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Examining small-scale cattle farmers' willingness to participate in livestock auction markets in Bushbuckridge Local Municipality

Zanele Nonhlanhla Nyembe^{id}, Jan Johannes Hlongwane^{id}, Rudzani Nengovhela*^{id}

Department of Agricultural Economics and Animal Production, University of Limpopo, South Africa

*Corresponding author: nengovhelarudzani90@gmail.com

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ABSTRACT

This study explored the willingness of small-scale cattle farmers in Bushbuckridge Local Municipality, Mpumalanga Province, South Africa, to participate in livestock auction markets. Agriculture, a cornerstone of economies, heavily relies on livestock farming in South Africa. However, small-scale cattle farmers face challenges in market participation. The study investigated the factors influencing farmers' willingness, emphasizing socio-economic characteristics. Using descriptive statistics and logistic regression, the research unveils significant factors, providing insights for targeted interventions. The logistic regression model indicates a statistically significant relationship between education level, farm size, access to agricultural information, farming experience, and farmers' willingness to engage in auction markets. Notably, higher education levels and larger farm sizes positively correlate with willingness, while increased access to agricultural information and excessive farming experience exhibit negative correlations. The findings have crucial implications for policy interventions, suggesting the need for educational programs to enhance farmers' awareness of auction markets, initiatives to increase farm sizes, and improved dissemination of agricultural market information.

Keyword: livestock auction markets, market participation, small-scale cattle farming, willingness.



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1. Introduction

Agriculture-including soil cultivation, crop production, and livestock farming, forms the backbone of many economies, playing a pivotal role in sustaining communities and contributing to national agricultural output. As a crucial facet of agriculture, livestock farming holds significant importance in South Africa, utilizing approximately 80% of accessible land and contributing over 40% to the country's overall agricultural output [1]. In this context, small-scale cattle farming emerges as a vital component, often representing the primary source of income for rural communities, thereby functioning as a form of social capital [2].

South Africa exhibits a dichotomy in farming practices, primarily classified into large-scale commercial farming and small-scale farming, with the latter facing structural constraints such as limited access to resources, technology, and markets [3;4]. The significance of market participation in agricultural development is underscored by Wilkus et al. [5], emphasizing its role as a key driver in developing countries' agricultural landscapes.

Livestock auction markets serve as established hubs where cattle are regularly assembled and auctioned through public bidding, engaging diverse buyers, including individuals, butchers, commercial farmers, and speculators [6;7]. Market participation, as highlighted by Rahman et al. [8], provides a pathway to the commercialization of small-scale cattle farming, leading to increased productivity and improved income

generation. However, despite the potential benefits of auction markets, participation by small-scale cattle farmers remains inconsistent, particularly in rural municipalities where these platforms are available but underutilized. Understanding the underlying drivers of this limited engagement is essential, especially within under-researched local contexts.

This study focuses on the Bushbuckridge Local Municipality, a predominantly rural area in Mpumalanga Province, South Africa, where small-scale cattle farming is a key livelihood activity. Despite the importance of livestock in the region, there is a notable gap in the literature concerning the determinants of formal market participation among cattle farmers in this locality. Existing studies tend to emphasize crop production or large-scale enterprises, with minimal focus on auction behaviour among small-scale cattle farmers. By addressing this gap, the study provides context-specific insights into the socio-economic factors that influence small-scale cattle farmers' participation in livestock auction markets. This study was guided by the following hypotheses: H₁: Small-scale cattle farmers in Bushbuckridge Local Municipality are not willing to participate in livestock auction markets; and H₂: There are no significant factors affecting the participation of small-scale cattle farmers in livestock auction markets in Bushbuckridge Local Municipality.

The study employs primary data collected from smallholder cattle farmers within the municipality. The anticipated outcome is a rejection of both null hypotheses, indicating that auction market participation is not only desired by a significant number of farmers but also shaped by measurable factors such as level of education, farm size, access to agricultural information, and farming experience.

Ultimately, the study aims to inform targeted interventions by policymakers, extension officers, and development agencies seeking to promote inclusive rural development through increased market participation. By identifying barriers and enabling factors, this research contributes to the broader discourse on smallholder commercialization and sustainable agricultural transformation in South Africa and beyond.

2. Materials and Methods, or Methods

2.1. Study Area

Bushbuckridge Local Municipality is located in Mpumalanga Province. The study area is characterised by agricultural activities, with cattle and goats dominating livestock farming. Additionally, the study area has a population of over 750,000 people. The Village people in the municipality use the communal land to cultivate, graze cattle, and gather a variety of non-timber forest products [9]. Additionally, Sehar [10] states that cattle are raised on communal rangelands, which make up 85% of the total area, most of these cattle are Sanga-type animals like Nguni and Afrikaner or their hybrids. In addition, the municipality has 2000 small-scale cattle farmers from different sections. Some cattle farmers in the study area have formed cooperatives such as the Mokgapeng Cattle Cooperative to share information, particularly related to the market [11].

2.2. Data Collection

The data collection process involved the use of semi-structured questionnaires, with purposive and simple random sampling techniques applied to select a representative sample of 50 small-scale cattle farmers from Bushbuckridge Local Municipality. The sample size determination is justified through the Raosoft Sample Calculator, considering a confidence level of 95%, a margin of error of 5%, and a population size of 2000 cattle farmers.

2.3. Data Analysis

The analytical techniques employed consist of descriptive statistics, Likert scale analysis, and a binary logistic regression model. Descriptive statistics are used to identify and describe the socioeconomic characteristics of small-scale cattle farmers, employing measures such as mean and percentiles. The Likert scale is utilized to assess farmers' willingness to participate in livestock auction markets, with survey responses transformed into a dummy dependent variable fitted into a binary logistic regression model. In the binary logistic model, as explained by Shrestha [12] Y is the dependent variable (WTP and $\beta_1 - \beta_{1k}$ are the coefficients, $X_1 - X_k$ are the independent variables). The logistic regression model was specifically formulated as:

$$\log \frac{\pi_i}{1-\pi_i} = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k + U_i \quad (1)$$

where $\pi(x) = P(X = x)$ is the independent variable Y with two categories which take the form 0 and 1 where 0 represents small-scale farmers' willingness to participate in auction markets and 1 represents the farmers who

are not willing to participate in auction markets.

3. Results and Discussion

The socio-economic characteristics of the farmers are presented in Table 1. The results indicate that the gender distribution among farmers within the Bushbuckridge Local Municipality is dominated by males. Hence, about 84% of participants are males and only 16% are females. Marital status revealed that 58% of farmers are married, 20% are single, 16% are widowed or widowers, and 6% are categorized as single. In terms of education, a majority have primary education (36%), followed by secondary education (24%), tertiary education (14%), and certificates (6%), while 20% have no formal education. The occupation breakdown indicates that 58% are full-time farmers, 12% are part-time, and 13% are pensioners. Household income distribution shows that 62% have income below R2000, 16% above R5000, and 22% above R20,000.

Table 1. The results of the social-economic characteristics of cattle farmers

Continuous variables				
Variables	Min	Max	Mean	Std Deviation
Age	26	82	58.98	13.342
Household size	1	10	5.78	2.444
Farming experience	1	54	18.06	15.708
Farm size	0.02	100	5.280	18.317
Total herd size	1	97	15.34	19.787
Categorical variables				
Variables	Categories	Frequencies	Percentages (%)	
Gender	Female	8	16	
	Male	42	84	
Willingness to participate	Willing	35	70	
	Not willing	15	30	
Marital status	Single	10	20	
	Married	29	58	
	Divorced	3	6	
	Widow/er	8	16	
Level of education	Primary education	18	36	
	Tertiary education	7	14	
	Secondary education	12	24	
	No education	10	20	
	Certificates	3	6	
Occupation	Full time farmer	29	58	
	Part time farmer	6	12	
	Pensioner	15	13	
Household income	Less than R2000	31	62	
	Above R5000	8	16	
	More than R20 000	11	22	

Moving on to social and economic characteristics, the age of farmers ranges from 26 to 82 years, with an average age of 58.98 years as presented in Table 1. Household sizes vary from 1 to 10 members, with an average of 6 household members. Farming experience ranges from 1 to 54 years, with an average of 18 years. Experienced farmers, particularly during drought seasons, demonstrate better mitigation strategies compared to inexperienced farmers who may sell cattle at lower prices due to decreased body counts. Farm sizes vary from 0.02 to 100 hectares, with an average of 5.28 hectares. Larger farms tend to have better market access and greater negotiating power. Total herd sizes range from 1 to 97 cattle per head, with an average of 15 cattle per head. Larger herd sizes generally contribute to higher production levels and market supply, influencing market prices and ensuring consistent consumer demand is met.

3.1. Factors affecting small-scale cattle farmers' willingness to participate in auction markets

The results provided in Table 2 pertain to the evaluation of a logistic regression model. The Cox & Snell R Square and Nagelkerke R Square are measures of the proportion of variation in the dependent variable explained by the model. In this case, the Cox & Snell R Square is 0.414, and the Nagelkerke R Square is 0.587. The Model Chi-square and the Model Sig. refer to the overall significance of the model. The Model Chi-square is 26.732 with a significance level of 0.002, suggesting that the model is statistically significant. The -2 Log likelihood is a measure of how well the model explains the observed data. A lower value indicates a better fit. Here, the value is 34.354, providing an indication of the model's adequacy in representing the underlying relationship in the data.

Table 2. Binary logistic regression results on small-scale cattle farmers' willingness to participate in auction markets

Variables	B	S.E.	Wald	Sig.
Age of Respondent	0.076	0.072	1.131	0.288
Gender of Respondent	-1.507	1.375	1.202	0.273
Level of Education	1.215**	0.594	4.182	0.041
Access to Markets	0.727	1.423	0.261	0.609
Farm size	0.143**	0.068	4.397	0.036
Total herd size	0.168	0.107	2.477	0.116
Access to agricultural market information	-3.15*	1.794	3.084	0.079
Access to extension service	2.876	1.788	2.587	0.108
Farming experience	-0.282**	0.134	4.433	0.035
Constant	-1.697	3.807	0.199	0.656
Cox & Snell R Square	0.414			
Nagelkerke R Square	0.587			
Model Chi-square	26.732			
Model Sig.	0.002			
-2 Log likelihood	34.354			

Note: * p=0.10, ** p=0.05 represents significance level

3.1.1. Level of Education

The farmers' education level showed significance at 5% ($\beta = 1.215$). This suggests a potential link between education level and farmers' willingness to engage in auction markets. This implies that the farmers' education level is likely to increase the market participation of farmers in the cattle auction market. Education influences farmers' decision-making and ultimately improves their awareness and willingness to participate in various auction markets [13;14].

3.1.2. Farm Size

Farm size was significant at 5% ($\beta = 0.143$), indicating a positive correlation between farm size and farmers' willingness to participate in auction markets. The results suggest that the size of the farm might affect farmers' willingness to participate in auction markets. Larger farms provide farmers with opportunities to enhance access to markets through the inclusion of auctions within their premises, and it enables farmers to accommodate large herd sizes, providing sufficient grazing and space for cattle.

3.1.3. Access to Agricultural Information

The significance level of the variable related to farmers' access to agricultural market information was determined to be negatively significant at 10%. This indicates a noteworthy correlation between market information and farmers' willingness to participate in auction markets, with a negative association. The implication is that an increase in access to market information by one unit is associated with a likelihood of decreasing market participation approximately -3.156 times. These results are in contrast to the findings of Mashapu [15] and Akouegnonhou [16].

3.1.4. Farming Experience

The variable farming experience of the farmers was found to be negative but significant at 5%. This implies that there's a negative relationship between farming experience and the willingness of farmers to participate in auction markets. The implication of this finding is that a unit increase in farming experience has a probability of decreasing market participation by about -0.282 times. The findings agree with Shiviya [2], and contradict the findings of Cheteni and Mokhele [17].

4. Conclusion

The research revealed crucial insights into the factors influencing small-scale cattle farmers' willingness to engage in livestock auction markets in Bushbuckridge Municipality. The socio-economic characteristics, including gender distribution, marital status, education, and occupation shed light on the diverse landscape of these farmers. Notably, variables such as education, farm size, access to agricultural information, and farming experience significantly impact their willingness to participate in action markets. The negative relationship between farming experience and willingness emphasizes the need for tailored interventions to enhance market engagement among experienced farmers. The findings have implications for policy interventions aimed at enhancing market participation and sustainable development in Bushbuckridge Municipality. The study therefore recommends that the government develop educational programs to improve farmers' awareness and understanding of auction markets and support initiatives to increase farm sizes, potentially through collaborative efforts or resource allocation. Furthermore, the evaluation and improvement of the dissemination of agricultural market information to farmers and tailored interventions to address the negative impact of excessive farming experience on market participation should be considered. Future research should explore the psychological and cultural factors influencing farmers' perceptions of auction markets and assess the long-term impact of policy interventions on market participation and rural livelihoods.

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