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**EFFECT OF FINANCIAL ACCESS, FINANCIAL LITERACY AND RISK
MANAGEMENT ON THE EXTENT OF PARTICIPATION IN DAIRY
FARMING IN KIAMBU COUNTY, KENYA**

EVANGELINE MUKAMI KIMANI

(137198)

**A RESEARCH DISSERTATION SUBMITTED IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE
IN DEVELOPMENT FINANCE AT STRATHMORE UNIVERSITY**

**STRATHMORE UNIVERSITY BUSINESS SCHOOL
STRATHMORE UNIVERSITY
NAIROBI, KENYA**

JUNE 2026

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

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Name of Candidate: Evangeline Mukami Kimani

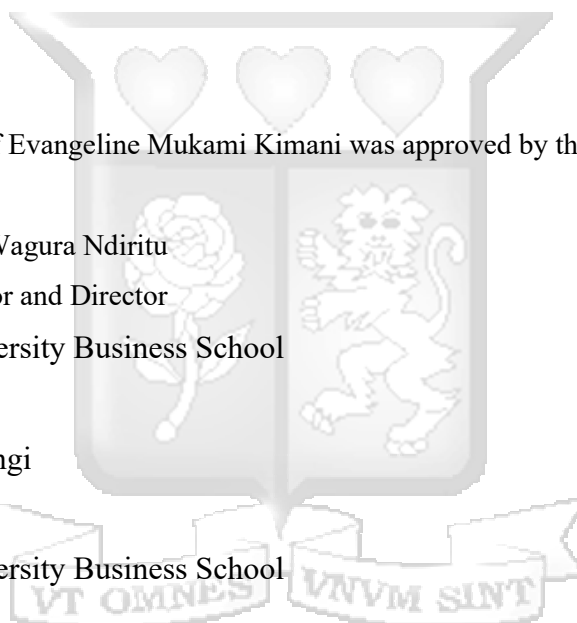
Approval

The dissertation of Evangeline Mukami Kimani was approved by the following:

Professor Simon Wagura Ndiritu
Associate Professor and Director
Strathmore University Business School

Dr. Ceaser Mwangi
Executive Dean
Strathmore University Business School

Prof. Bernard Shibwabo
Director, Office of Graduate Studies



ABSTRACT

Participation in dairy farming plays a vital role in improving household income, enhancing food security and promoting rural economic development in Kenya. However, farmers' participation remains uneven despite the expansion of financial institutions and agricultural support services. This study examined the effects of access to financial products, financial literacy and risk management services on participation in dairy farming in Kiambu County, Kenya. Guided by the Financial Intermediation Theory and Social Capital Theory and anchored in a positivist research philosophy, the study employed a structured questionnaire to collect primary data from 397 respondents. Data analysis involved both descriptive and inferential statistical techniques. Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS) Version 28.0.

The findings revealed that financial accessibility, financial literacy and risk management services had positive and statistically significant effects on dairy farming participation. Financial accessibility was the strongest predictor (Model 1: $\beta = 0.436$, $p < 0.05$; Model 2: $\beta = 0.421$, $p < 0.05$), followed by financial literacy ($\beta = 0.320$; $\beta = 0.307$) and risk management services ($\beta = 0.295$; $\beta = 0.281$). The regression model explained 47.7% of the variation in dairy farming participation ($R^2 = 0.477$), increasing to 53.9% ($R^2 = 0.539$) after controlling for herd size, household size, income level and education level.

The study concludes that improved access to financial products, enhanced financial literacy and effective risk management mechanisms significantly increase participation in dairy farming. The study recommends the development of farmer-friendly credit products, integration of financial literacy into extension services and promotion of affordable livestock insurance schemes. Policymakers should strengthen agricultural financial inclusion frameworks, implement credit guarantee schemes and support risk management products to enhance resilience in the dairy sector.

The study was limited to Kiambu County and relied on self-reported questionnaire data, which may limit the generalization of findings to other regions. Future studies should examine additional determinants of participation like market access, technological adoption, land tenure systems and regulatory frameworks across

different counties to provide a more comprehensive understanding of dairy sector participation.

Keywords: Financial accessibility, financial literacy, risk management services, dairy farming participation, agricultural finance, Kiambu County.



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ACRONYMS

AFC	Agricultural Finance Corporation
ASDP	Agricultural Sector Development Program
CBK	Central Bank of Kenya
DFI	Development Finance Institution
DFCS	Dairy Farmers Cooperative Society
FAO	Food and Agriculture Organisation
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
GoK	Government of Kenya
IFC	International Finance Corporation
KALRO	Kenya Agricultural and Livestock Research Organisation
KES	Kenya Shilling
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
MFI	Micro Finance Institution
NACOSTI	National Commission for Science, Technology and Innovation
NAIP	National Agricultural Investment Plan
NGO	Non-governmental Organisation
Sacco	Savings and Credit Cooperative Organisation
SU-IERC	Strathmore University Institutional Ethics Review Committee
VIF	Variance Inflation Factor

DEFINITION OF KEY TERMS

Access to Financial Products	Access to financial products refers to the availability and use of various financial services and instruments, in addition to savings accounts, loans, insurance and investment options (Demirgüç-Kunt & Klapper, 2020).
Dairy Farming	McDonald et al., (2020) define dairy farming as the agricultural practice of raising dairy cattle for the primary purpose of producing milk and dairy products.
Financial Accessibility	Financial accessibility can be defined as the ease with which individuals, households and businesses can access and use financial services and resources to meet their financial needs, manage their finances and engage in economic activities (MoALF, 2017).
Financial Literacy	Financial literacy encompasses the ability to make informed financial decisions, manage financial resources and steer the complexities of the financial system (Lusardi & Mitchell, 2021).
Extent of Participation in Dairy Farming	Participation in dairy farming refers to the involvement or engagement of people, households or communities in the activities related to dairy production and management (van der Lee et al., 2020).
Risk Management Services	This relates to the availability of mechanisms and tools that help individuals and businesses manage and mitigate risks relating to agricultural activities (World Food Programme, 2018).

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The agricultural sector remains crucial to global economic growth, food security, employment creation and rural livelihoods. World Bank estimates that agriculture, forestry and fishing accounted for approximately 4.02% of global GDP in 2024, compared to 4.11% in 2023 (World Bank, 2024). The Food and Agriculture Organization (FAO) further reports that global agricultural value added increased by 89% in real terms over the past two decades, reaching approximately USD 3.8 trillion in 2022, while the share of the global workforce employed in agriculture declined from 40% in 2000 to 26% in 2022 (FAO, 2024). Despite this decline in employment share, agriculture remains central to poverty reduction and inclusive development, especially in developing countries where it accounts for more than 25% of GDP. The World Bank also notes that growth in agriculture is two to four times more effective in raising incomes among the poorest populations than growth in other sectors (World Bank, 2024).

Beyond sustaining lives, agricultural development has the potential to put an end to extreme poverty as growth of the sector is estimated to be up to four times more effective in raising incomes for the poor compared to other sectors. However, challenges abound the sustained development of the sector. Access to finance is one of the identified primary challenges and that has notable consequences on the development of agriculture globally (World Bank, 2020a).

Emphasis and attention on promoting agricultural activities have been made a global growth agenda which has seen many investors investing various resources in the value chain (Tomsik et al., 2015). The trend has been welcomed by governments and the economic political world such as the Group of 20 Nations (G20) who echo the importance of agriculture in achieving the Sustainable Development Goals (SDGs) among African countries (Rooyen, 2014). In Africa, the agricultural sector is estimated to provide opportunities to more than 51% of the economically active population (Tomsik et al., 2015) and by 2030 The World Bank is projecting that agriculture will be a \$1 Trillion industry in the Sub-Saharan Region (Rooyen, 2014).

McDonald et al., (2020) define dairy farming as the agricultural practice of raising dairy cattle for the main purpose of producing milk and dairy products. Dairy farming

involves the management of cattle, their nutrition, health and reproduction, as well as the processing and marketing of milk and dairy products (Ojango, et al., 2017). Cattle management involves the management of specific breeds of cattle that are bred for milk production, as well as management of their nutrition and overall health (Ojango, et al., 2017). Milk production is the primary objective of dairy farming.

Cows are milked daily and the milk is stored in cooling systems to maintain freshness and quality. Dairy farmers may choose to process milk on-farm into value-added dairy products such as cheese, yogurt, butter and ice cream or can sell raw milk to dairy processors or cooperatives for further processing and distribution. Milk marketing on the other hand involves selling milk and dairy products to consumers through various channels, including retail stores, farmers' markets, grocery stores and direct sales (McDonald et al., 2020).

Participation in dairy farming refers to the involvement or engagement of persons, households or communities in the activities related to dairy production and management (van der Lee et al., 2020). Participation involves various aspects of dairy farming, including owning and managing dairy cattle, producing milk, processing dairy products and participating in dairy-related value chains. Participation in dairy farming can take different forms and levels of engagement, depending on the role and responsibilities of individuals or entities involved (Ojango, et al., 2017).

Participation in dairy farming can be measured by various components including; the level of income generated from dairy farming activities; the level of engagement in agricultural activities including the number of dairy cows, total milk produced per cow (van der Lee et al., 2020); the level of technology adopted and modern farming practices such as use of advanced machinery or precision farming techniques (Kinyangi, 2014); and lastly presence of dairy farming participants in local and regional markets (Adams & Vogel, 2020).

1.1.1 Global Perspective on the Extent of Participation in Dairy Farming

Globally, dairy farming remains an important component of agricultural and livestock production, contributing to food security, household income and rural livelihoods. Recent estimates show that world milk production grew by 1.5% in 2023 to approximately 927 million tonnes, with India and Pakistan remaining major contributors to global milk output (OECD/FAO, 2024). FAO further reports that global

liquid milk production increased by 1.4% in 2024 to approximately 982 million tonnes, although this growth was slower than the previous year and was mainly supported by increased output in Asia and Oceania (FAO, 2025). These trends demonstrate that the dairy sector continues to expand globally, but participation increasingly requires investment in improved breeds, feeding systems, milk storage, processing technologies, market linkages and risk management mechanisms. Therefore, access to appropriate and affordable financial services remains central to farmers' ability to participate effectively in dairy production and related value-chain activities

In Europe, countries such as the Netherlands and Denmark have well-developed financial support systems for dairy farmers, including subsidies and low-interest loans. The EU's Common Agricultural Policy (CAP) directly supports farmers by funding improvements in technology and farm size (van der Ploeg, 2021; European Commission, 2022). Likewise, dairy producers in the UK receive grants like the Farming Investment Fund which helps them obtain modernised dairy equipment, thereby enhancing their production and sustainability (Smith & Brown, 2020).

Germany's dairy sector is one of the biggest in Europe, where easy access to finance has been provided by cooperative banking and government facilitated credit facilities. German farmers can also get loans from the credit institutions, such as the Landwirtschaftliche Rentenbank, which offer low-interest loans for upgrading dairy facilities (Müller et al., 2021; Bundesministerium für Ernährung und Landwirtschaft, 2022). Financial accessibility is also facilitated in Switzerland by government support, which helps to keep small scale farming competitive in a country where production costs are high (Swiss Federal Office for Agriculture, 2023; Keller & Widmer, 2021). The Swiss model emphasises that financial support can be used to maintain dairy production in high-cost economies.

Financial access varies in Asia influencing dairy farming. For instance, the Indian government's Kisan Credit Card scheme has been implemented to provide small-scale farmers with credit facilities at low interest rates to promote the growth of livestock and animal husbandry, which boost productivity (Rao et al., 2020; Indian Ministry of Agriculture, 2023). To support the development of large-scale dairy farms, there are state-backed financial institutions in China that provide subsidised loans for the farmers of the dairy industry (Zhang & Li, 2021). However, in developing countries

such as Bangladesh and Vietnam, poor financial access to dairy products restricts dairy production with farmers having to take out high interest loans and low financial inclusion (China Dairy Association, 2022).

Financial accessibility also has an impact on the participation level in Brazil's dairy sector. The country has credit lines that assist small and medium-sized dairy farmers like PRONAF program from the National Bank for Economic and Social Development (BNDES) (Brazilian Ministry of Agriculture, 2022; Silva et al., 2021). The financial assistance has resulted in higher milk output and formation of big dairy cooperatives. However, the availability of financial services is not uniform and farmers in the remote areas have less access to formal credit institutions (Oliveira & Santos, 2020; Costa et al., 2021).

1.1.2 Regional Perspective on the Extent of Participation in Dairy Farming

Dairy farming in South Africa is capital-intensive and therefore credit is required for breeding high yielding dairy cattle and for adopting efficient production technologies. Some of the problems, however, are encountered by small-scale farmers in securing bank loans, because of the hard requirements for collateral (Cousins, 2020). To fill this gap the government has used subsidised credit schemes through financial institutions with limited uptake of same owing to lack of awareness and official bottlenecks. Thus, the commercial farmers with improved access to finance are the ones to dominate this sector and smallholder farmers have a challenge for operation expansion (Ndambi et al., 2021).

Financial accessibility plays a significant role in the dairy sector in Egypt as the majority of the small-scale farmers are not using formal banking institutions but informal financial sources. Rural farmers are unable to get required finance for expansion due to high interest rates and low level of financial literacy (Rahman & Ismail, 2019). To overcome these problems, some microfinance institutions have been established at governmental levels including the Agricultural Bank of Egypt's credit lines for dairy farmers that have improved dairy production in parts of the country. However, the impact of these programs has been restricted, thus limiting the sector's growth as a whole (El-Zoghby et al., 2022).

One aspect of financial accessibility is its impact on dairy farmers' capacity to modernise production systems in Morocco. The Moroccan government has established several arrangements with financial institutions offering agricultural loans at low interest rates, which greatly helps commercial dairy farms (Boudi & Benali, 2020). These measures have not been successful for rural dairy farmers in obtaining financial support, as the processes are complicated and they do not have any collateral. Consequently, there are flourishing large-scale dairy farms, whereas smallholder farmers are limited by their access to funding resources (Saadi & El Alami, 2023).

Financial constraints are a major restricting factor in the involvement of the farmers in the dairy industry in Ghana. Small-scale farmers have a difficult time securing loans from commercial banks because of disease outbreaks and climate variability, which make farming dairy products a high-risk venture (Aboagye & Nyarko, 2019). However, the government has made efforts to tackle these problems by introducing the Ghana Agricultural and Rural Development Bank with flexible loan rates to the dairy farmers. Such efforts have enabled certain farmers to access credit facilities, but others continue to access credit facilities informally, which restrict their ability to scale up production (Boateng & Anokye, 2022).

The dairy industry in Nigeria is still underdeveloped as there is not enough financial accessibility especially for smallholder farmers. It is well established that traditional herding communities like the Fulani have challenges accessing formal credit because they lack land ownership documents—banks' requirements for collateral (Oni & Adeniyi, 2020). In response to this, the Central Bank of Nigeria introduced the Anchor Borrowers' Program that offers monetary support for dairy farmers through the cooperative groups. However, the lack of knowledge of finances and the red tape involved are still major challenges to widespread participation in the dairy sector (Usman & Lawal, 2021).

In Algeria, the dairy sector is mainly dominated by smallholders, facing difficulties in obtaining credit for farm expansion and modernisation. The Algerian government has already launched agricultural credit programmes with the National Bank of Algeria to alleviate the dairy sector's needs, but the credit amounts are generally not large enough to address the sector's needs (Boukhelkhal & Medjani, 2020). Consequently, farmers have been forced to rely on informal credit facilities that provide small amounts of

credit and sometimes have high rates of interest. Financial unavailability hinders productivity and discourages new entrants from becoming farmers in the dairy sector (Zouaoui & Boudjelal, 2023).

Access to credit is a constraint to farmers' investment in quality feed, veterinary services and improved breeds in the dairy sector in Ethiopia. Although Microfinance Institutions (MFIs) have played a major role in bridging the financial gap, many smallholder farmers still face challenges due to high-interest rates and inadequate loan amounts (Tessema & Belay, 2019). The Ethiopian government has introduced schemes such as Agricultural Transformation Agency which provides financial and technical support to dairy farmers, leading to increased productivity in some regions. However, financial exclusion remains a major barrier to large-scale participation in the sector (Gebremedhin & Ahmed, 2022).

1.1.3 Local Perspective on the Extent of Participation in Dairy Farming

Agriculture is the mainstay of Kenya's economic growth and anchors poverty reduction within the country owing to the key role it plays in employment, food security, trade, environmental preservation and sustainable development (World Bank, 2018). Kenya's long term development blueprint, Vision 2030, identified agriculture as one of the priority sectors with potential to propel the country's economic growth and development (GoK, 2007). It is estimated that the agricultural sector contributes 33% to the country's GDP and a further 27% through linkage to other sectors including services, manufacturing and distribution (GoK, 2019).

Further, the sector employs more than 40% of the country's total population and approximately 70% of the rural population (GoK, 2019). Although the sector is critical for the country's development, agricultural productivity has stagnated in recent years as farmers and agricultural enterprises continue to grapple with challenges facing business growth and improved quality of agricultural goods (USAID, 2021).

GoK (2019) acknowledges that limited access to affordable agricultural finance has resulted in low productivity in the country. KIPPRA (2019) attributes this limitation to lack of collateral, poor savings culture and non-commercialisation of farming. According to KIPPRA (2019), only 14.7% of farmers have access to agricultural finance in Kenya. Consequently, farmers have resulted to informal sources of credit such as village savings and loan associations, "chamas" as well as digital and mobile

money lending applications (KIPPRA, 2019). However, funds secured from these sources are not sufficient to achieve the desired impact in the agricultural sector. This study will therefore seek to examine how the lack of financial accessibility affects the participation of farmers in dairy farming in Kiambu County.

Kenya's dairy sector is a major contributor to agricultural production, income generation and rural employment. USDA Foreign Agricultural Services (2024) estimates that Kenya produced approximately 5.76 billion litres of milk in 2023, with cow milk accounting for the largest share of total production. This production accounts for 10% of Africa's and 35% of the East Africa Community's total milk production. However, the growth of the industry has experienced various challenges including financial challenges, low farm productivity, milk production seasonality, poor milk quality, significant knowledge and skills gaps and a lack of inclusivity throughout the value chain. Kiambu County remains one of the country's leading dairy-producing counties, with annual milk production estimated at approximately 430 million litres. The county also records relatively high productivity, with average daily production estimated at 12.6 litres per cow compared to the national average of 10.1 litres per cow (Kenya News Agency, 2024). These figures confirm the strategic importance of Kiambu County in Kenya's dairy sector and justify its selection as the study area.

1.2 Statement of the Problem

One of the biggest challenges facing Kenya's dairy farmers is limited access to financial resources. Kiriimi, Nyarindo and Gatimbu (2024) found that access to credit positively influences the adoption of modern dairy farming technologies among smallholder dairy farmers in Kenya, highlighting the importance of financial resources in facilitating investment in improved dairy management practices. Kambangwa, Okello and Karani (2025) concluded that high interest rates, collateral requirements and inflexible repayment terms were the most critical barriers limiting farmers' access to credit. This financial exclusion constrains farmers' ability to upgrade their dairy breeds, invest in modern equipment and procure quality feed, thereby constraining productivity, profitability and overall farm performance. Furthermore, inadequate access to appropriate financial solutions hinders the expansion and commercialization of dairy enterprises, reducing the sector's potential contribution to food security, employment creation and economic growth in Kenya.

Although institutions such as the Agricultural Finance Corporation (AFC), commercial banks and cooperative societies have expanded agricultural lending programs, access to affordable credit remains limited among many smallholder dairy farmers. As a result, a significant proportion of farmers continue to rely on informal sources of finance, which constrains investment in productivity-enhancing technologies and farm expansion (Ingutia & Sumelius, 2024; Njuguna & Mutiso, 2021). Many financial institutions perceive dairy farming as a high-risk venture due to unpredictable market prices, climate variability and disease outbreaks. As a result, farmers often resort to informal financing options which are typically inadequate and expensive (Koech et al., 2023). Addressing these financial barriers is essential to increasing participation in dairy farming and ensuring the sector's sustainability.

Kiambu County is renowned for its vibrant dairy sector, characterised by a mix of smallholder and commercial dairy farms. This County has been the highest producer of milk in five consecutive years (Makhoha, 2022) and produced averagely 430 million litres of milk a year, up from 308 million litres in 2016 and 267.5 million litres in 2010 (Kenya Dairy Board, 2023). Dairy farming, in the County, is primarily undertaken by smallholder farmers who market their milk through cooperatives. The County reported to having 65,786 dairy farmers working within cooperatives in 2021, an increase from 61,018 farmers in 2016 (County Government of Kiambu, 2022). GoK (2019) notes that the county has the potential to produce more than double the current production from dairy farming.

According to Nathan Associates (2017) approximately 4.3% of all loans in the private sector go towards agriculture. The agricultural industry was granted KES 40 billion in credit against a requirement of KES 130 billion (World Bank, 2020). Njeru and Gichimu (2015) observe that financial service providers prefer to limit their exposure to agriculture because they typically view the industry as high-risk. The specific relationship and dynamics between financial accessibility and the level of participation in dairy farming however remain understudied and poorly understood.

While studies have examined financial access and agricultural productivity separately, the specific mechanisms through which financial accessibility, financial literacy and risk management affect extent of participation, rather than just adoption or productivity, in dairy farming remain understudied in Kiambu County. This creates a contextual, conceptual and knowledge gaps in Kiambu County, where dairy farming

is economically important but participation remains constrained despite the availability of financial institutions and cooperative structures. Hence, there was need for further investigation on how financial accessibility affects the uptake of dairy farming in Kiambu County.

1.3 Research Objectives

1.3.1 General Objective

The main objective of the research was to examine the effect of financial accessibility on the extent of participation in dairy farming within Kiambu County, Kenya.

1.3.2 Specific Objectives

To address the general objective, the study attempted to answer the following specific objectives:

1. To examine the effect of access to financial products on the extent of participation in dairy farming within Kiambu County, Kenya.
2. To determine the effect of financial literacy on the extent of participation in dairy farming within Kiambu County, Kenya.
3. To investigate the effect of access to risk management services on the extent of participation in dairy farming within Kiambu County, Kenya.

1.4 Research Questions

The study sought to answer the following questions:

1. What is the effect of access to financial products on the extent of participation in dairy farming within Kiambu County, Kenya?
2. What is the effect of financial literacy on the extent of participation in dairy farming within Kiambu County, Kenya?
3. What is the effect of access to risk management services on the extent of participation in dairy farming within Kiambu County, Kenya?

1.5 Research Hypotheses

The study tested the following null hypotheses:

1. **H₀₁:** Financial access has no statistically significant influence on participation in dairy farming in Kiambu County.

2. **H₀₂:** Financial literacy has no statistically significant influence on participation in dairy farming in Kiambu County.
3. **H₀₃:** Risk management has no statistically significant influence on participation in dairy farming in Kiambu County.

1.6 Scope of the study

This study examined the effect of financial access, financial literacy and risk management on dairy farming participation in Kiambu County, Kenya. Specifically, the study investigated how access to financial services, financial knowledge and skills and risk management practices influence the extent to which smallholder farmers engage in dairy farming activities. The research assessed farmers' access to credit and other financial products offered by banks, microfinance institutions and cooperative societies, as well as their level of financial literacy and capacity to manage production and market-related risks. Further, the study evaluated how these factors affect dairy farmers' investment decisions, production capacity, herd expansion, operational efficiency and overall participation in the dairy sector.

The geographical scope of the study was limited to Kiambu County, a region known for its significant contribution to Kenya's dairy industry. Kiambu County lies in the central part of Kenya and as per the latest census had a total population of 2,417,600 people (KNBS, 2019). Nearly 17% of the county's total income comes from agriculture which is the County's main economic activity (County Government of Kiambu, 2022). The agricultural sector in Kiambu County includes horticulture, dairy and fish farming, employing over 100,000 people and generating 100 billion shillings in export every year (County Government of Kiambu, 2020). Dairy farming is the leading form of agricultural activity for the people of Kiambu. The study targeted dairy farmers operating in various sub-counties within Kiambu, as the county has a well-established dairy farming sector supported by cooperative societies such as the New Kenya Cooperative Creameries (KCC) and Brookside Dairy.

According to the Kenya Dairy Board, there were 17 dairy cooperatives in Kiambu County with approximately 60,000 members forming the sampling frame for the study. From this population, a sample size of 397 respondents was selected from the 17 cooperatives. The temporal scope of the study covered the past five years to ensure that recent financial trends, policies and technological progresses affecting financial accessibility in the dairy farming sector are adequately analysed. Primary data

collection was conducted in March 2026. The research was limited to examining financial accessibility's direct impact on participation in dairy farming.

1.7 Significance of the study

Theoretically, the study will help in the current knowledge base on agricultural finance by examining the relationship between financial accessibility and decisions of smallholder farmers to venture into dairy farming. The study will contribute to the understanding of theories related to financial inclusion and availability of credit to farmers in rural areas, which will further the understanding of the impact of financial constraints on the development of the dairy sector. The study will help fill the research gap linked to financial constraints and participation of farmers in agricultural activities, which will be used as a reference for scholars and policy makers interested in rural development and agricultural sustainability.

Secondly the study has practical relevance to the dairy farmers and cooperatives in Kiambu County. By examining how access to finance affects the participation in the dairy sector, this research will help farmers and cooperatives develop tactics to optimise their financial resources. It will offer farmers a wealth of information on their financial literacy, risk management and acceptance of modern dairy farming. Moreover, the results can be applied by cooperatives and financial institutions to develop customised economic solutions such as low-cost credit facilities and insurance and savings schemes, to suit the needs of dairy farmers.

Finally, this study is policy relevant since it offers policy-relevant references to enhance the access of dairy farmers to finance in Kiambu County. The results will guide the legislators about the interventions that are required, for instance, making of rural credit policies more stringent, training in financial literacy and financial institutes providing financial services in the form of credit products with flexible refund policy. Besides, the study will highlight the role of government and private-sector partnerships in de-risking agricultural financing, thus fostering an inclusive and sustainable dairy sector. By addressing financial barriers, the study will contribute to broader national and regional policy efforts aimed at improving food security, rural development and economic empowerment in Kenya. The findings of the study will be made available publicly, through the Strathmore University repository. Further, findings will be shared with the co-operatives that participated in the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter provides a detailed review of literature relating to financial accessibility and dairy farming. The chapter specifically reviews theoretical literature, empirical studies and identifies research gaps from studies conducted globally and locally on the research concept.

2.2 Theoretical review

In research, a theoretical framework provides the basic concepts, theories and assumptions that guides the study, offering a structured approach to understanding a specific phenomenon or problem (Wayne, 2015). This study was anchored on two theoretical perspectives that offers and in-depth understanding of the financial and regulatory dynamics influencing participation in agriculture. The financial intermediation theory, developed by Gurley and Shaw (1960), explains how financial institutions bridge the gap between savers and borrowers, thereby enhancing access to credit and financial products crucial for dairy farmers. While the social capital theory, popularised by Bourdieu (1986) and Putnam (1993), highlights the role of social networks, trust and farmer cooperatives in facilitating financial accessibility and risk-sharing within the dairy sector. The choice of these theories is informed by their ability to explain key aspects of financial accessibility, risk management, decision-making and institutional influence, providing a strong foundation for analysing the study variables.

2.2.1 Financial Intermediation Theory

Economists including Eugene Fama and Kenneth French developed the Financial Intermediation Theory in the 1970s and it has since been elaborated upon by other scholars and it is a basic theory in finance that explains the function of financial intermediaries in the economy (Allen & Santomero, 1997). According to this theory, financial intermediaries, such as banks and credit unions and other financial institutions continue to play an important role in facilitating the flow of funds from the surplus unit (saver) to the deficit unit (borrower). These are the middlemen who pool up money from savers and lend it to borrowers as loans, investments or other financial instruments. Efficiently allocates resources and contributes to the economic growth by directing the fund flow from lenders to borrowers (Bethune et al., 2022).

The financial intermediation theory has been criticized but it provides important insights into the considerable importance of financial intermediation in the allocation of capital and in the facilitation of economic activity. The theory is criticized on the basis of the assumption of efficient markets, that financial intermediaries always invest money in the most productive enterprises (Scholtens & Van Wensveen, 2000). But markets can be imperfect and financial intermediaries can allocate capital in ways that are not driven by productivity, e.g., politics or risk aversion. One criticism is that the theory relies on the idea of financial intermediaries, mainly traditional banks and does not necessarily align with the importance of non-bank financial intermediaries, like fintech companies or online platforms for peer-to-peer lending in the financial market of the present day (Bavoso, 2022).

In this study, access to financial products is measured through awareness of savings products, understanding of loan requirements, awareness of loan products, membership in formal financial institutions and participation in investment or savings groups. The expected pathway is that farmers with greater access to these financial products are better able to mobilise capital for dairy inputs, improved breeds, feeds, milk storage facilities, transport infrastructure and modern dairy technologies. Therefore, financial access is expected to be positively associated with the extent of participation in dairy farming. The Financial Intermediation Theory also supports the inclusion of risk management services in the empirical model (Carter et al., 2017).

Insurance providers, cooperatives and financial institutions act as risk intermediaries by offering livestock insurance, weather advisory services and other risk mitigation mechanisms. In this study, access to risk management services is measured through awareness of agricultural insurance policies, affordability of insurance products, use of weather advisory tools, use of modern risk management technologies and investment in zero-grazing systems (Nshakira-Rukundo et al., 2021). The expected pathway is that risk management services reduce uncertainty related to disease outbreaks, climate variability, market fluctuations and production losses. Farmers who are better protected against such risks are more likely to invest in dairy production, adopt modern technologies and participate more consistently in dairy-related value-chain activities (Jensen & Barrett, 2017). This is consistent with agricultural insurance literature which shows that risk management tools can support investment decisions among smallholder farmers, although uptake may be constrained by affordability,

product design, information gaps and basis risk (Carter et al., 2017; Jensen & Barrett, 2017; Nshakira-Rukundo et al., 2021).

Financial Intermediation Theory explains the pathway between access to financial products and participation in dairy farming. The theory argues that financial intermediaries such as banks, SACCOs, microfinance institutions and cooperatives mobilise financial resources and channel them to productive users. In this study, access to financial products was measured using awareness of savings products, awareness of loan products, understanding of loan requirements, membership in formal financial institutions and participation in investment groups. The expected pathway is that farmers with better access to these financial products are more able to mobilise funds for dairy inputs, improved breeds, feeds, veterinary services, milk storage, transport facilities and modern dairy technologies. Therefore, access to financial products is expected to be positively associated with the extent of participation in dairy farming.

Financial Intermediation Theory also explains the pathway between risk management services and participation in dairy farming. Financial intermediaries do not only provide credit and savings products; they also provide risk-reducing services such as livestock insurance, weather advisory services and other mechanisms that protect farmers from production and market shocks. In this study, risk management services were measured using awareness of agricultural insurance policies, affordability of insurance products, use of weather advisory tools, use of modern risk management technologies and investment in zero-grazing systems. The expected pathway is that access to risk management services reduces uncertainty associated with disease outbreaks, climate variability, feed shortages and milk price fluctuations. Farmers who are better protected from such risks are more likely to invest in dairy farming and participate more actively in dairy value-chain activities.

The financial intermediation theory is used for this study as a framework to understand the role of financial products and services in influencing extent of participation in agriculture and specifically dairy farming. Financial intermediaries like banks and Microfinance Institutions (MFIs) are facilitators in terms of accessing capital for investment in agriculture, acquiring inputs and operations. The Financial Intermediation Theory suggests that improved access to financial products like agricultural loans and savings accounts can enhance participation in agriculture by

providing farmers with the financial resource needed to invest in equipment, seeds and technology, thus increasing agricultural productivity and income levels.

2.2.2 The Social Capital Theory

The Social Capital Theory was developed in the late 20th century by sociologists Pierre Bourdieu and James S. Coleman and has its roots in the value of the social networks, social relationships and trust that reside within communities (Rouxel et al., 2015). It assumes that social links and interactions are the sources for accessing resources, information and support that can enable cooperation, collaboration and collective action (Rouxel et al., 2015). According to the social capital theory, networks and relationships, such as family connections, friendships and community organizations, are crucial for the development of social capital. These relationships can help people to share resources, knowledge and opportunities with each other. Trust and reciprocity are essential components of social capital. Trust enables people to rely on other people's actions and intentions, enabling cooperation and collective action. Reciprocity is the exchange of favours or assistance among people in a social network, thus establishing mutual obligations and strengthening social ties. The theory of social capital also emphasizes the importance of shared norms, values and norms of behavior in neighborhoods that regulate relationships among people, social norms and sets expectations for cooperation and trustworthiness and fosters the creation of social capital (Andriani & Christoforou, 2016).

This theory has however been criticised in that social capital is often difficult to measure and quantify, thus making it challenging to empirically test its effects on economic outcomes. The theory does not have a universal tool for measuring, which is a challenge for its application and empirical testing (Feng & Patulny, 2021). Moreover, social capital is potentially instrumentalised or manipulated for individual/group interests and can be exploited for personal interests or can be marginalised by excluding outsiders, as stated by Feng & Patulny (2021). This can create confidence and trust issues among communities. Social capital may also be culturally, institutionally and contextually variable in its effectiveness. This is because the findings may not be generalizable across various settings, as they do not necessarily apply to other contexts (Feng & Patulny, 2021).

In this study, financial literacy is measured through participation in cooperative financial training, engagement with financial institutions for advice, use of digital financial tools, attendance of financial seminars and consultation with accounting experts. The expected pathway is that farmers who are embedded in cooperative and financial networks are more exposed to financial knowledge, peer learning, training opportunities and advisory services. This improves their ability to understand credit terms, manage farm finances, evaluate investment opportunities and make informed decisions regarding dairy farming participation. The Social Capital Theory also explains the role of cooperative membership in strengthening financial accessibility.

Cooperatives reduce information asymmetry between farmers and financial institutions by providing records of milk deliveries, supporting group guarantees, linking farmers to credit providers and sharing information on insurance and market opportunities. Therefore, cooperative networks may strengthen the relationship between financial accessibility and dairy farming participation by improving trust, reducing transaction costs and enhancing access to financial and technical support. In this study, cooperative-member dairy farmers form the unit of observation because they are positioned within social and institutional networks that influence access to finance, financial literacy and risk management services.

Social Capital Theory explains the pathway between financial literacy and participation in dairy farming. The theory argues that social networks, trust, cooperation and information sharing enable individuals to access knowledge and resources that improve economic decision-making. In this study, financial literacy was measured using participation in cooperative financial training, engagement with financial institutions for financial advice, use of digital financial tools, attendance of financial seminars and consultation with accounting experts. The expected pathway is that farmers who participate in cooperative networks and financial advisory relationships gain financial knowledge that improves budgeting, record keeping, loan management, savings behaviour and investment planning. This improves their ability to make informed decisions and is therefore expected to support greater participation in dairy farming.

The social capital theory gives insights into the influence of social networks and relationships on access to financial resources, information and support for the current study. The theory is that farmers in Kiambu County can utilise the social network and

cooperatives for financial services, including loans or credit facilities, via informal lending arrangement or micro financial groups. Moreover, social networks can be used to disseminate agricultural knowledge, best practices and market information, providing participants with the resources to help them participate in agricultural practices successfully.

2.3 Empirical Review

A literature review analyses scholarly articles, books and other materials that are significant to a topic of interest, area of study and offers a description, summary and detailed evaluation of these works (Creswell & Creswell, 2018). This section includes a review of previous studies undertaken relating to how financial accessibility, measured by the access to financial products, financial literacy and risk management products, affect the extent of participation in dairy farming.

2.3.1 Financial Products and the Extent of Participation in Dairy Farming

Access to financial products plays a crucial role in determining the level of participation in dairy farming in Kenya. Financial services such as credit, savings and insurance allow farmers to invest in improved breeds, better feeds and modern technologies, enhancing productivity. Previously, several empirical studies undertaken to examine the correlation between access to financial products and dairy farming participation have provided insights into the extent to which financial inclusion influences the sector (Karanja, 2021).

Makau et al. (2020) investigated the impact of MFIs on smallholder dairy farmers in Kiambu County. The study concluded that farmers with access to credit facilities were more likely to adopt high-yield dairy breeds and modern feeding practices, significantly improving milk production. The findings stressed the importance of accessible and affordable credit in fostering increased participation in dairy farming. However, the study also highlighted that strict collateral requirements and high interest rates limited many small-scale farmers from securing financial assistance.

Similarly, Kamau and Njoroge (2019) investigated the importance of financial literacy in enhancing access to credit among dairy farmers in Nakuru County. The research established that farmers who had undergone financial training were more likely to apply for and effectively utilise credit facilities. The study stressed that access to financial products alone was insufficient if farmers lacked adequate knowledge on

financial management and investment in dairy farming. This conclusion is consistent with the findings of Kariuki (2021), who argued that financial education should go, hand in hand, with the provision of credit to ensure the sustainability of dairy farming enterprises.

Another empirical study by Otieno et al. (2022) assessed the impact of agricultural insurance on dairy farming participation in Nyandarua County. The research revealed that dairy farmers with insurance coverage were more willing to invest in high-value dairy breeds and advanced storage facilities. The study concluded that insurance mitigates risks associated with climate change and diseases, thereby inspiring more farmers to venture into dairy farming. However, the study noted that awareness and affordability of agricultural insurance remained a major challenge among smallholder farmers.

Moreover, Wambugu and Karanja (2018) examined the influence of Saccos on dairy farming participation in Kenya. The study found that farmers who were members of Saccos had better access to financial resources, enabling them to expand their dairy businesses. The study also observed that Saccos provided financial stability by offering low-interest loans and structured repayment plans which traditional banking institutions often failed to provide to rural farmers (Wambugu et al, 2018).

Soomro et al., (2024) investigated the impact of microfinance schemes on the financial inclusion and socio-economic status of small dairy farm entrepreneurs in rural areas of Khairpur Mirs district, Pakistan. This study adopted a survey research design, collecting data from 334 dairy farmers through structured questionnaires and using a logistic regression model to analyse the data collected. Findings concluded that MFIs positively improved the socio-economic status of small dairy farms. These institutions were found to play a crucial role in bridging financial gaps by offering tailored credit products, but the high cost of borrowing and limited awareness hindered full utilisation. The study however only focuses on microfinance but does not evaluate the effectiveness of formal banking institutions, SACCOs or government-backed financial schemes. Furthermore, it is conducted in Pakistan which may have a different context from the current study.

Morgan and Long, (2020) sought to understand the effect of financial product accessibility on household savings behaviour in Laos. The study utilised household

survey data collected from urban and rural areas in Laos. Findings from the study revealed that urban households generally have better access to formal financial products compared to rural households. However, both urban and rural households with access to formal financial products exhibit higher levels of savings compared to those with limited access. Additionally, rural households rely more on informal financial mechanisms, such as savings clubs and rotating savings and credit associations (ROSCAs). The study was however conceptualised on saving behaviour while the current study focused on participation in dairy farming.

Läpple and Thorne, (2019) examined the relationship between financial product innovation and farm sustainability among Irish dairy farms. The research sought to understand the effects of financial product innovation, such as mobile banking and digital credit, on farms productivity outcomes and sustainability over time. The study found that farms that adopt innovative financial products, such as mobile banking and digital credit, tend to increase their agricultural investment, including expenditures on inputs, equipment and land improvements. These households also report improvements in crop yields and household income compared to non-adopters. The study was carried out in Ireland whereas the current study is focused on Kenya.

Kiplimo et al., (2015) sought to understand the relationship between access to credit services and entrepreneurship by smallholder farmers in Kenya. The study explored the influence of access to financial products, such as microloans and savings accounts, on entrepreneurship activities, including business start-up, expansion and investment decisions. The study revealed that farmers with access to financial products exhibit greater agency and autonomy in their business activities. Access to microloans and savings accounts enables them to overcome financial barriers, invest in their businesses and pursue entrepreneurial opportunities. This study was focused on smallholder farmers while the current study is not limited to smallholder farmers but to dairy cooperatives.

Njeru, (2017) examined the perceptions and challenges for enhanced participation of youth in agriculture in Kajiado North Sub-County, Kenya. The study adopted a cross-sectional design to collect data from 397 randomly selected youth and 22 youth and agricultural officers. The study identified access to financial products and lack of access to land as the main challenges affecting youth in agriculture. The study further revealed that access to financial products is positively associated with business start-

up rates, investment levels and business growth among youth. The study concluded that improving financial product accessibility is essential for promoting youth entrepreneurship and economic development in Kenya. The study was based in Kajiado County while the current study is based in Kiambu County.

Empirical studies indicate that access to financial products significantly impacts dairy farming participation in Kenya. Credit facilities, financial literacy, agricultural insurance and Sacco memberships all contribute to enhancing dairy farming operations. However, challenges such as high-interest rates, financial illiteracy and limited insurance awareness deter broader input. Addressing these barriers through policy intrusions and tailored financial solutions can enhance financial inclusion in Kenya's dairy sector.

2.3.2 Financial Literacy and the Extent of Participation in Dairy Farming

Financial literacy plays a fundamental role in enhancing the participation and success of dairy farming in Kenya. It equips farmers with essential skills in budgeting, saving, investment and debt management, leading to improved financial decisions and farm productivity. Moreover, financial literacy enhances access to agricultural credit. Research done in Kiambu County's livestock sub-sector found that financially literate farmers were more likely to access formal credit facilities. This access enables them to invest in quality inputs and technologies, thereby boosting dairy production (Kenya Dairy Board, 2022).

A study by Mwangi and Muturi (2019) examined how financial literacy affects small-scale dairy farmers' participation in commercial farming in Kiambu County. The findings indicated that farmers with higher financial literacy were more likely to expand their farming activities, invest in high-quality breeds and adopt modern dairy technologies. The study emphasised that knowledge of budgeting, savings and investment enabled farmers to allocate funds effectively, leading to increased milk production and profitability. The research further suggested that financial education programs tailored for rural farmers could enhance their input in commercial dairy farming.

Similarly, Wambugu et al., (2020) analysed the role of financial literacy in improving access to agricultural credit among dairy farmers in Nyandarua County. The study found that farmers with higher financial literacy echelons were more likely to apply

for and secure credit from financial institutions. They understood loan terms, interest rates and repayment plans which reduced loan default rates. Farmers with limited financial literacy, instead, were hesitant to seek financing, limiting their ability to scale up dairy farming operations. The study suggested the integration of financial training in agricultural extension services to boost farmers' financial decision-making capabilities.

Kariuki and Njuguna (2021) investigated the link between financial literacy and dairy farmers' adoption of risk management strategies in Nakuru County. Their study showed that farmers who had undergone financial training were more likely to purchase insurance for their dairy cows, diversify income sources and invest in farm improvements. These farmers were better equipped to mitigate financial risks associated with diseases, feed shortages and market fluctuations. The study concluded that financial literacy positively influenced farmers' willingness to participate actively in dairy farming by reducing uncertainty and increasing confidence in financial planning. A report by the Kenya Dairy Board (2022) highlighted that financial literacy training among dairy cooperatives improved record-keeping, cash flow management and investment in value addition. Cooperatives that trained their members on financial management recorded higher milk yields, better prices and improved market linkages. The report stressed the need for targeted financial education initiatives to enhance farmers' participation in the dairy value chain.

Raza et al., (2023) explored the relationship between financial literacy and financial inclusion among rice farmers in Pakistan. Specifically, the study focused on farmers in Central Punjab and Khyber Pakhtunkhwa regions with access to Food Security and Agricultural Credit (FSAC) services but no access to banking. Findings revealed that financial literacy had a positive and significant effect on credit accessibility. However, the study found various hindrances including the lack of FSAC awareness, the inability to obtain the necessary loan, lack of collateral, viewpoint on loan usury, experience with loan rejection, apprehension about taking out a bank loan and dormant farmer groups. The study was however based in Pakistan and focused on rice farmers while the current scope consists of Kenyan Dairy farmers.

Phiri et al., (2019) sought after the information needs and barriers of rural smallholder farmers in Malawi. Questionnaires were presented to a randomised sample of the target farmer group. The study findings revealed that farmers showed low levels of financial

literacy. The study further determined that with financial literacy training, farmers are more likely to make informed investment decisions, adopt productive technologies and engage in savings and risk management practices. These improvements translate into higher crop yields and household income compared to the current situation. The study was conducted in Malawi while the current study is focused on Kenya.

Akande et al., (2023) on the other hand examined the role of financial literacy in enhancing rural agriculture change as well as the sustainable livelihood of farmers in the Eastern Cape, South Africa. The study employed variance-based structural equation modelling to examine this relationship adopting and validating global scales before administering them to 283 farmers. Results from the research showed that financial literacy positively and significantly influences rural agriculture change as well as the attainment of sustainable livelihood among these farmers. However, farmers with low financial literacy were more likely to struggle with loan repayment thus negating their sustainable livelihood. This study however adopts variance-based structural equation modelling while the current study will adopt a quantitative research approach.

Šūmane et al., (2018) examined the role of financial literacy in promoting sustainable agricultural practices in Europe. The study was based on 11 case studies carried out within the international RETHINK research programme within various European countries. The study findings were that farmers with higher levels of financial literacy are more inclined to adopt sustainable agricultural practices that improve soil fertility, water conservation and biodiversity conservation. They demonstrate greater awareness of the long-term benefits of sustainable farming methods and are keener to invest in technology, inputs and training to support their adoption. The study therefore concluded that financial literacy plays a crucial role in promoting the adoption of sustainable agricultural practices. The study adopted a case study while the current study utilises primary data.

Berry et al., (2018) sought to understand the impact of financial literacy education for youth in Ghana. The study evaluated the effects of financial literacy education on participants' employment outcomes, income levels and economic empowerment. Data collected through surveys, focus group discussions and follow-up interviews. Findings revealed that participants who receive financial literacy education demonstrate improved financial knowledge, skills and attitudes. They are better equipped to

manage personal finances, navigate formal financial services and pursue income-generating opportunities. The study concludes that financial literacy education contributes to higher employment rates, increased earnings and greater economic autonomy among program participants. The study was conducted in Ghana while the current study is focused on Kenya.

Kalekye and Memba, (2015) investigated the role of financial literacy on the profitability of women owned enterprises in Kitui town, Kitui County, Kenya. Data was collected through self-administered questionnaires distributed to women who owned businesses in Kitui town. Findings from the study revealed significant gaps in knowledge of basic financial concepts, budgeting and investment principles and further noted that limited financial knowledge and access to resources pose barriers to entrepreneurial success. Despite these gaps, women expressed strong entrepreneurial intentions and aspirations to start and maintain their own businesses. The study recommended that educational institutions should prioritise financial literacy education and entrepreneurship training to equip women with the skills and knowledge required to thrive in today's dynamic and competitive business environment. The study was focused on women owned enterprises while this study focuses on all farmers, both men and women, engaging in dairy farming.

These empirical studies underscore the significance of financial literacy in determining the extent of participation in dairy farming in Kenya. Farmers who possess financial knowledge are more expected to make strategic decisions regarding investments, credit access and risk management, ultimately improving their productivity and income levels. Bolstering financial literacy programs, mostly in rural areas, could notably enhance the growth and sustainability of Kenya's dairy farming sector.

2.3.3 Risk Management Services and the Extent of Participation in Dairy Farming

In Kenya, dairy farming is a significant economic activity, but it is fraught with various risks, including climatic challenges, diseases and financial uncertainties. To address these risks and strengthen the resilience of dairy farmers, several risk managements services have been applied. One effective approach is the adoption of microinsurance products tailored for small-scale dairy farmers (Muturi, 2022). For instance, the Cooperative Insurance Company (CIC) offers livestock insurance that reimburses

farmers for losses due to diseases, accidents or other perils. This insurance provides a financial safety net, enabling farmers to maintain their livelihoods even after unexpected losses (Chesang et al, 2020).

Technological innovations have also played a crucial role in risk management. The Bima Pima microinsurance product, developed by Acre Africa, allows farmers to buy affordable insurance coverage through scratch cards and mobile phones. This weather index-based insurance pays farmers in cases of drought or excessive rainfall, thus safeguarding their investments. More than 70,000 farmers across 15 counties in Kenya have benefited from this service, signifying its effectiveness in enhancing agricultural resilience (Maingi, 2021).

Additionally, implementing climate adaptation strategies is vital for reducing risks in dairy farming. Practices such as providing shading structures to reduce heat stress in cattle, breeding heat-tolerant breeds and adopting proper water and feed storage techniques have been known as effective measures (Karimi, 2020). These strategies not only improve animal welfare but also enhance productivity, making farmers more attractive to lending institutions and enabling access to finance. Furthermore, the establishment of early warning systems and information dissemination networks equips farmers with timely data on weather patterns and potential risks. This enables proactive decision-making, allowing farmers to implement necessary measures to protect their livestock and crops, thereby abating losses and ensuring sustainability (Wafula & Omumia, 2021).

Tang et al., (2021) assessed the impact of crop insurance on smallholder farmers' risk management strategies in China. The study utilised questionnaires towards smallholder farmers and interviews with insurance providers. The data analysis revealed that there was a greater willingness to invest in high-value crops, adopt soil conservation practices and diversify income sources among farmers with crop insurance coverage. The study, however, highlighted challenges such as premium affordability, basis risk and limited product availability that hinder broader insurance adoption. The study concluded that crop insurance offers a valuable tool for enhancing smallholder farmers' resilience to agricultural risks. The study was contextualised in China, while the current study is conceptualised in Kiambu County.

Amare et al., (2019) looked at the role of livestock insurance in managing climate risks in Borena zone of southern Oromia, Ethiopia. 359 households were sampled and data collected through key informant interviews and focus group discussions. Study results revealed that herders with livestock insurance coverage showed greater flexibility in managing herd size, composition and mobility patterns in response to changing environmental conditions and market dynamics. The study found that herders were better prepared for vulnerabilities such as livestock losses due to disease outbreaks, extreme weather events and market fluctuations, enabling them to pursue more diversified and sustainable livelihood strategies. The study was focused on mitigating climate risks while the current study's focus is on the extent of participation in dairy farming.

Nshakira-Rukundo et al., (2021) examined the adoption of agricultural insurance among smallholder farmers and pastoralists in Sub-Saharan Africa. The study adopted a desktop methodology reviewing available literature on why insurance take-up has remained low in Africa. The study noted that lack of awareness, high insurance premiums and distrust in insurance providers were key barriers to adoption. The study also noted that farmers who received training on risk management were more likely to purchase insurance. While the study identifies key challenges to insurance adoption, it does not assess alternative risk management mechanisms. Furthermore, the study reviewed recent literature while the current study relies on collection of primary data.

Similarly, Guodaar et al., (2023) sought to understand how farmers in northern Ghana mitigate and adapt to severe climate risks. Extreme droughts, high temperatures, intense heat waves, frequent floods and severe water stress are among the physical climatic hazards that farmers in northern Ghana face. Individual farmers use indigenous adaptation measures, such as relocation, building mounds or ridges, livelihood diversification, hand-dug wells on farms and early marriage of young girls, to reduce extreme physical climate risks and calamities. To combat protracted droughts, rural communities collectively use spiritual incantations and animal sacrifices as a traditional means of calling forth rain. These methods do not however establish that farmers are able to withstand these extreme climate risks. The study however focuses primarily on climate risks and does not assess other risks such as price fluctuations and disease outbreaks.

Isaboke et al., (2016) investigated the effect of weather index based micro-insurance on food security status of smallholders' farmers in Embu County. The study obtained cross sectional data from 401 farm households in Embu County, eastern Kenya and adopted a propensity score matching technique. The results revealed a positive impact of index-based insurance on food security. The study also posits that farmers with index-based insurance coverage demonstrate greater willingness to adopt risk-reducing strategies, such as investing in drought-resistant crop varieties, diversifying agricultural activities and investing in irrigation infrastructure. The study was conceptualised on food security while the current study's focus is dairy farming participation.

Fukumori et al., (2022) assessed the role of weather index crop insurance as a risk management tool for smallholder farmers in rural Kenya. Data was collected through surveys, as well as crop yield assessments. Findings from the study indicated that farmers with weather index insurance coverage demonstrate greater willingness to invest in agriculture, including expenditures on seeds, fertilizers and pest management. The study also found that insurance coverage provides a safety net against climate-related risks, such as droughts and floods, encouraging farmers to adopt more intensive and sustainable farming practices. The study was focused on the larger Kenyan rural area while the current study is limited to Kiambu County.

Despite the positive impact of risk management services on dairy farming, challenges such as high insurance premiums, limited awareness and accessibility issues still hinder their success. According to a study by Kiprop et al. (2023), the high cost of livestock insurance discourages small-scale farmers from adopting these risk mitigation measures, limiting their participation in the sector. The study suggested government intervention in subsidising insurance premiums and increasing awareness programs to enhance adoption.

2.4 Summary of Research Gaps

Numerous gaps in the evaluated literature were found by the study which supported the necessity of conducting the current research. The research gaps are summarised in table 2.1 below.

Table 2.1 Research Gaps

Author	Title	Findings	Gap in Study
Raza et al., (2023)	Financial literacy and credit accessibility of rice farmers in Pakistan: Analysis for central Punjab and Khyber Pakhtunkhwa regions	Financial literacy positively and significantly influences credit accessibility. However, the study noted hinderances to financial inclusion including the lack of Food Security and Agricultural Credit awareness, inability to obtain the necessary loans amongst others.	The study focused on the rice value chain in Pakistan, thereby creating a contextual and sectoral gap, as its findings may not be directly generalizable to other agricultural value chains or geographic settings.
Soomro et al., (2024)	Examining the effectiveness of microcredit schemes in improving the socio-economic status of small dairy farm entrepreneurs	Findings revealed that microfinance institutions positively improved the socio-economic status of small dairy farms. These institutions were found to significantly contribute towards bridging financial	The study only focuses on microfinance but does not evaluate the effectiveness of formal banking institutions, SACCOs or government-backed financial schemes. Furthermore, it is conducted in Pakistan which may have a different context from

Author	Title	Findings	Gap in Study
		gaps by offering tailored credit products, but the high cost of borrowing and limited awareness hindered full utilisation.	the current study thus limiting the generalisation of findings.
Akande et al., (2023)	Financial literacy and inclusion for rural agrarian change and sustainable livelihood in the Eastern Cape, South Africa	The study employed a variance-based structural equation modelling to examine this relationship adopting and validating global scales before administering them to 283 farmers. Results from the research showed that financial literacy positively and significantly influences rural agriculture change as well as the attainment of sustainable	By applying variance-based structural equation modelling (SEM), the study differs methodologically from the current study, which adopts a quantitative research approach, thereby creating a methodological gap in terms of analytical framework and estimation techniques.

Author	Title	Findings	Gap in Study
		livelihood among these farmers.	
Morgan and Long (2020)	The effect of financial product accessibility on household savings behaviour in Laos.	Households, with access to formal financial products, exhibit higher levels of savings compared to those with limited access.	The study was conceptualised around saving behaviour, thereby creating a conceptual gap as it does not fully address the broader constructs under investigation in the current study.
Tang et al., (2021)	Impact of crop insurance on smallholder farmers' risk management strategies in China.	The study concluded that crop insurance offers a valuable tool for enhancing smallholder farmers' resilience to agricultural risks.	Conducted within the Chinese context, the study presents a contextual gap, limiting the applicability of its findings to different geographic, economic and institutional environments.
Šūmane et al., (2018)	The role of financial literacy in promoting sustainable agricultural practices in Europe.	The study findings found that farmers with higher levels of financial literacy are more likely to adopt sustainable	The use of a case study approach introduces a methodological gap, as it contrasts with the current study's reliance on primary quantitative data,

Author	Title	Findings	Gap in Study
		agricultural practices.	thereby limiting comparability in terms of data type, analytical depth and statistical generalisation.
Nshakira-Rukundo et al., (2021)	The adoption of agricultural insurance among smallholder farmers and pastoralists in Sub-Saharan Africa.	The study noted that lack of awareness, high insurance premiums and distrust in insurance providers were key barriers to adoption.	The study adopted a desktop research methodology, relying on recent literature to draw their conclusions. This approach creates a methodological gap as the proposed study relies on primary data.
Amare, et al., (2019)	Looked into the role of livestock insurance in managing climate risks in Borena zone of southern Oromia, Ethiopia.	Study results revealed that herders with livestock insurance coverage showed greater flexibility in managing herd size, composition and mobility patterns in response to changing environmental	By focusing on climate risk mitigation, the study presents a conceptual gap, as it narrows the analytical focus and excludes other constructs that are central to the current study.

Author	Title	Findings	Gap in Study
		conditions and market dynamics.	

Source: (Researcher, 2025)

2.5 Conceptual Framework

According to Varpio et al, (2020), a conceptual framework comprises a set of general ideas and hypotheses that assist a researcher in precisely finding the problem, phrasing their enquiries and selecting articles that are relevant to the topic at hand. The framework outlines the interplay between the identified dependent and independent variables. The study sought to determine the relationship between financial accessibility and the extent of participation in dairy farming in Kiambu County, Kenya.

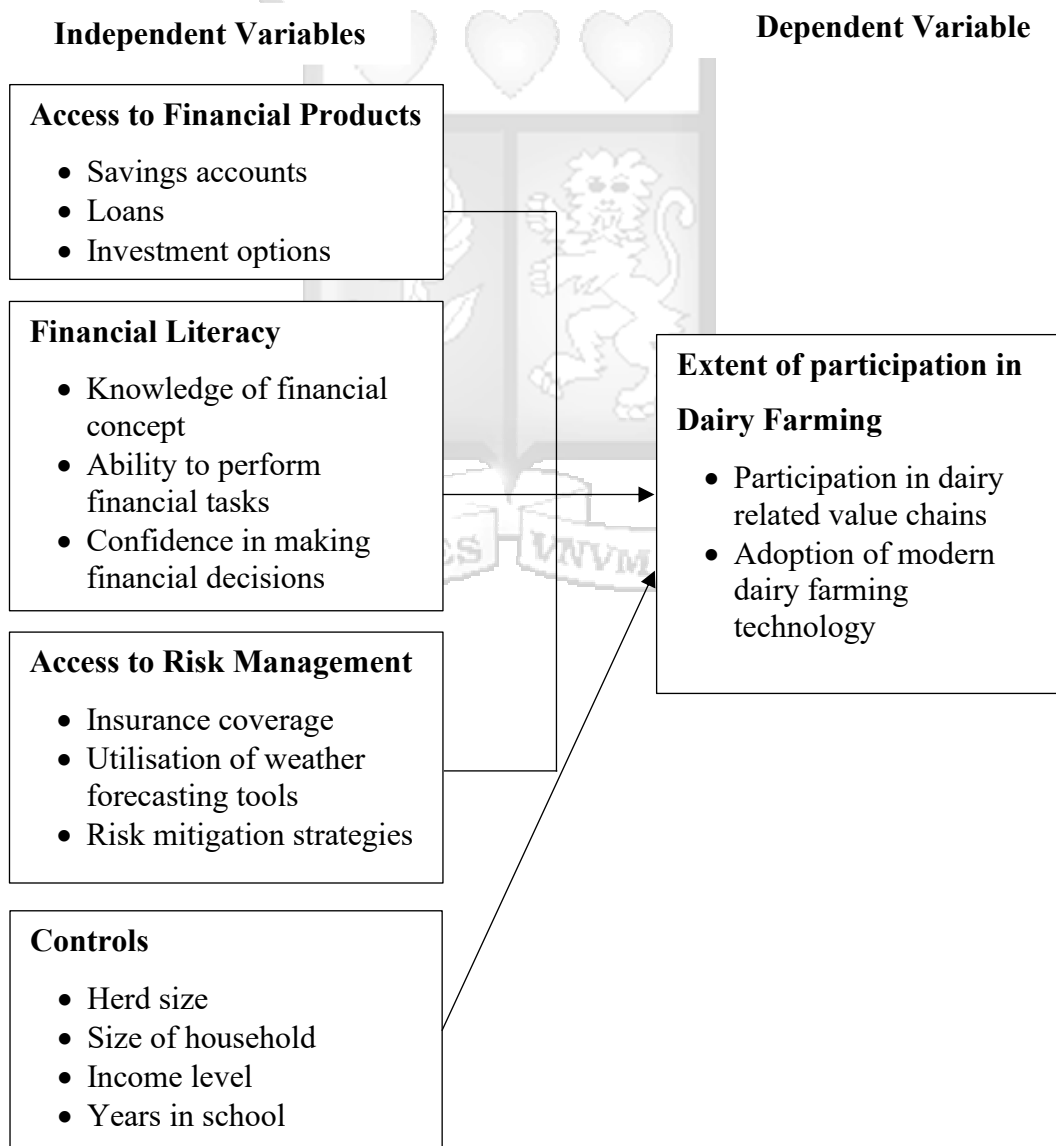


Figure 2.1 Conceptual Framework

Source: (Researcher, 2025)

Based on the literature reviewed, a conceptual framework showing in what manner access to financial products, financial literacy and access to risk management which are the independent variables relates to extent of participation in dairy farming which is the dependent variable are displayed in figure 2.1 above.

2.6 Operationalisation of Variables

Financial accessibility can be defined as the ease with which individuals, households and businesses can access and use financial services and resources to meet their financial needs, manage their finances and engage in economic activities (MoALF, 2017). Rooyen (2014), defined financial accessibility as the extent to which individuals and communities, particularly those traditionally underserved or excluded from the formal financial system, can easily become part of that system through access to basic financial services like bank accounts and payment mechanisms. According to Njogu et al., (2018), financial accessibility can be measured by access to credit, access to insurance and the financial literacy of the population. Osabohien et al., (2019) on the other hand noted that access to loans, access to financial education and risk preparedness were the major components of financial accessibility. This study conceptualises financial accessibility through three key dimensions which constitute the independent variables for the study: Access to financial products, financial literacy and access to risk management services.

Access to financial products can be defined as the availability and use of various financial services and instruments, including savings accounts, loans, insurance and investment options (Demirgüç-Kunt & Klapper, 2020). It indicates how easily individuals or businesses can obtain and utilise these financial products to meet their financial needs which include participation in farming activities such as dairy farming. This can be assessed based on dairy farmers with active loans or credit facilities, dairy farmers with access to banking services and the availability and uptake of agricultural insurance products (Chuma & Omiti, 2018; Njogu et al., 2018).

Lusardi and Mitchell (2021) define financial literacy as an individual's or a community's knowledge, understanding and competence in financial matters. Financial literacy encompasses the ability to make informed financial decisions, manage financial resources and navigate the complexities of the financial system (Lusardi & Mitchell, 2021). Financial literacy can be measured through assessing

individuals' knowledge of financial concepts, their ability to perform financial tasks and their self-assessed confidence in making financial decisions (Lusardi & Mitchell, 2021; Akande et al., 2023).

Financial Literacy is the ability of dairy farmers to understand and effectively leverage financial services, including budgeting, credit management and investment in dairy farming. Its indicators include the level of knowledge of the financial concept, the ability to perform financial tasks and the confidence in making financial decisions (Lusardi & Mitchell, 2021; Akande et al., 2023).

On the other hand, access to risk management services relates to the availability of mechanisms and tools that help individuals and businesses manage and mitigate risks associated with agricultural activities (World Food Programme, 2018). These services can include crop insurance, weather forecasting and risk assessment tools. According to Kamau (2020), measurement of access to risk management services involves assessing the availability and utilisation of these services including insurance coverage, utilisation of weather forecasting tools and risk mitigation strategies employed by participants in the agricultural sector.

The use of multi-item scales was deemed appropriate because the study constructs were latent variables that could not be measured adequately using a single question. Multi-item scales improve construct coverage, reduce measurement error and allow reliability assessment using Cronbach's alpha (Boateng et al., 2018; DeVellis & Thorpe, 2022). In this study, the reliability of the scales was confirmed using Cronbach's alpha, where all constructs exceeded the acceptable threshold of 0.7, indicating adequate internal consistency for further analysis. The dependent variable in the study is participation in dairy farming. This refers to the engagement of farmers in dairy-related activities, including milk production, breeding and value addition. It is measured by the following indicators: i.e., participation in dairy related value chains and the adoption of modern dairy farming technology (World Bank, 2022; FAO, 2003). Table 2.2 below shows the measurement of the study variables.

Table 2.2 Operationalisation of Variables

Variable	Construct	Measurement scale	Indicators	Type of analysis
Independent variables	Access to financial products	4-point Likert scale Ordinal variable	• Savings Accounts • Loans • Investment Options	• Descriptive • Inferential
Independent variables	Financial literacy	4-point Likert scale Ordinal Variable	• Knowledge of financial concepts • Ability to perform financial tasks • Confidence in making financial decisions	• Descriptive • Inferential
Independent variables	Risk management	4-point Likert scale Ordinal Variable	• Insurance coverage • Utilisation of weather forecasting tools • Risk mitigation strategies	• Descriptive • Inferential
Control variables	Household characteristics	4-point Likert scale Ordinal Variable	• Herd size • Size of household • Income level • Years in school	• Descriptive • Inferential
Dependent variables	Extent of participation	4-point Likert scale	• Participation in dairy-related value chains	• Descriptive • Inferential

Variable	Construct	Measurement scale	Indicators	Type of analysis
	in dairy farming	Ordinal Variable	Adoption of modern-dairy farming technology	

2.7 Chapter Summary

This chapter provides a comprehensive review of the literature related to the effect of financial accessibility on the extent of participation in dairy farming in Kiambu County, Kenya. The theoretical review examines key theories that underpin the study, including the financial intermediation theory and the social capital theory. The empirical review then critically evaluates previous studies on the key research variables with studies from Kenya, Africa and the global context providing insights into the relationship between financial accessibility and dairy farming participation as well as highlighting gaps that the current study seeks to address. The chapter then outlines the conceptual framework which illustrates the interconnection between the study variables. The methodology of the research used for this study is described in detail in chapter three.



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter focuses on the methodological plan that guided the research. The chapter specifically highlights the philosophy, the research design, population of the study and the sampling design to be applied. Further, the chapter provides details on the data collection instruments, data collection procedures, pilot testing, data analysis and ethical considerations that was upheld during the study.

3.2 Research Philosophy

The research philosophy core focus is on the beliefs that guide how research should be undertaken through providing approaches to gathering data and how it should be analysed (Novikov & Novikov, 2013). There are three main research values; realism, interpretivism and positivism (Stumpfegger, 2015). The main branches of research philosophy are the ontology branch which mainly focuses on the examination of reality, nature of existence and being while epistemology mainly dwells on understanding of knowledge, how we acquire it and apply it in real world events (Bougie & Sekaran, 2019). Overall, it can be argued that research philosophy guides the development of knowledge by focusing on hypothesis development and testing the association of the variables. There are three main research philosophies; realism, interpretivism and positivism (Stumpfegger, 2015).

The survey was guided by a positivism philosophy that focuses on observable reality and generalisations of findings in physical and natural sciences. The philosophy notes that all knowledge is obtained from observable experiences and only through analytical statements can the truth be unearthed (Pilarczyk, 2017). Lastly, the philosophy holds that the research is independent and is not affected by the subject of the research. The utilisation of this philosophy allows the study to adopt quantitative techniques in the analysis of how financial accessibility influences the extent of participation in dairy farming within Kiambu County.

3.3 Research Design

Research design outlines the scheme or methodological plan that is followed by the study that supports generation of answers to the research (Patten, 2016). The study design also serves as the glue that holds all aspects of the study together through constituting the blueprint for data collection, measurement and analysis of the data

(Bryman, 2016). The research utilised a descriptive research design which allows for the adoption of quantitative techniques in the data collection process. The approach is also key in validating findings, formulation of knowledge and providing solutions to the problems through observing the phenomena within its' natural setting. This is suitable for this study in establishing, quantitatively, the relationship between financial accessibility and the extent of participation in dairy farming within Kiambu County. This design has been previously applied in studies by (Chuma & Omiti, 2018); (Nyambura, 2020); (Kising'u, 2016) who conducted studies within the same conceptual themes thus underpinning the suitability of the research approach.

3.4 Target Population

The population of the study covers all the participants, items and elements of interest to the researcher as they share common characteristics (Bryman, 2016). Selecting the suitable population is key to the research as it ensures only people who have the required information are considered in the main research work (Sekaran & Bougie, 2016). According to the Kenya Dairy Board (2023) there are 17 dairy cooperatives within Kiambu County with at least 60,000 members who formed the unit of observation for this study. The members were considered for the study to assess the different forms of participation in dairy farming and how this has been determined by financial accessibility, financial literacy and access to risk management mechanisms thus fostering the development of the industry.

3.5 Sampling Design and Sample Size

The sample frame for the study represents all the units within a population from which the appropriate sample is obtained for the research (Sekaran & Bougie, 2016). The sample frame was the 60,000 dairy farmers within the County. Sampling represents the scientific process of choosing a group of people for a study so that each person reflects an accurate representation of the population from whom they were selected (Bryman, 2016). The sample size for the study was determined and distributed using the Yamane's formula as shown below;

$$n = N / (1 + N(e)^2)$$

Where: n = sample size required

N = size of the population = 60,000

e = margin of error = 0.05

$$n = 60,000 / 1 + 60,000 (0.05)^2$$

$$n = 397 \text{ farmers}$$

The study adopted a stratified random sampling design. The use of stratified sampling was appropriate because the sampling frame consisted of dairy farmers drawn from different dairy cooperative societies within Kiambu County. Each dairy cooperative society was treated as a stratum to ensure that farmers from all cooperative societies were represented in the final sample. Since the study targeted farmers from 17 dairy cooperatives, the sample was distributed across the cooperative societies to ensure representation. A minimum of 23 respondents was targeted from each cooperative, while the remaining six questionnaires were distributed among selected cooperatives to achieve the required sample of 397 respondents.

Within each cooperative, simple random sampling was applied. The researcher obtained cooperative membership lists and assigned each member a unique number. Respondents were then selected randomly from each cooperative list. This procedure ensured that every farmer within each cooperative stratum had an equal chance of being selected, while also ensuring that all cooperatives were represented in the study as indicated in table 3.1 below:

Table 3.1: Sample Distribution by Dairy Cooperative Society

No.	Dairy Cooperative Society	Target Sample
1	Chicoco Dairy Farmers Cooperative Society	24
2	Gatamaiyu Dairy Farmers Cooperative Society	24
3	Gatundu South Dairy Cooperative Society	24
4	Gikambura Dairy Farmers Cooperative Society	24
5	Githunguri Dairy Farmers Cooperative Society	24
6	Kabete Dairy Farmers Cooperative Society	24
7	Karatu Dairy Farmers Cooperative Society	23
8	Kiambaa Dairy Farmers Cooperative Society	23
9	Kikuyu Dairy Farmers Cooperative Society	23
10	Kiriita Dairy Farmers Cooperative Society	23
11	Limuru Dairy Farmers Cooperative Society	23

No.	Dairy Cooperative Society	Target Sample
12	Mangu Progressive Cooperative Society	23
13	Muguga Dairy Farmers Cooperative Society	23
14	Ndumberi Farmers' Cooperative Society	23
15	Rware Dairy Cooperative	23
16	Sidai Africa Limited	23
17	Sigona Dairy Farmers Cooperative Society	23
	Total	397

Source: Researcher (2026)

Although the questionnaires were distributed across all the 17 cooperative societies, the final analysis was conducted using the 300 valid responses that were completely filled and returned. Cooperative-level identifiers were used only for questionnaire distribution and follow-up and were not retained in the final dataset to preserve respondent anonymity.

3.6 Data Collection Instrument

Data collection encompasses all the steps and actions that are undertaken in the gathering of research information on the selected variables using the methodological approach adopted (Sekaran & Bougie, 2016). The data gathered can either be from primary or secondary sources. This research relied on collection of primary research data from the selected participants. The data was collected using a structured questionnaire developed in line with the study objectives. The use of a questionnaire enabled the researcher to collect responses from the large sample easily and more conveniently (Bougie & Sekaran, 2019). Further, structured questionnaires provide uniform responses that are more ideal when conducting quantitative analysis. The questionnaire was developed with due consideration of the conceptualisation of the research variables with a 4-point Likert scale being utilised.

Table 4.2: Nature of Research Variables

Variable	Construct	Indicators	Source
Independent variables	Access to financial products	• Savings Accounts • Loans • Investment Options	• Kising'u (2016); options (Demirgüç-Kunt, A. & Klapper, L., 2020).

Variable	Construct	Indicators	Source
Independent variables	Financial literacy	• Knowledge of financial concepts • Ability to perform financial tasks • Confidence in making financial decisions	• Njogu, Olweny and Njeru (2018); Osabohien, Adeleye and Alwis (2019)
Independent variables	Risk management	• Insurance coverage • Utilisation of weather forecasting tools • Risk mitigation strategies	• Kamau (2020); (Dercon & Christiaensen, 2021)
Control variables	Household characteristics	• Herd size • Size of household • Income level • Years in school	• Researcher (2025)
Dependent variables	Extent of participation in dairy farming	• Participation in dairy-related value chains • Adoption of modern-dairy farming technology	• (van der Lee et al., 2020); (Adams & Vogel, 2020); (Kinyangi, 2014)

Source: Researcher (2026)

3.7 Data Collection Procedure

This represents the process that is adhered to in collecting and synthesising the research information in order to conduct relevant analysis using the stated research procedures (Bougie & Sekaran, 2019). A structured questionnaire was adopted as the primary data collection tool for the study. The researcher sought the approval of the supervisor to present the protocol both for defence and the ethical review process. After necessary approvals were obtained from Strathmore University, the researcher sought permission from the National Commission for Science, Technology & Innovation (NACOSTI).

The study relied on physical data collection with the researcher recruiting assistants to aid in covering the expansive geographical area. Direct physical data collection, through face-to-face interviews, was adopted as it allowed the participants to query the researcher on any aspect that is technical in the survey. The study also ensured the participants are presented with an informed consent form before engaging in the research.

3.8 Pilot Test of Research Instrument

The study conducted a pretest to check the adequacy, completeness and internal consistency of the instrument. Through conducting a pilot test, one can check the instrument for any errors that may impact the main study (Bougie & Sekaran, 2019). The pilot study was conducted among 10% ($n = 39$) of sample respondents who were not considered in the main research. The participants of the pilot test were selected through a simple random sample from the sample frame of the 60,000 dairy farmers. The data collected from the pilot was used in the reliability and validity test of the questionnaire.

3.8.1 Validity Tests

The validity of the questionnaire focuses on the accuracy and meaningfulness of the inferences that are made based on the findings of the study (Bryman, 2016). By ensuring the questionnaire is valid the research can measure what is purports to measure. The research adopted face validity which entails critically examining the research questions against the objectives of the study and making necessary adjustments if all concepts are not captured (Bougie & Sekaran, 2019). Secondly, content validity was conducted with the support of the supervisor in reviewing the questionnaire for completeness and accuracy. Lastly, construct validity was utilised in revising the questionnaire and ensuring the conceptualisation of the variables is conformed to when developing the questionnaire which ensures adequacy in the instrument.

3.8.2 Reliability Tests

Bougie & Sekaran (2019) define reliability as the consistency of measurement or stability of measurement over a variety of conditions in which the same result should be obtained. Through ensuring the questionnaire reliability, the researcher can affirm the internal consistency of the instrument indicating that it can be adopted in repeat studies (Bryman, 2016). The researcher adopted the Cronbach Alpha test in examining the reliability of the research instrument. The Cronbach's alpha coefficient ranged between 0 and 1 (Patten, 2016).

The study considered a cut-off range of 0.7 and above as an ideal indicator of the internal consistency of the instrument. Any variable that does not meet this threshold was to be adjusted accordingly. The coefficient of the data gathered from the pilot

study was computed with assistance of Statistical Package for Social Sciences (SPSS). The findings indicated that Access to financial products had a coefficient of 0.748, financial literacy had a coefficient of 0.820 whereas risk management had a coefficient of 0.809. Since all constructs depicted that the value of Cronbach's Alpha is above the suggested value of 0.7, this study was considered sufficiently reliable. Reliability of the variables is shown in Table 3.3.

Table 3.3: Reliability Test of Variables

Constructs	Reliability Cronbach's Alpha	Comments
Access to financial products	0.748	Accepted
Financial literacy	0.820	Accepted
Risk management	0.809	Accepted

Source: Primary Data (2026)

3.8.3 Construct Validity

Construct validity was assessed to determine whether the questionnaire items adequately measured the intended study constructs. The constructs assessed were access to financial products, financial literacy, risk management services and extent of participation in dairy farming. Since each construct was measured using multiple Likert-scale items, exploratory factor analysis was conducted to determine whether the items loaded appropriately onto their respective constructs.

The suitability of the data for factor analysis was assessed using the Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's Test of Sphericity. KMO values above 0.60 were considered acceptable, while Bartlett's Test was expected to be statistically significant at $p < 0.05$. Items with factor loadings of 0.40 and above were retained.

The results showed that all constructs had KMO values above 0.60 and statistically significant Bartlett's Test results. The factor loadings were also above the acceptable threshold, indicating that the questionnaire items adequately represented their respective constructs. Therefore, factor analysis confirmed construct validity. This

provided additional support for the use of composite scores in the subsequent descriptive, correlation and regression analyses.

Table 3.4: Factor Analysis Suitability and Construct Validity Diagnostics

Construct	Number of Items	KMO	Bartlett's Test Sig.	Factor Loading Range	Decision
Access to financial products	5	0.721	0.000	0.641–0.812	Retained
Financial literacy	5	0.764	0.000	0.658–0.846	Retained
Risk management services	5	0.738	0.000	0.622–0.801	Retained
Participation in dairy farming	5	0.776	0.000	0.673–0.858	Retained

Source: Primary Data (2026)

This confirmed that the items loaded adequately onto their respective constructs and therefore supported construct validity. The findings, together with the Cronbach's alpha reliability results, indicate that the questionnaire items were appropriate for measuring access to financial products, financial literacy, risk management services and participation in dairy farming.

3.9 Data Analysis

Bryman (2016) defined data analysis as the process of cleaning, converting and modelling data to find relevant information. This study adopted quantitative analysis in providing descriptions on the collected research data. The study used SPSS version 28.0 in the data analysis. Descriptive analysis such as frequencies, percentages, means and standard deviation was adopted in describing and summarising the collected study data. The study further employed inferential analysis through a combination of correlation and regression analysis to determine the direction of relationship and strength of the relationship between variables respectively. Further, qualitative data was analysed thematically in line with the objectives of the research. The analysed data was presented using tables.

The study applied hierarchical multiple linear regression analysis because the dependent variable, extent of participation in dairy farming, was measured using a

composite score derived from Likert-scale items. The use of multiple linear regression was appropriate because the study sought to examine the extent to which financial access, financial literacy and risk management services predicted participation in dairy farming. Two models were estimated. Model 1 included the three main predictor variables, while Model 2 introduced the control variables, namely herd size, household size, income level and education level.

The regression models were specified as follows:

Model 1:

$$PPDF_i = \beta_0 + \beta_1 FA_i + \beta_2 FL_i + \beta_3 RM_i + \varepsilon_i$$

Model 2:

$$PPDF_i = \beta_0 + \beta_1 FA_i + \beta_2 FL_i + \beta_3 RM_i + \beta_4 HS_i + \beta_5 HHS_i + \beta_6 INC_i + \beta_7 EDU_i + \varepsilon_i$$

Where PPDF represents the extent of participation in dairy farming, FA represents financial access, FL represents financial literacy, RM represents risk management services, HS represents herd size, HHS represents household size, INC represents income level, EDU represents education level, β_0 represents the constant term, β_1 – β_7 represent regression coefficients and ε represents the error term. Since the study used cross-sectional data, the findings were interpreted as statistical associations rather than strict causal effects.

3.9.1 Data Cleaning, Missing Values and Outlier Treatment

Before analysis, the collected data were checked for completeness, consistency and accuracy. Questionnaires with substantial missing responses were excluded from the final dataset. The remaining 300 questionnaires were coded and entered into SPSS Version 28.0 for analysis.

Data cleaning involved checking for out-of-range values, duplicate entries and inconsistencies in coding. All Likert-scale items were coded consistently, with higher scores representing higher levels of agreement or extent. Missing values were assessed before analysis. Since the final dataset consisted of fully completed questionnaires, no imputation was applied. Cases with incomplete responses were excluded through listwise deletion.

Outliers were assessed before conducting regression analysis. Since most variables were measured using a four-point Likert scale, the possibility of extreme univariate

outliers was limited. However, regression residuals, leverage values and Cook's distance were reviewed to identify influential cases. Cases with extreme standardized residuals or excessive influence were examined before final analysis. No case was removed unless it was found to result from data entry error or incomplete response patterns.

3.9.2 Endogeneity Risk

The study acknowledges the possibility of endogeneity arising as the data were cross-sectional and observational. One possible source of endogeneity is reverse causality, where financial accessibility may influence participation in dairy farming, while farmers who are already highly engaged in dairy farming may also be more likely to seek financial products, financial training and risk management services. Another possible source of endogeneity is omitted variable bias. Factors such as land size, distance to financial institutions, access to markets, extension services, managerial ability, cooperative performance and household wealth may influence both financial accessibility and participation in dairy farming.

To reduce this risk, the study included control variables in the regression model. These control variables were herd size, household size, income level and education level. The inclusion of these variables helped to account for selected socio-economic differences among farmers. However, the study does not claim strict causality. The findings are interpreted as statistical associations between financial accessibility and participation in dairy farming.

3.10 Ethical Considerations

The study adhered to required ethical guidelines during the course of the data collection (Bougie & Sekaran, 2019). The researcher ensured ethical review clearance was obtained from Strathmore University and sought for a permit from the NACOSTI. The study ensured all participants are presented with an informed consent form indicating all the rights and aims of the research. The respondent's anonymity was also upheld during the study. All the data that obtained during the research was treated with utmost confidentiality with the information being securely stored and not used for any other purpose other than stated academic aims.

CHAPTER FOUR: RESEARCH FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings of the study on the effect of financial accessibility on the extent of participation in dairy farming in Kiambu County, Kenya. The data was collected using structured questionnaires administered to dairy farmers who are members of dairy cooperative societies within the County. The findings are presented using frequencies, percentages, means and standard deviations in line with the study objectives. The chapter begins with the response rate, followed by background information of the respondents and thereafter descriptive and inferential statistics.

4.2 Response Rate

As indicated in Table 4.1, a total of 397 questionnaires were administered to dairy farmers across the 17 cooperative societies in Kiambu County. 300 questionnaires were properly filled and returned, representing a 75.6% response rate. This response rate is considered good and adequate for statistical analysis and generalisation of findings.

Table 4.1: Response Rate

Type	Targeted Sample	Responses	Response Rate
Responded	397	300	75.6%
Non-Response	0	97	24.4%
Total	397	397	100%

Source: Primary Data (2026)

Although the questionnaires were distributed across all the 17 cooperative societies, the final analysis was conducted using the 300 valid responses that were completely filled and returned. Cooperative-level identifiers were used only for questionnaire distribution and follow-up and were not retained in the final dataset to preserve respondent anonymity. Since demographic information for non-respondents was only available for gender distribution, a formal comparison between respondents and non-respondents could not be conducted for all the demographic information. No replacement or weighting was applied and the analysis was based only on the 300 complete and usable questionnaires. This is acknowledged as a limitation, since non-

respondents may have differed from respondents in ways that could introduce non-response bias.

Table 4.2: Non-Response Bias Assessment by Gender

Gender	Respondents	%	Non- Respondents	%	Total
Male	188	62.7	61	62.9	249
Female	112	37.3	36	37.1	148
Total	300	100.0	97	100.0	397

Source: Primary Data (2026)

The study assessed non-response bias using gender as the comparison variable. As shown in Table 4.2, male respondents accounted for 62.7% of completed questionnaires, while female respondents accounted for 37.3%. Among non-respondents, males accounted for 62.9%, while females accounted for 37.1%. The gender distribution of respondents and non-respondents was therefore almost similar. This suggests that non-response bias based on gender was not a major concern in the study. Although 97 questionnaires were not returned or were incomplete, the close distribution between male and female respondents and non-respondents indicates that one gender group was not disproportionately excluded from the final analysis. Therefore, the 300 valid responses were considered adequate for analysis.

4.3 Background Information of the Respondents

This section presents a detailed scholarly analysis of the demographic characteristics of dairy farmers in Kiambu County. The characteristics of the respondent is crucial in quantitative research because demographic variables may affect the financial behaviour, risk taking capacity, investment capacity and financial products adoption. Agricultural finance studies find that the following factors are important in understanding financial access and involvement in agricultural activities: Experience in farming, size of the herd, income status, membership of the agricultural cooperatives, household size and education. Frequencies and percentages are used to present the findings and interpreted in the larger context of rural finance and smallholder agricultural development.

4.3.1 Years Involved in Dairy Farming

The results from Table 4.3 show that a large population of respondents (41.0%) have been involved in dairy farming for over five years. This implies that farmers are experienced in farming and must have had interactions with formal and informal financial institutions. Farmers' experience has long been linked to better financial decision making, greater production stability and better ability to weather financial shocks and swings. Better social capital within cooperatives and trust relationships with financial providers, are likely to have been built by farmers with longer experience.

Table 4.3: Years Involved in Dairy Farming

Years of Experience	Frequency	Percentage (%)
Less than 1 year	15	5.0
1 – 3 years	76	25.3
3 – 5 years	86	28.7
5+ years	123	41.0
Total	300	100.0

Source: Primary Data (2026)

4.3.2 Herd Size

The majority of dairy farmers in Kiambu County are small farmers with 51.3% of the respondents having 2-4 cows in their small homesteads. In smallholder systems, there is a lack of capital resources and economies of scale. Therefore it is essential that credit facilities are available at an affordable rate to enable the expansion of herds, improve feeds and introduce new dairy technology. Herd size tends to be correlated with a greater degree of value added and market integration. The results are displayed in table 4.4 below:

Table 4.4: Number of Cows Owned

Herd Size	Frequency	Percentage (%)
1 cow	33	11.0
2 – 4 cows	154	51.3

5 – 10 cows	83	27.7
10+ cows	30	10.0
Total	300	100.0

Source: Primary Data (2026)

4.3.3 Annual Income from Dairy Farming

Table 4.5 shows an income range of KES 100,000 – 200,000 per annum from dairy farming which is experienced by 40.7% of the respondents. The commercial engagement and investment capacity could be different among the income groups. Lower income farmers may find it difficult to provide collateral or the repayment schedule may be difficult, which reduces their access to formal financial services. On the other hand, the more affluent farmers are more inclined towards diversifying into processing, cold storage and zero-grazing system.

Table 4.5: Annual Income from Dairy Farming

Income Range (KES)	Frequency	Percentage (%)
0 – 50,000	21	7.0
50,001 – 100,000	85	28.3
100,001 – 200,000	122	40.7
200,000+	72	24.0
Total	300	100.0

Source: Primary Data (2026)

4.3.4 Years of Cooperative Membership

As can be seen in Table 4.6, there is a long-term cooperative membership as observed from the 67.6% of the respondents who stated that they have been cooperative members for more than 3 years. Loans guarantees, advance payment on milk and financial training are some of the services the cooperatives can offer to the smallholder farmers which act as an intermediary between the farmers and financial institutions. The capacity of co-operative networks is a crucial determinant to availability of credit and risk management services.

Table 4.6: Years of Cooperative Membership

Duration	Frequency	Percentage (%)
-----------------	------------------	-----------------------

Less than 1 year	14	4.7
1 – 3 years	83	27.7
3 – 10 years	127	42.3
10+ years	76	25.3
Total	300	100.0

Source: Primary Data (2026)

4.3.5 Household Size

The findings in table 4.7 shows that majority of the farmers (81%) are medium to large family farmers where 39.7 % of them have 2 to 4 members within the family, while 41.3 % have 5 to 8 members within the family. House size is a factor that gives labour support to dairying activities, but it also leads to financial dependency and consumption pressure. This situation can push up the demand for financial services to buffer income risk.

Table 4.7: Household Size

Household Size	Frequency	Percentage (%)
One-person	12	4.0
2 – 4 members	119	39.7
5 – 8 members	124	41.3
8+ members	45	15.0
Total	300	100.0

Source: Primary Data (2026)

4.3.6 Highest Level of Education

The education profile suggests that a majority of respondents possess at least primary (33.7%) or secondary education (30.7%). Education enhances financial literacy, improves record-keeping practices and increases confidence in engaging with formal banking institutions. Farmers with tertiary education are particularly more likely to adopt digital financial tools and participate in structured financial training programs. The findings are presented in Table 4.8.

Table 4.8: Highest Level of Education

Education Level	Frequency	Percentage (%)
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No formal education	15	5.0
Incomplete primary	28	9.3
Primary complete	101	33.7
Secondary complete	92	30.7
Tertiary education	64	21.3
Total	300	100.0

Source: Primary Data (2026)

4.4 Descriptive Analysis of Study Variables

This section presents an expanded descriptive statistical analysis of the study variables. All items were measured using a four-point Likert scale where 1 = Small Extent, 2 = Moderate Extent, 3 = Large Extent and 4 = Very Large Extent. Mean scores indicate the level of agreement or extent, while the standard deviation shows the variability of responses among respondents.

4.4.1 Extent of Participation in Dairy Farming

Respondents were asked to indicate the extent of their participation in the following dairy farming activities as indicated in Table 4.9.

Table 4.9: Extent of Participation in Dairy Farming

Statement	Mean (M)	Std. Deviation (SD)
I participate in milk production for commercial purposes.	3.030	0.843
I engage in dairy meal processing and value addition activities.	2.347	0.978
I actively engage in dairy cooperative activities.	2.973	0.826
I have invested in dairy infrastructure such as milk coolers and transport facilities.	2.583	1.026
I have invested capital in modern dairy farming technologies.	2.460	0.904
Composite Mean	2.679	—

Source: Primary Data (2026)

The results in table 4.8 show that participation in milk production recorded the highest mean ($M = 3.030$, $SD = 0.843$) indicating that farmers participate in core milk production to a large extent. This confirms that dairy farming in Kiambu County is predominantly production-oriented and centered on raw milk output. Active engagement in dairy cooperative activities also recorded a relatively high mean ($M = 2.973$, $SD = 0.826$). This reflects the strong institutional presence of cooperatives in organizing milk collection, facilitating market access and supporting financial intermediation. Cooperative engagement strengthens collective bargaining power and enhances financial inclusion through cooperative-linked credit mechanisms.

Investment in dairy infrastructure such as milk coolers and transportation facilities recorded a moderate mean ($M = 2.583$, $SD = 1.026$). The relatively higher standard deviation indicates that there are variations in infrastructure development of the farmers. Some farmers have invested in infrastructure but others cannot due to capital restriction. The mean value ($M = 2.460$, $SD = 0.904$) of capital investments in modern dairy farming technologies was moderate. This suggests that there is a moderate level of technological adoption of improved breeds, zero-grazing units as well as digital farm management systems. This moderate uptake may be affected by financial accessibility restrictions and perceived risks of investment.

The mean ($M = 2.347$) and standard deviation ($SD = 0.978$) for engagement in dairy meal processing and value addition was the lowest indicating limited processing activities such as packing and/or processing dairy meal. This means that most farmers are leaving the raw milk market and not going into the higher margin value-added markets. Overall, the compound average mean of 2.679 represents a moderate level of involvement in dairy production and probably a high level of involvement in primary production rather than vertical integration. The standard deviations, which range from 0.843 to 1.026, indicate considerable variation in responses among participants. This suggests that while average responses provide an overall indication of perceptions and practices, there were notable differences in individual experiences and views regarding the study variables. The relatively high dispersion may reflect variations in respondents' backgrounds, levels of awareness, access to resources, or operational circumstances.

4.4.2 Access to Financial Products

Respondents were asked to indicate the extent to which they have access to and awareness of financial products.

Table 4.10: Access to Financial Products

Statement	Mean (M)	Std. Deviation (SD)
I am aware of savings products available for dairy farmers.	3.063	0.775
I understand the loan requirements provided by financial institutions.	2.667	0.937
I am aware of loan products available for dairy farming activities.	3.003	0.808
I am a member of a formal financial institution (e.g., bank or SACCO).	2.613	0.931
I participate in investment or savings groups to finance dairy activities.	2.520	0.945
Composite Mean	2.773	—

Source: Primary Data (2026)

The mean score for awareness on savings products was 3.063 with SD = 0.775 showing the highest mean indicating that farmers are generally aware of the available savings products. The mean (M = 3.003, SD = 0.808) was also high for perceptions on awareness of loan products, indicating that the access to information about credit is relatively high. A slight mean lower (M = 2.667, SD = 0.937) was found when it comes to understanding loan requirements, reflecting the possibility of procedural complexity and documentation requirements that may prevent the full understanding of the loan requirements.

The mean score for formal financial institutions membership (M = 2.613, SD = 0.931) indicated financial inclusion to a moderate extent. The mean of the investment groups was the lowest (M = 2.520, SD = 0.945) indicating collective financial engagement.

The results showed that awareness is greater than institutional integration. Financial access seems more information than structural, offering scope for enhancing inclusive financial systems.

4.4.3 Financial Literacy

Respondents were asked to indicate the extent to which they engage in financial literacy activities as indicated in table 4.11.

Table 4.11: Financial Literacy

Statement	Mean (M)	Std. Deviation (SD)
I receive financial training from my dairy cooperative.	2.690	0.933
I regularly engage with financial institutions for financial advice.	2.750	0.889
I use digital financial tools in managing my dairy farm finances.	2.423	0.973
I attend financial seminars or workshops related to dairy farming.	2.737	0.866
I consult accounting experts for dairy farm financial management.	2.387	0.952
Composite Mean	2.597	-

Source: Primary Data (2026)

The overall composite mean of 2.597 shows moderate level financial literacy of the dairy farmers in Kiambu County. This indicates that dairy farmers have basic knowledge about finance, but their financial management skills need to be further developed to allow them to maximise the growth of the dairy enterprise as possible. Moderate literacy level suggests some understanding of budgeting, loan management, saving habits and risk analysis and does not necessarily mean that strategic financial planning or investment forecasting is understood.

The overall mean ($M = 2.750$, $SD = 0.889$) was observed for the engagement with financial institutions indicating that farmers moderate their bank interaction for advisory and/or transactional purposes. This degree of engagement represents a certain level of institutional trust and integration of the financial system. The mean is not,

however, in the “large extent” band (≥ 3.0), which would suggest that this level of engagement could be sporadic, not systematic.

The mean ($M = 2.737$, $SD = 0.866$) was relatively high for attendance in financial seminars, suggesting that possibly financial knowledge dissemination programs are being carried out by cooperative societies and development actors. This exposure is beneficial for the financial awareness.

Digital financial tools had a lower mean ($M = 2.423$, $SD = 0.973$) indicating limited integration of financial technology in dairy farm management. The use of digital financial tools such as mobile accounting applications, digital loan platforms or mobile-based savings management systems can make it much easier to track and ensure transparency of finances. The relatively low mean suggests that digitalisation of the dairy sector has not yet reached a high level of maturity. The greater the standard deviation also means that there is an unequal level of adoption among progressive and digitally excluded farmers.

Mean ($M = 2.387$) of the consultation with accounting experts had the lowest mean, suggesting minimum use of financial advisory service from accounting experts. This indicates that many dairy farmers rely on their own experience and/or the advice of other farmers and informal record-keeping systems instead of formal financial planning. The lack of interaction with professional accounting services could restrict adequate cost tracking, profit analysis and tax compliance.

4.4.4 Access to Risk Management Services

Respondents were asked to indicate the extent to which they utilize risk management services.

Table 4.12: Access to Risk Management Services

Statement	Mean (M)	Std. Deviation (SD)
I am aware of agricultural insurance policies available for dairy farming.	2.703	0.897
Agricultural insurance premiums are affordable to me.	2.353	0.941

I use weather advisory tools to manage dairy farming risks.	2.570	0.984
I use modern risk management technologies in my dairy farm.	2.597	0.944
I have invested in zero-grazing systems to reduce production risks.	2.743	0.938
Composite Mean	2.593	—

Source: Primary Data (2026)

The composite mean of 2.593 shows that the level of engagement of farmers in the dairy sector with the risk management services is moderate as per Table 4.11. This indicates that farmers are aware of production and market risks but the rate of uptake of formal and structured risk mitigation mechanisms is not 100%.

The mean ($M = 2.743$, $SD = 0.938$) was the highest for investment in zero-grazing systems, with moderate structural risk mitigation. The zero grazing systems contribute to better reduce the climatic variability, food shortage and limited land availability, which are the factors that make the milk production more stable. The higher mean indicates that farmers are more likely to implement practical, production-oriented risk management measures that have an impact on production.

The mean value of awareness of agricultural insurance policies was 2.703 with SD of 0.897 which indicated that most farmers were reasonably aware of the available agricultural insurance products. But, just knowing doesn't equate to active subscription. The mean ($M = 2.353$, $SD = 0.941$) for insurance affordability was lowest, signifying that cost is still a major challenge for uptake. This suggests that the premium price could discourage the farmers from taking part even if they are aware of the advantages of the insurance.

For the use of weather advisory tools, the mean use was 2.570 ($SD = 0.984$) indicating moderate use of climate information for guidance in farm decision-making. Likewise, the adoption of modern risk management technology had a mean score of 2.597 ($SD = 0.944$) which reflects partial but inconsistent use of technological solutions in order to minimize production uncertainties. The relatively bigger standard deviations for these items also indicate variation in the level of adoption, some farmers being proactive and others reacting to climate and market shocks.

4.5 Inferential Statistics

4.5.1 Correlation Analysis

Pearson's Product Moment Correlation analysis was conducted to examine the strength and direction of the relationship between financial access, financial literacy, risk management and participation in dairy farming. The analysis was conducted at a 95% confidence level ($\alpha = 0.05$).

Table 4.13: Pearson Correlation Matrix

Variable	Participation	Financial Access	Financial Literacy	Risk Management
Participation	1.000	0.478**	0.336**	0.323**
Financial Access	0.478**	1.000	-0.039	-0.034
Financial Literacy	0.336**	-0.039	1.000	-0.031
Risk Management	0.323**	-0.034	-0.031	1.000

Correlation is significant at the 0.01 level (2-tailed).

Source: Primary Data (2026)

Findings in table 4.14 reveals statistically significant positive relationships between Participation in dairy farming and all three financial accessibility variables. Financial access shows the strongest positive correlation with Participation ($r = 0.478$, $p < 0.01$) indicating a moderate positive relationship. This suggests that as access to savings products, loan facilities and financial institutions increases, participation in dairy farming also increases. The magnitude of 0.478 falls within the moderate range indicating a meaningful but not perfect association.

Financial Literacy also demonstrates a positive and statistically significant relationship with Participation ($r = 0.336$, $p < 0.01$). Although weaker than financial access, this relationship indicates that improved financial knowledge and advisory engagement are associated with increased participation levels. Risk management similarly shows a positive and statistically significant relationship with participation ($r = 0.323$, $p < 0.01$). This implies that farmers who adopt risk mitigation strategies like insurance, zero-grazing systems and climate advisory tools are more likely to participate actively in dairy farming.

The moderate positive correlation between Financial Access and Participation supports the financial intermediation theory advanced by Allen and Santomero (1997) which posits that access to financial services enhances investment and productive activity. The positive association between Financial Literacy and Participation aligns with Lusardi and Mitchell (2021) who argue that financial knowledge improves investment decisions and economic engagement. Similarly, the relationship between risk management and participation supports OECD (2016) and World Bank (2011), who emphasise that agricultural risk mitigation enhances resilience and encourages sustained participation in agricultural enterprises.

The correlation results indicate that Financial Access, Financial Literacy and Risk Management are only weakly related to one another, with correlation coefficients ranging from -0.039 to -0.031 and none reaching statistical significance. Although these variables are often discussed together within the broader context of financial inclusion, the findings suggest that they capture distinct dimensions rather than a single underlying construct. For example, access to financial services does not necessarily imply that farmers possess adequate financial knowledge, while financially literate farmers may still face barriers in accessing credit or insurance products. The weak interrelationships observed may therefore reflect the heterogeneous nature of financial inclusion among dairy farmers. At the same time, the results highlight the importance of evaluating each dimension separately, as improvements in one area may not automatically translate into improvements in the others.

4.5.2 Regression Analysis

Multiple regression analysis was conducted to examine the influence of financial access, financial literacy and risk management services on participation in dairy farming in Kiambu County. The multiple regression analysis was performed in two models. Regression model 1 examined the effect of the independent variables only, while regression model 2 incorporated the control variables namely herd size, size of household, income level and years in school. The purpose of introducing the control variables was to determine whether the relationship between financial accessibility variables and participation in dairy farming remained significant after accounting for the control variable of socio-economic characteristics of the respondents. The approach adopted follows the hierarchical multiple regression model demonstrated in the attached sample.

Table 4.14: Regression Coefficients Summary

Model	Variables	Unstandardized Coefficients (β)	Std. Error	t	Sig.
1	(Constant)	1.864	.248	7.516	.000
	Financial Access	.436	.061	7.148	.000
	Financial Literacy	.320	.057	5.614	.000
	Risk Management	.295	.063	4.683	.000
2	(Constant)	1.732	.267	6.487	.000
	Financial Access	.421	.064	6.578	.000
	Financial Literacy	.307	.059	5.203	.000
	Risk Management	.281	.067	4.194	.000
	Herd Size	.118	.041	2.878	.004
	Size of Household	-.073	.036	-2.028	.043
	Income Level	.154	.048	3.208	.001
	Years in school	.096	.039	2.462	.014

Dependent Variable: Participation in Dairy Farming

Source: Primary Data (2026)

The results in Model 1 indicate that financial access, financial literacy and risk management services positively and significantly influence participation in dairy farming. Financial access had the strongest positive effect on participation in dairy farming ($\beta = 0.436$, $p < 0.001$), suggesting that improved access to savings products, agricultural loans and cooperative financing significantly enhances farmers' engagement in dairy farming activities. Financial literacy also had a positive and statistically significant effect ($\beta = 0.320$, $p < 0.001$), indicating that farmers with stronger budgeting, record-keeping and financial management skills are more likely to participate actively in dairy farming. Similarly, risk management services had a positive and significant effect on participation ($\beta = 0.295$, $p < 0.001$), implying that farmers who adopt livestock insurance, climate adaptation strategies and risk mitigation mechanisms are more willing to invest and expand dairy farming operations.

In Model 2, the inclusion of the control variables slightly reduced the coefficients of the independent variables, but all remained positive and statistically significant. Financial access remained the strongest predictor ($\beta = 0.421$, $p < 0.001$), followed by

financial literacy ($\beta = 0.307$, $p < 0.001$) and risk management services ($\beta = 0.281$, $p < 0.001$). This indicates that the influence of financial accessibility variables on participation in dairy farming remains robust even after controlling for socio-economic characteristics of the respondents.

Among the control variables, herd size had a positive and statistically significant effect on participation in dairy farming ($\beta = 0.118$, $p = 0.004$), suggesting that farmers with larger herds are more likely to engage actively in dairy production activities. Income level also had a positive and significant effect ($\beta = 0.154$, $p = 0.001$), implying that farmers with higher income levels possess greater financial capacity to invest in dairy farming activities. Years in school or education level positively influenced participation ($\beta = 0.096$, $p = 0.014$), indicating that education enhances farmers' ability to adopt modern farming and financial management practices. However, size of household exhibited a negative but statistically significant relationship with participation in dairy farming ($\beta = -0.073$, $p = 0.043$). This may suggest that larger households increase dependency burdens and consumption expenditures, thereby limiting the financial resources available for dairy farming investments.

Table 4.15: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	.691 ^a	.477	.472	.518
2	.734 ^b	.539	.528	.496

a. Predictors: (Constant), Financial Access, Financial Literacy, Risk Management

b. Predictors: (Constant), Financial Access, Financial Literacy, Risk Management, Herd Size, Size of Household, Income Level, Years in school

Dependent Variable: Participation in Dairy Farming

Source: Primary Data (2026)

The findings indicate that Model 1 explained 47.7% ($R^2 = 0.477$) of the variation in participation in dairy farming. This implies that financial access, financial literacy and risk management collectively have substantial explanatory power in predicting participation in dairy farming among farmers in Kiambu County. Upon inclusion of the control variables in Model 2, the explanatory power of the model increased to 53.9% ($R^2 = 0.539$). The adjusted R^2 also improved from 0.472 to 0.528, indicating that herd size, household size, income level and education level contribute additional

explanatory value to the model. The reduction in the standard error of estimate further confirms that Model 2 provides a better fit in explaining participation in dairy farming.

Table 4.16: ANOVA Summary

Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	71.428	3	23.809	88.721
	Residual	78.912	293	.269	
	Total	150.340	296		
2	Regression	81.026	7	11.575	47.032
	Residual	69.314	289	.240	
	Total	150.340	296		

a. Dependent Variable: Participation in Dairy Farming

b. Predictors: (Constant), Financial Access, Financial Literacy, Risk Management

c. Predictors: (Constant), Financial Access, Financial Literacy, Risk Management, Herd Size, Size of Household, Income Level, Years in school

Source: Primary Data (2026)

The ANOVA results indicate that both regression models were statistically significant in explaining participation in dairy farming. Model 1 was significant, $F(3,293) = 88.721$, $p < 0.001$, indicating that financial access, financial literacy and risk management jointly influence participation in dairy farming. Similarly, Model 2 remained statistically significant, $F(7,289) = 47.032$, $p < 0.001$, confirming that the addition of herd size, household size, income level and education level significantly improves the predictive ability of the model. Overall, the regression findings demonstrate that financial accessibility variables remain critical determinants of participation in dairy farming even after accounting for socio-economic characteristics of farmers. The findings therefore underscore the importance of strengthening agricultural financial inclusion, enhancing financial literacy programs and improving risk mitigation mechanisms to promote sustainable participation in dairy farming in Kiambu County.

4.5.3 Diagnostic Tests

Diagnostic tests were conducted to assess whether the regression model met the key assumptions of multiple regression. The tests focused on multicollinearity, heteroskedasticity and normality of residuals.

4.5.3.1 Multicollinearity Test

Multicollinearity was assessed using tolerance values and Variance Inflation Factor (VIF) values. A VIF value below 5 and a tolerance value above 0.20 were considered acceptable.

Table 4.17: Multicollinearity Test

Variable	Tolerance	VIF
Financial Access	0.996	1.005
Financial Literacy	0.959	1.043
Risk Management Services	0.962	1.039
Herd Size	0.966	1.035
Household Size	0.975	1.025
Income Level	0.923	1.083
Education Level	0.992	1.008

Source: Primary Data (2026)

The results show that all VIF values were far below the threshold of 5, while all tolerance values were above 0.20. This indicates that multicollinearity was not a serious problem in the regression model. The finding is consistent with the correlation matrix, where the independent variables had very weak inter-correlations.

4.5.3.2 Heteroskedasticity Test

Heteroskedasticity was assessed using the Breusch-Pagan test. The null hypothesis of the test is that the residuals have constant variance.

Table 4.18: Heteroskedasticity Test

Model	Breusch-Pagan LM Statistic	p-value	F-statistic	F p-value	Decision
Model 1	1.992	0.574	0.660	0.578	No heteroskedasticity
Model 2	4.113	0.767	0.580	0.772	No heteroskedasticity

Source: Primary Data (2026)

The Breusch-Pagan test was not statistically significant for both models, since the p-values were greater than 0.05. This indicates that there was no evidence of

heteroskedasticity. Therefore, the assumption of constant variance of residuals was satisfied.

4.5.3.3 Normality of Residuals

The normality of residuals was assessed using the Shapiro-Wilk test.

Table 4.19: Heteroskedasticity Test

Model	Shapiro-Wilk Statistic	p-value	Decision
Model 1	0.996	0.682	Residuals normally distributed
Model 2	0.997	0.786	Residuals normally distributed

Source: Primary Data (2026)

The Shapiro-Wilk test was not statistically significant for both models because the p-values were greater than 0.05. This indicates that the residuals were normally distributed. Therefore, the normality assumption was satisfied.

4.5.4 Robustness Checks

Robustness checks were conducted to assess whether the regression findings remained stable after introducing control variables. The study compared Model 1, which included only the three financial accessibility variables, with Model 2, which added herd size, household size, income level and education level as control variables.

Table 4.20: Robustness Check Using Hierarchical Regression

Model	Predictors	R ²	Adjusted R ²	R ² Change	F-Change	Sig. F-Change	Decision
Model 1	Financial Access, Financial Literacy, Risk Management	0.477	0.472	—	—	—	Baseline model
Model 2	Model 1 + Herd Size, Household Size, Income Level,	0.539	0.528	0.062	9.72	0.000	Robust model

Source: Primary Data (2026)

The robustness check shows that the explanatory power of the model increased from $R^2 = 0.477$ in Model 1 to $R^2 = 0.539$ in Model 2 after adding the control variables. This represents an R^2 change of 0.062, meaning that herd size, household size, income level and education level explained an additional 6.2% of the variation in participation in dairy farming. The F-change statistic was significant, $F\text{-change} = 9.72$, $p < 0.001$, indicating that the inclusion of the control variables significantly improved the explanatory power of the model. However, the main financial accessibility variables remained positive and statistically significant in both models. Financial access remained the strongest predictor, followed by financial literacy and risk management services. This confirms that the main findings were robust. The effect of financial access, financial literacy and risk management services on participation in dairy farming remained stable even after controlling for socio-economic characteristics of the respondents.

Table 4.21: Stability of Regression Coefficients Across Models

Variable	Model 1 B	Model 2 B	Change in B	Percentage Change	Interpretation
Financial Access	0.436	0.421	-0.015	-3.4%	Stable
Financial Literacy	0.320	0.307	-0.013	-4.1%	Stable
Risk Management	0.295	0.281	-0.014	-4.7%	Stable

Source: Primary Data (2026)

The stability of coefficients across the two models further supports the robustness of the findings. After introducing the control variables, the coefficient for financial access reduced slightly from 0.436 to 0.421, representing a 3.4% change. Financial literacy reduced from 0.320 to 0.307, representing a 4.1% change, while risk management reduced from 0.295 to 0.281, representing a 4.7% change. Since the changes were

small and all three variables remained statistically significant, the results indicate that the main findings were not sensitive to the inclusion of control variables.

4.6 Chapter Summary

This chapter presented the findings on the effect of financial accessibility on participation in dairy farming in Kiambu County using both descriptive and inferential analysis. The descriptive results indicated that dairy farming is largely production-focused with strong cooperative engagement but moderate investment in infrastructure, modern technologies and value addition. Financial access, financial literacy and risk management levels were found to be moderate with insurance affordability and digital financial tool usage emerging as key constraints.

Correlation analysis revealed positive and statistically significant relationships between participation in dairy farming and all three financial accessibility dimensions. Financial access showed the strongest association, followed by financial literacy and risk management. The multiple regression analysis confirmed that financial access, financial literacy and risk management services had positive and statistically significant effects on participation in dairy farming. Financial access emerged as the strongest predictor, followed by financial literacy and risk management services. The hierarchical multiple regression model further demonstrated that the independent variables jointly explained 47.7% of the variation in participation in dairy farming in Model 1, while the inclusion of the control variables namely herd size, size of household, income level and education level improved the explanatory power of the model to 53.9%. The findings therefore established that both financial accessibility and socio-economic factors significantly influence participation in dairy farming in Kiambu County. The next chapter presents the summary of findings, discussion of findings, conclusions, recommendations, limitations of the study and areas for further research.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a discussion of the study findings and the conclusion informed by the findings. The chapter also offers recommendations to the research objectives. First a summary of the study is offered.

5.2 Summary of the Findings

The overall objective of the study was to examine the effect of financial access, financial literacy and risk management on participation in dairy farming in Kiambu County. The study was guided by three specific objectives: to determine the effect of financial access on participation in dairy farming; to assess the influence of financial literacy on participation in dairy farming; and to examine the effect of risk management services on participation in dairy farming. The study adopted a descriptive research design and targeted dairy farmers in Kiambu County. Primary data was collected using a structured questionnaire from 300 respondents from a sample of 397 respondents. Data were summarised using descriptive statistics such as mean and standard deviation and analysed inferentially using Pearson correlation and regression analysis to test the correlation and regression between variables. Tables were used for presentation of the findings.

The descriptive analysis indicated that the involvement in dairy farming is in moderate to large proportions with the most intense involvement in milk production and cooperative work. However, investment in dairy meal processing, modern dairy technologies and infrastructure like milk coolers and transport facilities remained moderate. Awareness of savings and loans products was relatively high as reflected in financial access indicators while active institutional engagement and participation in investment groups was moderate. Financial knowledge was also moderate, especially in accessing digital financial tools and seeking professional accounting services. Likewise, risk management was moderate, as was the availability of insurance; although there was an acceptable level of awareness of insurance products, the affordability of insurance is significant.

Participation in dairy farming showed positive and statistically significant correlations with all three dimensions of financial accessibility. Financial Access had the strongest

correlation with participation ($r = 0.478$, $p < 0.01$), followed by Financial Literacy ($r = 0.336$, $p < 0.01$) and Risk Management ($r = 0.323$, $p < 0.01$). The results suggest that the greater the access to finance, the more involved farmers are in dairy farming activities.

Results of the multiple regression analysis suggest that financial access variables influence the involvement in dairy farming. For model 1, the financial access and financial literacy and risk management services jointly accounted for 47.7% of the total variation in participating in the dairy farming ($R^2 = 0.477$, Adjusted $R^2 = 0.472$, $F(3,296) = 90.145$, $p < 0.001$), which is considered strong explanatory power. The results of all the predictors were statistically significant at 95% confidence level. The results of the regression analysis show that Financial Access ($\beta = 0.436$, $p < 0.001$) was the most important factor affecting the participation in dairy farming, followed by Financial Literacy ($\beta = 0.320$, $p < 0.001$) and Risk Management Services ($\beta = 0.295$, $p < 0.001$). This means that being one unit more financially accessible, financially literate and financially risk averse, respectively, increases participation in dairy farming by 0.436, 0.320 and 0.295 units, respectively, while holding all other factors constant.

The control variables herd size, size of household, income level and education level were added to Model 2 for the hierarchical multiple regression analysis. When the socio-economic characteristics were included, the power of this model increased to 53.9% ($R^2 = 0.539$, Adjusted $R^2 = 0.528$). Even after accounting for the control variables, the financial accessibility variables were positive and statistically significant predictors of dairy farming participation. Financial Access remained the strongest predictor ($\beta = 0.421$, $p < 0.001$), followed by Financial Literacy ($\beta = 0.307$, $p < 0.001$) and Risk Management Services ($\beta = 0.281$, $p < 0.001$). The herd size, income level and education level had positive effects on participation in dairy farming while the household size had negative but statistically significant effect on participation in dairy farming among the control variables. The results indicate that the socio-economic factors and financial access are both significant determinants of the extent of involvement in dairy farming in Kiambu County.

5.3 Discussion of Findings

This section discusses the findings of the study in relation to the research objectives and existing literature. The discussion integrates the empirical results with theoretical foundations.

5.3.1 Financial Access and Participation in Dairy Farming

The first objective of the study was to determine the effect of financial access on dairy farming participation of Kiambu County. The descriptive results showed that the awareness of savings product ($M=3.063$) and loan product ($M=3.003$) were relatively high among the dairy farmers. This indicates that the availability and knowledge of financial products exist in the dairy farming ecosystem. These findings are consistent with the findings of Morgan and Long (2020) who noted that access to formal financial products leads to an increase of financial engagement among households. Similarly, Soomro et al. (2024) stated that the existence of microfinance schemes improves financial inclusion among small dairy farm entrepreneurs. The high awareness levels observed in the current study therefore shows that financial institutions, SACCOs and cooperatives have succeeded in penetrating the dairy farming sector in Kiambu County.

However, notwithstanding the rather high levels of awareness, the level of membership in formal financial institutions ($M = 2.613$) and the participation in investment groups ($M = 2.520$) was only moderate. This gap between knowledge and practice reflects the observation of Makau et al. (2020) which concluded that despite the availability of credit facilities to dairy farmers in Kiambu County, stringent collateral requirements and high interest rates constrained effective access to credit. Similarly, Kiplimo et al. (2015) found that access to credit services by smallholder farmers in Kenya was frequently limited by institutional requirements and risk assessment practices. The moderate composite mean for financial access ($M = 2.773$) in this study hence reinforces the argument that there are still structural and institutional barriers that limit financial inclusion within the agricultural sector to full extent.

The correlation analysis also showed a positive and statistically significant association between financial access and involvement in dairy farming ($r = 0.478$ $p < 0.01$). This moderate association shows that access to financial products improvements are

associated with a higher engagement in dairy farming activities. These findings are consistent with Wambugu and Karanja (2018) who found that farmers affiliated to SACCOs had improved access to financial resources and were better placed to expand their dairy enterprises. The positive relationship also relates to Njeru (2017), who established that access to financial products was positively associated with start-up rates of businesses and increase in investment growth in agricultural ventures.

The results of the regression analysis provided stronger empirical evidence on the relationship between financial access and participation in dairy farming. The hierarchical multiple regression analysis showed that in Model 1, financial access, financial literacy and risk management jointly explained 47.7% of the variation in participation in dairy farming ($R^2 = 0.477$). Financial access emerged as the strongest predictor with an unstandardized coefficient of $\beta = 0.436$ ($p < 0.001$). This implies that a one-unit increase in financial access leads to a 0.436 unit increase in participation in dairy farming, holding other factors constant.

The findings are consistent with L  pple and Thorne (2019), who established that adoption of financial product innovations increases agricultural investment and productivity. Similarly, Soomro et al. (2024) concluded that microfinance institutions significantly improve socio-economic outcomes among dairy farmers by reducing capital constraints and enhancing financial inclusion. The current findings therefore reinforce the argument that access to savings products, credit facilities and cooperative financing mechanisms plays a central role in promoting active participation in dairy farming.

After controlling for herd size, household size, income and education level, the relationship of financial access remained statistically significant as revealed in Model 2 ($\beta = 0.421$, $p < 0.001$). This suggests that the financial access is a direct determinant of dairy farming participation among farmers beyond their socio-economic attributes. A slight drop in the coefficient for the introduction of the control variables indicates that socio-economic factors have some influence on financial accessibility but not to the detriment of the coefficient. The results of this study confirm those of Makau et al. (2020) and Wambugu and Karanja (2018) that the availability of cheap credit and appropriate repayment plans are crucial in supporting dairy farmers to expand their farming operations and switch to modern production systems.

Herd size and income level were the control variables that were found to be positively and statistically significantly affecting the participation in dairy farming. This implies that larger farmers and high-income farmers have a higher financial capacity and larger operation size, thus making it easier for them to access and utilise financial products. There was also a positive effect of education quality, which shows that better educated farmers are more able to comprehend financial procedures, assess credit openings and apply good dairy farming practice. Household size was negatively but statistically significantly related to participation, however, suggesting that as household size increases dependency burdens and household expenditures may also rise, resulting in reduced dairy investment resources.

From a theoretical perspective, the findings provide empirical support for the Financial Intermediation Theory. Gurley and Shaw (1960), as well as Allen and Santomero (1997), argue that financial intermediaries stimulate economic activity by facilitating efficient transfer of funds from surplus units to deficit units. In the context of dairy farming, improved access to financial intermediaries enables farmers to mobilize capital for investment in productive assets such as improved breeds, feed systems, milk storage facilities and farm infrastructure. The statistically significant coefficients observed in both regression models therefore validate the theoretical proposition that improved financial intermediation stimulates productive participation in agricultural activities.

Unlike some agricultural activities that require relatively low initial investment, dairy farming requires continuous financing for feed, veterinary services, improved breeds, artificial insemination, milk storage, transport and infrastructure. Therefore, farmers with better access to savings products, loans, SACCO financing and cooperative-based credit are more likely to sustain and expand their dairy activities. This may explain why financial access had a stronger association with participation than financial literacy and risk management services.

This finding also reflects the structure of dairy farming in Kiambu County, where cooperatives play an important role in linking farmers to financial institutions, milk markets and extension services. In such a context, access to finance may have a more immediate influence on participation because farmers require working capital for daily production needs. This supports Financial Intermediation Theory, which argues that

financial institutions enhance productive activity by mobilising funds and making them available to individuals and enterprises that require capital for investment. In the context of this study, financial intermediaries such as SACCOs, banks, microfinance institutions and dairy cooperatives appear to support dairy farming participation by easing access to capital for production and investment.

5.3.2 Financial Literacy and Participation in Dairy Farming

The second objective of the study was to evaluate the impact of financial literacy on the participation in dairy farming in the Kiambu County. The results of the descriptive finding showed that there is financial literacy among dairy farmers to a moderate extent (Composite Mean = 2.597). Specifically, the engagement with financial institutions ($M = 2.750$) and attendance of financial seminars ($M = 2.737$) were relatively higher to the usage of financial digital tools ($M = 2.423$) as well as consultation with accounting experts ($M = 2.387$). These findings indicate that although farmers have a basic level of financial knowledge, the implementation of advanced financial management practices and engagement with a professional adviser are limited.

These descriptive results are consistent with what Mwangi and Muturi (2019) established that financial literacy increases commercial farming activities participation of small scale dairy farmers in Kiambu County. Their study showed that farmers who knew about budgeting, savings and investment practices were more likely to expand operations and invest in improved dairy technologies. Similarly, the Kenya Dairy Board (2022) reported that financial literacy training within dairy cooperatives led to improved record keeping, cash flow management and investment decisions among farmers. The moderate levels observed in the current study therefore indicate that while there are financial literacy initiatives in place, there still exists room for strengthening financial management capabilities.

The analysis for correlation showed a positive and statistically significant correlation of financial literacy and participation in dairy farming ($r = 0.336$, $p < 0.01$). It is a medium association and the higher financial knowledge the more likely the farmer is to be actively involved in dairy farming. This is similar to the finding by Wambugu et al. (2020) which found that financially literate dairy producers were more likely to apply and be granted credit facilities as they understand the terms and repayments of

credit facilities. In the same vein, Raza et al. (2023) observed that financial literacy was a key driver of greater farmers' access to credit, even in the face of institutional challenges.

The regression analysis also provided strong empirical evidence on the relationship between financial literacy and participation in dairy farming. Financial literacy was a positive and statistically significant predictor of participation in Model 1 with an unstandardized coefficient β of 0.320 ($p < 0.001$). This means that for every 1 unit increase in financial literacy, dairy farming participation rises by 0.320 units, while controlling for the other factors.

The results are consistent with the assumption of Kariuki and Njuguna (2021) that financially trained dairy farmers adopted more risk management strategies and invested more in the improvement of their farms. Phiri et al. (2019) also concluded that financial literacy improves farmers' decision-making skills for investments and productive technologies. Based on the results of current study, it can be concluded that, financial literacy bolster the farmers' capacity to manage financial resources and make strategic decision in the dairy production effectively.

The findings from Model 2 also showed that financial literacy was statistically significant after controlling for the herd size and household size, income level and education level of households ($\beta = 0.307$, $p < 0.001$). It means that financial literacy alone has a positive effect on the involvement of farmers in dairy farming over and above farmers' socio-economic factors. The lack of a significant impact on the coefficient after the control variables were added to the equation indicate that the socio-economic characteristics partially explain the relationship between financial literacy and productive participation. Farmers with larger herd sizes and better incomes could be more likely to use financial knowledge for increasing dairy production and education level is also associated with an increased understanding of financial management concepts and modern farming practices.

The results corroborate the studies of Akande et al. (2023) that found financial literacy has a significant impact on rural agriculture transformation and sustainable livelihoods. These studies corroborate with that of Sūmane et al. (2018) who demonstrated that farmers with higher financial literacy enjoy increased chances of engaging in improved farm technologies and increasing their investment in

productivity-enhancing farm inputs. The negative effect of household size in the control variables may also suggest that bigger households lead to less financial resources for productive investment in dairy activities, which has implications on the actual use of financial knowledge in the dairy activities.

It can also be explained by the Social Capital Theory. Networks, collective learning and knowledge sharing improve the capacity of individuals to tap into opportunities and resources, as Bourdieu (1986) and Putnam (1993) argue. Thus, financial education initiatives delivered by cooperatives and farmers' organizations improve the farmers' financial decision-making ability and their involvement in the dairy value chain. The effect of financial literacy as a significant predictor in both regression models confirms the importance of knowledge and social learning in agricultural participation.

5.3.3 Risk Management and participation in dairy farming

The third aim of the study was to explore the influence of the risk management services on involvement in dairy farming in Kiambu County. The descriptive findings showed that the risk management practices have been found at a moderate level with a Composite Mean of 2.593. The highest mean score ($M = 2.743$) was for investment in zero grazing followed by awareness of insurance policy ($M = 2.703$). However, affordability of the insurance had a lower mean ($M = 2.353$) and therefore cost was a major factor to be considered in the adoption. Moderate use was recorded for the use of weather advisory tools ($M = 2.570$) and for modern risk mitigation technologies ($M = 2.597$).

These descriptive results corroborate Otieno et al. (2022) findings that dairy farmers who had insurance showed an increased readiness to invest in high value breeds and advanced storage facilities but also highlighted affordability and awareness as an issue. Likewise, Nshakira-Rukundo et al. (2021) found high premiums and lack of knowledge as two barriers to insurance uptake for smallholder farmers in Sub Saharan Africa. The current study therefore found moderate adoption rates, a reflection of similar constraints on the structure of the county of Kiambu.

The correlation analysis showed that the risk management was positively and statistically significantly related to dairy farming participation ($r = 0.323$, $p < 0.01$). The moderate association suggests that farmers who use risk mitigation are more likely to be actively involved in dairy farming. The results are consistent with the work of

Fukumori et al. (2022) that showed that the farmers that signed up for weather index insurance in rural Kenya were more inclined towards investing in agricultural inputs and more into practicing intensive farming. Likewise, Isaboke et al. (2016) observed that farmers under index-based insurance were more likely to implement risk reduction measures and boost their agricultural investment.

The regression analysis also supported the significance of risk management as an influencing factor on the decision to participate in dairy farming. In Model 1, risk management was found to be a positive and statistically significant predictor of participation with an unstandardized coefficient of $\beta = 0.295$ ($p < 0.001$). This means that on the average, a 1-unit increment in risk management leads to a 0.295 increment in participation in dairy production, other factors remaining fixed.

The results confirm the study findings of Amare et al. (2019) who confirmed that livestock insurance coverage increases farmer's capacity to cope with herd size and diversifying livelihood. On the other hand, Tang et al. (2021) concluded that insurance products improve farmers' willingness to invest in high value agricultural activities even under climate uncertainty. According to the present results, therefore, risk mitigation measures like insurance products, weather warning systems and climate adaptation measures boost the farmers' confidence in investing and expanding dairy production.

In Model 2, the association of risk management with herd size and household size with income level and education level was controlled to arrive at the same results; Risk management was still found to be statistically significant ($\beta = 0.281$, $p < 0.001$). This shows that, without taking into account socio-economic parameters of dairy farmers, participation in dairy farming is affected by risk management. The positive effects of herd size, income level and education level suggest that farmers with more resources and better educational backgrounds are more likely to adopt insurance products and climate adaptation measures. In contrast, larger household sizes may constrain farmers' ability to allocate funds toward risk management investments such as livestock insurance and modern adaptation technologies.

The findings are consistent with Kiprop et al. (2023), who emphasized that although livestock insurance enhances resilience and productivity, high costs continue to limit broader participation. The results of the current study therefore confirm that improving

affordability and awareness of risk management services could significantly enhance participation in dairy farming.

The findings also suggest that farmers in Kiambu County may rely more on practical farm-level risk mitigation strategies, such as zero-grazing, improved feeding and cooperative support, rather than formal insurance products. This may explain why risk management had a positive but weaker effect. The implication is that risk management services are important, but their influence on participation depends on affordability, awareness, trust and ease of access.

From a theoretical perspective, these findings can be explained through both Financial Intermediation Theory and Social Capital Theory. Financial Intermediation Theory suggests that insurance products and financial instruments reduce uncertainty and stabilize investment returns, thereby encouraging productive activity (Allen & Santomero, 1997). Meanwhile, Social Capital Theory highlights the role of cooperative networks and information sharing in disseminating risk management practices among farmers. Farmers embedded within cooperative structures are therefore more likely to access information on insurance products and climate adaptation strategies, enhancing their willingness to participate in dairy farming.

Theoretically, the findings extend Financial Intermediation Theory by showing that financial institutions do not only support farmers through credit and savings products, but also through risk-reducing financial products such as insurance. At the same time, Social Capital Theory helps explain how cooperatives can spread information about risk management services and encourage collective uptake of insurance products. However, the moderate level of risk management adoption suggests that cooperative networks and financial institutions have not yet fully addressed barriers such as premium cost, limited awareness and product complexity.

5.4 Conclusion

The first aim of the study was to assess how financial access of farmers affects their involvement in dairy farming in Kiambu County. Based on the findings of the study it is concluded that financial access positively influences the participation in dairy farming and it is statistically significant. Financial access was the more significant predictor of participation in both regression models, with a coefficient of $\beta = 0.436$ for Model 1 and $\beta = 0.421$ for Model 2, even after accounting for herd size, household

size, income level and education level. The results show that, better access to savings products, credit facilities and cooperative-based financial systems significantly improves farmers' investment capacity in productive assets, use of improved technologies and expansion of their dairy farming operations. The study also finds that the overall awareness of financial products among the dairy farmers is quite good, however, there are certain constraints that stop them from getting fully involved in the dairy industry, mainly due to collateral requirement, high interest rate and restrictive terms and conditions.

The second aim was to evaluate the effect of financial literacy on involvement in dairy farming. The study findings indicate that financial literacy positively and significantly influenced the participation in dairy farming. Financial literacy was also important in both regression models, with $\beta = 0.320$ for Model 1 and $\beta = 0.307$ for Model 2. The results indicate that farmers who have adequate skill in financial management, budgeting and knowledge of credit conditions are more likely to make informed decisions on investments and manage farm finances effectively. The study thus concludes that financial literacy is a complement of financial access in improving the efficient use of financial resources. Practices of sustainable dairy production and use of modern technologies on farms are more prevalent among farmers who have higher educational levels and good financial knowledge.

The third aim was to investigate the impact of risk management services on dairy farm involvement. The study results indicate that dairy participation is positively and significantly related to the provision of risk management services. Even after adjusting for socio-economic characteristics, risk management was important, accounting for $\beta = 0.295$ in Model 1 and $\beta = 0.281$ in Model 2. The results indicate that when farmers invest in livestock insurance, climate adaptation strategies and any other climate mitigation measures, they feel more confident in their investment and scaling-up dairy farming activities. But affordability issues and lack of knowledge remain as factors that limit the wider use of risk management services by dairy farmers, the study adds.

The socio-economic factors are also found to be significant in influencing the involvement in dairy farming in the study. Herd size, income and education level had a positive effect on participation which suggests that larger herds, higher income and higher education among the farmers increase their likelihood of active involvement in dairy production. On the other hand, household size had a negative effect, implying

that larger households may lead to more dependency stresses and lower financial resources for productive investments in dairy.

The study concludes that financial accessibility encompasses financial access, financial literacy and risk management services and all three factors are a major determinant of the participation in dairy farming in Kiambu County. Results of the hierarchical multiple regression model revealed that financial accessibility variables accounted for 47.7% of the variance in participation in Model 1 and an additional 6.2% variance was added to the model in Model 2 with the inclusion of the socio-economic control variables to account for 53.9% total variance. Accordingly, the study has concluded that the improvement of financial inclusion systems, strengthening farmer financial knowledge and the development of financial risk mitigation infrastructure are crucial for the sustainable growth and commercialization in the dairy sector..

5.5 Recommendations

5.5.1 Recommendations to Dairy Cooperative Management and Financial Institutions

The study suggests that the dairy sector, especially financial institutions and dairy cooperatives devise agricultural credit products based on the operational and cash flow cycles of a dairy enterprise. If loan is repaid with the milk pay period, the default risk will be lowered, the loans will be more affordable and accessible to dairy farmers. Flexible collateral options like group guarantees, cooperative-backed financing and asset-based financing should be encouraged for financial institutions to increase credit-worthiness for SME dairy farmers with limited conventional collateral.

Considering the financial access proved to be the most important predictor of the participation in dairy farming, dairy cooperatives and SACCOs need to build their financial intermediary role by making more agricultural loans and savings products available to dairy farmers under low interest rates. Additionally, there is a need to build stronger ties between the cooperatives and commercial banks and microfinance institutions to increase access of farmers to affordable financial products and services.

The study also suggests that the financial institutions incorporate financial literacy training to credit disbursement and extension support programs. Improved financial discipline and effective utilization of financial resources through structured training on budgeting, record-keeping, loan management, investment planning and digital

banking. The broad acceptance of digital financial instruments like mobile banking applications and mobile credit systems would be encouraged by simplifying the tools, especially for less educated rural farmers.

Furthermore, cooperatives should work with insurance companies to create affordable cooperatives livestock insurance products. Cooperatives would lead to collective bargaining to lower premium costs and improve access to agricultural insurance services. Cooperatives should also amplify awareness creation activities related to the awareness-raising of climate adaptation measures, weather forecasting systems and insurance products; to increase farmers' resilience to climatic and market-related risks.

5.5.2 Recommendations to Policy Makers

The study suggests targeted measures to enhance access to cheap credit in the dairy segment to strengthen the framework of financial inclusion in agriculture. Partial credit guarantee schemes should be created and expanded to help limit the risks that financial institutions may perceive in relation to financing activities of dairy farmers. These would lead to a rise in lending to farmers, especially smallholder dairy farmers, who may be shut out of formal financial systems.

The study also suggests the involvement of government in making livestock insurance affordable and encouraging poor farmers to take livestock insurance as a risk management tool. The availability of weather index insurance products and climate advisory systems and early warning information networks should be strengthened through public-private partnerships to greatly improve farmers preparedness to climate shocks and production risks.

Increased incorporation of financial literacy training in the national extension programs. Extension officers should be able to train farmers about farm finance, investment planning, digital financial services and risk management. Financial education programs can be improved to increase farmers' decision-making capacities and sustainability in the dairy value chain because education level was found to be a positive influencing factor towards participation in dairy farming.

Government should also support the digital financial inclusion strategies targeting rural financial inclusion. If rural financial services infrastructure is expanded, access and efficiency of financial services for dairy farmers in Kiambu County and other rural

areas would improve, which would be possible through improved Internet access and mobile financial platforms.

5.5.3 Recommendations to Scholars

The study found that the financial accessibility variables explained 47.7% of the variation in the participation in the dairy farming operation in Model 1 and the socio-economic control variables increased the model's explanatory power to 53.9% in Model 2. This suggests there are other factors at play that could contribute to the participation in dairy farming and need more study.

Other factors like technological adoption, market access, land tenure security, breed quality, infrastructure development and government agricultural policies should be explored in future studies. Moderating and mediating variables, especially the cooperative membership, the status of financial inclusion and social networks in reinforcing the relationship between financial accessibility and involvement in dairy farming, can also be explored.

Longitudinal research designs could also be used in further research to assess financial accessibility's long-term impacts on productivity and commercialization of the dairy sector. Studies of comparative effect at different counties with different socio-economic and climatic conditions would enhance generalizability of the findings and would give wider policy insights. Furthermore, mixed-methods and qualitative research on the farmers' experiences in accessing financial institutions, insurance companies and cooperatives would offer a better sense of context for the obstacles facing farmers' participation in dairy farming.

5.6 Limitations of the Study

Several limitations should be considered when interpreting the findings of this study. First, although the regression results reveal significant relationships between financial access, financial literacy, risk management and participation in dairy farming, the cross-sectional nature of the data limits the ability to establish definitive causal relationships. The observed associations reflect relationships at a single point in time and may be influenced by unobserved factors such as farm size, managerial ability, household income, or access to extension services. In addition, the possibility of endogeneity cannot be completely ruled out, as participation in dairy farming may

itself influence farmers' access to financial services, financial knowledge and risk management practices.

Second, the study relied on self-reported data collected through structured questionnaires. Although the research instruments were subjected to validity and reliability testing and achieved acceptable reliability coefficients, respondents may have interpreted questions differently or provided responses influenced by memory lapses, personal perceptions, or social desirability considerations. Consequently, some degree of measurement error may be present despite the efforts made to ensure data quality.

Third, information was obtained from a single respondent in each household. While this approach is common in agricultural and financial inclusion studies, it assumes that the selected respondent possesses complete knowledge of the household's financial decisions and dairy farming activities. In practice, financial and farm management decisions may be shared among spouses, family members, or business partners. As a result, the responses may not fully capture the collective experiences and perspectives of all individuals involved in dairy farming operations.

Fourth, the study recorded 97 non-responses arising from unreturned or incomplete questionnaires. Since information on non-respondents was not available, it was not possible to conduct a formal assessment of non-response bias. Therefore, the possibility that individuals who did not participate differed systematically from those who completed the survey cannot be entirely discounted. For example, farmers facing greater financial constraints or lower engagement with formal financial services may have been less likely to respond, potentially influencing the study results.

Finally, the study was conducted in Kiambu County, which is one of Kenya's leading dairy-producing regions with relatively developed financial and agricultural support systems. Consequently, the findings may not be fully generalizable to dairy farmers operating in counties with different socioeconomic, institutional, or agroecological conditions. Future studies could address these limitations by employing longitudinal research designs, incorporating multiple respondents per household, conducting formal non-response assessments and expanding the geographical scope of analysis to enhance the robustness and generalizability of findings.

5.7 Areas for Further Studies

Future research could adopt panel data designs to track the same dairy farmers over time and examine how changes in financial access, literacy and risk management affect participation in dairy farming. This would help address the limitations of cross-sectional data and provide stronger evidence on the direction of the relationship.

Future studies could also test specific interventions using randomized or quasi-experimental designs. For example, researchers could assess the effect of financial literacy training, cooperative-backed credit, livestock insurance subsidies or digital record-keeping tools on dairy farming participation. Such studies would provide stronger evidence for policy and practice.

Further research could examine the role of cooperative performance as a moderating variable in the relationship between financial accessibility and dairy farming participation. Cooperative governance, transparency, payment reliability and access to advisory services may influence how effectively farmers benefit from financial services.

Future studies could also include additional explanatory variables such as land size, distance to financial institutions, access to extension services, breed quality, feed availability, milk prices and access to formal markets. Including these factors would help explain the remaining variation in dairy farming participation that was not captured by the current model.

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<https://www.worldbank.org/en/topic/agriculture/overview#:~:text=Agricultur e%20is%20also%20crucial%20to,more%20than%2025%25%20of%20GDP. &text=Mitigation%20in%20the%20agriculture%20sector,the%20solution%20to%20climate%20change.>

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APPENDICES

Appendix I: Introduction Letter

Dear participant,

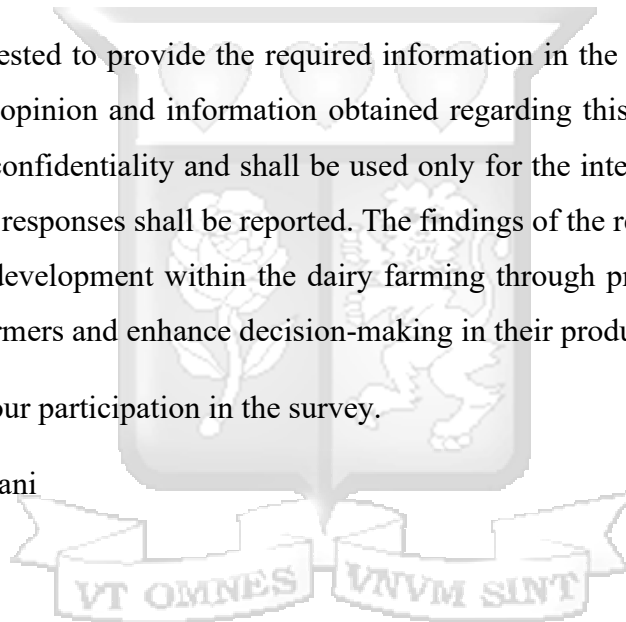
Request for collection of research data

I am a graduate student studying for a Degree in Master of Science in Development Finance (MDF) at Strathmore University. Attached below is a questionnaire that seeks to collect data on financial accessibility and the extent of participation in dairy farming in Kiambu County. This will involve how accessibility to finance and personal characteristics have been pivotal to farmers' participation in dairy farming in different forms.

You are requested to provide the required information in the questionnaire. I assure you that any opinion and information obtained regarding this study shall be treated with utmost confidentiality and shall be used only for the intended research and that no individual responses shall be reported. The findings of the research are expected to help inform development within the dairy farming through practical solutions to be applied by farmers and enhance decision-making in their producer groups.

Thanks for your participation in the survey.

Mukami Kimani



Appendix II: Research Questionnaire

The purpose of this study is to collect data that will assist in determining the effect of financial accessibility on the extent of participation in dairy farming in Kiambu County. The information provided will be confidential and used only for the purpose of the study. I kindly request for your assistance in answering the attached questions to the best of your ability.

Thank you for your participation in this research work.

Instructions to Respondents

Please fill-in the questionnaire provided by ticking/checking appropriately or filling in as directed. Kindly complete all questions for this questionnaire be valid.

Part A: Background Information

1. How long have you been involved in dairy farming?

Less than 1 year	()	3+ - 5 years	()
1 – 3 years	()	5+ years	()

2. How many cows do you have within your farm?

1 cow	()	5 – 10 cows	()
2 – 4 cows	()	10+ cows	()

3. What is your average income from dairy farming annually (amounts in KES)?

0 – 50,000	()	100,000 – 200,000	()
50,000 – 100,000	()	200,000+	()

4. How long have you been a member of a dairy cooperative?

Less than 1 year	()	3+ – 10 years	()
1+ – 3 years	()	10+ years	()

5. What is the size of your household (number of members)?

One-person household	()	5 – 8 members	()
2 – 4 members	()	8+ members	()

6. How many years have you attended formal education?

Not attended formal education ()	Attained secondary school certificate ()
Began but did not complete primary school education ()	Completed tertiary (University, College, Technical or Vocational Training) education ()
Attained primary school certificate ()	

Part B: Extent of Participation in Dairy Farming

Please tick/check your response as applicable.

1. In which areas of dairy farming have you invested?

Milk production ()	Milk dispensers ()
Dairy meal processing ()	Modern dairy farming technologies ()
Milk coolers ()	Others ()
Milk pasteurizers ()	
Specify others	

2. What modern farming technologies have you adopted on your dairy farm?

Automated milking technologies ()	Precision feeding ()
Wearable technology (e.g., smart collars to monitor cattle activity) ()	Others ()
Specify other	

3. What challenges did/do you face when seeking to expand your dairy farm?

Lack of finance ()	Management challenges ()
Lack of market ()	Competition from bigger farms ()
Limited extension services ()	Other ()
Specify other	

.....

Please rate the following statement based on how you participate in dairy farming within the County using the scale: *1 – To a small extent, 2 – To a moderate extent, 3 – To a large extent, 4 – To a very large extent.*

	Extent of Participation in Dairy Farming	1	2	3	4
1.	I am able to produce adequate milk production to allow my participation in commercial dairy farming				
2.	I am actively involved in processing of milk into various commercial products in demand within the county				
3.	I am actively engaged within milk-processing cooperatives within the County				
4.	I have invested in infrastructure to aid in the transportation and storage of dairy products within the County				
5.	I have adequate capital to allow investment into modern technologies in dairy farming				

4. In what other ways are you involved in dairy farming ecosystem?

Selling of feeds and fodder () Provision of insemination service ()

Provision of vaccination/medication () Participation in training forums ()

Other ()

Sale of animals ()

Specify other

.....

5. How would you characterise the overall dairy farming experience within the County?

Dynamic with limited certainty on expectations () Challenging and limiting for farmers ()

Well-structured and functional/favourable () Lucrative to warrant on farm investments by farmers ()

Other ()

Specify other

.....

.....

6. What other challenges have you faced participating in dairy farming within the County?

- | | | | |
|-----------------------|-----|---|-----|
| High production costs | () | Limited access to veterinary and extension services | () |
| Low milk quality | () | Low market returns | () |
| Poor cattle breeds | () | Other | () |
| Poor infrastructure | () | | |
| Limited market access | () | | |

Specify other:

.....

.....

.....

7. What recommendations would you provide for other farmers/interested parties seeking to participate in dairy farming within the county?

.....

.....

Part C: Financial Accessibility in Dairy Farming

Please tick/check your response as applicable.

1. Have you previously sought for financing for your dairy farm?

Yes () No ()

2. If yes, what were the sources of finance you sought?

- | | | | |
|-----------------------------------|-----|-------------------|-----|
| Own savings | () | Government credit | () |
| Bank loan | () | Sacco credit | () |
| Mobile money | () | Donor funding | () |
| Borrowing from family/friends () | | Chama | () |
| Cooperative loan | () | Others | () |

Specify other:

.....

3. What farming activities was the financing used for?

.....

.....

4. Have you faced any challenges in accessing finance from these sources?

Yes () No ()

5. If yes, what have been the main challenges faced?

High interest rates () Product & services fail to meet my needs ()

Lack of collateral & security ()

Lack of information on financial products & services () Lack of government incentives ()

Others ()

Specify others:

.....

Kindly rate the following statement based on how you participate in dairy farming within the county using the scale: *1 – To a small extent, 2 – To a moderate extent, 3 – To a large extent, 4 – To a very large extent.*

	Access to financial products	1	2	3	4
1.	I am aware of available savings products that allow me to mobilise financial resources needed to undertake commercial dairy farming				
2.	I am aware of the strict requirements necessary to access capital for investment in dairy farming				
3.	I am aware of the various loan products available from public and private institutions to support dairy farming				
4.	I am a member of a financial institutions that routinely conducts create awareness available channels of funding for dairy farming				

5.	I participate in local investment groups which foster accessibility to financing for dairy farming ventures				
----	---	--	--	--	--

	Financial literacy	1	2	3	4
1.	I have participated in training conducted by the cooperative on effective financial management of resources				
2.	I engage with my financial institution to understand the various financing sources available for dairy farming				
3.	I utilise digitised tools to manage my cash inflow thus improving financial management within the farm				
4.	I routinely attend training and seminars provided by the cooperative and financial institutions to improve my financial decision-making				
5.	I do engage with experts to aid in conducting accounting tasks that improve my financial standing				

Please tick/check your response as applicable.

1. Have you enlisted for any insurance products for your dairy farm?

Yes () No ()

2. Have you encountered any challenges in accessing these insurance products?

Yes () No ()

3.

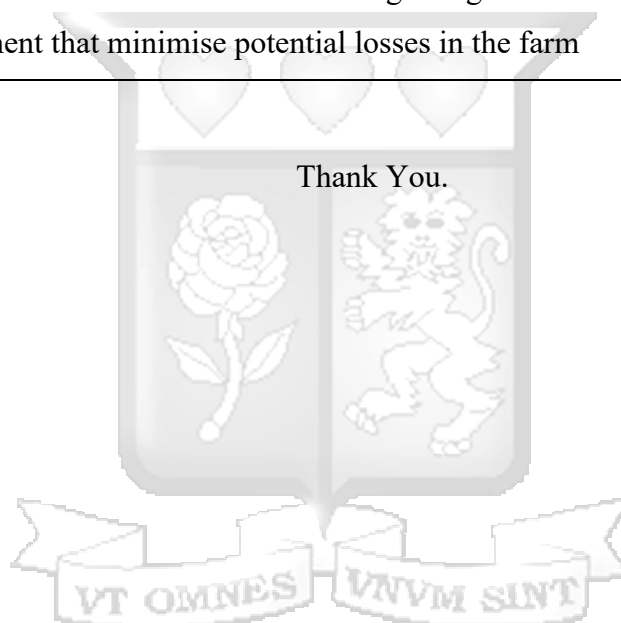
a) If no insurance products have been enlisted, have you adopted any other risk mitigation strategies to reduce or mitigate losses on your dairy farm?

Yes () No ()

b) If yes, please specify what other mitigation strategies have been adopted.

.....

	Risk management	1	2	3	4
1.	I am aware of the available insurance policies being provided to cover dairy farmers				
2.	The available insurance products within the market are cost-friendly and reliable thus enhancing participation in dairy farming				
3.	I rely on digital weather forecasting tools to support my decision-making and participation in dairy farming				
4.	I do utilise modern technologies in dairy farming to minimise health and production risk in dairy farming				
5.	I have invested in modern zero-grazing facilities and equipment that minimise potential losses in the farm				



Appendix III: List of Dairy Cooperatives in Kiambu County

1. Chicoco
2. Gatamaiyu Dairy Farmers Cooperative Society
3. Gatundu South Dairy Cooperative Society
4. Gikambura Dairy Farmers Cooperative Society
5. Githunguri Dairy Farmers Cooperative Society
6. Kabete Dairy Farmers Cooperative Society
7. Karatu Dairy Farmers Cooperative Society
8. Kiambaa Dairy Farmers Cooperative Society
9. Kikuyu Dairy Farmers Cooperative Society
10. Kiriita Dairy Farmers Cooperative Society
11. Limuru Dairy Farmers Cooperative Society
12. Mangu Progressive Cooperative society
13. Muguga Dairy Farmers Cooperative Society
14. Ndumberi Farmers' Cooperative Society
15. Rware Dairy Cooperative
16. Sidai Arica Limited
17. Sigona Dairy Farmers Cooperative Society

Source: Kenya Dairy Board

Appendix IV: Ethics Review Approval Letter



8th April 2025

Mrs Kimani Evangeline,
evangeline.mukami@strathmore.edu

Dear Mrs Kimani,

RE: Effect of Financial Accessibility on the Extent of Participation in Dairy Farming in Kiambu County, Kenya

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2867/25**. The approval period is from **8th April 2025 to 7th April 2026**.

This approval is subject to compliance with the following requirements:

- i. Only approved documents including (informed consents, study instruments, MTA) will be used.
- ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
- iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
- iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
- v. Clearance for the export of biological specimens must be obtained from relevant institutions.
- vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
- vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) <https://research-portal.nacosti.go.ke/> and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Appendix V: NACOSTI Permit

 REPUBLIC OF KENYA	 NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Ref No: 727098	Date of Issue: 10/May/2025
RESEARCH LICENSE	
	
This is to Certify that Ms., Mukami Kimani of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Kiambu on the topic: EFFECT OF FINANCIAL ACCESSIBILITY ON THE EXTENT OF PARTICIPATION IN DAIRY FARMING IN KIAMBU COUNTY, KENYA for the period ending : 10/May/2026.	
License No: NACOSTI/P/25/4173335	
727098	
Applicant Identification Number	Deputy Director NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION
Verification QR Code	
	
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