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DEVELOPMENT BENEFITS OF SHIFTING FROM PASTORALISM TO SEDENTARY CATTLE KEEPING IN RURAL AREAS: "POLICY FRAMEWORK AND PRACTICE IN RWANDA"

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Dedication

I dedicate this research project to the Lord Almighty for his grace that enabled me to go through the course successfully, and my Wife, Sons, and Daughters for their understanding, moral support, and encouragement throughout the entire process and preparation of writing this research paper.

Acknowledgment

I take this opportunity to express my sincere thanks to my supervisor, Dr. UWIZEYE Dieudonné for his guidance, patience and tireless efforts that played an important role in the completion of this project. I would also like to acknowledge the support provided by the Local Government Authorities and Government Officials in identifying the respondents in Nyagatare and Gatsibo districts. Special thanks go to the respondents for sacrificing their time to avail the information I needed for the study.

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Abstract

The research sought to assess development benefits of shifting from Pastoralism to Sedentary Cattle keeping in rural areas: "Policy framework and Practice in Rwanda". The rationale was that the development benefits on the side of farmers as well as animal resources sub-sector have not been assessed and appropriately documented during the process of implementation of the National Agricultural Policy led to shift from Pastoral System to Sedentary cattle keeping. The present study, therefore, sought to generate baseline data that can be used to evaluate the success of the National Agricultural Policy. In addition, the Policy was accompanied by Ministerial Order on stray cattle and other domestic animals. The research areas were covered 2 Districts of Eastern Province which are dominant by Pastoralism in last years, such as Nyagatare and Gatsibo Districts with help of three objectives, namely:

1) To investigate the implementation pathways of National Agricultural Policy, aspect of animal resources, in Eastern Province, Rwanda;
2) To assess the challenges of the implementation of the policy in the Eastern Province while transforming pastoral system to sedentary cattle keeping;
3) And to identify the development benefits resulting from sedentary cattle keeping practice in the Eastern Province of Rwanda.

In this context 399 persons were interviewed, whereby 388 Farmers/Breeders from Milk Collection centers, 2 District's Executive committee members, 2 Sector Executive Secretaries, 6 Officials under Agricultural departments (2 Districts' agronomists, 2 Districts' Veterinaries and 1 Sector Agronomist & 1 Sector Veterinary) and 1 Official from RAB. However, during field research, I considered a Focus group discussion of 1 to more than 1 participants because I considered interviewing MCC or Local Leaders and Government Officials stands alone, as they were not in the same location and Responsibilities as well the composition was not so big.

Data were collected through two primary data collection methods: (i) focus groups constituted by farmers/breeders from committee members of MCCs, (ii) Local Leaders and Government Officials and (iii) individual interviews constituted by 1 Official of RAB. The focus group interviews were conducted in the open-air at the Milk Collection Centers physical places of

production, District and Sector headquarters. Secondary data sources in the form of annual reports of the animal resources aspect like milk production, minutes of the meetings and useful administrative documents provided written information which was used to verify accuracy of data collected through interviews and policy effects.

However, in transitional of Pastoralism to sedentary cattle keeping some challenges raised. There was a challenge based on resistance to change of moving from pastoralism to sedentary cattle keeping and not very easy to integrate in individual pastures with a big number of cows. There was an issue of lack of water for livestock since there was a limited infrastructure like valley dams as well valley tanks could help farmers to find water easily and in reasonable distance. There was no cattle market for milk produced and cows. The veterinary services were very poor and difficult to afford while sedentary cattle keeping need improved and ensured veterinary services.

After the Policy development and dissemination, the individual pastures distributed and the owner requested to develop them by clearing bushes, fencing and introducing the new forages species. The Government constructed valley dams and valley tanks, the government subsidies on dam sheets and motor pumps have been introduced. In addition, milk collection centers have been constructed and equipped. The Local Government through the Districts' councils voted a resolution prohibiting any movement of cattle into the reserved areas like the Gabiro Combat Training center, with tough sanctions supporting the Ministerial order on stray cattle. The control and prevention of animal diseases enhanced and the frequencies reduced.

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Key words: Pastoralism, Sedentary Cattle keeping, Farmers or Breeders, Milk Collection Center, Valley dams and valley tanks, development benefits, modernization of agriculture and national agricultural policy.

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List of abbreviations and Acronyms

1. BCRK: Bweya Cyenjojo Rwempasha Kazaza dairy cooperative
2. BNRT: Bwera ntoma rutungo tworore
3. BPR: Banque Populaire du Rwanda
4. BQ: Black Quarter
5. CO2: Carbon Dioxide
6. CODEN: Cooperative de Development d'Elevage de Ngarama
7. EXECOM: Executive Committee
8. FAO: Food and Agriculture Organization of the United Nations
9. FMD: Foot Mount Disease;
10. GDP: Gross Domestic Product
11. HOK: Hinga orora Kijyambere
12. KAFCO: Katabagemu farmers' cooperative
13. KAMDAMACO: Kamate dairy marketing cooperative
14. KOIIMU: Koperative Ikizere mu Iterambere rya Muhura
15. LG: Local Government
16. LSD: Lump Skin Disease;
17. MCC: Milk Collection Centre
18. MINAGRI: Ministry of agriculture
19. MINICOM: Ministry of Commerce and Industry
20. Mt: Metric tone
21. MUDACOS: Murambi Dairy Cooperative Society
22. NAP: National Agricultural Policy
23. NDFU: Nyagatare Dairy Farmers Union
24. NGDP: National Gross Domestic Product:
25. NST-1: National Strategy for Transformational
26. PSF: Private Sector Federation
27. PSTA-4: Strategic Plan for Agriculture Transformation 4
28. RAB: Rwanda Agricultural Board
29. RVF: Rift Valley Disease
30. SACCOs: Saving and Credit Cooperatives

Chapter One: Introduction

1.1. Background of the study

Normally a human being is characterized by the effort made to meet the basic needs by exercising socio-economic activities enable him/her to obtain means of satisfying subsistence needs and go beyond. Consider a region to another, certain activities are traditional or modern, in which these traditional activities are prioritized based on geographical localization, adaptation, potentialities, ideological, political as well as culture. However, take into consideration some economic activities oriented on the agricultural sector including livestock development under Pastoralism are influenced by some factors, such as rainy seasons, climate, land, water, policy and so on.

By supporting these ideas, Goodwin et al., illustrated specific frequently used categorization that human perceived as needs into five categories: (1) Physiological needs, such as hunger and thirst, (2) Safety needs, for security and protection, (3) Social needs, for a sense of belonging and love, (4) Esteem needs, for self-esteem, recognition, and status, (5) Self-actualization needs, for self-development and realization (Goodwin et al., 2018).

In this regard, the Nomadic Pastoralists to satisfy the first category of needs of Physiological needs use the Pastoral system by growing cattle, and when they consume them as food for hunger, as well satisfy others' basic needs through different derivatives generated by cattle and the money earned. Indeed, the Pastoralism is considered as a way of life that based primarily on raising livestock, particularly small ruminants, cattle and camels depend on geographical context (African Union, 2010).

Generally, Pastoralists have developed management systems based on strategic mobility, which are well-adapted to these difficult conditions. Based on human needs and development perspective, Pastoralists in many areas are adapting to trends such as new economic opportunities and better access to modern means of communication (African Union, 2010). In

this background, this definition helped to understand the living conditions of pastoralists, way of exercising such kind of activity and challenges facing pastoralists that need to be transformed to sedentary cattle keeping through a given appropriate policy formulated, disseminated and implemented accordingly.

Boto and Edeme indicated that Pastoral systems facilitate livelihoods of millions of people living in tough environments where options of land-use systems are highly impossible. Also, the rearing system in pastoral systems contributes enormously to the whole nation's as well as the region's economies by providing considerable environmental services such as carbon sequestration, and biodiversity conservation (Boto, I., & Edeme, 2012). However, consider parameters of Pastoralism exigencies as prerequisites, there exist unlimited issues to pastoral systems based on climate change mostly affects water table sources, rainy shortage due to stray cattle degraded environment and ecosystem. This movement of pastoralism causes perpetual food insecurity and vulnerability, as well as a lack of infrastructures like health and education facilities, inherits many risks of lack of health care services, literacy which promotes a big number of illiterates' people.

Historically, Pastoralism faced an important challenge worldwide, as well as in Rwanda. In this framework, many challenges are generally common to the majority of pastoral systems worldwide. Therefore to mention a few among them:

1) Conduct marketing of the pastoral system is typically complicated by high expenses implied due to the long distances that the pastoralists must carry out, in addition to the poor infrastructure that is generally found in the market place;
2) Most of the time transport costs of Livestock and goods purchased, are often prohibitive and act as a deterrent to traders;
3) Lack of agro-processing facilities means that access to certain markets is limited, hence causes perishability of some animal products, such as milk;
4) Challenge of lack of financial services: it implies that producers do not have the necessary capital to underwrite cash expenses associated with marketing. Moreover, they lack insurance and thus face risks of taking livestock to market, and they lose choice over the timing of sales;

5) Lack of organized and stabilized local markets (inside): At the top, there is a critical factor of lack of market information (price market), and led to exploitation by middlemen brokers;
6) There is an issue of feeding and lack of water for livestock. (Boto & Edeme, 2012)
7) Poor animal feeding as a result of the shortage of farming land, insufficient commercial feeds, and scarcity of water for livestock;
8) Frequent animal diseases that lower productivity;
9) Poor performing of local breeds that form a big fraction of the animal species;
10) Poor veterinary services delivery as a result of lack of Professionals, especially Veterinary Doctors, Assistants, and Artificial Insemination technicians;
11) Poor investors in the livestock industry. The inadequate linkage between research and extension to farmers. Until now, research has been conducted mostly in research stations without much impact on farming communities;
12) Weak farmers' organizations. There are a few farmers associations in the rural areas and these are usually small with low human and financial resources as well as organizational capacity;
13) Limited diversification of animal husbandry. Livestock production has in the past emphasized cattle keeping ahead of other animals and yet the reproductive cycle is shorter for other animals in addition to the advantages of integration (Butera & Rutagwenda, 2004).

Boto and Edeme indicated that to ensure and enhance market access of pastoral system products the following elements have to take into consideration: (1) support marketing of specialty of animal produce, (2) participation in decision of purchasing, (3) improve coordination of supply chain, (4) empower access to finance, (5) build capacity of pastoralists' associations, and (6) introducing veterinary services to maintain the quality of meat and milk products (Boto & Edeme, 2012). Considering population and economic-based challenges in Pastoral system, policy framework is a fundamental element needed and could be developed holistically in order to sustain livestock farming exercised by Pastoralists as an important part in achieving food security, especially in terms of the protein requirements and its potential role can play in poverty alleviation.

In this background, the policy must be referred to a comprehensive understanding of the multiple values of drylands and pastoral system, beyond the narrow focus on commercial products. Besides, environmental services are incrementally highly valued in the global context and their promotion could represent an important economic potential (Boto & Edeme, 2012). Generally, to achieve economic potentialities of pastoralism requires the provision of enabling incentives, such as lands acquisition, access to financial services including credit, relevant research and extension services. In this context, the Government has to ensure if these requirements are in place as well as providing the right services adapted to the pastoral context.

Therefore, Pastoralists need to be fully empowered to influence policies and implementation pathways on a large scale. Also, the changes in socio-economic infrastructures, as well as social services underpinned in favorable policies to pastoralists, are needed. These include extension and training tools that need to be developed in compliance with pastoral systems (Boto & Edeme, 2012). In a concrete manner, all mentioned issues observed in Pastoral systems didn't discourage Rwanda. Instead, the Government of Rwanda has acknowledged livestock as an important part of achieving food security for Rwanda, especially in terms of the protein requirements and also its potential role in poverty alleviation. Policy-based on these issues as well as required programs and projects developed. (MINAGRI, 2004).

In this context, Rwanda had developed and enacted a National Agricultural Policy (NAP) aiming to transform agriculture from traditional to a modernize agriculture including the transformation of Pastoralism to sedentary cattle keeping. The major agenda was to reduce poverty, health problems, making the nation united and democratic. Modernization of agriculture and livestock production was one of the major strategies of the Vision 2020. In the context of history and current efforts to address mentioned challenges on the agriculture sector, the NAP developed in 2004 including other related Policies, programs and systems accompanied it, adopted by Farmers and other stakeholders (MINAGRI, 2004). Therefore, my research focused on direct development benefits that are interlinked to pastoralists and economic-based challenges faced before policy enactment as well as investigated key achievements after implementing National Agricultural Policy in Eastern Province, in Rwanda.

1.2. Problem statement

Being aware of the importance of agriculture in the national economy and of its necessity to ensure food and nutrition security to the whole population, the Government of Rwanda in 2004 has adopted her agricultural policy. It was for the purpose of contributing to the achievement of food security and to boost the Country's economy. This agricultural sector policy reflected agriculture and livestock sub-sectors. Not only these, but also, in livestock development, the policy intended to address pastoral system challenges encountered (MINAGRI, 2004).

However, there was no investigation of the Policy implementation process carried out to know if the Policy enacted was performed well and could help others to learn on success stories, and those which are not performed to be avoided by Policymakers in the future. Knowing that the updated policy has been approved by Cabinet to improve better (MINAGRI, 2018). Particularly, the studies have not yet established development benefits of shifting from pastoralism to sedentary cattle keeping. The absence of not investigating the implementation process of the National Agricultural Policy created a gap of not confirming if the policy contributed to development benefits to Sedentary Cattle keeping vs Pastoralism. Therefore, this study aimed to investigate the development benefits of shifting from Pastoralism to sedentary cattle keeping in rural areas: "Policy framework and Practice in Rwanda". The findings would generate baseline data that can be used to evaluate the success of the 2004 National Agricultural Policy in Rwanda.

1.3. The research objectives

1.3.1. The general objective of the research

The aim of the research was to assess the policy as well as the practice process of transforming pastoralism into sedentary cattle keeping and the associated development benefits in rural areas. The research focused on the Eastern Province, one of the provinces of Rwanda where pastoralism was practiced until recent years.

1.3.2. The specific objectives

1) To investigate the implementation pathways of National Agricultural Policy, aspect of animal resources, in Eastern Province, Rwanda;
2) To assess the challenges of the implementation of the policy in the Eastern Province while transforming pastoral system to sedentary cattle keeping;
3) To identify the development benefits resulting from sedentary cattle keeping practice in the Eastern Province of Rwanda.

1.4. Research questions

In view of the above discussion, the research question is: "What is the extent to which Policy and practices transformed Pastoralism to sedentary cattle keeping in Eastern Province, and what are the possible implications of this for socio-economic development benefits of Pastoralists and for the society as a whole"?. From this question emerge some Sub-questions:

1) How does the implementation pathways of National Agricultural Policy, aspect of animal resources, in Eastern Province, Rwanda?
2) What are the challenges assessed that the Policy faced during the implementation process in the Eastern Province while transforming the pastoral system to sedentary cattle keeping?
3) What are the developments benefits resulting from sedentary cattle keeping practice as opposed to pastoralism identified in Eastern Province?

1.5. Significance of the study

The government of Rwanda acknowledges livestock as an important part of achieving food security in the context of self-reliance, especially in terms of the protein requirements and its potential role in poverty alleviation. It saw as a key pillar for economic growth, poverty reduction as described in the Rwandan Vision 2020 (Republic of Rwanda, 2012). By doing so, many things had been done in aiming of the transformation of the Agriculture Sector, especially

the livestock sub-sector based on policy(MINAGRI, 2004) followed by Ministerial Order put on the place as evidence-informed policy and practice (MINAGRI, 2010). But researchers didn't put attention on harmonization and fine-tuning the process in order to know which are performing well and which achieved intended outcomes. This could help others to learn on success stories and those which are not performed to be avoided by Policymakers and practitioners including beneficiaries, like pastoralists.

In this context, the studies have not yet established developments benefits of shifting from pastoral system to sedentary cattle keeping due to Policy implemented as well Ministerial Order. However, the research findings would help to bridge these gaps, based on the investigation of the Policy implementation pathway and strategies used at different levels. Furthermore, the study would help to ensure if the appropriate pro-pastoral policy including practices and institutional reforms can empower pastoral people and promote equitable access to resources, facilities, and services.

1.6. Scope of the research

The Scope of this research aimed to assess if the developed policy was always being at the center of successes in the development of Eastern Province's animal resources potentiality and population livelihoods. In this background, policy can either promote or hinder economic and social development benefits in pastoral areas of Eastern Province. Specifically, the policy and institutional environment determined access to the resources of these areas and therefore, had a significant impact on equity, productivity, and livelihoods. Limited or uncertain resource tenure and access to, or ownership of land, water, socio-economic infrastructures, and other resources is a long-term, fundamental constraint for pastoralism.

In addition, limited formal education and health facilities, inappropriate market development, and poor access to other livestock services can lead to discontent, generate injustice and further promote conflict. In other words, right pro-pastoral policy and structural reforms can empower pastoralists and enhance equitable access to existing resources; facilities, services, knowledge, lands, and skills required and ensure sustainable livestock development. Indeed, the study was

carried out in a period of 10 years beginning 2008 to 2017 and considers 2 Districts of Eastern Province, i.e. Nyagatare and Gatsibo Districts, but limitation couldn't influence the findings and proposed recommendations, they can be applied to the other parts of Country and elsewhere.

1.7. Limitation of the study

The study conducted related to the investigation of the Policy implementation process through Pastoral system considered as local economic development potentiality now transformed to sedentary cattle keeping. In this regard, the study was addressed to the implementation of the National Agricultural Policy in favor of People exercising nomadic pastoralism in the past. Today, they exercised semi-extensive livestock due to enacted policy and practices followed in Rwanda generally, and particularly in Eastern Province. Therefore, the limitation considered two Districts which are more favorable to the Pastoral system of Eastern Province, such as Nyagatare and Gatsibo Districts whereby livestock activity exercised in the family or individual pastures. Indeed, the study was carried out in a period of 10 years beginning 2008 up to 2017.

Chapter Two: A literature review

2. 1. Introduction

A country has its own strategies to develop itself in all socio-economic aspects as well in related governance. These strategies can be determined in the focus of short-term, mid-term or long-term periods depends on the sensitivity of what a given country wants to address, to handle or to achieve towards socio-economic development and transformation of its community. Rwanda as a country has these characteristics and capability of enhancing the development of all aspects of the country in broad (Republic of Rwanda, 2012). These developments cannot be achieved if there is a gap in Public policies, laws, and regulations to provide clear guidance for actors and community as beneficiaries will be adopted these Public Policies (MINAGRI, 2010). In this regard, many policies had designed and implemented towards related existing problems into the community, in a clear vision of a country (MINAGRI, 2004).

However, in Rwanda, there are many public policies that have been implemented, but in this Research, I mentioned one of them; investigated their limitations and successes in the pathways of implementation considered as determinants of development benefits as well challenges. The Policy considered was a National Agricultural Policy (MINAGRI, 2004) and affiliated Ministerial Order on Stray cattle and other domestic animals as policy framework and practice in Rwanda (MINAGRI, 2010). In this context, my research referred to the challenges observed in Agriculture Sector that led the Government to put on place a policy and interlinked programs which intended to shift from Pastoralism to Sedentary cattle keeping in Eastern Province and in Rwanda generally.

2.2. Definition of key concepts

2.2.1. A Policy

Sharkanskv defined the policy as a proposal or programmed as well as an important decision (Sharkanskv,1978, p. 7). Also, Ikelegbe defined the policy as simple actions that took by a government or private organization (Ikelegbe, 1996, p. 1).

According to Dye: Public Policy is the ability to understand what governments do, why they do it and what difference it makes on the society is very crucial in the study of politics(Dye, 1972). Similarly, Dimock, et al., described Public Policy as deciding at any time or places what objectives and substantive measures should be chosen in order to deal with a particular problem issue or innovation. It also includes the reasons they should be chosen (Dimock et al., 1983, p. 40). Generally, a policy is a plan or course of action, as of a government, political party, or business, intended to influence and determine decisions actions, and other matters.

2.2.2. The public policy features

Ikelegbe illustrated the main features of the policy. He mentioned firstly that the policy involves a choice. It is an important choice or a critical or important decision taken by individuals, groups or organizations. In this regard, there have to be several policy alternatives and policy formation involves the development of several policy alternatives and the choice of an alternative. The Secondly, Author said that the polices are determined courses of action or a projected set of decisions (Ikelegbe, 1996).

Thirdly feature of the Policy is described as result-oriented. Fourth, Ikelegbe showed that policies have to do with particular problems or problem areas. They are not abstracts, but rather relate to and are actually responses to the challenges and pressures arising from an environment. In this context, the policy determines clearly the vision, the guidelines and how to achieve certain goals. Moreover, it provides the shape, on how it is in the present and future actions have to be undertaken. Generally, the policy is a major guideline for action (Ikelegbe, 1996).

2.2.3. The significance of the policy analysis

According to Roberts and Edwards, Policy Analysis is the assessment of the design, the realization of public policy, the norms of policymakers and the conducive environment of the policymaking system and the expenditures of policy alternatives (Roberts and Edwards, 1991, p. 98). This is why, in my Research, I preferred to use this theory in investigating the National

Agricultural Policy in Rwanda to ensure the effects of Policy in socio-economic aspects described as development benefits.

2.2.4. Types of Policies

According to Ikilegbe, Public Policy Analysis should be used in the purpose of driving significance and rational contribution, in the manner of demarcating, researching, and investigating the public problem, which are policy formulation, policy success, impact assessment, policy forecasting as well as for advocacy (Ikelegbe, 1996, p. 8). In this context, Theodore Lowi categorized policies in 3 categories, such as distributive, regulatory and redistributive based on purposes, issues and end-users (Lowi, 1964, p. 677).

2.3. The approaches in policy analysis

In Policy analysis, there are four approaches used in the analysis that is: **perspective, descriptive, micro and macro approaches**. Each approach has its specific characteristics as highlighted below:

2.3.1. The perspective approach

Ikelegbe highlighted that the perspective approach refers to the four characteristics as indicated below:

1) It is analytical because it emphasized the generation of data in which they will be analyzed with social science techniques and methodologies, models and concepts, especially quantitative techniques;
2) It presents the characteristics of results-oriented. In other words, it pre-occupied specific problems and the objective is to offer solutions and advice;
3) It has more focus on the beneficiaries' interests. Therefore, the attention is on the practice and significance of public policy analysis to real-life and societal needs (Ikelegbe, 1996).

2.3.2. The descriptive approach

In the descriptive approach, the Author indicated that it has specific characteristics as described below:

1) It is an academic study whose intentions and aims are not informed by the needs of the prompts of beneficiaries or policy actors;
2) It seeks an understanding of policy processes, policy demands, and stations. It intends particularly to explain the causes of public policy, nature, and trends of costs in policy domains or areas, and the issues of public policies, among others;
3) It deals with the investigations of policy implementation, results, and contributions of particular policies;
4) They are evaluatory and hence retrospective and relate the studies of on-going or completed programs (Ikelegbe, 1996).

2.3.3. Micro approach

According to Ikelegbe, the micro approach goal based on assessment of a particular policy's design, promulgation, realization, results, level of performance, effects as well as problems. In other words, the Author said that it generally refers to an intensive study of the policy involving assessment of archives and other sources of knowledge on the development, accomplishment, and contribution of the policy (Ikelegbe, 1996).

2.3.4. The macro approach

Under this approach, the Author illustrated that broadly four categories in macro approach analysis which are:

- Firstly the micro approach focuses on the nature of the policies themselves;
- Secondly, the micro approach focuses on a thorough investigation of the policymaking process and implementation;
- Thirdly, the micro approach develops models, theories and concepts to explain or interpret policy issues;

- Fourthly, the micro approach puts attention on public policy areas rather than on specific policies (Ikelegbe, 1996).

2.4. The qualitative approaches to the research of public policy

In the research on assessing public policy, there is a need for a specific approach. However, in the investigation of the implementation of public policy there exist different approaches, such as qualitative and quantitative in which are utilized to narrate, characterize and assess data of policy issues understudied. Indeed, in this research, the focus will be oriented on the qualitative approach.

2.4.1. The qualitative approach

According to the Author, the qualitative approach relies on narrations and descriptions rather than quantitative data analysis. Furthermore, the qualitative approach emphasizes background, philosophical, legal and narrations of policy issues or demands and effects. Indeed, this approach describes the policy process, narrates its realization and contributions of related programs (Ikelegbe, 1996, p. 28). In this background, this approach is preferred to be used in order to analyze the implementation of public policy.

2.5. Policy formulation process

According to Dye, policy design or elaboration refers to the methods, conditions, procedures, activities, interactions, and stages by which policies are made (Dye, 1972). In this context, there exists roadmap that have to be followed in policy development, the environment in moment of policy formulation, guidelines, harmonized milestones and relationship between stages and intended outcomes.

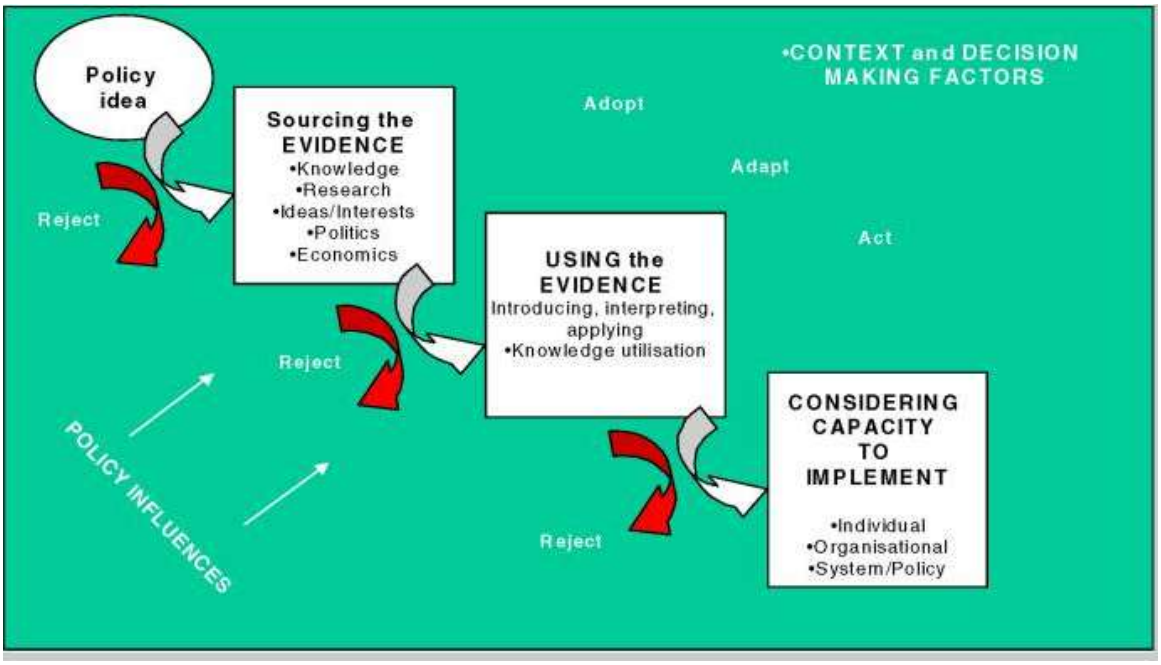
2.6. Pathways of policy-practice implementation to transform lives of the people

2.6.1. Pathways to "Evidence-Informed" Policy and Practice: a framework for action

Theory on the translation of research findings into policy and practice, and on knowledge utilization, offers only part of the solution to this complex task. The policymaking context is highly political and rapidly changing, and depends on a variety of factors, inputs, and relationships (Bowen & Zwi, 2005). In this regard, the "evidence-informed policy and practice pathway" can help both researchers and policy actors navigate the use of evidence (Bowen & Zwi, 2005).

However, the pathway illustrates different types of evidence and their uses in health policymaking and proposes that specific capacities, such as an individual's skills, experience, and participation in networks, influence the adoption and adaptation of evidence in practice (Bowen & Zwi, 2005). Refer, to this pathway, we can investigate how the National Agricultural Policy in Rwanda has been interpreted and acted. The evidence-informed policy and practice in my researcher, they helped me to investigate how policy applied by all concerned Partners from Ministries, Government Agencies, local government entities (Districts, Sectors and environment levels), practitioners including pastoralist population and development partners in livestock development in way of sedentary cattle keeping, by improving living conditions and economic factors. The figure below illustrates how the facts-informed policy and practices pathway supported my research with interlink to the Ministerial Order on stray cattle in Nyagatare and Gatsibo district successes.

Figure 1: Evidence-informed policy and practice pathway



Source: **The Evidence-Informed Policy and Practice Pathway** (Bowen & Zwi, 2005)

According to Bowen & Zwi, using the term "evidence-influenced" or "evidence-informed" reflects the need to be context-sensitive and consider the use of the best available evidence when dealing with everyday circumstances. They continue illustrating that a variety of distinct pieces of evidence and sources of knowledge inform policy, such as histories and experience, beliefs, values, competency/skills, legislation, politics and politicians, protocols, and research results. Indeed, policy analysis theory proposes that evidence is information (information is data that has meaning) "that affects existing beliefs of important people about significant features of the problem under study and how it might be solved or mitigated (Bowen & Zwi, 2005).

2.7. Community-based policy implementation Pathways: opportunities and challenges

2.7.1. Opportunities

2.7.1. 1. Defining changes needed at the Community Level

If a community group is to function successfully, several criteria must be met: the group must address a felt need and a common interest; the benefits to individuals of participating in the group must outweigh the costs; the group should be embedded in the existing social organization; it must have the capacity, leadership, knowledge, and skills to manage the task; and it must own and enforce its own rules and regulations. Steps need to be taken, therefore, whether strengthening or modifying existing organizations or establishing new ones, to ensure that these conditions are in place (Narayan, 1995). However, community-level, focusing on the continued capacity of a community to develop and deliver programs (Sebastian I. C., et al., 2018).

2.7.1.2. Defining changes needed in implementing agencies

Narayan indicated that designing an appropriate outreach strategy to support the community development process often involves difficult changes in the structure and orientation of the implementing agencies. The role of the agency and its relationship with community groups needs to be supported by appropriate changes in legislation. Key issues include the mandate of agencies, funding mechanisms, accountability systems, the registration requirements and legal status of community groups, and use and tenure rights over assets (particularly natural resources) (Narayan, 1995).

2.7.1.3. Community-based development pathway Strategy

In many countries, limited government success in managing natural resources, providing basic infrastructure, and ensuring primary social services has led to the search for alternative institutional options. In recent years, a shift has occurred away from supply-driven toward demand-driven approaches, and from central command-and-control to local management or co-

management of resources and services. This shift is intended to increase efficiency, equity, empowerment, and cost-effectiveness (Narayan, 1995). In additional, rely on a community-based approach. A community-based approach are ways of working in partnership with people of concern throughout community-based program implementation (Sebastian I. C., et al., 2018)

2.7.1.4. Time and Financial Costs

There exist two persistent myths about community-based programs: first that they cost more than conventional programs and, second that they take longer. However, evidence increasingly indicates that when the institutional framework is right, community-based programs actually cost less and are quicker to implement than conventional programs (Narayan, 1995). Furthermore, the financial resources factor deals with financial resources required and/or available for the community-based program (Sebastian I. C., et al., 2018).

2.7.1.5. Community participation:

Local communities hold the key to sustainable development. They have the capacity to take charge of their own development and hence their effective participation is indispensable. Participation should be mobilized and concentrated at the lowest operational (MINALOC, 2008). In perspective of success, imply community acceptance and involvement. Commonly linked with the previous feature, community acceptance and involvement requires incorporation of the targeted community's needs in all aspects of Community Based Programmes (Sebastian I. C., et al., 2018).

2.8. Stages and drivers of implementation: A brief overview

Bertram et al indicated that the implementation of fact-based practice does not happen instantaneously. They said that these stages take a process that can take two to four years to complete in a provider organization at the local level (Bertram et al, 2011). In other words, a concrete manner, livestock development through transformation of pastoralism to sedentary

cattle keeping, it is a progressive process with determined milestones. They should focus on achievement that aiming an improvement of livestock outcomes, in which changing the rearing system and related conditions through which beneficiaries, veterinary service systems, and entire stakeholders support sedentary cattle keeping initiatives. There are four functional stages of implementation: exploration, installation, initial implementation, and full implementation. Sustainability, while often considered a final stage, in fact, must be integrated into each of the four stages if it is to be achieved. (Bertram et al., 2015).

2.8.1. Stages of Implementation

2.8.1.1. Exploration

Under this stage, the Authors indicated that the potential match between community needs and resources and the new practice or initiative requirements must be carefully assessed before a decision is made to proceed or not to proceed. It means that the potential barriers to implementation must be examined before commencement. Therefore, these may include funding, staffing, referrals, system changes, and other factors. Indeed, the expected outcomes of such realization should be a consensus concerning the appropriateness of the program as well as practice to be implemented and a clear implementation plan with tasks and timelines to facilitate its installation and initial implementation (Bertram et al., 2015).

2.8.1.2. Setting implementation

In this background, when a decision is taken, then new prevention is immediately initiated. However, there are key tasks that are required to be completed before end-users experience a change in practice. Furthermore, these actions define the implementation process. The inputs will be utilized as structural supports required to start the new projects organized. Also, these activities and their associated start-up costs are necessary first steps to begin any new endeavor (Fixsen, et al., 2005).

2.9.1.3. Initial implementation

During the stage of initial implementation, amidst the inherently difficult, complex work of implementing something that requires new understanding and activities, the excitement and anticipation of new practice meet compelling forces of investment in prerequisite conditions (Fixsen, et al., 2005).

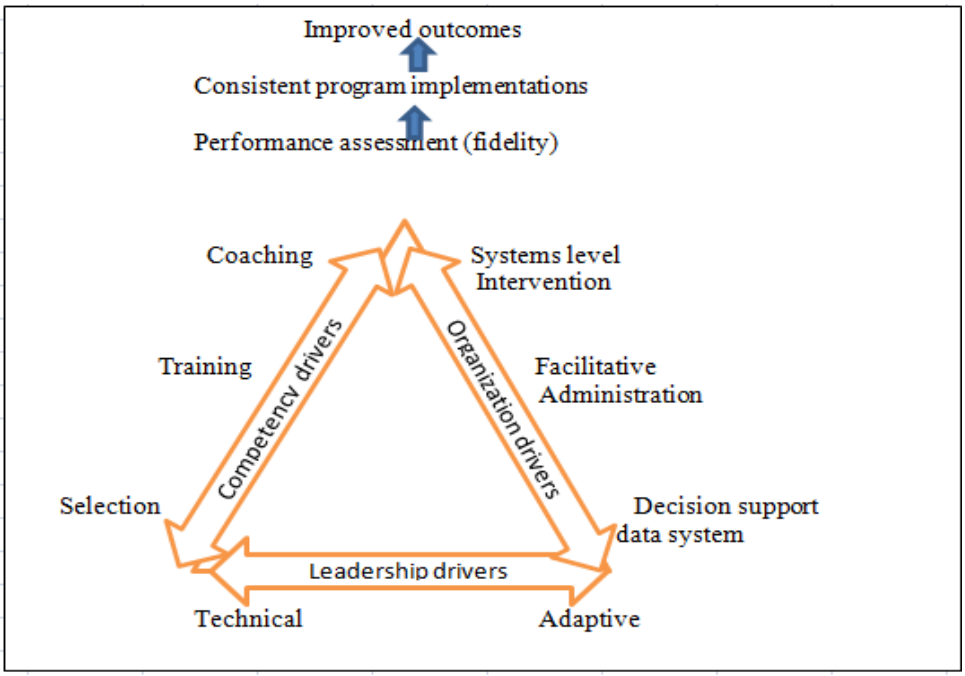
2.9.1.4. Full implementation

Full implementation of an initiative can occur once the new program components are well supported, integrating at all levels (federal, state, local) infrastructure, policies, and procedures that facilitate implementation and sustainability so the new practice is well-established in practitioner competencies. Over time, the program or initiative becomes the new norm for "business as usual"(Fixsen, et al., 2005).

2.9.2. Implementation drivers

Implementation drivers are core components that establish the capacity to create practice, program, and systems-level changes necessary for program success. Indeed, implementation drivers (see Figure 3) must be analyzed and operationalized within each stage of implementation. Each of the three classes of drivers and their structural components and activities collectively contributes to effective, sustainable implementation (Fixsen, et al., 2005).

Figure 2: Implementation drivers



Source: Fixed & Blasé, 2008

Collectively, implementation drivers ensure high quality and sustainable programs or initiatives. Competency drivers develop the competence and confidence of practitioners by attending to staff selection, training, coaching, and performance assessment (fidelity). Organization drivers create a more hospitable administrative, funding, and policy environment to ensure that the competency drivers are accessible and effective, and to ensure continuous quality monitoring and improvement. Leadership drivers differentiate adaptive challenges from technical challenges so as to apply the appropriate actions to maintain a focus on quality. (Fixsen et al., 2005).

2.10. Development benefits of smooth implementation of a community-based policy

2.10.1. Characteristics of successful community Groups

According to the Narayan, the local or community level collaboration occurs when the members of a group realize that they cannot carry out certain tasks or achieve their goals individually. It depends on the nature of the benefits or the task, the limits on their own skills, capacity, and resources (Narayan, 1995).

2.11. Cattle keeping: Pastoralism, Nomadism, Vs Sedentary

2.11.1.Definition of Pastoralism

Jonathan defined Pastoralism system like an extensive livestock production in the rangelands. He said that it is one of the most sustainable food systems on the planet (Jonathan, 2015). Also, Pastoralism is a subsistence pattern in which people make their living by tending herds of large animals. In this context, the species of animals vary with the region of the world, but they are all domesticated herbivores that normally live in herds and eat grasses or other abundant plant foods.

Some Authors cited by FAO indicated that Pastoralism and extensive livestock production, with the exception of reindeer, is premised on the presence of rangelands. The literature uses several terms for the main world's rangelands: African savanna, Eurasian steppe, South American savanna, North American prairies, Indian savanna, and Australian grasslands (FAO, 1999).

2.11.2.The various form of Pastoralism

According to Boto & Edem, there are two forms of pastoralism, which are nomadism and transhumance. The Authors said that pastoral nomads follow a seasonal migratory pattern that can vary from year to year. In this regard, the duration and destinations of migrations are determined primarily by the needs of the herd animals for water and fodder. Furthermore, the nomadic societies do not create permanent settlements, but rather they live in tents or other relatively easily constructed dwellings the year-round. Indeed, Pastoralist nomads are usually self-sufficient in terms of food and most other necessities. (Boto & Edeme, 2012).

While the Authors said that Transhumance pastoralists follow a cyclical pattern of migrations that usually take them to cool highland valleys in the summer and warmer lowland valleys in the winter. Also, in this form pastoralists conduct the regular movement of herds among fixed points to exploit the seasonal availability of pastures (Boto & Edeme, 2012).

2.11. 3. Pastoralism in the world and Africa

According to Jonathan, Pastoralism is practiced by many people worldwide varied between 200 and 500 million people. Therefore it is considered all nomadic communities, transhumant herders as well as agro-pastoralists. Also, Pastoralists are generally facing similar challenges in both developed and developing countries. (Jonathan, 2015). In this background, extensive pastoral production is practiced on 25% of the global land area, from the drylands of Africa and the Arabian, Peninsula to the highlands of Asia and Latin America (Boto & Edeme, 2012).

Pastoralism in Rwanda was characterized by farmers moved their cattle from one place to other places, based on seasons and climate changes in searching herbs and water. Pastoralists suffered a challenge of prolonged drought sometimes caused a death of cows that implied a big loss of cows. In these circumstances, a large number of pastoralists obliged to make unlimited kinds of movements for searching favorable areas could allow feeding their cows in such circumstances of climate change. Most of the time the water for livestock was not enough and located in limited areas. The Pastoralists confronted with high pressure of animal diseases, such as Foot mount Disease, lump skin disease, brucellosis and Ikibagarira (MINAGRI, 2004).

There is no market of milk and cows as well as animal products. In this model of farming, the lands were big and permitted the movements of pastoralists, but there is no rationality of production given by the number of cows possessed by Pastoralists and the area covered. Moreover, there was a conflict between cattle keepers and farmers due to go to search herbs illegally sometimes attacked farmers' plantations like maize, sorghum, bean, and everywhere they could attain and satisfy their cattle. Therefore, livestock production was not contributing to the National Gross Domestic Product (NGDP).

2.11.4. What makes the abortion of pastoralism so challenging or why has pastoralism survived?

Given the forces ranged against it, it is perhaps surprising that pastoralism has survived at all. However, pastoralists do have some features in their favor. These are **Flexibility, Low costs,**

Freedom of movement and Light regulatory environment. In this background, Pastoralists have long-term flexibility derived from their ability to exploit patchy resources. It has often been observed that the more 'nomadic' pastoralists are, the better they are able to survive climatic catastrophes such as blizzards and droughts (FAO, 2005).

When pastoralists come up against highly efficient modern era livestock industries they face major price competition for their products especially as these may often be dumped. Sometimes by the same bodies offering pastoralists emergency assistance with another arm. However, pastoralists do not have to meet sometimes onerous hygiene costs, packaging, transport and tariffs. Moreover, the single most important cost to all intensive systems is an investment in land itself, both enclosing it and maintaining its productivity, a cost that pastoralists do not bear, except on the rare occasions when they destock to conserve forage (FAO, 2005).

2.11.5. Key trends in twentieth-century pastoralism

Whatever the future of pastoralism, its present shape has evolved under pressure from very distinctive twentieth-century influences, making impossible any return to some prior imagined golden era. These factors are summarized in the following table:

Table 1: Key factors shaping twentieth-century pastoralism

Factors	Impact
Modern veterinary medicine	Increases in productivity and greatly enlarged herbs
Modern weapons	Major decline in predator threats
Enclaving	The collapse of traditional "safety-nets" in terms of long-distance migration in a period of climatic extremes
International pressure for hygiene in slaughtering and dairying	Declining market for pastoralist products
Declining prestige of dairy products	Terms of trade running constantly against pastoral livelihoods
The world market in livestock products.	Governments import cheap meat, milk etc. to satisfy urban demand at the expense pastoral sector.
Ideological interference by the state	Inappropriate social and management strategies adopted and maintained by a combination of subsidized inputs and implied violence.
Alternative calls on pastoral labor.	Pressure for children to go to school and younger people to earn cash outside the pastoral economy.

Factors	Impact
Modern transportation structures	Affects systems where transport is a major element of economic production (Hamas, horses).
Introduction of high-input, high-output exotic breeds	Makes pastoralists dependent on effective infrastructure where in fact the system cannot supply inputs regularly thereby creating periodic crises.
Emergency relief, restocking and rehabilitation programs	Keeps non-viable households in pastoral areas, thereby accelerating the cycle deficits.
Conservation lobby	The pressure to turn previously pastoral land over to reserved wildlife/biodiversity regions with corresponding hard currency income from tourism.
Encroachment on rangeland	Rangeland is being eliminated through the use of political attractive but often uneconomic irrigation systems.

Source: (FAO, 2005)

2.11.6. Where is pastoralism headed?

Evidence as to the future of pastoralism is generally discouraging; throughout Africa and the Near East pastoralists are being driven into ever more marginal areas through the gradual expansion of arable terrain. Transport and enclosed livestock production are forcing out the remaining pastoralists in the America and the circum-Mediterranean region. The marginal lands that were previously the province of pastoralists are increasingly coming into focus as reserves of biodiversity. Besides, the veterinary services are weak and market prices for livestock products reflect the same challenges in the region. In this situation, the consequences continue accelerating impoverishment in many countries, that can be addressed by minerals exploitation but not for the case of Pastoralism. (FAO, 2005).

We observe that Pastoralism is likely to simply disappear in any region where it competes with agriculture. In such circumstances, the reason behind Pastoralism's challenges in some areas often depends on the mining of fossil water, which is not a long-term development strategy. Therefore in some decades, pastoralists may reclaim such land. The analysis illustrated the ancient North African development of much of the northern Sahara through large irrigation channels is today only an archaeological curiosity in a pastoral zone (FAO, 2005).

2.11.7. Development benefits of pastoralism versus sedentary lifestyle

There are different values of pastoralism that can be considered as directs or indirect. Among direct, there are milk, meat, organic manure, while for the indirect values can consider skins and money can be earned after selling animal products as well as the animals (cows, camel, etc.).

2.11.7.1. Direct values of pastoralism

According to Nyariki, the 'economic contribution' of pastoralism should integrate economic and social systems of a country or community or group of communities. A 'social system' refers to the interdependent relationships between the economic factors of production (land, labor, and capital) and non-economic factors including attitudes towards life and work, administrative structures, patterns of kinship and religion, cultural traditions and systems of land tenure (Nyariki & Amwata, 2019).

2.11.7.1.1. Animal and milk sales and consumption

Boto and Edeme illustrated direct values of Pastoralism such as Milk sold and consumed as an important direct value of pastoralism in developing countries but not in developed economies where the dairy sector is highly intensive and uses specialized breeds. Indeed, in such circumstances, milk production from pastoralist systems is less competitive. Furthermore, it is noted that some industrialized countries maintain a vibrant pastoral dairy sector through the production of niche products, such as organic cheese (Boto & Edeme, 2012).

2.11.7.1.2. Hides and skins sales and consumption

Another direct value from Pastoralism can be observed through the exploitation hides and skins sold, as well as its use in the pastoralist production set, which is an important direct value of pastoralism. In other words, the trade of hides and skins is usually linked to the animals' sales for

meat. Moreover, in some pastoral systems, the animals lost to disease can provide skins for processing although the meat is not commercialized (Boto & Edeme, 2012).

2.11.7.1.3. Transport and traction

According to Boto & Edeme, the cost of transport in Pastoralism is high and is one factor affects production costs. Then, it is a major constraint for market access. In these circumstances, the contribution of the animals' products for the livelihood of the owners is significant but rarely quantified in monetary terms. However, in some areas, Livestock provides power for transport and traction for many pastoralists in some regions (Boto & Edeme, 2012).

2.11.7.1.4. Manure and agricultural productivity

According to Boto & Edeme, manure from livestock is used as one of the major methods used to maintain soil fertility and it is still a common practice in many production systems. In this context, the manure of animal as pastoralism product is considered as a direct value, if considered as a final commodity able to be valued using market prices, or as an indirect value if manure is considered as an input needed for some natural processes. The Authors mentioned that manure from different animal species can be collected, kept, dried and sold or used by pastoralists to complement their income or contribute to their livelihood (Boto & Edeme, 2012).

2.11.7.2. Indirect values

Under indirect values, Boto & Edeme mentioned that manure, traction, and transport are tangible indirect values. Also, the Author highlighted complementary products such as gum arabic, honey, medicinal plants, wildlife, and tourism. Lastly, they also include less tangible values including financial services (investment), ecosystem services (such as biodiversity, nutrient cycling, and energy flow) and a range of social and cultural values (Boto Edeme, 2012).

2.11.7.2.1. Contribution of pastoralism to agriculture

Boto & Edeme indicated that there is a linkage between pastoralism and agriculture. Furthermore, the Animal trading for cross-breeding or stocking programs has been promoted in many countries as a way to improve the productivity of local breeds or provide alternatives to enhance the livelihood of smallholders (Boto & Edeme, 2012). However, in many cases, the consequence of these programs is the loss of indigenous breeds because of a substitution process guided solely by market forces focused on productivity traits.

2.11.7.2.2. Payments for Ecosystem Services

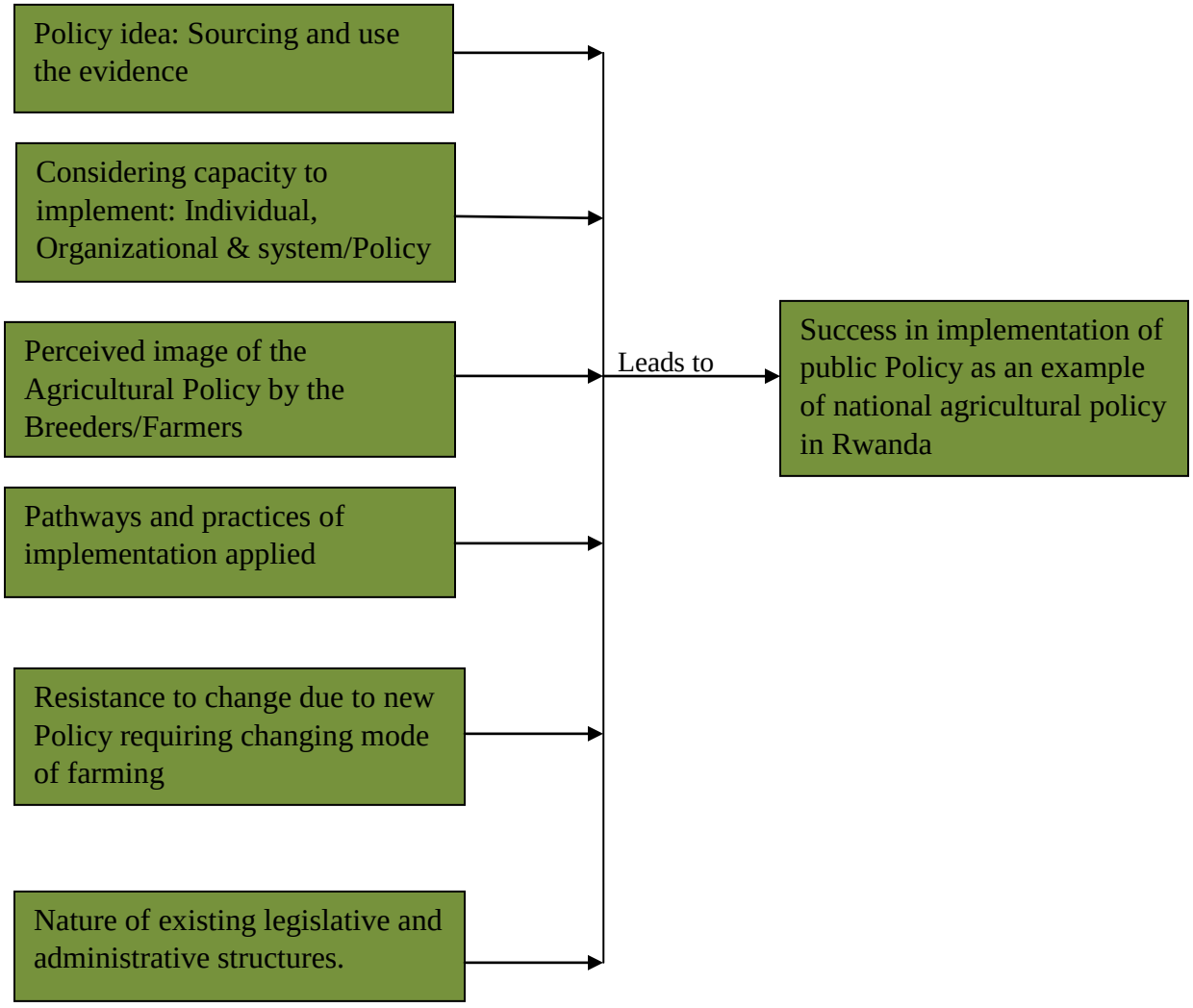
The Authors underlined again that the sustainable pastoral system maintained several critical ecosystem services. However, these services are typically not valued or traded on markets. Tools such as economic valuation and payments for ecosystem services can internalize the value of biodiversity and ecosystem services, and provide a strong economic incentive for conserving biodiversity (Boto & Edeme, 2012).

2.12. Conceptual Framework

Henderson argued that the major aims of research should be either to relate data to a theory or to generate a theory from data. In order to hold existing and new knowledge, theory should provide a conceptual framework, so that knowledge can be interpreted for empirical application in a comprehensive manner. The conceptualization was based on the following variables: Policy idea, considering capacity to implement, the Perceived image of the National Agricultural Policy by the Breeders/Farmers; pathways and practices of implementation applied; Resistance to change due to New Policy requiring a changing mode of cattle farming; nature of existing legislative and administrative structures.

These will form the independent variables of the study. The dependent variable is the quality of implementation of the National Agricultural Policy explained in terms of development benefits addressed Population issues and socio-economic issues related Pastoral system. The figure below shows the conceptualization of the relationship between the dependent and the independent variables.

Figure 4: The concept framework



Chapter Three: Research Methodology

3.1. Introduction

This chapter focuses on the research design was used in this study. Research design is defined as "the plan, structure and strategy of investigation conceived so as to obtain answers to research questions and to control variance." A research design guides the research in collecting, analyzing and interpreting observed facts. This chapter presents the research areas and details the approaches that were used in the research project. This includes the study design, study population, sampling techniques, data collection instruments or tools, data collection procedures, data collection methods and data analysis (Kerlinger, 1964, p. 275)

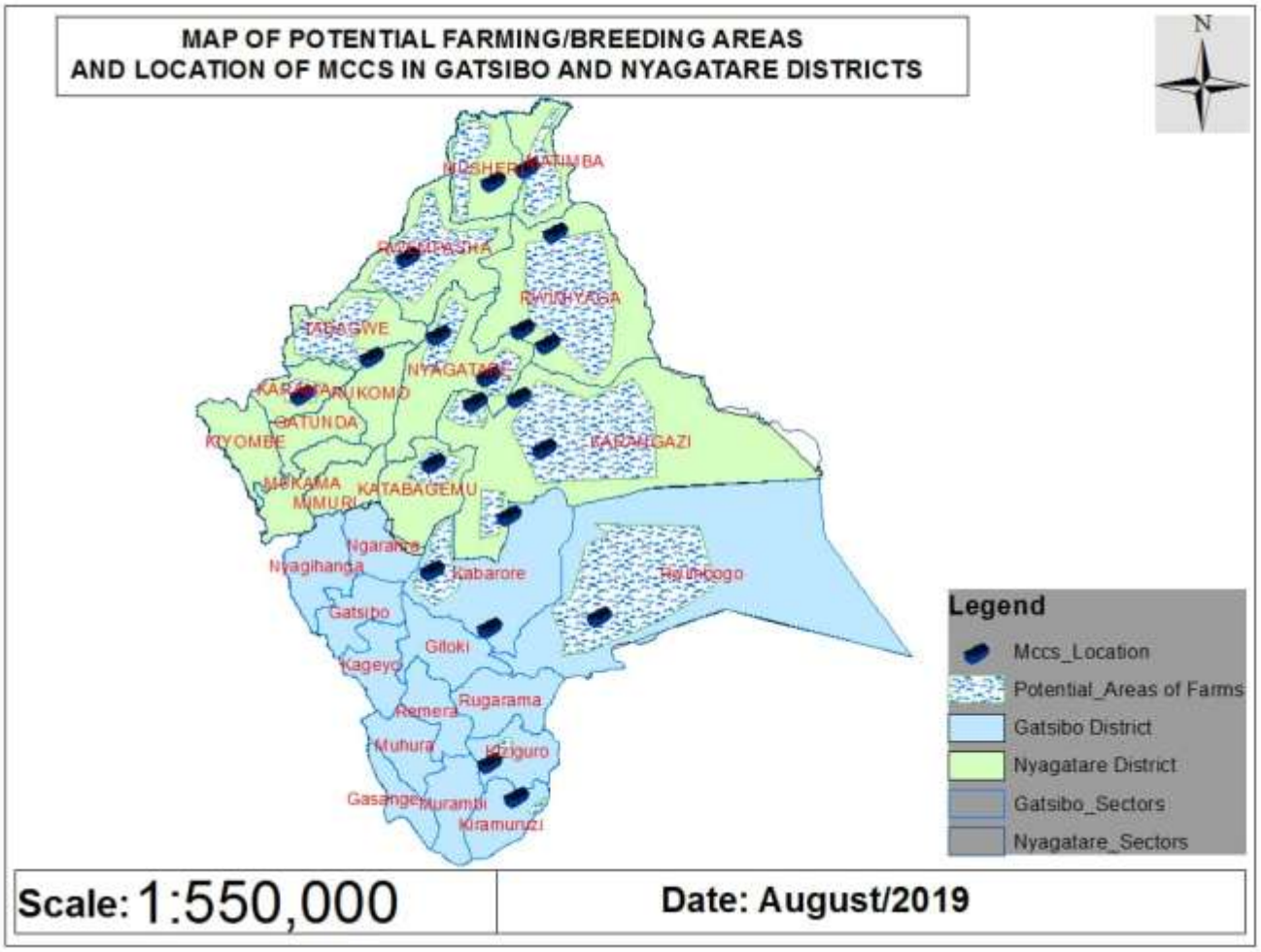
3.2. Sites description

The research was conducted in Nyagatare and Gatsibo Districts, in Eastern Province. Nyagatare and Gatsibo Districts are among 7 Districts composed of Eastern Province. They constituted based on Law Governing Local Government in 2006 as amended in 2013. Nyagatare District is sub-divided into 14 Sectors (Imirenge), 106 cells and 628 villages and spread over an area of 1,741 square kilometers making it the largest district of the country by area. The District borders with Uganda in the North, Tanzania in the East, and in the South by Gatsibo and by Gicumbi District in the West. Nyagatare is known for its fertile soils, cattle breeding and thereby dairy production, its industrial exploitation of granite and its close proximity to the National Park Akagera, which brings touristic opportunities, while Gatsibo District is located in South-East of Eastern Province, with 14 Sectors, 69 Cells, and 603 Villages. The Gatsibo District borders with the Akagera National Park in East, Gicumbi District in North, and in South by Kayonza District They are predominated of farming activity as described by the Map above.

Therefore, the map below illustrates the potentialities of the rearing system and location of MCCs in Nyagatare and Gatsibo Districts as research study areas. Generally, Nyagatare and Gatsibo districts are dominated by farming activity. Their breeders are organized and grouped into Cooperatives of farmers, where most of them are recognized as Milk Collection Centres.

Therefore, Nyagatare and Gatsibo have well organized and functional 15 MCCs and 6 MCCs respectively. The study covered only 8 Milk collections centers in Nyagatare District and 3 Milk Collection Centres in Gatsibo District based on proportional representation.

Figure 3: Geographical description of the Research areas



3.3. The design of the research

The research conducted founded on the systematic investigation by considering qualitative and quantitative data collected through different levels of LG in 2 Districts of Eastern Province concerned by the implementation of NAP. It was addressed to local leaders & government Officials, farmers (cattle keepers) or members of Milk Collection centers/farmers' cooperatives

as well as Union Members. It takes the form of systematic investigation into the phenomena of concern to the field of study. In this context, it is using a range of quantitative and qualitative approaches, the results of which add to, confirm, or reject what is already known (Wojtek & Krzanowski, 2007).

A qualitative design enabled my research to reveal the complexities of the policy and practices effects on the Agriculture sector, especially the animal resources sub-sector. It was done through Pastoralists exercising livestock activity in 2 Districts of Eastern Province adopted sedentary cattle keeping in rural areas. It enabled us to build a complex and holistic picture through the analysis of words, to report specific views of the informants and to conduct the study in a natural setting. According to Abasede and Onanuga, qualitative research is a systematic, subjective approach to describe life experiences and give them meaning (Abosede & Onanuga, 2016).

Secondarily, this research was exploratory research as it tried to uncover relationships and dimensions of a phenomenon by investigating the manner in which the phenomenon manifests itself. Thirdly, it is descriptive because its design refers to the accurate portrayal of particular individuals or real-life situations, for the purpose of discovering new meaning and describing what exists by categorizing the information generated from the study. In this study, Pastoralists exercising farming in Nyagatare and Gatsibo districts grouped into Cooperatives defined as milk collection centers were interviewed. The members grouped in these Milk collections centers provided completed and accurate information considered in the context of highlighting the process of implementation of policy and its effects. These included development benefits as well as existing challenges during the implementation of shifting from Pastoral system to sedentary cattle keeping.

To a limited extent, the research was quantitative as some statistics were used to measure the contributions and achievements of livestock production. In this context, it covered the period of the last 10 years from 2008 up to 2017 after the promulgation of the Policy (Policy was adopted in 2004) at different Milk Collection Centers. These statistics helped to illustrate the concrete improvement in livestock production (milk and cattle population) as the benefit of Policy

enacted. This is why I've used a combination of methods in what called "multiple operationalisms" or triangulation (Miles and Huberman, 1994, p. 51).

For time management and significant representation, during data collection, the focus group discussion approach was adopted. Here the groups' discussions were composed by Local Leaders at different levels, the committee members of Milk collection centers and government Officials representing District/Sector and RAB. In addition, I collected secondary data through the analysis of the document. The document analysis approach was highlighted based on administrative data from the reports, minutes of meetings and other useful administrative documents at the District and RAB office. Therefore, the analysis of the documents helped me in assessing the resolutions or recommendations made by the District council in mater of handling issues encountered in the implementation of National Agricultural Policy while data related to livestock population and productions illustrated the concrete effects of the Policy pathway of implementation.

Finally, in the determination of Population size, I applied a simple random sampling to select farmers/breeders. Farmers/breeders were recruited among the members of Milk Collection Centers as Cooperatives, Local leaders and RAB officials were selected purposively. I selected Local Leaders from Nyagatare and Gatsibo Districts' Executive committees and Technicians. The Technicians included district and sector veterinary and agriculture officers, and one of the sector and district executive committee members selected on availability. At RAB, I selected one of the officials whose jobs involve much of cattle keeping.

3.4. The qualitative approaches

The research conducted is about a National Agricultural Policy implementation in perspective of addressing existing challenges in the agriculture sector including animal resources sub-sector in Rwanda. This is why in my research I preferred to use qualitative method to analyze the implementation of this policy by investigating the development benefit brought since it is included in Public Policy enacted.

3.5. Population of the study

In this context, the study conducted is related to the Population exercising Pastoral activity in the last 10 years. This activity is considered as local economic development potentiality transformed by the National Agricultural Policy accompanied by Ministerial Order on Stray Cattle and other domestic animals in 2 Districts of Eastern Province. These Districts are today exercising farming activity in pastures or in semi-extensive livestock in perspective of sedentary cattle keeping opposed to Pastoralism. Therefore, the study was addressed to farmers (cattle keepers or Breeders), local leaders, government officials of District and Sectors as well RAB.

The District Executive Committee members and Sector Executive Secretaries as local leaders and Government Officials (District, Sector and RAB) are those mobilizing farmers/breeders. They are those who are handling conflicts and other related disputes during the implementation of Central Government Policy and programs related. All were played a significant role in clarifying how Policy contributed to transforming Pastolarism to Sedentary cattle keeping during Policy investigation. In this background, the limitation considered 2 Districts that are most favorable to the traditional Pastoral system in Eastern Province, such as Nyagatare and Gatsibo Districts whereby livestock development exercised on big land in the family or individual pastures. Due to the limitation of budget constraint and time all farmers grouped in Cooperatives were not considered, I used simple random sampling with a significant representative in terms of proportional applied to the total number of members of MCCs translated in a number of members of Selected Representation for each MCC.

3.6. Focus Group Discussion

The focus group discussion was constituted based on the category of informants/ respondents. Therefore, 3 categories of focus group discussions were formed. A first group is composed of the farmers/breeders from committee members of Milk Collection Centers and farmers from the Union of Farmers. The second one is constituted by Local Leaders (EXECOM-Executive Committee members) and the District's Officials (Agronomist, Veterinary and Sector Executive Secretary) and third is composed by the Rwanda Agricultural Board Official at District Level in

order to facilitate the communication and participation of all the respondents. However, 15 questions were asked during the interviews (see appendix 1).

3.7. Sample size

In the Research area, there are 21 MCCs in 2 Districts, whereby Nyagatare District has 15 MCCs and Gatsibo District posses 6 MCCs. For equity and representation of each District, due to the number of MCCs existing in each District, I considered half of existing MCCs per District during the interview, i.e. 3 MCCs of Gatsibo and a half of 15 MCCs for Nyagatare equals to 7.5 MCCs approximately 8 MCCs. Therefore, the sample was made by 3 MCCs of Gatsibo District and 8 MCCs of Nyagatare District. In addition to that, the simple random sampling of MCCs was guided by the numbers of important members of MCCs after applied proportional representation. The following is the synthesis of Population size based on simple random sampling.

Table 2: Membership of MCCs in Gatsibo District and selected respondents

S/N	Sector	Cooperative/ MCC	Membership	Proportional Representation	Selected Representation Respondents
1	Rwimbogo	Rwimbogo Dairy Cooperative	240	18%	44
2	Kiramuruzi	MUDACOS	163	12%	20
3	Kabarore	Kibondo Farmers Cooperative	244	18%	45
4	Kiziguro	Kiziguro Dairy Cooperative	140	11%	15
5	Ngarama	CODEN	383	29%	111
6	Muhura	KOIIMU	150	11%	17
	Total		**1,320**	**100%**	**252**

In Gatsibo District only 3 MCCs selected that is Rwimbogo dairy cooperative, Kibondo Farmers Cooperative, and CODEN. In total, 200 farmers or Breeders as members of MCCs were sampled randomly in my research study.

Table 3: Membership of MCCs in Nyagatare District and selected respondents

S/N	Sector	Cooperative/ MCC	Membership	Proportional Representation	Selected Representation Respondents
1	Rwimiyaga	Kirebe	275	11%	31
2	Matimba	Matwoki	114	5%	5
3	Musheri	Zirahumuje	205	8%	17
4	Tabagwe	Muvumba	89	4%	3
5	Nyagatare	Nyagatare	172	7%	12
6	Karangazi	Rwabiharamba	397	16%	64
7	Rwempasha	BCRK	170	7%	12
8	Rwimiyaga	Isangano	273	11%	30
9	Nyagatare	Abashumbabeza	70	3%	2
10	Karangazi	Terimberemworozi	125	5%	6
11	Katabagemu	KAFCO	84	3%	3
12	Karangazi	KAMDAMACO	177	7%	13
13	Karangazi	Abarwanashyaka	104	4%	4
14	Rwimiyaga	BNRT	150	6%	9
15	Karama	HOK	60	2%	1
	Total		**2,465**	**100%**	**212**

The table above illustrated that only 8 MCCs in Nyagatare District were selected, that is Kirebe, Zirahumuje, Nyagatare, Rwabiharamba, BCRK, Isangano, KAMDAMACO & BNRT. Therefore, 188 farmers or breeders represented members of MCCs in Nyagatare District were selected randomly.

In this context 399 persons were interviewed, whereby 388 Farmers/Breeders from Milk Collection centers, 2 District's Executive committee members, 2 Sector Executive Secretaries, 6 Officials under Agricultural departments (2 Districts' agronomists, 2 Districts' Veterinaries and 1 Sector Agronomist & 1 Sector Veterinary) and 1 Official from RAB. However, during field research, I considered a Focus group discussion of 1 to more than 1 participants because I considered interviewing MCC or Local Leaders and Government Officials stands alone, as they were not in the same location and Responsibilities as well the composition was not so big.

The Carey reinforces this view when she states that the fewer people there are in the group, the greater the likelihood that they will interact, and reiterates the ease with which moderators can manage and attend to a smaller group (Carey, 1994).

3.8. Data collection process

In my research, data were collected through two primary data collection methods: (i) focus groups constituted by farmers/breeders from committee members of MCCs, (ii) Local Leaders and Government Officials and (iii) individual interviews constituted by 1 Official of RAB. The focus group interviews were conducted in the open-air at the Milk Collection Centers physical places of production, District and Sector headquarters. Secondary data sources in the form of annual reports of the animal resources aspect like milk production, minutes of the meetings and useful administrative documents provided written information which was used to verify accuracy of data collected through interviews and policy effects.

In the purpose of investigating the livestock production as a contribution of the policy effects, in this particular research, some statistics are needed, for instance, the Liters of Milk collected at Milk Collection Centres, in Nyagatare and Gatsibo Districts as annual production in last 10 Years consecutively. These qualitative data assisted in the data presentation and analysis of the information collected through interviews. According to Miles and Huberman wrote that using triangulation can make findings more robust (Miles, M.B. and Huberman, A.M., 1994). Indeed, triangulation means combining research methods to give a collaboration of information. It is often beneficial when designing an evaluation to incorporate aspects both of qualitative and quantitative research designs.

3.9. Data collection tools

3.9.1. Interviews

Data collection techniques were mainly in the form of interviews, focus groups, and direct observations. The information collected was captured and translated from Kinyarwanda into English. As for the analysis process, we favored thematic content analysis.

3.9.2. Document analysis

The templates were designed to help in the assessment of the livestock production statistics, minutes of the meetings as well as other useful administrative data. In addition, the documents were assessed in order to identify documented challenges encountered led to the resolution taken to address the issue of persistent challenge(s) that need to be still addressed. But also, the resolutions took by the District's council and some cases sanctioned were assessed to ensure policy implication vis-à-vis beneficiaries, implementers and development benefits holistically.

3.9.3. Case Study

I conducted research in Nyagatare and Gatsibo Districts, in Eastern Province. I assessed the data related to milk collected through MCCs in the last 10 years in the purpose of illustrating a systematic trend of increases in milk production as a contribution of National Agricultural Policy including ministerial order on stray cattle and other domestic animals in the research areas in sub-sector of animal resources.

Furthermore, the shifting in a number of cow population by races, such as exotics and crossbreeding were assessed respectively in order to know if these changes either in increasing or shrinking by race is due to Policy effects or others factors. These statistics could be supported by the narrative words as provided by the tellers during the focus group discussion at field works with the precision of appreciation or denial of policy effects. Therefore, the implementation pathway of National Agricultural Policy accompanied by ministerial order was investigated through interviews composed of 15 questions, whereby 8 are appropriated to focus group discussions of farmers from MCCs committee members, 10 to Local Leaders and Districts' Officials/Staffs selected while 6 questions were addressed to Professional of RAB.

3.10. Data analysis and reporting

Analysis focus group discussion usually yields both qualitative and observational data where analyses are demanding. In my research, the emphasis in data analysis was focused on the

content of words provided during interactions carried out with respondents, analyzed documents like resolutions taken and implemented as well as statistics data analysis and interpretation carried out.

3.11. Conclusion

This chapter indicated the geographical location of the research areas and the research design of the study. It was referred to as different methods, among them including qualitative and quantitative methods. The research was also considered as an exploratory method simply because it tried to uncover the relationship and dimension of a phenomenon through the investigation of phenomena manifested. The research considered a period of last 10 years, i.e. from 2008 up to 2017. The policy investigated was enacted in 2004. Indeed, the Policy under analysis classified under public policy. Therefore, the qualitative approach analysis prevailed. The population of the study was addressed to farmers (cattle keepers), local leaders, government officials of Districts and Sectors as well RAB. In data collection, the interview, focus group discussions and simple random sampling of MCCs guided by the important numbers of members of MCCs after applied proportional representation. The questionnaire and templates were developed and used in data collection.

Chapter Four: Data presentation and analysis

4.1. Introduction

This chapter presents data analysis, interpretation, and discussion of the research findings from the information given by the 3 categories of Focus Groups of respondents. The chapter examines, the policy implementation pathway, challenges encountered and how were addressed as well as the development benefits resulted in the policy.

4.2. Implementation pathways of National Agricultural Policy, in Eastern Province, Rwanda

4.2.1. Farming activity and challenges in the last ten years in Nyagatare and Gatsibo Districts

During field research and data collection, Participants from Famers/Breeders grouped in MCCs constituted one focus group discussion that was interviewed. They described how the farming activity was in the last 10 Years, ie from 2008 after the national agricultural policy was developed and enacted:

> *"We had local cows so-called "Ankole", the land was so big and allowed to move cows from one place to another. The water for livestock was localized in some parts of Karangazi and very difficult to access it, except to make a long-distance. The milk production was very little and only for family consumption. When there was a change of climate, we recognized the death of big numbers of cows but we had the possibility of moving cows to another favorable area. But after the dissemination of National agricultural Policy, there was an issue of use fragmented land for a big number of cows possessed. Now, we exercise breeding activity in pastures. Some of them are developed. We have improved cows, like cross-breeds. Today, we have where we supply our milk as well as the market of milk exists, the milk production increased, there is a big change generally." (Farmers/Breeders from Kirebe MCC)*

> "*The Karangazi Executive Secretary and Sector Veterinary said that the breeders had a big number of cows, so that when there was a challenge of prolonged drought a certain number*

of cows could die but when it rained the breeders survived with the remained cows and continued to move. In this context, there was a conflict between cattle keepers and farmers due to go to search herbs illegally sometimes attacked farmers' plantations like maize, sorghum, bean, and everywhere they could attain and satisfy their cattle. The local authorities were mostly occupied in disputes resolution. In that situation, the breeders experienced to stray cattle, to them it was very favorable and not demanding high expenses compared to our days". (Executive Secretary, Agronomist, and Veterinary of Karangazi Sector)

"Before changing pastoral system to sedentary cattle keeping, we stray cattle on common pastures. Livestock production like milk had no market, only for family consumption. We exercised livestock activity like a culture rather than a business. The animal diseases were frequently and killed more cows. But after shifting from pastoralism, we changed local cows to cross-breeds. But not all farmers or breeders improved cows; there are some breeders with local races. It needs continuous mobilization". (Farmers from Isangano MCC)

"In Karangazi Sector as all neighbors sectors, we had local cows with long horns, with limit milk of production and we stray cattle in common pastures. When we met prolonged drought we are moved cows to military zone even Tanzania areas like neighboring countries. We did a long distance to find water for livestock. We had an issue with animal diseases and no veterinary service. The market for cows was not organized and to sell cows we are obliged to make the long-distance to the cattle markets (Igikomera), and they are organized irregularly. The milk production was very little and only for family consumption. Now, we exercise breeding activity in pastures distributed by the national task force in charge of farms distribution. Most of them are fenced. We have improved our cows; we have cross-breeds and Frisian". (Farmers from KAMADMACO MCC)

"In this area, we had local cows with long horns, with low milk of production and we stray cattle in common pastures. We had a critical issue of treating animal diseases due to the externalities from Akagera National Park and Gabiro Military Zone. The veterinary services were very limited due to limited Veterinaries, low skills, and types of equipment. In these

circumstances, we had tried to make some arrangement and brought animal medicines from Veterinary Pharmacies, even use agriculture pesticides to treat these kinds of animal diseases. The Black quarter and Foot Mouth Diseases were frequent diseases in this area". (Farmers from Rwabiharamba MCC).

The farmers of Nyagatare Milk Collection interviewed said that:

"Before there were many problems. We raised local Cows "Inyanrwanda" with long horns. To raise cows was a culture or prestige rather than function and business. But when we have distributed individuals' pastures and adopted improved cows as well raise cross-breeds it becomes very well. Now, we reduced the number of cows, they provided high production of milk, we have the Inyange industry buys our milk production and some increment has been done on milk price. We plant new species of forage plants for increasing milk production. But we have challenges of knowledge, the limited number of veterinaries and how to harvest forages plant". (Participants from Nyagatare MCC).

The farming activity in last 10 years according to Zirahumuje Milk Collection Centres breeders' members is cited as the following:

"We've tried to improve our livestock compared to the past whereby we raised local cows known as Ankole with long horns, but today at least 75% have been improved their cows. And those we are not achieved are due to the weather and not for lack of initiatives". (Farmers from Zirahumuje MCC)

In Rwempasha Sector, there is no many Milk Collection center, there is only one among 15 Milk Collection centers existed in Nyagatare District which is "BNRT" MCC. The farmers in this area were selected among the interviewers. Their views are the following:

"We did the farming activity on big land with a huge number of cattle. The water for livestock was very critical. The cows conducted a long distance for water. The milk was for family consumption. The prolonged drought most of time killed a lot number of cows but when it rains the cows regenerated and farmers or breeders can't suffer the loss. In this area, there were no infrastructures for health and education". (Farmers from BNRT)

In Gatsibo District there are 6 Milk Collection Centers, as described in our sample. Therefore, in this research only 3 Milk Collection Centers have been selected. These MCCs are Kibondo MCC, Rwimbogo Dairy Cooperative and CODEN. The following are the views of participants from respective MCCs.

"*Before the policy, we did the traditional rearing system characterized by the local cows. The Breeder raised an important number of cows but the quantity of milk obtained per day was very low. The time required to treat these herds was very limited (short) since we moved cows in common pastures, it was not necessary to stay with cows and make additional works like bringing other nutrients for increasing milk production. To seek animal medicines was occasionally and depending on circumstances". (Farmers from Kibondo Farmers Cooperatives)*

"In Rwimbogo Sector we did farming activity in common pastures. The Milk production was very low due to local races (Inyarwanda). The cattle markets were limited and very far". (Farmers from Kibondo Farmers Cooperative).

"The farmers had big pastures with a big number of local cows. They had habitude of moving cows from one area to another depending on circumstances. The milk production was very low and no market. But now, the farmers/breeders are celebrating to the change brought by the Policy. But, some farmers/Breeders had resistance to change due to worry about changing method of rearing". (The Executive Secretary, Veterinary and Agronomist of Rwimbogo Sector)

During field research, I visited also CODEN MCC localized in Ngama Sector, in Gatsibo District. All farmers of the Ngarama Sector are grouped in only one Milk Collection center named CODEN. However, they are parts of my sample in my research. In addition, they were interviewed and responded as follow:

"In the Ngarama area, before the Policy of agriculture, there were many problems. We raised local Cows so-called "Anakole" with long horns. To raise cows was a culture or prestige rather than function and business. But we have challenges of knowledge, the

limited number of veterinaries and how to harvest forages plant. The milk production was very low and there was no stable market". (Farmers from CODEN).

The District's Agronomist and veterinary were selected among respondents. For Nyagatare District as the dominated rearing system, the District's Officials revealed the following responses about farming activity in last years.

"The District's Agronomist and Veterinary said that Pastoralism farming system is transited to sedentary farming because of Low levels of productivity for livestock due to low input use, poor production techniques and inefficient farming practices. Indeed, pastoralism farming needs a big land while in our country we have small land, particularly the Nyagatare District". (Nyagatare District's Agronomist and Veterinary).

"In this context, in Gatsibo District, the District's agronomist and Veterinary said that, before 2007, the Breeders realized rearing through stray of cattle in different areas, whereby a farmer/breeder had around 300 cattle, moving anywhere by searching herbs. But in 2008, the farms or pastures have been distributed and the District's council prohibited farmers to bring cows in Gabiro military zone". (Gatsibo District's Agronomist and Veterinary).

"At the level of Local Government, the District was incapable to determine the number of population cattle and production could be obtained. The Districts weren't capable to predict the production in the short-term, mid-term and long term due to these movements carried out by these pastoralists". (Gatsibo District's Agronomist & Veterinary).

"*In addition, the livestock production could not be considered as district's production since couldn't be contributed to national production due to uncontrolled movements of pastoralists that could go beyond national boundaries". (Gatsibo District's Executive Committee member)*

4.2.2. Process of implementation of Policy in Nyagatare and Gatsibo on side of farmers and local leaders

In the research, we are interested in knowing how the policy has been implemented by the concerned. In order words, the farmers should testify the process of shifting from pastoral systems to sedentary cattle keeping. In this regard, the process of policy implementation has been underlined in this section. The following are the views of the study participants:

"We are formed into Farmers Cooperatives or Milk Collection Centres. And then after, in Nyagatare District we formed a Farmers' unions, called Nyagatare Dairy Farmers Union (NDFU)". (Farmers and Union committee members of Nyagatare)

"We received some facilities to bring milk to MCCs, like cans received through MCCs". (Committee members of all MCCs selected in Nyagatare & Gatsibo).

"We improved our local cows and integrated cross-breeds. We raised our cows into family pastures."

"We constructed and rehabilitated feeder roads for increasing transportation of animals' products (milk, and Cows). In collaboration with RAB, Veterinary services introduced and available to all Milk Collection Centres. We constructed valley dams and valley tanks in order to avail the water for livestock". (Nyagatare and Gatsibo District Executive Committee members)

"Before pulling milk, we have to check the quality of the milk. We use Lactometer, Alcohol test and Antibiotic test. Then, we try to cooler milk and transport them at the Savannah industry by Union rather on behalf of Cooperative or MCC. Our Local races have been improved by Artificial insemination and the use of Selected Taurus. All milk Collection centers have been transformed into Dairy Business Hub Centres". (All farmers from 11 MCCs selected)

We improve local cows so-called Ankole with long horns through AI and Taurus. But some farmers were not implemented immediately. (Farmers from Kirehe MCC).

The Milk produced found the market and the price was regulated (Farmers from Kirehe MCC).

We have changes our traditional cows "namely Inyarwanda" to cross-breeds. And the Government put on place the stable market of milk through Inyange Industry. (Farmers from Isangano).

"Through subsidies or Nkunganire we bought dam sheets and installed them for rainwater harvesting. This helped to reduce the money used at drought season for fetching water using the truck". (Farmers from Nyatagatare MCC)

4.2.3. Challenges faced in the period of transition from pastoralism to sedentary

The study participants cited several challenges encountered during policy implementation. In the implementation of any policy, there are some perceptions and behavior in terms of mindset change. There is a stage where the actors shift from the existing environment to the new working. It implies some challenges, sometimes, most of which are anticipated or not expected. However, in the transition period from pastoralism to sedentary cattle keeping, the Breeders had different challenges categorized as following:

"There was a challenge based on resistance to change of moving from pastoralism to sedentary cattle keeping because the farmers are familiarized to use common pasture obliged them to shift to family or individual pastures as well zero-grazing system that is difficult to comply due to the big number of cows possessed. There was an issue of lack of water for livestock since there was limited infrastructure like valley dams as well valley tanks could help farmers to find water easily and in reasonable distance. There was no cattle market for milk produced and cows". (District's Agronomist & Veterinaries)

"We had the challenges of rearing into the fragmented pastures compared to the number of cows possessed. In some areas, it was very difficult to access water for livestock. There was an issue of a limited number of veterinaries required to inseminate cows and related pieces of equipment". (Farmers from Kirebe MCC)

"We had an issue of a lack of medicine and vaccines. To treat the tick-borne was very critical. All farmers didn't improve their cows and are those affecting their neighbors. Therefore they affected animal diseases their neighbors' cows". (Framers from Isangano MCC)

"We had an issue of lack of water for livestock, the milk market, and price. We had an issue of a lack of species of forage plants. During cows' improvement, some cows became infertility due to the low capacity of veterinaries and lack of Nitrogen liquid and other facilities". (Framers from KAMDAMACO MCC)

"We had a big number of cows which they are not proportional to the cows we had so that we are obliged to sell the theme. Most of the time the cows inseminated failed and led to infertility". (Framers from Nyagatare MCC)

"We had an issue of scarcity of veterinary drugs, sometimes are very expensive. There was an issue when there was a change in the climate. There was no possibility of moving cows to other favorable areas. We had an issue of lack of market". (Framers from Zirahumuje MCC)

"We had the pressure of improving local cows in a short time for compliance with farm size. Also, there is an issue of milk price compared to what invested in the improvement of livestock. Besides, the mark is not stable. Some veterinary drugs are very expensive like Beatrix costs 13000 Rwf/20 ml". (Framers from Kibondo MCC)

"There was an issue of Farmers/Breeders mindset change that not wants to change the way of the farming method. The improved cows, like Frisian or crossbreeds, didn't well adapt to some areas". (Framers from BNRT)

"There are some animal diseases appear frequently, like Lumpy skin diseases, FMD and Tick-borne. Lack of veterinary medicine and vaccines. Lack of some socio-economic infrastructure, like schools, health centers." (Framers from Rwimbogo MCC).

"The farmers faced challenges of complying with the number of cows and the farm size. The farmers were willing to improve the cows but there was an issue of veterinary services, especially insemination. Many cows become infertility. (Rwimgogo Executive Secretary, Veterinary and Agronomist).

In Nyagatare District, the District Executive Committee members and District's Veterinary are among interviewers.

"*The Farmers/Breeders had a big number of local cattle couldn't bear use of zero-grazing or individual pasture, so there was a need for transformation of local races to crosses cattle. It was not automatic to transform local cows to improved cows immediately. It required a process and compliance, in term of living conditions, cow treatments, artificial insemination, feeding, control and preventions of animal diseases required some skills and*

animal medicines doctors". (District's executive committee, District's Agronomist and Veterinary)

"Many farmers having the culture to keep many cows in their farms faced the problems for rearing few cows. Some farmers didn't believe that you can keep many cows on small land by zero grazings. The population has the resistance to change their farming method". (Nyagatare District's Veterinary).

4.2.4. Process of handling challenges in transitional of the pastoral system to sedentary cattle keeping

In this background, the mentioned above challenges manifested by study participants interviewed, have to be addressed. In regards, I was interested to know if there is any central government intervention as well as local government decision to handle these existing challenges. The participants interviewed, they provided the following interventions:

"The Ministry of agriculture (CG) and its stakeholders including local governments (districts and sectors) disseminated the policy in place through mobilization and campaigns. From 2008, the pastures have been distributed to farmers in respect of numbers of cows possessed and family members. Pastures distributed were family pastures or individuals. In 2010, the Ministerial Order on stray cattle and other domestic animals have been developed and reinforced. The infrastructures related to water for livestock have been constructed and others developed, such as valley dams and valley tanks. The Milk collection centers constructed to facilitate Breeders to bring the milk and collect them at one recognized and well-equipped milk collection centers for easy access on the milk market; like Inyange industry ltd and Savannah industry". (Local leaders).

4.2.5. Strategies and mechanisms supporting the implementation of policy in place

The Study participants determined challenges met and yet described strategies and special actions taken for the purpose of implementing the policy in place. These strategies have been

initiated by different institutions involved in policy implementation. Some of them are in term of facilities, resolutions, resources, and capacity building:

> *"After introduction of National Agriculture Policy, the Policy on milk transportation has been adopted and the milk became a business rather than family consumption". (RAB Official).*

> *"Districts' Councils approved resolutions prohibiting the movement of cattle to some reserves zones such as Gabiro Combat Training Centre to avoid dissemination of wildlife animal diseases and other negative externalities to livestock may result from Military zone. The cows caught in these movements auctioned and the money generated is deposited to the Public Account". (District's Executive Committee members Gatsibo & Nyagatare).*

> *"Different projects and pieces of training as well as study tours supported by stakeholders like Heifer International, East Africa Dairy Development, RAB, Send Cow, etc have been implemented and contributed enormously in handling some raised issues. RAB introduced plants species for animal feeds". (District's Veterinary and RAB official).*

> *"RAB developed and installed a unit of transformation of Semen locally at Rubirizi and now started decentralization into the zones. In this context, Nyagatare is in a plan to access its own unit for production of Semen". (Nyagatare District Executive committee member, RAB and District Veterinary)*

> *"RAB in collaboration of Local Government initiated how to control and prevent animal diseases through planned schedule of vaccination for some critical diseases manifested frequently, like Black Quarter (BQ), Lump skin disease (LSD), Foot mouth disease (FMD), Rift Valley Disease (RVF), Brucellosis, etc." (RAB Official & Districts Veterinarians for Nyagatare and Gatsibo).*

In this synergy, the following is the illustration process of milk supply channel at MCC and quality testing before pulling out into the cooler.

Figure 4: Supply of Milk at MCCs by farmers/breeders and milk quality testing

The Photo of how milk is supplied, tested, weighted and pulled out into the Cooler at MCC

"In perspective of livestock development as well as land use management in Nyagatare and Gatsibo Districts, in 2008 Breeders have been provided farms and requested to develop their farm. To develop the farm or pasture a farmer/breeder required to do the following: cleared and fenced farm or pasture, farmer or breeder has cows into the farm/pasture, has access to water and includes a farmhouse for farm/pasture activities. Therefore, when the farm or pasture is partially cleared, poorly fenced and cultivated above 30% it is considered as land use abuse while undeveloped pasture is when the pasture is unclear, unfenced, no cows or communally grazed as well as very long distance to water points". (Local Leaders, District's Agronomists and Veterinaries).

4.2.6. Cattle health and animal diseases

The study participants often highlighted how they treated cattle in the last time compared to today's rearing system. In pastoral systems, the breeders are experience local cows that resisted to animal diseases. With the new rearing system, namely sedentary cattle keeping, the local cows "Ankole" most of them were improved and pure races have been introduced, like Frisians and Holstein Grecian. These cows can't resist to such kinds of animal diseases. In other words, the

animal health has to be improved, in order to improve cattle environment, treatment and hence increase animal production, in different derivatives:

> *"In the last 10 years, there were different animal diseases killed a big number including Black quarter, Lumpy skin disease, Foot mouth disease, and Rift Valley Favor but today there was a plan of animal disease control and vaccination". Indeed, there is an issue of lack of some vaccines, especially Tick-borne. (Gatsibo District's Veterinary)*

> *"Vaccination of animal diseases (black quarter, lump skin diseases, foot and mouth diseases, Rift valley fever, brucellosis, Rabies, tick-borne etc) enhanced. Control of animal movements inside and outside the District carried out. Control of animals entering our country coming from Uganda and Tanzania prevented. Screening of some animal diseases carried out". (Nyagatare District's Veterinary).*

Table 4: Veterinary services introduced by MCCs based on Policy's incentives and affiliated programs

No	Name of MCC	Establishment date	Existed service veterinary in time of commencement	Others veterinary services introduced	Appreciation of farmers	Observations of the Researcher
1	Kibondo Farmers' Cooperative/ Kabarore	2006	Vaccination Treatment.	Forage cultivation, Improved feeding, Forage conservation, Increased milk production in both quantity and quality, Artificial insemination.	Well appreciated but difficult to adopt	Low or slow adaptability of farmers to the new veterinary services.
2	Rwimbogo Dairy cooperative	2006	Vaccination Treatment.	Forage cultivation, Improved feeding,	Well appreciated but difficult to adopt	Low or slow adaptability of

No	Name of MCC	Establishment date	Existed service veterinary in time of commencement	Others veterinary services introduced	Appreciation of farmers	Observations of the Researcher
				Forage conservation, Increased milk production in both quantity and quality, artificial insemination		farmers to the new veterinary services
3	Coden Njyambere mworozi/Ngarama	2006	Vaccination Treatment.	Forage cultivation, Improved feeding, Forage conservation Increased milk production in both quantity and quality, Artificial insemination.	Well appreciated but difficult to adopt.	Low or slow adaptability of farmers to the new veterinary services.
4	Kiziguro Dairy cooperative	2006	Vaccination Treatment.	Forage cultivation, Improved feeding, Forage conservation Increased milk production in both quantity and quality, artificial insemination	Well appreciated but difficult to adopt.	Low or slow adaptability of farmers to the new veterinary services.
5	MUDACOS/	2006	Vaccination	Forage	Well	Low or

No	Name of MCC	Establishment date	Existed service veterinary in time of commencement	Others veterinary services introduced	Appreciation of farmers	Observations of the Researcher
	Kiramuruzi		Treatment	cultivation, Improved feeding, Forage conservation, Increased milk production in both quantity and quality, Artificial insemination	appreciated but difficult to adopt.	slow adaptability of farmers to the new veterinary services

Nyagatare and Gatsibo Districts are the Districts' bordering 2 Rwandan neighbors' countries which are Uganda and Tanzania. These countries had large areas whereby Pastoralism is still exercised. In that time, these implied many tentative of Rwandan Pastoralists to move their cows for searching herbs in these transboundary areas. Frequently diseases reported by Breeders in this research period are Tick-borne, Foot Mouth Disease (FMD) and Lump skin disease. These related movements led to many cases of animal diseases, as well as many outbreaks and death cases of cows. However, the adoption of National Agricultural Policy, Ministerial Orders and some Districts' Councils resolutions, the animal diseases encountered based on these movements have been curbed down.

4.2.7. Distance made by breeders to access veterinary services and how it was solved

The study participants justified the ways of rearing system, whereby the farmers/breeders conducted long distances with the cows through common pastures, by searching the herbs and water for livestock. Besides, they were obliged to go to find out veterinary services. All these

elements and associated factors implied the conditions of making long distances but with the policy and associated initiatives or programs, things have been changed:

> *"Before the Policy has been adopted, the Breeder should make no less than 30 km to attain veterinary services. When the Ministry of Agriculture was implementing national agricultural policy introduced veterinary services to Milk collections centers so that most of MCCs transformed into Dairy Business Hub Model whereby farmers are able to find: veterinary drugs and farm inputs, milk bulking, AI services and extension, milk quality testing, disease diagnostics, Financial Services, Fodder seeds and concentrates and advisory services, etc".(Farmers for Nyagatare Union Farmers)*

> *"Before the Policy implementation, there was a Veterinary guided by a short term contract and this led to poor service delivery, since there was no guarantee and confidence to keep Veterinary position. After the Policy enacted, the structure was changed, the Veterinary is guided by the general statute of the public servants. All veterinaries have required levels from A1 up to A0 as well as specialized Animal Medicine Doctors. The District up to Sector levels, there are District and Sector Veterinaries, there are 2 animal health workers at each village, 2 Private Veterinaries at each Sector and those in charge of insemination". Moreover, Veterinary Pharmacies have been opened in different commercial centers whereby farmers can find all required veterinary drugs and farm inputs.* (*(Gatsibo District's Veterinary)*

During research and policy analysis, we found that the distances made by farmers as they said were reduced at least 65% compared to the traditional Pastoral system and Sedentary cattle keeping period. In addition to that, this strategy of construction of milk collection centers contributed enormously to the reduction of distances and improvement of cattle health.

4.3. Challenges of the Policy implementation in Nyagatare and Gatsibo

4.3.1. Resistance in policy implementation and way forward for success

The study participants described how the policy was implemented and how some of them resisted to the policy. Even though, they said that, they were aware and those who have implemented it timely, they are celebrating:

> *"In the policy implementation process, we had worry of change in rearing system. The number of cattle possessed it was not very easy to adopt semi-extensive livestock or sedentary cattle keeping. Zero-grazing was not very easy to apply it". (Rwimbogo Diary Cooperative farmer's members).*
>
> *"In this background, the Ministry of Agriculture, RAB and Development Partners availed all requirements in order to implement the Policy. The requirements are categorized in different forms, such as financial and human resources, skills development and conducive environment, study tours, installation of system and facilities (Physical and non-physical). Financial resources were provided and allocated in related implementation drivers such as programmes and facilities like construction of valley dams, valley tanks, supply of water for livestock in some pastures, procuring veterinary drugs and farm inputs, hiring Veterinaries and others staff, conducting training and study tours, control and prevention of animal diseases, etc". (Local leaders, Veterinaries and RAB Official)*

> *"During the implementation process of National Agricultural Policy, involved stakeholders increased community mobilization for knowing the goodness and benefit of the Policy. In addition, the Districts councils have approved District's council resolutions to handle some challenges and sanctioned some violation occurred of the policy based on the Policy and affiliated ministerial order of 2010. Among these resolutions approved permitted the Districts to auction cattle caught in reserved areas, like Gabiro Military Zone, whereby 745 Cows were auctioned and a total of 118,997,100 Rwandan francs were collected and deposited to the Public Treasury Account in favor of public interests". (Local leaders, Veterinaries and RAB Official)*

The following table captured key resolution taken and implementation status to support the implementation of the National Agricultural Policy in favor of sedentary cattle keeping.

Table 5: Recaptured analysis of resolutions and recommendations taken during shifting pastoralism to sedentary cattle keeping

No	Institution	Identified challenges during policy implementation	Resolution took by involved institutions to address related issues	Status of implementation
1	Gatsibo & Nyagatare Districts	Livestock and small stocks wondering in Gabiro Training Combat Centre for grassland, people exercising different activities in this area like extraction of Minerals, fetching woods, beekeeping as well creating streets	1) **Resolution 1**: To auction any livestock and small stock (Cow, goat, and sheep) captures in Gabiro military zone; 2) **Resolution 2**: All money generated through auctioning will be remitted to the Public Treasury Account; 3) **Resolution 3**: To punish any person captures in Gabiro Military zone refer to prevailing laws; 4) **Resolution 4**: To request the District Executive Committee in collaboration with Gabiro Military Command in immediate effects to determine a specific plan to disseminate people on these related adopted resolutions of the concerned meeting.	• From 4th December 2018 up to 15th September 2019, 745 cows have been auctioned. • In Gatsibo District a total amount of 93,964,100 Rwf collected after auctioning 565 cows caught in Gabiro Training Combat Centre had been deposited to the Public Treasury Account; •In Nyagatare District 180 cows caught in Gabiro Training Combat Centre auctioned and 25,033,000 Rwandan Francs collected and deposited to the Public Treasury Account.
2	Nyagatare, Gatsibo, Kirehe and Kayonza Districts	Land use abuse	The provincial commission settled out and assigned to assess how grazing has been granted, description and status of use by farmers/breeders of Nyagatare, Gatsibo, Kayonza and Kirehe Districts.	• 9,896 Pastures/farms existed in 4 Districts 9,416 have been distributed by a National Steering Committee in Charge of farm distribution, while 428 provided by the Districts, 52 distributed by the other instances and 905 pastures were bought. • In the context of the use of pastures: 107/286 Pastures are developed, 112/286 pastures are

No	Institution	Identified challenges during policy implementation	Resolution took by involved institutions to address related issues	Status of implementation
				underdeveloped, 32 pastures undeveloped while 25/286 are not found and 10 appeared twice at the list.

During field research, we found that Government in its capability of State took into consideration pastoralism challenges, developed and enacted a Policy like an action to a given demand to curb down the existing challenges. However, Pastoralists after knowing that there is a change in the livestock husbandry system, some resistance was made due to the new system and worried about negative effects that might come after the implementation of the Policy. The issue behind of this resistance was fundamentally based on mindset attitude of Breeders.

4.3.2. Administrative and technical problems

In the Research conducted at the field, we found that there are many improvements in livestock development after shifting the pastoral system to sedentary cattle keeping. But, some administrative and technical problems have been highlighted and needed proper interventions to address them as confirmed by interviewers met to reach the national vision and perspectives. The following are key problems highlighted:

> *"Animal disease control and prevention is continuous exercise but there are not at the levels it could be because some animal diseases appear frequently as it is the case of Foot mouth disease and Tick-borne disease'. Some Breeders have the attendance to go back into the Pastoral system and try to make an illegal movement towards the served areas to search for herbs. This causes sanctions and big losses financially when their cows are captured and auctioned based on the Policy, instructions and resolutions in place. For instance in Gatsibo District, about 10 months 565 Cows caught in Gabiro Training Combat Centre auctioned and a total of 93,964,100 collected and deposited to the Public Account. (District's Executive Committee, Agronomist and Veterinary, Gatsibo)*

"Some Breeders didn't put more effort into the improvement of local races to crossbreeds, so that they are still facing challenges of low production and productivity, then it may lead them to abandon the rearing system to sedentary cropping. There are some complaints from Breeders and Districts' Officials of cows failed to be inseminated through Artificial insemination that let to infertility". (RAB's Official)

"Water for livestock on-farm is still a big challenge. It required a high budget and skills. The farmers wish to supply water for livestock in their family pasture in order to avoid making an unnecessary movement for going to search water, sometimes cause dissemination of animal diseases like tick-borne, etc" (Nyagatare District Veterinary and Members of Milk Collection Centres).

"There is an issue of the low rate of insemination sometimes led to cows infertility because when a cow tried to be inseminated artificially three times no successful performance, it causes such infertility. Therefore, the Breeders worried to apply Artificial insemination more than 2 times when failures resulted and then, adopted to use Taurus in their farms. Here the Performance rate of AI valued at 50% at the national average while at Gatsibo District is at 38%. The conditions of insemination not yet harmonized". (Gatsibo District Veterinary)

"A big number of breeders did not yet transform their cows, most of the time they don't need high prevention simply because their cows have high resistance to animal diseases, in these conditions, they generate negative effects to their neighbors already have crosses or improved cows, for instance, the tick-borne". (Rwimbogo District Agronomist & Veterinary)

"High cost of electricity (between 600,000 & 800,000 Rwf) and generator (between 800,000 & 1,200,000,000 Rwf) in case the there is a cut of electricity that become a burden to MCC. It will be better to reduce the tariff of electricity in order to facilitate MCCs as

small industries through the advocacy of Local Government, MINAGRI & MINICOM." *(Nyagatare District's Executive Committee member)*

"High cost of measuring the quality of milk through the 2 tests carried out like Antibiotic and resazurin tests." Gatsibo Sector Executive Secretary, Veterinary and Agronomist)
"Most of the pastures the bushes are not cleaned, fenced and transformed to model farms. (Nyagatare District Executive Committee members & District Veterinary)

"We have an issue of lack of efficient veterinary drug preventing resistance of tick-borne. However, it obliges some breeders to use crop pesticides in place of veterinary drugs lead to cows' death due to inadequate drugs. The Local government in collaboration with RAB shall facilitate and avail at the market the real drug to mitigate the tick-borne disease and negative effects that might occur". (Members from Nyagatare Farmers Union).

4.4. Development benefit of National Agriculture Policy in Nyagatare & Gatsibo Districts

4.4.1. Status of livestock production and contributing divers

During the field, documentation analysis was used in order to track the contribution of policy based on statistical data. The table below illustrates the trend of livestock production in Nyagatare and Gatsibo Districts as evidence-based Policy outputs based on District's annual reports assessed. The table below indicates clearly that trend for instance from 2012 up to 2018.

Table 6: Trend of Milk production in Nyagatare and Gatsibo Districts

Fiscal Years	Liters received by MCCs in Nyagatare District	Liters received by MCCs in Gatsibo District
2012-2013	8,126,546	1,042,008
2013-2014	9,538,567	1,100,053
2014-2015	9,523,807	1,118,481
2015-2016	9,540,939	1,152,642
2016-2017	10,367,649	1,293,537.0
2017-2018	17,118,795	2,061,825

The table above illustrates that the annual milk production in Nyagatare and Gatsibo Districts increased successively. Especially, in 2017/2018 there is an important increase rate of 52.5% compare to production obtained in 2012/2013 as the figures presented for Nyagatare and Gatsibo District. It increased by 59.4% compared to the production collected at MCCs in 2017 for Nyagatare District, while for Gatsibo increased by 97.8%. The reason of this increment is due to the rearing system being exercised as business activity through sedentary cattle keeping opposed to traditional Pastoral system accordingly to the Policy enacted. Today breeders are using different types to improve the blood of cows like Artificial insemination in terms of natural heat or hormones as well improved Taurus. Most of Breeders used individual and family pastures in semi-intensive livestock as well as zero-grazing. The mindset change and consider livestock as business. The animal disease control and prevention have been reinforced. The implementation of the National Agricultural Policy and other interlinked initiatives has contributed to the transformation of livestock in Nyagatare and Gatsibo districts.

In order to confirm whether there are development benefits due to sedentary cattle keeping practice compared to pastoralism, Local leaders, committee members of MCCs and Union Leaders approached through interview:

"Each breeder today has an individual or use family pastures where he/she raises cows. We have reduced the number of cows in the function of land that we possess, but in contrast, we increased the milk production compared to the last year with an important number of cows. In the past, the child born and sent to shepherd the cows, but today they are sent to schools. The water for livestock was supplied in some farms and valley dams as well valley tank developed". (Famers from Kirebe MCC).

"We have a truck transporting water for livestock and fulfill dam sheet during drought season at a low price. In this context, the breeders contribute with a few sums of money for fuel. In some areas, there was developed modern boreholes installed to solar system supplying water to livestock. The Milk collection center recruited a Veterinary Officer supporting breeders in the treatment of cows and providing pieces of advice to breeders. Feeder roads and bridges constructed and facilitate in the transportation of animal produce and organic manure". (Breeders from Isangano MCC)

"After improving the blood of local cows "Inyarwanda" the production of milk has been increased as well the price. This production of milk can be obtained on 20 cows while in the past we couldn't find it on 60 cows. So, there is a grateful improvement. In the pastoral system we are obliged to buy food but today we are suppliers of food due to intercropping activity and manure". (Breeders from KAMDAMACO MCC).

"Today we have dairy, the milk has an ensured market and price, and even it is not enough. Valley dam of Rutaraka 1 and Rutaraka 2 have been developed, even though need to be rehabilitated. We are grateful for veterinary services. The breeders have improved cows bloods and contribute to an increase in milk production". (Breeders from Nyagatare MCC).

"The milk collection center has been constructed, equipped and introduced veterinary services and medicines. Damsheets with government subsidies are available and facilitate breeders to harvest rainwater that uses at dry season". (Breeders from Zirahumuje MCC).

"The local races known as "Ankole" have been improved, and around 85% of cows have been improved today. The milk production is increased, while in the pastoral system a breeder could able to get 20 liters out of 100 cows, on contrast today he/she is able to get 50-75 liters out of 10 to 15 cows on 1Ha of grazing. Indeed, it means that all of these cows are not milking. In addition, 2 valley dams in Kabarore have been constructed. Veterinary services are available. All farmers are organized in Cooperative transformed to MCC". (Breeders from Kibondo MCC)

"The milk production has been increased from a small number of cows. Veterinary services are available at MCC as well as Veterinary Pharmacies in the area. Before the Policy enacted the price of milk didn't go beyond between 100-150 Rwf per liter, but today it valued at 200 Rwf per liter. Today we installed a dam sheet on farms and we harvest rainwater. In addition, valley dams have been constructed in perimeter allowing breeders to access water in short distance. Furthermore, the feeder roads have been constructed, hence facilitate the breeders to bring the Milk obtained at Milk Collection Centre". (Farmers from Rwimbogo MCC).

"The cattle population is very known today against of the pastoral system. Limited number of cattle with high production, both quantifiable milk, and money earned as well other animal production very known. Economic infrastructures developed and others constructed, like Valley dams and valley tanks for the supply of water for livestock, MCCs constructed electrified and well equipped with Coolers, feeder roads, and cattle markets. Social infrastructures constructed and others established, such as Schools and Health facilities. Decentralized veterinaries at District and Sector levels, animal health workers, Para-vet and inseminators skilled". (Executive Committee member, Agronomist and Veterinary for Gatsibo District)

"Local cows improved and introduced Holstein Friesian cattle or Grecian cattle. They provide a high quantity of milk per day/per cow. Cooperatives of farmers or Milk collection Centres formed, trained and managed farmers business as well as existing issues. Farmers unions created and advocating farmers' issues as well as supporting farmers' initiatives. Government Subsidies determined and provided in the buy of some livestock facilities and services, like dam sheets, Motor pumping machines, and vaccines. Breeders benefited capacity building through trainings, study tours carried internal and external of country. Cows insemination services and Cows vaccination services enhanced". *(Executive Committee member, Agronomist and Veterinary for Gatsibo District)*

"Breeders benefited capacity building through pieces of training, study tours carried internal and external of country. Cows insemination services and Cows vaccination services enhanced, Cattle markets constructed, Livestock becomes a business rather than a culture and prestige. Social infrastructures constructed and others established, such as Schools and Health facilities. Decentralized veterinaries at District and Sector levels, animal health workers, Para-vet and inseminators skilled". *Executive Committee member, Agronomist and Veterinary for Gatsibo District)*

In this research area, we found that after the Policy implementation and before the farms' distribution (2008) the Pastoral system was predominant, but after that period, it shifted to sedentary cattle keeping, since there were no common farms. Indeed, in my Research all participants interviewed in focus group discussions composed of Local leaders, Veterinary and

Agriculture officers at Sectors and selected districts as well selected farmers. They are all celebrating the key developments benefits as fruit of NAP and affiliated Ministerial Order on stray cattle and other domestic animals, as summarized and indicated in the table above since most of them were common to all interviewed and there was no needs to illustrate views of each participant with such repetition.

4.4.2. Cattle population in last 10 Years in Gatsibo Districts (2008-2017)

In this background, the proper intervention was required at the side of the Government as a Policy to address pastoral system challenges encountered. However, the implementation of Policy contributed enormously in the improvement of local cows into exotic and cross-breeding as the table below illustrates the trend of livestock population in Gatsibo District as evidence-based of Policy outputs.

Table 7: Cattle population in the last 10 Years in Gatsibo District from 2008 up to 2017

N0	Cow blood	Years									
		2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
1.	Ankole (0-25%)	101,391	90,157	81,213	72,025	65,126	61,276	57,842	53,848	47,818	41,848
2	Exotic 75-100%	1,213	1,547	2,419	2,498	3,191	3,618	3,986	4,329	4,512	4,829
3	Cross (50-75%)	10,168	12,584	17,500	21,022	22,643	25,021	26,758	27,406	30,506	32,272
	Total	120,772	104,288	101,132	95,545	90,960	89,915	88,586	85,583	82,836	78,949

The table above indicates that, in 2008/2009 Gatsibo had counted 101,391 cows of Local races. They were reduced progressively and in 2017/2018 they were only 41,848 cows of Ankole. However, there is a decrease rate of 58.7% equivalent to 59,543 cows. In addition, the exotic cows recorded was 1,213 cows and increased up to 4,829 cows in 2017/2018, so, it was multiplied by 3.9%, while the cross shifted from 10,168 cows to 32,272 cows, it means that it was multiplied by 3.2%

"*The drivers of change and improvement of livestock development resulted in the National Agricultural Policy with aligned different programs and initiatives. Livestock exercised as a business due to Policy. Farmers used Artificial insemination and improved Taurus. Zero-grazing was adopted and a semi-intensive rearing system". There was a mindset change, animal disease control and prevention reinforced."(Gatsibo District Executive committee, agronomist and Veterinary)*

Based on statistical data gathered about the status of cattle population, there was an increasing or a decreasing rate of the number of cattle total population. These changes are illustrated by the policy practices of farmers or breeders during the pathway of Policy implementation and consideration of Policy advantages. It is a matter of exercising farming activity in the family or individual pastures even zero-grazing. It is due to an improvement of local cows known as Ankole cows to exotic cows or cross-breeding as well as substitution of Local cows with Holstein Friesian in order to increase milk production. Indeed, the table above indicates that, due to the implementation of the National Agricultural Policy in Gatsibo, many changes have been observed.

Table 8: Livestock infrastructures developed between 2008 & 2017 due to Policy enforcement and related programs in Gatsibo and Nyagatare Districts

No	Infrastructures developed	Purpose of infrastructure	Existing challenge(s)	Effects on the existed challenge(s)	Beneficiaries
1	5 MCCs and 16 MCCs with farmers cooperatives	Milk collection with quality and quantity	Poor management of farmers cooperatives funds, assets, gifts	Lack of willingness	The loss to farmers themselves and their cooperatives
2	9Valley dams in Gatsibo and 38 in Nyagatare	Water availability	There was water scarcity but with valley dams problems was solved	Water availability	Availability of water
3	5Cattle market/ Ibikomera in Gatsibo and 12 Nyagatare	Buy and sell of cattle	Lack of cattle market	Lack of way of selling and buying cattle	Lack of way of selling and buying cattle

4.4.3. Requirements to sustain the results and keep enjoying the 2018 Amended Policy

Based on the research carried out by investigating how the national policy of agriculture has been implemented, many achievements have been highlighted. Therefore, sustainability is required in order to continue exploiting existing achievements, especially facilities and keeping the trend of production, both cattle population, and milk production. The following are actions to be taken in sustainability purpose, based on respondents' views:

> *"Continue exercising livestock in farms or pastures as well zero-grazing rather than moving with cattle elsewhere". (Gatsibo District's Executive committee member, Agronomist and Veterinary)*
>
> *Maintain infrastructures installed and constructed including rehabilitation. Supply water for livestock in farms by developing large scale water supply systems. Make integrated trainings and coaching plans for farmers, Veterinaries as well as study tours". (Gatsibo District's Executive committee member, Agronomist and Veterinary)*
>
> *"Increase infrastructures and initiatives increasing value addition of milk like MCCs, small unit of milk processing in different derivatives in order to increase the price of milk and be competitive economically. Increasing innovation and techniques in harvesting and conservations of animal feeds (forage plants)". (Nyagatare District's Executive Committee member, Agronomist and Veterinary)*
>
> *"Increase the milk and animal markets, not relying on the Inyange industry market only, in order to increase competition and value addition of animal products. Continue mobilization and train Districts and Sectors Veterinaries". (RAB's Official).*

4.4.4. Strategies to deliver effectively to achieve Livestock Sector Strategies contributing to NTS-1 targets

In perspective of livestock development, during our research, I need to know views of informants about strategies that can be taken to deliver effectively National strategy for transformation in the component of livestock and its contribution to the entire economy:

"Continue to implement National Agricultural Policy in respect of roles and responsibilities of all involved stakeholders from national level up to direct beneficiaries." (Gatsibo district Veterinary & Agronomist)

"Improve sensitization approaches and innovations, specifically to farmers and local government partners. Provide incentives to investors in livestock sub-sector". (Nyagatare District Executive Committee member, Veterinary and Agronomist)

"Plan the large scale projects of supplying water for livestock in farms in the approach of cost-sharing between Government and farmers through long term loans paid by farmers, as they have the willingness to participate in order to solve sustainably this challenge (in the approach of Public-Private Partnership)".(Participants from Nyagatare Dairy Farmers Union)

"Increase advisory services to farmers through Veterinaries and Researchers Institutions like RAB and Academicians". (Gatsibo district Veterinary & Agronomist)

"Sensitize breeders to take cows insurance to guarantee their cows to mitigate risks as well as increase investment capacities". (RAB's Official)

"Sensitize breeders to realize rearing business rather than subsistence livestock". *(Gatsibo district Executive Committee member, Veterinary & Agronomist).*

"Reinforcement of dissemination of amended National Agricultural Policy. Enhance dissemination of PSTA-4 as implementing the Policy and related programs". (RAB's Official)

"Introduce the Farmer Field School of Livestock to demonstrate breeders/farmers how to treat cows in modern way in the purpose of increasing production and how to harvest the fodder for animal". (Gatsibo district Veterinary & Agronomist)

Based on participants' views there was a high commitment to increase animal production and sustain the achievements. However, conduct Mid-term evaluation policy or Policy analysis to make review or amendments timely where can be required in order to meet the intended policy outcomes.

4.5. Discussion

Farming activity and related challenges: Based on what informants testified, the Livestock activity in Nyagatare and Gatsibo Districts was characterized by the traditional pastoral system before 2008. The farmers moved their cattle from one place to other places, based on seasons and climate changes in searching herbs and water. In this context, the pastoralists had a big number of cows, whereby a smaller farmer or smaller Pastoralist had a cow varied between 50 cows to 200 cows while the big farmer or big pastoralist could have more than 200 cows. In this model of farming, the lands were big and permitted the movements of pastoralists, but there is no rationality of production given by the number of cows possessed by Pastoralists and the area covered. The smaller Pastoralism could have 1 to 2 liters per cow among this population hardly. The milk produced was for consumption by family members and neighbors. Generally, the livestock was culture rather than a function or professional could be considered as Business.

Also, when farmers met with climate changes and some outbreaks preferred to shift from Rwandan boundaries towards Uganda and Tanzania as neighbors' countries had big land for farming. The pastoralists suffered a challenge of prolonged drought sometimes caused the death of cows that implied a big loss of cows. Most of the time the water for livestock was not enough and located in limited areas. There was no market of milk and cows as well as animal products. In this context, livestock production couldn't be counted realistically and precisely in local and national production as well as among neighboring countries as confirmed by Local Leaders and Technicians.

Moreover, there was a conflict between cattle keepers and farmers due to go to search herbs illegally sometimes attacked farmers' plantations like maize, sorghum, bean, and everywhere they could attain and satisfy their cattle. Furthermore, the Pastoralists confronted with high pressure of animal diseases, such as foot mouth disease, lumpy skin disease, brucellosis, and Ikibagarira. There is no way of controlling and preventing such kind of animal diseases, the Pastoralists were obliged to make long distances in order to find the medicines and vaccines, generally, there is an issue of lack of veterinary services to support farmers in diagnosticating of animal diseases and carrying out required preventions.

In the context of the transitional period from pastoralism to sedentary cattle keeping, the Breeders had different challenges categorized as following based on what participants testified:

- There was an issue of reducing the numbers of cows to rational cows and farm sizes. But the breeders it was difficult to understand it. Most of the time they considered a big number of cattle possessed as a culture and prestige to them. It was not a business as such.
- There was an issue of prolonged drought caused the death of cows but when the season rainy came to the cows regenerated or restocked, so that the farmer resumed their rearing activity without considering losses encountered, but for the sedentary cattle keeping the loss was very high and difficult to make a recovery due to investments carried out.
- There was an issue of Veterinary services, especially Artificial insemination, in order to improve local cows as well as targeting an increase in milk production.

The animal diseases are crucial to farmers even though the policy and other initiatives are implemented. The tick-borne is a complicated disease and the medicines used are not efficient to cure the tick-borne. In addition to that, there is a plan of vaccinating animal diseases and control of some outbreaks might come.

The process of policy implementation: the findings presented above indicated that the Ministry of Agriculture was assessed the challenges undermining the Pastoralists and formulated the Policy in aiming of addressing related challenges. After formulation and promulgation of the Policy, the community involved as well as stakeholders have been sensitized, the programs and projects developed and implemented towards the challenges in the Rwandan perspective of increasing contribution of agriculture in the Rwandan economy.

Also, common pastures have been fragmented and distributed based on the size of cows and land occupied. The pastures became an individual or family's pasture. The blood of local cows has been improved and pure races introduced, like Frisian and Holstein Grecian, or used artificial insemination. The infrastructures have been developed, like feeder roads, valley dams, cattle markets, MCCs constructed and equipped.

The milk production was increased and the market for milk ensured. The Government subsidies have been determined and applied to some facilities, like dam sheets and motor pumps for harvesting rainwater and use it in the dry season.

Challenges in period of transitional from pastoralism to sedentary cattle keeping: as other policies, during policy implementation some challenges based on implementation highlighted by study participants. There was a challenge in the aspect of resistance to change the way of rearing system to the new model. There was an issue related to the rationalization of cows and pasture size. In Rwandan culture, to have a big number cows was like a culture and prestige. From this mindset and comply with the policy advising to raise a few cows but with high productivity, it took a long time. However, some farmers improved their cows and stressed with high pressure of animal diseases, condition of feeding and how could access veterinary services. There were many cases of cows losses due to death resulted in the compatibility of climate to the pure races, knowledge, cost of production and marginal benefits, and sometimes led some breeders to return to local races. In this background, there was a big issue of lack of veterinary services, medicine and vaccines as well as failure of artificial cow insemination, led to some infertility of cows when the cows failed three times.

Process of handling challenges: The government in its capability played big roles and responsibilities in solving the issues related to Policy undermining. The Government trained more veterinaries, put on place Community Animal Health Workers, para-vet, provided study tours and offered training to different involved parties, ie farmers, veterinaries, and local leaders. The Ministerial order put on a place and subsidies has been introduced.

Strategies and mechanisms supporting policy implementation: after the improvement of the blood of local cows, increasing milk production, the government facilitated farmers to access milk markets by constructing and rehabilitating feeder roads. Besides, that milk prices proposed in negotiation carried out with farmers' cooperatives and the Inyange industries. The Milk Collections were constructed and equipped, but also, the local government through the district's council tool resolution prohibiting the cows' movements, especially in reserved areas like Gabiro

Military Zone. These resolutions are banned with severe sanctions to those violating it.

Cattle health and animal diseases: cattle as other living beings needing to take care of, facilitate to increase their living conditions. Indeed, enhance and ensure animal disease control and prevention. In spirit of increasing milk production whatever milk and meat as well as the money earned in animal yields, one key important element the Government through Ministry of Agriculture/RAB and stakeholders including private operators was to enhance and ensure control of animal diseases, through vaccinations, and isolation cows in putting on place special zoning known as "Quarantine" when there is an outbreak. This becomes an issue when it arrived the cases of such diseases in the area like Nyagatare and Gatsibo considered as Rwandan food basket. The animal product couldn't circulate to the market and hence the animal products at the market become a rare commodity, especially meat. Ensure improved cattle health, all Milk Collection Centers constructed were equipped with veterinary products and feeds. Water for livestock has been provided in different areas through infrastructures constructed, ie valley dams or valley tanks, boreholes installed to solar systems, etc.

Distance made to access veterinary services: to motivate breeders and curb down some outbreaks as well as frequent animal diseases appear, all MCCs had recruited Veterinary Officer and advise farmers/breeders accordingly as an expert in the rearing. Veterinary pharmacies opened in different commercial areas in the guidance of the Ministry of Agriculture guidance.

Administrative and technical problems: A lot of things have been done in livestock development through policy implementation. However, some administrative and technical problems have been highlighted and needed proper interventions to address if sedentary cattle keeping can be a function or a profession. Firstly, the responsibility for animal production should enhance animal disease control and prevention to allow access to a local, regional and international market. This will help incite more investor in sub-sector and guarantee the animal market. To avail at the market efficient medicine, especially those cure tick-borne.

Continue to sensitize farmers to improve blood of local cows and the introduction of crossbreeding, to increase milk production. There are a high number of cows inseminated and

pregnant diagnostic proven failed and led to infertility. Indeed, there is an issue of the low rate of insemination sometimes led to cows infertility because when a cow tried to be inseminated artificially three times no successful performance, it causes such infertility. These discourage farmers and prefer to use Taurus instead of artificial insemination. Technically, it has to be assessed specifically and take measures accordingly. The cost of electricity is very high for cooler milk. The advocacy is required to REG and MCCs be considered as industries' tariffs. Also, there is a high cost of measuring the quality of milk through the 2 tests carried out like Antibiotic and resazurin tests." The products used to make test should be subsidized and be accessible to all MCCs and reduce the Milk cost of production.

D**evelopment benefit resulted to the policy**: Indeed, in my Research all participants interviewed in focus group discussions composed of Local leaders, Veterinary and Agriculture officers at Sectors and selected districts as well selected farmers testified the Policy implementation positive effects. They are all celebrating the key developments benefits as fruit of NAP and affiliated Ministerial Order on stray cattle and other domestic animals. The local cows improved, the milk production increased, the milk price increased and ensured, the socio-economic infrastructures constructed such as MCCs, feeder roads, cattle markets, electricity connection to MCCs, valley dams/tanks, schools and health facilities in farming areas. Also, breeders knowledge in modern farming increased, capacity and skills in farming such as folder harvesting and storing increased.

Gaps in policy implementation process and expected outputs: However, some gaps in the pathway of policy implementation have been observed as follows:

i. The policy didn't be assessed and reviewed by the concerned institution jointly with Partners in order to adjust the weakness and take measure to sustain the elements' achieved.
ii. There are no clear strategies put on place for the sustainability of infrastructure. The policy was put in place for the sustainability of facilities.
iii. The policy was put on place and the farms were distributed parallel without any consultation while it can't be automatic. Insemination and vaccination are still not well found easily and access to affordable prices.

iv. The policy didn’t put attention on availability and compliance of the requirements to realize a modernize rearing system or sedentary cattle keeping.
v. Some farms don't have access to the water infrastructure. In this condition, it is difficult to invest in livestock. The policy should solve this pertinent issue and motivate all investors who have a wish to invest in that sector.

Chapter Five: Findings, conclusion, and recommendations

5.1. Introduction

This chapter presents the summary of major findings, conclusions and recommendations. The study sought to investigate the policy and practice process of transforming pastoralism into sedentary cattle keeping and the associated development benefits in rural areas. The study was focused on Nyagatare and Gatsibo districts of Eastern Province, one of the provinces of Rwanda where pastoralism was practiced until recent years. The research was guided by 3 objectives, namely (1) to investigate the implementation pathways of National Agricultural Policy, aspect of animal resources, in Eastern Province, Rwanda, (2) to assess the challenges of the implementation of the policy in the Eastern Province while transforming pastoral system to sedentary cattle keeping and (3) to identify the development benefits resulting from sedentary cattle keeping practice in Eastern Province of Rwanda.

5.2. Summary of Key Findings

This study investigated the implementation pathway of NAP in Gatsibo and Nyagatare Districts, in Eastern Province. In this journey of the Policy implementation process, the study highlighted the features of rearing activity in last ten years in these 2 Districts. It was dominated by a pastoral system whereby the breeders moved cows from one place to another. The breeders raised a big number of local cows named ‘Ankole” with long horns and used common pastures. The farming activity was like culture and prestige rather than a function or a business. After the implementation of policy and affiliated Ministerial Order, key development benefits have been achieved. The farmers testified through interviews carried out. The following are the key findings highlighted in summary

5.2.1. Implementation pathway of the National Agricultural policy

The Farmers/Breeders were in Pastoral system and they were sensitized on the NAP, there were no facilities promoting livestock, such as water for livestock localized in limited zones, but with the policy in place and interlinked programs as well as projects water for livestock provided at a

certain level. The local cows were not improved but due to the Policy were improved. There were no socio-economic infrastructures in the rearing area, while through the policy different infrastructures have been developed and other constructed. These include valley dams/tanks, boreholes, feeder roads, cattle markets, schools, and health facilities. The Milk production produced was very little and used for family consumption but after policy enactment, milk production increased. There is no market for milk even though it was insufficient. In addition, the rearing system is frequently faced prolonged drought and in such circumstances, breeders recognized a big number of cows' deaths. In such a condition, they were obliged to move from one place to another for searching for favorable areas. Therefore, these movements are conducted within the country or outside country, especially towards neighboring countries, such as Uganda and Tanzania. With the distribution of family and individual pastures, things changed. The policy curb down the level of negative externalities caused by climate change through individual or family pastures, and water for livestock ensured.

5.2.2. Challenges encountered in the implementation of the National Agricultural Policy

However, in transitional of Pastoralism to sedentary cattle keeping some challenges raised. There was a challenge based on resistance to change of moving from pastoralism to sedentary cattle keeping and not very easy to integrate in individual pastures with a big number of cows. There was an issue of lack of water for livestock since there was a limited infrastructure like valley dams as well valley tanks could help farmers to find water easily and in reasonable distance. There was no cattle market for milk produced and cows. The veterinary services were very poor and difficult to afford while sedentary cattle keeping need improved and ensured veterinary services.

In this background, the challenges encountered in transitional of pastoralism to sedentary cattle keeping have been addressed through the Government interventions and local government decisions. The Ministry of Agriculture (MINAGRI) and Stakeholders disseminated the policy and related programs. The individual pastures distributed and the owner requested to develop them by clearing bushes, fencing and introducing the new forages species. The Government

constructed valley dams and valley tanks, the government subsidies on damsheets and motor pumps have been introduced. In addition, in 2010 the MINAGRI established a Ministerial order to support the policy. The Ministerial Order on stray cattle and other domestic animals. This enforced the policy by sanctioning anyone who doesn't want to use individual pasture and continue to move the cows anywhere.

In addition, milk collection centers have been constructed and equipped. The success of this policy was also accompanied by other strategies and mechanisms supporting the implementation of policy in place considered as practices. The Local Government through the Districts' councils voted a resolution prohibiting any movement of cattle into the reserved areas like the Gabiro Combat Training center, with tough sanctions. The control and prevention of animal diseases enhanced and the frequencies reduced. In these perspectives, all MCCs constructed have been introduced Veterinary services. The MCCs recruited Veterinary Officers in order to support Farmers/Breeders by providing pieces of advice, treating cows as well as inseminating cows. The milk was obliged to be collected at MCCs before to be supplied to different clients. The milk test and quality were checked before to be pulled into MCCs in order to avoid any loses and other diseases may cause due to poor hygiene, addition of water into the milk and some bacteria.

In the Research conducted at the field, we found that there are many improvements in livestock development after shifting the pastoral system to sedentary cattle keeping. But, some administrative and technical problems are still highlighted and need proper interventions to address them. Animal disease control and prevention is continuous exercise but there are not at the levels it could be, some animal diseases appear frequently as it is the case of Foot mouth disease and Tick-borne disease. Some Breeders have the attendance to go back into the Pastoral system and try to make an illegal movement towards the reserved areas to search for herbs. For instance in Gatsibo District, about 10 months (4th December 2018 up to 15th September 2019) 565 Cows caught in Gabiro Training Combat Centre auctioned and a total of 93,964,100 collected and deposited to the Public Account. In Nyagatare District 180 cows caught in Gabiro Training Combat Centre auctioned and 25,033,000 Rwandan Francs collected and deposited to the Public Treasury Account.

Some Breeders didn't put more effort into improvement of local races, and those are affecting their neighbors. Most of the time, they don't need high prevention simply because their cows have high resistance to animal diseases. Moreover, they are still facing the challenge of low productivity, and then it may lead them to abandon the rearing system to sedentary cropping. The water in farms not yet supplied at a good level, where a breeder can access it easily. When it comes to drought season, most breeders recognized losses of cows.

There is an issue of a low rate of insemination sometimes led to cows infertility, because when a cow tried to be inseminated artificially three times no successful performance, it causes such infertility. Therefore, the Breeders worried to apply Artificial insemination more than 2 times when failures resulted and then, adopted to use Taurus in their farms. Here the Performance rate of AI valued at 50% at the national average while at Gatsibo District is at 38%, for instance. The conditions of insemination not yet harmonized.

5.2.3. Developments benefits of the National Agricultural Policy

Even, there exist these challenges, from 2004 after development and enactment of National Agriculture Policy, some changes testified in sedentary cattle keeping. In 2008 the common pastures subdivided and distributed in a range of 10 Ha to 50 Ha depends on the size of the cattle and the farm each breeder possessed before. The blood of local cows improved and breeders tried to raise cows in individual pastures. The farmers started to organize in Farmers Cooperatives, the milk collection centers (MCCS) have been constructed, some facilities (canes) have been provided to breeders and help them to bring milk at MCCs. Veterinary services introduced, the milk production increased and the Market for milk negotiated and ensured through the support of the Government. Furthermore, the feeder roads constructed and rehabilitated for facilitating the transport of milk and other animal products, the electrical lines constructed and most of MCCs electrified. The animal diseases controlled and prevented. Through government subsidies, the breeders' accessed dam sheets as well as motor pump machines and installed them in their farms.

In 2008/2009 Gatsibo had counted 101,391 cows of Local races. They were reduced progressively and in 2017/2018 they were only 41,848 cows of Ankole. However, there is a decrease rate of 58.7% equivalent to 59,543 cows. In addition, the exotic cows recorded was 1,213 cows and increased up to 4,829 cows in 2017/2018, so, it was multiplied by 3.9%, while the cross shifted from 10,168 cows to 32,272 cows, it means that it was multiplied by 3.2%.

Based on statistical data gathered about the status of cattle population, there was an increasing of improved cows and a decreasing rate of the number of cattle population of local cows (Inyanrwanda). These changes are among the positives effects of the Policy enacted. It is a matter of exercising farming activity in a family or individual pastures even zero-grazing. It is due to an improvement of local cows known as Ankole cows to exotic cows or cross-breeding as well as substitution of Local cows with Holstein Friesian in order to increase milk production.

The farmers have a truck transporting water for livestock and fulfill dam sheets during drought season at a low price. In this context, the breeders contribute with a few sums of money for fuel. In some areas, there was developed modern boreholes installed to solar system supplying water to livestock. Feeder roads and bridges constructed and facilitate in the transportation of animal produce and organic manure.

Veterinaries are decentralized at District and Sector levels, animal health workers, Para-vet and inseminators skilled. Breeders benefited capacity building through trainings, study tours carried internal and external of country. In addition, Social infrastructures constructed and others established, such as Schools and Health facilities. Breeders benefited capacity building through trainings, study tours carried internal and external of country.

5.2.4. Sustainability of achievements

There is still a long journey to arrive at the level of satisfying the contribution of livestock in the Rwandan Economy. Rwanda has to ensure food and nutrition security by using modern agribusiness technologies, professionalizing farmers in terms of production, commercialization

of the outputs, and the creation of a competitive agricultural sector. To attain this, farmers have to continue exercising livestock in farms or pastures as well as zero-grazing rather than moving with cattle elsewhere. Maintain infrastructures installed and constructed including rehabilitation. Supply water for livestock in farms by developing large scale water supply systems. Make integrated trainings and coaching plans for farmers, Veterinaries as well as study tours. Increase infrastructures and initiatives increasing value addition of milk like MCCs, a small unit of milk processing in different derivatives in order to increase the price of milk and be competitive economically. Increasing innovation and techniques in harvesting and conservations of animal feeds (forage plants). Increase the milk and animal markets, not relying on the Inyange industry market only, in order to increase competition and value addition of animal products.

5.2.5. Strategies to deliver effectively to achieve Livestock Sector Strategies

In this research, we found that strategies to deliver effectively livestock strategies are the following:

i. Continue to implement National Agricultural Policy in respect of the roles and responsibilities of all involved stakeholders from the national level up to direct beneficiaries.
ii. Improve sensitization approaches and innovations, specifically to farmers and local government partners.
iii. Provide incentives to investors in the livestock sub-sector.
iv. Plan the large scale projects of supplying water for livestock in farms in the approach of cost-sharing between Government and farmers through long term loan paid by farmers, as they have the willingness to participate in order to solve sustainably this challenge (in the approach of Public-Private Partnership.
v. Increase advisory services to farmers through Veterinaries and Researchers Institutions like RAB and Academicians.
vi. Sensitize breeders to take cows insurance to guarantee their cows to mitigate risks as well as increase investment capacities.
vii. Sensitize breeders to realize rearing business rather than subsistence livestock.

viii. Reinforcement of dissemination of amended National Agricultural Policy. Enhance dissemination of PSTA-4 as implementing the Policy and related programs.

ix. Introduce the Farmer Field School of Livestock to demonstrate breeders/farmers how to treat cows in a modern way for the purpose of increasing production and how to harvest the fodder for the animal.

x. Conduct a Mid-term evaluation of the Policy in order to make review or amendment timely where it can be required in order to meet the intended policy outcomes.

5.3. Recommendations

In the light of the Policy and Ministerial Order implementation-related development benefits and some key challenges that were identified from the foregoing findings, various recommendations were derived.

1) To enjoy the key achievements highlighted contributed to livestock development that enhanced sedentary cattle keeping, Breeders should continue to sustain socio-economic infrastructures put on the place and use of veterinary services accordingly to ensure an in incremental increase of livestock production;
2) To curb down the animal diseases that still persist in Nyagatare and Gatsibo Districts and elsewhere, MINAGRI and RAB should introduce the efficient or effective medicines and vaccines cur the Tick-borne disease of cattle and other diseases on affordable prices;
3) To address the issue of scarcity of water for livestock in Pastures like Nyagatare and Gatsibo, as well as other parts of Eastern Province, MINAGRI and RAB should make an integrated investment Plans and costs sharing of water for livestock between Government and Farmers/Breeders, in purpose of realizing large scale water supply projects into farms that should address lack of water for livestock in these areas;
4) To ensure the increase of livestock production as well as investments in livestock development for milk and meat, MINAGRI and Local Government entities in partnership with Private Sector Federation (PSF) should encourage other investors to invest in livestock to ensure local and external competitive stable. This will help to increase the Price market and stability of rearing system so that it can encourage others to exercise farming activity rather than abandon it;

5) To address existing challenges of insemination, MINAGRI and Development Partners should expand extension services and coaching programs in Livestock to farmers in order to build capacity development of Breeders enabling them to realize themselves some livestock services (like insemination and vaccination;
6) For any policy developed and enacted as Public Policy, MINAGRI should conduct an exercise of Policy Evaluation to ensure success or failure of the Policy in order to intervene correctly, timely and rightly to ensure intended outcomes.

5.4. Areas for further research

Further research is recommended in the following areas:

1. Veterinarians to conduct research in an aspect of impact of Genetic improvement, characteristics and adaptability versus biological effects as well milk quality, i.e. standards;
2. Economic Researchers to realize research to identify advantages of Sedentary cattle keeping vis-à-vis investments carried out linkage to policy intended outcome or perspective;
3. Environmentalist and developmental researchers to conduct Joint research to assess sedentary cattle keeping and contribution to the green economy;
4. Political science researchers to conduct research in perspective of Policy implementation vis-à-vis governance aspects-which can address conflicts through community participation in policy formulation and implementation.

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Appendix I: Tools for data collection during field research

Tool 1: Interview guide

Objective of Study 1: To investigate the implementation pathways of National Agricultural Policy, aspect of animal resources, in Eastern Province, Rwanda

1) How can you describe farming activity in the last ten years while transiting from pastoralism to sedentary farming? (To Explain briefly): **(Veterinary, Agronomist, Farmers/Breeders, Local Leaders)**

2) What challenges have the population faced in that period of transition from pastoralism to sedentary? (To explain briefly) **(Veterinary, Agronomist, Farmers/Breeders, Local Leaders, RAB Officer)**

3) Describe the process of addressing the challenges: Central Government interventions, local government decisions? **(local leaders as described above)**

4) To ask some references as documents for analysis

5) How is the process of implementation of the National Agricultural Policy in Nyagatare/Gatsibo District on side of farmers and local leaders as well as all concerned of the Policy? **(Veterinary, Agronomist, Farmers/Breeders, Local Leaders)**

6) After adopting a National Agricultural Policy, how different institutions implementing that Policy put on place strategies and mechanisms supporting the implementation of policy in place? **(For Local Leaders, RAB Officer, Veterinary, Agronomist)** (To ask some references as documents for analysis)

1) …….

Cattle health and disease problems and distance to developed centers…….

7) How are the cattle health and disease problems in Nyagatare or Gatsibo District? Describe to me what has been done to curb down these issues refer to the Policy? **(Veterinaries & Farmers/Breeders, RAB Officer)**

1) ……

8) Briefly, describe what about the distance made to access veterinary services to prevent animal diseases before and after the Policy and Ministerial Order? **(Farmers/Breeders)**

1).....

9) Would you tell me what has been done in order to avail all required services enhancing livestock development to MCCs? Tell me how does it operate? **(Farmers/Breeders, RAB Officer)**

1)……

Objective of Study 2: To assess the challenges of the implementation of the policy in the Eastern Province while transforming the pastoral system to sedentary cattle keeping

10) Is there any challenges related to resistance to change observed at the side of Local Leaders as well as farmers (Pastoralists) during the implementation of Policy based on mindset? In this situation, what are the measures took to address the issues encountered on the ground, especially on side of Local leaders and farmers identified, as well as in the farming area generally? How these challenges have been handled up to reach common understood of implementing that policy effectively by all concerned? **(For Local Leaders, Farmers/Breeders & RAB)(** (To ask some references as documents for analysis)

1)……

11) After the adoption of a National Agriculture Policy followed by a Ministerial Order on stray cattle and other domestic animals promoting sedentary cattle keeping in your district in last 10 years, what are the problems (administrative and technical) that you are still facing in your District? **(For Local Leaders, Veterinary, Agronomist & Farmers) (If possible to check any document submitted to the concerned institution to handle them)**

1)……
2)……

Objective of Study 3: To identify the development benefits resulting from sedentary cattle keeping practice in the Eastern Province of Rwanda

12) What are the developments benefits resulting from sedentary cattle keeping practices as opposed to pastoralism in Eastern Province of Rwanda? **(Farmers, Veterinary, Agronomist & Local Leaders)** (To ask some references as documents for analysis)

1)……

13) What is the status of livestock in the last 10 Years in Nyagatare or Gatsibo District? What are the drivers of these changes? **(For Local Leaders, Veterinary & Agronomist)**

1)……..

14) What should be done to sustain the results and to keep enjoying the Amended Policy (National Agricultural Policy) and affiliated ministerial order on stray cattle? **(Local Leaders, Veterinary, RAB Officer)**

1)……..
2)…….

15) What would be the strategies to deliver effectively to achieve Livestock Sector Strategies contributing to National Strategy for Transformation targets? **(Local Leaders & RAB Officer)**

1)…….

Tool 2: Template for collecting data related to cattle population in the last 10 Years in Nyagatare and Gatsibo districts (from 2008-2017)

N0	Cow blood	Years									
		2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18
	Eg: Local race "Ankole"										

Tool 3: Template of collection of data of production of milk in Nyagatare and Gatsibo Districts in last 10 Years (8 MCCs for Nyagatare & 3 MCCs of Gatsibo)

N0	Year	MCC name	Quantity of Milk targeted	Quantity of Milk collected
District's name				
1	2008-2009			
2	2009-2010			
3	2010-2011			
4	2011-2012			
5	2012-2013			
6	2013-2014			
7	2014-2015			
8	2015-2016			
9	2016-2017			
10	2017-2018			
Total production in 10 Years				

Tool 4: Template for analysis of resolutions and recommendations taken during implementation to address challenges encountered

No	Institution	Identified challenges during policy implementation	Resolution took by involved institutions to address related issues	Status of implementation	My Observations as a researcher

Tool 5: Template for analysis of Veterinary services introduced by MCCs based on Policy's incentives and affiliated programs

No	Name of MCC	Establishment date	Existed service veterinary in time of commencement	Others veterinary services introduced	Appreciation of farmers	Observations of the Researcher

Tool 6: Template for analysis of livestock infrastructures developed between 2008 & 2017 due to Policy enforcement and related programs

No	Infrastructures developed	Purpose of infrastructure	Existing challenge(s)	Effects on existed challenge(s)	Beneficiaries	Observations of Researcher