© JHE 2020 J Hum Ecol, 70(1-3): 67-78 (2020)
PRINT: ISSN 0970-9274 ONLINE: ISSN 2456-6608 DOI: 10.31901/24566608.2020/70.1-3.3216

An Analysis of Cattle Marketing in Zimbabwe: A Case Study of Mukumbura Communal Area in Mt Darwin District

Motion Manhanga[1], Lovemore Musemwa[1], Melusi Sibanda[2*] and Simbarashe Ndhleve[3]

[1]Department of Agricultural Economics, Education and Extension, Bindura University of Science Education, P. Bag 1020, Bindura, Zimbabwe
[2]Department of Agriculture, Faculty of Science and Agriculture, University of Zululand, P. Bag X1001, KwaDlangezwa, 3886, South Africa
[3]Risk and Vulnerability Science Centre, Walter Sisulu University, Private Bag X1, Mthatha, 5099, South Africa

KEYWORDS Livestock Farming. Marketing Channel. Market Off-take Rate. Rural Livelihoods. Small-scale

ABSTRACT This paper analyses cattle marketing in Mukumbura communal area, Mt Darwin District, Zimbabwe. A sample of 60 communal cattle farmers was purposively selected. Cattle sold varied across marketing channels (auctions, abattoirs, butcheries and private sales), with private sales dominating. A low average market off-take rate (16.12%) was recorded possibly due to the poor conditions of animals at the time of selling. All respondents reported poor cattle prices, lack of market information, and lack of marketable heard as primary constraints, followed by poor cattle conditions (98.3%), poor handling facilities (96.7%) and high transport costs (55%) among others. Cattle herd size ($p<0.006$) was found to be statistically significant and negatively correlated with the market cattle off-take rate. The researchers recommend that farmers should keep a small manageable herd of cattle, especially during dry spells. Additionally, concerted effort by all stakeholders, market infrastructure (abattoirs and transport) and collective action are critical.

INTRODUCTION

Cattle are an important livestock species in Zimbabwe, and they contribute about twenty-five percent to gross domestic product (GDP), trailed by goats. Owning livestock is common across southern Africa (Government of the Republic of Namibia 2005; Mashoko et al. 2007; van Rooyen 2007; Maburutse et al. 2012; Mogotsi et al. 2016). However, the number of cattle in Zimbabwe is inconclusive; with an approximate herd number of 5 to 6 million (Bote et al. 2014; Mashoko et al. 2007), the majority of cattle (89%) are kept in communal areas (Tavirimirwa et al. 2013; Mavedzenge et al. 2006; Ndebele et al. 2007). A higher percentage of cattle (88%) in the communal areas are mainly indigenous breeds or crossbreeds that are of predominantly indigenous blood, while in the commercial sector, exotic breeds are the ones that dominate (Mpofu 2002; Government of the Republic of Namibia 2005; Mavedzenge et al. 2006; Ndebele et al. 2007; Gororo et al. 2018).

According to Francis and Sibanda (2001), commercial farmers in Zimbabwe consider indigenous breeds as being unproductive due to their small frame. However, many authors cite advantages of the indigenous breeds, these include superior genetics (Khombe 2002; Mwai et al. 2015), high fertility (Mpofu 2002), disease tolerance (Assan 2012; Tada et al. 2013), heat tolerance and less feed requirement (Moyo 1995; Nyamushamba et al. 2016). Also, beef from indigenous cattle is leaner, with little fat than the exotic breeds (Mpofu 2002; Muchenje et al. 2008). According to Assan (2012), the economic benefits of indigenous cattle are higher than those of exotic breeds due to their multipurpose nature, low feed requirements and resistance to diseases. The typical cattle breed in Zimbabwe includes the Mashona, Nguni, Tuli, Brahman, Afrikander, Hereford, Simmental and nondescript crossbreeds (Mashoko et al. 2007; Mhuka et al. 2017). The Nguni, Mashona and Tuli are considered as native to Zimbabwe (Mpofu 2002). Cattle fulfil multiple roles. These include milk provision, manure (Font-Palma 2019; Khombe

*Address for correspondence:
E-mail: SibandaM@unizulu.ac.za
Telephone: +27-(0)-35-902-6068

2002; Masikati 2011; Ndlovu et al. 2004), draught power for ploughing and mode of transport (Chimonyo et al. 1999; Musemwa et al. 2008; Okello et al. 2015). Cattle can also serve as a store of wealth (Maburutse et al. 2012; Shava and Masuku 2019). Terminal products such as meat and hides are also obtained from cattle (Mavedzenge et al. 2006; Bettencourt et al. 2015). Cattle dung is used as a source of fuel and floor/seal, while skins are used as leather for making drums, mats, tents, and car seats (Shackleton et al. 1999; Bayer et al. 2004; Mapiye et al. 2006; Musemwa et al. 2008). Cattle selling, including bi-products, is also a means of generating income among communal households. Through various market channels, there is an opportunity to improve cattle production and pioneering value addition that can avail job opportunities through the processing and selling of cattle and its products (Food and Agriculture Organisation (FAO) 2019).

Cattle have a fundamental share in sociocultural systems, for example, distinct communal occasions and gatherings. These include marriage celebrations, funerals, circumcision, dispute settlement by paying fines and appeasement of ancestors (Chimonyo et al. 1999; Shackleton et al. 1999; Bayer et al. 2004; Maburutse et al. 2012). Also, cattle are essential in the recycling of nutrients in communal pastures (Tessema et al. 2011; Sorathiya et al. 2014). It is also common for households to loan or exchange cattle to their neighbours to strengthen relationships. Furthermore, for resource-poor people, cattle are an inflation-free alternative to banking and can be traded when the need arises, for example, paying of school fees, general household upkeep, medical bills and village dues (Dovie et al. 2006; Simela et al. 2006; Musemwa et al. 2007; Bote et al. 2014; Nyamushamba et al. 2016).

Generally, cattle rearing is significant to the socio-economic profile of rural households. However, communal cattle herds remain an underutilised resource, and most communal cattle owners are still trapped in the vicious circles of poverty (Nyamushamba et al. 2016; van Rooyen 2016). The government and other non-governmental organisations have, in the past decades, come up with several projects aimed at increasing cattle productivity and reducing mortality in communal areas (FAO 2007; Muchenje et al. 2008; Musemwa et al. 2008). Despite the efforts, there has been limited exploration and progress in identifying cattle marketing difficulties and dynamics faced by communal farmers in Zimbabwe.

Objectives

Against this context, the specific objectives of this research were to

- Examine cattle marketing challenges and,
- Analyse factors affecting the marketing of cattle in Mukumbura communal area of Mt Darwin.

MATERIAL AND METHODS

Description of the Study Area

Mukumbura is located 98.7km or 01hr19min North of Mt Darwin. It has a population of approximately 53, 526 people. The population is housed in about 11, 763 households, with an average household size of 4 people (Parliament Research Department 2011). The area is almost flat terrain with some gullies characterising the soft soils. Temperatures of Mukumbura can rise very high to around 39°C in the summer season and during the winter temperatures fall to about 20°C. Mukumbura area is characteristic of semi-arid tropics, with almost sporadic rainfall. The area receives a minimum of approximately 600mm of rain per annum. The rains usually come as heavy downpours, leading to flash floods since the soil pore spaces clog quickly when hit by heavy raindrops. Rivers flood during the rains, and shortly after the rains they run dry, turning into sand bays, a notable example of which is the Mukumbura River. The rain season in Mukumbura area begins typically in November and ends around March. The vegetation type of Mukumbura is predominantly Mopani, Musau and thorn trees, with grasses only thriving during the rainy season and withering soon after the rains stop due to very high temperatures. The communal farmers of Mukumbura mostly grow cotton and sorghum. They sell these crops and use the money to take care of household liabilities, for example, paying school fees. However, the prices of cotton have fallen, and most farmers have abandoned cotton production.

Recently, the communal farmers of Mukumbura have begun to farm sesame seed (*chitove*) which is thought to have a ready market in Mozambique. More so, livestock rearing is another economic activity practised in Mukumbura communal area. Most farmers keep cattle, goats and sheep.

Sampling Procedure

The study was specifically conducted in Kapiripiri Ward 4, which was selected purposively based on the fact that most households in the ward kept cattle. Kapiripiri has a population of about 1392, comprising of 650 households, of which 208 own cattle. The ward has 16 villages. Six villages were randomly selected from the 16. Random sampling provided the advantage of every village having an equal chance of being selected. Ten cattle owners were then randomly selected from each village, from a complete list of communal cattle farmers obtained from the Livestock Production Department. In total, 60 communal cattle farmers (household heads) were interviewed at the convenience of their homes. In instances where the selected household was not willing to participate or not available during the time of the survey, another household was randomly selected from the list.

Data Collection

A survey method was used to collect primary data. The survey collected information on the challenges faced by communal cattle farmers and factors that affect the cattle market off-take rate. Open and closed-ended questions were used to gather information through a questionnaire in Kapiripiri Ward 4 of Mukumbura, Mt Darwin. The questionnaires were interviewer-administered – here, the researchers interviewed the farmers in the local Shona language and completed the responses.

Analytical Framework

Data was managed and analysed through the Statistical Package for Social Sciences (SPSS) version 20 (SPSS Inc. (IBM), Chicago, Illinois, USA) software. Descriptive statistics (frequencies and percentages) is employed in this paper to describe the demographics of communal cattle farmers, their market channels and challenges. The market off-take rate was calculated using the following formula:

Equation 1:

$$\text{Market off-take rate} = \frac{number\ of\ cattle\ sold}{herdsize}\ x\ 100\ percent \quad (1)$$

A multiple regression model employing Ordinary Least Squares (OLS) is used to determine the factors affecting the cattle marketing off-take in the Mukumbura communal area. The dependent variable used in the model is the market off-take rate, which was calculated using the formula stated in Equation 1. The explanatory parameters include the following demographics: the age of the head of the household, household size, the gender of the household head, marital status of the household head, level of education of the household head. The explanatory parameters also include farm characteristics, herd size, condition of grazing land and cattle. These were considered in the multiple regression model as guided by literature. Equation 2 shows the multiple regression model used to estimate the determinants of the market take-off rate for communal cattle farmers in Mukumbura communal area.

Equation 2:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots \beta_k X_k + \varepsilon \quad (2)$$

Where,

Y denotes the dependent variable; which is the market take-off rate, and

β_0 is the constant.

$\beta_0 \ldots \beta_\kappa$ are the estimates of the regression coefficients.

$X_1 \ldots X_K$ are the distinct, independent or predictor variables in the regression model.

ε is the error or disturbance term.

Explanation of Variables

The age of the household head was taken as the number of years since the date of birth of the household head. Age was coded as a continuous variable, which denotes the number of years of the respondents. It is expected to have a positive correlation with the cattle market off-take rate (Table 1). As the number of years of the household head increases, the more experience they gain. Therefore, the size of the herd is ex-

Table 1: Discrete and continuous variables used in the multiple regression model

Parameter	*Description*	*Variable type*	*Prior expectation*
Age	Age of the household head in years	Continuous	Negative association
Household size	Members of the household	Continuous	Negative association
Gender	Sex of the household head	Discrete	Indeterminable
Marital status	Marital status of the household head	Discrete	Indeterminable
Level of education	The education level of the household head	Discrete	Positive association
Herd size	Number of cattle owned	Continuous	Positive association
Grazing land	Condition of grazing land	Discrete	Positive association
Condition of herd	Body condition of cattle	Discrete	Positive association

pected to increase, and hence the cattle market off-take.

Household size was treated as a continuous variable in this paper, which denotes the number of household members dependent on the owner of the cattle (Table 1). Cattle market off-take is usually low in bigger households because of inheritance issues; the cattle are divided amongst the male children in a household as an inheritance; hence, there is a decreased number of cattle available for sale.

The gender variable was used to denote the sex of the household head. The gender variable was treated as a discrete variable and coded as a dummy variable with the numeric value 1 standing for male and 0 for female (Table 1). It is generally expected that male cattle owners have a high cattle market off-take rate compared to females since males in the African (patriarchy) society are typically the owners of cattle.

Marital status was treated in the model as a discrete variable. Marital status was coded as a dummy variable, with married taking a numeric value 1 and single becoming the base (0). The influence of marital status on the cattle market off-take rate could not be predetermined; hence, the expectation was either a positive or negative one (Table 1).

The level of education represents the education status of communal cattle farmers. In this paper, the level of education was treated as a discrete variable and coded as a dummy with a numeric value 1 standing for literate cattle farmers and 0 standing for those who are illiterate, that is those who cannot read and write. The expectation is that those cattle farmers who are literate will have a positive correlation with the cattle market off-take rate (Table 1).

Herd size was treated as a continuous variable in this paper and denoted the number of cattle owned. This variable has a positive prior expectation (Table 1). The higher the herd size, the lower the market off-take, this is because the farmers will not be able to fetch enough feed for the cattle, and the body condition of cattle will be poor.

The condition of the grazing land describes the palatability of the rangelands. As such, the condition of the grazing land is likely to affect the body condition of the animal and, hence, the market off-take rate. The expectation in this paper is that the condition of the grazing land will be positively correlated with the cattle market off-take rate (Table 1).

Condition of the herd was included as a discrete variable in this paper, and it was coded as a dummy variable in the model (Table 1). The condition of the cattle affects the market off-take. The acceptability of the cattle in the market is based on their stature and condition. Diseased animals are very difficult to dispose of; therefore, if the herd has diseases or other physical conformity issues, the market off-take rate becomes very low.

RESULTS

Descriptive Statistics

Demographic Characteristics

The lowest, maximum and average recorded age of household heads among the interviewed communal cattle farmers in Mukumbura communal area was 24, 55 and 40 years old, respectively (Table 2). Household size ranged from 3 to 10 members, with an average household size of 6 (Table 2). The results in Table 2 reveal that the majority (73.3%) of the interviewed communal cattle farmers were predominantly male and the

remaining 26.7 percent were female. Based on these results, it evident that male-headed households in the study area dominate cattle ownership. The majority (78.3%) of the interviewed communal cattle farmers were married, while only 21.6 percent were not married (single, divorced or widowed). In terms of educational status, a fair proportion (55%) of the interviewed communal cattle farmers had attained some level of education (informal, primary, secondary and tertiary). The remaining forty-five percent had received no formal education. The majority (88.3%) of the respondents were full-time communal farmers, while the informal and professional sectors each accounted for five percent. Only 1.7 percent of the interviewed communal cattle farmers had no occupation. Table 2 summarises the household demographic profile of the interviewed communal cattle farmers.

Table 2: Household demographic profile of respondents (n = 60)

Parameter	*Minimum*	*Maximum*	*Mean*
Age (years)	24	55	40
Household size	3	10	6
Parameter			*Frequency (%)*
Gender			
Male			73.3
Female			26.7
Total			100
Marital Status			
Married			78.3
Not married (Single, divorced, widowed)			21.6
Total			100
Level of Education			
No formal education (illiterate)			45.0
Literate (informal, primary, secondary, tertiary)			55.0
Total			100
Occupation			
Informal			5.0
Professional			5.0
None			1.7
Full-time farmer			88.3
Total			100

Cattle Market Channels and Off-take Rate

The least, highest, and mean number of cattle owned by the interviewed communal cattle farmers was 4, 25 and 9, respectively. In the previous 12 months, the highest number of cattle sold by the interviewed communal cattle farmers in auctions, abattoirs, butcheries and private sales was 1, 2, 3 and 4, respectively. Auctions, abattoirs, butcheries and private sales recorded an average of 0.22, 0.3, 0.32 and 1.05, respectively. The minimum cattle market off-take rate of the respondents in the Mukumbura communal area is 6.3 percent, and the maximum is 37.5 percent with the average cattle market off-take rate being 16.12 percent. Table 3 summarises the cattle market channels and off-take rate in Mukumbura communal area.

Cattle Marketing Challenges

Several challenges were noted to affect the marketing of cattle in Mukumbura communal area. All respondents (100%) indicated that the principal challenges were poor prices, lack of market information and lack of marketable herd (Table 4). Other notable challenges reported by respondents included poor cattle condition (98.3%), poor handling facilities (96.7%), and high transport cost (55%) (Table 4). Other difficulties reported by respondents, but were not major, are poor roads (21.7%), disease outbreaks (20%), livestock movement restrictions (18.3%) and cattle clearing (18.3%) (Table 4). The results indicate that the primary challenges faced by the communal cattle farmers of Mukumbura communal area are poor cattle market prices, coupled with a lack of market information and a marketable herd. This finding shows that almost every farmer in the study area is affected by the challenge of possessing a small herd of cattle, which negatively affected the cattle market off-take. The observed poor condition of cattle could be a result of the poor rangelands in the study area. Rainfall is erratic and very low, leading to a deplorable condition of the grazing lands. The condition of the cattle handling facilities in the study area is very poor if there happens to be any, but the most significant challenge is the lack of these cattle handling facilities. High transport costs were also reported as a major challenge. The distance from the study area to where abattoirs and butcheries are located is very long (ranging from 110 to 300 km),

Table 3: Cattle market channels and off-take rate in Mukumbura communal area (n = 60)

Parameter	*Statistic*		
	Minimum	*Maximum*	*Mean*
Herd size	4.00	25.00	9.234
Market	*Highest number sold in 12 months channel*		*Mean*
Auctions	1		0.22
Abattoirs	2		0.3
Butcheries	3		0.32
Private sales	4		1.05
	Minimum	*Maximum*	*Mean*
Market off-take rate	6.30	37.50	16.12

leading to the cost of transporting cattle being very high. Table 4 shows the marketing challenges faced by respondents in the Mukumbura communal area. Mukumbura is characterised by some poor roads, although this challenge is not quite a big challenge. In the study area, the outbreak of diseases is not a very big problem, although sometimes there are few cases of disease outbreaks. The interviewed communal cattle farmers cited some cases of disease outbreaks of anthrax and blackleg and ticks being the major parasites faced, especially during the summer season. Livestock movement and cattle clearing challenges constitute the least challenge. The few cases of livestock movement restrictions only happen when there are disease outbreaks to avoid the spread of viruses.

Table 4: Challenges faced by communal cattle farmers in Mukumbura communal area (n = 60)

Challenge	*Frequency (%)*
Poor prices	100
Lack of Market information	100
Lack of marketable heard	100
Poor cattle condition	98.3
Poor handling facilities	96.7
High transport costs	55
Poor roads	21.7
Disease outbreaks	20
Livestock movement restrictions	18.3
Cattle clearing	18.3

Estimates of the Multiple Regression Model on the Factors Affecting the Cattle Market Off-take in Mukumbura Communal Area

Table 5 presents the multiple regression model results on the factors affecting the cattle market off-take in the Mukumbura communal area. The goodness of fit results indicate that the R-value is 0.454, which is forty-five percent; the R square value is 0.206. This is not very impressive, but not bad either compared with the R square values one tends to get in analyses of social survey data.

The results indicate that the explanatory variables explain 45.4 percent of the changes in the researchers' model. The value is less than fifty percent; however, this does not necessarily mean that the model is not a good fit. Looking at the standard error of the estimate; we have a low value of about five percent, signifying that the distances between the data points and the fitted values are minor. Eight (8) variables were included in the model, and of these 8 only one variable (cattle herd size) is found to be statistically significant (***). Among the 8 variables included in the model, 6 variables have negative coefficient values. These variables include the gender of the household head, education level of the household head, household size, cattle herd size, condition of grazing land and body condition of animals. An addition of one unit to the variables with a negative value leads to a decrease in the market off-take of the cattle, while for those with a positive coefficient value, the addition of one unit leads to an increase in the market off-take of cattle.

The variable of cattle herd size is statistically significant in explaining the changes in the market off-take of cattle and has a negative coefficient value. From the regression results in the regression output, an increase by one unit of livestock in the herd leads to a decrease in market off-take by 50.6 percent.

DISCUSSION

In rural areas, agriculture, mainly livestock farming continues to be an essential sector (Bettencourt et al. 2015). Respondents were generally full-time communal farmers, with less occupied in the informal and professional sectors.

Table 5: Estimates of the multiple regression model (n = 60)

	Unstandardised coefficients		*Standardised coefficients*		
Parameter	*β*	*Std. error*	*β*	*t*	*Sig.*
Constant	30.321	6.730	-	4.505	0.0000
Age of household head	0.015	0.148	0.019	0.099	0.921
Household size	-0.049	0.644	-0.015	-0.076	0.940
Gender of household head	-2.314	2.003	-0.179	-1.155	0.254
Marital status of household head	0.097	1.002	0.016	0.097	0.923
Level of education of household head	-0.566	0.600	-0.131	-0.943	0.350
Cattle herd size	-0.506***	0.177	-0.421	-2.865	0.006
Condition of grazing lands	-1.509	1.931	-0.113	-0.782	0.438
Body condition of animals	-1.197	2.251	-0.075	-0.532	0.597
Number of observations			60		
R			0.454		
R Square			0.206		
Adjusted R Square			0.079		
Std. error of the estimate			5.46231		

*** Denotes significant at 5 percent level

The results show that most of the respondents in the Mukumbura communal area are reliant on farming. In the literature, various socio-economic characteristics of the communal cattle farmers have been analysed to establish their effect on cattle marketing (Motiang and Webb 2016; Mwanyumba et al. 2015; Ayele et al. 2019; Ngarava et al. 2019). However, there seems to be no consensus on their effect.

Citing Ndoro et al. (2015), the age of the household head specifies the managerial capacity and decision-making concerning cattle marketing. Ndoro et al. (2015) asserted that older and experienced farmers could effectively coordinate market transactions. This situation could imply that older communal cattle farmers are likely to market cattle at lucrative markets, such as auctions. On the other hand, Mafimisebi et al. (2013) citing Oseni opined that a farmer's cattle marketing performance efficiency declines with age. They explained that the cattle marketing business is energy-sapping, and older age may impinge on the level of market efficiency. This paper finds this to be inconsistent with the expectation set out initially, where the effect of age on cattle market off-take rate was discussed (it shows a negative correlation). Descriptive results show that the respondents in Mukurumbwa communal area were neither old nor young. Nonetheless, the effect of age in this paper on cattle market off-take is found to be statistically insignificant.

This paper hypothesised that the cattle market off-take rate would be negatively correlated with larger households. This assertion is because, in a large household, the cattle herd size can be reduced by dividing it amongst the male children as part of their inheritance, thus leaving a low number of cattle for sale. Yet, on the contrary, Ayele et al. (2019) found that family size is positively associated with farmers' likelihood to sell beef cattle. Nonetheless, the finding from the OLS regression model is consistent with the researchers' prior expectation. The finding is also supported by the descriptive results that showed that the household size of communal cattle farmers in Mukumbura communal area was reasonably large. However, the effect of household size is found to be statistically insignificant on the cattle market off-take rate in this paper.

In the literature, for example, Schmidt and Sevak (2006), Fletschner and Kenney (2011), and Dlamini and Huang (2019) find gender to be an essential aspect of communal cattle ownership and its management. Quisumbing et al.'s (2015) findings show that women involvement in livestock farming can successfully improve production and income, although they found that the income of women increased at a slower rate than that of men. This discovery highlights the gender-asset gap in livestock farming. The findings of this paper show that males dominated communal cattle farming in Mukurumbwa communal

area. This finding is typical in sub-Saharan Africa. The male-biased ownership of livestock refutes women the prospect to own essential assets such as cattle. Instead, women generally tend to own small stock, such as poultry, goats and sheep. Also, there are restrictions on women's mobility to training and participation in markets. This situation could impede on the productive cattle market off-take rate as women are considerable players in communal farming in Zimbabwe (Bote et al. 2014). Congruent to the finding of this paper is the discovery by Ngarava et al. (2019) that gender has a negative effect on cattle marketing. Nonetheless, this paper finds that the effect of gender statistically insignificantly influences the cattle market off-take rate.

Mafimisebi et al. (2013) asserted that marital status defines the level of responsibility of an individual in society. In their assertion, marital status helps a farmer to devote to the marketing process and the activities of his or her business. The results show that most communal cattle farmers in Mukumbura communal area were married. Dlamini and Huang (2019) postulated that married cattle farmers reflect a broader human resource base concerning decision-making functions and labour availability, and are thus more likely to participate in markets. However, their findings showed that marital status did not statistically and significantly influence market participation but rather that being married statistically and significantly increased the intensity of market participation. The finding in this paper is consistent with the finding of Dlamini and Huang (2019) in that marital status has a positive association with cattle marketing. However, in this paper, we were not able to establish a statistically significant influence of the effect of marital status on the cattle market off-take rate in Mukumbura communal area.

Education depicts the critical role of social capital in lessening transaction costs (Ndoro et al. 2015). This assertion is valid as an educated farmer is likely to spend less time searching for market information, and can efficiently process and act on the information. A fair proportion of the communal cattle farmers in Mukumbura communal area had attained some level of education. The initial expectation was that the highest level of education of the household head would be positively correlated with the cattle market off-take rate. Surprisingly, the researchers' finding exhibit a negative association between education and the cattle market off-take rate in Mukumbura communal area. This finding could be attributed to other factors that outweigh the effect of education, despite the farmers having attained some level of education. Another explanation could be the less bidding from the private (informal) markets, which resultantly discourage the subsequent sale of cattle, thus the low market off-take rate. Nonetheless, this paper could not establish a statistically significant effect of education on the cattle market off-take rate in Mukumbura communal area.

The results show that cattle marketing occurred over many channels - auctions, abattoirs, butcheries and private sales - in the Mukumbura communal area. Consistent with other studies, for example, Antwi et al. (2017) and Togarepi et al. (2016), private sales were found to be the primary channel for communal cattle farmers. Communal cattle farmers would prefer to market their cattle through private sales because of the ease of entry this presents, the costs minimum are when compared to other markets. Qualitative data also showed that other reasons claimed for choosing private sales included better prices and selling to friends or neighbours, mainly due to family obligations like paying school fees. In private sales, the price was set by the farmer or negotiated with the buyer. Though private sales are preferred by communal farmers, there are some concerns that they may present several challenges and risks. Alarcon et al. (2017) mention some of the concerns to include poor grading standards of livestock or meat, as well as value addition, thus presenting a significant entry barrier to high-end markets. Consumers may also prefer these markets because of the low prices. However, this system could be vulnerable to shocks, illegal activities and food safety risks. The cattle market off-take rate in Mukumbura communal area, as already indicated, was found to be generally low. This finding could be attributed to several cattle marketing challenges reported by the communal cattle farmers. The primary challenges included weak market prices, lack of market information, lack of marketable herd, poor cattle condition, inadequate handling

facilities, and high transport costs. Other challenges, although not prevalent, were poor road infrastructure, disease outbreaks, livestock movement restrictions and cattle clearing. The finding from this paper reiterates the study of Kocho et al. (2011) and Sotsha et al. (2018) that livestock farmers face inadequate market infrastructure, market information, high transaction costs, road infrastructure and high transport costs that affect their marketing. Thus, livestock farmers facing challenging market conditions bid fewer benefits from the market.

Næss and Bårdsen (2013) contend that increasing herd size (herd accumulation) can be an effective strategy, but costly. Herd accumulation is not a viable risk strategy for communal farmers due to negative density dependence. Næss and Bårdsen (2013) further postulated that density and climate settings impinge negatively on the body mass of individual animals and their survival. Ngarava et al. (2019) also found cattle herd size to be a statistically significant factor in cattle marketing. Consistent with the researchers' prior expectation, the results show that cattle herd size has a statistically significant and negative effect on the cattle market off-take rate in Mukumbura communal area. The effect of increasing cattle herd size is predicted to reduce the market off-take rate by about fifty-one percent. The explanation for the reduced market off-take rate with increasing cattle herd size could be because for sub-Saharan African households, a large herd size is viewed to hold a prestigious social status. Therefore, communal cattle farmers may be unwilling to sell their cattle. Generally, communal livestock feed on communal grazing in summer, they forage on crop residues and vleis in winter and browse on new leaves, crop residues and vleis in spring. It is rare for communal cattle farmers to offer food supplements to livestock. Given this, as argued by Næss and Bårdsen (2013), heard accumulation might reduce the body mass and survival of animals as they compete for grazing pasture, especially in winter or during a dry season. This situation may negate the number of livestock available for marketing, resulting in a low market off-take rate.

Mapiye et al. (2009) found that the rangeland type was statistically significantly associated with the animal body condition. Inconsistent with the researchers' prior expectation, the condition of grazing land was found to be negatively correlated with the cattle market off-take rate. Shared grazing land or rangelands is the most common source of cattle feed in the communal areas. It, therefore, stands to reason that poor cattle condition in communal rangelands can be attributed to poor grazing and feed shortage. Nonetheless, the condition of the grazing land has a statistically insignificant effect on the cattle market off-take rate in the Mukumbura communal area.

The body condition of the animal has a significant influence on cattle marketing (Ndoro et al. 2015; Hasnah and Smith 2016). The body condition of a beast influences the willingness of the buyers, it can therefore be responsible for the gap between the expected and bid price of communal cattle farmers. The researchers' initial hypothesis was that the acceptability of the beast concerning its condition to the market would positively correlate with the market off-take rate. The researchers' finding is in contrast with their prior expectation. Nonetheless, this paper could not establish a statistically significant effect of the body condition of the animal on the cattle market off-take rate in the Mukumbura communal area.

CONCLUSION

This paper investigated and analysed the challenges and factors affecting the marketing of cattle in Mukumbura communal area of Mt Darwin, Zimbabwe. Communal cattle farming is facing numerous challenges. There is a need to comprehend the challenges for developing sustainable cattle improvement programmes for communal cattle farming. The immediate communal cattle farming challenges in the study area that need intervention included poor cattle prices; lack of market information; lack of marketable herd; poor cattle condition; poor handling facilities; and high transport costs. In the Mukumbura communal area, the dominant cattle marketing channel was informal markets – private sales that may offer them less bidding, thus reduced prices. Concerning the low market off-take rate, herd size was found to be a significant factor and negating it. Communal farmers may want to keep a large herd size for social prestige.

The researchers conclude that unless the number of livestock (cattle herd size) per household is reduced to a manageable number, the cattle market off-take rate will remain very low.

RECOMMENDATIONS

It is imperative to develop concerted communal cattle farming in the Mukumbura communal area. The researchers make some recommendations. There is a need to vigorously emphasise formal markets through mutual participation from the private sector, producer organisations, and the government. Once this happens, cattle can fetch higher prices at the market. Government extension services should be strengthened to support communal livestock farmers towards a commercially-oriented approach through the provision of market information. Because communal farmers are reluctant to offer supplemental feeding, planned communal rangeland management should be implemented to improve the condition of cattle for marketing. Improved transport and handling facilities, such as abattoirs, may reduce losses in the condition of cattle from the farm. The government and other stakeholders can facilitate the building and maintenance of communal abattoirs. Collective action in the form of group marketing may be explored to curb the challenge of high transport costs. More research is needed to reveal the complex dynamics of communal cattle marketing. Furthermore, other factors, such as institutional and marketing policies not included in this paper, may be incorporated.

ACKNOWLEDGEMENTS

The researchers extend gratitude to the Ward and village leaders, agricultural extension workers and the communal cattle farmers for their cooperation.

NOTE

*** Denotes statistical significance at 5 percent level.

REFERENCES

Alarcon P, Fèvre EM, Murungi MK, Muinde P, Akoko J, Dominguez-Salas, P, Kiambi S, Ahmed, S, Häsler B, Rushton J 2017. Mapping of beef, sheep and goat food systems in Nairobi - A framework for policy making and the identification of structural vulnerabilities and deficiencies. *Agricultural Systems*, 152: 1-17.

Antwi MA, Mazibuko NVE, Chagwiza C 2017. Determinants of smallholder cattle farmers' access to high-value cattle markets in the Ngaka Modiri Molema District, South Africa. *Indian Journal of Animal Research*, 51(4): 764-770.

Assan N 2012. Genetic improvement and utilization of indigenous cattle breeds for beef production in Zimbabwe: Past, present and future prospects. *Scientific Journal of Agricultural*, 1: 1-13.

Ayele S, Zemedu L, Gebremdhin B 2019. Determinants of beef cattle market participation decision by smallholder farmers in Dugda and Bora Districts, Oromia Regional State, Ethiopia. *Journal of Natural Sciences Research*, 9(20): 32-38.

Bayer W, Alcock R, Gilles P 2004. Going Backwards? – Moving Forward? – Nguni Cattle in Communal Kwazulu-Natal. Rural Poverty Reduction through Research for Development and Transformation. *Paper Presented at a Conference held at Agricultural and Horticultural Faculty*, 5 - 7 October, Humboldt-Universität Zu, Berlin, Germany.

Bettencourt EMV, Tilman M, Narciso V, Carvalho, Carvalho MLdS, Henriques PDdS 2015. The livestock roles in the wellbeing of rural communities of Timor-Leste. *Revista de Economia e Sociologia Rural*, 53(Suppl 1): 63-80.

Bote D, Mago S, Hofisi C 2014. Innovative rural financing in Zimbabwe: A case of cattle banking. *International Business and Economics Research Journal (IBER)*, 13(4): 815-822.

Chimonyo M, Kusina NT, Hamudikuwanda H, Nyoni O 1999. A survey on land use and usage of cattle for draught in a smallholder farming area of Zimbabwe. *Journal of Applied Sciences for Southern Africa*, 5(2): 111-121.

Dlamini SI, Huang W 2019. A double hurdle estimation of sales decisions by smallholder beef cattle farmers in Eswatini. *Sustainability*, 11(19): 5185. DOI: 10.3390/su11195185.

Dovie DBK, Shackleton CM, Witkowski ETF 2006. Valuation of communal area livestock benefits, rural livelihoods and related policy issues. *Land Use Policy*, 23: 260-271.

Food and Agriculture Organisation (FAO) 2019. Developing Sustainable Value Chains for Small-Scale Livestock Producers. In: GM Leroy (Ed.): Fernando. *FAO Animal Production and Health Guidelines No. 21*. FAO, Rome, Italy.

Food and Agriculture Organisation (FAO) 2007. Subregional Report on Genetic Resources: Southern Africa. *Annex to the State of the World's Animal Genetic Resources for Food and Agriculture.* FAO, Rome, Italy.

Font-Palma C 2019. Methods for the treatment of cattle manure - A review. *Journal of Carbon Research*, 5(2): 27. DOI: 10.3390/c5020027.

Fletschner D, Kenney L 2011. Rural Women's Access to Financial Services: Credit, Savings and Insurance. ESA Working Paper No. 11-07. The Food and Agricultural Organisation of the United Nations. From

<http://www.fao.org/3/a-am312e.pdf> (Retrieved on 22 November 2019).

Francis J, Sibanda S 2001. Participatory Action Research Experiences in Smallholder Dairy Farming in Zimbabwe. Livestock Research for Rural Development, 13: 1-15. From <http://www.lrrd.org/lrrd13/3/fran133.htm> (Retrieved on 22 November 2019).

Gororo E, Makuza SM, Chatiza FP, Chidzwondo F, Sanyika TW 2018. Genetic diversity in Zimbabwean Sanga cattle breeds using microsatellite markers. *South African Journal of Animal Science*, 48(1): 128-141.

Government of the Republic of Namibia 2005. Support to NEPAD-CAADP Implementation TCP/NAM/2903 (i) (NEPAD ref. 05/38 E) Volume VII of VII. Bankable Investment Project Profile. From <http://www.theeis.com/data/literature/Support %20to% 20NEPAD_ CAADP%20 Implementation. pdf> (Retrieved on 21 November 2019).

Hasnah PI, Smith RGB 2016. Household-level Farming and Marketing Practices Determining Body Condition Score and Economic Value of Cattle in Cambodia. Livestock Research for Rural Development, 28(116). From <http://www.lrrd.org/lrrd28/6/hans28116.html> (Retrieved on 22 November 2019).

Khombe CT 2002. Genetic Improvement of Indigenous Cattle Breeds in Zimbabwe: A Case Study of the Mashona Group Breeding Scheme. From <https://pdfs.semanticscholar.org/7423/235eb 0319f 5bea38e2a 80d0a 972005ac03ec.pdf?_g a=2.69443 536.15568 16115.1574329627-1943792 62. 1574329627> (Retrieved on 21 November 2019).

Kocho T, Abebe G, Tegegne A, Gebremedhin B 2011. Marketing value-chain of smallholder sheep and goats in crop-livestock mixed farming system of Alaba, Southern Ethiopia. *Small Ruminant Research*, 96: 101-105.

Maburutse BE, Mutibvu T, Mbiriri DT, Kashangura M 2012. Communal livestock production in Simbe, Gokwe South District of Zimbabwe. *Online Journal of Animal and Feed Research*, 2: 351-360.

Mafimisebi TE, Bobola OM, Mafimisebi OE 2013. Fundamentals of Cattle Marketing in Southwest, Nigeria: Analyzing Market Intermediaries, Price Formation and Yield Performance. *Invited Paper Presented at the 4th International Conference of the African Association of Agricultural Economists*, 22 – 25 September, Hammamet, Tunisia.

Mapiye C, Mupangwa JF, Mugabe PH, Chikumba N, Poshiwa X, Foti R 2006. A review of forage legume research for rangeland improvement in Zimbabwe. *Tropical Grasslands*, 40: 145-149.

Mapiye C, Chimonyo M, Dzama K, Raats JG, Mapekula M 2009. Opportunities for improving Nguni cattle production in the smallholder farming systems of South Africa. *Livestock Science*, 124: 196-204.

Mashoko E, Muchenje V, Ndlovu T, Mapiye C, Chimonyo M, Musemwa L 2007. Beef cattle production in a peri-urban area of Zimbabwe. *Journal of Sustainable Development in Africa*, 9: 121-132.

Masikati P 2011. *Improving the Water Productivity of Integrated Crop-livestock Systems in the Semi-arid Tropics of Zimbabwe an Ex-ante Analysis Using Simulation Modeling*. PhD Thesis, Unpublished. Bonn, Germany: Bonn University.

Mavedzenge BZ, Mahenehene J, Murimbarimba F, Scoones I, Wolmer W 2006. Changes in the Livestock Sector in Zimbabwe Following Land Reform: The Case of Masvingo Province. From <https://www.ids.ac.uk/files/dmfile/Masvingoresearchreport.pdf> (Retrieved on 21 November 2019).

Mhuka C, Chatiza FP, Chidzwondo F, Sithole-Niang I, Makuza S, Mlambo SS 2017. Use of RAPD-PCR for breed/genotype identification in Zimbabwean cattle. *Journal of Cellular Biotechnology*, 2(2): 131-137.

Mogotsi K, Kgosikoma OE, Lubinda KF 2016. Wildlife-livestock interface, veterinary cordon fence damage, lack of protection zones, livestock theft and owner apathy: Complex socio-ecological dynamics in foot and mouth disease control in southern Africa. *Pastoralism*, Volume 6, Article #21. DOI: 10.1186/s13570-016-0068-7.

Motiang DM, Webb EC 2016. The Influence of Household Characteristics on Cattle Off-Take Rates in the North West Province of South Africa. Livestock Research for Rural Development, 28(6). From <http://www.lrrd.org/lrrd28/6/moti28118.html> (Retrieved on 21 November 2019).

Moyo S 1995. Evaluation of breeds for beef performance in Zimbabwe. In: K Dzama, FN Gwerume, E Bhebhe (Eds.): *Proceedings of the International Symposium on Livestock Production through Animal breeding and Genetics*, 10 – 11 May, University of Zimbabwe, Harare, Zimbabwe, pp. 122-129.

Mpofu N 2002. Comparison of Indigenous and Foreign Cattle for Beef Production at Matopos Research Station in Zimbabwe. From <https://cgspace.cgiar.org/bitstream/handle/10568/3521/casestudy-Mpofu-Matopos_51.pdf?sequence=1&isAllowed=y> (Retrieved on 21 November 2019).

Muchenje V, Dzama K, Chimonyo M, Raats JG, Strydom PE 2008. Meat quality of Nguni, Bonsmara and Aberdeen Angus steers raised on natural pasture in the Eastern Cape, South Africa. *Meat Science*, 79: 20-28.

Musemwa L, Chagwiza C, Sikuka W, Frazer G, Chimonyo M, Mzileni N 2007. Analysis of Cattle Marketing Channels Used by Small Scale Farmers in the Eastern Cape Province, South Africa. Livestock Research for Rural Development, Volume 19, Article #9. From <https://lrrd.cipav.org.co/lrrd19/9/muse19131.htm> (Retrieved on 21 November 2019).

Musemwa L, Mushunje A, Chimonyo M, Fraser G, Mapiye C, Muchenje V 2008. Nguni cattle marketing constraints and opportunities in the communal areas of South Africa: Review. *African Journal of Agricultural Research*, 3: 239-245.

Mwai O, Hanotte O, Kwon YJ, Cho S 2015. African indigenous cattle: Unique genetic resources in a rapidly changing world. *Asian-Australasian Journal of Animal Sciences*, 28(7): 911-921.

Mwanyumba PM, Wahome RW, MacOpiyo L, Kanyari P 2015. Livestock herd structures and dynamics in Garissa County, Kenya. *Pastoralism*, Volume 5, Article #26. DOI: 10.1186/s13570-015-0045-6.

Næss MW, Bårdsen B-J 2013. Why herd size matters - mitigating the effects of livestock crashes. *PLoS One*, 8(8): e70161. DOI: 10.1371/journal.pone.0070161.

Ndebele JJ, Muchenje V, Mapiye C, Chimonyo M, Musemwa L, Ndlovu T 2007. Cattle Breeding Management Practices in the Gwayi Smallholder Farming Area of South-Western Zimbabwe. Livestock Research for Rural Development, Volume 19, Article #183. From <http://www.lrrd.org/lrrd19/12/ndeb19183.htm> (Retrieved on 21 November 2019).

Ndlovu RL, Bwakura T, Topps JH 2004. Donkeys, people and development. In: P Starkey, D Fielding (Eds.): *A Resource Book of the Animal Traction Network for Eastern and Southern Africa (ATNESA)*. Wageningen, the Netherlands: ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), P. 244.

Ndoro JT, Mudhara M, Chimonyo M 2015. Farmers' choice of cattle marketing channels under transaction cost in rural South Africa: A multinomial logit model. *African Journal of Range and Forage Science*, 32(4): 243-252.

Ngarava S, Phetshe M, Mushunje A 2019. Market awareness and participation for cattle farmers in the Kaonafatso ya Dikgomo (KyD) Scheme in KwaZulu-Natal Province, South Africa. *Agriculture*, 9(10): 215. DOI: 10.3390/agriculture9100215.

Nyamushamba G, Mapiye C, Tada O, Halimani TE, Muchenje V 2016. Conservation of indigenous cattle genetic resources in Southern Africa's smallholder areas: Turning threats into opportunities. *Asian-Australasian Journal of Animal Sciences*, 30: 1-19.

Okello WO, Muhanguzi D, MacLeod, ET, Welburn SC, Waiswa C, Shaw AP 2015. Contribution of draft cattle to rural livelihoods in a district of south eastern Uganda endemic for bovine parasitic diseases: An economic evaluation. *Parasites Vectors*, 8: 571. DOI: 10.1186/s13071-015-1191-9.

Parliament Research Department 2011. *Mt. Darwin North Constituency Profile*. Harare, Zimbabwe: Parliament of Zimbabwe.

Quisumbing AR, Rubin D, Manfre C, Waithanji E, Bold Mvd, Olney D, Johnson N, Meinzen-Dick R 2015. Gender, assets, and market-oriented agriculture: Learning from high-value crop and livestock projects in Africa and Asia. *Agriculture and Human Values*, 32(4): 705-725.

Schmidt L, Sevak P 2006. Gender, marriage and asset accumulation in the United States. *Feminist Economics*, 12(1-2): 139-166.

Shackleton CM, Shackleton SE, Netshiluvhi TR, Mathabela FR, Phiri C 1999. The Direct Use Value of Goods and Services Attributed to Cattle and Goats in the Sand River Catchment. *Bushbuckridge, CSIR-Environmentek Report No.* ENV-P-C 99003. Pretoria, South Africa: CSIR.

Shava S, Masuku S 2019. Living currency: The multiple roles of livestock in livelihood sustenance and exchange in the context of rural indigenous communities in southern Africa. *Southern African Journal of Environmental Education*, 35: 1-13.

Simela L, Montshwe BD, Mahanjana AM, Tshuwa MP 2006. The Livestock Production Environment in the South African Smallholder Sector. New Challenges for the Animal Science Industries. *South African Society for Animal Science (SASAS) 41st Congress Abstracts*, 3 - 6 April, The University of Free State, Bloemfontein, South Africa.

Sorathiya LM, Fulsoundar AB, Tyagi KK, Patel MD, Singh RR 2014. Eco-friendly and modern methods of livestock waste recycling for enhancing farm profitability. *International Journal of Recycling of Organic Waste in Agriculture*, 3: Article #50. DOI: 10.1007/s40093-014-0050-6.

Sotsha K, Fakudze B, Khoza T, Mmbengwa V, Ngqangweni S, Lubinga M, Mazibuko N, Ntshangase T, Nyhodo B, Myeki L, Ngetu X 2018. Factors influencing communal livestock farmers' participation into the National Red Meat Development Programme (NRMDP) in South Africa: The case of the Eastern Cape Province. *Ontario International Development Agency (OIDA) International Journal of Sustainable Development*, 11(1): 73-80.

Tada O, Muchenje V, Dzama K 2013. Preferential traits for breeding Nguni cattle in low-input in-situ conservation production systems. *Springer Plus*, 2(1): 195. DOI: 10.1186/2193-1801-2-195.

Tavirimirwa B, Mwembe R, Ngulube B, Banana NYD, Nyamushamba GB, Ncube S, Nkomboni D 2013. Communal Cattle Production in Zimbabwe: A Review. Livestock Research for Rural Development, 25(12). From <http://www.lrrd.org/lrrd25/12/tavi25217.htm> (Retrieved on 22 November 2019).

Tessema ZK, De Boer WF, Baars RMT, Prins HHT 2011. Changes in vegetation structure, herbaceous biomass and soil nutrients in response to grazing in semi-arid savannas in Ethiopia. *Journal of Arid Environments*, 75(7): 662-670.

Togarepi C, Thomas B, Kankono M 2016. Cattle Marketing Constraints and Opportunities in North-Central Communal Areas of Namibia, Ohangwena Region. Livestock Research for Rural Development, 28(7). From <http://www.lrrd.org/lrrd28/7/toga28132.html> (Retrieved on 22 November 2019).

van Rooyen AF 2007. *Livestock Development in Southern Africa: Future Research and Investment Priorities.* Andhra Pradesh, India: International Crop Research Institute for Semi-arid Tropics (ICRISAT).

van Rooyen J 2016. *Livestock Production and Animal Health Management Systems in Communal Farming Areas at the Wildlife-Livestock Interface in South Africa*. PhD Thesis, Unpublished. Pretoria, South Africa: University of Pretoria.

Paper received for publication in December, 2019
Paper accepted for publication in February, 2020