AN ANALYSIS OF THE VALUE CHAIN AND PROFITABILITY FOR SMALL-SCALE INDIGENOUS CHICKEN PRODUCTION IN BINDURA DISTRICT ZIMBABWE.

A dissertation submitted in partial fulfilment of the requirements of the Bachelor of Agricultural Science Honours Degree in Agricultural Economics and Management.

Bindura University of Science Education

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DECLARATION

I hereby declare that the research project entitled"AN ANALYSIS OF THE VALUE CHAIN AND PROFITABILITY FOR SMALL-SCALE INDIGENOUS CHICKEN PRODUCTION IN BINDURA DISTRICT ZIMBABWE"submitted to Bindura University of Science Education, Faculty of Agriculture and Environmental Science, Department of AgriculturalEconomics and Extension is a record of an original work done by me under the guidance and supervision of Dr L Musemwa and this work is submitted in partial fulfilment of the requirements for the award of a Bachelor of Agriculture Economics and Management. The results embodied in this thesis have not been submitted to any University or Institute for the award of any degree of diploma.

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DEDICATION

I dedicate this work to my parents and the rest of the family. Thank you all for your support

ACKNOWLEDGEMENTS

Firstly, I would like to send my special thanks to my family and my supervisor for his guidance in the writing of this research. To my fellow class mates, mentors, colleagues and lectures your assistance in getting me this far will never go unnoticed. Thank you for pushing me to the limits, and for all the encouragement and cooperation. All said and done I would like to give all the thanks to God for all His blessings and for making this research a success.

ABSTRACT

Indigenous chicken production plays a critical role in the livelihoods. This research investigates the indigenous chicken production, aiming to identify challenges, map the value chain, assess economic contributions, and determine factors influencing profitability. The study employs a descriptive survey research design, with data collected through questionnaires, key informant interviews, and observations. A sample of 80 farmers is randomly selected from the population, while key informants are purposively sampled based on their expertise and involvement in indigenous chicken farming. Descriptive statistics, regression analysis, and gross margin analysis are utilized to analyse the data and draw conclusions.The findings reveal significant challenges faced by indigenous chicken farmers in Bindura district, including high mortality rates, costly vaccination programs, limited market access, and fluctuations in feed and labour costs. Agricultural markets, middlemen, roadside sales, and farmgate sales are identified as primary market channels, highlighting the importance of market access for farmers. The findings of the study revealed several significant variables influencing the profitability of indigenous chicken production in Bindura district. Regression analysis identified feed costs ($B = 3.085$, $p = 0.032$), labour costs ($B = 0.656$, $p = 0.055$), vaccine costs ($B = 0.024$, $p = 0.008$), and mortality rates ($B = 0.091$, $p = 0.011$) as significant predictors of profitability, underscoring the need for efficient resource management and disease control measures. Moreover, recommendations are formulated to address the identified challenges and enhance the profitability and sustainability of indigenous chicken production. These recommendations include implementing effective disease management strategies, improving market access, capacity-building initiatives, promoting own feed formulation methods, and supporting research and innovation efforts.In conclusion, this dissertation provides valuable insights into the indigenous chicken production sector in Bindura district, Zimbabwe, offering recommendations for policymakers, extension workers, and indigenous chicken farmers to enhance the resilience and profitability of the sector. By addressing the identified challenges and implementing the proposed recommendations, stakeholders can promote sustainable and inclusive growth in indigenous chicken farming, contributing to poverty alleviation, food security, and rural development in the region.

Key words: Profitability Return on Investment Regression IndigenousChickens Value chain

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CHAPTER ONE
INTRODUCTION

1.1 Introduction

Agriculture forms the backbone of Zimbabwe's economy, as reported by Faranisi (1995). It provides income for a substantial portion of the population, roughly 75%, and contributes over 40% of the country's export earnings (Faranisi, 1995). Chicken production in Zimbabwe, mirroring trends in many developing nations, follows a two-tiered system: large-scale and smallholder production (Faranisi, 1995). Large-scale operations are characterized by intensive management practices, heavy reliance on machinery, and specialization (Pedersen, 2002). A small number of large companies dominate this sector, acting as both breeders and producers (Pedersen, 2002). In contrast, the smallholder sector encompasses a wider range of practices, including small-scale commercial (semi-intensive) and communal (extensive) farming systems. Notably, 70% of Zimbabwe's total chicken population, and a substantial portion of sub-Saharan Africa's as well, is raised using the extensive production system (Faranisi, 1995).

1.2 Background of the study

Driven by population growth, the demand for white meat, including indigenous chickens, is on the rise (FAO, 2003). In Zimbabwe, indigenous chicken production is characterized by traditional practices that utilize natural systems with minimal reliance on supplemental feeds (FAO, 2003). This approach is believed to contribute to the nutritional value and health benefits of the chickens for consumers.The production of indigenous chickens provides important benefits in the rural communities in Zimbabwe through the provision of eggs, meat and income. This helps in reducing food and nutrition insecurity at the household level as the chickens are usually reared for family consumption where they provide a source of high-quality protein and income from surpluses (Kyarisiima et al., 2004).The existence of indigenous chickens despite the introduction of exotic breeds has proved that indigenous chickens can compete with improved breeds in poultry production (Kyarisiima et al., 2004).

Research by Mutenje et al. (2008) highlights another valuable contribution of indigenous chickens in Zimbabwe. They serve as a critical buffer against income fluctuations caused by HIV/AIDS, especially for women and child-headed households. These families utilize

indigenous chickens as a way to maintain consistent food consumption despite facing economic hardships.Beyond their role in food security, indigenous chickens offer a distinct advantage over other poultry options, like broilers. Their unique flavour profile is preferred by many consumers (citation needed for taste preference). Additionally, research by the FAO (2010b) suggests that indigenous chicken meat boasts health benefits compared to other meats. It's generally lower in total fat and contains more monounsaturated fats, considered healthier.

Chickens offer a potentially more efficient source of animal protein compared to other livestock due to their superior feed conversion rates. Research by Al-qamashoui (2014) suggests that only 2-4 kilograms of feed are needed to produce 1 kilogram of chicken, whereas beef cattle may require 7-10 kilograms of feed for the same weight gain. Despite this advantage, low sales rates remain a persistent challenge for smallholder indigenous chicken farmers.Indigenous chicken production is still underdeveloped as there are poor linkages between producers and consumers. Information on players or marketers is still lacking thereby depressing the growth of the sector. Addressing information challenges will help to improve the production of indigenous chickens and consequently improve sales rates for indigenous chickens thereby improving farmer's welfare through increased income from indigenous chickens (FAO, 2010b).

Indigenous chicken production has been shown to have a positive potential to improve the well-being of most rural populations. This is because theythrive well to the local climate and they are very cheap to rear compared to the other breed. However, few studies have been conducted to look at the economic viability of small-scale indigenous chicken production hence the need for conducting this study whose main aim is to analyse the value chain and profitability of indigenous chickens in Bindura District. This study provides insights into the economic viability of indigenous chicken production for small-scale farmers, thereby informing policy decisions aimed at promoting sustainable agricultural practices and rural development. Additionally, identifying key value chain actors, market dynamics, and constraints can help stakeholders devise targeted interventions to enhance the competitiveness and resilience of the indigenous chicken sector.

1.3 Statement of the problem

Indigenous chicken production plays a crucial role in addressing food insecurity among small-scale farmers. However, the majority of these farmers are food insecure, with 75% of

the food insecure group being unemployed and keeping indigenous chickens ranging from 5-20. This small volume of chicken ownership indicates a potential decline in their numbers, which could exacerbate food insecurity in the region. According to the 2024 First Round Crop, Livestock and Fisheries report (CLAFA 1), chicken was available in 30% of the markets and has declined to 13% which signify shortage of chicken. Despite the outlined importance of indigenous chickens, small-scale farmers face significant challenges such as high morbidity of chickens due to New Castle, shortage of vaccines, lack of feed, unavailability of viable markets, lack of access to credit, high transport costs of markets, theft, and lack of knowledge on good practices in raising the chickens. These challenges significantly affect the profitability of small-scale indigenous chicken production. Therefore, there is a pressing need to investigate the value chain and profitability of small-scale indigenous chicken production in Bindura District.

1.4 Research questions

1. What are the challenges faced by small-scale indigenous chicken farmers in Bindura district?
2. What are the components of indigenous chickens' production value chain in Bindura district?
3. What is the average return on investment (ROI) for indigenous chicken production in Bindura district?
4. What are the factors that affect the profitability of indigenous chicken in Bindura district?

1.5 Research objective

1.5.1 Main objective

To analyse the value chain and profitability of indigenous chickens in Bindura district.

1.5.2 Specific objectives

i. To identify challenges faced in indigenous chicken production in Bindura district.

ii. To map indigenous chickens' production value chain in Bindura district.

iii. To determine the contribution of indigenous chicken production on Return on investment (ROI)in Bindura district.

iv. To identify factors that affect the return on investment in indigenous chicken productionin Bindura district.

1.6 Significance of the study

Understanding the value chain and profitability of indigenous chickens in Zimbabwe is crucial for several reasons. Firstly, it provides insights into the economic viability of indigenous chicken production for small-scale farmers, thereby informing policy decisions aimed at promoting sustainable agricultural practices and rural development. Additionally,identifying key value chain actors, market dynamics, and constraints can help stakeholders devise targeted interventions to enhance the competitiveness and resilience of the indigenous chicken sector.

1.7 imitations and delimitations of the study

The primary constraints include cost, time, and logistical challenges. The financial cost of conducting a comprehensive study can be substantial, considering the expenses related to data collection, analysis, and report writing. Time is another significant constraint, as the study requires ample time to gather and analyze data, which might not always be available. Logistical issues, such as reaching remote areas in the district and coordinating with local communities, can also pose challenges.To mitigate these limitations, the study employed several strategies. To address cost constraints, the study utilized cost-effective methods such as online surveys and local collaborations to gather data. Time limitations were managed through careful planning and efficient use of resources. Logistical challenges were mitigated by partnering with local community leaders and organizations, which facilitated access to the study areas and participants. These strategies helped to ensure the study's feasibility and reliability despite the outlined limitations.

1.8 Outline of the research project

The study is organized into five chapters. Chapter 1 provides an introduction and background to the study, setting the context and outlining the research problem. Chapter 2 presents a literature review, critically examining previous studies and theoretical frameworks relevant to the research topic. Chapter 3 details the research methodology, explaining the methods used for data collection and analysis. Chapter 4 presents the research findings and provides a discussion, interpreting the data in the context of the research questions. Finally, Chapter 5

offers a summary of the study, draws conclusions based on the findings, and provides recommendations for future research.

1.9 Chapter Summary

This chapter provides an introduction to the study, outlining the background, objectives, significance, and scope of the research. The chapter begins by presenting an overview of the indigenous chicken production sector, highlighting its importance for food security, income generation, and rural development in Bindura district. The objectives of the study are then delineated, focusing on identifying challenges, mapping the value chain, assessing the economic contributions, and determining factors influencing profitability in indigenous chicken production. The significance of the study is underscored, emphasizing its potential to inform policy, guide interventions, and enhance the livelihoods of small-scale farmers. Lastly, the chapter outlines the scope and structure of the research, delineating the key chapters and the methodology employed to achieve the study's objectives.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Indigenous chicken farming has gained attention due to its potential to empower local communities and promote sustainable agricultural practices. This literature review aims to analyse the value chain of indigenous chicken production and assess its profitability, focusing on the unique characteristics and challenges faced by small-scale farmers.

2.2 Definition of key concepts

2.2.1 Value chain

The value chain is defined as the full range of activities that firms and workers perform to bring a product from its conception to final use (Gereffi and Fernandez-Stark, 2011). According to Porter (1985), value chain refers to the series of activities that a company undertakes to deliver a product or service to the end customer. Kaplinsky and Morris (2001), defineda value chain as the full range of activities which are required to bring a product or service from conception, through the different phases of production (i.e.involving combinations of physical transformation and the input of several producer services), delivery to final consumers and final disposal after use.

2.2.2 Profitability

Profitability is the ability of a business to make profits from its operations by employing its resources. It is known as an economic tool that guides all of the business's decisions about how to manage its operations and interact with its business partners. As a result, it becomes a crucial factor in determining the level of economic efficiency (Cojocaru, 2000).The goal of profitability is to generate a profit from sales of output that is greater than costs.Relevant stakeholders might be informed by profitability about a company's capacity to maintain its market position and grow.

2.2.3 Return on investment (ROI)

Return on investment (ROI) is a ratio that measures the profitability of an investment by comparing gain and loss to its cost. It helps assess the potential return of investments on things like stocks or business ventures. It can be defined as a performance measure used to evaluate the proficiency of an investment or compare the competence of different investments. It measures the amount of return on an investment associated with the investment cost.Higher ROI indicates a more efficient use of capital and a more profitable investment. ROI is usually presented as a percentage and can be calculated using a specific formula as follows:

ROI= Net Return on Investment / Cost of Investment ×100%

2.3 Challenges in Indigenous chicken production in developing countries

2.3.1 Production challenges

The absence of sufficient maize grains, soybeans, day-old chicks, disease prevalence, and poor purchasing power of the populace are the main obstacles facing the poultry industry in

Africa. Low employment rates, a slow improvement in the sale of poultry products, and a generally low level of societal wealth have a detrimental impact on the African consumer market. But throughout the past 20 years, Africa's meat-eating patterns have undergone a substantial shift. The most popular meat used to be beef, but lately, hog and chicken meat have taken its position. Nowadays, half of the meat consumed is chicken meat (Chadd, 2007). This shift in the way that people consume meat has been caused by both taste and poverty, as many have turned to less expensive alternatives.

2.3.1.1 Insufficient input supply

African producers have struggled to meet the rising societal demand for meat products. With 83% of food consumed in Africa being imported, this dependency highlights the underlying weaknesses in the continent's agricultural system, leading to a crisis in poultry production (Juma, 2016). It is unlikely that Africa will increase its poultry output if it is unable to increase its own grain production (Mengesha, 2012b). One of the most crucial factors in intensively farmed poultry production is nutrition. Numerous factors, including food quality, animal performance, animal genetics, and animal health, affect how well food performs. Therefore, the future system must place a higher priority on resource security and efficiency (Chadd, 2007; Mengesha, 2012a).

Grain is supposed to be produced in excess of what is needed to support the human population, but many African nations are now unable to produce enough of it. Lihoussou and Limbourg (2022) proposed that the accessibility of maize and soybean should be the primary focus of efforts to increase chicken production. Given its numerous uses as a food source, animal feed, and industrial raw material, soybeans may eventually establish itself as a major crop in Africa (Sinclair et al., 2014).

2.3.1.2 Genetic quality

Rapid changes in agricultural systems are depleting animal genetic resources in developing nations generally. The primary factor contributing to the loss of native animal genetic resources is the careless introduction of exotic genetic resources before native genetic resources have been properly characterized, used, and conserved (FAO, 1999). The majority of indigenous, low-yielding hens utilized in Ethiopia have gone toward producing the majority of poultry items. Numerous sources claim that Ethiopia is seeing a rise in demand for poultry, poultry products, and poultry by-products despite the low productivity of the native chicken breed.

2.3.1.3 Predatory

Predators are the main factor limiting chicken output; they are brought on by inadequate housing and a scavenging feeding system (Assefa et al., 2015). Alemayehu et al. (2015) found that the most frequent predators identified by the chicken owners in the research areas in Benishangul-Gumuz, Western Ethiopia, were foxes, eagles, and wild cats (known locally as "shelemetma"). Eagles are a major hazard during the dry season, while other birds are more prone to attack chickens during the wet season. Owners of chickens claim that during the rainy season, foliage hides the scavenging grounds, making it simpler for foxes and wild cats to assault hens. Because there is less vegetation at scavenging areas during dry seasons, chickens are more vulnerable to eagle attacks.

2.3.1.4 Diseases

Poultry diseases are reported to be the greatest impediment to successful indigenous poultry farming in Kenya. Some commonly reported diseases could include Newcastle, fowl typhoid, fowl pox, gumboro, marek's, and coccidiosis (Omondi, 2018). Disease infection causes great economic losses through mortality and reduced profit margins (Njagi et al., 2012). The disease prevalence could be attributed to low adherence to strict biosecurity measures and lack of strict vaccination schedules in the free-range system of production which is commonly practised.

2.3.2 Marketing challenges

According to Molla (2010), the market price of chickens was determined by many factors such as the kind of comb, weight, and colour of the feathers.The village chicken production system in Zimbabwe has several fundamental limitations, including a lack of markets and marketing expertise (Kusina and Kusina, 1999).

2.3.2.1Limited Market Access

Smallholder farmers often face significant barriers in accessing larger and more profitable markets due to inadequate infrastructure. Poor road networks and lack of reliable transportation facilities make it challenging for farmers to transport their chickens to distant markets where demand and prices might be higher (Molla, 2010). This limited market access confines farmers to local markets, which are often saturated and offer lower prices, reducing

the potential for higher earnings and growth within the indigenous chicken value chain (Omondi, 2022).

2.3.2.2 Price Fluctuations

Indigenous chicken farmers are frequently affected by significant price fluctuations, which are driven by seasonal changes in supply and demand. During peak production periods, the market becomes flooded with chickens, leading to a drop in prices. Conversely, during off-peak seasons, prices may rise, but the limited supply means farmers cannot fully capitalize on these higher prices (Magothe et al., 2012). This volatility creates financial instability for farmers, making it difficult to predict income and manage finances effectively (Ayieko et al., 2014).

2.3.2.3Lack of Market Information

Access to timely and accurate market information is crucial for making informed decisions about production and sales. However, smallholder farmers often lack access to such information, including current market prices, consumer preferences, and demand trends. This information gap prevents farmers from optimizing their production and marketing strategies to meet market demands effectively (Molla, 2010). As a result, they may miss opportunities to maximize their profits and enhance their competitiveness in the indigenous chicken value chain (Omondi, 2022).

2.3.2.4 High Transaction Costs

The indigenous chicken value chain is characterized by the involvement of numerous intermediaries, such as traders and middlemen, who facilitate the movement of chickens from farmers to consumers. These intermediaries add to the transaction costs, reducing the overall profit margins for smallholder farmers (Magothe et al., 2012). High transaction costs can be attributed to multiple factors, including transportation fees, middlemen commissions, and various market levies, which cumulatively erode the earnings of farmers (Ayieko et al., 2014).

2.3.2.5 Inadequate Marketing Skills

Many smallholder farmers lack formal training in marketing, which is essential for effectively promoting and selling their products. Without knowledge in areas such as branding, customer engagement, and market positioning, farmers struggle to differentiate

their products in the market and attract better prices (Omondi, 2022). This deficiency in marketing skills hampers their ability to compete with more commercialized poultry producers and limits their potential to expand their market reach and profitability (Magothe et al., 2012). Training programs and support services aimed at enhancing farmers' marketing skills could play a significant role in overcoming this challenge (Ayieko et al., 2014).

2.3.3 Institutional challenges

Among the institutional restraints are the absence of services for smallholder farmers' demands in terms of agricultural input supply, financial facilities, and viable urban marketplaces.

2.3.3.1 Lack of support

Institutional assistance should be given at different levels to address every aspect of producing chickens in villages. Assistance may take the form of granting finance, distributing and supplying inputs, marketing, supplying feed and stock, and making general capital investments. This type of assistance will enable the village's chicken production to continue, grow in confidence among farmers, and ultimately be sustainable. Research institutes should concentrate on the issue of optimal resource usage in the current production systems rather than on-station research for maximum production (Kusina and Kusina, 1999).

2.3.3.2 Lack of evidence

The low returns of village chicken production in rural areas can be attributed to insufficient empirical case studies, the use of conventional and sometimes inappropriate economic models to measure production and financial returns and failure to consider all uses. This is also due to the chickens’ multiple non-cash outputs, such as manure, traditional purposes, home consumption, social obligations and status. Since poultry products consumed by the farming family only passes through non-formal marketing channels, researchers and decision-makers do not adequately appreciate the economic importance of such products. There is need to understand the perceptions of the farmers on the functions of village chickens and the value of their products under the existing production systems in order to improve village chicken productivity and sustainability in rural areas.

2.3.3.3 Inadequate extension services

According to FAO(2008) in research conducted in Kenya, public education and training on safe poultry production, adequate biosecurity, and management were essential for rural regions.In a situation when a disease strikes, smallholder chicken producers who practice free-range production may decide to take no action, use human or modern medicine, or apply traditional veterinary techniques (Mapiye and Sibanda, 2005).Farmers' inability to react to disease outbreaks was blamed on their lack of resources to buy veterinary medications and the lack of veterinary extension services; in contrast, traditional medicine is frequently utilized and preferred because of its accessibility, affordability, and ease of application.

2.4 Indigenous chicken value chain in developing countries

In order to comprehend the different players engaged in indigenous chicken micro-farming and their actions, this study has analysed the literature that is currently accessible as part of the process model building utilizing system dynamics. The pre-producer, wholesalers, processors, retailers, and consumers are the primary players in the indigenous chicken value chain, according to the value chain mapping conducted through the literature research. Pre-producers are the initial players in the value chain of indigenous suppliers. Pre-farmers give producers access to inputs such day-old chickens (DOCs), vaccinations, feed, equipment, and extension services. One of the key participants in the domestic chicken value chain is the producer.

The producer sells their chicken to either directly to mainly consumers or through middlemen,butcheries, restaurants and wholesalers, who then resell it to processors and merchants. Wholesalers, retailers and butcheries then resell toconsumers as full chicken or cutlets. Middlemen offen sale the chicken to consumers as live birds. Processors that provide and serve chicken products to final consumers, which includesvarious restaurants and butcheries, enhance the value of the chain. Furthermore, a few processors have their own slaughterhouses where they kill native birds. Chickens that have been slaughtered are packaged and prepared for sale in the frozen market.

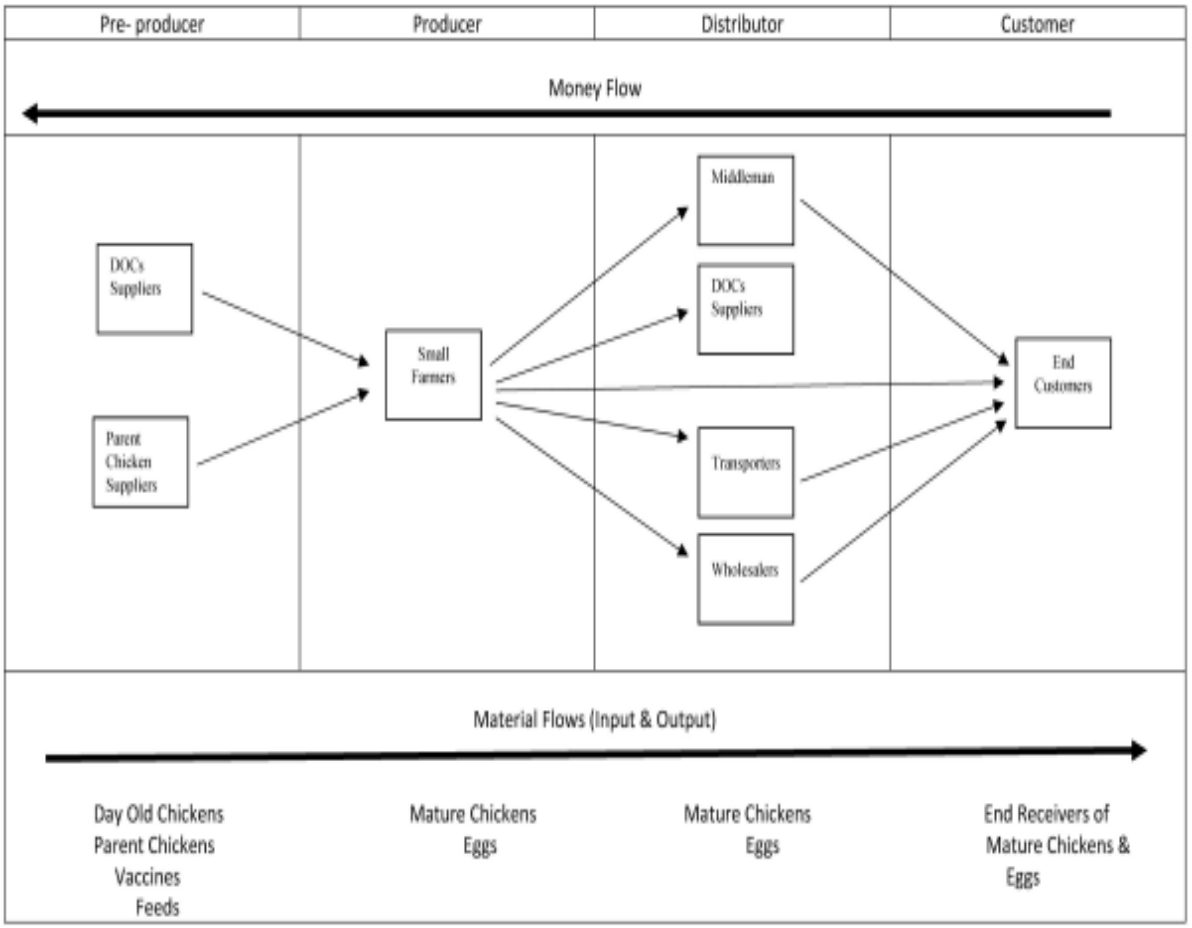

Figure 2. 1Various actors and their relationship in the value chain of indigenous chicken from previous studies.

Zambia's value chain or marketing system for indigenous is rather basic and underdeveloped, with the exception of a few market stalls in the urban commercial centres of Lusaka and other significant cities. The main players in this value chain are the small-scale farmers, the primary collectors, the brokers, the wholesalers and the negotiators, as well as the sellers of live birds. The main marketing channels are direct from the producer to the consumer or marketer (informal marketing). The second marketing channel places the producer first in front of the market and then the consumer (primary marketing). Certain agricultural producers sell their goods directly to restaurants, while others sell their goods to middlemen or brokers who then resell the eggs to secondary or urban markets (wholesalers).

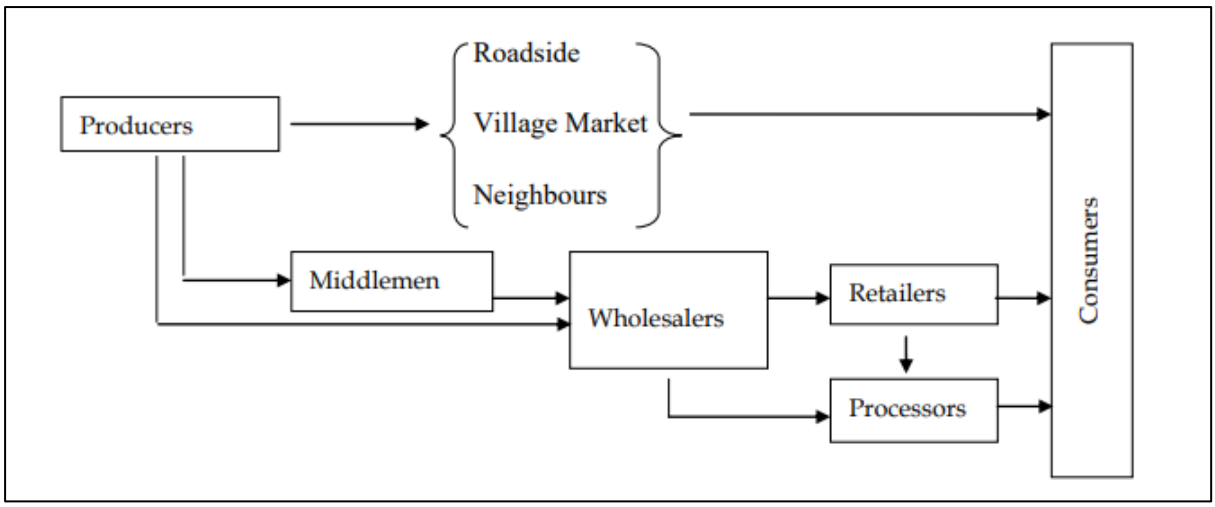

Figure 2. 2Chicken value chain map in Zambia.

Kenya's Indigenous chicken value chain consists of five main role players categorized as input suppliers, producers, output traders, service providers, and consumers (Omondi, 2022). The main products derived from indigenous chicken include live chickens, meat, and eggs. Others may include manure, feathers, bones, and shells (ROK, 2013).Poultry inputs supplied to farmers include feed, day-old chicks, vaccines, and drugs. Feed is acquired from both large and small-scale suppliers. Day-old chicks are purchased from small-scale hatcheries or imported from neighbouring countries. The role players at the production level include individual farmers, farmers groups, and small-scale poultry institutions. Indigenous chicken farming is predominantly small scaled and less specialized (Omondi., 2020). Earlier research showed that women are more involved in husbandry practices in the free range of production while men predominate in the intensive system of production (Ngeno et al., 2011) Service providers in the poultry value chain include veterinarians, extension service providers, livestock officers, financial service providers, and non-governmental organisations. Services provided include training of farmers and provision of inputs such as drugs. Poultry farmers obtain advice and veterinary services from private practitioners and government officers.

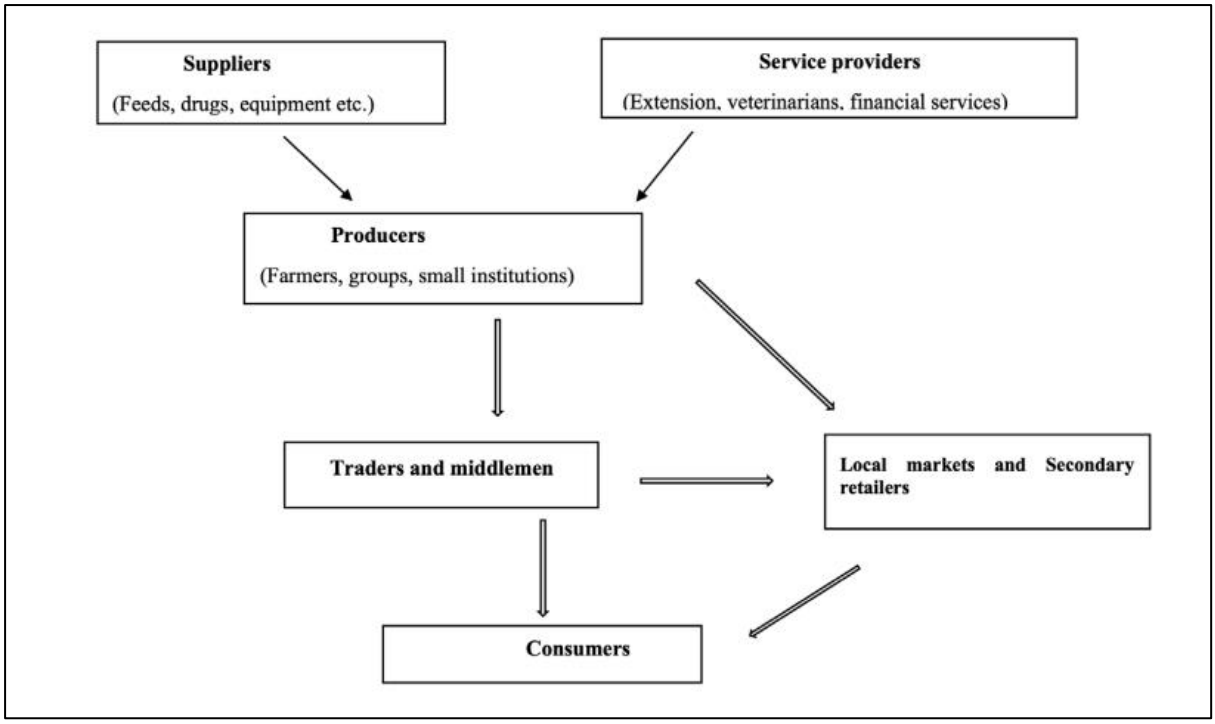

Figure 3: Kenya's indigenous chicken value chain map

2.5 Profitability of indigenous chicken in sub-Sahara Africa

Indigenous chicken farming holds substantial potential for profitability in Sub-Saharan Africa, primarily due to the low input costs associated with their rearing. Unlike commercial poultry farming, which requires significant investment in housing, specialized feeds, and veterinary care, indigenous chickens thrive on minimal inputs. They are well adapted to local environments, subsisting on locally available resources such as kitchen waste and natural forages, which significantly reduces feeding costs (Molla, 2010). This adaptability makes indigenous chickens an attractive option for smallholder farmers who have limited capital but can leverage their natural surroundings for poultry production.

Furthermore, the market demand for indigenous chickens is robust due to their perceived superior taste, texture, and nutritional value compared to commercial breeds. Consumers often prefer indigenous chickens for their organic nature and the belief that they are healthier and free from industrial chemicals and hormones (Magothe et al., 2012). This preference allows farmers to command higher prices for indigenous chickens, particularly in urban markets where consumers are willing to pay a premium for organic and locally sourced poultry (Ayieko et al., 2014). The premium pricing, coupled with low production costs, enhances the profit margins for farmers engaged in indigenous chicken farming.

Despite these advantages, there are significant challenges that impact the overall profitability of indigenous chicken farming in Sub-Saharan Africa. Issues such as disease outbreaks, lack of access to veterinary services, and inadequate market infrastructure can hinder production efficiency and market access (Omondi, 2022). Moreover, farmers often face high transaction costs due to the involvement of intermediaries and the lack of direct access to high-value markets. Addressing these challenges through improved veterinary care, better market linkages, and training in modern farming practices can further enhance the profitability of indigenous chicken farming, providing a sustainable income source for rural households (Ayieko et al., 2014). distress and droughts.

2.6 Factors affecting profitability of small-scale chicken production

2.6.1 Feed Costs

The cost and availability of feed are critical factors affecting the profitability of small-scale chicken production. Feed typically constitutes a significant portion of the total production cost, often accounting for up to 70% of the expenses in poultry farming (Mbuza et al., 2016). Fluctuations in feed prices can directly impact profitability, as higher feed costs reduce the margin between production costs and revenue from sales. Small-scale farmers, who often lack the economies of scale enjoyed by larger producers, are particularly vulnerable to these price fluctuations. In many regions, the reliance on imported feed exacerbates this issue, as global market trends and exchange rates influence local prices (Chawker et al., 2021). Ensuring a stable and affordable feed supply is thus essential for maintaining profitability in small-scale chicken production.

2.6.2 Disease Management

Effective disease prevention and control are essential for the profitability of small-scale chicken production. Disease outbreaks, such as Newcastle disease, can lead to high mortality rates and substantial financial losses. For instance, Newcastle disease is highly contagious and can wipe out entire flocks, leading to a sudden and severe reduction in production capacity (Hassan et al., 2011). The cost of vaccination and other preventive measures, although an added expense, is crucial in maintaining flock health and ensuring continuous production. Small-scale farmers often face challenges in accessing veterinary services and vaccines, which further complicates disease management efforts. Inadequate disease control not only affects immediate production but can also have long-term impacts on the overall viability of small-scale operations (Guteta and Ameha, 2020).

2.6.3 Market Access

The ability to access larger, more profitable markets significantly affects the profitability of small-scale chicken production. Limited market access due to poor infrastructure or lack of transportation options can constrain sales and revenue. Many small-scale farmers are confined to selling their products in local markets, where competition is high and prices are relatively low (Magothe et al., 2012). Poor road networks and inadequate transportation facilities make it difficult to reach urban markets, where demand and prices might be higher. Additionally, small-scale farmers often lack the resources to meet the quality and quantity requirements of larger markets, further limiting their market opportunities. Improving infrastructure and providing better market linkages are essential steps towards enhancing the profitability of small-scale chicken farming (Ayieko et al., 2014).

2.6.4 Breeding Practices

The choice of breed and breeding practices significantly influence the productivity and growth rates in small-scale chicken production. Indigenous breeds, while being hardier and more resistant to local diseases, generally have slower growth rates compared to commercial breeds. This slower growth can impact overall production efficiency and profitability (Magothe et al., 2012). Indigenous breeds are often preferred by local consumers for their taste and adaptability, but the trade-off is in the longer time required to reach market weight. Small-scale farmers must balance the benefits of using indigenous breeds with the potential economic advantages of faster-growing commercial breeds. Effective breeding practices, including selective breeding and crossbreeding, can help improve productivity while maintaining the desirable traits of indigenous chickens (Guteta and Ameha, 2020). Investing in better breeding strategies can thus enhance both production efficiency and profitability for small-scale farmers.

2.6.5 Natural Disasters

Natural disasters such as floods, droughts, and storms pose significant threats to the profitability of small-scale chicken production. These events can destroy infrastructure, including chicken coops and feed storage facilities, leading to substantial financial losses. Floods and storms can result in the death of chickens, either directly through the impact of the disaster or indirectly through the spread of diseases in the aftermath (Mbuza et al., 2016). The loss of infrastructure and livestock forces farmers to invest heavily in rebuilding and restocking, which can strain their financial resources. Additionally, the disruption of local

markets during and after natural disasters can lead to a loss of income for farmers who are unable to sell their products (Chawker et al., 2021).

2.6.6 Climate Change

Climate change presents long-term challenges for small-scale chicken production by altering weather patterns and increasing the frequency and severity of extreme weather events. Changes in temperature and precipitation can affect the availability and quality of feed crops, leading to higher feed costs and reduced productivity (Hassan et al., 2011). Heat stress, in particular, can negatively impact chicken health and growth rates, resulting in lower meat and egg production. Moreover, climate change can exacerbate the spread of diseases, as warmer and more humid conditions create favourable environments for pathogens and parasites (Guteta and Ameha, 2020). Farmers need to adopt adaptive measures, such as improving housing and ventilation systems, to mitigate the adverse effects of climate change on their poultry operations.

2.7 Conceptual framework

The conceptual framework of this study posits that the profitability of small-scale indigenous chicken production is influenced by a complex interplay of various factors including feed costs, disease management, market access, breeding practices, natural disasters, and climate change. Feed costs are pivotal as they represent a significant portion of production expenses, directly affecting profit margins. Effective disease management ensures flock health and reduces mortality rates, which is essential for maintaining consistent production levels. Market access impacts the ability to sell products at favorable prices, with infrastructure and transportation playing crucial roles. Breeding practices influence the growth rate and resilience of the chickens, affecting productivity and operational efficiency. Additionally, natural disasters and climate change introduce risks that can disrupt production and increase costs. These factors are interconnected and collectively determine the overall profitability of small-scale indigenous chicken farming, with improvements or setbacks in any one area potentially having significant repercussions across the value chain.

2.8 Summary

This literature review examined challenges faced by indigenous chicken producers and the value chain of indigenous chicken production in developing countries. In addition, the chapter also analysed the profitability small-scale indigenous chicken production system.The

review also highlights the knowledge gaps in optimizing indigenous chicken production systems. Further research is needed to explore alternative feed sources, improve disease control methods, and develop breeding programs to enhance productivity. By investing in research and development, we can unlock the full potential of this vital sector and empower rural communities in developing countries.Overall, the literature highlights the potential of indigenous chicken production for empowering communities and promoting sustainable agriculture. However, addressing the challenges in the value chain is crucial to improve profitability and ensure the long-term success of this sector.

CHAPTER THREE

METHODOLOGY

3.1 Description of Study Area

The study was conducted in Bindura district of Mashonaland Central Province in Zimbabwe. The district is in natural region 2a that has semi-arid climate, with an average annual rainfall of between 700 and 1050mm. The rainfall is usually received from late November to late March. The soils in this region are sandy loams with a low nutrient content and vegetation is characterised as predominantly savannah grasslands with shrubs and trees in some areas. The research was carried out in ward 13 which consist of nine villages. This is because there are a lot of indigenous chicken farmers and these villages received some past intervention in indigenous chicken production by Ensuring Nutrition, Transforming & Empowering Rural Farmers& Promoting Resilience in Zimbabwe (ENTERPRIZE) in 2019.

3.2 Research Design

The study employed a descriptive survey research design to systematically collect and analyse data on the factors affecting profitability in small-scale indigenous chicken farming. This research design is appropriate for obtaining detailed, factual information about the current conditions, practices, and challenges faced by farmers. By using structured questionnaires, key informant interviews, and observations, the study was able to capture a comprehensive picture of the farming operations, including input costs, income, disease management, market access, and breeding practices. The descriptive survey design allowed for the collection of quantitative data to quantify relationships and qualitative data to provide context and deeper understanding. This approach facilitated the identification of patterns and trends within the data, enabling a thorough analysis of the determinants of profitability in the indigenous chicken value chain.

3.3 Sampling procedure

To select participants, the study used stratified random sampling. This means the target population was divided (smallholder farmers raising indigenous chickens) into groups based on villages. Within Ward 13, which has nine villages, three villages namely Chiveso, Mazarura, and Gwezerewere chosen randomly. Purposive sampling was employed to select the key informants. These were selected based on the number of participants in the ENTERPRIZE project with the ratios of participants being 3:3:2 for Chiveso (30 participants), Mazarura (30 participants) and Gwezere (30 participants) respectively.

3.4 Data collection procedure

To gather information, the researcher interviewed 80randomly selected smallholder indigenous chicken farmers. They decided this number was sufficient because social science research often uses a minimum of 30 participants, which is considered statistically strong enough to draw reliable conclusions (Bailey, 1994; Saunders et al., 2007).

3.4.1 Data collection instruments

Questionnaires were a primary data collection instrument used in this study. They were designed to gather quantitative and qualitative data from small-scale indigenous chicken farmers. The contents of the questionnaires included questions on demographic information, farm characteristics, production practices, costs and revenues, disease management practices, market access, and the impact of natural disasters and climate change. Both closed-ended and open-ended questions were included to capture detailed responses. The questionnaires were administered to a representative sample of small-scale farmers across various regions, ensuring a diverse and comprehensive data set. Farmers were chosen based on their experience in indigenous chicken farming and their willingness to participate in the study. The interviews were conducted at homesteads, local shops were the respondents were at that particular time. In the event of the unavailability of the household head, the persona available at that homestead was interviewed.

3.4.1.1 Key Informant Interviews

Key informant interviews were conducted to gain in-depth insights from individuals with specialized knowledge and experience in the indigenous chicken value chain. The key informants included agricultural extension officers, veterinary professionals, feed suppliers, market intermediaries, and local government officials. The interviews focused on understanding broader issues such as market dynamics, disease control strategies, feed supply challenges, and policy impacts on small-scale poultry farming. These interviews provided valuable contextual information that complemented the data gathered from the questionnaires. The interviews were semi-structured, allowing for flexibility in exploring topics in greater depth based on the informants' expertise.

3.4.1.2 Observations

Observations were used as a qualitative data collection method to provide a real-time assessment of farming practices and conditions on the ground. The researchers conducted

field visits to several small-scale chicken farms, observing the physical environment, housing conditions, feeding practices, health management, and overall farm operations. Detailed notes were taken on aspects such as the cleanliness of the farms, the health and behaviour of the chickens, the types of feed used, and the infrastructure available. Observations also included the state of transportation and market facilities. This method allowed the researchers to verify and contextualize the information obtained through questionnaires and interviews, ensuring a holistic understanding of the factors affecting profitability in small-scale indigenous chicken production.

3.5 Data analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 20. Descriptive data analysis was employed to characterise the value chain for indigenous chickens in Zimbabwe by means of tables, and simple summaries. Value chain map was used to analyse value chain for indigenous chicken. The collected data was analysed to identify the main actors and to characterise the key structure of the value chain.

Financial metrics like return on investment (ROI) was calculated to measure the profitability and to determine the average return on investment of indigenous chicken enterprise. Also, Gross margin analysis was used to assess profitability of indigenous chicken production. Income and expenditure were compared to determine the extend in viability of the enterprise. Regression analysis was employed to Identify relationships between variables (e.g., feed costs and profitability) and assess the significance of those relationships.

Table 3. 1 Data Analysis Framework

Objective	Data obtained	Analytical method
v. To identify challenges faced in indigenous chickens' production in Bindura district.	Input availability, diseases outbreak, access to market information, financial issues	Descriptive statistics: frequencies and means together with percentages were used.
vi. To map indigenous chickens' production value chain in	Key actors (input suppliers, wholesalers, processors, retailers, consumers)	Value chain mapping

	Bindura district.		
vii.	To determine the contribution of indigenous chicken production on Return on investment (ROI) in Bindura district.	Total variable cost Total fixed cost Total revenue	Gross margin analysis Return on investment Net present value
viii.	To identify factors that affect return on investment in indigenous chicken production in Bindura district.	Mortality rate Output input prices Stock size	Regression analysis

3.5.1 Profitability Analysis

3.5.1.1 Gross Margin Analysis

Gross margin analysis is relevant for understanding the financial performance of small-scale indigenous chicken farming. It measures the difference between total revenue and variable costs, providing insight into the profitability before accounting for fixed costs. This metric is essential for assessing how well a farm covers its variable costs from its revenue, which is crucial for short-term financial planning and sustainability.

Formula: Gross Margin=Total Revenue−Variable Costs

Total revenue includes income from the sale of chickens and eggs, while variable costs encompass expenses directly associated with production, such as feed, veterinary services, and labour.

3.5.1.2 Benefit-Cost Ratio (BCR)

The Benefit-Cost Ratio (BCR) is a critical indicator for evaluating the economic viability of small-scale chicken production projects. It compares the benefits derived from the project to

the costs incurred, helping to determine whether the investment is worthwhile. A BCR greater than 1 indicates that the benefits exceed the costs, suggesting a profitable venture.

Formula:BCR=Total Benefits/Total Costs

Total benefits include all forms of revenue from chicken and egg sales, while total costs cover both variable and fixed costs associated with the production.

3.5.1.3 Net Profit Margin (NPM)

Net Profit Margin (NPM) is a key financial metric that shows the percentage of profit generated from total revenue after all expenses have been deducted. It is crucial for understanding the overall profitability of the chicken farming operations, indicating how effectively the farm converts revenue into actual profit.

Formula:NPM=(Net Profit/Total Revenue)×100

Net profit is calculated by subtracting total costs (both variable and fixed) from total revenue. This metric helps in evaluating the efficiency of the farm's operations and its ability to generate profit.

3.5.1.4 Return on Investment (ROI)

Return on Investment (ROI) is a widely used measure to evaluate the efficiency of an investment in chicken farming. It calculates the percentage return relative to the investment cost, helping farmers and stakeholders assess the profitability and performance of their investments.

Formula:ROI= (Net Profit/Total Investment) ×100

Total investment includes all capital costs, such as infrastructure, equipment, and initial stock purchase. ROI provides a clear picture of the financial returns relative to the invested capital, aiding in decision-making processes.

3.5.2 Regression Model for factors affecting return on investment in indigenous chickens

3.5.2.1 Linear Regression Model

In this study, a linear regression model will be employed to analyse the factors affecting the Return on Investment (ROI) in small-scale indigenous chicken farming. The ROI will be the dependent variable, while various factors such as input costs, income, feed costs, market

access, disease management, and breeding practices will serve as independent variables. This model will help identify the relationship between these factors and the ROI, providing insights into which variables significantly influence profitability.The linear regression model is relevant because it allows for the quantification of the impact of multiple independent variables on a single dependent variable. By understanding these relationships, stakeholders can make data-driven decisions to enhance profitability and optimize resource allocation. Specifically, in small-scale chicken farming, it is crucial to determine how different costs and income streams affect the overall ROI to ensure sustainable and profitable farming practices.

3.5.2.2 Multilinear Regression Formula

The general form of a multiple linear regression model is:

$$ROI=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\ldots+\beta_nX_n+\epsilon$$

Where:

ROI= Return on Investment (dependent variable)

$\beta 0$ = Intercept term

$\beta_1, \beta_2, \beta_3\ldots, \beta_n$ = Coefficients for each independent variable

$X_1, X_2, X_3\ldots, Xn$ = Independent variables (e.g., input costs, income, feed costs, market access, disease management, breeding practices)

ϵ = Error term

3.6 Ethical considerations

Informed consent was obtained from all participants before their involvement in the study. Participants were informed about the purpose of the research, the nature of their involvement, and the confidentiality of their responses.Ethical clearance was sought from relevant institutional review boards and ethical committees. The research adheres to ethical principles, ensuring the welfare and rights of participants are protected.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter covers the presentation and analysis of the research project's findings. In order to examine the descriptive data, percentages and frequency distribution were used. Multiple regression analysis was employed to ascertain the effect of the factors on the profitability of indigenous chicken production. This chapter is divided into four sections: the first examines the demographic data of indigenous chicken farmers; the second examines the challenges faced by these farmers and the third examines the profitability of broiler production and the fourth examines factors that affect profitability.

4.2 Household demographic and characteristics

This section contains the description of the demographic characteristics of the respondents in the study.

Table 4. 1Household demographic characteristics

Variable	Frequency	Percentage
Gender		
Female	48	60
Male	32	40
Marital Status		
Single	2	2.5
Married	48	60
Divorced	3	3.75
Widowed	27	33.75
Educational Level		
Primary	15	18.75
Secondary	35	43.75
Tertiary	4	5
Never attend	2	2.5
Informal	24	30

4.2.1 Gender of respondents

Table 4.1 shows that, from a total of 80 farmers that were interviewed, 60% percent were females and the remaining 40% were male which means women are leading in indigenous chicken production in Bindura district. The findings indicate that the chicken enterprise was

mainly dominated by women. This could be attributed to the low capital required and cultural beliefs whereby chicken is considered a woman's livestock. This concurs with a study carried out in Western Kenya which found out that 75% of chicken producers were women (Justus et al., 2013). This is also because women in rural areas bear the main responsibility for taking care of children and as more men travel to cities, the number of female-headed households has increased as well (World bank, 2017).

4.2.2 Level of Education

From table above, 43.8% of smallholder farmers in Bindura attained secondary education level followed by 30% who attended informal education, 18.8% attended primary and only 5% have managed to go for tertiary such as college and university. 2.5% of the total population never attended school. Chicken producers are mostly literate, as the majority of the respondents have secondary education, having spent approximately 11 years in school. These results agree with Mutua (2018) that indigenous chicken farmers had a basic education, which enabled them to access agricultural information and adopt innovative technologies to enhance farming.

4.2.3 Descriptive characteristics

The study's analysis of demographic and economic variables among households shows significant diversity. The age of household heads ranges from 18 to 72 years, with a mean of 39.2 and a standard deviation of 4.651, indicating a relatively young farming population. Household size varies from 3 to 13 members, with a mean of 5.31 and a standard deviation of 1.167, suggesting moderate family sizes that can influence labour availability and economic needs. Average income from indigenous chickens' ranges from $0 to $250, with a mean of $21.4 and a standard deviation of 12.639, reflecting the variability in dependence on poultry farming for income. In comparison, the average income from other sources ranges from $5 to $750, with a mean of $126.4 and a standard deviation of 17.198, highlighting the significance of diversified income streams for households. The years of farming experience range from 1.5 to 28 years, with a mean of 4.2 and a standard deviation of 3.186, indicating a wide range of expertise among farmers.

Table 4. 2Descriptive demographic characteristics

Variable	Min	Max	Mean	St. Deviation
Age	18	72	39.2	4.651

Household size	3	13	5.31	1.167
Average Income from IndigenousChickens	0	250	21.4	12.639
Average income from other sources	5	750	126.4	17.198
Years of experience	1.5	28	4.2	3.186

4.3 Agriculture Activities practiced by respondents

4.3.1 Crops grown

The study's analysis of crop cultivation shows that maize is the most commonly grown crop, with 92.5% of households cultivating it. Horticulture follows closely, with 85% of households engaged in growing various fruits and vegetables. Pulses are also significant, with 52.5% of households cultivating them, highlighting their importance in crop rotation and soil fertility improvement. Sorghum and millet are grown by 43.75% of households, reflecting their role in providing food security and resilience against drought. Tobacco is cultivated by 33.75% of households, indicating its value as a cash crop despite potential health and environmental concerns. Lastly, other crops are grown by 3.75% of households, suggesting a minor but diverse agricultural activity. These findings highlight the diverse cropping patterns among households, which contribute to both food security and income generation, as supported by Ibeagwa et al. (2022) and Adhiaya and Cheruiyot (2021), who emphasize the importance of crop diversity in enhancing rural livelihoods

Table 4. 3Number of Crops grown

Crops	Frequency	Percentage
Other	3	3.75
Maize	74	92.50
Sorghum and Millet	35	43.75
Pulses	42	52.50
Tobacco	27	33.75
Horticulture	68	85.00

4.3.2 Livestock Ownership

The study's analysis of livestock ownership reveals significant variability in the number of different types of livestock kept by households. Cattle ownership shows a mean of 4.12 with a standard deviation of 4.112, which is lower than figures reported in other literature due to the impact of January disease in Zimbabwe. This disease has significantly reduced cattle

numbers, as noted by Ibeagwa et al. (2022), who emphasize the severe economic consequences of livestock diseases on rural farming communities. The lower mean number of cattle highlights the ongoing challenges faced by farmers in maintaining healthy herds amidst disease outbreaks. Goats, on the other hand, have a higher mean ownership of 12.4 and a standard deviation of 3.871, indicating their popularity and relatively stable presence among households. This is consistent with the findings of Adhiaya and Cheruiyot (2021), who reported that goats are a preferred livestock due to their adaptability and lower maintenance costs compared to larger animals like cattle. Desta (2021) also highlighted the role of goats in rural economies, where they contribute significantly to household income and food security.

Ducks show considerable variability in ownership with a mean of 3.24 and a standard deviation of 4.319, reflecting diverse preferences and possibly the suitability of ducks for certain environments. Broiler chickens are more commonly kept, with a mean ownership of 38.57 and a standard deviation of 7.841, indicating their importance in providing a quick return on investment due to their rapid growth rates. This trend is supported by the work of Islam (2021), who noted the high profitability of broiler farming in similar contexts. Rabbits, with a mean ownership of 5.31 and a standard deviation of 1.417, represent a smaller but significant part of household livestock. Their lower variability compared to other livestock types suggests a more uniform approach to rabbit farming among the surveyed households. Abbas Abbasi, Ashari, and Shabudin Bin Ariffin (2021) also reported that rabbits are valued for their rapid reproduction rates and low space requirements, making them a practical choice for small-scale farmers

Livestock	Min	Max	Mean	St. Deviation
Cattle	1	21.00	4.12	4.112
Goats	5	29.00	12.4	3.871
Ducks	0	31.00	3.24	4.319
Broiler chickens	25	250.00	38.57	7.841
Rabbits	0	12.00	5.31	1.417

4.3.3 Breeds of indigenous chicken reared

The study found that the non-descriptive breed is the most common type of indigenous chicken kept by households, constituting seventy-two percent of the total, as shown in Figure 4. This is followed by Boschveldat sixteen percent, Naked Neck at five percent, Sussex at four percent,and Sasso at three percent. The popularity of the non-descriptive breed can be

attributed to its resilient characteristics and low cost, making it a practical choice for many households. Similarly, Adhiaya and Cheruiyot (2021) noted that farmers in Western Kenya prefer indigenous breeds due to their adaptability to local conditions and resistance to diseases. The findings align with those of Aleme (2022), who reported that Ethiopian farmers also favour non-descriptive breeds for their hardiness and economic benefits.

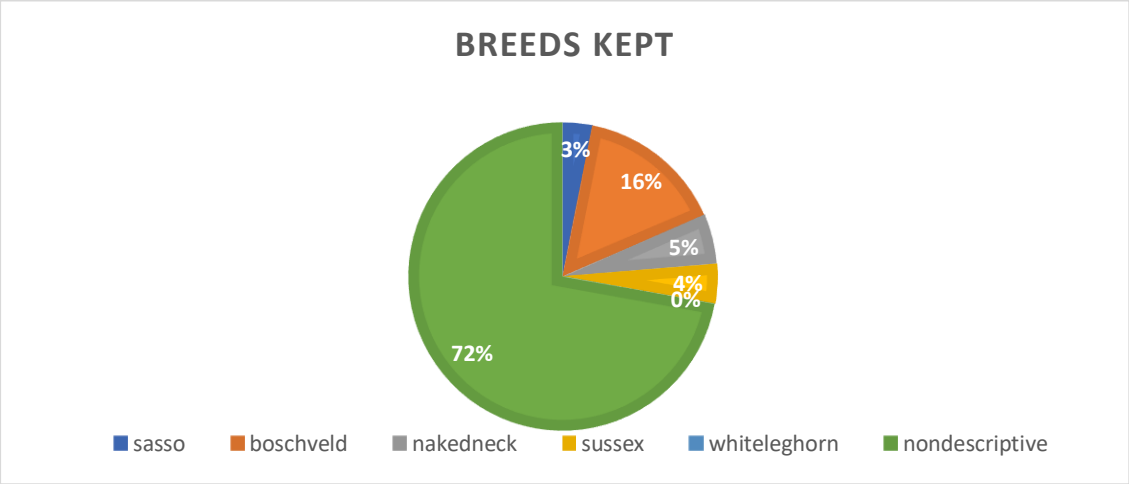

Figure 4. 1indigenous chicken breeds reared

The Boschveld breed was ranked second in popularity, primarily due to its good laying capacity, averaging more than 30 eggs per laying cycle, which is superior to other breeds. This finding is consistent with Ibeagwa et al. (2022), who highlighted the breed's productivity advantages in their study of indigenous and hybrid chickens. Similarly, Desta (2021) pointed out that the high egg production rate of certain indigenous breeds significantly contributes to poverty alleviation and women's empowerment in rural areas. The lower percentages of Naked Neck, Sussex, and Sasso breeds suggest that these breeds, while present, are less favoured due to either lower productivity or higher costs. This trend is also observed in the study by Abbas Abbasi, Ashari, and Shabudin Bin Ariffin (2021), which noted that farmers often opt for breeds that offer a balance of cost-effectiveness and productivity. The comparison of these results with the literature underscores the importance of breed selection in optimizing the productivity and sustainability of indigenous chicken farming.

4.3.4 Quantity per breed ownership analysis

The study's analysis of indigenous chicken breeds, as detailed in the Table 4.4, shows significant variations in the ownership of different breeds among households. The non-

descriptive breed, with a mean ownership of 31.63 and a standard deviation of 4.128, is the most widely kept breed. This breed's popularity can be attributed to its resilience and cost-effectiveness, a trend similarly noted by Adhiaya and Cheruiyot (2021) in Western Kenya, where such breeds are favoured for their adaptability and low maintenance costs. Aleme (2022) also reported high ownership of non-descriptive breeds in Ethiopia due to their economic benefits and robustness.

Table 4. 4 Analysis indigenous chickens by breed ownership

Indigenous Breed	Min	Max	Mean	St. Deviation
Sasso	3	25	15.13	3.631
Boschveld	5	34	20.85	3.589
Naked neck	4	8	5.31	1.131
Sussex	2	15	9.87	2.183
White leghorn	2	9	4.12	1.123
Non descriptive	8	56	31.63	4.128

Boschveld chickens have a mean ownership of 20.85 and a standard deviation of 3.589, reflecting their popularity due to their high egg production capacity, averaging over 30 eggs per laying cycle. This finding aligns with Ibeagwa et al. (2022), who highlighted the breed's productivity advantages. The relatively high mean ownership of Boschveld chickens indicates that farmers value their productive traits, which are essential for improving profitability and food security. Desta (2021) also emphasized the role of productive indigenous breeds in enhancing rural livelihoods through improved egg production.

In contrast, breeds like Sasso, Naked Neck, Sussex, and White Leghorn are less commonly kept. Sasso chickens have a mean ownership of 15.13 and a standard deviation of 3.631, indicating moderate popularity. The Naked Neck breed, with a mean ownership of 5.31 and a standard deviation of 1.131, and the Sussex breed, with a mean of 9.87 and a standard deviation of 2.183, show lower but stable ownership levels. White Leghorn chickens have the lowest mean ownership of 4.12 and a standard deviation of 1.123. These trends are consistent with the findings of Abbas Abbasi, Ashari, and Shabudin Bin Ariffin (2021), who noted that less popular breeds often have lower productivity or higher costs, making them less attractive to small-scale farmers

4.4 Challenges faced by small-scale indigenous chicken farmers

As much as indigenous chicken production is contributing to improving households' wellbeing in the study, there are challenges faced by households in keeping those chickens. These challenges hamper their well-being mostly. These challenges are discussed in Figure4.3

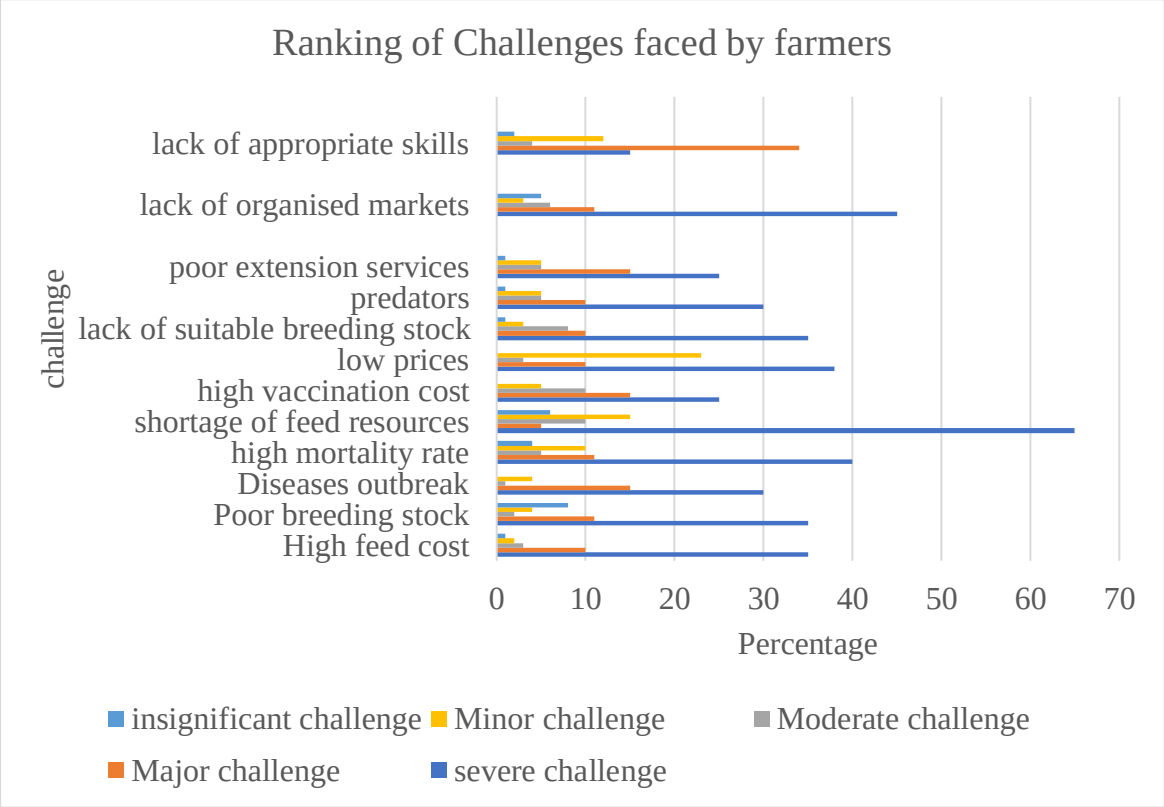

Figure 4. 2Challenges faced by small-scale indigenous chicken farmers

The study shows that high mortality rates, high vaccination costs, lack of organized markets, disease outbreaks, and shortage of feed resources were the most detrimental challenges faced by small-scale indigenous chicken farmers, as shown in Figure 5. High mortality rates were attributed to the frequent occurrence of Newcastle disease in the study area. Indigenous chicken farmers in Bindura district indicated that diseases were a significant challenge, severely impacting their operations, as highlighted by the interviewees. This high incidence of disease increased the mortality rate of indigenous chickens, thereby adversely affecting the profitability of indigenous chicken production in Bindura District (Adhiaya & Cheruiyot, 2021; Ibeagwa et al., 2022). The lack of formal markets also significantly impacted indigenous chicken production, potentially due to unpredictable market trends and low prices. Similar findings were reported in the Matabeleland North region in Zimbabwe, where the absence of organized marketing structures led to the exploitation of farmers, corroborating the study's results (Abbas Abbasi, Ashari, & Shabudin Bin Ariffin, 2021).

The study further indicated that low prices negatively affected the profitability of indigenous chicken, with the average price of a live bird sold at only $5. The low profit margins do not justify the time and effort involved in raising the chickens, especially when compared to other agricultural options like broilers and vegetable or crop farming (Islam, 2021). High vaccination costs were also highlighted as a major challenge by the interviewees. Many indigenous chicken farmers in Bindura district operate on a small scale, often with limited disposable income, which is a common issue in rural chicken farming as noted by Desta (2021). Additionally, some respondents were unaware of how to administer vaccines for specific diseases. While the high cost of transporting goods did not affect most farmerssince they could sell their chickens directly to local butchers and community members, some were still deterred by the expensive transportation needed to acquire supplies (Aleme, 2022). This comprehensive examination of the challenges faced by small-scale indigenous chicken farmers underscores the need for targeted interventions to improve their productivity and profitability.

4.5 Value chain map of indigenous chicken in Bindura district

The map in Figure 4.4 shows indigenous chicken value chain map of Bindura District. The main actors of this chain are smallholder farmers, service providers (AGRITEX, veterinary agro dealers), consumers, brokers, butcheries and local shops. Farmers receive technical production and marketing training and relevant information from AGRITEX. The map above shows that there is direct link between farmers and final consumers that make it the shortest chain. It is found that most chickens are sold to the local market and neighbors. This map is similar to that illustrated byAleme, (2022)who purportedthat farmers receive vaccines from the same service providers which are agro-dealers and veterinarians and also the chain pass through middleman.

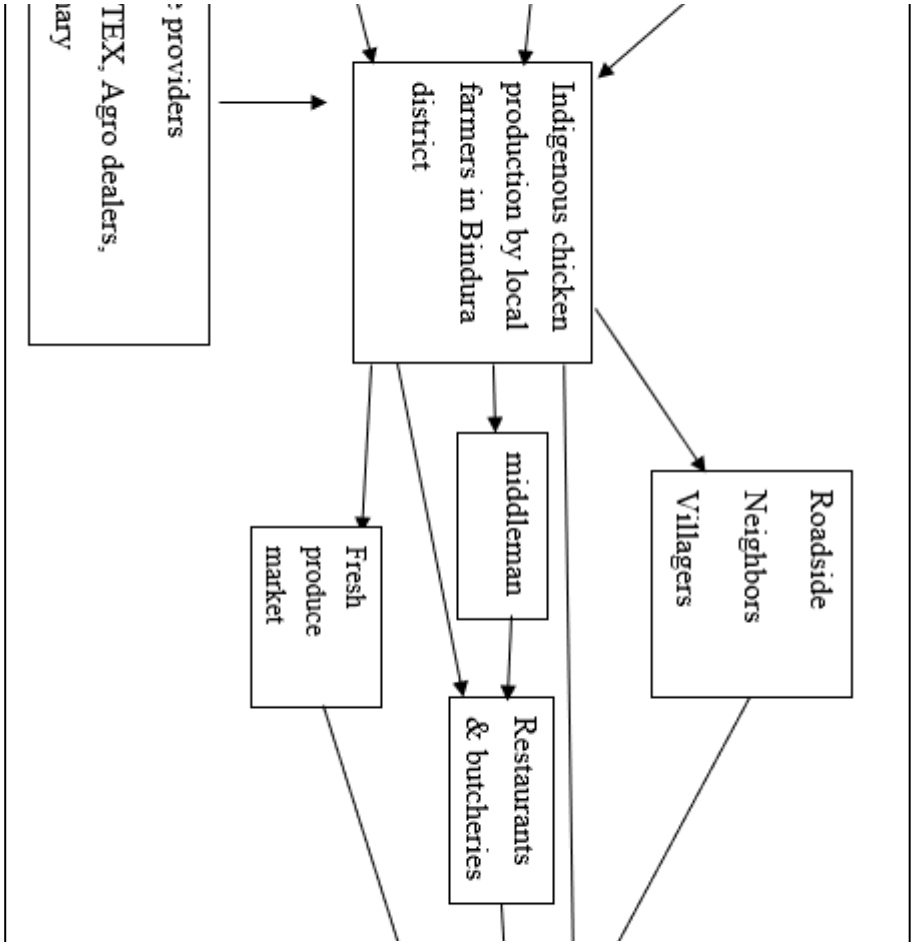

Figure 4. 3 Indigenous chicken value chain map

Major input suppliers of indigenous chickens includelocal farmers or villagers as they will be supplying feed and chicks to the farmers. Local farmers also supplied natural remedies such as (aloe vera known as “gavakava” in Shona, mutiti). Other inputs and medication were supplied by agro-dealers like Novateck, Gains and Veterinary distributors.

Butcheries were important component of the indigenous chicken value chain. These are usually found in the markets which are scattered around the suburbs and get the chickens either directly from the farms or from the middlemen at wholesale prices.Although restaurants only accounted for a small proportion of indigenous chicken marketed, they are an important segment of the value chain as they are the only ones adding value through processing.

Consumers were found at the last of the value chain of the indigenous chicken. The demand for Indigenous chicken was very high because of its low-fat content as compared to broiler chicken regardless of its low price. Most indigenous chicken were consumed by both low- and high-income groups.

4.5.1 Analysis of volumes sold per each market in the value chain

The study's analysis of markets accessed in the last quarter and the volumes of indigenous chickens sold in Table 4.5 reveals significant variations across different market channels. The Agricultural Market emerged as the leading outlet with a mean volume of 24.12 and a standard deviation of 4.128. This indicates that many farmers rely heavily on agricultural markets to sell their produce, reflecting the importance of these markets in providing broader market access and potentially better prices. This finding is consistent with Abbas Abbasi, Ashari, and Shabudin Bin Ariffin (2021), who emphasize the critical role of organized markets in enhancing market access and improving profitability for small-scale farmers. The reliance on agricultural markets highlights the need for improved infrastructure and support to further develop these market channels.

Table 4. 5 Volumes sold per each market in the value chain

Market in the value chain	Min	Max	Mean	St. Deviation
Butchery	2	15	5.12	3.631
Middlemen	5	25	14.56	3.589
Restaurants	2	17	7.72	1.131
Roadside	7	42	22.19	2.183
Farmgate	3	31	17.41	1.123
Agricultural Market	5	41	24.12	4.128

Moreso according to Table 4.4 middlemen were the second most accessed market channel, with a mean volume of 14.56 and a standard deviation of 3.589. While middlemen offer convenience and immediate cash for farmers, their involvement often reduces the profit margins for the producers due to the added cost of intermediaries. This is supported by Ibeagwa et al. (2022), who found that middlemen in the indigenous chicken value chain can exploit farmers by offering lower prices compared to direct market sales. Despite this, the high volume sold through middlemen indicates their significant presence and influence in the

value chain, underscoring the need for better market integration and direct sales opportunities for farmers.

Roadside sales and farmgate sales also show substantial volumes, with mean volumes of 22.19 and 17.41, respectively. These channels provide farmers with direct access to consumers, potentially offering better prices and immediate sales without the need for intermediaries. This is in line with the findings of Adhiaya and Cheruiyot (2021), who noted that direct sales channels like roadside and farmgate sales can enhance farmers' income by eliminating middlemen. However, the variability in these volumes, as indicated by their standard deviations, suggests fluctuations in demand and possible market saturation at times. Butcheries and restaurants, with mean volumes of 5.12 and 7.72 respectively, represent smaller but stable market outlets. These channels are crucial for farmers seeking steady and reliable sales, although they might offer lower volumes compared to other markets. This comprehensive analysis highlights the diverse market access points within the indigenous chicken value chain and underscores the importance of improving market infrastructure and reducing intermediary costs to enhance profitability for small-scale farmers.

4.6 Profitability of indigenous chicken

Table 4.6 contains a presentation on the research findings on the Gross Margin budget for indigenous chickens. The results indicated that feed cost constitute almost 70% of the variable cost, live chicken sold at $5 generated much revenue of $750 followed by eggs with $280. The market price is slightly lower from the findings of Aleme,(2022) who had a higher revenue because of the market price of $7 which also contributed to high Gross Margin. This is usually on average according to the key informant interviews after 4 months on some breeds like Sasso whilst its 6 months for the non-descriptive breed. The indigenous chicken farmers of Bindura district earned an average return per dollar invested of 0.28 USD$ per live bird. This signifies that the returns were sufficient to cover the initial dollar invested.

Table 4. 6Estimated Gross margin budget of indigenous chicken

Variable cost	**Quantity**	**Unit cost $USD**	**Total cost$USD**
Day old chicks	150	$0.5	$75
IBD vaccine (100doses)	6	$5	$30
Avipro (1000 doses)	4	$2.80	$11.2

Drinkers	32	$2	$64
Starter mash (50kg bag)	8	$34	$272
Transport cost 5litres fuel/trip	30	$1.57	$47.1
Egg trays	100	$0.10	$10
Labour	30	$2	$15
Growers (50kg bag)	4	$25	$100
0ther feed (maize concentrate, sunflower, soyabeans) (20 kgs)	20	$10	$200
Total variable cost (TVC)			**$824.3**
Returns			
Eggs (crate)	80	$3.50	$280
Manure (kg)	100	$0.25	$25
Birds	145	$5	$725
Total returns			**$1030**
Total variable cost			**$824.3**
Gross margin			**$205.7**
ROI			**0.28**
Returns/ TVC			**1.27**

The results in Table 4.5 also indicated that feed cost constitute almost 70% of the variable cost, live chicken sold at $5 generated much revenue of $750 followed by eggs with $280. The market price is slightly lower from the findings of Aleme,(2022) who had a higher revenue because of the market price of $7 which also contributed to high Gross Margin. This is usually on average according to the key informant interviews after 4 months on some breeds like Sasso whilst its 6 months for the non-descriptive breed. The indigenous chicken farmers of Bindura district earned an average return per dollar invested of 0.28 USD$ per live bird. This signifies that the returns were sufficient to cover the initial dollar invested.

The reduced gross margin can be attributed to smaller flock size and poor pricing of indigenous chickens. The sold indigenous chickens were sold or prized based on per bird because they do not weight much bu preference in the market is based on quality of meet, high nutritional value and their unique taste and traditional resemblance. This is similar to the findings of Adhiaya and Cheruiyot, (2021) who indicated that this is their distinctive point from the broilers which makes customers prefer them. This may reduce income for the farmer who might have high chicken output. The cost of feeding was among the highest, according to the figures displayed in the table above. Evidence shows that since most farmers sold their hens to local butcher shops and some residents, the high cost of transportation was insignificant.

4.7 Factors that affect return on investment in Bindura District

Multi linear regression was applied to analyse the factors affecting profitability of indigenous chicken production in Bindura District with ROI as the dependent variable and feed cost, vaccine cost, price, batch size, transport cost, labour cost and mortality as predictor variables.

Table 4. 7 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.946[a]	.896	.582	1.072
a. Predictors: (Constant), mortality rate, feed cost, labour cost, vaccine cost, transportcost batch size,				

Determination of coefficient (r-square) measures the goodness of fit in the model. If the r square is higher than 50%, the model is therefore considered to have a good fit. According to the regression model, secondary, feed cost, four years, mortality rate, labour cost and batch size account for 89.6% of variations in the dependent variable.The accuracy of the linear models was further assessed using adjusted R-squared. It indicates how much of the variation predicted can be explained by the factors included in the model. In other words, it tells how well the model fits the data. A value of adjusted R-squared greater than 50% suggests that the model is well-fitted. This means that the model captures a significant portion of the variation and explains the data well.

Table 4. 8 Regression Output

Variables	B value	Standard error	T value	Significance level

Constant	8.405	6.915	2.050	.021
Batch size	.109	.195	-.559	.578
Feed cost	3.085	.108	-.547	.032**
Transport cost	.471	.379	-1.243	.218
Labour cost	.656	.336	-1.953	.055***
Vaccine cost	.024	.205	-.116	.008*
Mortality rate	.091	.035	-2.597	.011**

* Significance at 1% ** Significance at 5% and *** significance at 10

The regression analysis identifies several significant variables influencing the profitability of indigenous chicken farming. Batch size, despite having a non-significant coefficient, is an important factor to consider. While its impact on profitability was not statistically significant ($p > .05$), its inclusion in the model is notable, indicating its potential role in influencing profitability. This finding aligns with the work of Aleme (2022), who emphasized the importance of batch management in optimizing production efficiency and resource utilization in poultry farming.

Feed cost emerges as a significant predictor of profitability, with a positive coefficient of 3.085 ($p < .05$). Higher feed costs are associated with lower profitability, highlighting the importance of efficient feed management practices to mitigate production expenses. This finding is supported by Abbas Abbasi, Ashari, and Shabudin Bin Ariffin (2021), who underscored the role of feed costs as a major determinant of profitability in poultry farming. By optimizing feed formulations and sourcing strategies, farmers can enhance profitability by reducing production expenses while maintaining optimal chicken growth and health.

Labour cost also significantly influences profitability, with a coefficient of 0.656 ($p < .10$). Higher labour costs are associated with reduced profitability, suggesting the need for efficient labour management practices to minimize production expenses. This finding corroborates the work of Adhiaya and Cheruiyot (2021), who highlighted the importance of labor efficiency in small-scale poultry farming. By streamlining production processes and optimizing labor allocation, farmers can improve profitability by reducing overhead costs associated with labor. However, further research may be needed to explore specific strategies for labor cost optimization in indigenous chicken farming contexts**.**

Vaccine cost was identified as a significant predictor of profitability, with a coefficient of 0.024 ($p < .05$). This implies that higher vaccine costs are associated with reduced

profitability in indigenous chicken farming. The significance of vaccine cost underscores the importance of disease management strategies in maximizing profitability. This finding aligns with the work of Ibeagwa et al. (2022), who emphasized the economic implications of disease outbreaks and the cost-effectiveness of vaccination programs in poultry farming. By implementing efficient vaccination protocols and investing in disease prevention measures, farmers can minimize the financial impact of diseases and improve overall profitability.

Mortality rate also emerges as a significant factor influencing profitability, with a coefficient of 0.091 ($p < .05$). Higher mortality rates are associated with lower profitability, indicating the detrimental effects of disease outbreaks and other factors leading to chicken mortality. This finding underscores the importance of effective disease management practices and biosecurity measures in indigenous chicken farming. It aligns with the findings of Desta (2021), who highlighted the economic consequences of high mortality rates in poultry production systems.

4.8 Summary

The findings in this section revealed significant challenges faced by farmers, including high mortality rates, costly vaccination programs, and fluctuations in feed and labor costs. Market access was identified as a critical determinant of profitability, with agricultural markets and direct sales channels emerging as primary outlets for chicken sales. Furthermore, the regression analysis identified feed costs, labor costs, vaccine costs, and mortality rates as significant predictors of profitability. These findings underscore the multifaceted nature of indigenous chicken farming and highlight the importance of implementing effective disease management strategies, optimizing production processes, and enhancing market access to improve profitability and sustainability for small-scale farmers in the region.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1.Summary

This study aimed to investigate various aspects of indigenous chicken production in Bindura district through a descriptive survey research design. The population for the study was randomly sampled, while key informants were purposively selected based on their expertise and involvement in indigenous chicken farming. Data collection methods included questionnaires administered to randomly sampled households, observations of production practices, and key informant interviews to gather in-depth insights. Regression analysis was employed to identify factors affecting profitability, while gross margin analysis provided a comprehensive assessment of the economic viability of indigenous chicken farming. Descriptive statistics such as means, frequencies, and standard deviations were used to summarize and analyze the collected data, providing valuable insights into the challenges, value chain dynamics, economic contributions, and factors influencing profitability in indigenous chicken production in Bindura district.

The study identified several challenges faced in indigenous chicken production in Bindura district. These challenges include high mortality rates attributed to diseases such as Newcastle disease, costly vaccination programs, limited market access, fluctuations in feed availability and costs, and labor constraints. These challenges significantly impact the profitability of indigenous chicken production and pose obstacles to the sustainability of small-scale farming operations in the region. Understanding these challenges is crucial for developing targeted interventions and support systems to address them effectively and enhance the resilience of indigenous chicken farmers in Bindura district.

Through mapping the indigenous chicken production value chain in Bindura district, the study revealed the intricate network of actors and processes involved in the production, distribution, and marketing of indigenous chickens. Agricultural markets, middlemen, roadside sales, and farmgate sales emerged as primary market channels for indigenous chicken sales. Understanding the value chain dynamics is essential for identifying opportunities for value addition, improving market access, and enhancing the overall efficiency and profitability of indigenous chicken farming in the district.

The study assessed the contribution of indigenous chicken production to Return on Investment (ROI) in Bindura district. Results indicated that indigenous chicken farming contributes significantly to ROI, albeit with varying levels of profitability among farmers. Factors such as batch size, feed costs, labor costs, vaccine costs, and mortality rates influence the ROI of indigenous chicken production. Understanding the ROI of indigenous chicken farming provides insights into the economic viability of small-scale poultry farming and informs decision-making processes for farmers and policymakers.

Factors affecting the return on investment in indigenous chicken production in Bindura district were identified through regression analysis. Feed costs, labor costs, vaccine costs, and mortality rates were found to be significant predictors of profitability. Higher feed costs, labor costs, and vaccine costs were associated with reduced profitability, highlighting the importance of efficient resource management and disease control measures. Additionally, higher mortality rates were found to negatively impact profitability, underscoring the importance of implementing effective disease management strategies and biosecurity measures. Understanding these factors is essential for developing targeted interventions and support mechanisms to enhance the profitability and sustainability of indigenous chicken farming in Bindura district.

5.2.Conclusion

In conclusion, the findings of this study shed light on the challenges, value chain dynamics, economic contributions, and factors influencing profitability in indigenous chicken production in Bindura district. The study identified significant challenges such as high mortality rates, costly vaccination programs, limited market access, and fluctuations in feed and labour costs, which hinder the profitability and sustainability of small-scale farming operations. Agricultural markets, middlemen, roadside sales, and farmgate sales were identified as primary market channels, highlighting the importance of market access for indigenous chicken farmers. Moreover, regression analysis revealed that factors such as feed costs, labour costs, vaccine costs, and mortality rates significantly influence profitability, emphasizing the need for efficient resource management and disease control measures. These findings provide valuable insights for policymakers, extension workers, and indigenous chicken farmers in developing targeted interventions and support systems to enhance the resilience and profitability of indigenous chicken production in Bindura district.

5.3.Recommendations

Based on the study's findings, a set of recommendations can be proposed to address the challenges highlighted and to enhance the profitability and sustainability of indigenous chicken production in Bindura district.

- First and foremost, effective disease management strategies should be implemented, including regular vaccination programs and stringent biosecurity measures, to mitigate the high mortality rates observed among the chicken population.
- Moreover, improving market access for indigenous chicken farmers is crucial, necessitating the development of infrastructure and organized marketing structures to facilitate fair pricing and stable market outlets.
- Capacity-building initiatives should also be prioritized, offering training and extension services to farmers on enhanced production techniques, disease management practices, and effective marketing strategies to boost productivity and competitiveness within the value chain.
- Furthermore, efficient resource management practices are essential, with a particular emphasis on promoting the adoption of own feed formulation methods to minimize production costs. This can be facilitated through strategies such as offering rebates on the importation of feed and raw materials used in feed production, thereby reducing the overall cost of feed production in Zimbabwe and increasing the profit margins received by farmers from the sale of their indigenous chickens.
- Lastly, continued research and innovation efforts should be encouraged to develop locally adapted breeds, improve feed formulations, and introduce technologies for value addition, thereby enhancing the resilience and competitiveness of the indigenous chicken farming sector in the district.

Through the implementation of these recommendations, stakeholders can address existing challenges, unlock opportunities, and support the sustainable growth of indigenous chicken production in Bindura district.

5.3.1 Recommendations for further study

Further research is recommended to explore the long-term economic and environmental impacts of implementing own feed formulation strategies in indigenous chicken production. This future study could investigate the efficacy of different feed formulations on chicken growth, health, and overall production efficiency, while also assessing the potential

environmental benefits, such as reduced carbon emissions and resource usage. Additionally, examining the socioeconomic implications for farmers, including the feasibility of adopting own feed formulation methods and the associated costs and benefits, would provide valuable insights for promoting sustainable and cost-effective poultry farming practices.

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ANNEX 1: QUESTIONNAIRE

My name isTauya Madyira pursuing a BSc Honor's Degree in Agricultural Economics and Management at Bindura University of Science Education. I am carrying out research on the analysis of the smallholder indigenous chicken value chain and profitability in Zimbabwe farmers in Bindura District, Zimbabwe. All information provided by respondent is will be kept CONFIDENTIAL and will serve no purpose other than academic. Your cooperation is valuable in the process**.**

QUESTIONNAIRE ON INDIGENOUS CHICKEN PRODUCTION

All information provided by interviewee will be treated as STRICTLY CONFIDENTIAL for mutual benefit of both the researcher and the respondents.

Enumerator name……..…… Name of respondent……

District name…….. Village name…….....

Ward……..... Date...…….....

Section A: Demographic details

1. Gender of the household head: 1= Male [ ] 2= Female [ ]

2. What is your age? [ ]

3. Marital status of household head

1=Single [ ] 2= Married [ ] 3=Divorced [ ] 4. Windowed [ ]

4. Household size [ ]

5. What is your level of education

1= Primary [ ] 2= Secondary [ ] 3= Tertiary [ ] 4=Never attended [ ] 4= informal

Section B background information of agriculture **1.What agricultural activities do you practice?**			
Livestock	**Crop**	**Vegetable**	**None**

2. Which crops and vegetables did you grow last season? (Rank 1 as the most commonly grown crop/vegetable)				
			Purpose of production	
Crop/vegetable	**Rank**	**Area (L x W)**	**Consumption**	**Sale**

3. What do you consider to be the main problem in crop production? (Rank 1 as the most severe problem)			
Problem	**Rank**	**Problem**	**Rank**
Labour		**Low temperature**	
Input supply		**Low rainfall**	
High costs of inputs		**High transport cost**	
Lack of equipment		**Lack of water sources**	
High temperatures		**Theft**	
Diseases		**Lack of Capital**	
Land shortage		**No proper structures (no fence)**	
Late planting		**Lack of skills**	
No markets		**Pests**	
Other (specify):			

4. What type of livestock species do you keep? (Rank specie)							
Class	**Cattle**	**Goats**	**Sheep**	**Pigs**	**chicken**		**Other specif**
					broile	**indigeno**	

					r	**us**	**y**
Number							
Rank							

SECTION C Production and management practises							
1.What breeds of indigenous chicken do you raise? (Rank breed)							
Breed	**Sasso**	**Boschveld**	**Sussex**	**naked neck**	**White leghorn**	**Non descriptive**	**Other (specify)**
Number							
Rank							

2. Why do you keep indigenous chicken? (Rank 1 as the most important reason)			
Use	**Rank**	**Use**	**Rank**
Meat		**Sales**	
Eggs		**Status**	
Manure		**Ceremonies**	
Feathers		**Other**	

3. Which of the following housing system do you use?			
System	**Tick**	**System**	**Tick**
Slatted houses		**Open sided**	
Deep liter house		**Front and back sides**	
Nests and perches		**Chicken run**	
Basket housing		**Other specify**	

4. What are the major challenges you are facing in raising your chickens? (Rank 1 as the most severe challenge)			
Problem	**Rank**	**Problem**	**Rank**
Shortage of feed resources		**Lack of organized markets**	
High transport cost		**Poor extension**	
High mortality and reproductive wastage		**Veterinary services**	
Lack of suitable breeding stock		**Institutional support**	
Lack of control of parasites and disease		**Lack of infrastructural**	
Labour shortages		**Stock theft**	
Lack appropriate skills for indigenous chicken production		**High temperatures**	
Low rainfall		**Low prices**	
Competition among farmers		**Predators**	
Other (specify)			

SECTION D Mapping Indigenous Chicken Production Value Chain
1.Do you sell your birds live or process them before selling? Live/ processed
If processing, what processing activities do you perform? Packaging [ ] grading[ ] slaughter [ ]
2.What is your source of chicken feed? [ ]

3.Where do you get vaccines and medicine for your chicken? [ ]
4. How do your finished products reach the final consumer? **……**
5. How do you transport indigenous chicken to the market? 1= Using human labour [ ] 2= Using a farm animal cart [ ] 3=Using a pick up/ truck [ ]
6.Who are key actors in indigenous chicken's production value chain? And How often do you interact with each actor? 0=never, rarely(once or twice a month) 2=sometimes (three to 10 times a month) 3=often (more than 10 times per month)

Actors	**Tick**	
Input supplier		
Farmers		
Processors /manufacturer		
Wholesaler		
Retailer		
Butcheries		
Restaurants		
Consumer		
Other (specify)		

SECTION E PROFITABILITY OF INDIGENOUS CHICKEN

1. What is your flock size? [ ]

2. What is the average laying rate per bird (%)? [ ]

3. What is the price of feed? [ ]

4. What is the average mortality rate (%)? [ ]

5. What is your selling price per live bird or per kilogram of processed chicken? [ ]

6. What is your estimated cost of labor? [ ]

7. How do you rate the profitability of indigenous chicken production in terms of return on investment?

1=Highly profitable [ ] 2= Moderately profitable[ ] 3=Breakeven Not profitable[ ]

8. Have you calculated return on investment (ROI)? Yes[ ] no[ ]if yes what is your estimated ROI percentage? [ ]

What cost you have incurred in chicken production in US$?	
Item	**Amount in US$**
Transport cost	
Unit cost of labour	
Storage cost	
Packaging	
Handling	
Vaccine cost	
Egg trays	
Day old chicks	
Drinkers	

9.What are the factors that affect return on investment of indigenous chicken production? (Rank 1 as the main challenge	
Variable	**Rank**

Disease outbreak	
Labor cost	
Feed cost	
Mortality rate	
Vaccine cost	
Batch size	
Poor infrastructure	
Gender	
Transport cost	
Type of breed	
Price	
Type of housing	

THANK YOU