FACTORS AFFECTING DAIRY FARMING IN KENYA: A CASE STUDY OF KAPSABET DAIRY FARM IN NANDI COUNTY.

JEPLETING BILDA RUNYA

A RESEARCH PROJECT SUBMITTED TO THE SCHOOL OF MANAGEMENT AND LEADERSHIP IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF BACHELOR OF MANAGEMENT AND LEADERSHIP OF THE MANAGEMENT UNIVERSITY OF AFRICA

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DECLARATION

This research project is my original work and has not been presented for a degree in any other University

Signature..... Date.....

Jepleting Bilda Runya

BMLK/6/00174/3/21

This research project has been submitted for examination with my approval as University Supervisor

Signature..... Date.....

Francis Macharia

The Management University of Africa

DEDICATION

This project is dedicated to my parents for their endless support and sacrifices throughout my academic journey.

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Table of Contents

DECLARATION ..... **ii**
DEDICATION ..... **iii**
ACKNOWLEDMENT ..... **iv**
LIST OF TABLES ..... **viii**
LIST OF FIGURES ..... **ix**
ACRONYMS AND ABBREVIATIONS ..... **x**
OPERATIONAL DEFINITION OF TERMS ..... **xi**
ABSTRACT ..... **xii**
CHAPTER ONE **1**
INTRODUCTION **1**
1.0 Introduction 1
1.1 Background of the Study 1
1.1.1 Feeding Practices 3
1.1.2 Disease Management 3
1.1.3 Breeding Methods 3
1.2 Statement of the Problem 4
1.3 Objectives of the Study 6
1.3.1 General Objective 6
1.3.2 Specific Objectives 6
1.4 Research Questions 7
1.5 Significance of the Study 7
1.6 Scope of the Study 8
1.7 Chapter Summary 9
CHAPTER TWO **10**
LITERATURE REVIEW **10**
2.0 Introduction 10
2.1 Theoretical Literature Review 10
2.1.1 Optimum Foraging Theory 10
2.1.2 Germ Theory of Disease 11
2.1.3 Genetic Improvement Theory 11
2.2 Empirical Literature Review 12
2.2.1 Feeding Methods and Dairy Farming 12

2.2.2 Disease Management and Dairy Farming 14
2.2.3 Breeding Practices and Dairy Farming 15
2.3 Summary and Research Gaps 16
2.4 Conceptual Framework 19
2.5 Operationalization of Variables 19
2.6 Chapter Summary 20
CHAPTER THREE 21
RESEARCH DESIGN AND METHODOLOGY 21
3.0 Introduction 21
3.2 Target Population 21
3.3 Sample and Sampling Technique 22
3.4 Data Collection Instruments 24
3.5 Pilot Study 24
3.6 Data Collection Procedure 25
3.7 Data Analysis and Presentation 26
3.8 Ethical Considerations 27
3.9 Chapter Summary 29
CHAPTER FOUR 30
RESEARCH FINDINGS AND DISCUSSION 30
4.0 Introduction 30
4.1 Presentation of Research Findings 30
4.1.1 Response Rate 30
4.1.2 Demographic Information 32
4.1.2.1 Gender of Respondents 32
4.1.2.2 Age Distribution of Respondents 33
4.1.2.3 Role of Respondents. 35
4.1.2.4 Years of Experience 36
4.1.3 Influence of Feeding Methods on Dairy Productivity 38
4.1.4 Impact of Disease Management Practices on Milk Yield and Quality 39
4.1.5 Impact of Breeding Methods on Reproductive Performance and Productivity 41
4.2 Limitations of the Study 42
4.3 Chapter Summary 43
CHAPTER FIVE 44

SUMMARY, RECOMMENDATIONS AND CONLUSION.....44
5.0 Introduction 44
5.1 Summary of Findings 44
5.1.1 Background Information 44
5.1.2 Feeding Methods and Milk Yield and Quality 46
5.1.3 Disease Management Practices and Dairy Productivity 46
5.1.4 Breeding Methods and Reproductive Efficiency and Milk Production 47
5.2 Recommendations..... 48
5.3 Conclusions 49
5.4 Suggestions for Further Studies 50
REFERENCES 51
APPENDICES 56
APPENDIX 1: QUESTIONNAIRE 56

LIST OF TABLES

Table 1: Summary and Research Gaps 17
Table 2: Operationalization of Variables 20
Table 3: Target Population 22
Table 4: Sample Size 23
Table 5: Response Rate 30
Table 6: Gender Distribution of Respondents 32
Table 7: Age Distribution of Respondents 33
Table 8: Role of Respondents 35
Table 9: Years of Experience 36
Table 10: Respondents' Perception on Feeding Methods and Dairy Productivity 38
Table 11: Respondents' Perception on Disease Management Practices and Milk Yield and Quality 39
Table 12: Respondents' Perception on Breeding Methods and Reproductive Performance and Productivity 41

LIST OF FIGURES

Figure 1: Conceptual Framework 19
Figure 2: Response Rate 31
Figure 3: Gender Distribution of Respondents 32
Figure 4: Age Distribution of Respondents 34
Figure 5: Role of Respondents 35
Figure 6: Years of Experience 37

ACRONYMS AND ABBREVIATIONS

AI	Artificial Insemination
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
ILRI	International Livestock Research Institute
KDB	Kenya Dairy Board
KIPPRA	Kenya Institute for Public Policy Research and Analysis
OFT	Optimum Foraging Theory
PMR	Partial Mixed Ration

OPERATIONAL DEFINITION OF TERMS

Artificial Insemination	A breeding method involving the manual deposition of semen into a cow's reproductive tract without natural mating, aimed at genetic improvement.
Breeding Practices	Strategies and techniques employed to manage reproduction in dairy herds, including sire selection, genetic evaluation, and calving interval management.
Dairy Productivity	The efficiency and output of dairy farming operations, measured in terms of milk yield, milk quality, and reproductive performance.
Disease Management	All preventive and curative measures implemented to maintain animal health, including vaccination, biosecurity, deworming, and hygiene practices.
Feeding Methods	The systems and practices used to provide nutrition to dairy cattle, including grazing, zero-grazing, mixed systems, and supplementary feeding.
Mastitis	An inflammatory condition in the cow's under tissue, often caused by bacterial infection, affecting milk yield and quality.
Zero-Grazing	A feeding system where livestock are kept in enclosures and provided with cut-and-carry fodder instead of grazing in pastures.

ABSTRACT

Dairy farming is a critical component of Kenya's agricultural sector, contributing significantly to livelihoods and the national economy. However, productivity remains substantially below global benchmarks, particularly in medium-scale farms facing multifaceted constraints. This study investigated the factors affecting dairy farming productivity, using Kapsabet Dairy Farm in Nandi County as a case study. The research specifically assessed the influence of feeding methods, disease management practices, and breeding methods on dairy productivity. A descriptive research design was employed, with a target population of 40 farm workers, veterinary officers, and management staff. Using Slovin's formula, a sample size of 36 respondents was determined, and a stratified random sampling technique was used to ensure proportional representation. Data was collected through a structured questionnaire, piloted for validity and reliability, and analyzed using descriptive statistics, including mean scores from a 5-point Likert scale. The study achieved a 94% response rate. Key findings revealed that high feed costs and seasonal scarcity significantly limit feed availability (Mean=4.03, 3.09), though supplementation was acknowledged to improve milk yield (Mean=3.94). Disease management was identified as a major cost burden affecting profitability (Mean=4.15), with inconsistent milking hygiene (Mean=3.18) undermining otherwise available veterinary services. Breeding practices were found to be highly inefficient, primarily due to ineffective heat detection (Mean=2.71) and a lack of performance-based selection (Mean=2.56), leading to suboptimal calving intervals (Mean=2.65). The study concludes that the intertwined challenges of costly feeding methods, inconsistent disease prevention, and inefficient breeding practices are the primary constraints to productivity at Kapsabet Dairy Farm. It recommends investing in fodder conservation, implementing strict and standardized milking hygiene protocols, and providing regular staff training on advanced heat detection techniques. These evidence-based recommendations are tailored to enhance milk yield, reproductive efficiency, and overall farm profitability. The study contributes to academic knowledge by filling a gap on the combined effect of these factors in a medium-scale Kenyan context and provides a practical framework for farm managers, policymakers, and extension officers to improve dairy sector sustainability. Further longitudinal research across multiple regions is suggested to explore the broader socio-economic barriers to implementing these interventions.

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter introduces the study by presenting the background, statement of the problem, research objectives and questions, significance, scope, and operational definitions, all aimed at guiding the investigation into the effects of feeding methods, disease management, and breeding practices on dairy productivity at Kapsabet Dairy Farm in Nandi County.

1.1 Background of the Study

Dairy farming plays an important role in supporting livelihoods, food security and economic growth across the globe. According to the Food and Agriculture Organization (FAO, 2020), over 150 million households are engaged in milk production worldwide, providing an important source of income and nutrition. In developing nations, dairy farming is a critical part of rural economies, yet it faces persistent productivity gaps compared to global averages. These gaps are often linked to three interrelated factors, feeding methods, disease management, and breeding practices, which directly determine herd health, milk yield, and overall profitability (Nzuma et al., 2019).

Globally, feeding methods remain a major determinant of dairy output. Research indicates that using high-quality forages and balanced rations can raise milk yields by over 30% in tropical and subtropical production systems (Herrero et al., 2017). Yet, many farmers in low- and middle-income countries depend on low-quality feeds such as

untreated crop residues, which provide insufficient nutrients for optimal lactation (Mottet et al., 2017). Disease management is equally critical: mastitis alone is estimated to cause annual global losses of over USD 32 billion due to reduced production, treatment costs, and discarded milk (Ruegg, 2017). Breeding methods, whether through artificial insemination (AI) or natural service, have also been shown to significantly influence milk yield, calving intervals, and genetic improvement (Bebe et al., 2017; García-Ruiz et al., 2016).

In Kenya, the dairy sector contributes approximately 4% to the national GDP and 14% to the agricultural GDP (KDB, 2021). The industry is dominated by smallholder farmers, who typically manage 1–5 cows under zero-grazing or semi-intensive systems (Kilelu et al., 2017). Feeding challenges remain a major bottleneck, driven by seasonal variability, high costs of concentrates, and declining availability of fodder due to land subdivision (Nabuko et al., 2020). Disease management issues persist, with mastitis prevalence reported at between 38–50% in smallholder systems, alongside outbreaks of East Coast fever and lumpy skin disease (Mbindyo et al., 2021; KIPPRA, 2021). Breeding inefficiencies are common, with low AI success rates often linked to poor heat detection, inadequate nutrition, and limited access to quality semen (Mugambi et al., 2019). Addressing these three factors is essential for enhancing dairy productivity in the country.

Kapsabet Dairy Farm is located in Kapsabet Town, Nandi County, a key dairy-producing region in Kenya's Rift Valley. The farm operates on a medium scale, supplying milk to both local and urban markets. Feeding relies on a combination of Napier grass, maize stover, and commercial concentrates, but feed availability fluctuates with seasons.

Disease management is challenged by recurring cases of mastitis and tick-borne diseases, which reduce milk yield and quality. Breeding combines artificial insemination and bull service, but variable conception rates and prolonged calving intervals limit productivity. These constraints typify many medium-scale dairy farms in Nandi County, making Kapsabet a suitable case study for examining how feeding methods, disease management, and breeding practices affect dairy production.

1.1.1 Feeding Practices

Feeding methods at Kapsabet Dairy Farm influence milk production and reproductive performance. This study will investigate the types of feeds used, feeding schedules, and supplementation practices to evaluate their adequacy and impact on productivity. The goal is to identify improvements that can stabilize feed availability and enhance milk yields in a seasonal environment (ILRI, 2025; Nabuko et al., 2020).

1.1.2 Disease Management

The study will assess current disease control strategies at Kapsabet, focusing on mastitis and tick-borne diseases. It will evaluate detection, treatment, and preventive measures, with the aim of recommending effective, sustainable management practices to reduce losses and improve milk quality (Mbindyo et al., 2021; ILRI/CGIAR, 2025).

1.1.3 Breeding Methods

Breeding practices affect herd genetic quality and reproductive efficiency. This research will examine breeding strategies employed, including artificial insemination and bull service, conception rates, and calving intervals. The study aims to identify gaps and

recommend breeding interventions suitable for Kapsabet's resources and environment to enhance productivity (Bebe et al., 2017; Mugambi et al., 2019).

1.2 Statement of the Problem

Dairy farming in Kenya is a vital source of income, nutrition, and employment, contributing approximately 4% to the national GDP and 14% to agricultural GDP (Kenya Dairy Board [KDB], 2021). However, productivity remains significantly below global benchmarks. Kenya's average milk yield per cow per day is estimated at 6 liters, while the global average is about 20 liters (KDB, 2021). This gap is especially pronounced in medium-scale farms like Kapsabet Dairy Farm in Nandi County, where multiple constraints limit potential output.

A critical problem affecting dairy productivity is suboptimal feeding methods. Many farms depend on seasonal and often inadequate forage supplies such as Napier grass and crop residues, which lack balanced nutrients required for optimal milk production and reproduction (Nabuko et al., 2020). Seasonal feed shortages force farmers to reduce feeding levels or rely heavily on expensive commercial concentrates, increasing production costs and reducing profit margins (ILRI, 2025). Without proper feeding strategies, cows experience negative energy balance, leading to reduced milk yield, poor body condition, and fertility problems (Cheruiyot et al., 2020).

Furthermore, disease management poses a substantial challenge. Mastitis alone affects between 38% and 50% of dairy cows in Kenyan herds, causing direct losses through decreased milk production, poor milk quality, and increased veterinary costs (Mbindyo et

al., 2021; ILRI/CGIAR, 2025). Other prevalent diseases, including tick-borne illnesses like East Coast fever, further threaten herd health and productivity (KIPPRA, 2021). Inadequate disease control and indiscriminate antibiotic use also raise concerns about antimicrobial resistance, which threatens both animal and public health (Mbindyo et al., 2021). These health challenges compromise farmers' ability to consistently supply quality milk to urban markets such as Nairobi, undermining food safety and economic returns.

In addition, breeding inefficiencies limit genetic improvement and reproductive performance. Medium-scale farms frequently experience low conception rates and prolonged calving intervals due to poor heat detection, limited access to quality artificial insemination (AI) services, and mismatched breed choices that do not consider local feed availability or environmental conditions (Mugambi et al., 2019; Bebe et al., 2017). These inefficiencies reduce the number of productive lactations per cow, further depressing milk output and farm profitability.

These intertwined challenges, feeding methods, disease management, and breeding practices, directly reduce milk production efficiency at Kapsabet Dairy Farm, reflecting broader sectoral issues in Nandi County and Kenya at large. Despite the importance of these factors, there is limited focused research exploring their combined effect on medium-scale dairy farms supplying urban markets. This knowledge gap constrains the development of practical interventions tailored to farms like Kapsabet, where both resource limitations and market demands require context-specific solutions.

Therefore, this study aims to comprehensively assess how feeding methods, disease management, and breeding practices affect dairy productivity at Kapsabet Dairy Farm. Understanding these dynamics will help formulate evidence-based recommendations to improve milk yield, quality, reproductive efficiency, and ultimately the sustainability and profitability of medium-scale dairy farming in Kenya.

1.3 Objectives of the Study

1.3.1 General Objective

The main aim of this research is to investigate the factors affecting dairy farming productivity at Kapsabet Dairy Farm in Nandi County.

1.3.2 Specific Objectives

i. To assess the influence of feeding methods on dairy productivity at Kapsabet Dairy Farm in Nandi County.
ii. To assess the impact of disease management practices on milk yield and quality at Kapsabet Dairy Farm.
iii. To examine the impact of breeding methods on reproductive performance and overall productivity at Kapsabet Dairy Farm.

1.4 Research Questions

i. How do different feeding methods affect milk yield and quality at Kapsabet Dairy Farm?
ii. What is the relationship between disease management practices and dairy productivity at Kapsabet Dairy Farm?
iii. How do breeding methods influence reproductive efficiency and milk production at Kapsabet Dairy Farm?

1.5 Significance of the Study

By examining feeding methods, disease management and breeding practices, the research will help farm owners and managers identify practical strategies to improve milk yield, reproductive efficiency, and overall herd health. These improvements can lead to increased profitability and sustainability, which are critical for the long-term success of dairy farms operating under similar conditions.

Moreover, the findings will be valuable to policymakers and agricultural extension officers who design and implement programs targeting dairy farmers. The study's insights will guide the development of tailored interventions that address the specific challenges of feeding, disease control and breeding faced by medium-scale dairy producers. This will enhance the effectiveness of extension services and contribute to improved productivity across the dairy sector.

The research will also contribute to academic knowledge by filling gaps related to the combined effects of feeding, disease management, and breeding practices in the Kenyan

context, particularly for medium-scale farms. This can stimulate further research and inform educational curricula that support sustainable dairy farming practices.

Finally, improving dairy productivity has wider benefits for consumers and the dairy industry. By helping farms increase milk quantity and quality, this study supports a more stable and safe milk supply, especially in urban centers like Nairobi. This contributes to national food security and public health by ensuring that consumers have access to nutritious and safe dairy products.

1.6 Scope of the Study

This study will be undertaken over a period of approximately four months, from May to August 2025. The timeline has been designed to allow adequate time for data collection, analysis, and interpretation, ensuring that seasonal variations in dairy farming practices, particularly in feeding and disease management, are taken into account. Geographically, the research will focus on Kapsabet Dairy Farm, located in Kapsabet Town, Nandi County, within Kenya's Rift Valley region. Nandi County is among Kenya's leading dairy production zones due to its favorable climate, fertile soils, and strong dairy culture (KIPPRA, 2021; Kenya Dairy Board, 2023). The farm was selected as a case study because it represents a typical medium-scale dairy enterprise supplying milk to both local and urban markets, including Nairobi, while facing challenges common to similar farms across the county.

The target population of the study will consist of Kapsabet Dairy Farm's management team, farm workers, and technical personnel directly involved in feeding, disease

management, and breeding operations. These individuals are best positioned to provide first-hand information on the farm's operational challenges and successes. Involving the core workforce is essential, as their experiences and practices significantly influence dairy productivity (Cheruiyot et al., 2020; Ministry of Agriculture and Livestock Development, 2023).

1.7 Chapter Summary

The chapter has discussed the background of the study, statement of the problem, objectives of the study, research questions, significance and scope of the study on dairy productivity at Kapsabet Dairy Farm in Nandi County.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter includes theoretical review, empirical literature review, summary and research gaps, conceptual framework and operationalization of variables.

2.1 Theoretical Literature Review

The theoretical review outlines the conceptual foundations guiding this study, focusing on the Optimum Foraging Theory as the anchor theory, alongside the Germ Theory of Disease and the Genetic Improvement Theory, which together explain how feeding methods, disease management, and breeding practices influence dairy productivity at Kapsabet Dairy Farm.

2.1.1 Optimum Foraging Theory

The theory was developed by Eric Charnov in 1976 and it explains how animals select feeding strategies that maximize energy gain while minimizing the effort and time spent acquiring food. It assumes that livestock, like wild animals, will choose feed sources that provide the highest nutritional returns relative to the energy invested (Pyke et al., 1977). In the context of Kapsabet Dairy Farm, this theory relates directly to the feeding methods variable, as the choice between zero-grazing, free-range grazing, or a mixed system can significantly influence nutrient intake and milk production. By applying OFT principles, farmers can design feeding programs that enhance productivity while minimizing costs. However, critics argue that OFT oversimplifies real-world feeding behavior by ignoring

economic, social, and environmental constraints that also determine how livestock are fed (Stephens et al., 2007).

2.1.2 Germ Theory of Disease

The theory was formulated by Louis Pasteur and expanded by Robert Koch in the mid-to-late 19th century. This theory posits that microorganisms are the primary cause of many diseases and that preventing pathogen exposure through sanitation, vaccination, and medical intervention can control or eradicate illness (Pasteur, 1861). In dairy farming, Germ Theory is highly relevant to the disease management variable, as it underpins measures such as regular vaccination programs, milking hygiene, deworming, and footbath use to control mastitis, foot-and-mouth disease, and other infections. For Kapsabet Dairy Farm, adopting practices grounded in Germ Theory can lead to healthier herds and improved milk yields. Nonetheless, the theory has been criticized for focusing too narrowly on pathogens while underestimating the influence of nutrition, genetics, and environmental stress on disease susceptibility (McMichael, 2015).

2.1.3 Genetic Improvement Theory

The theory was articulated by Douglas Falconer and Trudy Mackay in 1996, building on earlier livestock genetics principles. This theory emphasizes selective breeding to enhance desirable traits such as milk yield, reproductive efficiency and disease resistance over successive generations. In the case of Kapsabet Dairy Farm, this theory is directly linked to the breeding practices variable, where strategic use of artificial insemination and selection of high-performance sires can improve herd productivity and adaptability to

local conditions. However, critics warn that overemphasis on genetic gains may reduce genetic diversity, increase inbreeding risks, and potentially compromise animal welfare if breeding focuses excessively on production traits at the expense of resilience and health (Hansen, 2020).

2.2 Empirical Literature Review

This section presents past studies on feeding methods, disease management and breeding practices in dairy farming, highlighting their methodologies, key findings, conclusions, recommendations and existing research gaps that this study seeks to address.

2.2.1 Feeding Methods and Dairy Farming

Smith et al. (2018) conducted a longitudinal study in New Zealand using a mixed-method approach of farm surveys and milk yield records over three years. They found that cows under a partial mixed ration (PMR) system produced 15% more milk than those on pasture-only diets due to higher nutrient density. The study concluded that combining grazing with supplemental feeding optimizes productivity. They recommended training farmers on ration formulation. However, the study did not consider smallholder contexts where feed costs are a limiting factor.

Martins and Silva (2020) used an experimental design in Brazil to compare zero-grazing and pasture-based systems in 40 dairy farms. Findings indicated that zero-grazing cows had more consistent milk quality but higher feeding costs. The authors concluded that the most suitable feeding method depends on economic capacity. They recommended cost-

benefit analyses before adopting zero-grazing. The study lacked focus on environmental sustainability implications.

Ngeno et al. (2019) examined 120 dairy farms in Uganda using a cross-sectional survey. They found that feed scarcity during dry seasons reduced milk yields by up to 30%. The conclusion emphasized the importance of fodder conservation. Recommendations included establishing fodder banks. The study did not explore farmer adoption rates for conservation practices.

Koech et al. (2017) studied 80 smallholder dairy farmers in Kiambu County, Kenya, through structured interviews and milk production analysis. They found that farmers using a combination of Napier grass and dairy meal achieved higher yields than those relying solely on natural pasture. The conclusion emphasized integrating fodder production with concentrate feeding. They recommended capacity building on feed formulation. However, the study did not address the financial feasibility for resource-poor farmers.

Cheruiyot et al. (2021) applied a case study design in Nakuru County, analyzing feed composition and production records from five farms. They found nutrient imbalances in many feeding programs, reducing milk output by 12%. They concluded that poor feed formulation is a major constraint. Recommendations included extension services to train on feed balancing. However, the study did not investigate the impact of feed supply chain issues.

2.2.2 Disease Management and Dairy Farming

Oliver et al. (2018) in the USA used a randomized controlled trial across 50 dairy farms to test the effect of mastitis control protocols. Findings showed a 25% reduction in mastitis incidence in herds following strict sanitation and antibiotic use guidelines. They concluded that adherence to biosecurity measures significantly improves herd health. They recommended farmer training in mastitis prevention. However, the study did not address antimicrobial resistance concerns.

Kivaria et al. (2020) in the Netherlands conducted a retrospective analysis of national dairy health records. Results indicated that integrated herd health plans reduced disease prevalence by 18% over five years. They concluded that long-term health planning is more effective than ad hoc treatment. Recommendations focused on continuous veterinary involvement. The study lacked insight into small-scale, resource-limited farming contexts.

Munyua et al. (2019) surveyed 150 dairy farmers in Tanzania to assess disease control practices. They found that low adoption of vaccination programs correlated with high disease outbreaks. They concluded that limited farmer awareness hampers disease management. Recommendations included government-subsidized vaccination drives. The study did not analyze the role of extension services in depth.

Githinji et al. (2016) studied 90 dairy farmers in Nyeri County using interviews and farm inspections. They found that farms with routine deworming had 20% higher milk yields. They concluded that parasite control is crucial for productivity. Recommendations

focused on regular health check-ups. The study did not examine farmers' willingness to pay for veterinary services.

Mbindyo et al. (2021) conducted an observational study in Uasin Gishu County. Findings showed that farms practicing strict milking hygiene had lower somatic cell counts in milk. They concluded that training on milking hygiene is essential. Recommendations included integrating hygiene training into farmer field schools. The study did not investigate the economic barriers to implementing hygiene protocols.

2.2.3 Breeding Practices and Dairy Farming

García-Peniche et al. (2016) in Mexico applied a cohort study design on Holstein herds. They found that artificial insemination using genetically evaluated sires increased milk yield by 18% over natural mating. They concluded that selective breeding boosts productivity. Recommendations included genetic record-keeping. The study did not address adaptability of exotic breeds to local environments.

Haile-Mariam and Pryce (2019) in Australia used a longitudinal analysis of genetic evaluation data. They found that selection for fertility traits improved calving rates by 12% over a decade. They concluded that balanced breeding goals enhance both productivity and reproduction. They recommended integrating disease resistance into breeding indices. The study did not explore cost implications for smallholders.

Kugonza et al. (2017) studied 200 dairy farms in Rwanda through a cross-sectional survey. They found that crossbreeding local cattle with Friesians increased milk yield by 45% but required higher feed inputs. They concluded that crossbreeding is effective when

feed resources are adequate. They recommended extension support for crossbreeding programs. The study did not assess long-term genetic sustainability.

Bebe et al. (2017) in Nakuru County conducted a case study on smallholder breeding practices. They found that farmers using AI had 25% higher milk yields than those using uncontrolled mating. They concluded that AI adoption should be scaled up. Recommendations included subsidizing AI services. The study did not address farmer perceptions about AI.

Maina et al. (2020) in Kiambu County used focus group discussions and herd records analysis. They found that lack of access to quality breeding stock limited productivity. They concluded that improving breeder networks is key. Recommendations included establishing cooperative-led breeding programs. The study did not explore policies to regulate breeding quality standards.

2.3 Summary and Research Gaps

This section presents a summary of the past studies done related to this study by highlighting the author (s), area of study, methodologies they used, their findings, research gaps and the focus of this study in addressing those gaps.

Table 1: Summary and Research Gaps

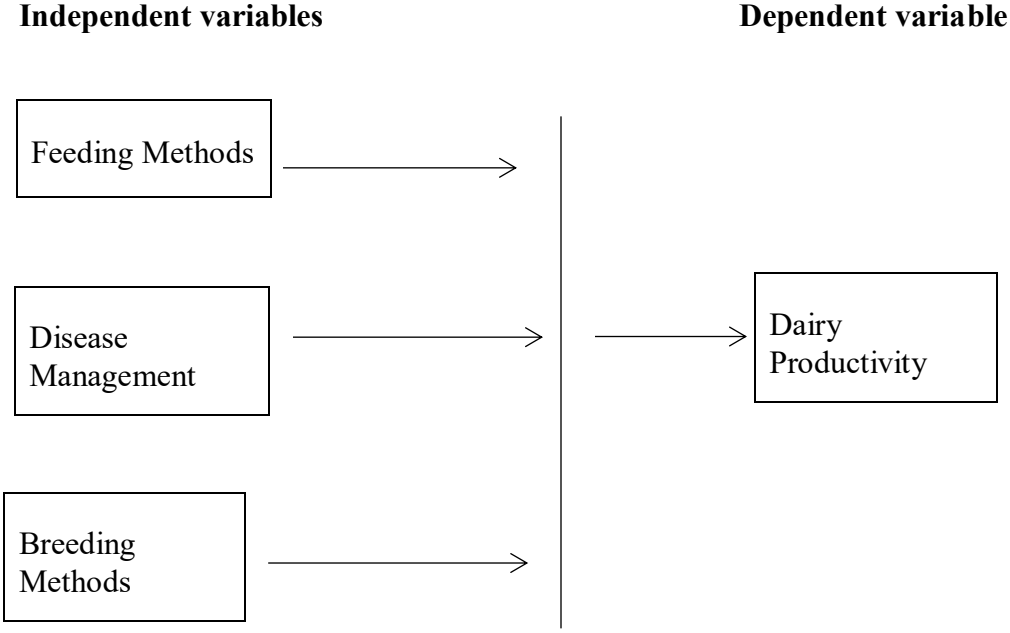
Author (s)	Area of Study	Methodology	Findings	Knowledge Gaps	Focus of this Study
Smith et al. (2018)	Feeding methods in New Zealand	Longitudinal study (mixed-methods)	PMR system increased milk yield by 15%	Did not consider smallholder contexts with feed cost constraints	Examine feeding systems within medium-scale Kenyan farm with seasonal feed shortages
Martins & Silva (2020)	Feeding systems in Brazil	Experimental design on 40 farms	Zero-grazing improved quality but raised costs	Lacked environmental sustainability assessment	Assess cost-effective feeding strategies suitable for medium-scale farms
Ngeno et al. (2019)	Fodder scarcity in Uganda	Cross-sectional survey (120 farms)	Dry season scarcity reduced yields by 30%	No analysis of farmer adoption of fodder conservation	Evaluate adoption of feed conservation at Kapsabet
Koech et al. (2017)	Feeding in Kiambu County, Kenya	Structured interviews & production analysis	Napier grass + dairy meal increased yields	No financial feasibility analysis for poor farmers	Assess economic viability of improved feeding
Cheruiyot et al. (2021)	Feed formulation in Nakuru County, Kenya	Case study of 5 farms	Poor formulation reduced output by 12%	Ignored feed supply chain challenges	Examine both feed quality and supply chain
Oliver et al. (2018)	Mastitis control in USA	Randomized controlled trial	Protocol adherence reduced mastitis by 25%	No antimicrobial resistance assessment	Explore disease control without overuse of antibiotics
Kivaria et al. (2020)	Herd health in Netherlands	Retrospective analysis	Integrated plans reduced disease by	No insight into resource-limited	Adapt long-term plans to Kenyan

			18%	contexts	context
Munyua et al. (2019)	Disease management in Tanzania	Farmer survey (150 farms)	Low vaccination uptake linked to outbreaks	Did not explore extension services role	Examine extension-facilitated disease control
Githinji et al. (2016)	Deworming in Nyeri County, Kenya	Interviews & inspections	Routine deworming raised yields by 20%	No assessment of willingness to pay	Assess economic feasibility of parasite control
Mbindyo et al. (2021)	Milking hygiene in Uasin Gishu County, Kenya	Observational study	Hygiene reduced somatic cell count	No cost analysis of hygiene measures	Evaluate low-cost hygiene improvement
García-Peniche et al. (2016)	AI in Mexico	Cohort study	Genetically evaluated sires increased yield by 18%	No adaptability assessment for local breeds	Examine AI success rates with local constraints
Haile-Mariam & Pryce (2019)	Breeding in Australia	Longitudinal analysis	Fertility trait selection improved calving rates by 12%	No cost analysis for smallholders	Evaluate breeding affordability in Kenya
Kugonza et al. (2017)	Crossbreeding in Rwanda	Cross-sectional survey	Crossbreeding increased yield by 45% but needed more feed	No long-term sustainability assessment	Assess feed-resource matching in breeding
Bebe et al. (2017)	AI adoption in Nakuru County, Kenya	Case study	AI increased yields by 25%	No study on farmer perceptions	Assess farmer willingness to use AI
Maina et al. (2020)	Breeding stock access in Kiambu County, Kenya	FGDs & herd record analysis	Lack of quality stock limited productivity	No policy framework explored	Propose cooperative breeding programs

2.4 Conceptual Framework

A conceptual framework is a research tool used to illustrate the relationship between variables in a study, guiding the collection, interpretation, and analysis of data (Adom, Hussein, & Joe, 2018).

Figure 1: Conceptual Framework



2.5 Operationalization of Variables

Operationalization of variables refers to the process of defining study variables in measurable terms by specifying their indicators, measurement scales, and the type of measurement to be used (Bhandari, 2020).

Table 2: Operationalization of Variables

Variable	Indicators	Measurement Scale	Type of Scale
Feeding Methods	Type of feeding system	5-point Likert Scale	
	Frequency of feeding, feed quality		Ordinal
	Feed availability		
Disease management	Vaccination frequency	5-point Likert Scale	
	Biosecurity measures, veterinary visits		Ordinal
	Disease records		
Breeding Methods	Type of breeding method	5-point Likert Scale	
	Sire selection		
	Genetic improvement practices		Ordinal
	AI usage		
Dairy Productivity	Milk yield	5-point Likert Scale	
	Milk quality		
	Calving intervals		Ordinal
	Reproductive performance		

2.6 Chapter Summary

The chapter has presented the theoretical foundations, empirical literature, conceptual framework, and operationalization of variables that underpin this study, highlighting existing knowledge, research gaps, and the relationships between feeding methods, disease management, breeding practices, and dairy productivity at Kapsabet Dairy Farm.

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.0 Introduction

This chapter outlines the research design, target population, sample and sampling techniques, data collection instruments, data analysis and presentation and ethical considerations, all aimed at investigating the effects of feeding methods, disease management, and breeding practices on dairy productivity at Kapsabet Dairy Farm.

3.1 Research Design

It refers to the framework that the researcher intends to follow for conducting the research study. This study will employ a descriptive research design, which involves collecting data to describe characteristics of a population or phenomenon systematically without manipulating variables (Creswell & Creswell, 2018). The design is appropriate for this study because it allows for an in-depth analysis of how feeding methods, disease management, and breeding practices influence dairy productivity, enabling the researcher to gather both quantitative and qualitative data to explain observed patterns (Kothari, 2017).

3.2 Target Population

A target population refers to the entire group of individuals, items, or events that have a common observable characteristic from which a sample is drawn for a study (Etikan & Bala, 2017). For this research, the target population will comprise all farm workers, veterinary officers, and management staff directly involved in dairy operations at

Kapsabet Dairy Farm. This population is selected because they possess direct experience and knowledge about the farm's feeding practices, disease management, and breeding methods, which are the key focus areas of the study.

Table 3: Target Population

Category	Frequency	Percentage (%)
Farm Workers	25	62.5
Veterinary Officers	5	12.5
Management Staff	10	25.0
Total	**40**	**100**

3.3 Sample and Sampling Technique

A sample is a subset of a population selected for participation in a study, representing the larger group from which it is drawn (Sekaran & Bougie, 2016). In research, sampling enables the collection of data from a manageable number of subjects while maintaining the ability to generalize the findings of the entire population.

The sample size will be determined using Slovin's formula, which is appropriate when the population size is known, and a specific margin of error is desired. This formula is expressed as:

$$n = \frac{N}{1 + N(e^2)}$$ Where:

n= approximate sample size

N= total population (40)

e= margin of error (represented as 0.05 for a 95% confidence level).

$$n = \frac{40}{1 + 40\,(0.05^2)}$$

$$n = \frac{40}{1 + 40(0.0025)}$$

$$n = \frac{40}{1 + 0.1}$$

$$n = 36$$

Thus the sample size for the study will be 36 respondents.

Table 4: Sample Size

Category	Frequency	Percentage (%)
Farm workers	23	64
Veterinary Officers	7	19
Management Staff	6	17
Total	**36**	**100**

The study will employ a stratified random sampling technique, which involves dividing the target population into distinct, homogeneous subgroups (strata) and then randomly selecting respondents from each subgroup. Stratification ensures that all categories of interest are proportionately represented, reducing sampling bias and enhancing the precision of estimates (Etikan & Bala, 2017). In this study, the strata will be based on job category: farm workers, veterinary officers, and management staff. This method is particularly suited for the research objectives, as it captures the experiences of each group, especially smaller but significant categories like veterinary officers, whose input is vital in disease management and breeding practices.

3.4 Data Collection Instruments

Data collection instruments refer to the tools or mechanisms that researchers use to gather, measure and record information from study participants in a systematic way (Kumar, 2019). These instruments may include questionnaires, interviews, observation checklists, and standardized tests, depending on the nature of the research and the type of data required (Brace, 2018). Well-designed data collection instruments are essential for ensuring the validity, reliability, and accuracy of research findings (Creswell & Creswell, 2018). In this study, the main data collection instrument will be a questionnaire, which is a structured set of written questions aimed at eliciting specific information from respondents (Bryman, 2016). The questionnaire will be suitable for this research for three main reasons. First, it will allow for efficient collection of data from a relatively larger number of respondents within a shorter time frame, which is ideal for the May to August 2025 study period. Second, it minimizes interviewer bias and encourages more honest responses by offering a degree of anonymity (Taherdoost, 2016). Third, it enables the use of closed-ended questions for quantitative analysis and open-ended questions for deeper qualitative insights, making it well-suited for investigating feeding methods, disease management, and breeding practices at Kapsabet Dairy Farm.

3.5 Pilot Study

A pilot study is a small-scale preliminary investigation conducted prior to the main research to test the feasibility, clarity, and appropriateness of research instruments and procedures (Van Teijlingen & Hundley, 2016). According to Kallio et al. (2016), a well-conducted pilot test improves the overall quality of the research by ensuring that

instruments are both practical and contextually relevant. In this study, the questionnaire will be piloted on approximately 10% of the sample population, which is about four respondents, selected from a dairy farm in Nairobi County that has similar operational characteristics to Kapsabet Dairy Farm but is not part of the study population.

3.5.1 Validity

It refers to the degree to which an instrument measures what it is intended to measure (Taherdoost, 2016). A valid instrument will ensure that the data collected accurately represents the concepts under investigation without being distorted by irrelevant factors. To ensure validity in this research, content validity will be established through expert review by dairy farming specialists and research methodologists, ensuring that all questionnaire items are relevant to the study objectives.

3.5.2 Reliability Test

It refers to the extent to which a research instrument consistently yields the same results under similar conditions (Heale & Twycross, 2015). A reliable instrument will ensure that findings are stable and repeatable over time. To enhance reliability for this study, the questionnaire will be designed with clear and concise wording to avoid ambiguity and a standardized 5-point Likert scale will be used to measure all key variables.

3.6 Data Collection Procedure

Data collection procedure refers to the systematic process a researcher follows to gather data from identified respondents in a manner that ensures accuracy, reliability and adherence to ethical standards (Kabir, 2016). It outlines the specific steps taken to obtain information using the selected research instruments, ensuring that the process is

consistent and replicable. According to Saunders et al. (2019), a clear and well-documented data collection procedure minimizes bias, protects respondents' rights, and enhances the credibility of the findings.

In this study, the data collection procedure will begin with the researcher obtaining an official introductory letter from the Management University of Africa, granting permission to approach the study site and target respondents. This letter will be presented to the management of Kapsabet Dairy Farm in Nandi County, together with a formal request for authorization to conduct the research within their premises.

3.7 Data Analysis and Presentation

Data analysis refers to the process of systematically examining, cleaning, transforming, and interpreting collected data to identify patterns, trends, and relationships that address the research objectives (Kumar, 2019). It enables the researcher to make informed conclusions and recommendations based on evidence. According to Creswell and Creswell (2018), effective data analysis ensures that raw data is meaningfully organized and interpreted in alignment with the study's goals. Data presentation, on the other hand, involves organizing analyzed data into a clear and understandable format, such as tables, charts, and graphs, to enhance interpretation and communication of results (Saunders et al., 2019).

Descriptive statistics will be used to summarize and describe the characteristics of the respondents and their responses. These measures are suitable for summarizing categorical and ordinal data, such as responses on a Likert scale.

The analyzed data will be presented using tables for numerical clarity and charts (such as bar graphs and pie charts) to provide visual representations that enhance comprehension and comparison of results. This combination of descriptive statistics and visual presentations will make it easier to interpret findings, identify trends, and relate them to the research objectives.

3.8 Ethical Considerations

Ethical considerations refer to the principles and guidelines that ensure research is conducted in a manner that respects the rights, dignity, and welfare of participants (Resnik, 2020). They safeguard both the participants and the researcher, promoting trustworthiness and credibility in the research process. According to Saunders et al. (2019), adherence to ethical standards minimizes harm, avoids exploitation, and ensures the integrity of the study's findings.

3.8.1 Informed Consent

Informed consent is the process by which participants are fully informed about the research purpose, procedures, potential risks, and benefits before agreeing to take part (Nayak & Narayan, 2019). In this study, informed consent will be obtained by providing each participant with an information sheet and consent form, ensuring they understand and agree before any data is collected.

3.8.2 Voluntary Participation

Voluntary participation means that respondents are free to choose whether or not to take part in the study without any form of coercion or undue influence (Babbie, 2020). This study will ensure voluntary participation by clearly explaining that involvement is entirely optional and that participants can withdraw at any time without penalty or negative consequences.

3.8.3 Confidentiality

Confidentiality involves protecting the data provided by participants from being disclosed to unauthorized persons (Creswell & Creswell, 2018). This study will uphold confidentiality by securely storing completed questionnaires and ensuring that only the researcher has access to raw data. Findings will be reported in aggregated form so that no individual's responses can be linked back to them.

3.8.4 Privacy

Privacy refers to an individual's right to control access to their personal information and to be free from unnecessary intrusion (Wiles, 2016). The study will respect privacy by asking only questions directly relevant to the research objectives and conducting data collection in environments where participants feel secure and comfortable.

3.8.5 Anonymity

Anonymity means that the identity of participants cannot be linked to the data they provide (Walliman, 2017). In this study, anonymity will be ensured by avoiding the collection of personal identifiers such as names, phone numbers, or addresses

3.9 Chapter Summary

This chapter has outlined the research design, target population, sample and sampling techniques, data collection instruments, pilot study, data collection procedure, data analysis and presentation and ethical considerations on dairy productivity at Kapsabet Dairy Farm.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.0 Introduction

This chapter presents the analysis, finding, and discussion of the data collected on the factors affecting dairy farming productivity at Kapsabet Dairy Farm, focusing on the response rate, demographic profile of respondents, and the influence of feeding methods, disease management and breeding practices; it also acknowledges the limitations encountered during the study.

4.1 Presentation of Research Findings

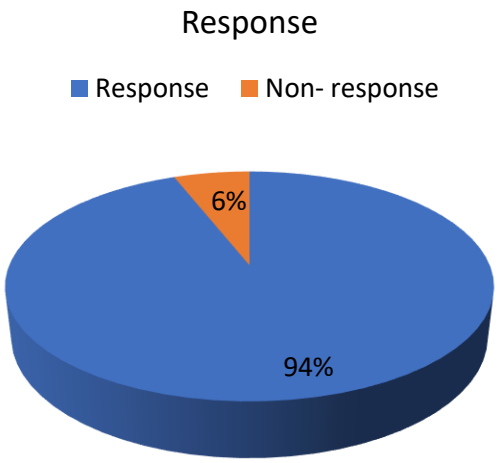
4.1.1 Response Rate

This section outlines the proportion of questionnaires that were successfully completed and returned from the sampled population.

Table 5: Response Rate

Category	Frequency	Percentage (%)
Response	34	94
Non-Response	2	6
Total	**36**	**100**

Figure 2: Response Rate



The study achieved a high response rate of 94% (34 out of 36 respondents), which is considered excellent for social science research and significantly enhances the reliability, validity, and generalizability of the findings. The two instances of non-response (6%) were attributed to one farm worker being on extended leave and one veterinary officer being unavailable due to field emergencies during the data collection period. This high level of participation suggests a strong interest in the research topic among the farm's staff and minimizes the potential for non-response bias.

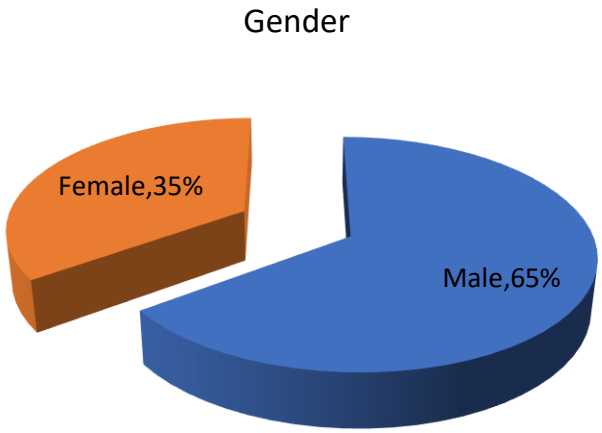
4.1.2 Demographic Information

4.1.2.1 Gender of Respondents. This section presents the distribution of respondents based on gender.

Table 6: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)
Male	22	65
Female	12	35
Total	**34**	**100**

Figure 3: Gender Distribution of Respondents



The results indicate that the majority of the respondents, 65% (n=22), were male, while 35% (n=12) were female. This gender distribution is reflective of the general workforce composition commonly found in dairy farming operations in the region, where roles such as milking, feeding, and herd management are often male-dominated. The participation of

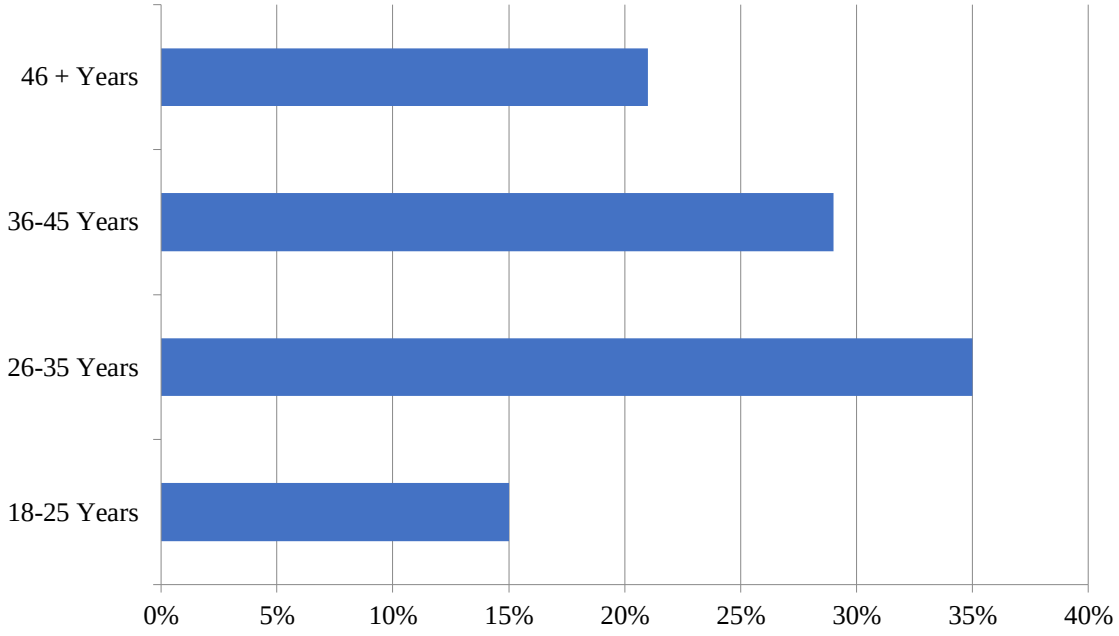
both genders, however, ensures that the data incorporates diverse perspectives from the farm's workforce.

4.1.2.2 Age Distribution of Respondents. This section presents the distribution of respondents based on their age groups.

Table 7: Age Distribution of Respondents

Age Group	Frequency	Percentage (%)
18-25 years	5	15
26-35 years	12	35
36-45 years	10	29
46+ years	7	21
Total	**34**	**100**

Figure 4: Age Distribution of Respondents



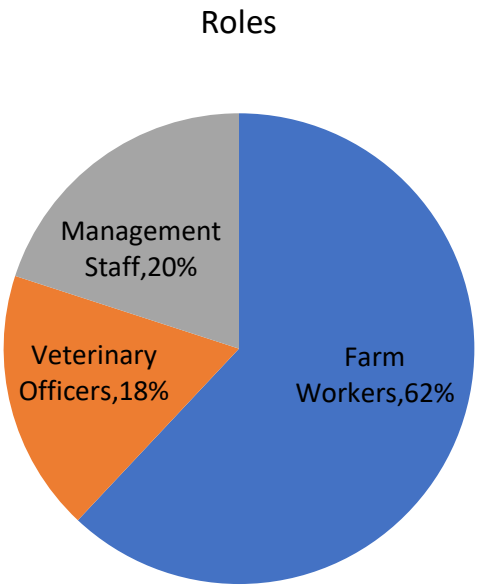
The findings show that the largest proportion of respondents, 35% (n=12), fall within the 26-35 years age bracket. This is followed by the 36-45 years group at 29% (n=10), indicating that the workforce at Kapsabet Dairy Farm is predominantly comprised of experienced and middle-aged individuals who are likely in their peak productive years. The significant representation (21%) of those aged 46 and above brings valuable long-term experience and traditional knowledge, while the younger cohort (18-25 years) at 15% suggests an infusion of new perspectives. This age diversity is beneficial for the study as it captures insights from different generations with varying levels of experience in dairy farming practices.

4.1.2.3 Role of Respondents. This section presents the distribution of respondents based on their designated roles at Kapsabet Dairy Farm.

Table 8: Role of Respondents

Role	Frequency	Percentage (%)
Farm Worker	21	62
Veterinary Officer	6	18
Management Staff	7	20
Total	**34**	**100**

Figure 5: Role of Respondents



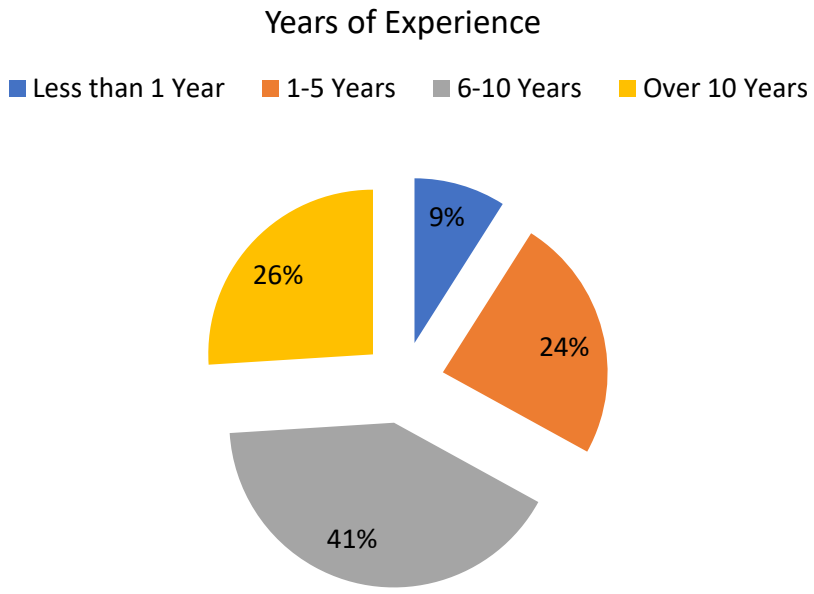
The results indicate that the majority of respondents, 62% (n=21), were farm workers. This is expected as they form the core operational workforce directly involved in the daily implementation of feeding, milking, and basic animal care practices. Management staff constituted 21% (n=7) of the respondents, providing insights into strategic decision-making, resource allocation, and overall farm policy. Veterinary officers, though the smallest group at 18% (n=6), offered critical technical expertise on disease management and breeding programs. This distribution ensures that the data collected is comprehensive, encompassing the practical, managerial, and technical perspectives necessary for a holistic analysis of the factors affecting dairy productivity on the farm. The high participation rate across all strata, as per the sampling design, validates the representativeness of the findings.

4.1.2.4 Years of Experience . This section presents the distribution of respondents based on their years of involvement in dairy farming.

Table 9: Years of Experience

Years of Experience	Frequency	Percentage (%)
Less than 1 year	3	9
1 - 5 years	8	24
6 - 10 years	14	41
Over 10 years	9	26
Total	**34**	**100**

Figure 6: Years of Experience



The findings reveal that a significant majority of the respondents, comprising 67% (n=23), have more than 5 years of experience in dairy farming, with the largest single group (41%, n=14) having 6 to 10 years of involvement. This indicates a highly experienced workforce at Kapsabet Dairy Farm, whose long-term engagement provides them with deep, practical knowledge of operational challenges, seasonal variations, and the long-term impact of farming practices on productivity. The 26% (n=9) with over a decade of experience contribute invaluable historical perspective on the farm's evolution. While smaller, the cohorts with 1-5 years (24%) and less than 1 year (9%) of experience offer newer perspectives and potentially reflect recent hiring or knowledge of modern techniques. This wealth of experience across the respondent pool greatly enhances the reliability and depth of the data collected, as participants are well-equipped to provide informed responses on the intricacies of feeding, disease management, and breeding practices.

4.1.3 Influence of Feeding Methods on Dairy Productivity

This section presents the respondents' perceptions on the feeding methods used at Kapsabet Dairy Farm and their influence on productivity.

Table 10: Respondents' Perception on Feeding Methods and Dairy Productivity

Statement	1	2	3	4	5	Mean Score
The farm provides adequate feed throughout the year.	4 (12%)	9 (26%)	5 (15%)	12 (35%)	4 (12 %)	3.09
Feed given is of high nutritional quality.	3 (9%)	7 (21%)	6 (18%)	13 (38%)	5 (15 %)	3.29
Fodder conservation methods are practiced.	8 (24%)	10 (29%)	4 (12%)	9 (26%)	3 (9%)	2.68
Feed supplementation improves milk yield.	2 (6%)	3 (9%)	2 (6%)	15 (44%)	12 (35 %)	3.94
Cost of feed limits its availability.	1 (3%)	4 (12%)	3 (9%)	11 (32%)	15 (44 %)	4.03

The findings indicate significant challenges in feeding methods, consistent with literature on Kenyan dairy systems (Nabuko et al., 2020; Cheruiyot et al., 2021). The low mean score (2.68) for fodder conservation practices explains the seasonal feed inadequacy (mean 3.09), mirroring Ngeno et al.'s (2019) findings in Uganda where dry season scarcity reduced yields by 30%. While respondents acknowledged the nutritional quality

of feed (mean 3.29), the high cost was identified as the foremost constraint (mean 4.03), supporting Koech et al.'s (2017) emphasis on the financial feasibility of improved feeding. Crucially, there was strong consensus (mean 3.94) that supplementation boosts milk yield, validating global studies like Smith et al. (2018) which found Partial Mixed Ration systems increased production by 15%. This presents a clear opportunity: investing in cost-effective supplementation and fodder conservation could significantly enhance productivity, bridging the gap identified in the problem statement.

4.1.4 Impact of Disease Management Practices on Milk Yield and Quality

This section presents the respondents' assessment of disease management practices and their impact on productivity.

Table 11: Respondents' Perception on Disease Management Practices and Milk Yield and Quality

Statement	1	2	3	4	5	Mean Score
Regular vaccination programs are in place.	2 (6%)	5 (15%)	4 (12%)	16 (47%)	7 (21%)	3.62
Disease outbreaks are rare on the farm.	6 (18%)	11 (32%)	7 (21%)	8 (24%)	2 (6%)	2.68
Milking hygiene protocols are followed consistently.	4 (12%)	8 (24%)	5 (15%)	12 (35%)	5 (15%)	3.18
Veterinary services	3 (9%)	4	6	14	7	3.53

Statement	1	2	3	4	5	Mean Score
are readily accessible.		(12%)	(18%)	(41%)	(21%)	
Disease management costs affect profitability.	1 (3%)	2 (6%)	3 (9%)	13 (38%)	15 (44%)	4.15

The results confirm that disease management remains a critical bottleneck, as established in the literature (Mbindyo et al., 2021; KIPPRA, 2021). The perception that outbreaks are not rare (mean 2.68) aligns with the high prevalence of mastitis (38-50%) reported in Kenyan herds. While vaccination programs and veterinary access are fairly established (means of 3.62 and 3.53), their effectiveness is seemingly undermined by inconsistent milking hygiene (mean 3.18). This directly supports Mbindyo et al.'s (2021) observational study in Uasin Gishu which found hygiene to be essential for reducing somatic cell counts. The most striking finding is the overwhelming agreement that disease costs hurt profitability (mean 4.15). This echoes the global estimate of USD 32 billion in annual losses due to mastitis (Ruegg, 2017) and underscores the economic imperative for preventive measures. The gap between having services (vaccination, vets) and achieving health outcomes (reduced outbreaks) points to a need for more rigorous implementation of biosecurity protocols, a factor highlighted as a gap in studies like Oliver et al. (2018).

4.1.5 Impact of Breeding Methods on Reproductive Performance and Productivity

This section presents the respondents' views on the breeding practices employed and their impact on productivity.

Table 12: Respondents' Perception on Breeding Methods and Reproductive Performance and Productivity

Statement	1	2	3	4	5	Mean Score
Artificial insemination (AI) is regularly used.	5 (15%)	9 (26%)	5 (15%)	11 (32%)	4 (12%)	3.00
Heat detection methods are effective.	7 (21%)	10 (29%)	6 (18%)	8 (24%)	3 (9%)	2.71
Breeding stock is selected on performance records.	8 (24%)	12 (35%)	4 (12%)	7 (21%)	3 (9%)	2.56
Calving intervals are within optimal range.	6 (18%)	13 (38%)	5 (15%)	7 (21%)	3 (9%)	2.65
Breeding practices have improved productivity.	4 (12%)	8 (24%)	9 (26%)	10 (29%)	3 (9%)	3.00

The results reveal significant inefficiencies in breeding practices, directly addressing the research gap concerning farmer-level constraints (Bebe et al., 2017; Mugambi et al., 2019). The irregular use of AI (mean 3.00) and poor performance-based selection (mean 2.56) reflect the limited access to quality genetics and record-keeping identified in the literature. The core issue appears to be ineffective heat detection (mean 2.71), which is a primary cause of low conception rates and prolonged calving intervals (mean 2.65). This finding corroborates Maina et al.'s (2020) study in Kiambu, which identified lack of access to quality breeding stock and services as a key constraint. The neutral stance on whether breeding has improved productivity (mean 3.00) suggests that current practices are not yielding significant genetic gains. This aligns with García-Peniche et al.'s (2016) findings that genetically evaluated sires can increase yield by 18%, a benefit not fully realized at Kapsabet. The results underscore the need for targeted interventions, such as training in heat detection and improving access to reliable AI services, to harness the full potential of genetic improvement for productivity.

4.2 Limitations of the Study

Despite the rigorous design and implementation of this research, several limitations were encountered. The study's focus on a single case study farm, Kapsabet Dairy, while providing depth, limits the generalizability of the findings to all medium-scale farms in Kenya, as operational contexts may vary significantly across different regions. The reliance on self-reported data through questionnaires introduces the potential for social desirability bias, where respondents may have provided answers they believed were expected rather than those that fully reflected reality, particularly on sensitive issues like protocol adherence. Furthermore, the use of a cross-sectional survey design provides a

snapshot of the farm's operations at a specific point in time (May-August 2025) and may not fully capture the long-term effects of the variables or account for all seasonal variations in dairy productivity, which was a noted challenge in the feeding methods. Finally, while the conceptual framework focused on three key variables, other unmeasured factors such as farmer knowledge, access to credit, and climate change effects could also influence productivity but were beyond the scope of this study.

4.3 Chapter Summary

This chapter has presented the analysis of the response rate and demographic data, detailed the research findings on feeding methods, disease management, and breeding practices, and discussed these results in the context of existing literature, while also acknowledging the limitations of the study.

CHAPTER FIVE

SUMMARY, RECOMMENDATIONS AND CONLUSION

5.0 Introduction

This chapter provides a comprehensive discussion of the key findings presents the conclusions derived from the study and offers practical recommendations for Kapsabet Dairy Farm and other stakeholders, alongside suggestions for future research.

5.1 Summary of Findings

5.1.1 Background Information

The analysis of the background information revealed a 94% response rate, which is considered excellent in social science research (Sekaran & Bougie, 2016). This high level of participation minimizes non-response bias and significantly enhances the reliability and validity of the study's findings, as it provides a near-complete representation of the targeted sample population. The gender distribution of respondents, which was 65% male and 35% female, is consistent with empirical literature on agricultural workforce composition in Kenya. Studies by the Kenya Dairy Board (2021) and the Ministry of Agriculture and Livestock Development (2023) consistently report that primary dairy farming activities are male-dominated, particularly in operational roles such as feeding and herd management, while women often engage in ancillary activities. This distribution confirms that the study captured perspectives from the core demographic engaged in the farm's daily physical operations. Regarding age distribution, the largest cohort of respondents (35%) was between 26-35 years old, followed by 29% aged 36-45 years.

This prevalence of a young and middle-aged workforce aligns with findings from Kilelu et al. (2017), who noted that dairy farming in Kenya's Rift Valley is increasingly attracting younger, educated individuals seeking agricultural entrepreneurship. This demographic is often more receptive to adopting new technologies and management practices, which is crucial for implementing the recommendations of this study. The data on years of experience showed that a significant majority (67%) of respondents had over 5 years of experience, with 41% having 6-10 years. This high level of experiential knowledge is a critical asset, as noted by Etikan and Bala (2017), because experienced respondents provide deeper, more contextual insights into the farm's historical challenges, seasonal variations, and the long-term efficacy of management practices related to feeding, disease control, and breeding. This lends considerable credibility to their responses on the study's variables. Finally, the distribution of roles on the farm, 62% farm workers, 21% management staff, and 18% veterinary officers, accurately reflects the typical organisational structure of a medium-scale Kenyan dairy farm (Bebe et al., 2017). This stratification ensured that data was collected from all crucial operational levels: those who implement daily practices (farm workers), those who make strategic decisions (management), and those who provide specialised technical input (veterinary officers). This comprehensive capture of perspectives ensures the findings are holistic and representative of the entire farm system.

5.1.2 Feeding Methods and Milk Yield and Quality

The findings indicate that feeding methods significantly constrain productivity. The high cost of feed was the most severe limitation (Mean=4.03), leading to seasonal inadequacy (Mean=3.09) and low adoption of fodder conservation practices like silage making (Mean=2.68). This result strongly aligns with the studies by Nabuko et al. (2020) and Koech et al. (2017), who identified feed cost and seasonal scarcity as the primary bottlenecks to dairy productivity in Kenya, often forcing farmers to reduce ration quality or quantity. However, there was strong agreement (Mean=3.94) that feed supplementation improves milk yield. This corroborates the work of Smith et al. (2018), whose longitudinal study in New Zealand found that Partial Mixed Ration (PMR) systems, which incorporate supplements, increased milk production by 15% compared to pasture-only systems. The suboptimal feeding practices at Kapsabet explain the low milk yields, as the herd likely experiences negative energy balance, a finding consistent with Cheruiyot et al. (2021), who reported a 12% reduction in output due to nutrient imbalances.

5.1.3 Disease Management Practices and Dairy Productivity

The results for disease management reveal a critical gap between the availability of services and effective health outcomes. While vaccination programs and veterinary accessibility were fairly established (Means of 3.62 and 3.53 respectively), respondents did not agree that disease outbreaks were rare (Mean=2.68). Most critically, disease management was perceived as a major cost that erodes profitability (Mean=4.15). This finding directly mirrors the empirical literature. Mbindyo et al. (2021) and KIPPRA

(2021) reported high mastitis prevalence in Kenyan herds, leading to substantial economic losses. The study by Ruegg (2017) estimated global annual losses from mastitis at over USD 32 billion, underscoring the economic imperative for better control measures. The inconsistency in milking hygiene protocols (Mean=3.18) appears to be a key weakness, validating Oliver et al. (2018), who found that strict adherence to biosecurity and hygiene measures reduced mastitis incidence by 25%. Thus, the core issue is not a lack of services but inconsistent implementation of preventive protocols.

5.1.4 Breeding Methods and Reproductive Efficiency and Milk Production

The analysis of breeding practices uncovered significant inefficiencies. The use of Artificial Insemination (AI) was irregular (Mean=3.00), but the most critical failure was ineffective heat detection (Mean=2.71) and a lack of performance-based selection for breeding stock (Mean=2.56). This directly leads to prolonged calving intervals (Mean=2.65), which reduces the number of productive lactations per cow. These results provide empirical validation for the constraints identified by Mugambi et al. (2019) and Bebe et al. (2017), who cited poor heat detection and limited access to quality genetics as the main barriers to successful AI adoption in Kenya. The neutral stance on whether breeding practices have improved productivity (Mean=3.00) suggests that the potential genetic gains demonstrated in studies like García-Peniche et al. (2016)**,** where AI with genetically evaluated sires increased yield by 18%, are not being realized at Kapsabet. The findings affirm the conclusion of Maina et al. (2020) that improving breeder networks and technical support is essential for enhancing reproductive performance.

5.2 Recommendations

To address the high cost and seasonal variability of feed, the farm management should prioritize the establishment of a strategic fodder conservation system, specifically by investing in the infrastructure for creating silage and hay during the abundant rainy seasons to build a reliable feed bank for dry periods. Furthermore, the farm should conduct a cost-benefit analysis to explore the feasibility of formulating its own concentrates using locally available ingredients to reduce reliance on expensive commercial supplements, thereby enhancing the economic sustainability of its feeding program while maintaining nutritional quality.

To improve disease control and reduce associated costs, it is recommended that the farm implement a mandatory, standardized milking hygiene protocol for all workers, including training on pre- and post-milking procedures, regular equipment sterilization, and the use of footbaths, which would directly target the mastitis challenge. Additionally, management should work with their veterinary officers to develop a proactive, year-round herd health plan that integrates vaccination, routine deworming, and biosecurity measures rather than relying on reactive treatments, thereby reducing outbreak frequency and improving long-term profitability.

To enhance reproductive efficiency, the farm must invest in regular training for all relevant staff on advanced heat detection techniques, potentially incorporating technology such as activity monitors or tail painting to improve accuracy and conception rates from Artificial Insemination. Moreover, management should initiate a simple but systematic performance recording system to track individual cow milk yield, health events, and

calving intervals to enable data-driven selection of breeding stock and culling of chronically low-performing or infertile animals, which is fundamental to achieving genetic progress and improving overall herd productivity.

5.3 Conclusions

Feeding methods at Kapsabet Dairy Farm present a significant constraint to achieving optimal dairy productivity, primarily characterized by high feed costs and seasonal inadequacy that lead to inconsistent nutrient intake among the herd. While there is a clear recognition of the value of supplementation, the financial barriers to consistent, high-quality feed provision and the underutilization of fodder conservation strategies directly contribute to the suboptimal milk yields observed, validating the central premise of the Optimum Foraging Theory that economic and environmental constraints often prevent the adoption of maximally efficient nutritional strategies.

While basic veterinary infrastructure and vaccination programs are in place at the farm, disease management remains a critical weakness, as evidenced by the frequency of outbreaks and the high associated costs that negatively impact profitability. The inconsistency in implementing fundamental preventive measures, particularly in milking hygiene, undermines the potential effectiveness of existing services and indicates a significant gap between knowledge and practice, reflecting the limitations of the Germ Theory when applied without a holistic approach that considers operational and economic realities on the farm.

Breeding practices at Kapsabet Dairy Farm are markedly inefficient, with poor heat detection and a lack of systematic, performance-based selection constituting the primary

barriers to genetic improvement and reproductive performance. The failure to effectively implement these core breeding principles results in prolonged calving intervals and stifles productivity gains, demonstrating that even where technologies like Artificial Insemination are available, their success is wholly dependent on foundational management practices, a nuance that is often underemphasized in the Genetic Improvement Theory.

5.4 Suggestions for Further Studies

Future research should expand beyond this case study to employ a longitudinal, mixed-methods approach across multiple medium-scale farms in different agro-ecological zones of Kenya to better understand the long-term and regional dynamics of the identified constraints. Such a study could quantitatively track productivity metrics alongside implementation of interventions like improved feeding strategies or hygiene protocols over several production cycles, while qualitatively exploring the socio-economic barriers, such as access to credit, gender roles in decision-making, and the impact of climate variability, that were beyond the scope of this research but are critical for developing holistic and scalable solutions for the Kenyan dairy sector.

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APPENDICES

APPENDIX 1: QUESTIONNAIRE

Factors Affecting Dairy Farming Productivity at Kapsabet Dairy Farm in Nandi County, Kenya

Dear Respondents,

I am a student at the Management University of Africa conducting a research on the factors affecting dairy farming productivity at Kapsabet Dairy Farm, focusing on feeding methods, disease management and breeding practices. All information will be treated confidentially and used solely for academic purposes.

Instructions:

Please read each question carefully and answer honestly.

- For multiple-choice questions, tick (✔) the option that best represents your answer.
- For Likert scale questions, indicate your level of agreement by ticking (✔) the most appropriate response:

  1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

SECTION A: BACKGROUND INFORMATION

1. What is your gender**?**

   ☐ Male ☐ Female

2. What is your age group?

   ☐ 18–25 ☐ 26–35 ☐ 36–45 ☐ 46+

3. What is your role in the farm?

   ☐ Farm Worker ☐ Veterinary Officer ☐ Management Staff

4. How many years have you been involved in dairy farming**?**

   ☐ Less than 1 ☐ 1–5 ☐ 6–10 ☐ Over 10

SECTION B: STUDY VARIABLES

B1: Feeding Methods

Statement	1	2	3	4	5
The farm provides adequate feed throughout the year.					
Feed given is of high nutritional quality.					
Fodder conservation methods (e.g., silage, hay) are practiced.					
Feed supplementation improves milk yield.					
Cost of feed limits its availability.					

B2: Disease Management

Statement	1	2	3	4	5
Regular vaccination programs are in place.					
Disease outbreaks are rare on the farm.					
Milking hygiene protocols are followed consistently.					
Veterinary services are readily accessible.					
Disease management costs affect profitability.					

B3: Breeding Practices

Statement	1	2	3	4	5
Artificial insemination is regularly used.					
Heat detection methods are effective.					
Breeding stock is selected based on performance records.					
Calving intervals are within optimal range.					
Breeding practices have improved productivity.					

THANKYOU FOR YOUR PARTICIPATION!