Full Length Research Paper

Analysis of factors determining cattle marketing of communal farmers in Namibia: A case study from Kunene

Kapimbi Y. and Teweldemedhin M. Y.

Senior Lecturer at the Polytechnic of Namibia Windhoek, Namibia.

The purpose of this study was to examine key determinants of cattle marketing in Northern Namibia in the Kunene region. A total of 150 questionnaires were distributed, but only 90 were used for analysis as the rest were either not returned or were rejected as incomplete. The sampling technique was a non-probability (convenience) sampling technique. Since the data was not distributed normally, a non-parametric run-test with Principal Component Analysis (PCA) was performed to reduce the multicollinearity problem and improve the estimation power of the regression model. The results suggested that improving the marketing system would help farmers to participate in cattle marketing. Further, it is important to strengthen the existing farmers' associations or unions, and extension staff to empower farmers through identification of cattle marketing problems and solutions thereto. The study also found that development of capacity building and training programme is crucial.

Key words: Cattle marketing, communal farmers, non probability and non-parametric run-test.

INTRODUCTION

Although, agriculture contributes only about 6% to the Gross Domestic Product (GDP), it is regarded as an important part of Namibia's economy, as it employs 37% of the work force, and sustains 70% of the Namibian population (Mushendami et al., 2008).

Cattle farming in Namibia are the main agricultural production sector in the country, the value of production of which is annually estimated at N $ 900 million, and approximately N $ 400 million is contributed by cattle weaner exports. The average number of cattle was estimated at around 2.3 million in 2006 (Meat Board of Namibia, 2007). The sector's contribution to the economy is estimated at about 75% to the total agricultural economy, 69% of which is estimated to be from commercial livestock production (Emongor, 2007). Beef production is the most important part of the sector

followed by small stock (sheep and goat) production.

The sector can be categorised into commercial and communal sectors. The commercial farming sector constitutes approximately 4,200 farmers and occupies 44% of the arable land, whereas, communal farmers account for 41% of the agricultural land and are estimated to make up 67% of the total population, 90% of whom are dependent on subsistence agriculture for their livelihood (Emongor, 2007).

Cattle numbers in Namibia and exports in beef and veal showed an increasing trend since 1996, while live export has declined as a result of government policy on the value addition concept (Kruger et al., 2008). Currently, Namibia enjoys a beef export quota of 13,000 tons to the European Union under the EU/ACP trade agreement. The EU market accounts for 40% of Namibia's beef product exports (Emongor, 2007).

Due to the common outbreak of diseases such as Foot and Mouth disease (FMD), cattle marketing has to go through long channels or processes of a quarantining system, waiting for the transaction to be finalized before

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*Corresponding author. E-mail: tmogos@polytechnic.edu.na. Tel: +264 61 207 2304. Fax: +264 207 2143.
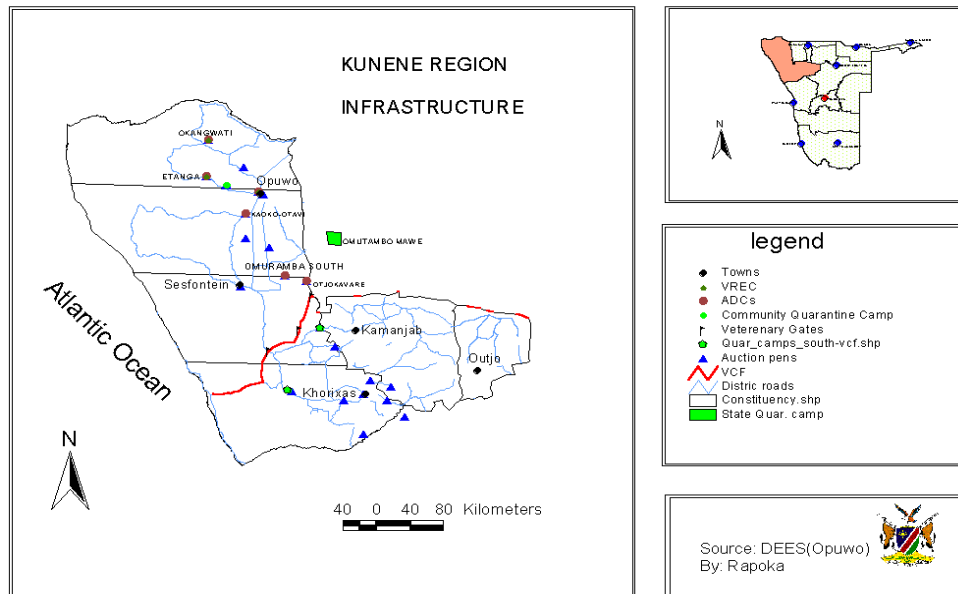
Figure 1. Infrastructure in Kunene North (Source: DEES-Opuwo by Tjikurame, 2010).

animals are ready to be slaughtered at the Oshakati abattoir in the Northern part of the country (Meat Board of Namibia, 2006). Although, Meat company (the biggest meat processing company in Namibia) can be an alternative market, there are still difficulties and constraints in livestock marketing in the sub-region. Meat company has recently introduced a new system, abolishing the quarantine system. Once a buyer and seller have agreed on the transaction, transfer of ownership is made immediately. Still, there are some questions that remained unanswered, some of which are:

1. Will this improve the marketing system?
2. Will this improve the cattle production management system?
3. Will this improve the economic wellbeing of farmers?

Since Meat company buys animals from the farmers at a central point, farmers still need to herd their animals to the marketing point. As a result, the animals have to travel long distances without fodder and water and lose condition, causing the farmers to receive low prices.

To aggravate matters further, the biggest challenge to livestock farmers in the communal area is lack of capacity building in binding to the buyers' quality criteria and understanding of the marketing system in general. Bailey et al. (1999) indicated that selling decisions require reliable, relevant knowledge about cattle prices, timing, effective information channels and buyers' quality criteria. In addition, the Kunene region is situated North of the Veterinary Cordon Fence (VCF), where there is a high incidence of Foot and Mouth Disease (FMD) (Kruger and Lammerts-Imbuwa, 2008). Thus, compliance with health regulations makes marketing in the study area very difficult and challenging. On top of this, lack of marketing infrastructure and distance to marketing outlets further complicate the marketing system (Fitter et al., 2001).

The overall objective of this study is to analyse factors influencing cattle marketing in the Northern Kunene region, and specifically to measure the key determinants of cattle marketing capacity in the study area. It focuses on whether or not the constraints relate to lack of physical access or institutional capacity. This would be useful in informing policy decisions aimed at improving communal farmers' prospects.

MATERIALS AND METHODS

Study area

The study was conducted in the North-western part of Namibia in the Kunene region, specifically around Kaokoland or Kunene North. Kaokoland falls within the constituencies of Sesfontein, Opuwo and Epupa. The region has a surface area of 144,255 km^2 and a total population of 68 735 people (National Planning Commission, 2001). Kunene North covers an area of 48,982 km^2 and it borders in the North with Angola, to the East with the Omusati region, to the South with the Otjozondjupa region and to the West with the Atlantic Ocean (Mendelsohn, 2006). The region receives low rainfall and is a drought prone area. The coordinate of Kaoko-Otavi: 13°39' 8.99" East and 18°18' 2.98" South.

As indicated in Figure 1, there are six Agricultural Development Centres, four Veterinary Centres, two Quarantine camps (a Community quarantine camp and a State quarantine camp) and eighteen Auction facilities. The community quarantine camp is situated in the Northern part of the region at Oshakati, Southwest of Opuwo (Kapopo and Kapimbi, 2003). Opuwo coordinates are: 13°50' 22.99" East 18° 3' 46" South.

Table 1. Type of cattle sold and marketing channel in 2010.

Type of cattle	Relatives and friends	Meat co	Speculators	Local market	Total	Percentage
Cows	16	72	53	4	145	21.8
Heifers	9	18	49	1	77	11.6
Bulls	-	5	-	-	5	0.8
Oxen (bullocks)	3	224	184	2	413	62.0
Other	1	11	13	1	26	
Total	29	330	299	8	666	0.33
Percentage	4	50	45	1	100	

Figure 2. Type of cattle sold in the area.

Data collection

A sample of 150 farmers was randomly selected from approximately 3,000 cattle farmers who are registered with the Meat Board of Namibia as cattle producers, and who represent 5% of the targeted population. Structured questionnaires were the primary source of data, whereas, the secondary data was obtained from annual reports, publications and articles.

Two questionnaires were designed. The first aimed to assess major constraints on cattle marketing in the study area, and the second questionnaire focuses mainly on identifying possible measures or strategies that can improve the marketing of cattle in the Northern Veterinary Cordon Zone, specifically, the Kunene North sub-region.

Methods of analysis

A descriptive and Weighted Least Square regression (WLS) analysis was applied to build the influence of variables in the modelling. Descriptive statistics were used to assess differences in the basic characteristics of the households, and the influence or effect of each variable on farmers' choice of marketing.

The sampling was made through a non-probability (convenience) sampling technique. A non-parametric test was applied to test and confirm with regard to normality distribution and Principal Component Analysis (PCA) was performed to avoid multicollinearity problems and improve the estimation power of the regression model. From the PCA, six variables, namely, age, farming system practiced, reason for keeping livestock, means of transportation used and cost of transport, were found significant and relevant to the analysis.

Statistical analysis

Computing the standard descriptive statistics (for example, mean and standard deviation) is sometimes not the most informative way to summarise the data. Using non-parametric and distributions will compute a wide variety of measures of location (mean, median, mode etc) and dispersion (variance, average deviation and quartile range etc) to provide a "complete picture" of the data (Hill and Lewicki, 2007).

RESULTS

Descriptive analysis

Although, men constituted 93% of the respondents, whereas, women accounted for only 7%, this does not necessarily show the cattle farming dominancy of male farmers. Rather, this was a result of migration to cattle posts during the time of the survey. As shown in Table 1, Meat Company is the preferred market, followed by speculators. However, the number of cattle sold in 2010 accounted for only 0.33%, which is a very low off-take. Note that bigger cattle (>300 kg per LSU) are mainly sold to Meat Company, whereas, speculators prefer heifers and cows over bulls Figure 2. The biggest proportion of sales (62%) is oxen, which shows that farmers have the good managerial practice to reduce oxen from their herds. The second biggest category is cows, which
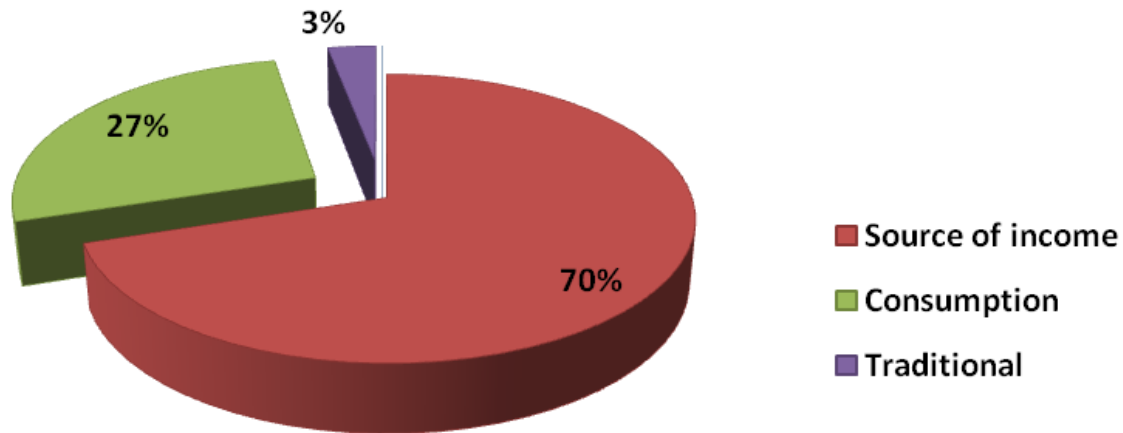
Figure 3. Motivation for keeping cattle (2010).

accounts for 22%. Farmers indicated that they sell their productive assets due to high inflation that forces them to cover their basic needs, and 1% of the respondent indicated that they sell bulls (Table 1).

When a further query was made as to why farmers prefer to sell to the abattoir and speculators rather than locally, to relatives and friends, 69% of the respondents stated that it was due to easy accessibility to these formal markets. Furthermore, 23% gave as a reason that speculators offer good prices. This may be also be linked to the fact that there is no private butchery or abattoir in the area.

In terms of educational attainment, 56% of respondents had no schooling at all, 11% attained between grade 8 and 10 and 10% had less than grade 5, 10% between grades 5 and 7, about 7% of the respondents had completed secondary school (grades 10 to 12), and 6% had post-matric qualifications, respectively. This implies that the majority of the respondents have a challenge to access information and training due to lack of education. As a result, these groups of farmers are unable to understand the marketing system dynamics in the area.

As shown in Figure 3, the study revealed that there are multiple reasons for keeping cattle in the study area. The reasons are diverse across households and reflect the individual households' needs, and either direct (for example, provision of meat and milk) or indirect income benefits (for example, income). As shown in Figure 3, the respondents indicated that their main reason for keeping cattle is for income generation. About 70% of the respondents indicated that they kept cattle as source income from sales whereas, 27% keep cattle for consumption and 3% for traditional reasons. When the respondents were further asked why they are marketing their cattle, 70% indicated that it was to cover their basic needs (food, school fees, funerals, festivals, animal welfare and clothing etc), whereas, 30% are marketing for income generation. This shows that the quarantine marketing system complicates the marketing activities in

the area. As a result, when a query is made with regard to the removal of the quarantine, most of the respondents (98%) said they will be happy to see the removal of the quarantine system in their area as it would improve their participation in marketing activities and improve their productivity, while only 2% of respondents were of the opinion that it would not make any difference. Perceived benefits that could be derived from removal of the quarantine are summarised as follows:

1. Forty percent of them noted that payments would be made immediately.
2. Since Meat Co is buying cattle at villages, from the central points, thirty-three percent of the respondents indicated that distances to walk and herd cattle would be reduced, as it is mainly travelling long distances that cause the weight loss of animals.
3. Farmers are responsible for all costs (that is, care takers, drugs, etc) for the 21 days to quarantine animals. Twenty-one percent of the respondents indicated that they would be happy to see the abolishment of the quarantine.
4. During the quarantine, the rate of cattle deaths is high due to predators, and six percent of the respondents were of the opinion that cattle deaths from predators and diseases would be reduced. When asked about possible solutions that might improve livestock marketing in the area, the farmers' responses are summarised in Figure 4. Eight options were given to the respondents to choose from Figure 5.
5. Since there was no disease outbreak for the past 20 years, Forty-four percent of the respondents agreed for the removal of the Veterinary Cordon Fence.
6. About 25% of the respondents suggested for an Abattoir to be constructed in Opuwo. This might create competition among the other cattle marketing agencies, and this might lead to increase in cattle prices.
7. Ten percent of the respondents suggested auctions and permit days to be introduced in the region. This might
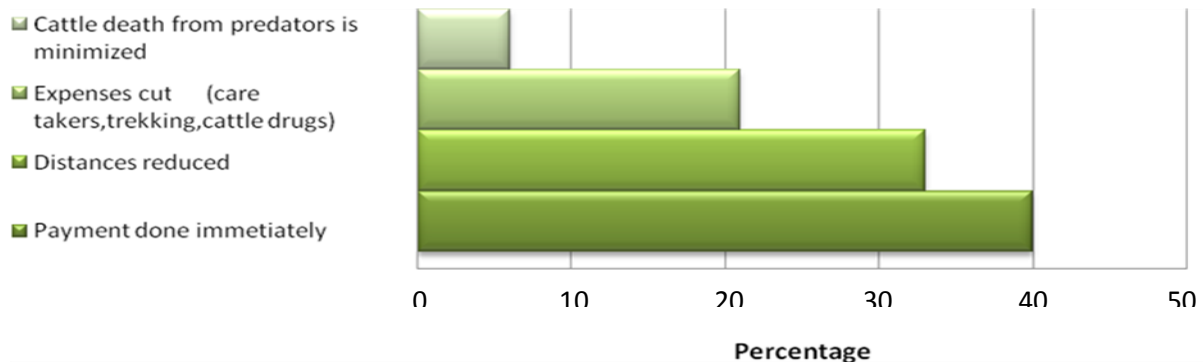
Figure 4. Perception of farmers to the abolishment of the quarantine in the study area (2010).
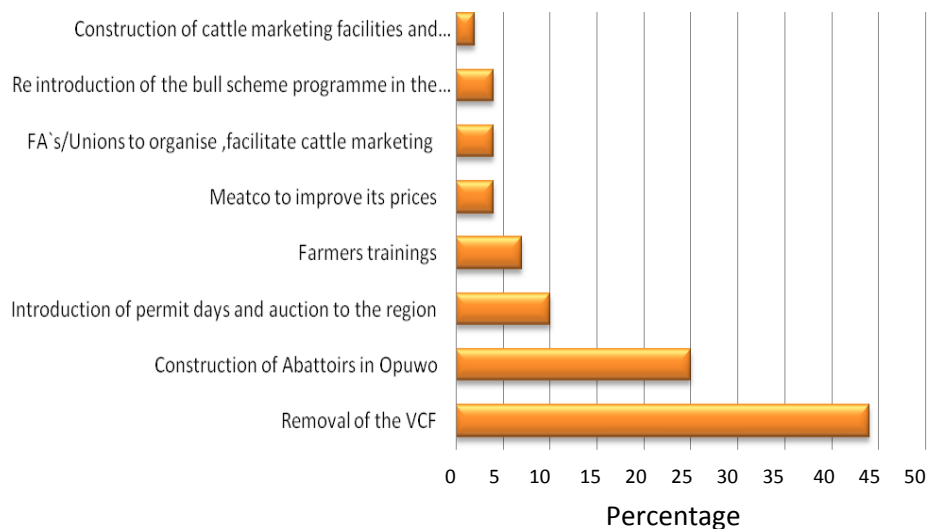

Figure 5. Possible solutions to improve livelihood of farmers.

attract more buyers to the region, create competition and eventually result in cattle price increase.

8. About seven percent of the respondents suggested agriculture stakeholders should offer more training to farmers in the region on the regular bases important to improve cattle farming in the area. Trainings referred to marketing, animal husbandry and range management etc.

9. Less than five percent of the respondents suggested the following:

10. Meat Company should improve its prices.

11. Farmers organisation should organise, facilitate cattle marketing.

12. Construction of more auction facilities.

13. Decentralisation of auction facilities.

The study applied the Friedman Test/Kendall's W test which non-parametric test for normality, and the result found that it was significant at 5%, suggesting the residuals are normally distributed (Tables 2 and 3). Table 3 shows that the age of respondents and farming systems practiced and reasons for cattle marketing, frequency of marketing, transportation used to market and problems associated with transport were found to be significant at 1% when applying mean and median frequency evaluations (Table 3).

Before applying any regression analysis, it is very important to test the data for any irregularity including testing for autocorrelation and multicollinearity problem. However, in this study when the statistical test was done, it was found that both mentioned problems existed that arises from high correlation. To avoid these problems, it was required to follow two steps. First step was to use backward reduction method to exclude the most insignificant variable till the valid one remains. Alternatively, the best method to apply Principal Component Analysis (PCA) is to pick the relevant variables only; then after weight the residuals to solve the

Table 2. Friedman Test/Kendall's W. test: non-parametric test.

Ranks	Mean rank
Sales	11.65
Gender	5.03
Age range	11.47
Family house hold size	10.56
Highest qualification	5.10
Number of cattle	10.76
Reason for keeping cattle	5.95
Other income	5.07
Farming system	8.42
Reasons for marketing animal	5.53
Frequency of marketing	10.73
Means of transporting animal to market	4.36
Cost of transport	5.20
Problems associated with transport	5.16
Test statistics: Friedman test/Kendall's W. test	
N	88
Chi-Square	606.77
Df	13
Asymp. sig.	0.00%

Table 3. One sample Kolmogorov Smirnov test: none parametric test.

Variable		Gender	Age range	Family house hold size	Highest qualification	Number of cattle	Reason for keeping cattle	Other income	F-system	Reasons for marketing animal	Frequency of marketing	Means of transport animal to market	Cost transport	Associated problem with transport
N		88	88	88	88	88	88	88	88	88	88	88	88	88
Uniform parameters	Minimum	1	2	1	0	1	1	1	0	0	0	0	0	0
	Maximum	2	4	4	5	5	4	2	3	2	3	1	4	2
Most extreme differences	Absolute	0.93	0.34	0.35	0.56	0.35	0.70	0.91	0.51	0.43	0.86	0.92	0.55	0.42
	Positive	0.93	0.34	0.32	0.56	0.22	0.70	0.91	0.12	0.23	0.08	0.08	0.55	0.31
	Negative	-0.07	-0.34	-0.35	-0.10	-0.35	-0.02	-0.09	-0.51	-0.43	-0.86	-0.92	-0.02	-0.42
Kolmogorov-Smirnov Z		8.74	3.20	3.27	5.22	3.30	6.61	8.53	4.76	4.05	8.10	8.63	5.12	3.94

Table 3. cont.

Asymp. sig. (2-tailed)	0	0	0	0	0	0	0	0	0	0	0	0	0
a	Test distribution is uniform												
b	Calculated from data												

Table 4. ANOVA relationship and weighted regression ANOVA to measure linearity.

Variation	Sum of squares	Df	Mean square	F	Sig.
Regression	4.631	12	0.386	2.172	0.025
Residual	10.839	61	0.178		
Total	15.471	73			

Weighted regression

Coefficients	Unstandardised coefficients		Standardised coefficients		t	Sig.
	B	Std. Error	Beta	Std. error		
(Constant)	2.005	0.682			2.939	0.004
Age range	-0.265	0138	-0.196	0.102	-1.915	0.050
O-income	0.866	0.461	0.193	0.103	1.878	0.065
C-transp	-0.218	0.052	-0.457	0.108	-4.233	0.000
Tran-prob	-0.354	0.157	0.109	-2.251	0.028	
Multiple R	0.547					
R square	0.399					

problems to run WLS. However, in this study, PCA was applied and followed by weighting the residuals to apply Weighted Least Square (WLS), this can improve power of the regression model. When PCA analysis was applied out of twenty five variables, only four variables were found relevant to the analysis, that is mainly age, and income, transport and others related to transport. Table 4 summarises the model result for analysis of variation (ANOVA) and WLS. ANOVA tests for the relevance of the variables to the linearity of the relationship and WLS looks at the impact of each variable on the dependent variable. ANOVA shows significance at the 5% level, suggesting there is linear relationship among the variables.

As indicated in Table 4, age was found to be significant at 5% that restrict marketing and negatively affected cattle marketing in the study area. This implies that, as age increases, participation in marketing is reduced, which suggests that younger and middle-age farmers tend to participate more actively in cattle marketing, understand the marketing system better, and have more energy to walk long distances, whereas, older farmers place more value on keeping more animals as it defines their status in the community, and that this group probably only sell their cattle when the need arises.

Off-farm income (OINCOME) was also found to be positive and significant, implying that those who have off-farm activities are more likely to participate in marketing. This may be due to the fact that farmers travel to market not only to sell their animals but also to take other commodities. They might also be involved in other marketing streams at least to cover their marketing costs, which allow them to engage in many enterprises to improve their livelihood. The off-farm income is

also a good cash injection to the livestock enterprise. They support their farms through other income from outside the farm. Off-farm income also helps many farm households as a means of diversification of their risks. Transportation costs and other problems associated with transport were both significant at 5% significance level, suggesting that these factors were hampering farming activities in the area. This implies that if farmers were supported in the issue of transportation in terms of subsidies on their transportation costs, this could help farmers to participate in the marketing channel more actively. In this region, distance was a factor contributing to the fact that the total number of cattle sold was very low, as recorded during the study. This implies that transport is a major problem, and as a result farmers might not able to participate actively in cattle marketing.

DISCUSSION

In this study area, the biggest marketing channels were Meat Company and speculators, meaning that farmers mainly use formal markets. Farmers perceived that relatively higher prices were obtained as compared to the informal marketing system. Most farmers (98%) were happy to see the abolishment of the quarantine system as this will improve the marketing system in the study area by reducing costs and the death rate of animals during the quarantine. Furthermore, payments would be made immediately.

Findings from Ouma et al. (2003) show that the role of cattle in Kenya is still underrated in traditional systems. They stress that the reasons for keeping cattle vary from one community to another community and largely determines strategies, interventions, demand and supply as well as, the development of opportunities. Similar study from Rendani (2003) also showed that the principal contribution of cattle to rural households is the provision of the family income (81%) and wealth (8%) in South Africa. This study also showed that about 70% of the respondents indicated that they kept cattle as source income from sales whereas, 27% keep cattle for consumption and 3% for traditional reasons.

This study's findings have highlighted factors that influence the marketing of cattle in Kunene North region. It showed that the marketing decisions of most respondents were influenced by the low prices offered for livestock and the lack of marketing channels. In addition, poor infrastructure such as roads and transportation also contributed to the low level of cattle off-take in the study area, since most farmers have to walk long distances to the marketing areas. As a result, cattle lose weight and this influences the price per head. This forces farmers to sell their livestock at the nearest place of convenience (which is available markets). Therefore, high transactional cost is among the barriers to their efficient participation in the market.

Government, non-government organisations and all stakeholders need to support these communal farmers in terms of improving marketing infrastructure. Specifically, extension personnel in the area need to play a role in empowering farmers in the identification of which cattle to market, as this will further assist in providing solutions to their marketing problems. Keeping everything else constant, lack of information access reduces cattle sales. Therefore, improved extension services can also lead to higher productivity and output. Training should be directed at developing farmers' negotiating skills during the settlement of transactions as well as, their production abilities, and teaching basic farm management tools such as marketing, record keeping and financial management.

The decentralisation of livestock markets and wider dissemination of information to the communal farmers by the government and other stakeholders involved in agriculture can play a great role in improving communal farmers' access to formal markets. The provision of market information will strengthen farmers' knowledge during transactions with individual speculators and consequently prevent the possible exploitation of farmers by better informed buyers.

It is important to invest in transportation and processing facilities (own abattoir and transport), which might be from the local farmers' unions or cooperatives. This will enable communal cattle farmers to become more active participants in the formal marketing systems. This not only can improve marketing efficiency but is also a good poverty reduction strategy. Attention must be given to the improvement of infrastructure, the amendment of current marketing policies and the formulation of new ones, as well as, institutional reforms to ease constraints on market involvement.

Conclusions

The study explored the following objectives namely to analyse factors influencing cattle marketing in the Northern Kunene region, and specifically to measure the key determinants of cattle marketing. The study uses both descriptive and WLS regression analysis with PCA to avoid autocorrelation and multicollinearity problems. The sampling technique was a non-probability (convenience) sampling technique. Since the data was not distributed normally, a non-parametric run-test with Principal Component Analysis (PCA) was performed to reduce the multicollinearity problem and improve the estimation power of the regression model. Only four variables were found to be relevant to the analysis that is mainly age, other income, transport and other related to transport.

Off-farm income (OINCOME) was also found to be positive and significant, implying that those who have off-farm activities are more likely to participate in marketing.

The off-farm income showed good cash injection and

used it as a means of diversification of their risks. Transportation costs and other problems associated with transport were both significant at the significance level; this shows that in this region, distance was a factor contributing to the fact that the total number of cattle sold was very low, as recorded during the study. This implies that transport is a major problem, and as a result farmers might not able to participate actively in cattle marketing.

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