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Determinants of Farmers' Marketing Choices and Preferences under Communal Cattle Farming: Evidence from Mwenezi District in Zimbabwe

Obert Paenda[1], Lovemore Musemwa[1], Simbarashe Ndhleve[2] and Melusi Sibanda[3,*]

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

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ABSTRACT The challenges and constraints faced by communal cattle producers are detrimental to the growth of the sector. This study seeks to establish the factors affecting farmers' participation in livestock marketing. Questionnaires were administered to sixty (60) farmers randomly selected from Mwenezi District soliciting marketing information. Butcheries, abattoirs, speculators, private sales emerged as the main livestock value chain players, while auctioneers play an insignificant role. Farmers participate in both formal and informal livestock markets. Marketing challenges range from lack of market information, long distance to the market, low prices and poor condition of animals. Farmers' choice on whether to participate in the highly rewarding formal marketing channel was influenced by the animal condition (p=0.004), frequency of extension worker visits (p=0.001), buying price (p=0.037) and the age of the livestock owner. To operate efficiently, the livestock sector requires support systems that are capable of eliminating constraints and creating value for livestock farmers.

INTRODUCTION

Agriculture plays a vital role in the livelihoods, nutrition security and broader economic growth for the majority of populations in developing countries (Coetzee et al. 2005; World Bank 2009; Enahoro et al. 2019; Hatab et al. 2019; Marshall et al. 2019; Mapiye et al. 2020). Livestock farming is one of the fastest-growing enterprises in developing countries. The World Bank (2009) and Gizaw et al. (2020) estimated that the livestock sector contributes 30 percent of the value of agricultural production in most developing countries. The principal livestock enterprises pursued by the poor are beef, dairy, poultry, pigs, small ruminants and ostriches (Mujeyi 2012; Mapiye et al. 2020). More than 70 percent of the poor people that derive their income from the livestock sector reside in South Asia and sub-Saharan Africa. Livestock derived products make a significant contribution to the global trade of agricultural products and make a substantial contribution to the global trade of agricultural products (Enahoro et al. 2019). Besides, livestock also serves as a form of savings and insurance, provides inputs to crop production, fulfil the social or cultural obligations and provide draught power (Thomas et al. 2013; Marshall et al. 2019). Despite fostering income growth and economic growth for marginal communities, the economic viability of livestock production in most developing countries is not immune to challenges, threats and has limited opportunities (Enahoro et al. 2019).

The growing demand for animal protein in developing countries emanates from population growth, urbanization and rising income provide opportunities for growth of the livestock sector (Enahoro et al. 2019; McDermott et al. 2010; Tavirimirwa et al. 2019). In any rural farming setting, in addition to the consumption of livestock products like meat and milk, livestock owners benefit from livestock sales. Despite increased global demand for meat, a significant number of livestock farmers in communal areas struggle to sale their livestock (Musemwa et al. 2007; Enahoro et al. 2019). Kindness and Gordon (2001) and Sirdey and Lallau (2020) argued that the ability

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

of farmers to access remunerative markets is critical for improved incomes and increased production. Thus an improved understanding of marketing factors could lead to critical development of interventions that are essential for the livestock sector in developing countries. The development of the sector could be boosted by the effective utilization of improved production practices and marketing (Girei et al. 2014; Gizaw et al. 2020).

Livestock marketing systems are complex. The market for livestock in most developing countries is dynamic, and most smallholder farmers struggle to cope with the trends (Tsourgiannis et al. 2008; Gizaw et al. 2020). Market uncertainty affects agro-businesses' prospects, especially for sustained profitability, competitive advantage, thus affecting overall productivity (Utete 2003; Tefera et al. 2020). Due to these uncertainties and challenges, the majority of smallholder livestock farmers remain poor. To improve livestock marketing, Zimbabwe's livestock sector experienced different types of marketing systems, ranging from state-controlled market systems around the 1930s to free-market systems in the 1990s (Muir-Leresche and Muchopa 2006; Chingarande et al. 2020). To date, commercial beef production and marketing in Zimbabwe has multiple players and has attracted government interest over the past decades. Cold Storage Commission, which used to control trade in the livestock industry is now defunct, and the sector is mostly made up of private players (Scoones et al. 2010; Bennett et al. 2019). However, as opposed to conventional thinking, these market reforms have failed to bring about efficient marketing systems and anticipated growth. The livestock sector continues to experience multiple challenges ranging from small heard size, lack of infrastructure support, inefficient markets and limited farmer advisory services (Nkombori and Beekman 2015; Bennett et al. 2020; Chingarande et al. 2020).

Objectives

Livestock farming is one of the main sources of livelihood for the poor in the tropics and has significant economic importance in most countries in the tropics, including Zimbabwe. The agricultural sector of Zimbabwe uses a liberalized marketing approach, and studies seeking to understand farmers' choice of marketing channels are critical. It is important to undertake an analysis of the livestock marketing systems to understand the farmers level of participation in livestock marketing and income generation. This study uses district representative data for Zimbabwe to 1) examine farmers' choices, preferences and level of participation in livestock marketing channels in the studied communal areas, 2) identify factors affecting these choices, preferences and participation; and 3) identify constraints and opportunities experienced by farmers along a typical communal livestock production value chain. Communal livestock production is emerging as a crucial livelihood activity globally (Bennett et al. 2019).

METHODOLOGY

Description of the Study Area

Mwenezi District is located partly in natural region 4 and partly in region 5. It is 138km south of Masvingo town along the Masvingo-Beit bridge road at 21.4226° S, 30.7264° E. It is divided into Mwenezi East (eastern side of Mwenezi River) and Mwenezi South to the other side of the river. Maranda (Ward 9) is on to the southern part of the district in region 5, located some 68km from the highway via Neshuro Growth Point. The area receives low and erratic rainfall which averages 550 mm per year. It can sometimes receive above-normal rain that is characteristic of tropical cyclones, which are not beneficial for crop establishment. Periodic seasonal droughts and mid-season dry spells are widespread in Mwenezi during the rainy season. Mwenezi experiences very high temperatures in summer usually above 25°C and low temperatures between 10-15°C, resulting in a high annual range of 10-15°C (Muchara 2010; Frischen et al. 2020). Due to these climatic conditions, sound crop production is difficult under this rainfall situation. The district consists mainly of Mopani, Baobab, Marula and Mutsviri trees, with some of the trees used to provide special timber. The veld in resettlement areas is composed of nutritious species, which form the "sweet-veld" rich in protein and can be used for off veld cattle fattening. Most parts of the district have poor

sandy soils that are generally of low depth. Drought tolerant small grain crop varieties are grown in the area. Livestock farming is a more appropriate agricultural activity and favours breeds that are adapted to the environment. The district has been affected by the Land Reform Policy of 2000 and many parts of Mwenezi that were previously utilized for cattle ranching were demarcated into plots and resulted in a shift from cattle ranching to communal livestock farming system (Utete 2003; Frischen et al. 2020).

Sampling Procedure and Data Collection

The study utilized both primary and secondary data. Respondents were chosen based on cattle ownership, from a list of farmers supplied by government extension workers and village secretaries. Five out of 18 villages were randomly selected for the study, namely Beperi, Ramubhudha, Bhadhagi, Chiwarure and Bonda. About a third of the farmers (60) out of 183 farmers were randomly selected for interviews. Focus groups discussions and questionnaire-based interviews were done at livestock marketing centres and farmers' homesteads. Focus group discussions were carried out with the aid of local grassroots level structures such as councillors, opinion leaders, politicians, agricultural extension NGO staff and government departments. Questionnaire administration was done with the assistance of trained school leavers, extension workers, university students, community development workers and teachers. The questionnaires solicited demographic, socioeconomic, production and marketing information. This included cattle ownership, cattle off-take, prices offered, costs, market facility availability, market distance, participation in different channels, availability of marketing information, availability of extension service and accessibility of markets, reasons for channel preference and reasons for selling cattle. Secondary data was gathered from key livestock database sources like the Agricultural Technical and Extension Services in Zimbabwe (AGRITEX), abattoirs (Montana and Carswell Meats in Masvingo), Mwenezi Rural District Council, Veterinary Services Department, Livestock Production and Development Department (LPD) and Zimbabwe Republic Police (ZRP). Abattoirs provided data on livestock marketing information such as prices and grading system. The local authority provided information on cattle sales including name of sellers, prices at which cattle were bought, levies charged to buyers, administration costs and market facilities availability.

Statistical Analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 16 and Microsoft Excel 2007. Descriptive statistics were in the form of frequencies, percentages and measures of central tendency such as means and standard deviation on demographic data like age, flock size, family size, income levels and cattle off-take.

Ranking and Scoring

Ranking and scoring technique was used to rank the constraining effect of the identified livestock marketing challenges. The technique provides a score on a 0-10 scale, with 0 being regarded a less constraining factor. Differences between scores given to different items show the strength of the constraint over another. The rating average is calculated as:

$$\frac{x_1w_1 + x_2w_2 + x_3w_3 + x_3x_3 \pm - - - - x_nw_n}{Total\ of\ weighting\ values}$$

where
w = weight of answer choice
x = response count for an answer choice

Regression Analysis

Economic literature has vast models that can be used to examine market participation and the common ones in the econometric analysis are Probit and Logit models. Binary Logistic Model was used to analyze data on the factors affecting a farmer's choice of a cattle marketing channel. The binary Logit model is widely applied to determine cattle sales decisions, especially if the dependent variable is dichotomous (Greene 2008; Büchner et al. 2020). The model is specified as:

$$Y^* = ln\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1X_1 + \beta_2X_2 + - - - - \beta_nX_n + v_i \ldots (1)$$

The formula for the estimated probability is:

$$p = \frac{\exp(Y^*)}{[exp(Y^*) + 1]}$$

The dependent variable is binary. In this specification, the dependent variable carries 1 if the farmer sold cattle to a formal marketing channel and zero otherwise, (formal = 1, non-formal = 0).

Where β_0 is the intercept term, β_1 to β_7 are unknown parameters to be estimated, reflecting the impact of changes in x on the probability of selling or not to a given channel. Y^* is the channel choice. *vi* is the error term, assumed to be normal with mean zero and constant variance. β_j is the co-efficient for the jth explanatory variable X_j, P_i is the probability of household participating in cattle marketing. The independent variables of the model are given as follows: animal condition, access to extension services, market price, number of livestock sold, age of the farmer, marketing experience and level of education.

The Logit was used to model the factors that influence farmers' decision to sell cattle in one channel instead of the other. Interpretation of the logistical model results involves calculating the estimated probability of a given independent variable on the likelihood of a farmer's decision on given channel participation.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

Table 1 shows the demographic distribution of cattle farmers in the study area. Both women and men are engaged in livestock production. However, men were proportionally more than women. Approximately 80 percent of the household heads were married. The higher proportion of youth practising agriculture is not common in most developing countries. The results suggest that livestock owners in the study area are economically active and energetic to make a positive contribution to the sector and exploit the opportunities presented by the sector and rural livelihoods. The proportion of respondents who attained primary and tertiary education was equal to 18.3 percent, and the proportion was higher for uneducated (26.8%) and secondary education (36.6%) categories (Table 1). A higher proportion of illiterate farmers negatively affects productivity and marketing. Educational level influences the adoption of innovations, management practices and promotes participation in high-end markets (Coetzee et al. 2005; Suchiradipta and Saravanan 2020). The existence of uneducated participants calls for knowledge-based support systems. Livestock development support programs in rural areas should emphasize the capacity building of the producers and should avoid generalizations about communal farmers' educational level.

Table 1: Household demographic characteristics

Variable description	*Frequency*	*Percentage (%)*
Gender of the Household Head		
Male	48	80
Female	12	20
Marital Status of the Household Head		
Widow/widower	9	15
Married	48	80
Single	1	1.7
Divorced	2	3.3
Age (years)		
21-40	18	30
41-60	33	55
61-80	8	13
81-100	1	2
Education		
Primary	11	18.3
Secondary	22	36.6
Tertiary	11	18.3
I did not attend formal school	16	26.8

Description of Agriculture and Livelihoods in the Study Area

Table 2 provides a descriptive summary of household livestock enterprises in the study area in a way that demonstrates the relevance of livestock in the household economy. The presented statistic includes the livestock types, average numbers per household and management systems. Average household herd size is 9. Of the total cattle, 75 percent were owned by individuals, whereas the whole family owns 25 percent. Eighty-two percent (82%) of the cattle were acquired through purchases from the local market while 18 percent were inherited from parents and other relatives. The task of looking after livestock is mainly carried out by sons in the community (45%), followed by fathers (30%), and hired labour (15%). Women (mothers) also play a part in taking care of livestock (10%).

Concerning the feeding of the cattle, 63 percent of the farmers practise herding while 37 percent combine grazing with hay feeding.

Table 2: Livestock types, ownership and management systems

Variable description		*Percentage (%)*
Livestock types (mean per household)	Cattle	9
	Goats	8
	Donkeys	3
	Chicken	14
	Pigs	1
	Sheep	1
Cattle ownership	Own cattle	75
	Whole family owned	25
	Purchased cattle	82
	Inherited cattle	18
Household member participation in production activities	Hired labour	15
	Father	30
	Mother	10
	Sons	45
Livestock management system	Communal grazing only	65
	Grazing with supplementary feeding	25

Mixed farming systems is a common practice in communal Zimbabwe. Utete (2003) and Mapiye et al. (2020) emphasized the importance of this farming system and note that cattle provide draught power for tillage, manure and transport as inputs to crop production, and the consume stover and other crop wastes as inputs to livestock production. Table 3 shows the level of livestock farmers' participation in crop production, in addition to owning livestock. The average arable land size for farmers under-study was 4.3 ha and 30 percent of the households lease land from other farmers. All the farmers (100%) practice crop farming. Pearl millet and sorghum had larger average crop area of 1.2 and 1.1ha, respectively. Maize was 0.9ha, followed by legumes 0.6ha and lastly cotton (0.4ha). Practising mixed farming systems inclusive of forage crops promotes income diversification and is used as an insurance against droughts. The interviewed farmers reported an average quarterly income of US$460 from livestock sales, US$171.00 from salaries/wages, US$60.00 from casual labour and US$45 from remittances. Vegetable and crop sales averaged US$25 and US$29 respectively, whereas remittances were US$45. Approximately 80 percent of the farmers sold cattle during the period under review. This finding shows that livestock sales are the highest contributor to the income of livestock owners.

Table 3: Crop production activities

Crop type	*Area planted (ha)*	*Yield (t/ha)*	*% of farmers growing crop*
Maize	0.9	0.24	57
Sorghum	1.1	0.36	88
Pearl millet	1.2	0.34	88
Cotton	0.4	0.3	37
Legume	0.4	0.3	82
Sweet potatoes	0.1	1.8	12

Reasons for Keeping Cattle

By ranking and scoring the reasons for keeping cattle, draught power was ranked as the most important reason for keeping cattle (92% responses). Approximately 95 percent of farm operations in the smallholder sector is dependent on cattle-based draught power (Mujeyi 2012; Mapiye et al. 2020). Cattle sales were ranked 2nd in importance (73% responses), whereas lobola was ranked 3rd (60% responses) and social prestige was the least important (66% responses). The persistence of drought and crop failure in the study area has resulted in the rise of cattle sales used as an insurance against drought, and livestock sales being one of the most important sources of income. About 98.3 percent of the respondents indicated that they had at least sold cattle since they began keeping them, and 80 percent sold some cattle over the past year.

Both formal and informal markets exist in the study area. Table 4 shows results on the used and preferred marketing channels by cattle owners in the study area, listing the main value chain actors in cattle marketing. Farmers' choice and preferences of marketing channels vary widely among respondents. Preference for channel choice was abattoirs, auctions, private sales, butcheries and speculators, in that order. Private sales and speculators are regarded as informal marketing channels and abattoirs, auctions and butcheries are formal livestock marketing channels. Table 4 shows the level of participation in various existing livestock marketing in the study area. More farmers participate in formal marketing channels than informal chan-

nels. However, livestock auctions are temporarily dysfunctional in the area. Higher participation of farmers in the formal marketing channels has significant implications on the economic contribution of the livestock sector to Zimbabwe as a whole and challenges the Cattle Complex Philosophy. Actual off-take to abattoir was 53 percent, private sales contributed 22 percent, butcheries 12 percent and speculators 13 percent. Despite the reported absence of cattle auction in the area, farmers remain confident of the auction marketing channel. About 10 percent of farmers sell their livestock through speculators. Speculators capitalize on information asymmetry, thus taking advantage of the farmers. Concerning market preferences, 27 and 22 percent of the farmers prefer auctions and private sales, respectively (Table 4).

Table 4: Analysis of livestock sales and participation in different marketing channels

Channel	*Used (%)*	*Preferred (%)*	*The proportion of cattle sold (%)*	*Average distance to market (km)*
Butchery	12	15	12	84
Abattoir	36	31	53	230
Speculators	10	5	13	0
Auction	7	27	0	6
Private sales	35	22	22	0

Besides strengthening relations between buyers and sellers, and capitalize on already existing relationships, private sales do not depend on the grading systems and provide an opportunity for bargaining mostly depending on the aesthetic look of the cattle. These factors made the butchery less attractive as compared to private sales. Farmers are comfortable with channels that are easily accessible, where they negotiate and bargain prices, with no/less condemnation of their livestock. Livestock farmers have an inherent dislike for the livestock grading systems and shy away from marketing channels that charge them commission charges or have inherent transactional costs. High preference for abattoirs and auctions could be a reflection of the potential of the formal livestock marketing channels in the studied communities. An averagely higher proportion of livestock sold through private sales could reflect farmers intention to avoid paying commissions and transactional costs. The above-highlighted results emphasize results by Nkori (2004), Musemwa et al. (2007) and Kadju et al. (2020).

Table 5 presents a comparative analysis of the transactional costs, average selling price and an estimate of the net income derived by sellers from the existing marketing channels in the study area. The variables have an essential bearing on farmer's choice of the marketing channel. The average selling price was higher for abattoirs, butchery, speculators and lastly private sales, in that order. However, concerning net income, farmers selling to speculators get higher net income than those selling to butcheries. When using butcheries, farmers are expected to pay a fee of US$20 for Veterinary and Police Clearance before the sale. The producer gets higher prices in the formal market than the informal markets, and the difference was significant (p=0.042). This was despite tenfold higher transactional costs paid in the formal market and insignificant costs in the informal sector. A conclusion can be made that abattoirs present a lucrative marketing channel for most farmers as they offer higher prices that offset higher transactional costs if the condition of the cattle is good. Understanding these trends in the buying and selling of cattle is critical for market intervention.

Table 5: Comparative analysis of cattle marketing income across channels

Marketing channel	*Total marketing costs (US$)*	*Average selling price (US$)*	*Net income (US$)*
Butchery	$40.29	$401.40	$361.11
Abattoirs	$65.36	$527.05	$461.69
Speculator	$ 4.67	$370.83	$366.16
Private sales	$ 9.10	$235.24	$266.14

Table 6 shows quarterly sales distribution and number of cattle sales made in the district during the year, highlighting the peak periods. Peak cattle sales happen during the November to January period and August to October period. February–April period had the lowest figure. The November and January period coincides with the festive season, and higher sales in January could be meant to raise money for

school fees. Demand for meat is high during the festive seasons, and these sales are usually through the private sale channel. Nkori (2004) and Poole et al. (2019) highlighted that both the number of transactions and the prices of cattle increase during the peak season relative to the off-peak season. In addition to information on market participation, an attempt was made to establish who made sales decisions among sellers. The findings indicated that 40 percent of the respondents make cattle sales decisions together with their spouses. In comparison, 36 percent stated that the household head made the decision, and in most cases, the decision is male-dominated. About 21 percent indicated that the whole household decides. This explanation is evident for cattle that were acquired through inheritance, where several household members have a stake in the ownership of these cattle. The level of spread of decision making on livestock sales across all family members emphasizes the importance of livestock ownership as a livelihood in the study area.

Table 6: Quarterly cattle sales

Time of the year	*Number of cattle sold*
August 2014 - October 2014	18
November 2014-January 2015	19
February 2015-April 2015	10
May 2015-July 2015	11

Cattle Marketing Challenges

This section presents the challenges faced by sellers emanating from both the formal and non-formal channel. Table 7 shows the extent of the constraints as reported by the cattle farmers in the study area. The challenges were presented separately for the formal and non-formal marketing channel. These challenges were assumed to affect the farmers in different ways and at different magnitudes considering the systems and operations of each channel.

Diseases were reported as the primary challenge affecting cattle marketing for communal farmers with a weighted score of 7.85. This challenge was followed by transport costs, small herd size and low prices with scores 5.8, 5.4 and 4.4, respectively. The other constraining factors were police and veterinary clearance fees, council levies, absence or poor market infrastructure, long-distance, lack of marketing information and poor roads as the least important challenge. The major problems affecting cattle marketing in the non-formal channel are small herd size (5.6), disease (5.5) and low prices (3.9). There are cases of stock theft where farmers indicated that they have had their cattle stolen. Also, they lack knowledge about other marketing channels for them to participate actively.

Table 7: Factors constraining farmers' choice of formal vs informal markets

Description of constraint	*Formal livetsock markets*	*Informal livestock markets*
Transport costs	5.8	-
Clearance costs	4.25	-
Municipality levies	2.9	-
Market infrastructure	2.65	-
Diseases	7.58	5.5
Distance to markets	2.35	-
Herd size	5.4	5.6
Road infrastructure	1.6	1.75
Lack of market information	1.65	2
Low prices	4.4	3.9
Stock pilferage	-	2.65

Livestock diseases were reported as the biggest constraint to cattle through a formal channel and were ranked second in the non-formal channel with weighted scores of 7.85 and 5.5, respectively. Livestock diseases are common in both communal and commercial livestock setting. Similar findings were reported by Mapiye et al. (2020) for Nguni cattle farmers in South Africa. Mwenezi District in Zimbabwe experienced foot and mouth outbreak in April 2014. Livestock production support systems should prioritize the provision of vaccines and diseases control, especially in susceptible areas. Debertin (2004), Hamidu (2014) and Mapiye et al. (2020) note that diseases present a significant constraint for both production and marketing of livestock. Incidence of diseases usually results in areas being quarantined which affect cattle sales. Muchara (2010) indicated that public cattle sales are halted at times due to the outbreak of anthrax and foot and mouth disease, and this negatively affects livestock owners' incomes. Small herd size was also ranked as a constraint limiting farmers' participation in both channels with scores of 5.6 and 5.8 in the informal and

formal channel, respectively. Cattle perform multiple roles including the provision of draught power, and farmers find it difficult to dispose of livestock if their herd size is small; thus a low market off-take rate of approximately 5.5 percent was reported. In South Africa, an off-take of 33 percent was reported for farmers owning less than 10 heads (Ngarava et al. 2020). Transport cost and road infrastructure were ranked 11.6 and 4.7, respectively. Farmers are cost-sensitive. Farmers in more remote areas with inadequate infrastructure pay higher transport costs, and this hinders farmer participation in formal markets.

Similarly, Shiimi et al. (2012) in Namibia and Dafar and Tebeje (2018) in Ethiopia reported that farmers travel more than 300km to access formal markets like abattoirs. Price was reported to be a vital constraint with scores of 4.4 and 3.9 for formal and informal channels, respectively. The significance of prices affecting farmers' decision on marketing channels cannot be overemphasized (Musemwa et al. 2007; Mapiye et al. 2020). Scores of 4.25 and 2.9, for formal channel and informal channels, respectively were reported for council levies. Farmers are compelled to pay fees before selling their cattle, and this is usually common with the auction markets and abattoirs (Muchara 2010). In cases where the buyers pay the costs, the costs are always indirectly transferred to sellers through low prices.

Factors Affecting Choice of Cattle Marketing Channel by the Farmers

Table 8 gives a summary of the regression analysis results to determine the factors that affect farmers' decisions in making choices of a cattle marketing channel. The results from logistical regression show factors that affect a farmer's decision to participate in a particular marketing channel. The explanatory variables account for 73.8 percent (Nagelkerke R-square) variation in the model specification. The model also indicates a low log-likelihood 34.452, with a significant $R^2 = 48.124$. Of the seven factors considered, four were found to be significantly affecting farmers' choice of either formal or informal marketing channel. Three of these were significant at 5 percent level. These were animal condition p-value 0.004, frequency of extension worker visits ($p = 0.001$), price ($p = 0.037$) and age of the livestock owner was significant at 10 percent.

Formal and informal livestock markets offer different producer prices for livestock (Musemwa et al. 2007; Mmbando 2014). The finding from this study indicates that farmers are price responsive and reflect the overriding importance of the producer price mechanism in affecting livestock marketing channels. Producer prices provide critical incentives for farmer's choice of market and overall participation. Low prices paid to farmers in the informal markets emerge as one of the critical disincentives to the selection of the channels. The price-setting systems and processes of either of the two markets, have to be adjusted if they are to be competitive. In informal markets, buyers and sellers determine prices through bilateral bargaining process (Anbarci et al. 2012; Mapiye et al. 2020). Price variable is crucial in stimulating selling decisions (Musemwa et al. 2007; Anbarci et al. 2012; Mapiye et al. 2020).

The finding from this study indicates that the condition of the animal influences the producer's choice of marketing channels, where farmers selling animals in good condition prefer formal channel. Livestock in good condition fetch

Table 8: Summary of logistical regression results

Variable	*B*	*S.E.*	*Wald*	*d.f*	*Sig*	*Exp(β)*
Animal condition	4.019	1.411	8.114	1	0.004	55.634
Access to extension services	1.476	0.459	10.331	1	0.001	4.372
Market price	0.007	0.003	4.359	1	0.037	1.007
Number of livestocks sold	0.779	0.980	0.632	1	0.427	2.180
Age of the farmer	-0.110	0.063	3.069	1	0.080	0.895
Marketing experience	0.094	0.074	1.624	1	0.203	1.098
Level of education	0.008	0.009	0.754	1	0.385	1.008
Constant	-5.137	2.288	5.039	1	0.025	0.006

higher prices in the formal market (Shiimi et al. 2012). The study area, Mwenezi, is prone to drought and diseases, which negatively affect the condition of livestock. As a result, the majority of the animals are sold through the non-formal channel, where there are no set quality standards. When faced with uncertainty about the acceptance of their cattle by abattoirs because of poor quality, and high costs of transportation, risk-averse farmers opt to settle for speculators and private buyers, although they pay low prices. Strategies aimed at increasing the use of formal markets should focus on maintaining the status of livestock.

The results show that access to extension services increase the chances of participation in the formal marketing channel. The results demonstrate the importance of capacity enhancement and support for livestock owners in promoting participation in formal and probably high-value markets. Similarly, Mapiye et al. (2020) in Southern Africa, Musemwa et al. (2007) in South Africa and Nkori (2004) in Botswana found that livestock owners who receive technical support and marketing information, especially through extension support, are more likely to participate in the formal livestock markets. Thus, these results could be generalized for communal livestock farmers across Southern Africa. Livestock owners who have frequent contact with the extension services benefit from technical support, knowledge on efficient livestock management practices and market information. These increase their chances to participate in formal livestock markets.

Age of the livestock owner indicated a negative influence on participation in formal marketing channels. The negative factor presents a differential response in the market choice between youth and elderly livestock owners, thus implying that older farmers prefer informal livestock marketing channels over formal channels. The results confirm the findings by Musemwa et al. (2007) and Mapiye et al. (2020) that also showed that elderly livestock owners do not prefer selling their cattle through formal marketing channels. They are more comfortable with private sales to (friends and relatives) and speculators. Elderly livestock owners prefer local buyers that they are familiar with than selling their livestock in the formal market. The perceived degree of risk and uncertainty associated with formal markets make elderly livestock owners prefer to fall prey to speculators who take advantage of market information asymmetry. When selling through formal markets, livestock owners do not have control over how their cattle are sold, especially in terms of negotiation. Literature documented the importance of power relations and uncertainties in business partner selection (Kadju et al. 2020; Mapiye et al. 2020). The results of this study indirectly infer the negative effect of market risk, uncertainties and lack of market information on livestock owners selection of marketing channels and how it is linked to the age of the farmer. Adjemian et al. (2020) argue that greater market uncertainty limit firms to deal with old partners and limit expansion into new markets.

CONCLUSION

Cattle production and marketing is a crucial source of livelihood for the poor and a significant rural economic activity in arid areas. Cattle perform multiple roles, and the challenges that bedevil the sector should be prioritized. Farmers had differences in preferences for marketing channels, and there were variations between the preferred market and the ultimate market of choice. It also emerged from this study that farmers are sensitive to transactional costs, risk and uncertainties in the market, and it affects their choice of marketing channel. Farmers are in constant search of high income for their livestock, low risk and efficient marketing channels and trustworthy and supportive value chain partners and institutional support to obtain better incomes from livestock sales. Regression analysis results indicated that animal condition, availability of extension services, price and age of livestock owner are significant factors affecting cattle marketing decisions.

RECOMMENDATIONS

Important policy recommendations could be provided through this study as the identified factors and variables have a significant effect on market participation and the number of animals sold by respondents. The outcome of this

research calls for policies aimed at improving road and livestock marketing infrastructure for communal farmers, access to training and capacity building programmes aimed at increasing herd size per farmer and improved livestock condition, high market off-take of livestock and high returns from livestock sales by communal farmers in developing countries and beyond. To increase herd size and improve livestock conditions, farmers should be encouraged to practice proper livestock management practices, provide supplementary feeding and practice commercial pen fattening as a way of adding value to their livestock. This could be achieved through constant capacity building exercises and technical support. Farmers who frequently interact with extension officers, veterinary and livestock specialists are more productive and produce quality livestock. Concerning market risk and uncertainties; high transactional costs and levies, lack of trust and market information asymmetries between buyers and livestock owners emerged as major constraints. This study proposes the establishment of community networks where key players in the livestock value chain collaborate to address market constraints and achieve consensus. Open dialogues between players promote agreements and balancing of interests is crucial in any value chain. Dialogues, institutional and policy reforms go a long way in reducing the challenges faced by farmers in marketing their livestock.

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