Examination of the challenges facing the modernization of dairy farming practices in Uganda.

REPORT.

BY

NKURUMAH EDWIN KUSASIRA

X22105573

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SUPERVISOR:

Mr. RICHARD HEYWOOD JONES

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Nkurumah Edwin Kusasira

National College of Ireland

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Abstract.

The study was aimed at examining the challenges facing modernization of dairy farming practices in Uganda. Modernization of dairy farming operations in Uganda is a complex and multifaceted task that spans agriculture, economics, technology, and socio-cultural aspects. This study sought to explore the major problems encountered in Uganda's process of upgrading dairy farming techniques. However, the study firstly examined the success that has been achieved by the Ugandan government with the objective of moving dairy farming practices in Uganda to modernization before examining the different challenges.

The researcher used a mixed method approach research design and the study results were obtained using questionnaires and interview guides from a sample of 60 respondents and results were analyzed and presented using frequencies, percentages and descriptive statistics. The study established the advantages created due to modernization of dairy farming which included the establishment of the Dairy Development Authority mandated with supporting farmers in dairy value addition, ensuring quality assurance and domestic dairy consumption promotion, supporting farmers with veterinary services and supporting farmers with in marketing dairy products, establishment of market for dairy products and provision of incentives to farm inputs and tax waivers on dairy products and input materials.

This study recommends that the government and the Dairy Development Authority should participate in stabilizing prices for dairy products, source for market of dairy products as a morale booster to modernization of dairy farming, put incentives and tax waivers to dairy farming inputs and milk products, increased capacity building for farmers and increase funding to the dairy farming sector.

CHAPTER ONE:

STUDY BACKGROUND.

1.1 Introduction.

In Uganda's lush green landscapes, a country endowed with enormous natural resources lies its agricultural heritage that extends back generations, with traditional farming practices profoundly embedded in the lives of its people that kept traditional long horned cows (Sserunkuuma and Olson,1998; Alary et al., 2007)Dairy farming arose as a critical component among these practices, providing crucial nutrition from the dairy products , revenue, and social cohesion becoming a major backbone defining both the country's economic and cultural fabric (Ekou, 2014) External factors such as colonial rule and global market needs altered the trajectory of dairy farming over time, resulting in substantial changes in the sector's dynamics..

Milk is profoundly one of the most important single agricultural commodities produced in Uganda. from the nutritional perspective it provides the country with basic food containing practically all essential ingredients to promote and maintain a health life.in addition dairy products like cheese milk and butter are considerably amounts consumed on an ever-widening variety of other products from the food processing, baking canning and healthy food industries.(Westerik *et al.,* 2020)

In the last decade rapid developments have taken place in the farming methods largely due to the adoption of the new farming methods breeding methods and different technology of electronics. This has been true particularly through the milking and management of the dairy cows this has enabled farmers to adopt the different aspects of farming which have relived them of the daily tedious and time-consuming allowing focus on management of the dairy cows

The dairy production in Uganda is an enthralling drama that combines indigenous knowledge and practices with colonial legacy and modern innovations. Early Dairy Farming in Uganda began on a small scale, with farmers keeping a few animals for personal consumption and local trade the evolution of this sector demonstrates Ugandan farmers' tenacity and adaptation, as well as the transformational impact of agricultural development policies throughout time (Roschinsky et al., 2012).

In the early 1980s the Ugandan government realized the economic growth potential of dairy farming and began developing regulations to help the sector. However, the dairy sector in Uganda encountered hurdles in the 1980s as a result of political upheaval and economic volatility. This resulted in a decrease in milk production as well as a lack of modernization activities

According to Ashley and Nanyeenya (2002), 1992 was the month the Ugandan government launched the Milk Master Plan which was aimed at modernizing dairy farming. Farmers started the importation of high milk production cows basically from South Africa, Netherlands and Norway. Some farmers started importing semen for cross breeding with the local cows with the aim of getting good milk production cows.

The years following in 1998, the government established dairy development authority with the aim of regulating dairy farming in Uganda and aid farmers who embraced modern practices of dairy farming. Since then, dairy farming had steadily improved as more farmers increasing embraced modern dairy farming practices and milk produced is commercialized to earn income for their families and this has led to increased GDP of the country

The researcher's own background in dairy farming was a motivating factor in trying to find a solution to the existing challenges that hinder bridging the gap between modern farming practices and traditional ways. This was an opportunity to examine the challenges facing the modernization of dairy farming practices in Uganda. Although, over the past 30 years in Uganda, it has been relatively a successful process, growing tremendously, affecting the lives of millions of people and considerably contributing to Uganda's agricultural landscape. Nevertheless, there are still challenges which are examined in this work.

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In 2000, the government started a government program named the NAADS program (National Agricultural Advisory Services) which gave organized farmers free dairy cows (Friesian cattle) where one family would feed it and after it has given birth, they would give it to another family until all the members of the group gets a cow. All these were aimed at modernising dairy farming in Uganda. The government of Uganda has created many opportunities for dairy farmers ranging from provision of tax incentives on farm inputs, subsidized agriculture insurance for farmers and

creation of a bank for farmers (Uganda Development Bank) and other initiatives with the aim of modernizing dairy farming.

Farmers that embraced modernization of dairy farming have exponentially grown into large dairy farmers while others are slowly taking a similar trend. But despite all the efforts by the government, private sector, non-governmental organization and development partners, Uganda still faces challenges in the dairy sector and this has made the researcher interested in unearthing the challenges and possibly proposing solutions to the challenges still facing dairy farming in Uganda.

Contextual study

Dairy farming in the world is of great socio-economic importance since it significantly contributes to employment, food and nutrition and economic growth. It is of great importance to the farmer for the source of income and milk production for their livelihoods (Food and Agriculture Organization (FAO), 1996).

In the early 1990s the government of Uganda adopted privatization as a part of the economic reforms to stimulate economic growth as the country was in full recovery from the past war and conflicts that brought the sitting government into power in 1986 (MAAIF Report 1998)

In 1998, the government of Uganda sought to develop the dairy industry and established the Dairy Development Authority through an Act of Parliament with the mandate to provide proper coordination and efficient implementation of all government policies. This was designed to achieve and maintain self-sufficiency in the production of milk in Uganda by promoting production and competition in the dairy industry, monitoring the market for milk and dairy products, and carrying out regulatory functions in the dairy industry (Food and Agriculture Organization (FAO), 1999).

In 1992, the government of Uganda launched its Milk Master Plan, which aimed to modernize dairy farming by improving rural farmers' incomes, the living standard of informal dairy farmers, increase efficiency in milk production, foster diversification of dairy products and search for the export market of dairy farm products (Ashley and Nanyeenya, 2002**).**

Ashley and Nanyeenya (2002) noted that the government of Uganda, furthermore, in light of the need to modernize dairy farming invited private sector and non-governmental organizations, and development partners to support in the training of the traditional dairy farmers who were practicing dairy farming to get milk for subsistence consumption**.**

Nanyeenya W. N (2002) noted that the government of Uganda furthermore in light of the need to modernize dairy farming invited private sector and non-governmental organizations, development partners to support in training of the traditional dairy farmers who were practicing dairy farming to get milk for subsistence consumption.

Different reforms were made after the launch of the 1992 Milk Master Plan and among the reforms was to establish the Dairy Development Authority (DDA) under the Dairy Industry Act of 1998 that established the DDA as a corporate entity under Uganda's Ministry of Agriculture, Animal Industries and Fisheries (Dairy Development Authority (DDA), 2004).

The Authority changed the role of the government from direct participation in milk production, processing and marketing to creating an enabling environment where farmers and private investor players actively participated in the growth of the dairy sector. In exercising its mandate of enforcing quality standards, inspection of premises, licensing and regulating all dealers, milk collection centers, dairy factories and supply of all dairy farming, the DDA has ensured the growth of dairy farming in Uganda (Dairy Development Authority (DDA), 2004)

According to the Dairy Development Authority report (2015), the government of Uganda in support of the modernisation of dairy farming waived all taxes and incentivized all daily farm inputs and machinery, especially milk coolers and freezers and milk road tankers. The Dairy Development Authority, in exercising its mandate of enforcing quality standards, inspection of premises, licensing and regulating all dealers, milk collection centers, dairy factories and supply of all dairy farming, has ensured the growth of dairy farming in Uganda

Khapayi and Celliers (2016) noted that the government must take center stage in the modernisation of dairy farming. Structural, financial, and market access measures are some of the examples the government should prioritize in the quest to have dairy farming modernized.

In Uganda, farmers have embraced good and modern dairy farming practices through better animal feeding, rearing high-quality breeds and investment in the nutrition and health of dairy animals as all these have contributed to the growth of dairy production (Dairy Development Authority (DDA), 2018).

However, modernisation of dairy farming has had challenges within individual countries ranging from lack of knowledge and skills, inadequate credit, poor or lack of market for dairy products, lack of access to land, lack of extension services and poor bread animals that produce less milk, diseases of animals, and poor technology in dairy farming (Dairy Development Authority (DDA), 2018).

The traditional dairy farmers faced challenges ranging from lack of veterinary services, pest and diseases, lack of extension services, poor dairy breeds of cattle and lack of post milking handling skills and many more. Dairy farming in Uganda is largely subsistence and informal with informal farming practices due to use of poor technology, lack of knowledge and skills, inadequate credit, lack of access to land, lack of extension services and poor bread animals that produce less milk, diseases of animals. This therefore is as result of the sector being more manual and labor intensive which has limited its growth over a long period (Dairy Development Authority (DDA), 2019)

The government of Uganda through the Dairy Development Authority and Makerere University Department of Agriculture and partners have put in place programs to modernize dairy farming through provision of veterinary extensive services, put in place tax waivers on farm machinery equipment, rewarded the best farmers with free paid trips to the Netherlands and Norway to visit dairy farmers, and supported farmers financially who are engaged in dairy farming through the Uganda Development Bank. Furthermore, the government has taken center stage in fighting animal tick and diseases, building dairy processing machines in all the regions of the country as all and more are aimed at the modernization of dairy farming (Dairy Development Authority (DDA), 2020).

Problem Statement.

The dairy sector in Uganda lies in its considerable potential to alleviate rural poverty, stimulate economic development, and enhance household food security. This industry serves as a source of income that plays a crucial role in reducing poverty and enhancing people's quality of life.

Uganda's dairy sector experiences an average annual growth rate of 7-10%, with the processed milk segment expanding even more rapidly at around 11% each year. This substantial growth is primarily attributed to government-driven dairy sector liberalization and impactful initiatives and investments made by Non-Governmental Organizations**.** Even with enhancements and funding in the dairy industry carried out by governmental bodies and non-governmental organizations, Uganda has not yet reached its full milk production capability. Presently, the country generates 2.04 million tons of milk on a yearly basis. Nevertheless, Uganda has the capacity to achieve more than 10 million tons of milk production annually based on its existing output. However, this potential remains unrealized due to challenges such as animal diseases, suboptimal breeding rates, issues with artificial insemination, climatic conditions, and insufficient farmer extension services.

The government of Uganda has created immense opportunities for the modernization of the dairy farming business due to Uganda's favorable climate, good government policies and incentives. (DDA Report 2020/21). Dairy Development Authority report 2020 Despite the rise in national milk output, the increased cattle population has been linked to the increase in milk production.

Research Questions.

i. What are the opportunities available in the Modernization of Dairy farming in Uganda?

ii. What are the challenges affecting modernization of dairy farming in Uganda?

iii. How can challenges affecting modernization of dairy farming be solved?

Research Objectives.

i. To establish the opportunities available in the modernization dairy farming in Uganda,
ii. Identify challenges affecting the Modernization of dairy farming in Uganda.
iii. To identify the Solutions to the challenges affecting the Modernization of dairy farming in Uganda.

Scope of the study.

Geographical Scope:

The study will be conducted in Uganda with three different category of respondents that is Dairy farmers, Diary development authority and Makerere university department of agriculture.

content scope.

The study will main be focused on the effects of modernization of dairy farming in Uganda. The study will evaluate the opportunities for modernization of dairy farming, challenges affecting dairy farming and the possible solutions to the challenges affecting dairy farming in Uganda.

Time scope.

The study will mainly be focused in the year from 1992 to-date. 1992 was the year when the governments started initiatives to modernize dairy farming in Uganda.

Significance of the Study.
The study will be of importance in the following ways,

i. It will provide solutions to the challenges in the modernization of dairy farming in Uganda.
ii. The study will establish and unearth the potential opportunities in the modernization of dairy farming in Uganda.
iii. The study will help the government understand areas for further funding with the aim of fully modernizing dairy farming in Uganda.
iv. The study will be a source of knowledge for future researchers who may want to take a similar or related study.

Terms used in this study.

(a) Modernization refers to a model of progressive transition from pre-modern or traditional to a modern society.

(b) Dairy farming refers to a mode of agriculture for long term production of milk for either processing or sale at the farm or dairy plant.

CHAPTER TWO:

LITERATURE REVIEW

This chapter aims to critically examine the role of the Ugandan government and society in the success of modernized farming, what hindrances there may be to the proposed goals' success and the best way forward in overcoming the problems to an achievable and realistic success.

THE SUCCESS OF MODERNIZATION OF THE DAIRY FARMING PRACTICES IN UGANDA

Dairy farming is extremely important in Uganda's agricultural sector and rural economy. The Ugandan government and numerous stakeholders have pursued projects to modernize the dairy sector during the last few decades, with the goal of increasing productivity, improving livelihoods, and contributing to economic growth. This literature review examines Uganda's successes in modernizing dairy production, concentrating on major tactics, improvements, and consequences.

Policy and Institutional Support:

After the 1992 Milk Master Plan adopted by the Ugandan government, it brought some resolutions and these were approving the UNDP/FAO Project model that was developed for milk profitability of the dairy milk plan. The official policy emphasized the developmental role that dairy producer groups would play in the sector. Another area of emphasis was the provision of assistance services to dairy farmers. The Ugandan new dairy body also intended to rebuild and concentrate its support services in selected milksheds based on comparative advantage. The government would fund the service if it contributed to the progress of the dairy industry and the nation as a whole. In contrast, if the service directly benefited individual farmers or farmer groups and they were willing and capable of paying for it, as in the case of artificial insemination, the expense of the service would be borne by the users.

The Milk Master Plan made various recommendations with the intention of revitalizing the dairy sector. Some of the primary solutions or advice was to be

a) liberalizing the dairy business;
b) transforming the state-run dairy manufacturing sector and dairy sector into a commercially oriented institution which would eventually be open to the public;

c) establishing a Dairy Board to assume the Dairy Corporation's development and regulatory tasks.

All these changes from the 1993 Milk Master Plan gave birth to the 1998 Dairy Industry Act which saw the implementation of the 1993 Milk Master Plan. The Act created a structure enacting primary proposals described in the Milk Master Plan and then led to the formation of the Dairy Development Authority (DDA) established in the statute as a partially independent legal agency responsible for overseeing the growth and control of the dairy sector. Furthermore, the legislation established the legal framework for transforming the milk cooperatives into a profit-making enterprise.

Government policies and institutional frameworks have been critical in promoting dairy modernization. According to Okoboi et al. (2016) policy actions aimed at encouraging dairy farming, such as input subsidies and credit facilities, have pushed farmers to participate in the sector. Furthermore, the establishment of regulatory agencies has helped to enforce quality standards and enhance market access.

Cross-Breeding and enhanced Breeds:

according to Ainembabazi and Mugisha (2014), up until the 1990s the exotic breeding was mostly dependent on the local indigenous cattle with fear that the exotic breed would not flourish under the climate conditions of Uganda. However, it was also the government's responsibility to deliver artificial insemination as a way of crossbreeding the indigenous local animals to the dairy animals that had high percentages in the dairy cattle levels. Now, in accordance to under birthed breeding policy, the Ugandan Ministry of Agriculture authorized private entities to import sperm and AI equipment, offering on-field AI services. The Animal Breeding Centre was converted into the National Animal Genetic Resources Centre and Data Bank, focusing on animal genetic resources, import, export, and trade, and transforming AI services from public to commercial private sector.

The cross breeding was seen to be the best substitution of the indigenous cattle and foreign cattle breeds for the less productive native cattle breeds, becoming more and more common. A paper written by scientists from the Consultative Group on International Agricultural Research (CGIAR) describes this observation. On September 3rd, 2007, the research was presented at an international conference held in Interlaken, Switzerland (The Cattle Site, 2007).

Cross-breeding programs and enhanced dairy cattle breeds have resulted in increased milk outputs and better adaptation to local conditions. Mugenyi et al. (2017) found that cross-breeding local Ankole cattle with exotic Holstein-Friesian breeds increased milk output and animal resilience, adding to the overall success of dairy modernization.

Technological Advances and Training: The use of contemporary dairy farming methods has substantially enhanced productivity. According to Akabwai et al. (2018) ,it is critical to provide farmers with training and extension services on best practices such as correct feeding, breeding, and animal health management. The integration of mobile applications and internet resources has aided in the distribution of knowledge and real-time access to information.

Market-Oriented Approach and Value Chain creation:

Market-Oriented Approach and Value Chain creation: A shift toward a market-oriented approach, as well as the creation of dairy value chains, have been critical to the success of Uganda's dairy farming modernization. According to a study conducted by Kugonza et al. (2019), the development of formal dairy cooperatives and the integration of smallholder farmers into value chains has boosted market access, improved milk quality, and promoted technology adoption.

Investments in dairy infrastructure, such as milk collection centers and refrigeration facilities, have helped reduce post-harvest losses and increase milk quality. According to Ngabirano et al. (2020), the construction of milk collecting networks has improved connectivity between farmers and markets, maintaining a consistent cash flow and promoting continuing participation in dairy production.

Dairy farming in Uganda has seen great success as a result of a mix of market-oriented tactics, technological developments, improved breeding methods, infrastructural development, regulatory assistance, and favorable socioeconomic consequences. However, issues such as loan

availability, extension services, and climate change resilience must still be addressed. Continued stakeholder collaboration, efficient policy implementation, and the incorporation of innovative solutions will be critical for sustaining and enhancing Uganda's dairy sector advances.

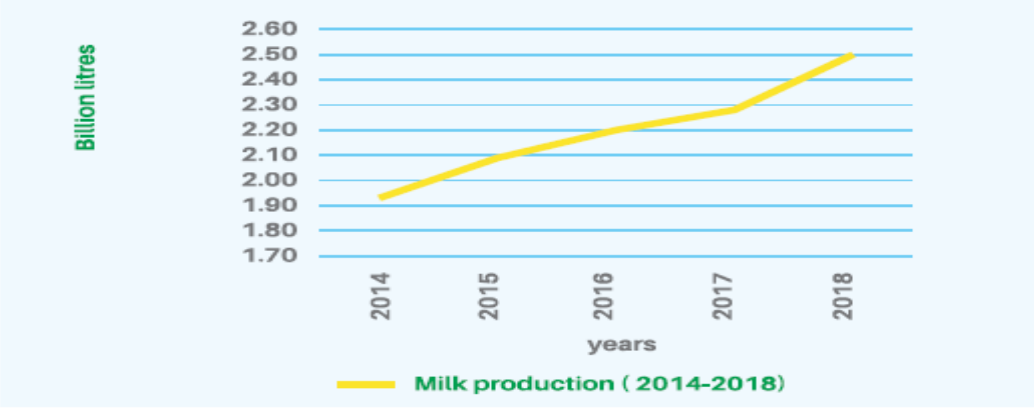
Modernization of Dairy farming.

The primary blueprint guiding the development of Uganda's dairy sector is still the 1993-instituted Milk Dairy Master Plan. The liberalization and modernization of the dairy industry, the restructuring and commercialization of state-owned dairy processing facilities, and the creation of a Dairy Board are notable initiatives resulting from the plan.

Thanks to strategic interventions such as the adoption of improved dairy breeds, provision of better pasture seeds and planting materials, training of dairy farmers in effective farming practices, and more, the effort to modernize dairy farming and boost milk production has been on a positive trajectory over the past five years. Starting from 1.93 billion litres in 2014, the country's total milk production has risen to 2.5 billion litres in 2018.

Analyzing the milk output trends between 2014 and 2018, as reported in the 2019 DDA Annual Reports, the nation was geographically divided into milk production areas, including Northern, Eastern, South Western, Mid-Western, Central, and Karamoja, with the goal of monitoring national milk production and related aspects. Among these regions, the South West milk shed stands out by contributing the largest share (42%) to the overall national milk production, surpassing other regions like Eastern and Central in terms of output.

Milk production trends of 2014 to 2018



DDA annual report 2019

In order to monitor national milk production and other related factors, the nation was partitioned into milk production areas, specifically named Northern, Eastern, South Western, Mid-Western, Central, and Karamoja. In comparison with other geographical areas, the South West milk production area plays the most significant role, accounting for 42 percent of the total national milk output. The Central and Eastern regions' milk production areas contributed 30 percent and 19 percent, respectively, to the overall output. The remaining regions collectively contributed less than 10 percent of the national milk output, as reported in the Dairy Development Authority (DDA) Report of 2020.

The modernization efforts in the dairy farming sector have led to enhancements in milk production, which has risen from 70% of the total production in 2014 to 80.2% in 2018. Among the produced milk, 34% undergoes pasteurization, while the remaining 66% is sold in its raw form. The marketing of milk has proven to be a profitable revenue stream for both farmers and traders. The value of milk sold in the market has experienced an increase, going from USD 716 million in 2015 to approximately USD 850 million (equivalent to UGX 3.1 trillion) in 2018. It's important to note that not all milk produced in Uganda is traded for monetary gain. The term "marketed milk" specifically refers to the milk that generates direct income for the farmer or merchant. On the other hand, "unmarked milk" is retained for personal consumption and as feed for calves. This shift indicates a growing commercialization of the milk industry

Opportunities available in the modernization of dairy farming

Mubiru (2008) noted that the modernization of dairy farming provides economic and social benefits to farmers and increased milk production. Kumbirai (2006) noted that dairy farmers, other

than marketing milk products, also consume milk products that provide the much-needed protein in the human diet and a small but sustainable monthly income in many households.

The Dairy Development Authority (DDA) (2009) noted that the government has introduced penalties and fines to farmers who adulterate milk with water and chemicals and sell contaminated milk as all these initiatives promote the modernize of dairy farming in Uganda.

Thornton and Gerber (2010) noted that the modernization of dairy farming was through the development in cattle breeds, nutrition and prioritizing good animal health. It is further noted that a good health breed of cattle produced high-quality milk in large quantities.

Balikowa (2011) noted that the modernization of dairy farming contributed to the growth of dairy farming in Uganda thus making the sector a major contributor to the national GDP after cereal products**.**

The Dairy Development Authority (DDA) (2011) noted that the modernization of dairy farming has contributed to an increase in quality breed cattle since the majority of farmers kept good quality cattle to increase milk production

Mbowa, Shinyekwa and Lwanga (2012) highlighted that the participation of the private sector, cooperatives, and non-governmental organizations has become critical in the delivery of dairy farm inputs, crossbreeding, and providing free veterinary extension services to farmers, all of which are targeted at increasing milk production.

According to Dairy Development Authority (DDA) (2015), the Ugandan government gave prominence to the advancement of commercial dairy farming by eliminating taxes and offering incentives for essential dairy inputs, with a particular focus on items like metal cleaners and milk cooling equipment.

According to MAAIF (2018), the Uganda's dairy sector profitability is determined by the quality of the milk products, the relationship between dairy farmers and milk processors. As a result, partnership along the dairy value chain is crucial. The MAAIF (2018) further indicated that the demand for milk exceeds the supply which is partly explained by the increase in the price of milk and its products. Since milk and milk products are in high demand, there is a likelihood that farmers will adopt better farming techniques to increase production and further reduce the informal markets for milk.

The government of Uganda and its partners have pledged support to dairy farmers with extension services so as to increase awareness and educating farmers on the best means of production with the aim to increase milk production and enhance commercialization of dairy farming (FAO Report 2019).

In Uganda, dairy farmers have expanded considerably since the implementation of the DDA Act of 1998, and indications are that processors are prepared to buy milk from farmers. However, the dairy supply chain in Uganda necessitates stringent control measures on hygiene, contamination and disease control which must be adhered to; taking this stance, however, requires a significant investment that requires government support, training, supervision and research.

Challenges affecting the modernization of dairy farming practices

According to studies by Staal and Kaguongo (2003), Dobson and Combs (2005) and Kaaya et al. (2005), despite numerous initiatives taken by the Ugandan government through the Ministry of Agriculture and the dairy organization the Dairy Development Authority (DDA) to modernize the dairy sector, there has not been a significant improvement for the past years in the different parts of Uganda milk sheds. Adopting productive farming methods, such as artificial insemination, appropriate feeding methods, animal nutrition, animal health, and secure milk handling, is difficult for these farmers and these have played a role in difficulties that have resulted in a drop-in milk output.

Dairy cattle in Uganda are prone to a variety of diseases, including East Coast fever, foot-and-mouth disease, and mastitis. Productivity is hampered by a lack of access to veterinary services and adequate disease management technique

According to Tijjani and Yetisemiyen (2015), they state the following about animal breeds and diseases in the dairy industry: The principal cattle breeds in the dairy industry are native types such as the Ankole longhorn, which accounts for 50% of the population, zebu, which accounts for 30%, and Nganda, which accounts for 16%. The milk yield of these native breeds, however, is quite low, ranging from 500 to 1500 kg per lactation year, which is much lower than the milk yield of around 8000 kg per cow in developed countries.

The prevalence of diseases, particularly those transmitted by ticks and trypanosomiasis, is one of the greatest obstacles to the adoption of improved cattle breeds. These diseases are more widespread in native breeds, rendering them more vulnerable than developed types. It is estimated that 85.6% of tick-borne infections are managed**.**

Low Milk Quality: According to Balikowa .D ,(2011) poor milk quality results from the prevalent practice of compensating farmers based on the volume of their milk rather than its value components or overall quality. It is rare to do milk testing prior to purchase for issues such as bad odor, water adulteration, and antibiotic contamination. Milk rejections owing to water adulteration appear to be rare, as farmers have discovered means to include water without risking milk rejection.

Despite the DDA (Dairy Development Authority) initiatives to improve milk handling, such as promoting the use of plastic jerry cans and boiling milk in open air to eradicate pathogens, methods including the addition of water and substances during the processing remain popular.

The sale of loose unprocessed milk is currently the biggest challenge as far as quality in the dairy value chain is concerned, this has greatly affected modernization of dairy farming in Uganda (Dairy Development Authority (DDA), 2011).

The predominant traditional, small-scale production approach and informal market structure in Uganda pose significant challenges to the modernization of the dairy sector. Despite this, they do offer consistent income and employment prospects, especially for financially disadvantaged households. However, by focusing on initiatives such as enhancing market entry, promoting quality dairy breeding stock, introducing advanced dairy technologies, and providing effective guidance and business development support, particularly in areas like animal health, breeding, finance, markets, and marketing infrastructure, there exists substantial potential for considerable growth in dairy production and overall productivity. Dairy Development Authority (DDA), 2011).

Every year, the country in different regions receives only a short period of rain, resulting in frequent extended spells of dryness. These prolonged dry episodes have a number of serious implications. Among these include a lack of grazing pastures and water sources for both livestock and humans, which results in animal mortality, decreased milk production, insufficient food

supply, and lower household income. Furthermore, both humans and animals rely on the same watering holes, which are quickly depleted.

Limited Access to Quality Feed and Nutrition

Limited Access to Quality Feed and Nutrition Dairy farmers in Uganda face considerable challenges in obtaining high-quality, inexpensive feed. Inadequate access to appropriate diet has an impact on milk output as well as general cattle health. According to Lukuyu et al. (2009), limited access of feeds and poor quality of the animal pastures is embedded in many categories, some being climate change especially during the dry seasons, low knowledge of modern technologies to the farmers. They further described that community constraints also play a role as there are limited feeds since the traditional ways of farming which was nomadic pastoralism moving place to place for pastures.

Lack of Improved and High-Yielding Dairy Breeds:

According to Balikowa (2011), despite the privatization of AI services by the government, there are still a number of technological and operational barriers preventing widespread implementation of this technology, especially for improving the genetic potential of native animal breeds handled using conventional comprehensive methods. Despite doing several inseminations annually, less calves are being born as a result of the use of AI. Especially in the context of farms using conventional extensive grazing systems, the majority of farmers still choose natural breeding practices. according to Balikowa (2011).

lack of improved and high-yielding dairy breeds can limit the possibility for increasing milk output. Low-quality genetics can lead to decreased milk output and illness risk.

Inadequate Infrastructure and Services:

Inadequate infrastructure, particularly dairy cow sheds roads and transportation, makes access to markets, veterinary services, and feed resources difficult. However, according to Muhammad (2020), dairy performance is significantly impacted by the housing of cattle. Dairy cattle that is aimed at milk delivery purposes has to be in conditions that may favor the cow’s conditions to be out of stress and hence be able to provide milk. Inadequate housing facilities on many dairy farms result in morbidity and fatalities despite their significance in maintaining optimal calf performance.

When a dairy farmer succeeds in having a calf, the calf's performance is limited by a number of things, including the absence of suitable accommodation on the farms.

Market Access and Price Volatility:

Vidal (2021) describes the marketing of the milk and other dairy products as being less than 1% for commercial dairy farmers. He further adds that the majority of farmers individually sell their milk on the black market which is characterized by milk from the farm with a bicycle to small family households that need milk for daily consumption.

Atuhaire (2020) noted that the quality of the milk sold is negatively impacted by poor milking and handling practices and was for a few years denied entrance in the Republic of Kenya since it was regarded as milk of low quality. The habit of storing and transporting milk in plastic containers, particularly jerry cans, is pervasive and continues to be bad for the milk's quality. The technique of diluting milk with water prior to sale is one that many farmers and street vendors also do.

Dairy farmers frequently struggle to find regular and profitable outlets for their milk. Price changes can have an influence on their income and financial security.

CHAPTER THREE:

METHODOLOGY

Research design

The researcher used both qualitative and quantitative research designs commonly known as Mixed method approach aimed at capturing both numeric and non-numeric data from the respondents. This method was believed to be useful to exhausting the research questions. According to Amin (2005) Qualitative research design is important in examining the in-dept knowledge of study variables and generating new ideas, experiences and concepts and quantitative research design on the other hand is used to provide numeric descriptions of some part of the population especially the demographic features of the respondents and descriptive statistics of the research variables. Both qualitative and quantitative data was obtained from both the questionnaire and interview guide.

Population

According to Amin (2005), study population refers to collection of elements with similar or related characteristics for a particular study. The study considered respondents from dairy farmers, Makerere university department of agriculture and private sector and government officials from the dairy department farmers in Uganda.

Sample size

Saunders et al, (2009) defined sampling as a statistical process used to determine the number of objects from a large population with similar characteristics. The researcher used both the probability sampling technique and non-probability sampling technique.

Simple random sampling was used in the selection of respondents to participate in the study. This was done to give every respondent in the study an equal chance of participating in the study as this was to reduce bias and errors in obtaining data.

The researcher furthermore used purposive sampling for key respondents from diary development authority and Makerere university department of agriculture who were recommended by the respective heads of departments

A sample size of 65 respondents was obtained based on Krejcie and Morgan's (1970) table of sample determination from the population size of approximately 60 respondents. Simple random sampling was used in the selection of respondents to participate in the study as this was to reduce bias and errors in obtaining data. The researcher used purposive sampling for key respondents

who were recommended by the diary development authority and Makerere university department of agriculture.

Population and Sample size

Category	Accessible Population	Sample size
Makerere university department of Agriculture	10	10
Dairy development authority	15	14
Dairy Farmers.	40	36
Total	**65**	**60**

Data sources

The study used primary data obtained from questionnaires and interview guides. The study further used secondary data from textbooks, journals and previous research books. Data collection instrument

The research used both a self-administered questionnaire and interview guides in the collection of data.

Validity and reliability of instruments

The data collection instruments were checked and verified by experts, my research supervisor and fellow researchers to check for accuracy, completeness and relevancy to the study objectives.

Data Processing and Analysis

Data obtained from both questionnaires and interview guides was written, edited and coded to ensure errors are reduced. Data was analyzed using a statistical package for social scientists (SPSS) to derive analytical statistics. Information on sample statistics was obtained using frequencies and descriptive statistics.

CHAPTER FOUR.

PRESENTATION, ANALYSIS, AND INTERPRETATION OF FINDINGS

Introduction

The study examined the challenges faced in the modernization of dairy farming practices in Uganda. The chapter presents the background characteristics of the respondents and the presentation of findings in relation to the specific objectives.

Background information

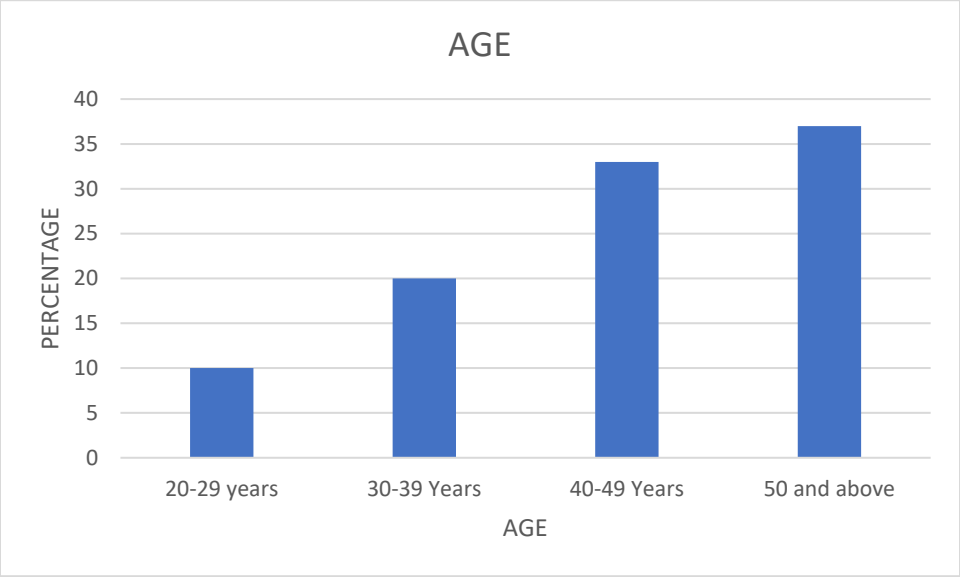
This section presents bio data facts about the respondents, namely, age, gender, marital status, education level.

Distribution of Responses on Bio Data.

Category	Response	Frequency	Percentage
Age	20-29 years	6	10
	30-39 Years	12	20
	40-49 Years	20	33
	50 and above	22	37
	Total	**60**	**100**
sex	Male	41	68
	Female	19	32
	Total	**60**	**100**
Marital status	Married	38	63
	Single	12	20
	divorced	3	5
	Widowed	7	12
	Total	**60**	**100**
Education Level	Masters	16	27
	Bachelors	12	20
	Diploma	14	23
	Certificate	18	30
	Total	**60**	**100**

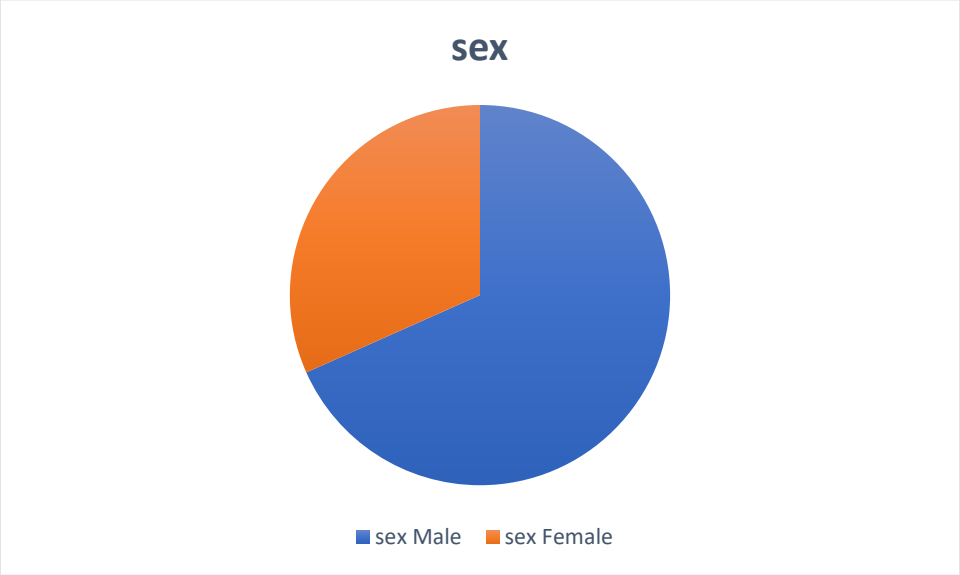
Source: Primary data.

CHART:1 AGE DISTRIBUTION



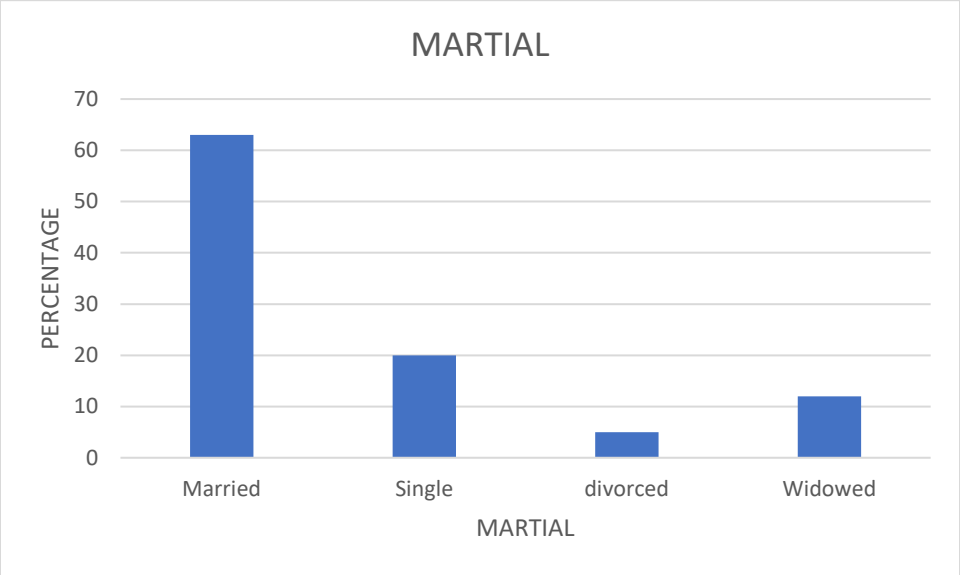
Based on the study finding, it was revealed that 10% of the total respondents were aged between 20-29years, 20% were aged between 30-39 years, 33% were aged between 40-49 years and 37years aged 50 years and above. This implies that the majority of the respondents were aged above 50 years and this shows that majority respondents understood the dairy farming and better farming practices than the young ones.

CHART 2: SEX DISTRIBUTION



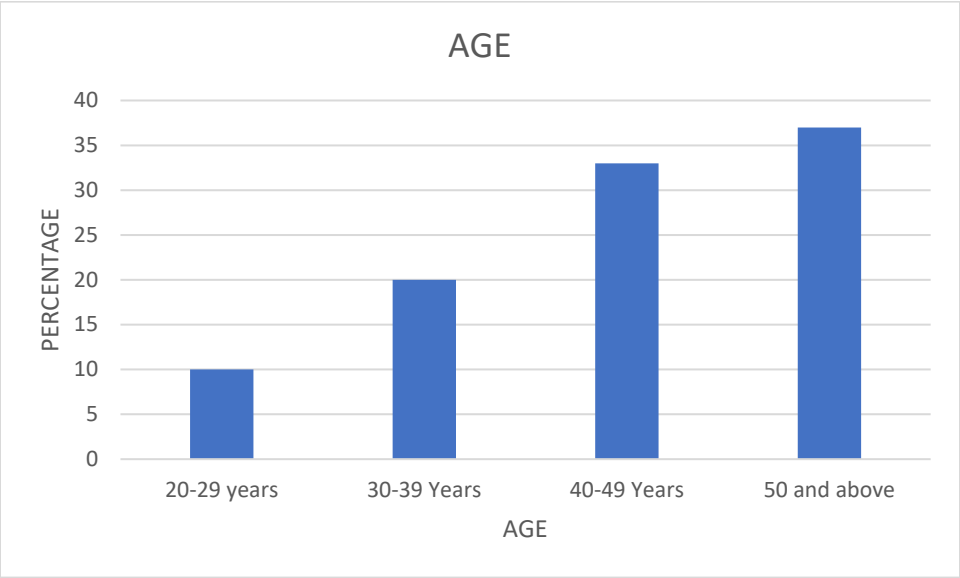
Study results further established that 68% of the total respondents were males compared to 32% female respondents. Dairy farming in Uganda dominated by males due to culture practices on inheritance as majority females are house wives.

CHART3: MARTIAL DISTRIBUTION



This implies that majority respondents were married. In Ugandan cultures, Married people are usually use cattle for payment of dowries, and some retire from active employment to dairy farming.

CHART 4 EDUCATION DISTRIBUTION



The study findings reveal that 27% of the total respondents were having masters, 20% have bachelor's degree, 23% were having diplomas and 30% were having certificate as their level of education. This implies that majority respondents were having certificate as their level of education.

Empirical Results based on Research objectives

Results were presented based on the study findings. The study was conducted among 60 respondents. The responses were given based on the five Likert scale ranging from 1-Strongly disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-strongly agree. Mean value in this study indicates the average figure in reference to the 5-point Likert scale used to get responses. Standard deviation means the non-conformity or figures representing the deviation from the mean score obtained. The standard deviation is normally from 0 to 3. If the standard deviation is less than one, it means that there was limited variation in responses and if the standard deviation is greater than one, it means that there was high variation in responses.

Opportunities available in the modernization of dairy farming.

Respondents' opinion on Opportunities available for dairy farming due dairy development authority.

Responses are presented based on the five Likert scale ranging from 1-strongly disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-strongly agree.

Descriptive Statistics								
	N	SDA (1)	DA (2)	NS (3)	A (4)	SA (5)	**Mean**	Std. Deviation
The Authority support farmers with veterinary services	14			4	6	4	**4.00**	.784
The Authority support farmers with in marketing dairy products	14			2	7	5	**4.21**	.699
Controls and regulations in places support dairy farmers	14			4	7	3	**3.93**	.730
The DDA supports farmers in dairy value addition	14		1	2	7	4	**4.00**	.877
The authority ensures quality Assurance and domestic dairy consumption promotion	14		1	1	6	6	**4.21**	.893
The Authority coordinates all dairy processing and marketing promotional activities to support dairy farmers	14		1	3	6	4	**3.93**	.917
The authority acts as an arbitrator in any conflict between dairy companies, processors and farmers	14			2	8	4	**4.14**	.663
The Authority supports dairy farmers through products development and general market promotion	14			2	5	7	**4.36**	.745
The Authority in sourcing good dairy breeds and innovations	14		5	6	2	1	**2.93**	.917
Farmers are provided with pasture seeds and planting materials to improve animal feeding	14	5	6	3			**1.86**	.770
DDA is strengthening partnerships with development partners to further promote growth of the dairy subsector	14		2	7	4	1	**3.29**	.825

Study findings reveals that respondents agreed that farmers get veterinary services from the dairy development authority as shown by the mean vale 4.

The study findings reveal that respondents agreed that the authority supports farmers in marketing dairy products as shown by the mean value 4.21.

The study findings further reveal that respondents agreed that controls and regulations are in place to support dairy farmers as shown by the mean value of 3.93.

Results further reveals that respondents agreed that DDA supports farmers in dairy value addition as shown by the mean value 4. This implies that the authority facilitates value chain processes in the dairy sub-sector.

Study findings further reveals that respondents agreed that the authority ensures quality assurance and domestic dairy consumption promotion as shown by the mean value 4.21.

The authority further reveals that respondents agreed that the Authority coordinates all dairy processing and marketing promotional activities to support dairy farmers as shown by the mean value 3.93.

The study results further reveal that respondents agreed that the authority acts as an arbitrator in any conflict between dairy companies, processors and farmers ash sown by the mean value 4.14

Study results shows that respondents agreed that Dairy development authority supports farmers through product development and general market promotion as shown by the mean value 4.36.

The study further reveals that respondents were not sure whether the authority supports farmers in sourcing good dairy breeds and in innovation as shown by the mean value 2.93.

The study further reveals that respondents disagreed that the authority provided pasture seeds and planting materials to farmers so as to improve on animal feeds as shown by the mean value 1.86. tis therefore implies that the authority should assist dairy farmers in the search for better pasture seeds to support farmers.

Results further show that respondents disagreed that DDA is strengthening partnerships with development partners to further promote growth of the dairy subsector as shown by the mean value 3.29. this further implies that the authority is failing on its mandate to develop the dairy sector in Uganda.

Respondents' opinion on Available opportunities in the dairy farming for farmers

Responses are presented based on the five Likert scale ranging from 1-strongly disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-strongly agree.

Descriptive Statistics								
	N	SDA (1)	DA (2)	NS (3)	A (4)	SA (5)	**Mean**	Std. Deviation
The government supports dairy farmers financially	36	6	3	10	16	1	**3.08**	1.156

There are free extension services from government	36	5	5	15	6	5	**3.03**	1.207
Drugs are available for my cattle's in case they are sick	36	9	11	11	3	2	**2.39**	1.128
The government stabilized prices for my dairy products	36	4	12	14	4	2	**2.67**	1.014
There is available market for dairy products	36	2	4	3	9	18	**4.03**	1.253
There is available technology in Uganda for dairy farming	36	15	11	5	2	3	**2.08**	1.251
There are available dairy cattle in the market	36	2	8	12	11	3	**3.14**	1.046
The environment favors dairy farming in Uganda	36	2	2	9	15	8	**3.69**	1.064
There are incentives for dairy farmers	36	11	10	11	4	0	**2.22**	1.017
In case of breeding, sperms are available	36	7	9	17	3	0	**2.44**	.909
There available feeds for my cattle	36	3	7	10	14	2	**3.14**	1.073

Source: Primary data.

Based on the study findings, it was revealed that respondents were not sure whether the government supports farmers financially as shown by the mean value 3.08. this implies that the government support to dairy farming in Uganda is not felt by the farmers.

The study results further revealed that respondents were not sure whether dairy farmers get free extension services as shown by the mean value 3.03.

The study results further show that respondents disagreed that drugs are available for their cattle in case they are sick as shown by the mean value 2.39. This implies that drugs for animals were not available for dairy farmers.

The study results further revealed that respondents were not sure whether government has stabilized prices for dairy products as shown by the mean value 2.67.

The study results further revealed that respondents agreed that there is available market for dairy products as shown by the mean value 4.03. This implies that there is available market for all the dairy products.

The study results further revealed that respondents disagreed that there is available technology for dairy farming in Uganda as show by the mean value 2.08. this implies that farmers in Uganda still use traditional methods in the dairy farming practices.

The study findings reveal that respondents were not sure whether of the availability of dairy cattle in the market as shown by the mean value 3.14.

The study reveals that respondents agreed that the environment favors dairy farming in Uganda as shown by the mean value 3.69.

The study reveals that respondents disagreed that there are incentives for dairy farmers as shown by the mean value of 2.22, this implies that the incentives given by the government not trickling down to the dairy farmers.

The study results further reveal that respondents disagreed that there is availability of sperms for dairy breeds for farmers as shown by the mean value of 2.44.

The study further reveals that respondents were not sure of the availability of feeds for dairy cattle as shown by the mean value 3.14.

Respondents' opinion on Opportunities available for dairy farming for Makerere University department of agriculture.

Responses are presented based on the five Likert scale ranging from 1-strongly disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-strongly agree.

Descriptive Statistics								
	N	SDA (1)	DA (2)	NS (3)	A (4)	SA (5)	Mean	Std. Deviation
The institution has carried out research on improving dairy breeds of cattle	10				5	5	4.50	.527
The institution has assisted innovation of animal acaricides	10				3	7	4.70	.483
The institution has supported farmers with extension services	10				7	3	4.30	.483
The institution has supported farmers with knowledge and skills in dairy value addition	10			4	3	3	3.90	.876
The institution has supported capacity building in value addition for dairy farmers	10				4	6	4.60	.516
The institution has supported innovations in pasture seeds and planting materials	10				3	7	4.70	.483
The institute has supported farmers with knowledge on feeding cattle to increasing milk production.	10			1	5	4	4.30	.675

Source: Primary data

The study findings reveal that respondents strongly agreed that dairy farming has benefited from Makerere university department of agriculture in research for improved dairy breeds of cattle as shown by the mean value 4.5.

The study further reveals that respondents strongly agreed that the institution has assisted innovation of animal acaricides as shown by the mean value of 4.7.

The study further reveals that respondents agreed that the institution has supported farmers with extension services as shown by the mean value 4.3.

The study further reveals that respondents agreed that the institution has supported farmers with knowledge and skills in dairy value addition as shown by the mean value 3.9.

The study findings further show that respondents strongly agreed that the institution has supported capacity building in value addition for dairy farmers as shown by the mean value 4.6

The study results reveal that respondents strongly agreed that the institution has supported innovations in pasture seeds and planting materials as shown by the value of 4.7.

The study results further reveal that respondents agreed that the institute has supported farmers with knowledge on feeding cattle to increasing milk production as shown by the mean value 4.3.

Challenges facing dairy farming in Uganda.

Respondents' opinion on challenges faced by DDA in developing Dairy farming.

Responses are presented based on the five Likert scale ranging from 1-strongly disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-strongly agree.

Descriptive Statistics								
Responses	N	SDA (1)	DA (2)	NS (3)	A (4)	SA (5)	Mean	Std. Deviation
Farmers lack necessary skills and technology in dairy farming	14			4	7	3	**3.93**	.730
Limited dairy extension services in most areas affect dairy production	14		2	4	6	2	**3.57**	.938
Milk collection centers lack improved equipment in storage and value addition	14			3	5	6	**4.21**	.802
Prolonged drought, pest and diseases affect dairy farmers	14			4	8	2	**3.86**	.663
Drugs on the market are not up to standards.	14	3	5	3	2	1	**2.50**	1.225
Limited staff at the authority affects supervision and regulation of dairy farmers	14		3	2	6	3	**3.64**	1.082
The authority lacks regional laboratories, mobile laboratories and milk inspectors	14			2	6	6	**4.29**	.726
Farmers still use tradition ways of dairy farmers which affect dairy farming	14		1	2	5	6	**4.14**	.949

There is limited investment by farmers in improving the quality of feed resources	14		3	8	3		**3.00**	.679

Source: Primary data.

Study findings reveals that respondents agreed that farmers lack necessary skills and technology in dairy farming as shown by the mean value 3.93.

Study findings further reveals that respondents agreed that the authority offered limited dairy extension services which affects dairy production as shown by the mean value 3.57.

Study findings further reveals that respondents agreed that Milk collection centers lack improved equipment in storage and value addition as shown by the mean value 4.21.

The study results further reveals that respondents agreed that Prolonged drought, pest and diseases affect dairy farmers as shown by the mean value 3.86.

Study results further reveals that respondents were not sure whether the drugs on the market are not up to standards as shown by the mean vale 2.5.

Study findings further reveals that respondents agreed that limited staff at the authority affects supervision and regulation of dairy farmers as shown by the mean value of 3.64.

The study also reveal that respondents agreed that the authority lacks regional laboratories, mobile laboratories and milk inspectors as shown by the value 4.29.

Results reveals that respondents agreed that Farmers still use tradition ways of dairy farmers which affect dairy farming as shown by the value 4.14.

The study findings further reveal that respondents were not sure There is limited investment by farmers in improving the quality of feed resources as shown by the mean value 3.

Respondents' opinion on challenges faced by dairy farmers

Responses are presented based on the five Likert scale ranging from 1-strongly disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-strongly agree.

Descriptive Statistics								
	N	SDA (1)	DA (2)	NS (3)	A (4)	SA (5)	**Mean**	Std. Deviation
There is fluctuation in prices for dairy products	36	3	4	3	13	13	**3.81**	1.283
It's hard to get good dairy animals	36	1	9	6	8	12	**3.58**	1.273
The government doesn't farmers engaged in dairy farming	36	3	7	9	15	2	**3.17**	1.082

Technology used in milking animals is not available.	36	2	6	9	16	3	**3.33**	1.042
Banks in Uganda don't support dairy farmers financially	36	3	5	8	10	10	**3.53**	1.276
There is increased pest and diseases for dairy animals	36	2	3	4	12	15	**3.97**	1.183
There is no improved machinery and equipment on the market to be used in dairy farming	36	4	4	6	10	12	**3.61**	1.358
There are inadequate veterinary services	36	3	2	16	9	6	**3.36**	1.099
There no storage facilities for our milk.	36	2	6	8	13	7	**3.47**	1.158
There is poor infrastructure in transportation and handling of milk products	36	0	0	4	14	18	**4.39**	.688

Source: Primary data.

The study results show that respondents agreed that there is fluctuation in prices for dairy products as shown by the mean value 3.81. this implies that dairy farmers are not guaranteed of the stable and better prices for their dairy farm products especially milk.

The study results further reveal that respondents agreed that it's hard to get good dairy animal breeds as shown by the mean value 3.58. A farmer noted that "to get a dairy breed cattle one has to first import it from south Africa Netherlands which are very expensive"

Results further reveals that respondents were not sure whether of the involvement of government in dairy sub sector as shown by the mean value 3.17. this was therefore partly due to limited funding in the agriculture sector and the dairy farming subsector.

Study results further reveals that respondents were not sure whether the technology used in milking animals not available as shown by the mean value 3.33. this therefore implies that farmers still use traditional methods of milking.

The study results further show that respondents agreed that banks in Uganda don't support dairy farmers financially as shown by the mean value 3.53. A farmer in Mbarara district noted that "While the government has introduced Agriculture credit financing (ACF) for dairy farmers in Ugandan commercial banks, the terms and conditions for accessing such funding are too stringent, leaving the majority of farmers out."

Study results reveals that respondents agreed that There is increased pest and diseases for dairy animals as shown by the mean value of 3.97. this is further supported by the farmer in Kiruhura

district western Uganda as noted that “Tick- and tick-borne disease, foot and mouth disease, east coast fever, and other diseases have become more common, and the majority of acaricides on the market do not treat them.

Study findings further reveals that respondents agreed that there is no improved machinery and equipment on the market to be used in dairy farming as shown by the mean value 3.61.

The study findings reveal that respondents were not sure whether there are inadequate services veterinary services as shown by the mean value 3.36.

Respondents further were not sure where there no storage facilities for their milk as shown by the mean value 3.47. this is because majority farmers till traditional methods of storage of milk.

Study findings further reveals that respondents agreed that there is poor infrastructure in transportation and handling of milk products as shown by the mean value 4.39

Respondents’ opinion on challenges faced by Makerere University department of agriculture in developing Dairy farming.

Responses are presented based on the five Likert scale ranging from 1-strongly disagree, 2-Disagree, 3-Not sure, 4-Agree and 5-strongly agree.

Descriptive Statistics								
Response	N	SDA (1)	DA (2)	NS (3)	A (4)	SA (5)	Mean	Std. Deviation
lack of adequate attention to changing technology in extension of services	10				5	5	4.50	.527
Limited funding affecting the institution in providing extension services to dairy farmers	10			5	3	2	3.70	.823
There is no approved Dairy Policy on breeding	10			3	5	2	3.90	.738
The institute has no Laboratory and innovation hubs	10	2	6	2			2.00	.667

Source: Primary data

The study results show that respondents strongly agreed that lack of adequate attention to changing technology in extension of services to farmers as sown by the mean value 4.5. this implies that while the institution extends services to farmers little or no attention to changing technology has been put into account.

The study results further reveal that respondents agreed that there is limited funding affecting the institution in providing extension services to dairy farmers as shown by the mean value 3.7.

Makerere university department of agriculture noted "that the government has reduced funding to the department over the years, making it difficult for the institutions to provide full services to farmers."

Study finding reveals that respondents agreed that there is no approved Dairy Policy on breeding as shown by the mean value 3.9. Thus, this implies that whereas the institutions carry out research on different aspects of breeding and crossing breeding of animals, they lack mandate of the government to offers their services to farmers.

The study results further reveal that respondents disagreed that there no laboratory and innovation hubs at the institutions as shown by the mean value of 2. Thus, it shows that innovations and laboratory service hubs at the institutions are available only limited by funding and mandate of the government.

CHAPTER FIVE

SUMMARY AND DISCUSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

Introduction

This chapter presents the summary of findings, discussion of the study findings, conclusions and recommendations plus areas for further research.

Summary and Discussion of Findings.

Opportunities for modernization of dairy farming

Dairy development authority.

Based on the study findings in chapter four on the control and regulation support for farmers reveals, there are opportunities for dairy farming in Uganda due to establishment of the diary development authority as the main regulator and supervisor of all the dairy farming activities in Uganda.

Based on the study findings, study results reveal that the authority supports dairy farmers with veterinary services, marketing dairy products, controls and regulation of all the activities of all dairy farming activities.

The study further established that the authority coordinates all the processing, marketing and promotional of all activities in the dairy sub sector with the aim of develop and modernize dairy farming in Uganda.

Study findings further reveals that the authority acts as an arbitrator in any conflict between dairy companies, processors and dairy farmers and also the authority supports farmers through value addition of their dairy products as all those actions point to the modernization of dairy farming in Uganda.

Makerere university department of Agriculture.

Based on the study results, it was revealed that the department of agriculture at Makerere university had done a tremendous work in support of the modernization and development of dairy farming in Uganda through the research to improve dairy breeding cattle, innovation of acaricides for ticks and diseases and supporting farmers with free extension services through organized workshops and seminars.

The study further established that the institution has supported capacity building for dairy farmers with skills in value addition, innovation of good pasture feeds and planting material for dairy farmers with the aim of modernizing dairy farming business in Uganda.

The study further reveals that the institute has supported farmers with knowledge on feeding cattle to increasing milk production, establishing a semen bank for dairy farmers who would want to get cross breeds with the aim of changing from traditional animals to exotic breeds with high milk production.

Dairy farmers

Study findings reveals the initiatives put in place by the farmers and government to modernize dairy farming in Uganda among others included offering free extension and veterinary services to the dairy farmers, sourcing for market of dairy farm products.

The study results established that there is available market for dairy products in Uganda which necessitates modernization of dairy farming with the aim of increased milk productions.

Challenges facing modernization of dairy farming

Diary development authority.

Study results established the challenges faced by the Dairy development authority in modernization of dairy farming in Uganda which included prolonged drought, tick diseases affecting dairy farmers as most of the acaricides on the market is adulterated and contaminated.

Results further established that the authority had limited staff which affected supervision and regulation of dairy farmers, the authority also lacked regional laboratories, mobile laboratories and milk inspectors.

The authority also decried farmers who have continuously practiced traditional methods in dairy farming as opposed to modern milk handling technology and limited funding from government.

Dairy farmers

In the process of modernizing dairy farming in Uganda, the study established the following challenges faced by dairy farmers.

Dairy farmers in Uganda decried fluctuation of prices for dairy products, lack of financing from financial institutions, drug resistant ticks and diseases, lack of storage facilities for milk produces as all these are the setbacks to modernization of dairy farming in Uganda. Study finding therefore conform with World Bank report (2009) notes that financial institutions in Uganda are reluctant to extend financial services to dairy farmers due to associated risks like unstable milk prices,

increased informal markets for milk, increased middlemen in the marketing of milk products, unclear record keeping of their sales

The study also revealed that dairy farmers still use old fashioned and poor technology in milk handling, feeding and use of local breeds of cattle that produce less milk as opposed to cattle like Friesian, heifers, South African breeds and other exotic breeds of cattle.

The study further revealed that lack of veterinary services, semen for cross breeding, high cost of maintaining and importing exotic breeds of cattle all affected modernization of dairy farming in Uganda.

Makerere university department of Agriculture.

Study results reveals that the limited funding and attention from government towards modernization of dairy farming was main challenge. The study further established that the institution had no legal mandate from the government to support dairy farmers in the modernization of the subsector.

Conclusion.

The research identified the positive outcomes resulting from the modernization of dairy farming. One significant aspect was the establishment of the Dairy Development Authority, tasked with aiding farmers in enhancing the value of dairy products. This involved ensuring quality control, promoting domestic consumption of dairy, offering veterinary services to farmers, and assisting in the marketing of dairy items.

Furthermore, the study highlighted the advantages of modernizing dairy farming in Uganda. These benefits encompassed the creation of new markets for dairy products and the provision of incentives for farm inputs, including tax exemptions on both dairy products and input materials.

In addition to these gains, the modernization of dairy farming gave rise to various institutions such as non-governmental organizations (NGOs), the private sector, and the agricultural department at Makerere University. These institutions also engaged in research endeavors aimed at improving cattle breeds for dairy purposes. They facilitated innovation in the development of animal acaricides, offered extension services to farmers, imparted knowledge on optimal cattle feeding practices, and promoted innovations in pasture seeds and planting methods.

Challenges Impacting the Modernization of Dairy Farming

The study also shed light on the obstacles encountered during the process of modernizing dairy farming in Uganda. These challenges included the lack of essential skills and technological know-how among farmers in the field of dairy farming. Moreover, there was a scarcity of comprehensive dairy extension services in many regions of the country. The reluctance of farmers to adopt modern dairy farming techniques in place of traditional methods, along with limited investment resources due to poverty, further posed challenges to progress in improving the quality of feed resources

The study further revealed that fluctuations in dairy product prices, heightened incidences of pests and diseases affecting dairy animals, as well as inadequate infrastructure for transporting and handling milk products, stood out as major hurdles impeding the modernization of dairy farming.

Recommendations.

Based on the study findings, the following recommendations were made to the challenges affecting modernization of dairy farming business in Uganda.

The government of Uganda and development partners should increase funding Makerere university department of agriculture so as to put more emphasis on research and innovations, skilling and capacity building of dairy farmers so as to reduce on the constraints to modernization of dairy farming.

The government through diary development authority should participate in stabilizing prices for dairy products, source for market of dairy products as a morale booster to modernization of dairy farming.

The study further recommends that legislation and strict rules and laws should be put in place to punish crooks who adulterate acaricides on the market, farmers who have refused to embrace modern dairy farming practices in both milk handling, feeding and veterinary services.

The Dairy development authority should strengthen supervision, quality assurance and promotion of modern dairy farming practices through sensitization of dairy farmers since its mandated with the role.

The government to put incentives to farm inputs, trainings and free extension services to farmers, reduce taxes on all agriculture inputs and encourage foreign investors to come and support dairy farmers.

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