Viability of Goat Production and Market Participation a Comparative Analysis of Smallholder Farmers in Gwanda District, Zimbabwe

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ABSTRACT

Goat production plays a significant role in improving the welfare of farmers. In Zimbabwe, goats are widely valued as important domestic livestock for their economic value, contribution to food production, and significance in traditional beliefs, especially among smallholder farmers. However, these smallholder farmers, who own 97% of the goats, face numerous challenges that significantly impact their productivity and viability. Market participation offers potential welfare gains from sales that could alleviate these challenges. The purpose of this study was to assess the viability of goat production and determine whether market participation is a viable venture for smallholder goat farmers in Gwanda District, Zimbabwe. Data was collected through questionnaires in a survey of 100 respondents, selected using the multistage sampling technique. The gross margin analysis method was employed to analyse the data. Results showed that goat production is a viable enterprise amongst farmers in Gwanda District. Moreover, market participants demonstrated a higher gross margin compared to non-market participants. The study concluded that goat production is viable, and market participation further enhances this viability. Based on these findings, it is recommended that smallholder farmers consider adopting goat production and participate in goat marketing. Future research is suggested to explore other factors affecting the viability of goat production among smallholder farmers.

Keywords: Viability, Goat Production, Smallholder Farmers, Gross Margin Analysis, Market Participation

INTRODUCTION

In developing countries, small ruminants including goats play a significant role in improving the social and economic welfare of farmers (Rahadi et al., 2022). According to Kumar (2007), goats are one of the main meat-producing animals and apart from meat, they also provide milk, fiber, skin and manure while on the other hand they also play a significant role in the rural economy. Goats are also important for inheritance, payment of bride price, communal feasts and assistance of destitute households through lending (Oladeji and Oyesola, 2008). Badenhorst (2002) also states that goats are useful for dowry, ceremonial meals and payment. In the past, people wore goatskins on the upper parts of the body, as they are softer than those of cattle and other livestock (Burchell, 1967). Goat dung together with cattle dung is important for plastering the roof and walls of huts in most rural households (Badenhorst, 2002). In addition, goats are usually sold when a family needs some cash, thus in this way, they act as a savings account for most rural households (Degen et al, 2010). Generally, the products and functions of goats vary in different regions, countries, agro-ecological zones, cultures, production systems and socio-economic status of the households (Kosgey et al, 2008). Presently in Zimbabwe, goats are valued widely as an important domestic livestock for their economic value, contribution to food production and importance in traditional beliefs especially amongst smallholder farmers (Assan and Sibanda, 2014). About 97% of Zimbabwe's goat herd is owned by smallholder farmers (Ndlovu et al., 2020). These farmers maintain their livelihood through the production of small ruminants like goats which contribute largely to income (Rahadi et al., 2022). Zimbabwean smallholder farmers commonly own the Matabele and Mashona breeds although there are other breeds which are common in the country such as the Boer and Kalahari (Ndlovu et al., 2020).Gebremedhin and Gebrelul (1992) states that goats exhibit advantages over larger livestock as they consume forages that might not be consumed by other animals, have high reproductivity, lower investment and operating costs, lower mortality rates and high adaptability. Unlike cattle which feed on grass alone, goats are also browsers as such they feed on more vegetation helping farmers to

take advantage of the locally available natural resources (Ndlovu et al., 2020). Meanwhile, there is a rising increase in demand for meat and livestock products (Kyeyamwa et al, 2008). This thus makes goats much more suitable and relevant for marketing and income. Smallholder farmers in goat production face numerous challenges that significantly impact their productivity and viability. A production system with high productivity typically demonstrates greater efficiency, as it achieves increased output while utilizing fewer inputs, resulting in comparatively lower production costs (Setoboli et al., 2024). Challenges that affect productivity also affect viability. These include poor health care, inadequate nutrition, lack of proper management, and inappropriate shelter, resulting in diseases, high kid mortality, and poor reproductive performance (Ndlovu et al., 2020). These challenges lead to production losses, ultimately rendering goat production unviable. Consequently, smallholder farmers struggle to achieve their production goals, which include generating sales, providing food in the form of meat and milk, financing farm inputs, maintaining precautionary insurance and savings, and enhancing social status (Melesse et al., 2023). Furthermore, Homann et al. (2007) note that despite the important role of goat production in generating cash, there is a lack of documentation on market flows, goat markets, and the roles of market players. This deficiency hampers the development of effective marketing strategies, forcing farmers to rely on farm gate markets with low prices.

Given the significance of smallholder farmers in Zimbabwe's goat production sector and the challenges they face, this study aims to assess the viability of goat production in Gwanda district, Zimbabwe. Homann et al. (2007) highlight the low incentive to invest in goat production and question whether improved market access can stimulate smallholder goat production. Conversely, Melesse et al. (2023) suggest that market participants may experience welfare gains from sales, potentially alleviating these challenges. To address these conflicting perspectives, this study examines the role played by market participation on goat production viability by comparing outcomes between market participants and non-participants among smallholder farmers. According to Park and Allaby (2017), viability refers to the capability to survive, develop, and thrive, particularly in the context of goat production. In this study, the term profitability is often used interchangeably with viability, as profitability significantly contributes to the overall viability of goat enterprises. Nyathi and Tshuma (2024) highlight that several factors impact viability, including farmers' income, educational levels, and the frequency of visits from extension officers. These elements are crucial for understanding how market participants can enhance their goat production operations.

Research conducted by Mwebe et al. (2011) studied a sample of 126 farms with 888 goats in total to assess goat enterprise profitability under different management systems in Uganda using the gross margin analysis to analyze data. The management systems compared in this study were tethering, zero grazing combined with tethering, zero grazing and free range. Results showed that goat keeping is viable as the gross margins were positive. The tethering management system made more profits followed by zero grazing combined with tethering. Moreso, Prabu et al (2011) did a study in India to analyze the profitability of goats. The study by Prabu et al (2011) used data from a sample of 150 farmers selected using simple random sampling without replacement. In comparison to Mwebe et al (2011) who used gross margin analysis to compare the profitability of goats under different management enterprises, Prabu et al (2011) compared the profitability of goats among larger, small, landless and marginal farmers using gross incomes. The results of the study also showed that goat farming is profitable and is an income-generating avenue. Gross incomes were higher for the large farmers followed by landless farmers, marginal farmers and lowest in small farmers. In Nigeria, Elum et al. (2017) approached the profitability analysis from a marketing perspective rather than comparing management systems as seen in earlier studies. They used net profit models based on data from selected markets and concluded that goat marketing is highly profitable. Baruwa (2013) also examined costs and returns among 60 goat farmers through budgetary techniques, reinforcing the notion that goat production is indeed profitable. Just as Elum et al (2017), Baruwa (2013) did not use the gross margin for comparisons. The study analyzed data using the budgetary technique to determine the gross margin and net profit of goats. Results revealed that the gross margin and net profit of goats were positive showing that goat production is profitable. Rodríguez et al. (2015) contributed to the body of knowledge by analyzing sales data from eleven goat farms in Mexico over two years. The study made comparisons between the first and second year. The gross margins of goat enterprises included income from goat products, which were meat and cheese. The results showed that the gross margin of the first year was higher than the second year. However, both gross margins had positive values therefore consistent with the findings of Baruwa (2013) where goat production was profitable. Despite

the valuable insights from literature on goat viability and profitability across different regions and management practices, significant research gaps persist that justify the need for a comparative analysis between market participants and non-market participants. Most studies do not differentiate between these groups, limiting our understanding of how market participation influences profitability and sustainability of goat production enterprises. Addressing these gaps by analysing the viability of goat production among market and non-market participants provides a more comprehensive understanding of goat viability and inform strategies to enhance the livelihoods of both market and non-market participant farmers.

RESEARCH METHODOLOGY

Area of Study

The study was conducted in Gwanda District which is located in Matabeleland South province, between Bulawayo and Beitbridge areas, its coordinates being, 21˚30′0″S and 29˚30′0″E at 668m above sea level. The total area of land covered by Gwanda District is 14015.31km^2 (Gwanda RDC, n.d). It is divided to 24 wards which are further divided into various villages (Zim Stat, 2022). It is situated in natural region 5 which has very erratic and unreliable rainfall of less than 500mm per year (Rukuni and Eicher, 1994). The main sources of income for farmers in the area are cattle and goat production (FAO, 2000). Kindness et al (1999) and Ndlovu et al (2020), state that a large proportion of goat farmers in Zimbabwe live in the dry regions, agro-ecological regions 4 and 5. High temperatures and poor rainfall are common features of Gwanda just like most parts of natural region 5. Goat production is predominant in such regions as they are valuable assets in drought-prone areas for investment and income generation (Ndlovu et al., 2020). The total population of Gwanda District stands at 151,691, with 124,548 of this population being from the rural areas (ZimStat, 2022).

Sampling and Data CollectionThe multi-stage sampling method was used to select 100 study participants from a total of 751 households which produced goats as per the district veterinary officer's register. In the first stage of sampling, two wards were selected using purposive sampling on the bases of accessibility as some wards were located in areas with poor transport systems. In this stage of sampling, wards 15 and 18 were chosen as the most accessible amongst other wards with large goat populations. From the selected wards, two villages in each were selected (second stage) purposively on the bases of accessibility. In ward 15, Selonga and Tibeli villages were chosen as they were the most accessible in the ward, while in ward 18, Buvuma and Sukwe villages were chose purposively. According to the sampling frames of these villages from the veterinary officer, Selonga village had 284 households with goats, Tibeli village had 262, Sukwe village had 130 and Buvuma village had 111 yielding a total of 787 households. The method used for the selection of the sample of households for the study was simple random sampling (hat method). From the sampling frame of each village, the researcher selected 25 households to get a sum of 100 households for the study as shown in Figure 1. The study mainly relied on primary data collected in the study area, Gwanda District. Questionnaires were used as the main data collection tool for the study during the survey. Data collected was from one hundred smallholder goat farmers in Gwanda District in Selonga, Tibeli, Buvuma and Sukwe villages of ward 15 and 18. The data collected comprised of household goat production, marketing of goats and costs of production**.**

Analysis

Data were analyzed the using descriptive statistics and gross margin analysis. Descriptive statistics were for summarizing the characteristics of household goat production while the gross margin analysis was used for the assessment of the viability of goat production for households producing goats comparing market participants and non-participants in Gwanda District. Market participants were farmers that sold goats during the year while market participants were those that did not sell. Gross margins for each household were calculated, analyzed using the t-test and presented in a table showing market participant and non-participant households. The variables used to calculate the gross margins include the number of goats owned at the beginning of the year and at the end of the year, the number of goats sold during the year, transaction costs and production costs. The method used for calculating the gross margins was drawn from Mwebe et al. (2011). The price used to value goats owned by households was the general price of goats in the area of study less the potential

transaction costs and the selling price was the value for the sold goats. The gross margin calculation formulae used in the study as suggested by Mwebe et al. (2011) was as follows:

$$GM = GI - TVC$$

Where: *GM* = Gross Margin,

GI = Gross Income

TVC = Total Variable Costs

Limitations of the Research Methods

Most of the smallholder farmers did not have records, as a result, their responses were more of estimations and this affected the quality of data collected. The study focused on 100 households in two wards of Gwanda District, hence, the data collected does not give a precise representation of the households in whole district. Furthermore, the gross margin analysis does not give actual values of the profitability of goat production. However, there were several measures taken to keep the limitations of the research methods minimal and it is of expectation that the results give a general image of the state of goat production and marketing in Zimbabwe. The use of probing and language translation ensured that farmers understood the questions asked during interviews according to the demands of the questionnaires. The gross margin analysis used is also very useful in comparing relative costs and returns of similar enterprises.

RESULTS AND DISCUSSION

Descriptive Statistics

The results shown in table 1 show amongst the 100 households that participated in the study, 63 where market

participants while 37 were non-participants. Those that were market participants had an average length of experience in goat production of 15 years whereas the non-participants had an average of 14 years. The t-test

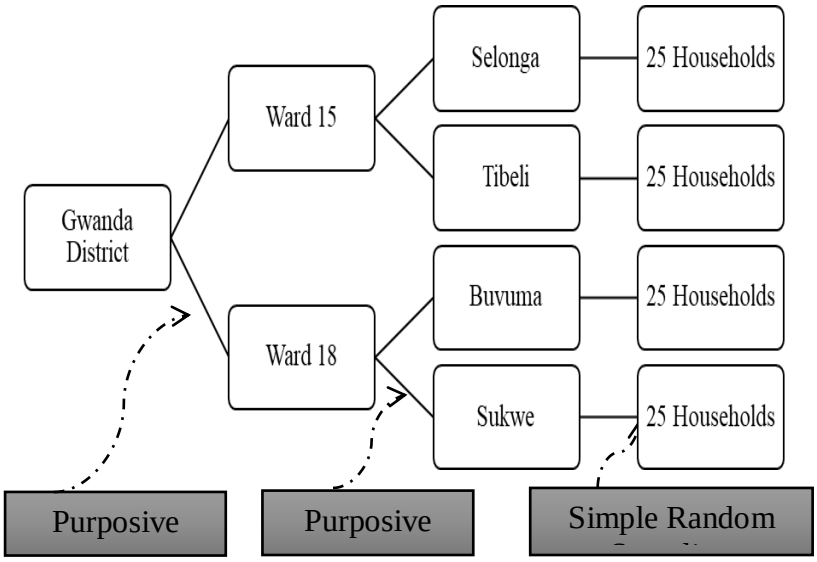

Figure 1: Sampling procedure

Source: Authors' conceptualisation

indicates that there was no significant difference in experience between market participants and non-market participants pertaining to goat production experience at 5% level of significance. The average number of goats owned at the beginning of the year by the market participants was 21 compared to 15 for the non-market participants, with an aggregate average of 19 for the study sample. Similarly, the t-test shows that there was no significant difference between the two groups. An average of 11 goats for the market participants were born during the year compared to six for the non-market participants, with an aggregate of nine for the overall study

sample. There was a significant difference in the number of goats born during the year between market participants and non-market participants at 5% level as indicated by the t-test. The average cost of production in 2017 was $35 for market participants while it was $15 for non-market participants. According to the t-test, there was no significant difference between the two at 5% level. Both groups consumed an average of two goats and lost an average of 4 goats to due to death. Of the 100 households interviewed, 63% produced goats for generating income, and these composed about 67% of the market participants and about 57% of the non-market participants. However, there was no significant difference between market participants and non-market participants pertaining to the major reason for producing goats at 5% level ($\chi 2 = 1.187$). Other reasons for production of goats included meat production (20%), wealth storage (12%), milk production (3%), and due to the influence of the local environment and culture (2%). Most of the households interviewed (65%) received agricultural training at some point and, these were composed about 68% of the market participants and about 60% of the non-market participants ($\chi 2 = 0.792$, $p > 0.05$). Amongst those who had received agricultural training, about 85% received training about goats comprised of about 91% of the market participants and about 73% of the non-market participants ($\chi 2 = 1.692$, $p > 0.05$). Furthermore, most (43.6%) of the farmers received training about the general management of goats. Other trainings related to goats were about health, feeding and marketing.

Table 1: Characteristics Of Factors Related to Goat Production for Households in Gwanda District, Zimbabwe

Characteristics	**Participants**	**Non-participants**	**Total**	**t-value**
Number of households	n=63	n=37	N=100	
Experience in goat production in years (Mean, SD)	15 (10)	14 (11)	15 (11)	-0.751
Number of goats at the beginning of the year (Mean, SD)	21 (17)	15 (14)	19 (16)	-1.858
Number of goats born (Mean, SD)	11 (14)	6 (4)	9 (11)	-1.989*
Number of goats dead (Mean, SD)	4 (4)	4 (4)	4 (4)	-0.469
Number of goats consumed (Mean, SD)	2 (3)	2 (2)	2 (3)	-0.898
Costs of production (US$) (Mean, SD)	35 (97)	15 (25)	28 (79)	-1.538
				Chi square
Major reason for producing goats:				
1. Income generation (%)	66.7	56.8	63	
2. Meat production (%)	17.5	24.3	20	
3. Wealth storage (%)	11.1	13.5	12	
4. Milk production (%)	3.2	2.7	3	
5. Environment/Culture (%)	1.6	2.7	2	1.187
Received agricultural training (%)	68.3	59.5	65	0.792
Inclusion of goats in the training [Yes (%)]	90.7	72.7	84.6	1.692
Type of training in goats:				
1. Health (%)	20.5	37.5	25.5	
2. Feeding (%)	17.9	18.8	18.2	
3. General management (%)	48.7	31.3	43.6	
4. Marketing (%)	12.8	12.5	12.7	3.471

***-Significant**

Source: Smallholder goat marketing survey (2018)

Market participants had more experience in goat production as compared to non-market participants. The market participants also owned more goats at the beginning of the year, which resulted in more goats being born during the year among market participants as compared to the non-market participants. The goats consumed, bought and those that died during the year were similar between both the market participants and the non-market participants. In addition, market participants faced more production costs than non-market

participants. The reason could be that market participants tend to worry more about producing goats that will get a higher price therefore they precisely follow the correct vaccination schedules and they try to supplement feed for their goats during times of adequate feed availability. However, non-market participants just need their goats to be consumable regardless of the meat quality and the price. The majority of the farmers had received agricultural training at some point. Most of the market participants had received agricultural training as compared to the non-market participants. Amongst the agricultural trained farmers, most had received training that included goats and similarly, most of these were market participants. More so, those who received training about the general management of goats were largely market participants as compared to those who received other types of training in goats.

Gross Margin Analysis

Table 2: Gross Margin Analysis of Smallholder Goat Farmers in Gwanda District, Zimbabwe

S/N	Indicators	Participants (n=63)	Non-participants (n=37)	t-value	Significance
1.	Number of goats owned at end of year (Mean, SD)	22 (23)	16 (17)	-1.485	Not Significant
2.	Value of goats owned at end of year (Mean, SD)	$667.62 (692.81)	$474.32 (498.19)	-1.485	Not Significant
3.	Value of goat sales (Mean, SD)	$217.12 (294.89)	$0	-5.844	Significant (*)
4.	End of year value and sales (b + c) (Mean, SD)	$884.74 (913.93)	$474.32 (498.19)	-2.517	Significant (*)
5.	Number of goats owned at beginning of year (Mean, SD)	21 (17)	15 (14)	-1.858	Not Significant
6.	Value of goats owned at beginning of year (Mean, SD)	$632.38 (515.84)	$445.95 (425.22)	-1.858	Not Significant
7.	Production costs (Mean, SD)	$35.05 (97.21)	$15.18 (25.02)	-1.538	Not Significant
8.	Transaction costs (Mean, SD)	$2.90 (10.31)	$0.16 (0.99)	-2.088	Significant (*)
9.	Beginning of year value and costs (f + g) (Mean, SD)	$670.33 (585.73)	$461.28 (437.09)	-1.883	Not Significant
	Gross Income	$884.74	$474.32	—	—
	Total Variable Costs	$670.33	$461.28	—	—
	Gross Margin (Mean, SD)	$214.41 (554.41)	$13.04 (253.25)	-2.476	Significant (*)

***-Significant**

Source: Smallholder goat marketing survey (2018)

The results of the gross margin analysis in table 2 show that the average gross income for goat production enterprises of the market participants was $884.74, obtained by summing up the end of year value of goats and goat sales. The total variable costs amounted to $640.33, obtained by summing the beginning of year value of goats and costs. Hence, the market participants had an average gross margin of $214 per household. On the other hand, the non-participants had an average gross income of $474.32 and total variable costs of $461.28, yielding a gross margin of $13.04. The t-test indicated that at 5% level of significance, there is a difference

between the gross margining of market participants and non-participants. The results show that the average gross margin of market participants ($214) is higher than that of non-participants ($13.04).

The gross margin analysis results show that gross margins for both market participant households and non-market participant households were positive implying that goat production was viable amongst both market participants and non-market participants. This means that goat production is a viable enterprise for smallholder goat farmers in Gwanda District. These results are similar to the findings of Mwebe et al (2011) who found positive gross margins indicating the viability of goat production. Prabu et al (2011) also found positive gross returns in a study profitability analysis of goat farming in India indicating that goat production is profitable hence viable. However, the gross margin of the market participant households was significantly higher than that of the non-market participant households.

Goat production was more viable among market participant households as compared to non-market participant households implying that market participation increases viability of goat production. The results are also consistent with the findings of Elum et al (2017) who found that goat marketing is very profitable in a study of the profitability of goat marketing in Nigeria. Goat production is viable among market participants because goats sold have a higher value than those kept for consumption, wealth storage and prestige amongst other reasons. According Sigei et al (2013), marketing leads to an increase in production, which then stimulates viability, thus resulting in viability being associated with market participants. Welfare gains from sales earned by market participants can potentially alleviate challenges faced by smallholder farmers resulting in an increase in viability (Melesse et al., 2023).

CONCLUSION AND RECOMMENDATIONS

The general objective of the research study was to analyse the viability of goat production among market participants and non-participant smallholder goat farmers in Gwanda District. The multistage sampling technique was used to select a sample of 100 goat farmers in Gwanda District for data collection using questionnaires. The gross margin analysis was used to assess the viability of goat production for households in Gwanda district. Results showed that goat production was viable among both market participants and non-participants although it was significantly more viable for market participants than non-participants. Consequently, the study concludes that market participation increases goat production viability among smallholder farmers.

The study provides valuable insights into the viability of goat production among smallholder farmers in Gwanda District, highlighting the significant benefits of market participation. To enhance the profitability and sustainability of goat production, it is recommended that targeted programs be developed to support smallholder farmers with access to better markets, improved infrastructure, and higher-quality feed and veterinary services. Additionally, training programs should be expanded to include practical management skills that emphasize cost efficiency and market strategies. Lastly, future research should explore the impact of external factors like climate change on goat production viability to inform adaptive strategies for smallholder farmers.

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