of the variable implies that the estimated coefficients had a strong effect on the level of supplying more livestock to the market. This shows that an increase of 1%, for example, in ownership leads to an increase of sales volume by 1% (Table 2). The negative estimated coefficients have the reverse implication. This implies

that increasing these estimated coefficients by 1% will lead to a decrease in the value of sales by the estimated coefficients percentage.

Generally, the estimated coefficients do not have much weight to influence the producers' decision. This implies that communal farmers in this area are not following the economics of the "supply and demand" concept. Rather, their decision might be based on other household needs.

Input cost

As expected, the results indicate that there is a significant and positive, direct relationship between the cost of inputs and cattle sales. As mentioned earlier, even though farmers' decisions at the communal area are driven by other family basic needs, in light of the issue of global warming and incidence of continuous drought and flooding, farmers forced to apply supplements to feed their animals, off course vaccine and medicine cost also another that force farmers to take their livestock to the market.

This study strongly advocates the formation of cattle marketing groups that can lower transaction costs, increase access to information, increase participation in formal markets and increase bargaining power. By aggregating into larger associations, such as inter-group associations, small-scale farmers have the potential to achieve even greater economies of scale in accessing services, information, infrastructure and markets. As far as transport is concerned, costs can easily be cut if these groups use the same transport to the market. By transporting in bulk, farmers stand a better chance of obtaining good discounts from transport firms, compared to transporting as individuals and in small quantities.

Number of cattle owned

As expected, the results show that an increase in the number of cattle owned by an individual farmer leads to an increase in the sales volume. Similar findings were reported for South Africa (Montshwe, 2006), Kenya (Bellemare and Barrett, 2004) and Botswana (Nkhori, 2004). The estimated coefficient is also relatively bigger compared to the other variables, which implies that the ownership has a significant influence on the farmer's capacity to take his animals to the market. This means if ownership increases by 1% in communal areas, the response of farmers to take the market will be increased by the same percentage. The P-value is also significant at 1% (Table 2).

Rainfall

The results in Table 2 indicate that rainfall has a

Table 1. Variable identification for determinants of sales.

Variable	Expected sign	Variable definition
PRP ¹	+	Producer price
CINPUT ²	±	Cost of input (that is, feeds, fuel, etc.)
RFALL ³	±	Rainfall
AMI ⁴	+	Access to market information
ACCESSL ⁵	±	Accessibility to local market
ACCEXPO ⁶	±	Accessibility to export market
FSIZE ⁷	±	Family size
OINCOME ⁸	-	Off-farm income
OWNERSHIP ⁹	+	Number of cattle owned

¹Producer price (PRP): expected to have a positive relationship with sales capacity, the higher producer price attracts more farmers to increase their sales volume. According to Cramer et al. (2001), price is a signal that guides decision makers to increase or reduce supply to the market;

²Cost of input (CINPUT) (that is, feeds, fuel, etc.) expected to have a direct or indirect relationship with the livestock farmers' sales volume;

³Rainfall (RFALL) will have both positive and negative relationships with sales. Farmers will be forced to sell cattle if rainfall is poor for fear of losing cattle as result of fodder shortages;

⁴Access to market information (AMI) will have a positive relationship with sales. As reported by Montshwe (2006) and Nkhori (2004), farmers will sell more cattle if they have access to market information;

⁵Accessibility to local market (ACCESSL) expected to have both positive and negative relationships with sales, because when markets are in close proximity farmers will sell more cattle and vice-versa (Mahanjana et al., 2001);

⁶Accessibility to export market (ACCEXPO) expected to have both positive and negative relationships with sales;

⁷Family size (FSIZE) expected to have both positive and negative relationships with sales, because farmers with big families will be forced to sell many cattle to meet their households' needs and vice-versa (Stroebe, 2004);

⁸OINCOME expected to have a negative sign. According to Mendelsohn (2006) both ownership and off-farm income have a significant influence on sales;

⁹OWNERSHIP expected to be positive. The participation in the marketing system has to do with the number of cattle owned by an individual farmer, and farmers with more cattle will generate high market surplus (Mendelsohn, 2006).

Table 2. WLS estimates of determinants of market.

Independent variable	Estimated coefficient	"t" – value
OWNERSHIP	1.000	0.00006*
CINPUT	0.000132	3.50*
OINCOME	-0.000027	-0.0395
SINFO	-0.000016	-3.596*
ACCESSL	-0.000012	-7.018*
ACCEXPO	-0.000014	-0.799
FSIZE	0.000012	0.603
RFALL	0.00000237	2.85*
Intercept	0.0000667	6.82*
DW-statistic	1.80	
R ²	0.97	
Adjusted R ²	0.95	
Prob (F-statistic)	0.0000	
Number of observation	100	

*Denotes significance at the 1% levels.

significant influence at 1% level. However, the estimated coefficient carries less weight, which indicates that livestock farming is not influenced much by the variability of rainfall or weather, even though it positively influences

the decision to destock farmers' herds. This implies that farmers might use other risk management mechanisms to cope with weather variability. As common sense dictates, livestock farming is a long-term investment that is

relatively tolerant to drought compared to short-term investment (such as crops). That means that livestock farming has a slower response rate to the variability of weather.

Access to market information

A source of information has a direct association with an institutional structure. Institutions play a critical role in reducing costs and can influence the development and organisation of economic activity. The results of this study calls for a revisit of the policies and institutional framework, and enriching farmers with information on the factors that affect performance. An innovative policy-making process is necessary to support communal farmers beyond the farm gate.

There is a need for improving access to institutions; to remove current distortions in the livestock marketing in Namibia; and to facilitate the flow of information and functional markets mechanisms that allow competition and market entrance by emerging farmers so as to enable farmers to participate. High transaction costs become particularly problematic to communal farmers; and reducing these costs requires significant transfers of information about the source or any credence attributes of commodities being transacted (Teweldemedhin, 2009). The results of the study show that there is an inverse relationship between source information and volume of sales. This means that as barrier to source of information increase defiantly will reduce the volume of sales. This in turn implies that the current policy advice should focus on the effects of policy distortions and that adequate attention should be given to the serious, embedded institutional deficiencies that limit many communal farmers or smallholder areas from taking advantage of market opportunities. Examples of these institutional deficiencies include the lack of information, inadequate contract systems in the buying and selling process, farmers' organisations, credit system and property rights system. These institutional deficiencies require intensive and long-term attention if globalisation is to offer opportunities for smallholder development (Teweldemedhin, 2009). The challenge of economic development therefore is to identify sources and reduce transaction costs of increasingly complex forms of trade. This can be achieved through the development of institutions that support trade by making available information (on markets and technologies), protecting property rights and providing effective mechanisms for enforcing agreements (Teweldemedhin, 2009). The challenges for communal farmers in Namibia can be summarised in the following points:

1. As most of the farmers do not have their own means of transport, they rely on contractors or neighbours, and some hire expensive transport because of their relatively

small production capacity. Moreover, these means are sometimes inaccessible themselves because of the poor roads network in most rural areas.

2. Long distances over which produce has to be transported to reach the market network.
3. Poor roads infrastructure.
4. Lack of market information and means to disseminate such information, which is critical for the survival of small farmers in the increasingly competitive marketing environment.

Family size

The results show that family size is not significant (Table 2). This finding is not in agreement with the findings of Ouma et al. (2003) in Kenya. Even though the family size is not significant, the positive sign of the FSIZE was shown as hypothesised. This indicates that family members are dependents on the farm. Responsibility and creativity increase as the farmer wants either to avoid risk or to obtain better income for the family.

Off-farm income

Off-farm income (OINCOME) indicates a negative estimated coefficient, which implies that the more farmers engage in off-farm activities, thus does not increase the sales capacity (Table 2). The off-farm income may be used as a good cash injection for farmers' livestock farming enterprises. This means that farmers have good income support to survive from both production and business risks. The off-farm income helps many farming households because it diversifies risk.

Conclusions

Factors identified as having a significant influence on cattle sale volumes in the communal farming areas of the Namibian Omaheke Region include the number of cattle owned; cost of production inputs; accessibility to market information; accessibility to local markets; and rainfall. The study strongly recommends the formation of cattle marketing groups and calls for a policy amendment or formulation that will address institutional deficiencies that limit communal farmers from taking advantage of market opportunities.

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