FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

FEED THE FUTURE RWANDA HANGA AKAZI ACTIVITY

LIVESTOCK INDUSTRY VALUE CHAINS LANDSCAPE ANALYSIS IN RWANDA

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Submitted to: Feed the Future Rwanda Hanga Akazi activity

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Table of Contents

Table of Contents i

Executive Summary v

List of tables xii

List of Figures xiv

Abbreviations xv

Section One: Introduction citing over view of livestock industry of Rwanda 1

1.1. Background 1

1.2. Purpose of the assignment 2

1.3. Specific tasks include: 2

1.4. Overview of Rwandan Livestock Landscape value chains 3

1.5. Composition of Rwandan livestock sector 4

1.6. Livestock production growth in Rwanda 5

Section Two: Stakeholders Field findings 7

2.1. Technical scope of the assignment 7

2.2. Data collection 9

2.3. Data Management, Processing and Analysis 9

2.4. Overview on livestock value chains (LVC) actors consulted 10

2.5. Special group discussion findings 15

Section Three: Detailed Livestock Value Chain Landscape Analysis 15

3.1. Cattle value chain 15

3.1.1. Dairy Cattle production in Rwanda 16

3.1.2. Cattle distribution in Rwanda 17

3.1.3. Feeds and feeding of cattle 17

3.1.4. Milk production 18

3.1.5. Milk collection/ aggregation 19

3.1.6. Raw milk collection system, transportation and storage 20

3.1.7. Projected Market Demand 23

3.1.8. Dairy value chain employment analysis 25
3.7.*8* Other Diary value chain programmes that are operating 48
3.2. The beef (cattle) value chain 49
3.2.1. Meat sector policies and strategies: 49
3.2.2. Meat value chain segments in Rwanda 50
3.2.3. Beef cattle production in Rwanda 50
3.2.4. Rwanda MVC Key Stakeholders and Operators (as of December 2021) 54
3.2.5. Beef value chain employment analysis 56
3.2.5.5. Other beef value chain development projects in place in Rwanda 64
3.3. Small Ruminants Value Chain 66
3.3.1. Goat value chain 66
3.3.2. Goat distribution in Rwanda 67
3.3.3. Trend of goats' production in Rwanda. 67
3.3.4. Goats value chain components 68
3.3.5. Markets and trade 69
3.3.6. Imports of small ruminants' products 71
3.4. Sheep value chain 72
3.4.1. Sheep distribution in Rwanda 72
3.4.2. Mutton and wool processing facilities, distribution and marketing 73
3.4.3. Wool and skins products 73
3.4.4. Small ruminants value chain employment analysis 73
3.4.4.1. Employment supply and demand in the value chain 73
3.4.4.2. Constraints and opportunities in small ruminant value chain 75
4.4.4.3. Identification of key actors on the small ruminant value chain 76
3.4.4.4. Potential interventions to address the constraints in the small ruminant value chain 79
3.4.4.5. Other small ruminants' value chain projects that are operating 81
3.5. Pigs, Poultry and Rabbits Value Chain 82
3.5.1. Pig value chain 82

3.5.1.1. Pigs' distribution in Rwanda 83
3.5.1.2. Pigs' meat production 84
3.5.1.3. Pig processing facilities, storage and transportation 84
3.5.1.4.Pig products distribution and marketing 85
3.5.1.5. Markets and trade 85
3.5.1.6. Pigs value chain employment analysis 88
i. Employment supply and demand in the value chain 88
ii. Constraints and opportunities in the pig value chain 89
iii. Identification of key actors on the pig value chain 90
iv. Potential interventions to address the constraints in the pig value chain 92
3.5.2. Poultry value chain 94
3.5.2.1. Poultry production 94
3.5.2.2. Poultry distribution in Rwanda 95
3.5.2.3. Poultry meat processing facilities, transportation and marketing 95
3.5.2.4. Poultry value chain employment analysis 98
i. Employment supply and demand in the value chain 98
ii. Constraints and opportunities in the poultry value chain 99
iii. Identification of key actors on the poultry value chain 100
iv. Potential interventions to address the constraints in the poultry value chain 102
3.5.3. Rabbits value chain 104
3.5.3.1. Rabbit production 104
3.5.3.2. Rabbits' distribution in Rwanda 105
Section Four: SWOT Analysis 108
4.1. A SWOT analysis of the Livestock landscape Value Chain 108
4.2. Enabling policies, laws and regulatory frameworks 113
Section Five: Opportunities, anticipated number of decent jobs and proposed intervention's Models for job creation 116
5.1. Prioritization of livestock value chains and number of jobs to be created 116
5.1.1. Selecting the key value chains and Jobs available 116

5.1.2. Number of predicted jobs opportunities 117
5.2. Potential opportunities for expansion in the livestock value chains in terms of job creation 130
5.3. Proposed Models for job creation program interventions 130
Section Six: Conclusion and Recommendations 137
6.1. Conclusion 137
6.2. Recommendations 137
List of Annexes 139
Annex 1: List of livestock value chains actors consulted 139
Annex 2: Statistical representation of selected medium and big size farms in Rwanda 141

Executive Summary

Agriculture is one of the viable pathways to transforming Rwanda into a middle-income country. Agriculture is regarded as an essential tool in reducing the nation's level of poverty, raising rural incomes, and stimulating progressive development in secondary sectors of the economy. The Government of Rwanda (GoR) has allocated significant resources to improve agricultural productivity, expand the livestock sector, promote sustainable land management, and develop supply chains and value-added activities.

The livestock value chain is one of the specific value chains Feed the Future Rwanda Hanga Akazi is considering to prioritize for potential support in order to create more jobs thereby improving the livelihoods of communities and prosperity. Hanga Akazi has been supporting development of both agriculture and livestock value chains. The project wishes to deep dive into identifying sections of the livestock value chains with high potential to create sustainable job opportunities.

In a bid to address the problem of insufficient employment opportunities and limited entrepreneurial success that has negatively impacts the Rwandan economy and hampering country's development goals, Hanga Akazi wants to facilitate capacity development of Rwandans – in particular women, youth, and persons with disabilities – in key technical and soft skills required to participate in a modern workforce.

The project Hanga Akazi will provide technical and soft skills interventions to a minimum of 23,000 job seekers to access new or to get improved employment contracts, while the Activity's support to agribusinesses will result in the creation of at least 19,000 jobs at partner firms/organizations.

Investments in agriculture and livestock production enterprises have the greatest potential to close the projected agriculture and livestock products consumption gap at the same time contributing to farm income and enhanced nutritional status of farming families as well as creating more jobs in the rural areas.

To this regard, one of the priority areas of the Rwanda's strategy is to increase the efficiency in production of various livestock products through a market-oriented business model through collaboration with the private sector value chain actors.

Therefore, if Rwanda's private sector involved in livestock industry value chains are to become competitive over the long term, they must acquire knowledge, skills, with business development management tools that could help them to overcome the present constraints. The demand of livestock products (milk, meat, eggs & skin) is increasingly satisfying the producers and on other hand, their export is still increasing which present the opportunities for small and large investments and creation of new and improved jobs. It within the same understanding that, HA commissioned a consultant to make a deep analysis of the livestock landscape value chains specifically for cattle, small ruminants, pigs, poultry and rabbits.

The analysis involved gathering knowledge and facts on the segments of each livestock specie value chain, highlighting practices used along each section of the value chains. This report therefore, elaborates in detail the finding of the livestock landscape value chains analysis per species as requested in the terms of reference. The report provided general over view of the livestock sector in Rwanda as well as elaborating

policies and programs that have been put in place to promote and develop livestock industry in Rwanda. Furthermore, the socio-economic importance of the domestic livestock to the community and their distribution is outlined.

- **Importance of job creation in Livestock sector in Rwanda**

Livestock industry creates and provide decent rural and urban employment opportunities. Livestock plays a crucial economic role for more than 60% of rural households in developing countries. Livestock contributes to the livelihoods of 1.7 billion poor people whose 70% of them are women. Dairy and other animal products creates cash and in-kind incomes and enables savings for future needs. As a result, the sector plays a major role in reducing poverty, improving resilience as well as combating food insecurity and malnutrition.

Demand for livestock products is expected to rise as a result of projected growth rates in world population, growing incomes and urbanization. Livestock production is indeed the fastest growing sector in agriculture and it offers numerous employment opportunities along production value chains.it also generates jobs in related sectors such as transport, trade, feed and input provision as well as veterinary services. Gainful and productive employment opportunities can also be derived from value-enhancing activities in livestock. Due to limited requirement and land ownership, short cycle species production; small ruminants, poultry, dairy, rabbits etc. present unique prospect for the rural poor, especially women and youth, to benefit from surging demands for animal products.

However, some employment challenges in the livestock sector remain and need to be overcome. Small scale livestock production is characterized with low productivity levels and incomes due to limited access to technologies, infrastructure, credit, land, technical know-how, and training on husbandry techniques, which can lead to poor animal health and limited use of genetic potential. Women and youth with no access to capital often engage in livestock related activities as unpaid family workers.in cultures where patriarchal ownership patterns dominate, women may not have access to or control over income derived from livestock activities.

- **Objective of this study**

The purpose of conducting a landscape analysis of livestock industry value chains in Rwanda is to gather information and insights about the current state and status of livestock sector in the country. The information obtained will be used to identify areas of intervention in order to improve sector growth thereby creating job opportunities as well as development of the livestock industry in Rwanda.

The analysis will provide a comprehensive overview of the existing livestock production practices along the value chains axis; the actors involved in the industry; the challenges faced by value chain operators as well as the policies/ regulations governing livestock sector development in Rwanda. Additionally, the analysis will identify best practices and successful models of livestock sector.

- **Specific objectives**

- Researching the livestock industry: The consultant would research the livestock industry value chains to gain an understanding of the current state of the industry, their challenges, and opportunities.

- Identifying key stakeholders/ actors: The consultant would identify the key stakeholders and actors in the livestock landscape, including farmers/producers, milk/meat/eggs/skin processors, and distributors in Rwanda.
- Analyzing the livestock landscape: The consultant would analyze the livestock farming/production landscape to identify the current trends, challenges, and opportunities for the industry. This analysis would include an assessment of the current and potential demand for livestock related products, as well as an evaluation of the competition in Rwandan market.
- Assessing the feasibility and opportunities of livestock value chains for job creation: The consultant will assess the feasibility and opportunities for job creation in the livestock value chains particularly for youth, women and persons with disabilities.
- Evaluate the potential for expanding the livestock industry in Rwanda, including the identification of new market opportunities, such as the export market, and the potential for diversification into other by products.
- Developing recommendations: Based on the analysis and assessment, the consultant would develop recommendations for livestock interventions that would promote job creation at different level of the values chain practices, the best practices for livestock, and the most effective marketing and distribution strategies in Rwandan market.

The ultimate goal of the livestock value chain landscape analysis study is therefore to inform the Hanga Akazi of the potential and business opportunities along the entire value chains of the livestock species analyzed and to recommend sound potential interventions that could boost production, productivity, and marketing interventions along each of the livestock value chain in a sustainable manner.

➢ Study approach and methodology

In order to conduct thorough livestock value chains landscape analysis, the consultants approached the assignment through the following methodology;

A) Desk review of various documents; reports, surveys, research materials, policies, strategies and any other relevant literature found around the species of livestock under this landscape analysis.

B) Conduction of interviews: based on the fact that, the assignment was comprehensive in nature as it covers wider aspects of domesticate livestock in Rwanda, in depth and in details, consultants had to undertake comprehensive discussions with stakeholders involved in livestock industry as direct operators; supporting institutions; service providers etc. therefore, to achieve this objective, the following were carried out;

   i) Interviews with key informants were conducted to get the in-depth status and state of the sector for each livestock value chain in the country. The KII provided detailed account of the policies, strategies and development scenarios and programs in place for the revitalization of the value chains to cope with demands and overcoming challenges as well as the future trend for each livestock value chain. This involved discussion with industry policy and decision makers on the side of the government, but also specific stakeholders operating in certain segments of the livestock value chains. Indirect value chain beneficiaries were also interviewed to gain the various understanding of the sector from various people with diverging opinions over the sector.

ii) Special discussions with specific categories of livestock service providers. In order to capture more information about the trend in development of the livestock sector in particular on what is going on at the grass-roots, we decided to deep dive into the wells of information by conducting special discussions with technicians who on daily basis are engaged with activities aiming to execute policies, strategies and programs put in place to develop the sector. Therefore, we held discussions with service providers; vets, animal scientist, and any other interveners in the value chains of livestock under this study.
iii) Primary and secondary date on each of the livestock value chain and landscape were collected and the data obtained were processed to generate the outline on how the livestock value chains under this assignment are prospering.
iv) Data was then put together and finally the report has been generated with detailed information and statistics over the entire livestock value chain landscape in Rwanda.

- **Key study findings**

Based on the terms of reference, the study has been able to provide detailed account of each livestock value chain as follows;

- **Cattle:** the bovine value chain has been found to have two very important value chains; **the dairy value chain**: this by itself is huge and most economically important in Rwanda than any other livestock as of currently. Details of it can be found on the section for dairy value chain in this text. In terms of employment opportunities estimates; under improved management practices, the dairy value chain in one year can generate **2,628** unskilled workers (cattle herders, aggregators, processing attendants); **18,700** seasonal casual laborers.

- **Beef/meat value chain:** this also has its importance in Rwanda. The beef value chain has also been detailed in the text and all what it takes to operate beef sector is found within this study. The beef value chain can generate about **800** unskilled workers majority operating at the slaughter premises, hides/skins and butcher operators.

Hides and skins: this is another value chain parallel to beef/meat value chain. It is a product of slaughter of beef animals. Hides value chain gains its economic relevance due to its quality for export earning traders forex.

- **Small ruminants value chain (Goats and sheep):** The value chain for these two interrelated shorts has been well elaborated and detailed in the report. Production trends and trade and marketing has been clearly elaborated in the report. Areas with opportunities for interventions with opportunities for creation of jobs also made clear. In terms of employment opportunities, the sheep value chain in particular wool production and processing, an estimated **124** workers can be absorbed. The goats value chain's estimation of employment opportunities is uncertain because marketing of goats is still informal. It is anticipated that, trough current PRISME project, informal business in goat value chain shall be addressed.

- **Pigs value chain:** This species has been found to also fast growing due to increasing demand of pork. Large scale farming is booming as of current and opportunities for creation of jobs are numerous. The detailed account on the swine production and marketing well elaborated in the report. The employment opportunity in this value chain has been estimated to be **1,695** unskilled workers per year.

- **Poultry value chain:** Poultry industry is discussed in two production systems:

Village chicken: this is the locally raised chicken in the rural areas of Rwanda. The chicken under this management system operates under low input low production. despite the fact, country chicken is preferred by many consumers of poultry, but availability is limited. Majority of households can keep between 2 to 5 chickens. They scavenge around without extra feeding. Employment opportunity in village chicken is mainly a family business. However, significant number of youths are actively engaged in collection of local chicken eggs that are at high demand. The project orora wihaze is supporting youth to collect eggs and egg collection centers have been set up by the same project. Transport facilities have been provided by the same project.

The commercial poultry: largest scale poultry production. The commercial poultry production value chain has been critically elaborated in the report and areas for intervention are highlighted Also sections that have opportunities for jobs creatin are elaborated. Commercial poultry has been discussed under two value products; meat/broilers and eggs. The commercial poultry can generate **775** unskilled workers in the poultry units.

- **Rabbits value chain:** This is also a fast-emerging sub-sector. Demand for white meat is increasing as such there are people who have invested their resources into rabbits rearing. The sector is still at its infancy but their role for improving livelihoods at house hold level is quite enormous. Poor families can easily keep rabbits because they are easy to rear, feeds not a big challenge. Employment opportunities estimates puts it to be **520** semi-skilled and unskilled workers.
- **Support services:** Across all livestock value chains described above, at least **2,232** veterinary technicians will be employed in the sector as providers of advisory services, animal health care, livestock management best practices; inseminators, meat inspectors etc.

➢ **Opportunities in livestock sector**

On each of the value chain, opportunities for further development and expansion have been elaborated well in the report. However, the **dairy sector** has huge investment opportunities and great segments that are and can provide more jobs than any other livestock value chain. Employment in the DVC are just obvious and available in as long as marketing system if streamlined. Youth and women have great chance of getting employed in the sector. Areas with opportunities for jobs creation have been highlighted.

Most sector value chain also has number of opportunities for job creation as long as the value chain supported to grow since demand for red meat is increasing.

Small ruminants also have shown some employment opportunities especially as live animals trade and as meat as well. Wool from sheep if well-developed there could be opportunities for women weaving wool to produce sweaters, wallets, hand bags etc.

Pigs value chain: Fast growing with a lot of jobs opportunities along its value chain axis. Youth and women could start small farms of pigs if given support. All in all, from the fact there is export of pork and live pigs justifies the importance of the specie in economic transformation.

Poultry value chain: also analyzed as village chicken and commercial poultry. Opportunities for growth and creation of jobs are obvious and well elaborated in the text. Women and youth dominated the village chicken.

Rabbits value chain: Rabbit production is emerging and provides ample opportunities for jobs creation should many investors get interested. Women and youth are the majority of beneficiaries for rabbits.

Therefore, under recommended interventions, at least **29, 284** workers may be employed in the livestock sector.

- **Recommendations for intervention in job creation**

Employment opportunities in the livestock value chains are massive if the operators of chain segments are given support (skills and technical) to be able to run their businesses professionally. It is evident that, each livestock value chain has a lot to offer in terms of job creation, improving food security, economic gains as well as contributing strongly to the national economy.

The study has outlined several areas where Hanga Akazi should intervene in each value chain (see affiliated tables on each value chain). However, the consultants are suggesting additional recommendations as follows;

i) Farmers' capacity enhancement to transform them from substance livestock farming is highly needed. Turning the mind-set towards business-oriented livestock production to cope with ambitions of PSTA 4, NST1, LMP and Agricultural policies is essential for increased production and productivity. In this regard, Hanga Akazi may invest its resources to conduct training to producers across all livestock value chains in order to impart the theory of change.

ii) Primary livestock production in Rwanda, is hampered by inadequate animal feeds basically originating from inadequate supply of appropriate feeds (fodder). Despite the fact that, land availability is a challenge, but even the available one is not fully utilized because of lack of climate resilient fodder grass and legumes. Efforts to improve feeds for livestock has been ongoing but the journey is stll far from reaching. In this aspect, Hanga Akazi, may intervene to support farmers with land to maximize fodder production through materials and financial support; provision of seeds, support to fodder seeds multipliers and upscaling of technologies of adding value to crop residues intended for animal feeding.

iii) When markets work efficiently and effectively, a pull effect spills over from end market to source of production. Final products are a product of processing facilities that as per analysis, not well functioning due to various technical and financial. It is therefore, recommended that, HA could provide both technical and financial (grants) to struggling processing facilities across the all-livestock value chain processing facilities in particular the SME's

iv) High quality and safe livestock products have been a challenge. Due to lack of knowledge on hygienic production of Animal Source Foods (ASF), substandard processing equipment; poor dispensing equipment/ utensil; as a result, the industry is critically facing production of products that are contaminated by various food contaminants along value chain axis. E.g., Milk collection centers; processors (SME's); abattoirs/slaughter houses; butchers; supermarkets; etc. in order to produce safer and good quality products, these challenges must be addressed; therefore, it is recommended, apart from skills capacity building, support for the installation of appropriate equipment would be of paramount importance and at this juncture, HA may intervene.

v) The livestock value chain actors, more often than not fail to access technical support services from the would-be providers of technical advices. Rearing livestock require regular and consistent animal health and production follow up. The farmer advisory service has been found to be fragmented for various reasons; inadequate proximity extension agents; farmers' unable to pay for advisory and intervention services; expensive production inputs; fragmented market structures making or reducing income to farmers; all in all, farmers and other value chain operators require such technical support. The analysis has revealed there is a lot of disconnection between technical services providers and people to be served. The extension agents lack or inadequate means (transport facilities and skills capacity) to serve value chain actors. in order to create better services to value chain actors, HA may in the first place provide capacity to such veterinarians to be able to provide accurate interventions, but also support them to reach all actors along the value chains through provision of motorcycle.

List of tables

Table 1: Number of livestock reared at national and provincial level by species 4
Table 2: % of households rearing livestock 5
Table 3: Livestock Population in Rwanda in Thousands by Species, 2010 to 2020 5
Table 4: Production of Animal-Source Foods in Thousands of Metric Tons from 2010-2020 6
Table 5: Projections of workers who will be looking for jobs in cities in 2032 6
Table 6: Numbers of livestock farmers and key informants interviewed: 8
Table 7: Numbers of key informants participated in group discussions: 8
Table 8: Numbers of the livestock value chain actors consulted by category and province: 10
Table 9: Farm's status in terms of animal population and farm workers 13
Table 10: MCC's location, installed capacities and actual average collection 20
Table 11: Milk utilization (in %) 22
Table 12: Estimated and Projected Milk Demand, 2022-2032 24
Table 13: Export of Milk in Volume and Revenue 25
Table 14: Summery of constraints and opportunities in the value chain 29
Table 15: Summary of jobs that could be created along the dairy value chain segments. 33
Table 16: Potential interventions to address the constraints 44
Table 17: Other Dairy Development support programmes in Place 48
Table 18: List of modern abattoirs across the country 52
Table 19: Regional trend in per capita meat consumption (kg/person/year; FAO, 2020) 53
Table 20: Exports of Hides and Skins in both Volume (kg) and Value (USD), 2014 to 2019 54
Table 21: Estimated number of BVC Operators across Provinces of Rwanda 55
Table 22: summery of constraints and opportunities in the beef value chain 57
Table 23: Potential interventions to address the constraints in the value chain 61
Table 24: Other beef development programmes in rwanda 64
Table 25: Goats and sheep traded in domestic markets 69
Table 26: value of exported product by country in 5 years ($) 70
Table 27: Regional Exports per year($) 70
Table 28: Goats and sheep export to DRC 71
Table 29: Imports of goats & sheep 71

Table 30: Sheep distribution by sex and province 73
Table 31: summery of constraints and opportunities in the small ruminant value chain 75
Table 32: Potential interventions to address the constraints in the value chain..... 79
Table 33: Other small ruminant's programmes in this space..... 81
Table 34: Number of pigs raised, by type and province..... 83
Table 35: Spotted Pigs cross border selling points-DRC 85
Table 36: Informal export of pigs and poultry products (value in USD)..... 87
Table 37 :summary of informal exports of pig and poultry products (Value in USD $)..... 87
Table 38 :ICBT data on Pigs per crossing points: 2017-2019 (in RWF) 88
Table 39: summery of constraints and opportunities in the pig value chain 89
Table 40: Potential interventions to address the constraints in the value chain..... 92
Table 41: ICBT data on Poultry per crossing points: 2017-2019 (in Rwf)..... 97
Table 42: summery of constraints and opportunities in the poultry value chain..... 99
Table 43: Potential interventions to address the constraints in the value chain..... 102
Table 44: Number of rabbits raised, by type and province..... 104
Table 45: summery of constraints and opportunities in the rabbit value chain 106
Table 46: Potential interventions to address the constraints in the value chain..... 107
Table 47: SWOT analysis matrix of the Livestock Value Chain in Rwanda..... 108
Table 48 : Key value chains in Rwanda's livestock sector..... 116
Table 49: Status of Employment Rate in Rwanda (May, 2023) 117
Table 50 : Number of decent jobs available by segments of VCs and recommended interventions 119

List of Figures

Figure 1: gender status of respondents 10
Figure 2: Working experience 12
Figure 3: Education level 12
Figure 4: Rugali Cross border livestock market 14
Figure 5: Farm System in Rwanda 16
Figure 6: Potential Cattle production by breed in Rwanda 17
Figure 7 : Cattle distribution 17
Figure 8: Milk supply V. chain in Rwanda 22
Figure 9: Milk marketing and consumption Pattern 25
Figure 10: Projected milk supply and demand over 10 years 26
Figure 11: Pie chart showing goats distribution in Rwanda 67
Figure 12: Growth of number of goats in Rwanda 68
Figure 13: Growth of exports to DRC 71
Figure 14 : Pigs distribution 84
Figure 15: Poultry distribution in Rwanda 95
Figure 16: Trend of rabbit's population (2010-2019) 105
Figure 17: Rabbits' distribution in Rwanda 105

Abbreviations

AHS: Agricultural Household Survey

ASF: Animal Source Food

BNR: Banque National du Rwanda

BVC: Beef value Chain

CFC: Crossbreed Family Chicken

DRC: Democratic Republic of Congo

EAC: East Africa Community

FAO: Food and Agriculture Organization

FDA: Food and Drugs Authority

GDP: Gross Domestic Product

GOR: Government of Rwanda

HIC: High-Income Country

ICBT: Informal Cross Border Trade

IFAD: International Fund for Agricultural Development

ITFC: Improved Traditional Family Chicken

LMP: livestock master plan of Rwanda

LSA: Livestock Sector Analysis

MCC: Milk Collection Center

MINAGRI: Ministry of Agriculture and Animals Resource

MINICOM: Ministry of Trade and Industry

MINIFRA: Ministry of Infrastructure

MINISANTE: Ministry of Health

MIR: Made in Rwanda

MVC: Meat value Chain

NAEB: National Agricultural Export Development Board

NAP: National Agricultural Policy

NGOs: Non-Governmental Organizational

NISR: National Institute of Statistics Rwanda

NST: National Strategy for Transformation

PEAL: Poultry East Africa Ltd

PHC: Population and Housing Census

PRISM: Partnership for Resilient and Inclusive Small Livestock Markets

PSTA4: Strategic Plan for Agriculture Transformation

RAB: Rwanda Agricultural Board

RCA: Rwanda Cooperative Agency

REG: Rwanda Energy Group

RNDP: Rwanda National Dairy Program

RTI: Research Triangle Institute

SDGs: Sustainable Development Goals

SME: Small and Medium-sized Enterprise

SP: Specialized Commercial Chicken

TFC: Traditional Family Chicken

UHT: Ultra Heat Treatment

USD: United State Dollars

Section One: Introduction citing over view of livestock industry of Rwanda

1.1. Background

The agriculture sector in Rwanda plays an important role as it employs approximately 72% of the active population especially women and contributes around 33% of the national GDP, while contributing about 70% of the country's trade export revenues. Of this, the livestock sector contributes a small share accounting for about 3% of the overall GDP (Self Help Africa, 2021). Rwanda's livestock population was as follows: 1,424,180 cattle, 1,513,140 goats, 331,748 sheep, 786,191 pigs, 2,583,33 chickens, and 361,330 rabbits[1] .

According to results from AHS 2020, it indicates that 3.8 million adult populations were engaged in agricultural activities (growing crops/and or livestock) including 2.1 million females representing a share of 56.6% of total farmers. The majority of farmers are old, less educated, and live in rural areas. The involvement of youth in agriculture is low, only a quarter of farmers (26.6 percent) are between 16 and 30 years old.

Different strategies have been developed to support the agriculture and livestock in general to thrive, namely Strategic Plan for Agricultural Transformation, the National Agricultural Policy, the livestock master plan and others. The National Strategy for Transformation 2017- 2024 (NST-1) in its economic pillar *(Priority area 1)* aims at creating 1.5 million decent and productive jobs, modernizing and increasing productivity of agriculture and livestock and promoting sustainable management of the environment while mainstreaming gender and social inclusion.
According to the PSTA4 and LMP, investments in agriculture and livestock production enterprises have the greatest potential to close the projected agriculture and livestock products consumption gap at the same time contributing to farm income and enhanced nutritional status of farming families.

Rwanda's private sector involved in livestock industry value chains have to become competitive as such they must acquire knowledge, skills, on business development management tools that could help them to overcome the present industry constraints. The domestic demands for livestock products as well export are steadily increasing calling for more investment opportunities for small, medium and large scale entrepreneurs thereby creating jobs and employment to youth, women and persons with disabilities across the country.

The landscape study was conceptualized based on the above contextual background of the GOR's efforts and Rwanda Hanga Akazi interventions to transform the agricultural sector to make it market-driven, linked to job opportunities surrounding the livestock value chains targeting increased productivity for income generation and employment.

RTI International is implementing the Feed the Future Rwanda Hanga Akazi to address the problem of insufficient employment opportunities and limited entrepreneurial success for Rwandans which negatively impacts the Rwandan economy and the country's development goals. The HA Activity will facilitate capacity development of Rwandans – in particular women, youth, and persons with disabilities – in key technical and soft skills required to participate in a modern workforce (focusing on opportunities surrounding the agricultural economy) and will catalyze new entry and growth of inclusive enterprises.

Target: All 30 districts in the country are included in Feed the Future-Rwanda Hanga Akazi Zone of Influence[2].

This report describes the general livestock production landscape in Rwanda. It covers the most economically domesticated animal species; cattle, goats, sheep, pigs, rabbits and poultry. It also provides details on the issues that are impacting Rwandan's livestock value chains as well as mitigation strategies. It also highlights the findings on present and future jobs creation opportunities along different livestock value chains.

1.2. Purpose of the assignment

The purpose of conducting a landscape analysis of livestock industry value chains in Rwanda is to gather information and insights about the current state and status of livestock sector in the country. The information obtained will be used to identify areas of intervention in order to improve sector growth thereby creating opportunities for development of the livestock industry in Rwanda.

The analysis provides a comprehensive overview of the existing livestock production practices along the value chains axis; the actors involved in the industry; the challenges faced by value chain operators as well as the policies/ regulations governing livestock sector development in Rwanda. Additionally, the analysis identifies best practices and successful models of livestock sector in other countries, which can be adapted and implemented in Rwanda to improve the livestock industry.

1.3. Specific tasks include:

The scope of work for a consultant to analyze the livestock landscape in Rwanda are the following:

- Researching the livestock industry: The consultant would research the livestock industry value chains to gain an understanding of the current state of the industry, their challenges, and opportunities.

[2] , (Feed the Future, 2022).

- Identifying key stakeholders/ actors: The consultant would identify the key stakeholders and actors in the livestock landscape, including farmers/producers, milk/meat/eggs/skin processors, and distributors in Rwanda.
- Analyzing the livestock landscape: The consultant would analyze the livestock farming/production landscape to identify the current trends, challenges, and opportunities for the industry. This analysis would include an assessment of the current and potential demand for livestock related products, as well as an evaluation of the competition in Rwandan market.
- Assessing the feasibility and opportunities of livestock value chains for job creation: The consultant will assess the feasibility and opportunities for job creation in the livestock value chains particularly for youth, women and persons with disabilities.
- Evaluate the potential for expanding the livestock industry in Rwanda, including the identification of new market opportunities, such as the export market, and the potential for diversification into other by products.
- Developing recommendations: Based on the analysis and assessment, the consultant would develop recommendations for livestock interventions that would promote job creation at different level of the values chain practices, the best practices for livestock, and the most effective marketing and distribution strategies in Rwandan market.
- The ultimate goal of the livestock value chain landscape analysis study is therefore to inform the Hanga Akazi of the potential and business opportunities along the entire value chains of the livestock species analyzed and to recommend sound potential interventions that could boost production, productivity, and marketing interventions along each of the livestock value chain in a sustainable manner.

1.4. Overview of Rwandan Livestock Landscape value chains

Rwanda, is a landlocked and low-income country situated in East Africa (with a population of about 13.2 million people), the country is aspiring to become Middle Income Country (MIC) and High-Income Country (HIC) status by 2035 and 2050, respectively[3]. This Vision is to be realized through a series of seven-year National Strategies for Transformation (NST1), underpinned by detailed sectoral strategies that are geared towards achievement of the SDGs. Furthermore, several frameworks are expected to sustainably address food/nutrition security; such as, the Rwanda Vision 2050, National Agricultural Policy (NAP), Strategic Plan for the Transformation of Agriculture in Rwanda (PSTA4), livestock master plan of Rwanda (LMP-2017-2022), the Made in Rwanda (MIR) Policy, etc.

Rwanda has recorded a steady economic growth over the last decade, and reports are highlighting a GDP increase of 8.0% in 2020, while a projection for 2021 was likely to raise to 8.2%. This rapid growth, coupled with a focus on the business environment, is believed to stimulate a growth in private investment (standing at 13% of GDP). The last 10 years has witnessed a growing body of evidences suggesting the country's strong case for livestock production potential and opportunities to prospect local and regional livestock products markets.

[3] (AfDBank, 2020)

Despite limited land, the livestock sector of Rwanda provides major opportunities to increase contribution to economic growth while improving incomes to reduce poverty and improve the nutritional security of many rural people. This potential has already been proven by the "One cow per family program" that has transformed dairy and agricultural productivity in the country.
The demand for meat, milk and eggs is expected to increase significantly for the foreseeable future due to increasing urbanization and middle-class income earners. Investments to develop the livestock value chains could bring greater impacts on both production and value addition. However, the sector is still constrained by low producing local animals, high morbidity and mortality rates. Detailed inter-disciplinary livestock sector analysis (the LSA) puts clear the potential benefits upon implementation of a livestock master plan (LMP) for Rwanda.

1.5. Composition of Rwandan livestock sector

The livestock sector in Rwanda is comprised of cattle, goats, sheep, pigs, rabbits, poultry, fish as well as bees. The economically domesticated livestock are a source of many animal source food products and by-products (meat, milk, eggs, leather, etc.) that have the potential to contribute to agriculture-led growth and the socio-economic transformation of the population. The statistics are; 999,979 MT of milk, and 8. 272 million eggs, 6.8 million MT of organic fertilizer and an estimated production of 6,305 MT of hides and skins per annum[4]. The livestock sector produces about 174,904 (MT) of meat per year; Red meat: 58,580 MT (2016/2017), Whereby 74 % is beef and the remaining 26% came from sheep and goats, However, per capita consumption of milk is still 75 l/person/year compared to 200 l/person/year as per FAO/WHO recommended level. Also, the meat consumption per capita for Rwandans is still very low (9.08 kg of meat/person/annum) compared to the WHO/FAO standards of 50 kg of meat annually[5].

According to the 2020-2021 Annual Report of the Ministry of Agriculture and Animal Resources[6], livestock contributed 3% to the Gross Domestic Product (GDP). As of 5th population and house hold census 2022, livestock population has been found to be; 1,424,180 herds of cattle; 1,513,140 goats, 331,748 sheep; 786,191 pigs; 361,330 rabbits; and over 2,583, 333 chicken. Table 1 displays the livestock population per province by species while table 2 depicts the trend of the main livestock species since 2010 over a ten-year period, pigs' production has more than doubled and poultry production increased by 54%, while the number of sheep declined by 22%[7].

Table 1: Number of livestock reared at national and provincial level by species[8]

	Cattle	Goats	sheep	pigs	rabbit	chicken	Other poultry

[4] Minagri, annual report 2021/225
[5] Minagri 2016 annual report & LMP 2017
[6] (MINAGRI 2021),
[7] AGHHS 2020
[8] 5th population and house hold census 2022

Rwanda	1,424,180	1,513,140	331,748	786,191	361,330	2,583,333	90,802
Kigali city	40,626	57,777	4,179	25,995	36,551	398,376	7,668
Southern province	389,419	428,181	37,005	302,117	135,947	571,583	15,093
Western province	305,047	179,854	111,128	183,988	49,312	291,465	7,544
Northern province	298,262	181,982	135,517	130,679	55,520	383,319	6,741
Eastern province	390,826	665,346	43,919	143,472	84,000	938,640	53,756

Table 2: % of households rearing livestock

	Cattle	Goats	Sheep	Pigs	Rabbits	Poultry
Rwanda	27.9	19.4	4.7	14.9	5.6	12.0
Kigali city	5.8	4.7	0.4	2.1	7.8	5.0
Southern province	37.2	26.4	2.6	27.0	8.0	17.1
Western province	33.0	13.0	7.6	18.3	4.2	10.1
Northern province	44.8	17.3	13.3	15.1	4.5	10.7
Eastern province	18.8	27.3	1.8	8.9	4.6	13.5

Source: 5th PHC 2022

Available data indicates that livestock sector has become increasingly productive over the past years and the aim is to sustain this growth under PSTA 4, where:

- ❖ Cows are to be promoted for milk production.
- ❖ While small-stock, poultry, and aquaculture will be reared mostly for meat production due to lower feed requirements.

1.6. Livestock production growth in Rwanda

Note that, during the year 2020/21, the cattle population increased by 5.6% compared to the fiscal year 2019/20[9], likewise the small stock population increased as follows; rabbits16%, sheep 11 %, goats 2% and 2.5% for poultry[10]. The increase of cattle and pig numbers is due to efforts deployed by the GoR to support vulnerable families and other interventions initiated by NGOs and Civil society organizations to assist poor families. In that context, 26,614 cows, 2,366 pigs and 41,691 poultry were distributed to 31,764 poor families in 2020/21. Since the Girinka program inception to date, 406,776 cows have been distributed to poor families.

Table 3: Livestock Population in Rwanda in Thousands by Species, 2010 to 2020

Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Poultry	3,538	4,421	4,688	4,803	4,917	4,838	5,239	5,273	5,442	5,306	5,442
Goats	2,688	2973	2,673	2,5709	2,5326	2,707	2,606	2,924	2,734	2,388	2,844
Cattle	1,335	1,143	1,1351	1,139	1,166	1,350	1,214	1,166	1,294	1,372	1,450
Pigs	685	706	989	1,311	1,015	1,492	1,685	1,7165	1,3302	1,386	1,441

[9] AHS 2020
[10] AHS 2020

Sheep	770	829	807	830	631	716	637	665	602	541	602
Rabbits	793	865	994	1,106	1,204	1,355	1,388	1,348	1,265	689	801

Source: (MINAGRI, 2021)

The production of animal-source foods (ASF) has increased dramatically in the past decade. In 2019, Rwanda produced 864,252 MT of milk compared to 372,619 MT in 2010[11]. Except for eggs, the production has doubled.

Table 4: Production of Animal-Source Foods in Thousands of Metric Tons from 2010-2020

Product	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Milk	373	442	503	648	704	731	776	817	848	865	892
Meat	71	74	75	91	119	131	138	152	1627	167	175
Eggs	5.2	5.7	6.3	6.8	7.0	7.3	7.3	7.5	8.0	8.0	8.3

Source:(MINAGRI, 2021)

The employment market in Rwanda

According to the Rwanda National Institute for Statistics (NISR) Household Survey, of the 11.8 million Rwandans in 2017, some 6.8 million were of working age (between the ages of 16 and 65). Of these, 5.9 million were economically active, and 5.8 million were employed. The largest share of the labor force is in agriculture-around 40% (excluding subsistence agriculture) and 70% (including subsistence agriculture). Based on the most recent survey report for 2019, 15.2 percent of the labor force is unemployed, while 26.8 percent of employed workers face time-related underemployment.

Women, the rural population, youth, and the middle-aged are more likely to be out of the labor force. In fact, women are close to 17 percentage points more likely to be unemployed than men (45% vs. 62% labor force participation), as they more frequently engage in unreported subsistence agriculture and unpaid domestic labor[12].

This study comes among solutions for the future challenge: creating jobs for an expanding population - With a current population of nearly 13 million people and an annual population growth rate of 2.1%, Rwanda has to create jobs at a rapid rate to absorb new workers coming into the labor force.

The NISR estimates that, in the next 12 years, the working-age population will be one-third of the total population, and the urban work force will increase by more than 80 percent. This trend means, of the 2.6 million jobs that will be needed, some 1.4 million will have to be in cities.

Table 5: Projections of workers who will be looking for jobs in cities in 2032

Working age and youth employment, 2020-2032 (thousands)

[11] (MINAGRI, 2020)
[12] (Richard Newfarmer and Anna Twum, 2022)

	2020	2032	No. of additional jobs	% increase	Annual growth (%)
Working age (16-64)	**7,171**	**9,824**	**2,853**	**37.0**	**2.7**
Urban	1,750	3,218	1,468	83.9	5.2
Rural	5,421	6,605	1,184	21.8	1.7
Youth	**2,576**	**3,059**	**483**	**18.8**	**1.4**
Urban	653	1,057	404	61.9	4.1
Rural	1,922	2,001	79	4.1	0.3
Total	**12,663**	**16,332**	**3,669**	**29.0**	**2.1**
Urban	2,773	4,900	2,127	76.7	4.9
Rural	9,890	11,433	1,543	15.6	1.2

Source: NISR Population Projections (2018).

As in other low-income countries, in Rwanda, citizens cannot rely on social insurance or transfers as they can in rich countries. In slow-growing countries with an expanding labor force, new entrants typically find work in low-productivity jobs. Whether this trend is likely to happen in Rwanda depends, in large measure, on job growth potential of the recent pattern of growth which has been increasingly driven by services and other higher-value-added sectors.

Section Two: Stakeholders Field findings

This section provides a detailed description of the technical scope, study area and methods of data collection and management protocols.

2.1. Technical scope of the assignment

a) Technically this study limited to:

- ✓ A desk review of the already existing study reports
- ✓ A desk review of the existing livestock national policies, strategies, programmes and plans
- ✓ Consult value chain actors (farmers, processors, traders and key informants in the livestock sector)
- ✓ assessment of the current and potential demand for livestock related products, as well as an evaluation of the competition in Rwandan market.
- ✓ assess the feasibility and opportunities for job creation in the livestock value chains particularly for youth, women and persons with disabilities.
- ✓ Evaluate the potential for expanding the livestock industry in Rwanda, including the identification of new market opportunities
- ✓ develop recommendations for livestock interventions that would promote job creation at different level of the values chain practices, the best practices for livestock, and the most effective marketing and distribution strategies in Rwandan market.

a. Study area

The assignment focused on all districts and purposively 12 districts were hence selected which are Rwamagana, Nyagatare, Bugesera, Kigali city, Gicumbi, Rulindo, Musanze, Nyabihu, Rubavu, Nyamasheke, Nyanza and Kamonyi. The above selection was based on the proportion weight of number of households rearing selected livestock species and the weight of the livestock commodities (milk sheds zones and districts, live animal markets, specific key actors in the value chains.

b. Study design

The study design was dominated by qualitative phase, implying more weight on data collection from interviews with key informants, farmers and few group discussions done by two (2) consultants.
This study didn't involve to make survey with enumerators raison why the quantitative approach was minor even if a questionnaire was developed and used to guide both consultants to come up with same information. This design from client was the source to limit a number of interviewees from selected districts.

c. Sample size of the study

In order to obtain a list of needed livestock value chains actors, the consultants have engaged district animal resources officers (DARO) from selected districts to get the livestock farmers who were at level of understanding well the value chain concerned as it was mainly the task of understanding current status, challenges hindering the sector and suggest the practical solutions which may be turned into job opportunities.
The key informants were also identified in the same spirit. The special group discussions were done at district level gathering 4 animal resources officers from sector and district level in order to explore and understand farmers' point of views.
The tables below show the number of different livestock value chain actors that were interviewed and invited for discussions.

Table 6: Numbers of livestock farmers and key informants interviewed:

Province	No. of District	Planned interviews	Held interviews	Realization rate (%)
Kigali	1	25	21	84%
East	3	16	12	75%
North	3	10	13	130%
West	3	11	8	73%
South	2	9	7	78%
Total	**12**	**71**	**61**	**86%**

Table 7: Numbers of key informants participated in group discussions:

Province	No. of groups	Number of expected	Attended FGDs	Attendance (%
East	2	8	7	88%
North	2	8	8	100%

West	1	4	4	100%
South	2	8	6	75%
Total	**7**	**28**	**25**	**89%**

The realization rate was 86% of interviews conducted, if it is compared to the planned number of LVC actors to be consulted (71 actors). While the attendance was rated to 89% for special group discussions.

2.2. Data collection

a) Secondary data collection

Secondary data was conducted through literature review from official documents (MINAGRI/RAB, RICA, MINICOM, FAO, ENABEL, etc.), websites of stakeholder institutions both public and private and government livestock policy and strategy documents (PSTA4, NST1-7YGP, Rwanda Livestock Master Plan, relevant ministries annual reports, etc.).

b) Primary data collection

Primary data was collected for the purposes of corroborating the secondary data collected during the desk review. This exercise was done through individual discussions through questionnaire to capture qualitative information required. Understand livestock value chains. The approach brought out target groups' valuable insights regarding people's subjective perceptions.
For the purposes of coming up with informed qualitative data, the study used observation during field visits, in-depth Key Informant Interviews (KIIs) from livestock farmers, officials and other specific key actors, and few special group discussions.

i. Key Informant Interviews (KIIs)

In this study, almost all consulted interviewees were considered as key Informants due to the nature of the assignment where the main purpose is to understand the livestock sector and then indicate the job opportunities in resolving the challenges identified. This point orient directly the specificity of the group of interviewees to be sought, including livestock farmers.
The interviewees were drawn from both central and decentralized levels, livestock farmers and private companies found in different livestock value chains.

ii. Special group discussions

Special group discussions were organized in all 7 districts of Rwanda to collect valuable qualitative and quantitative information received from different actors. Information collected from mainly focused on challenges and possible opportunities for improvement and job creation.

2.3. Data Management, Processing and Analysis

After data collection, the raw data was edited to ensure that it was free from inconsistencies, incompleteness, and any unusable data. Raw data collected was coded, sorted, cleaned and arranged

following the study questions ready for analysis and interpretation. Summative content analysis was used to analyse the data of the study components.

2.4. Overview on livestock value chains (LVC) actors consulted

a) LVC actors consulted

The study sampled a total of 61 livestock value chain actors as indicated in the table below. These LVC operators comprised 17 livestock farmers, 28 officials from public institutions, and 16 other key actors in the LVC.

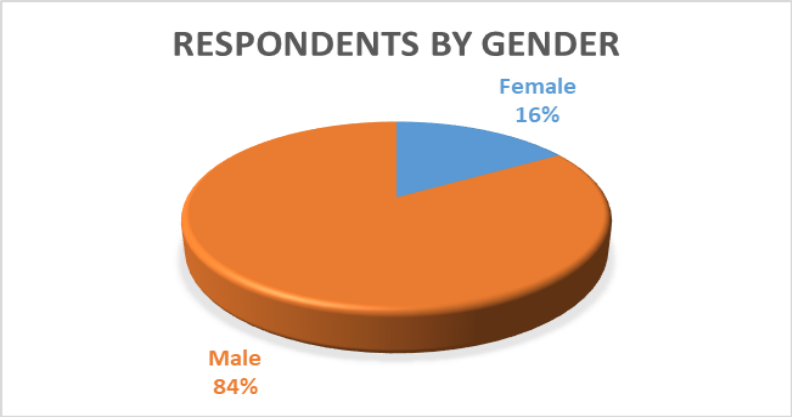
Table 8: Numbers of the livestock value chain actors consulted by category and province:

Category of actors	Kigali city	East	North	West	South	Total
1) Livestock Value chains farmers						
Cattle farmers		2	1	1	2	**6**
Goat farmers		1				**1**
Sheep farmers			1			**1**
Pig farmers		1	1	1		**3**
Poultry farmers		2	2			**4**
Rabbit farmers	1				1	**2**
S/Total 1	1	6	5	2	3	**17**
2) Other LVC actors						
KI officials (Districts, RAB, Minagri, UR, RAYF, cooperatives, etc.)	17	4	4	1	2	**28**
Vet service providers	1	1	2		1	**5**
Livestock traders, markets,..	1			2		**3**
Processors (meat & milk) & abattoir & MCCs		1	1	3	1	**6**
Bank loans service	1		1			**2**
S/ Total 2	20	6	8	6	4	**44**
Grand Total	**21**	**12**	**13**	**8**	**7**	**61**

b) Gender of LVC actors consulted

The LVC actors was randomly dominated by males with 84% and female 16%. No person with disabilities was recorded among respondents.

Figure 1: gender status of respondents


RESPONDENTS BY GENDER
Female
16%
Male
84%

c) Education level and working experience of respondents

Also, the study has shown that the respondents are highly educated and experienced. 39% of have a working experience of 11 to 30 years, 35% have an experience ranging from 6 to 10 years, and 26% have a working experience of 1 to 5years. While education level is dominated by highly educated people with a bachelor, Master or PhD degree at a proportion of 80%.

This situation refers to the nature of the assignment where we needed the actors who are able to understand the sector and propose the practical solutions to the currents challenges faced by livestock value chains in Rwanda.

Figure 2: Working experience

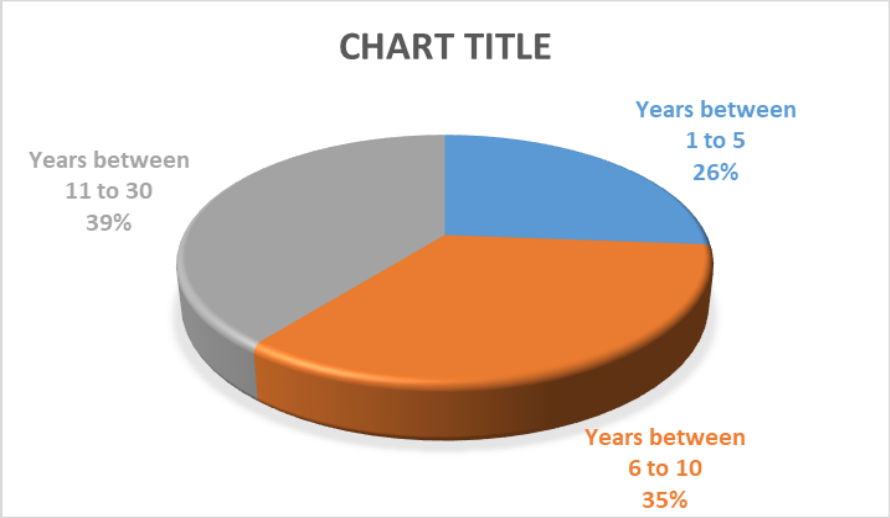
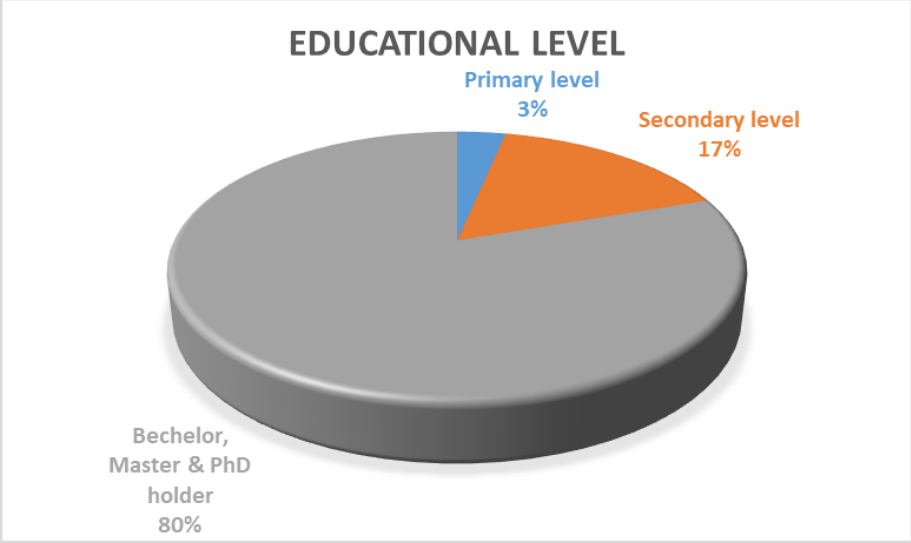


Figure 3: Education level



d) Current status of consulted farms

Normally, farmers and their staff/workers play a critical role in looking after the animals and maximizing productivity. In this regard, 100 farm workers/staff were recorded with 2 workers with disabilities conditions (2%). While among 17 farms consulted, 8 farms have farm managers and 4 have both farm accountants and veterinary technicians.

At this point of, the study revealed the 82.3% of the farms consulted present the lack of technical skills on behalf of their workers/staff especially farm owners, veterinary technicians and a team of farm animal keepers.

The table below gives insight on farm size by category and related farm workers/staff and how difficult it is to get a competent farm worker in terms of technical skills.

Table 9: Farm's status in terms of animal population and farm workers

#	Farmer's Names	Category	Number of animals	Number of farm workers	Getting Competent worker
1	Rutazinda Aimable	Cattle	6	2	Not easy
2	Munyebakwe Beatha	Cattle	9	4	Not easy
3	Mutabazi Shyaka	Cattle	10	4	Easy
4	HODARI KWAGWENE Hilary	Cattle	20	4	Not easy
5	Mumporeze Leonie	Cattle	21	4	Not easy
6	MLAMBO Simon	Cattle	53	10	Not easy
7	NSHOZABAHIZI Naphtal	Goat	320	4	Not available
8	Iyamuremye Faustin	Sheep	400	5	Not easy
9	Uwimana Jean d'Arc	Poultry	989	2	Easy
10	TUYISHIME Jean De Dieu	Poultry	7,000	8	Not easy
11	Nsengiyumva Vincent	Poultry	9,600	10	Not easy
12	MUSABYIMANA Jean Baptiste	Poultry	100,000	25	Not easy
13	Ndikumana Daniel	Pig	64	2	Easy
14	NIYONZIMA Jean Bosco	Pig	400	7	Not easy
15	NIYOYITA Peace	Pig	512	6	Not available
16	Ngurore Deogratias	Rabbit	50	1	Easy
17	Murangwa J. Bosco	Rabbit	450	2	Easy

This above table justifies the existence of challenges of technical skills matter where only 29% of the farms consulted confirm to get competent farm workers in easy way. Additionally, some general information was captured during interviews where they confirm at 100% to have regular market of their farm production which is sold on farm gate at 71% of respondents. The monthly sales are above 200,000RwF for all visited farms.

e) Current status for other actors in value chains

There are many players involved in the livestock value chains which were consulted during this study in order to support the package brought from desk review especially for processing and marketing. The following points were considered during the visits.

a. Livestock markets

There are two active livestock markets in Nyamasheke district which have been visited during this study and found that: Rugali cross border receives cows (especially bulls), goats and pigs while Ruharambunga Pig Market receives only pigs (at least 400 pigs per day, twice a week). Livestock traders get their supplies from other small markets outside the district and individual farmers who rear fatten bulls by targeting this market.

On weekly basis, both markets can receive and sell at least 1300 pigs, 370 cows, 300 goats and 90 sheep. The most clients are Congolese.

Figure 4: Rugali Cross border livestock market

Source: captured by consultant

ii. Slaughterhouses and Meat processors

Pig slaughter houses are not a common business in Rwanda. In many places across the country, the majority of them are slabs ("*Tueries*") and is done on-farm slaughtering. The few slaughter houses had complied with all the statutory requirements. We have visited 2 slaughterhouses in Rubavu districts to assess the meat cross border markets. On weekly basis, they slaughter at least 420 cows at CAMR abattoir (Gisenyi) and 840 pigs at TREBUCO LTD (Rugerero).

Livestock traders get their supplies from markets and farms for slaughtering and they pay only slaughtering service fees. The meat processing business is not well developed, it is limited on making cuts and few sausages.

iii. Milk collection centers (MCCs) and milk processing

We have consulted MCCs and milk processors especially in 4 milk shed zones: Nyagatare, Gicumbi, Nyabihu and Nyanza milk sheds to understand current milk business and we have come out with inputs used to formulate challenges and opportunities about this study.

iv. Animal feeds (concentrates)

As animal feeds as concern, the traders and processors consulted revealed that many of them sell a lot ingredients and or supply some orders according to farmer's directions at their stores. Only 2 animal feed plants (Gorilla Feeds Ltd and PRODEV Ltd: Tunga feeds*) have predictable demand across the country for different category of feeds.

2.5. Special group discussion findings

This group of value chain actors comprised of district staff (district animal resources officer and sector animal resources officers). This group of the key informants was organized into small group (one per district) and the results from the discussion provided more inputs into SWOT analysis discussed above.

Discussions focused on current stats of different livestock value chains, challenges hindering the livestock sector in their districts, available opportunities in job creation and then trying to formulate practical recommendations to overcome the situation.

Section Three: Detailed Livestock Value Chain Landscape Analysis

3.1. Cattle value chain

Like other parts in the world, cattle production has two main value chains;

a) The dairy value chain.

Despite the real fact that all cows produce milk, there are breeds that produce more milk than others due to their genetic potential. In Rwanda, there are three types of breeds that produce milk at different production capacities as follows;

- Local or traditional cattle mainly of the sub-specie Inyambo
- Cross breeds of exotic dairy breeds with local cattle
- Pure exotic breeds imported from abroad

b) Meat value chain:

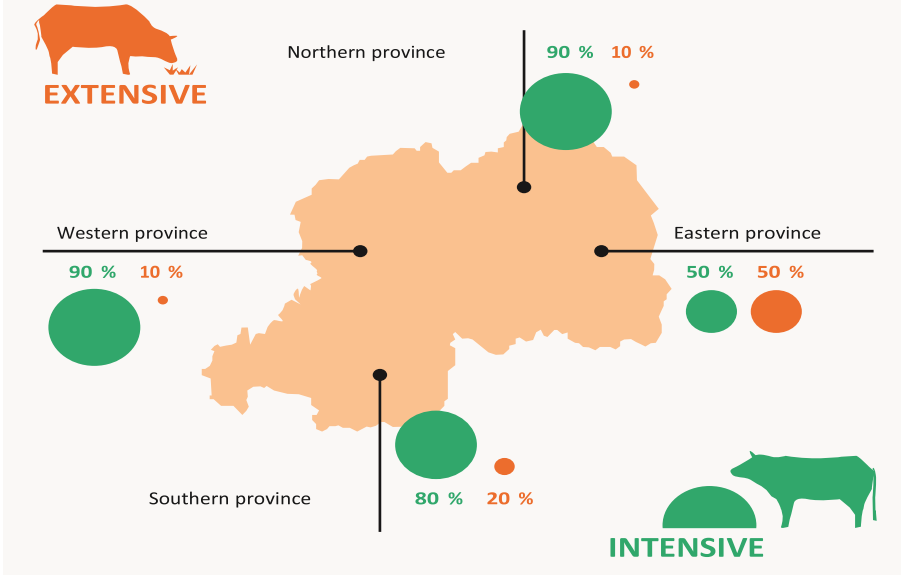
All cattle breeds can be part of the meat value chain. Predominantly, in Rwanda, the traditional breeds of cattle have been the main breed that contributes more on the red meat value chain, followed by crosses of local beef animals found in Rwanda such as Sahiwal, Brahman, and Boran. Bulls from both exotic and crosses are also fattened for meat production. Rarely, culled dairy cows may be slaughtered for meat in areas where beef cattle are insufficient.

3.1.1. Dairy Cattle production in Rwanda

All cattle reared in Rwanda produce milk. However, the cows that produce much more milk are the pure exotic breeds of dairy cows such as Holstein Frisians, Jersey, and the crosses of exotic breeds with local cattle. Basically, there are two cattle production systems in Rwanda. The intensive production commonly known as zero grazing (cut and carry feeding); which is practiced by over 90% of cattle rearing households. The open grazing system which is practiced by medium and large-scale cattle farmers in western highlands (Gishwati milk shed) and the savannah plateaus in the Eastern province – animals graze in demarcated individual grazing lands. Whereas in zero grazed cattle, 1-5 cattle are kept in stalls, in open grazing at least 10 or more cattle are grazing extensively in open pasture.

Figure 5: Farm System in Rwanda

Figure: Farm System in Rwanda



Source: Emily ter Steeg, 2019

Based on the fact that, the government policy on cattle production is to conduct genetic improvement by artificial insemination using semen from pure exotic dairy cattle bulls, the target is to decrease the

number of local cattle while increasing the number of cross breeds towards increased milk production per cow. In Rwanda, the major factor associated with low productivity of cattle has often been attributed to poor genetic potential and low standards of husbandry practices such as breeding, feeding and housing.[13]

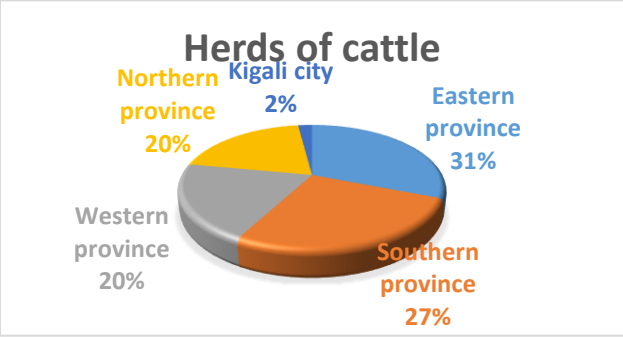
In 2017, the average annual milk production per cow was approximately 909 liters[14]. Average daily production varies from 2 liters/day up to a maximum of 15 liters/day[15]. There is a large difference between yields of exotic cows (951 liter/year), hybrid cows (505 liter/year) and local breeds (217 liter/year). It must be stressed that all yields are below the genetic potential of the cows.

Figure 6: Potential Cattle production by breed in Rwanda

3.1.2. Cattle distribution in Rwanda

Based on the cattle registration exercise conducted by MINAGRI/RAB late 2022, the distribution of cattle was found as follows per province:

Figure 7 : Cattle distribution



Source: NISR, AHS 2020

3.1.3. Feeds and feeding of cattle

Animal feed resources remain a major constraint for livestock development in tropical Africa. In Rwanda, grazing lands are shrinking sharply because crop cultivation is progressively encroaching on

[13] Mazimpaka Eugene, 2017
[14] (Minagri and RAB 2017).
[15] (NISR, 2017.).

grazing areas with increasing human pressure[16]. Therefore, over 60% of households cultivating less than 0.7 ha, and owning livestock, practice zero- grazing, where farmers cut-and-carry forage and crop residues to feed animals that are kept exclusively under sheds (MINAGRI 2009). In general, the main feed for dairy cattle under a zero-grazing system is Napier grass (Pennisetum purpureum). For more than a decade, efforts to improve the feed resource base and feeding management have been based on the introduction, characterization and evaluation of exotic forage species, including grasses and legumes. A number of ruminants feed resources have been identified and characterized as follows; grasses, legumes, crop residues, brewers' and home wastes, and nonconventional feeds. The high variability of feed resources indicates the shortage of feedstuffs in the country[17]. In peri-urban areas, small and large dairy farms use silage to feed cows. Also hay from grasses, especially Brachialis and Chloris Gayana grasses are baled and used to feed cattle. During rainy and wet seasons, the feeds most sourced off-farm are roadside grass, banana peels and sweet potato vines.

The Rwanda dairy development project among other things, has provided support for the production and access to best forage seeds through local seeds multipliers. Grasses such as Chloris Gayana, brachialis, kikuyu, and Napier; legumes- lab-lab, alfa-alfa, desimodium spp etc. have been distributed in areas where the project is operating. However, other dairy farmers across the country are accessing best fodder seeds from RAB. All in all, feeds for dairy cattle remain to be an all-time challenge.

Milk is 87% water, signifying the importance of adlib-tum water supply to the dairy farms. In Rwanda, particularly during dry season, water scarcity is a huge problem and an embarrassment to the dairy industry. Despite the fact that, in some places the government constructed valley dams, boreholes and even national water supply system, the burden of shortage of water for dairy cattle remain to be incomprehensible across the country. Addressing dairy cattle feeding should go hand in hand with water availability.

3.1.4. Milk production

Milk production in Rwanda accounts for 6% of the total production in the EAC. In 2022 its production was estimated at 1.1 billion liters with a per capita consumption of 78.2 liters per person (projected). Dairy products are a major source of cheap and nutritious food to millions of people in Rwanda and the main source of animal protein for the large young segment of the population especially children. According to the Rwanda Livestock Master Plan (LMP) 2017-2022, the dairy industry registered a growth rate of 4 percent annually. The continued growth of the sector is a key factor in attainment of the national development goals as spelled out in the National Strategy Transformation (NST1) and agenda for Vision 2050. This growth is largely a result of both increasing herd size and improving productivity levels. Currently, smallholder farmers, who produce over 80 percent of the domestic milk, dominate the dairy industry.

[16] Mutimura and Everson 2011)
[17] Mutimura and Everson 2011

There are five milk sheds in Rwanda. This is based on the number of cattle kept and the system of production practiced or the best practices used in general management of the herds. Milk production is a factor of two things; the breed's milk production genetic potential and the feeds type, quality, amount and water that the lactating cows gets during lactation. According to the MINAGRI annual report 2021/2022, about 999,976 MT of milk were recorded.

3.1.5. Milk collection/ aggregation

The foundation of a national milk marketing system lies in the ability of its structures to aggregate as much marketable milk as possible at the MCC level. Through MCCs, quality assurance is most reliable because they are the starting stage of the dairy cold chain; aggregators are regulated and are formal. A market penetration strategy will be used to make collection more extensive in order to increase supplies to processors through existing channels.

There are presently 132 MCCs and 150 milk collection points across the country with a total collection capacity of 483,400 liters/day (176 million liters/year). However, in 2022 the actual milk aggregation by MCCs was only 231,110 liters/day (83.2 million liters/per)[18]. This means that the average capacity utilization at MCCs was 48%. The national total milk production in 2022 stood at 1.1 billion liters. Taking into account Milk fed to calves and losses at farm level (14%), the total amount of milk available for the market was therefore 954 million liters a year. This means that MCCs were only able to collect 8.7% of marketable milk[19].

The table below elaborates the locations and installed capacity as well as the collection capacities of available MCC's in the country.

[18] Rwanda dairy marketing strategy 2022
[19] Rwanda dairy marketing strategy 2022

Table 10: MCC's location, installed capacities and actual average collection

	N⁰of MCC	Collection capacity lts/day)	Annual Collection (lts)	Actual average milk collection (lts/day)
South	23	67,850	7,447,941	20,690
East	41	194,000	34,029,657	94,525
North	39	123,650	25,627,733	71,182
west	28	91,900	16,096,268	44,713
Kigali	1	5,000		
Total	**132**	**483,400**	**83,201,599**	**231,110**

3.1.6. Raw milk collection system, transportation and storage

Over 90% of collected milk comes from small holder farmers keeping one to three milking cows. Majority of the farmers sell milk to the milk collectors at an agreed cost per liter depending on the distance travelled to reach the nearby MCC. The milk collectors are critical link between the MCC and the farmer. They are thus an integral part of value chain actors in the raw milk marketing context. The collectors may carry up to 300 liters when using a motorcycle while majority carry up to 100 liters on the bicycle. ***It is a business carried out by youth and women in some parts of the country. Upon milk reception, the MCC's cools milk up to 4⁰c and waits for processors to pick for transformation.***

While processing plants collect milk from MCC/s for processing, there other companies that also buy and transport bulk milk from the MCC's for the purpose of selling raw milk in the city of Kigali and other townships. These companies use refrigerated trucks and open trucks that carry milk in stainless steel cans to Kigali city. The company owners are connected to various milk trading kiosks where they supply raw milk mainly in Kigali city. As reported by the transporters, about 30,000 l/day are supplied by bulk milk hauling companies in the city of Kigali. However, the quality and safety of the milk through this route cannot be ascertained. Bulk transporters of milk are significantly and calls for policy makers to consider their inclusion in wider marketing strategy for milk and dairy products.

a) Milk processing facilities

In Rwanda there are inadequate milk transformation facilities. The processors are categorized as; Small and medium milk processing enterprises and large processing plants. However, in the western highlands grazing land where transportation of milk has met challenges due to very poor road network especially during rainy season, farmers have resorted into opening micro-cheese making facilities at the farm backyards.

b) Micro and SME's (Cottage) Processing Facilities:

Small-scale processing takes up a big portion of the Kigali dairy market, other cities and urban areas. The processing techniques used vary from one operator to another. In most cases milk is brought to a boiling point using wood fire. Most of these operators curdle milk at this stage, although it is

sometimes sold as it is and curdled subsequently by the buyer who most often is a small trader. The product is then sold in bulk to a retailer in 20-liter jerrycans or directly to a consumer in various types of plastic bottles, or less often, in small cans of 3 to 5 liters.

Many of the cottage processors also proceed to make other products like fermented milk ("ikivuguto"), yoghurt and various cheeses for the domestic market except for a couple of cheese processors who export their products within the EAC region and Central Africa.

Field visits revealed that not many cottage processors know which standards to apply for pasteurized milk and that there is no common practice in this field. So, it is essential that Government agencies ensure hygiene standards are complied with by small-scale processors for consumer safety. For the purpose of this study, small-scale processors have been categorized as those that have the capacity to process from any small volume up to a maximum of 1,500 liters per day.

In 2023, survey conducted by RNDP, there are 38 cottage processors with a combined capacity of 26,475 liters per day. This translates to 9.7 million liters per year (2022). This combined capacity is greater than that of the large processors! However, according to the Rwanda FDA listing of licensed food manufacturing facilities of September 2021, only four (4) dairy SME processors were licensed by then. The first and most critical activity in milk processing is Pasteurization. All cottage processors need to acquire industrial pasteurizers to increase their processing ability to serve better quality products as a dominant domestic milk market player.

c) Industrial processing:

The quality of milk and food safety is guaranteed in the formal large scale processing system. Consumer demand for processed products on the domestic formal market remains low because the purchasing power is also low. There are 11 large industrial processing plants (operating with an installed capacity of greater than 1,500 liters/day) in the Country. Their combined installed capacity is 78.9 million liters per year (2022). The range of products processed in ascending order of value addition includes; Pasteurized milk, Fermented milk, Yogurt, Flavored milk, UHT, ice cream, Ghee, Butter and Cheeses. The largest and most dominant processor in Inyange Dairies, combined with its subsidiaries -Savannah and Mukamira, their processing capacity is 170,000 lts/day. However, the biggest challenge facing processors is their inability to fully utilize their installed capacities. to enable entry into new markets with existing products. Therefore, market consumption research needs to be done for both domestic and export markets.

d) Dairy products distribution and marketing

Milk processing plants distribute dairy products through a chain of whole sellers and stockists, whose roles are to distribute processed dairy products to retailers and supermarkets in the country. Big processors have established a network of milk selling points "milk zones" as a marketing strategy particularly for pasteurized milk. At the milk zones you may find other package dairy products of the

brand of the MPP. There are about 260 milk zones established by Inyange, mukamira and Nyanza industries; however, other medium scale processors have established milk kiosks for selling their products. The table below shows the capacity of milk utilization per province.

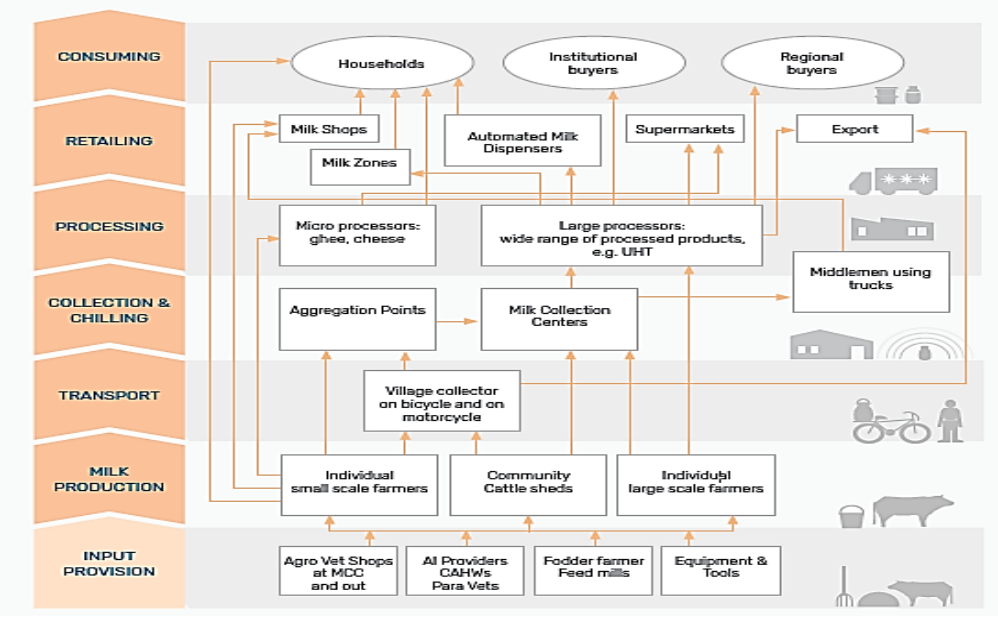
Table 11: Milk utilization (in %)

Province	Quantity consumed by HH	Quantity sold	Quantity given to others	Quantity used in other form
Kigali	29	64.7	4.8	1.6
South	56	32.9	10.4	0.7
West	37.1	50.6	10.1	2.2
North	42.5	50.9	6.1	0.4
East	41.3	51.7	6.5	0.5
Rwanda	**43.4**	**47.6**	**8**	**1**

Source: NISR, AHS 2020

The milk supply chain below, presents a mixed path in Rwanda dairy value chain, where formal traders/transporters to MCCs turned out to be the biggest buyers of marketed milk (47.6%) in the country, which shows good progress in milk quality assurance.

Figure 8: Milk supply V. chain in Rwanda



Source: Ter Steeg & Bonnier, 2019, adapted from Heifer International, 2016

e) Bulk milk production and storage projection

Milk collectors as well as individual farmers deliver milk to the nearby MCC. Upon reception, milk is tasted for quality and then poured in the cooling tanks where it is cooled to 4 degrees Celsius. Then milk will be hauled using refrigerated milk carrying tanks to the milk processing plants. According to the Rwandan dairy marketing strategy 2022-2029, milk production over the next 7 years is projected to reach 1.87 billion liters, marketable milk will then be 1.6 billion liters. With a target over the next 7 years to collect, if milk production will increase by 30% of marketable milk per year, the MCCs total capacity will need to be increased to 482 million liters. This means that over 7 years an additional 224 MCCs will need to be established (32 MCCs per year).

3.1.7. Projected Market Demand

Projected market demand scenarios are built to evaluate the outlook of the dairy industry in Rwanda, over the next 10 years. Population statistics, urbanization rates, and per capita consumption trends are used to project the market needs into 2032.

Table 12: Estimated and Projected Milk Demand, 2022-2032

		2022	2027	2032
Population Projections	Population ('000), urban portion of the population	13,252	14,779	16,332
Per Capita Consumption (liters/year)	National*	78.2	94.2	113.5
Consumption & Demand Estimates (million liters)	National	1,035,795	1,391,952	1,853,554

***Source*; NISR, 2022 (population*):**

Urban population growth at CAGR 6.1%*; Per capita consumption grows at CAGR of 3.8% annual Rwanda is projected to realize equilibrium between marketable milk produced against consumption in 2024 and will grow to a surplus of 849 million liters of milk by 2032. Urban areas, especially Kigali, will be responsible for an estimated 18% percent of the total growth in milk demand. The major cities of Kigali, Rubavu, Musanze and Huye will remain the driving forces behind increasing milk/dairy consumption in Rwanda in the medium term.

a) Markets and Trade for dairy products

Milk is consumed by the household and excess milk is mostly delivered to an MCC. IFAD (2016), as part of the Rwanda Dairy Development Project design document, estimated that 63% of the milk goes through the informal channel and only 37% through the formal structure. While the number of MCCs has increased since 2016 (from 96 to 132), the fraction of milk marketed formally is still likely to be low. The development of the National Dairy Strategy in 2013 by MINAGRI and the promulgation in 2016 of the ministerial order regulating the collection, transportation and selling of milk were essential in formalizing the dairy subsector.

Markets of dairy products are considered of two types:

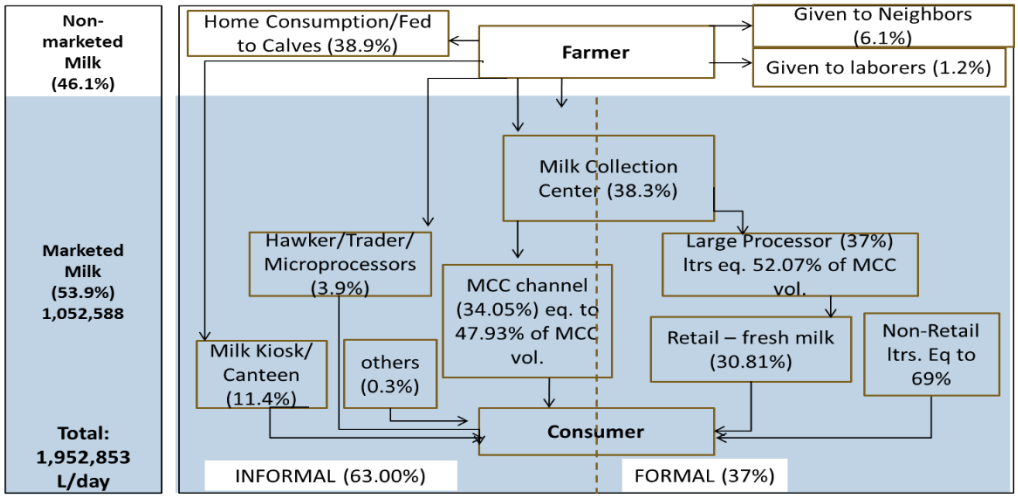
a) Domestic dairy products trade
b) Export of dairy products

The domestic demand for dairy products is projected to increase arithmetically over the next seven years as revealed by the Rwandan dairy marketing strategy 2022-2029. However, still the domestic milk consumption is facing a very big gap of supply as not all processed milk can reach consumers as per their preferences.

As the country move into middle income status in 2030-2035, middle class people who are main consumers of dairy products will need more dairy products for daily consumption. The school milk feeding program; a government supported program has become the main outlet of dairy products and has raised consumption at national level.

The figure below shows the dairy products marketing structure, distribution and consumption pattern in Rwanda.

Figure 9: Milk marketing and consumption Pattern



Source: IFAD (2016)

c) Export of Dairy products

Rwandan dairy products have been exported to various countries in the region as well as other parts in the African continent. Kanya, Uganda, Burundi, the DRC, central Africa, South Sudan are the major countries where D. products from Rwanda have been exported to. DRC is a main target of Rwandan dairy products so far.

Table 13: Export of Milk in Volume and Revenue

Exports	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Volume (liters)	15,038,406	12,732,335	12,081,956	17,514,192	9,304,523
Revenues (USD)	15,038,406	12,732,335	13,061,738	20,644,939	6,073,138
Average price / liter (USD)	1.00	1.00	1.08	1.18	0.65

Source: NEAB cited in the Statistical Yearbook 2019.

3.1.8. Dairy value chain employment analysis

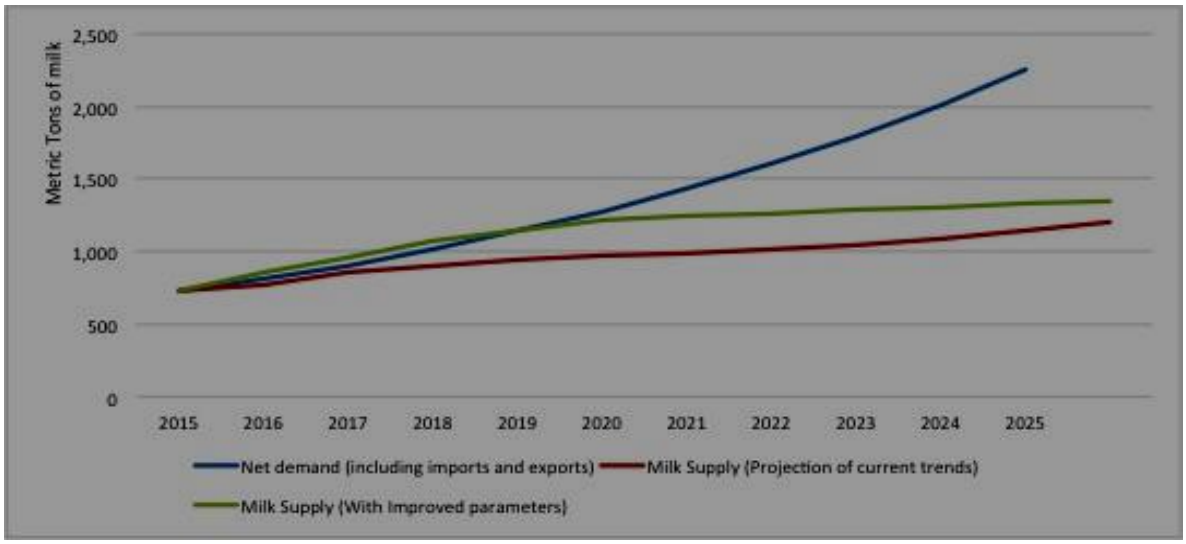
3.1.7.1. Employment supply and demand in the value chain

The supply and demand for employment in the value chain varies and is dependent on the stage within the value chain's segments. Some employment opportunities are seasonal and/ or part-time or permanent as the sector is still struggling to transition to a more commercial footing.

Similarly, the type of skills demanded will vary mainly due to the level of complexity and the skills required (low to high skills). By taking note on the Rwanda Dairy Development Project (RDDP), the

projections of the supply and demand in milk over the 10 years carried out during project design show a widening gap between the supply of milk and growing demand unless efforts are made to increase productivity of the country dairy herd.

Figure 10: Projected milk supply and demand over 10 years



Source: RDDP report.

In 2017, the Agro-processing sector employed around 35,000 workers, and if it is to absorb 2035 projected labor force for the sector, it needs to grow by around 8 percent annually. Under this scenario, its employment level is projected to increase a little over threefold in the next decade and a half (240,000 workers). While each of the sector's several products have different value chains, the case of one product— dairy—can illuminate some of the main issues in the sector[20].

Based on the above-mentioned projections coupled with ongoing governmental interventions, especially under RDDP project, provides an assurance of stable employment opportunities in the dairy value chain. Furthermore, taking into account the number of cattle farmers (small holder (1,055,912) and 1,143 large scale farmers; the increase in population of cattle rated at 5.6% in the 2020/21 as compared to year 2019/20, the dairy value chain has demonstrated various challenges as well as numerous windows of job opportunities along the value chain axis. Interventions that would be made on any of the dairy value chain segment would create jobs.

3.1.8.2. Constraints and opportunities in the value chain

The constraints listed below can be turned into opportunities for all value chain operators (farmers, investors and traders). The list shows the gaps, which can be filled by creating employment or perhaps use of new technologies.

[20] (Richard Newfarmer and Anna Twum, 2022).

- Low milk production per cow at farm level: the capacity to produce milk is based on two factors; (a) genetic potential of a cow, and (b) level of feeding (balanced meal for body maintenance and surplus for production) as well as water for drinking. Improving genetic constitution of a cows for increased milk production and feeding a balanced diet will increase milk production, hence creating more windows of trade and businesses along the dairy value chain.

- Milk of poor quality: Hygienic milk production begins at the farm level, if farmers do not understand the principles of hygienic milk production, the entire chain will receive milk of poor quality. Interventions at household level, through training and capacity building on hygienic milk production will raise the quality of raw milk at farm level. The quality of milk may also be altered by milk collectors/ transporters through adulteration, poor handling, and delayed delivery to cooing centers. At the cooling centers milk may again loose quality due to poor management and inadequate colling capacity/facilities. Interventions directed to increasing quality and safety of milk along the chain will automatically reduce rejection, improve quality as well as increase trade windows thereby creating more jobs.

- Inadequate extension advisory services: In order to improve dairy cattle production and productivity, farmers must have the right knowledge and skills to rear cows through employing new farming technologies as well as improving existing ones. Lack or inadequate availability of technicians has hampered farmers from maximizing the benefits of dairy farming. Farmers are struggling to maintain health and production of dairy cows due to lack of advisory services that should be provided by technicians. Availing technical advisory services and interventions will increase the level of production and productivity. Healthier cows produce healthier and safe milk for human consumption.

- Poorly organized or weak farmer cooperatives: At local level, dairy farmers need to be organized around their social fabrics in order to share and solve challenges affecting their dairy value chain businesses across segments. Issues of milk collection, transportation, handling and marketing could easily be solved when deals are done under cooperatives. Due to poor cooperative management and organization, milk aggregation, transportation, handling and marketing have continued to weaken dairy industry business in the country. Interventions aimed at strengthening the functioning of the dairy cooperatives; the formation of aggregators cooperatives, the management of milk collection and cooling centers as well as marketing of raw milk from the MCC's will automatically raise the volume of raw milk collection, thus increased volume to sell to processors. This will again increase job opportunities at the level of collection and handling.

- Inadequate or lack of inputs for dairy farming: dairy farmers are having it hard to access essential production and marketing inputs; inadequate and expensive best fodder seeds; expensive milk handling equipment/utensils; lack of water for cattle to drink; expensive

veterinary drugs and pesticides; inadequate milk marketing infrastructure; all these have impeded maximization of profits and benefits from dairy farming activities.

- Inadequate processing facilities coupled with weak or poorly organized milk and dairy products marketing system: Due to limited capacities of available milk processing facilities, huge amounts of milk are sold unprocessed basically through informal market channels. Available SME's have inferior equipment to be able to produce big volumes of good and safe milk products. Intervention aimed at improving processing at the cottage level shall increase absorption of more milk in the processing sectors thereby increasing safe and high-quality dairy products to the market. Numerous jobs will be created starting at processing level going forward to distribution and marketing.

Table 14: Summery of constraints and opportunities in the value chain

Value chain segments	Constraints	Production support for increased milk production directly linked to job creation
Farmer level	➢ Poor animal nutrition, shortage of feed and poor ration formulation are the biggest constraints for productivity. ➢ Shortage of land, forage and inadequate use of available feed resources. ➢ Limited marketing and high cost of forage and feed supplements. ➢ Lack of technical knowledge on best practices in cattle farming and low awareness of farmers regarding post-harvest, value addition and marketing strategies. ➢ Inadequate knowledge and skills on the use of crop residues (be transformed in animal feeds) and forage production. ➢ Local breed with low genetic potential for milk production ➢ Inadequate proximity veterinary interventions for health and breeding services. ➢ Seasonal fluctuations in milk production resulting in surpluses and shortages- unstable prices. ➢ Inadequate infrastructure for milk marketing systems (MCC's, processing facilities, etc.) ➢ Limited access to financial services for dairy farmers	o Government efforts to invest in animal fodder seeds production and planting (Pennisetum, Brachiaria, Chloris Gayana, LMP, 2017) o Availability and promotion for the use of crop residues to feed cattle in the country. o Production, and promotion for the use of "Hydroponic fodders" as alternative animal feed. o Increasing production would stimulate and accelerates formation and establishment of dairy processing facilities o Increasing number of high milk producing cows coupled with stable price of milk across the country attracts more famers to engage in professional cattle farming.
Milk collection & transportation (Aggregation)	✓ Poorly organized milk collection, transportation and handling system from the farm to the collection center ✓ Milk of poor quality (adulterated, antibiotic residues effects; aflatoxins, delayed delivery at MCC's) ✓ Lacking of knowledge on hygienic milk production best practices for improved quality and safe milk	▪ Government support to organise milk collectors/aggregators into cooperatives in progress and with time milk collection will continue to become formal thus increasing in volume delivered to MCC). ▪ Government's continued updating of the capacities of MCC's through provision of cooling facilities; testing of quality and contracting with processors has improved formal milk marketing system

	✓ Inadequate and expensive milk collection and handling equipment/ utensils	▪ Ongoing capacity enhancement of farmers, milk aggregators and at milk collection centres on hygienic milk production best practices has improved the production of good quality milk ▪ Increased number of processing facilities and access to markets for dairy products due to increased promotion and awareness campaigns on going, has increased domestic consumption of dairy products hence making the system formal than it was before.
Milk Collection centres	❖ Inadequate and inefficient milk collection centers ❖ Limited number of cooperatives provides inputs and services—MCCs Hub Models ❖ Lack of reliable off-takers of milk from the MCC's ❖ Weak cooperatives managing the MCC's; on issues of leadership; management best practices; business skills etc. ❖ Lack of business plans for running economically the MCC's ❖ Lack of financial support services to further improve services by buying milk and paying farmers on time ❖ Lack of knowledge and capacity for hygienic milk handling and storage ❖ Unreliable raw transport system from MCC's to end buyers (processors)	❑ The government's ongoing support and initiatives to rehabilitated and construct new MCC's/ MCP's are progressively increasing the uptake of milk from farmers to MCC's, the efficiency of the MCC's are progressively improving day after day thereby promoting the businesses of the MCC's investment to work as a hub model. ❑ Cooperative's legal environment given to district authorities to audit MCCs' cooperatives shall limit abuse of farmers' properties and embezzlement of funds which was a common practice at the MCC's cooperatives.
Milk processing	➢ High percentage of informal milk marketing. ➢ Inadequate dairy technologists/ dairy products processing experts capable of developing new or diversified dairy products, especially in SME's ➢ Undercapacity utilization of facilities due to various reasons including lack of finance enough to purchase milk, high cost of energy, insufficient markets for	o There is an increasing number of SMEs engaged in milk processing; formal and informal in the majority of milk shed areas, thereby increasing volume of milk by products o Marked growth in the export of milk and dairy products marketing across the border-(DRC, Burundi), o Increasing domestic demand for processed milk and milk by-products (new products, brands, packaging, etc.).

	products (capacity has been estimated at 280 MT/day, of which 35–40% is used)[21] ➢ High prices for processed dairy products-unaffordable due low purchase power of majority of the population ➢ Lack of financial support services to further improve production lines and related services ➢ Lack of marketing strategies and skills for promotion of processed products.	
Milk zones, kiosks and milk bars	✓ Lack of financial support services to further improve services; purchase of coolers and refrigerators ✓ High cost of energy for cooling pasteurized milk and specific dairy products that need cold environment (yoghurts, butter, cheeses etc.) ✓ Informal/ unorganized raw milk marketing that competes with processed products due to low prices offered compared to high quality and safe processed materials. ✓ Lack of knowledge on hygienic milk handling and trade for majority of milk zones/kiosks/ bars operators ✓ Inadequate milk food grade dispensing utensils	❑ The culture of milk consumption in Rwanda is an advantage for the dairy industry since domestic market is assured. ❑ There are ongoing government support to promote domestic milk consumption through nutrition campaigns for milk as well as promotion of schools milk feeding program ❑ Investment in dairy products marketing and trade has been made easy in Rwanda. ❑ Large milk processing plants have supported and initiated partnership with private individuals to establish milk zones/kiosks ❑ Initiatives to formalise the informal milk trade are in the pipeline as a move aimed at regulating trade of raw milk marketing for quality and safety
Service providers	❖ Farmers' limited access to proximity extension services ❖ High cost of veterinary services; drugs and veterinary chares not affordable for the majority of dairy farmers ❖ Inadequate dairy cattle breeding services; insufficient and ineffective artificial insemination services ❖ Lack of financial support services to improve services.	● The government has supported farmers to access proximity veterinary extension advisory services through sector veterinarians ● A ministerial instruction permitting the use of private veterinarians through sanitary mandate is now in place; this will increase farmers' accessibility to extension services ● Regular training and capacity building for veterinary technicians in modern technologies on animal health, production and artificial insemination/embryo

[21] Emilyter Steeng, 2019

	❖ Inadequate technical equipment for the veterinarians to enable them perform animal health care services correctly	transfer has been performed by the government to keep these persons in line with advancing dairy industry ● Improved dairy cows predispose them for various diseases and conditions that would require constant animal health services providers to avoid death of such high producing cows, thus vet technicians are highly needed ● Increased milk production and heifers borne are outcomes of best dairy cattle production and increased demand for feeds, water and other support services/interventions are predicted ● Veterinary teaching TVET schools and high learning institutions teaching animal health and production have been established for the purpose of producing sufficient veterinarians and paraprofessional to serve farmers in need ● The veterinary council and veterinary association are operating together in regulating the professional ethics and offers on regular basis licenses for technically competent vets to serve the population in need of vet services

3.1.8.3. How jobs are created across the dairy value chain

In real terms, all dairy value chain segments have the opportunity to offer jobs albeit at varied magnitude. While some segments have wider windows of creating many jobs, others have limited scope of providing jobs. The table below outlines where and how jobs could be created in the dairy value chain network of activities (direct or indirect).

Table 15: Summary of jobs that could be created along the dairy value chain segments.

Levels	Type of activity	How the sector operates	How and where they create jobs
Farm level support	Veterinary services	Improved dairy cattle require regular animal health care services as well as production experts due to increased susceptibility to diseases conditions and improved feeding for increased production of milk. Therefore, sufficient number of competent veterinarians are needed to support farmers	✓ As dairy arming activities progress to industrial level, needs for veterinarians and livestock experts becomes high; farmers would look for technicians to support or to provide advisory services; jobs are created in the line of veterinary animal health and production services. ✓ Related support business will increase in number; such as drugs, veterinary equipment and inputs shops ✓ *It is expected that, at least the number of technicians will increase (currently there at sector level) to cover all cells in the next five years if all efforts to improve dairy production will continue in the same pace*.
	Farmers' cooperatives	The formation of new and strengthening existing dairy farmers cooperatives will be the basis of government's means to provide support to dairy cattle breeders. It is expected that, all dairy farmers will be working under cooperatives where the issues /challenges affecting the industry will be discused and mitigations measures sought. Training and capacity enhancement to farmers will be made easy through cooperatives. Knowledge and skills for best animal husbandry practices will be collectively provided by extension agents. Therefore, it is expected that, farmers' compliance to best husbandry practices will lead to increased production and productivity.	✓ Through cooperatives, farmers will improve production of milk and number of improved cattle will be at the increase due best husbandry practices ✓ Milk production and delivery will increase arithmetically ✓ Due to increased milk production more milk collection centers and collection points will be put in place ✓ Knowledge and skills gaps will be minimized due to regular capacity building ✓ Therefore, there shall be increase of number of farmers (youth/females) joining the dairy cattle farming much as it is providing benefits.

			✓ *At least there shall be over 20% increase in new farmers of dairy cattle and expected that at household level, family labour will be replace by casual works; between one and two depending on the number of cattle owned. It is expected that, number of casual workers will double over the next five years under business unusual dairy farming.*
	Support services (investors/ innovators)	Producers of Animal feeds- concentrates; value addition to crops Crop residues as well as ongoing innovations in fodder production such as Hydroponic fodder; seeds production for grass and legumes. Increasing number of dairy cattle calls for improved feeding and water availability. Based on this concept, the number of parsons entering the production of animal feeds industry will increase accordingly. Animal feeds processing facilities in place will further increase production and new ones will be established in the coming years based on demand. Innovations in fodders production will increase as well. Multipliers of fodder and legumes seeds will increase in number and also suppliers of feeds ingredients will increase in number as well as the volume of feeds will go up to sufficiently accommodate demands from dairy farmers.	✓ Increasing number of animal feeds processing facilities have indirect support to creating of jobs along dairy value chain; as demand for cattle feeds increases, companies will recruit more qualified technicians as well as casual labourers. ✓ Many animal feeds distributors and selling points will be established, thus recruiting staff to manage the distribution and selling points across the country. ✓ Suppliers of feeds ingredients will also expand their purchasing powers and more selling points will be opened; at house hold level, farmers supplying feeds ingredients (maize, soya, cotton and sunflower cakes etc.) will increase production due to available market demand. ✓ *This part of the value chain is also expected to generate significant number of jobs to the market should dairy cattle production continue to become modernized at all fronts of the value chain*
Milk aggregation	Milk Collection	For any vibrant dairy industry to operate effectively and efficiently, milk from the dairy farmers must reach the collection points as quickly as possible. This is not done by miracles; it is done by a well-organized milk collection system that has been put in place by dairy farmers or the processors. In Rwanda, milk aggregation is done by the milk collectors and transporters. These are young and energetic persons capable of riding bicycles through long distances going house to house in search of milk. In most of the scenarios, these persons do buy milk directly from farmers	Increasing dairy farming best practices will result into increased milk production at house hold level. This will require improved milk collection and delivery services. The collection is done by the majority of youth (men and women) living in the designated milk sheds in Rwanda. Since the projection of milk production is expected to increase over the next ten years (dairy marketing strategy of 2023), there shall be a corresponding increase in number of milk collection centers across all milk sheds. To serve the new and existing MCC's will require many collectors at the village level. Currently there are 132 MCC's and each has a group of aggregators delivering milk. According to new

		or take it on credit (through mutual agreement) to be paid later when the buyer has paid back. All milk sheds have the milk collectors and transporters, majority of them capable of supplying 100 to 300 liters of milk to the nearby milk collection center (MCC). In order to improve their services and also to easy their regulation, the collectors have been urged to work in cooperatives and have been guided to forge contractual arrangement with operators of MCC's. if these collectors are supported to access better transport facilities and milk handling utensils, their work shall be highly improved. Theyr shall be capable of collecting and carrying much more milk to the MCC's hence the milk processing plants will get sufficient milk for processing.	projections, about 224 MCC' shall be established by 2033; meaning that, 24 MCC's per year will be constructed. Therefore, if on average each MCC will have the capacity of 3,000 liters; then about 72,000 liters will be collected and delivered every day creating about 720 new jobs each year (assuming each collector delivering 100 liters per day). The milk collection has attracted many women in the western provinces (Rubavu and Nyabihu districts). All in all, its only youth that has the ability to collect milk house to house in the rural areas. Dairy in Rwanda has employed many youths in collection and transportation of milk. Majority are currently working under cooperatives.
	Transportation	Bulk milk haulage is done by two categories of stakeholders; i) the processors who uses big refrigerated trucks to carry milk from the MCC's to the processing plants/facilities ii) bulk milk transporters (buyers) who carries huge volumes of milk from MCC's and distributes to various milk selling points/kiosks mainly in the city of Kigali.	- Proin this part of the value chain creation of jobs is limited to few capable individuals and companies but indirectly the companies may recruit few staff to oversee collection and distribution of milk. Under nay circumstance should there be an increase in milk production, the number of transporteers will increase also supporting staff in the process may increase. - Creation of jobs in the same section may include services related to maintenance of vehicles, equipment, and increase in number of milk selling kiosks or milk zones.
Post-Harvest	MCCs & MCPs	Collection of milk from small holder farmers is done in two ways; i) farmers own delivery to the MCC or collection points; ii) milk collectors who move house to house (farm 2 farm) buying milk and finally delivering to the MCC/MCP's This is where majority of youths and women are employed. Based on the nature and terrain of main milk producing areas such as the western and northern provinces, only young persons can manage the business. All in all, across	- Best dairy husbandry practices lead to increase in milk production calling for more milk collectors-creating more jobs. - MCC's and MCP's will have to expand the scope of their business by increasing number of staff as a consequence to increased volume of milk reception. Expansion of activities at the MCC's due to increased volume of milk calls for more services and operations which by enlarge will all need supporting staff.

		the country, milk collection is carried out by just young people of all sexes. Thes people uses stainless steel cans and in some hilly parts of the west and north still jerry cans are in use. To improve this very important services, the collectors have been organized into cooperatives to facilitate regulation thereby reducing informal milk trade which is commonly practiced by collectors. This group is on regular basis trained on hygienic milk collection, handling and transportation and are assisted to access quality testing gadgets. .	
	Milk plants and SMEs	Milk collected from small holder farmers have various channels of utilization; i) sold as raw milk to the community; ii) sold to milk processing facilities for production of diversified dairy products. As elaborated above, collection is typically done by milk collectors and bulk volumes are carried out by big trucks owned by either processing companies or individuals in milk buying and distribution businesses. In the Rwandan dairy industry, there are three categories of processors of milk for varied dairy products; i) micro-processing facilities (these are very small processing facilities that is done by the owner only); ii) small processing units that may process up to 1500 liters of milk and may employ one or two persons only; iii) medium processing facilities that can process up to 5,000 liters of milk per day-these facilities may employ more than 10 persons including skilled personel in processing; iv) larger scale processors; in Rwandan context, these facilities can process 10,000 liters and above.	All categories of processing facilities with the exception of micro-processors, have the capacity to employ significant number of employs based on the amount of milk processed. SME's may employ at least a minimum of 5 persons per unit while large scale processors have big number of both skilled, semi-skilled and non-skilled employees. In general terms, increase in volume of milk subsequently leads to the increase of either processing units or expansion of production lines within exisiting facilities thereby creating various jobs opportunities.

	Milk market off-taking	In Rwanda, as it stands currently, there are two types of milk marketing systems; (i) the widespread informal milk marketing system-literally unwanted but strongly existing; (ii) the formal milk and dairy products marketing system. While the informal milk marketing involves unprocessed milk that goes directly to milk selling kiosks and directly to the community as house-to-house delivery, the quality and safety of this milk is uncertain and pose great health risk to users; the formal market involves milk that goes through MCC's to either the processing units or to other consumers; this system assures milk quality and safety because at the MCC's milk is tasted for quality and safety. Distribution of processed dairy products is carried out by processors to retailers or whole sellers. Big processors of milk have engaged private individual to venture into establishment of milk zones/ kiosks-pasteurized milk is delivered to the cooling tanks owned by milk zones operators but at the same premises, packaged dairy products are also sold.	Milk and dairy products marketing business has advanced primarily in the city of Kigali and other secondary cities across the country employing significant number of employees mainly women and youth in managing milk zones/kiosks and even milk bars. At the majority of milk selling kiosks other food materials in the form of small bites and snacks are sold. The milk zones/kiosks have become popular and a segment that has created many jobs for youth (male and females). Dairy products whole sellers also have employed unskilled labor force for loading and off-loading of products as well as serving customers buying varied amounts of dairy products.	
Packaging	Packaging materials	As elaborated above, the milk zones or kiosks also sells packaged dairy products at the same time selling pasteurized milk stored in cooling tanks. These milk zones have become centers of trade for all types of dairy products. The zones and kiosks have been established formerly through the support and partnership with large processing plants. However, to day, any person wanting to venture into the business can easily do it and may partners with one of the large processors. Companies that make packaging materials also benefits from the sale of materials for packing various dairy products.	Increased milk processing for diversified products requires various types and forms of packaging materials. Industries that make such packaging products will as a consequence increase production. In this section, jobs are created in two wys; i) processing facilities will offer jobs to skilled; semi-skilled and unskilled persons to cope with increasing pressure of processing huge amounts of milk; ii) factories producing packaging materials will also increase the number of employees (skilled and unskilled) to cope with increasing demand of materials for dairy products packaging.	

Milk & by-products delivery	Transport and shipping services	As earlier elaborated, milk and milk products are sold either as raw or processed. Based on the very nature of milk and dairy products consumption pattern in Rwanda, delivery of dairy products can be carried out by quick delivery suppliers from the supermarket to one's place of residence. Middle class who are the majority of dairy products consumers often do call for quick service delivery providers to bring food materials to their residences. Motorcycles are these days providing delivery of food staffs to economically well-being families in the city.	Although not very common to low-income people, the delivery of food staffs including milk products in parts of the city of Kigali specifically involving middle and high income earners has become popular and in due course the system has created significant number of jobs; specifically the motorists who have taken the Royality and trust to deliver quick food products to households. The restaurants, supermarkets and suppliers of dairy products have taken at hand home delivery of food products including dairy to homes through such means. This system has further increased opportunities for creation of jobs.
Hospitality	Provision of ready dairy related food preparations to customers	Milk related food products are in various forms. The teas, coffees, milk shakes, hot milks, yoghurts, creams, cheeses, ice creams etc are few of dairy made products that are sold in various coffee shops and restaurants across the country. Milk has become a luxurious food and it is gaining popularity among operators of coffee joints. Significant number of individuals and companies have joined the business of operating coffee shops and bars together with snacks and bites for persons travelling along the highways-Kigali-Nyagatarer-Rusumo; Kigali-Huye and Kigali-Rubavu. The kiosks serving passing by-passengers are at the increase.	Establishment of coffee shops and kiosks at various angles of the city of Kigali and secondary cities in Rwanda as well as similar shops along the highways mentioned, has created enormous jobs for youth and disabled persons. For example, Stafford coffee shops have created jobs for the deaf young persons. Across the city, the Brioche coffee shops are very popular for having created many jobs for youth (at least at each Rubis petrol station there is a coffee shop owned by Brioche and works are youth). Similarly, other coffee centers have employed youth. It is critical to understand that, coffee has attracted the use of huge amounts of milk-coffee served with milk is the basis for milk/dairy products being part and parcel of the business.
Livestock inputs	Seeds multiplication and distribution	The dairy sector has many and varied service providers. Dairy cattle production inputs are various and are all provided by individuals and companies. Fodder seeds, feeds ingredients, feeds concentrate, farm implements, fertilizers, drugs, biologicals, etc. when dairy cattle farming activities increases, farmers would subsequently need more inputs to increase production of milk. Major stakeholders in inputs provision may include feeds manufacturers, importers, distributors and many others.	- Increasing levels of dairy cattle production require interaction of various production enhancing services. Feeds and feeding becomes the most important part of the service a famer would like to have in the midst of farming activities. Other services would come as as part of best practices aimed at increasing milk production and well-being of cattle. In this way, individuals or companies operating to provide inputs to dairy farming communities will increase production. Jobs will be created within services providers entities as well as at the farm hold level.

			- In this case, feeds manufacturers, supplies of ingredients; drugs and equipment suppliers etc. will improve their businesses and at times by increasing number of employees due to increased business volumes/opportunities. Distribution may involve whole sellers as well as retailers-for both domestically produced feeds and imported feeds.

3.1.8.4. Identification of key actors on the dairy value chain

Actor or player	Role	Public / private /NGO	Level of influence in VC
Heifer Project International Rwanda	-mission is to end hunger and poverty while caring for the earth. -provides livestock (heifers) in trust scheme and other species of livestock (goats, sheep) to needy families -organize heifer recipients into cooperatives where they share knowledge, pool resources and can access financing -support the development and operationalization of milk collection centers -provide capacity building to leaders and staff of MCC's on management and business development -they provide extension and animal health technical interventions to their beneficiaries	NGO (not for profit)	HPI's intervention in DVC is high in some parts of the country where they operate. The dairy development in Gicumbi district has its roots from the first batch of heifers donate under the auspices of HPI-Uganda by then. Currently HPI is co-financing organization to IFAD for Rwanda Dairy Development Project (RDDP); they will also co-fund the upcoming RDDP2 which is expected to begin January 2024
Send A Cow Rwanda; recently renamed; Ripple Effect	-supports farmers to get out of poverty -supports farmers to grow enough food to feed their families -provide training, -provide heifers through trust scheme system to poor families -provide goats, rabbits and bee hives to poor HH -supports HH to establish and manage kitchen gardens -organize their livestock beneficiaries into cooperatives -they provide extension advisory and animal health technical intervention to their beneficiaries	NGO (not for profit)	Role of send a Cow Rwanda (Ripple Effect) to the farming communities of Rwanda is significantly captured in areas where they provide intervention; particularly in the DVC-they have impacted highly since they provide pregnant heifers coupled with training and establishment of kitchen gardens. "Medium interventions"
RCVD (Rwanda Council of Veterinary Doctors)	-regulates the ethics and operations of veterinary professionals -provides professional capacity enhancement to vet and paraprofessionals -provides professional licenses for veterinarians	Private/PP	Their impact to the DVC is valued medium since they only appear based on farmers' needs, especially during animal health and production related interventions or training of dairy farmers

RAB (Rwanda Agriculture and Animal Resources Development Board)	This is the ministry of agriculture and animal resources institution responsible for implementation of policies into development actions. Dairy policies, strategies and their implementation done by RAB. Supports dairy farmers to access fodder seeds; production inputs; link farmers to available produce markets -constructed all milk marketing infrastructure; -support farmers to access water for livestock -provides training and technical advisory services to dairy farmers	Public	The value of the institution in the DVC is very high (extremely high); they regulate the sector; elaborates and puts in place strategic orientation of the sector; implements broad actions embedded in NST1 and PSTA 4 and LMP policy documents regarding dairy sector development. The institution is sorely responsible for the sector advancement .
RICA (Minicom)	Government post-harvest regulatory body; on quality and safety measures -responsible for meat, milk and other agricultural produce inspection for quality and safety -implements policies and strategies put in place for the quality development of meat, milk and other agriproducts -training of dairy value chain operators at post-harvest level	Public	The role of RICA in the dairy sector is ranked high due to it being responsible for inspection of milk and meat for quality and safety at the collection points.
RNDP (Rwanda National Dairy Platform)	-Advocacy entity for DVC operators -organization of stakeholders into functional cooperatives for milk sellers, milk collectors, -training of DVC operators on hygienic milk production, collection, transportation, storage, processing and distribution including retailing fo products -organizes study and learning events for farmers not excluding attending international dairy events	Private/PP	As an umbrella entity for DVC operators, its roles is high and progressively going forward for further streamlining of the very sector of dairy farming
MINICOM	The ministry is responsible for support to dairy value addition programs-supports MSME's to improve processing skills for good quality and safe products -advocates for dairy products markets within and for export -take part in the elaboration and setting up of farm gate milk prices	Public	The role of the ministry is high based on its functional roles on issues related to post-harvest value addition and marketing of products

	-supports processors to exhibit dairy products during national and international expos -put in place enhancing policies for investment in the DVC		
MINALOC	Responsible for provision of dairy extension advisory services through its technical staff-veterinarians are place and managed by MINALOC The ministry supports and oversees the functioning of dairy related cooperatives -ensures the smooth functioning of MCC's -advocate for markets for dairy products and live cattle Provides heifers to poor families (Girinka) and takes care of their health	Public	The role of MINALOC in the DVC is high based on their day-to-day involvement of its technical staff to the sector of dairy. Girinka program is implemented by districts as its overall mandates.
RSB (Rwanda standards Board)	_oversees the quality of dairy products _Sets standards for various dairy products _ Harmonizes the Rwandan dairy products standards with regional (EAC, COMESA) and international standards citing ISO, Codex Alimentarius	Public	The role of RSB to processed dairy products in as far as off-takers are high. Well set and harmonized standards attract export markets, thus increasing production due to spillover effect of improved trade.
NAEB (National Agriculture Export Board)	An entity responsible to organize export markets for agricultural value-added products -Links processors of Agri-products with international markets -create market enhancing facilities for various agri-food products (cold rooms, storage facilities etc.)	Public	The role of this institution to the DVC is medium. Dairy value chain operators have regular contact with RSB, MINICOM, MINAGRI (RAB) when it comes to marketing of products.
Rwanda TVET Board (RTB) AND Rwanda Polytechnique (RP)	Both institutions provide veterinary technical skills to would be extension agents; whereas TVET schools provide A-level diploma certificates, the RP provides Advanced level diplomas -Majority of veterinary extension agents (paraprofessionals) found in close proximity to dairy farmers are products of TVET	*Public (but Private TVET schools are also in place)*	-RTB is responsible for designing and distributing national-wide curricula for veterinary technicians - put in place training infrastructure; teaching materials, trainer's guides, methodologies, and training methods for all Level 1-5 TVET institutions -organizes events related to capacity development of trainees as well as refreshers courses

			-RP's provides advanced training courses in veterinary science close to what the universities are providing to graduate vets
University of Rwanda (UR)	This is a high learning institute that provides training to professional veterinary doctors and animal scientists The UR is under the ministry of education and is the only teaching university in Rwanda that produce graduates in veterinary medicine	*Public*	UR's influence to the agriculture sector is high because its graduates are key persons in the dairy sector. The expertise brough about by UR graduates both in veterinary science and animal production are the key elements of improved production and productivity to dairy farmers in Rwanda. Every year the public sector receives over 100 graduates from UR in veterinary medicine and animal production. These persons are employed in the sector directly or indirectly.

3.3.7.5. Potential interventions to address the constraints in the dairy value chain

The HA interventions in the dairy value chain will come to complement the existing efforts made from both public and private sectors. For example, the intervention so far made by RDDP programme elaborates massive investment done by the government to support and improve dairy value chain. In a nutshell, HA benefits in terms of jobs creation shall arise from the overall improvement of on and productivity of milk as well as organizational and managerial skills of farmers through their cooperatives (milk collection, processing and marketing). The table below shows potential intervention for addressing identified constraint leading to increased production thus jobs creation.

Table 16: Potential interventions to address the constraints

#	Potential interventions	HA direct interventions (proposed)	Potential Partner (s) for the provision of services needed	Level of recommendation	Potential opportunities and gender inclusion rating
1.	To provide intensive technical training to farmers in relation to areas where there are skills gaps in the DVC; such as, best husbandry practices (management (feeding, breeding), animal health related issues (diseases prevention, control, diagnosis, treatment); hygienic milk production, miking hygiene, collection, handling transportation, storage and marketing) *According to RLMP, such interventions, may cause daily milk production to increase by 30% and expenditure for veterinary services will increase by 50%.*	HA may intervene in two levels: ➢ Providing training of trainers (TOT's), for the massive training of paraprofessionals who are the majority of extension agents. Needed to have many vets as competent "Farm Advisors" the training should practical oriented for the fact that almost all TVET vet training schools lack equipment and materials for teaching with very limited on-farm practical accessibility ➢ Providing capacity building program to identified progressive farmers from different milk shed zones ready for improvement and job creation.	-RAB: has a team of experts with massive skills in livestock health and production -RCVD: Has big number of licensed vets with skills to provide technical training to fellow vets in extension services -Heifer International: The organization has longstanding capacity of farmer training using its core skills staff in the subject matters mentioned herein -Send a Cow: similar to HPI, SACR has also a team of skilled staff in the sector who could offer training and capacity building to farmers and vet extension agents	Medium	**High:** there are many females joining TVET school in in agriculture and livestock related courses. Majority of graduates going job less in rural areas are youth (male& female)
2.	Dairy cattle production is facing steep lack of feeds and water: to address the issue of feeds and feeding, an improvement of fodder grass and leguminous feed	➢ Training and capacity enhancement in support of farmers and interested investors to cultivate fodder grasses and leguminous fodder trees would very essential.	**RAB:** the institution has highly skilled pasture agronomists whose knowledge could be facilitated by HA to offer	High: demand for cattle feeds and water are higher across the country.	**Medium to Low**: little or limited number of women in fodder production as a business; but youth

	productions would be of paramount importance. Grasses such Pennisetum, Brachiaria, Chloris gayana, and legumes like Caliandra, desmodium species etc. Also, supplementary feeds for increased milk production are inadequate. *According to RLMP plan, the adoption rate and coverage of this technology waw to reach 50% and 100%, respectively in 2022, however, banking on the same assumption/hypothesis, the development will be the same under similar intervention conditions in subsequent years post-LMP period.*	➢ HA may intervene by supporting interested investors in animal feeds production through grants, supply of seeds and agronomic skills enhancement. *HA by doing this, conservable animal feed is available and seasonal employment is created.*	more of the needed interventions. **Private sector:** Individuals wanting to invest in the production of animal feeds could also be supported to access best seeds, farm implements and fertilizers to produce more		(male) in some areas are involvement in fodder production such hydroponic and hay from Chloris and brachiaria
3.	Improve the efficiency of AI service by engaging private AI practitioners Training of AI technicians. (15% of cows can access the service) *According to RLMP plan, the population of local breed cattle will decrease while increasing the number of crossbred; subsequently increasing the total cattle number. The number of crossbreed cattle had to increase by*	➢ Provide capacity building on bovine artificial insemination and supporting the technicians with AI kits. *HA may support the activity aimed at improving the efficiency of AI services; its success lead to increased number of high milk producing cows; increased volume of milk production; expanding aggregation, transportation, processing and marketing; all these segments are potential for increased jobs creation*	Districts RAB RCVD All the above institutions have the ability and capacity to offer the aforesaid training.	High: demand for AI services is increasing. Farmers want to have high producing cows in order to have more milk	**High:** Youth are extremely becoming engaged in AI services for cattle and pigs; However, few women are involved.

	annual growth rate of up to 8% in the first five years.				
4.	Support to increase the efficient use of crop residues as a sustainable alternative for inadequate animal feeds.	HA may be involved at this juncture on: ➢ To Support the interested investors/farmers to acquire modern equipment/materials, technology and training ➢ Support (grant) for scaling up and dissemination of existing technology for hydroponic fodders.	Private Investors Farmers Currently there are youth engaged in the fodder production using the technology and it is becoming popular.	Medium	High: youth (M&F) are engaged in this business adventure. Support will increase number of youth engagement and employment
5.	Support the capacity of MCCs in order to be able to provide production inputs to their members; animal health, extension and financial services (Hub Model). *According to RLMP, the annual increase is 8.4% for Hub Model MCCs and 13% of milk collected in the formal market.*	HA interventions will be provided at three levels: ➢ Support focused to capacity development on governance and management capacity of dairy cooperatives ➢ Support with grants (equipment or financial) to establish Hub Model system at the MCCs ➢ Strengthening the milk aggregation model (collection & transportation) by establishing formal framework and linkage with farmers.	RICA RNDP HPI RDDP RAB All the above organizations have the capacity to organize capacity development for operators along post-harvest value chain	High	High: gender inclusion in milk aggregation is very high in some milk sheds-west has more women in milk collection and processing. For all other milk zone; youth are the only force to carry milk from farmers; the northern and western highlands have more youth under 25 in milk collection/transportation

6.	Support SMEs to expand production potential and for the diversification of dairy products	➢ HA to stimulate collaboration among milk collectors with processing facilities through provision of transportation equipment (motorcycles, bicycles, tricycles, trucks etc.) to the cooperatives of youth engaged in milk aggregation to have sustainable supply chain to processors ➢ support to SMEs to acquire modern processing equipment; access new technology and training in order to increase quality, safety and number of various dairy products on market.	Milk processors (SMEs list) RSB RNDP RICA	High	High: Gender inclusivity in dairy sector is quite significant in many parts of the country; processed dairy products by enlarge are traded by females (milk zones, kiosks, bars,); youth in transportation and collection; supermarkets recruit majority of youth (M&F)

3.7.*8* Other Diary value chain programmes that are operating

Table below provides a list of diary development supporting programmes that are currently implemented and relevance to job creation along the dairy value chain in Rwanda. This kind of mapping may help Hanga Akazi to maximize job opportunities through collaboration while limiting duplication of activities.

Table 17: Other Dairy Development support programmes in Place

Project	Programme/ description	Area of intervention along the DVC	Job opportunities for HA
RDDP	The project is ending this year but phase 2 of the same expected to commence in January 2024. It is aimed at raising rural incomes by intensifying dairy production and improving market access. The project has provided intervention along all DVC segments and its impact has been massive.	-Dairy production -animal health - milk collection and storage -milk processing -farmers organization -construction of MCC/MCP's -Support to MCC's (cans and testing equipment) -Training of farmers & other VC operators Etc.	-Increased milk production: leads to increased capacity for collection; youth employment for aggregation -MCC's receive more milk; more services and more jobs created -Transport sector: more volume of milk more need for bulk haulage; increased jobs; - processing: increased milk supply to MPP's, more work load and more jobs created at MPP's-packaging and storage - marketing: increased processed products; leads to increased trading outlets-zones, kiosks, bars, restaurants, hotels all in need of more workers due to increased consumers for various diversified products
RAB	This is the government institution responsible for animal resources development in general. There is a department that is fully responsible for dairy cattle improvement	dairy cattle improvement-genetics and value chain improvement activities. ; issues of AI, extension services; animal health; follow up of functions of MCC/MCP's; milk aggregation and transportation; micro and SME's (MSME'); trade of dairy products etc.	Jobs creation is the same as described above
RICA	A government institution responsible for inspection and regulation of dairy products-post-harvest.	The main intervention areas include; storage of milk at the MCC's and MCP's. they look at quality and safety of milk at the MCC/MCP. Conducts tests for antibiotic residues and aflatoxins; somatic and bacterial cell counts	This segment is quite critical in the DVC, milk of good quality and safety has significant impact to the entire processing and marketing segments; lead to increased production of high value products for niche markets-

		as a measure of quality and safety. Provide training of MCC's staff on hygienic milk handling; testing for quality/safety/grading	higher incomes and potential for jobs creation.
RSB	Responsible for setting quality standards for dairy products going to the market	Their areas of intervention include; training of processors on processing best practices; HACCP; -setting brand standards -training on new processing technologies for dairy products	As a consequence, jobs will be created as many as marketing windows increases. Good processing practices results into increased marketing of processed high-quality foods from milk.
FDA	This a government institution responsible for approval and regulation of agrifoods and drugs; milk and its products are major areas of FDA'a intervention	FDA is very much concerned with the quality and safety of dairy products before taken to the markets for human consumption. Their direct intervention is at the processing facility and outlets storage facilities/ supermarkets	As described above, good practices along entire DVC segments, its impact spills over to all beneficiaries of the sector-including opportunities for job creation.

3.2. The beef (cattle) value chain

Meat is an extremely important component of the agri-food sector in Rwanda. It has many linkages along the chain; it is a source of income for a major segment of the country's population, provides high value protein in the nation's diet; contributes to food security and could be a major earner of foreign exchange. Rwanda produced about 58,580 MT of red meat in 2016/2017, whereby 74 % was beef and the remaining 26% came from sheep and goats.

The overall target was to reach production of 79,586 MT of red meat by 2021/22, through improvement of feed from grazing land resources, animal health services, and animal genetics; and use of appropriate feeding technology. In 2014/15 the per capita meat consumption for the people of Rwanda was only 7.9 kg/year for meat[22]. In the LSA baseline (2016/17) the per capita projection for meat was 9.08 kg. These values are far below the FAO nutritionally recommended level of consumption of animal source foods - 50kg/person/year [23]

3.2.1. Meat sector policies and strategies:

- Major achievements in terms of strategies and assessments have suggested evidence of the country's strong case for meat production potential and opportunities to prospect local and regional markets

[22]Minagri/RAB report 2015
[23] FAO 1999, MINGRI 2004

- Also, key regulations and policies addressing meat value chains (quality and safety) in Rwanda have been reviewed, with focus on relevant section addressing food safety as well as their implementation mechanism, during the last 10 years.

3.2.2. Meat value chain segments in Rwanda.

Ideally, the beef value chain is made of the following clusters of operators along the beef cattle production segments:

- Farmers (people rearing cattle)
- Cattle traders
- Market actors
- Transporters of cattle from the market to final destination
- Abattoir/slaughter houses operators
- Hides traders
- Butcher operators
- Meat processors
- Supermarkets
- consumers

3.2.3. Beef cattle production in Rwanda

The beef cattle value chain, entails the full range of activities required to bring beef to the final consumers passing through the different phases of production, processing and delivery.
In Rwanda there are still a big number of indigenous cattle that may be called local beef cattle and are the major source of beef in the country. Crosses of local cattle with known local breeds of beef cattle from the region are also available for meat production (Sahiwal, Boran, brahman, Bonsmara). Bulls and culled dairy cattle are also slaughtered for meat. Along the meat value chain itself, a lot of people are involved either as live cattle traders, operators of abattoirs, operators of butcheries, hides operators, blood and bones traders for animal feeds preparation etc.

The production system of beef cattle takes the same route as the dairy cattle production, usually cattle brought to markets are from both zero and open grazing systems. However, in Gako beef project, cattle are fed under feedlots for quick weight gain and slaughtered within 3 to 4 months of intensive feeding. The system of out-growers for the supply of beef cattle is encouraged as a boost to local beef cattle producers. Fattening of cattle intended for beef production requires a lot of feeds and water. A beef animal should be slaughtered at tender age in order to provide lean, soft and highly palatable meat cuts.

The average dressing percentage of sheep is 60 to 64 percent. However, dressing percentage can vary widely. A common misconception is that the consumer will be bringing home 63 percent of the animal's live weight (average dressing percentage). However, this 63 percent includes bone, fat, and moisture, which will be lost during processing.

There are existing initiatives in place to improve production and productivity in animal products such in Gako integrated beef project and cattle genetic improvement to help increase competitiveness in specific segments. Gako Beef is a public-private partnership project including integrated forage production, intensive cattle production, fattening, and meat processing. It covers a total of gross area of 6,000, ha of which 1,050, ha has been identified for irrigated forage to support beef production (NAEB, 2019).

i) Cattle marketing

There are well established cattle marketing infrastructure in Rwanda. Main cattle markets that have been built to standards includes 10 found in the districts of Nyagatare, Gatsibo, Kayonza, Kirehe, Ruhango and Rubavu. However, many localized cattle markets are found everywhere in all districts catering for all livestock species particularly cattle, goats and sheep. Livestock marketing system is organized per district per province in a way that facilitates participation of key traders of live cattle. Dates for livestock marketing are set and made public for all traders to take note of. Market bound cattle are given ear-tags for identification; the ear tags are provided by a public sector veterinarian.

ii) Transportation of live cattle for slaughter and export

Majority of beef cattle bought from markets across the country are transported by lorries to slaughtered premises. However, others are sold as live animal in the DRC at cross-border points, through Rusizi and Rubavu border posts.

iii) Abattoir, slaughter houses and slaughter slabs

According to RICA, there are 11 certified abattoirs for cattle and other ruminant species. However, only few have equipment for meat processing. Rugari and Gako slaughter houses are equipped with modern processing equipment. Nyabugogo abattoir is the largest of all and has the capacity to slaughter 566 cattle and over 1,500 goats/sheep per week. Among the busiest abattoirs is the Rubavu slaughter facility that is situated at the border with DRC. Abattoirs are operated privately but there are others constructed by district authorities but operated in partnerships with private companies. In general, there are around 107 slaughter facilities in Rwanda.

Table 18: List of modern abattoirs across the country[24]

Nr	Name Abattoir/Slaughterhouse	Specialization	District	Sector	Cell	Affiliation	Contact
1.	GAKO MEAT COMPANY LTD	Beef, goat	BUGESERA	MAYANGE	MBYO	PRIVATE	788616102
2.	MUHABURA TWO MEAT PROCESSING LTD	Beef, goat	BUGESERA	RUHUHA	RUHUHA	PRIVATE	788423820
3.	Poultry East Africa Ltd (PEAL)-Broiler Slaughter	Broiler	BUGESERA	MAYANGE	KAGENGE	PRIVATE	7255304130
4.	Rugari Meat processors Limited (Beef)	Beef, goat	BUGESERA	RUHUHA		PRIVATE	780 798 836
5.	Rugano Meat Supply Limited	Beef, goat	GASABO	RUSORORO	KABUGA I	PRIVATE	788304690
6.	Rugari Meat processors Limited (Pork)	Beef, goat	KICUKIRO	KANOMBE	NYARUGUNGA	PRIVATE	780 798 836
7.	SABAN Nyabugogo	Beef, goat	NYARUGENGE	GITEGA	AKABAHIZI	PRIVATE	788300999
8.	SOSEFIK Ltd	Beef, goat	GAKENKE	GAKENKE		PRIVATE	788352622
9.	Ruhango abattoir for district -YAK FAIR TRADE LTD	Beef, goat	RUHANGO	RUHANGO	NYAMAGANA	PRIVATE	788307522
10.	CAMR (Coperative y' Abaturage Morden Rubavu)	Beef, goat	RUBAVU	GISENYI	MBUGANGARI	PRIVATE	788400402
11.	KOADU Abattoir	Beef, goat	RUBAVU	GISENYI	GISENYI	PRIVATE	
12.	TREBUCO	Beef, goat	RUBAVU	RUGERERO	RUGERERO	PRIVATE	783408808
13.	RUKUBANA Abattoir	Pork	RUSIZI	BUGARAMA	PERA	PRIVATE	725097632

i. Butcher operators

Meat cuts from the slaughter facilities are delivered to various butcher operators across the city of Kigali (main consumers) and other municipalities and towns in Rwanda. Some butcher operators are among the cattle traders and some buy already slaughtered carcass just for trade. Butcheries are operated under specific hygienic recommendations and they are subjected to regular hygiene and personal health inspections. The ministry of agriculture and animal resources (MINAGRI), MINICOM and MINISANTE are responsible for the smooth and hygienic operation of the butchers. Meat from the slaughter facilities are transported in the specific vehicles (recommended) to the butcheries and supermarkets for immediate selling. There are about 400 butcher operators in the country and various supermarkets in the city of Kigali and other townships in the provinces.

[24] MVC Mapping and Gap Analysis (MINICOM, 2022).

ii. Meat processing

Basically, a standard abattoir should have among other facilities; a processing facility/unit. It can provide services to the butchers many of whom have no facilities for cutting meat into desirable cuts. A cold chain system is of paramount importance in the meat value chain; abattoirs must have the cold chain system in place to keep hanging carcasses for a day or so before distribution to butchers for sale. In Rwanda, few butcheries have the skills and capacity to process various meat products; into sausages, roasting, etc. Rugari MP; Paniel MP; Nziza MP; Meat hub; The House of meat; choice butcher; meat the carnivore; Istanbul butcher, German Butcher, La Galette, etc.

iii. Meat consumption trend

Meat consumption in Rwanda seems, unfortunately, to be among the lowest in the region, with an average of 9.08 Kg meat/person/year as per 2017 estimates.

Table 19: Regional trend in per capita meat consumption (kg/person/year; FAO, 2020)

Country	1961	2017	Absolute change	Relative change
Africa	13.44 kg	19.01 kg	+5.57 kg	+41%
Eastern Africa	14.54 kg	10.81 kg	-3.73 kg	-26%
Kenya	18.99 kg	15.94 kg	-3.05 kg	-16%
Rwanda	3.97 kg	9.08 kg	+5.11 kg	+129%
Tanzania	9.84 kg	9.22 kg	-0.62 kg	-6%
Uganda	13.14 kg	9.69 kg	-3.45 kg	-26%

iv. Hides trade and processing

As a rule of thumb, hides and skins are the product of slaughter process. They represent the number of livestock slaughtered. After skinning the animal during slaughter, hides and skins are treated either by salt for preservation or sun dried (rural area). Hides and skins are collected by dealers and stocked in Kigali for export. In Rwanda hides and skins are exported as raw. A tannery that was established few years back was closed due to environmental issues. There are measures being taken by MINICOM to get an investor who would put a hides and skins processing facility.

The tanneries main produced wet blue for export, which led local SMEs involved in the production of footwear to depend on imports of finished leather, consequently raising their costs of production. This also makes the local leather industry less competitive, creating room for increased volumes of second-hand leather products on the local market. The analysis of the estimated national demand, for selected leather products, shows a gap varying between 88% and 99%.

Table . Domestic Production vs Demand[25]

[25] MINICO Administration data 2022

Leather products	Actual production	Average national demand	Gap against average consumption (%)
WALLETS	2,891	413,305	99%
BAGS	26,337	285,012	91%
BELTS	35,346	677,195	95%
SANDALS	25,664	215,533	88%
SHOES	6,223	2,809,064	99%

According to NAEB report, the exports for hides and skins between 2014-2019 had a rapid decrease; in FY 2014-2015, the exports registered was 6,875,952 kg while 2018-2019 registered only 834,408 kg.

Table 20: Exports of Hides and Skins in both Volume (kg) and Value (USD), 2014 to 2019[26]

Exports	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019
Hides					
Volume (in kg)	6,875,952	5,379,524	5,294,420	2,603,454	834,408
Value (in USD)	8,845,104	5,640,796	6,103,622	3,956,789	802,988
Skins					
Volume (kg)	2,011,654	1,330,757	1,050,725	797,580	243,431
Value (in USD)	3,170,728	1,795,691	1,854,326	1,897,169	223,303
Grand total					
Volume (kg)	8,887,606	6,710,280	6,345,145	3,401,034	1,077,839
Value (in USD)	12,015,832	7,436,487	7,957,948	5,853,959	1,026,292

3.2.4. Rwanda MVC Key Stakeholders and Operators (as of December 2021)

MINICOM, data of 2021, on the table below indicate a relatively balanced distribution of MVC operator's clusters across the country, with however an important number (32.60%) being located in the Eastern and Northern Provinces, due to estimated higher number of cattle farmers in the East (12.70%) and pig farmers (7.80%) located in the Northern Province.

[26] NEAB cited in the Statistical Yearbook 2019

Table 21: Estimated number of BVC Operators across Provinces of Rwanda

BVC Stakeholders	Eastern Province		Kigali City		Northern Province		Southern Province		Western Province		Total
Abattoir	18	16.8%	3	2.8%	42	39.3%	15	14.0%	29	27.1%	**107**
Butcher	132	33.0%	21	5.3%	46	11.5%	118	29.5%	83	20.8%	**400**
Cattle farmer	413	63.1%	11	1.7%	115	17.6%	26	4.0%	89	13.6%	**654**
Cross-border Livestock Traders	4	6.1%	4	6.1%		0.0%	24	36.4%	34	51.5%	**66**
Cross-border Meat Traders		0.0%		0.0%		0.0%	10	19.2%	42	80.8%	**52**
Feed processors	3	42.9%	1	14.3%	2	28.6%	1	14.3%		0.0%	**7**
Livestock Markets	20	27.8%		0.0%	11	15.3%	17	23.6%	24	33.3%	**72**
Livestock Traders	3	13.0%		0.0%	4	17.4%	4	17.4%	12	52.2%	**23**
Livestock Transporters	11	12.4%		0.0%	15	16.9%	37	41.6%	26	29.2%	**89**
Livestock service providers	74	17.0%	8	1.8%	22	5.1%	230	52.9%	101	23.2%	**435**
Meat exporters	3	18.8%	2	12.5%	1	6.3%	7	43.8%	3	18.8%	**16**
Meat processors	1	20.0%		0.0%	1	20.0%	1	20.0%	2	40.0%	**5**
Middlemen	89	41.0%		0.0%	27	12.4%	51	23.5%	50	23.0%	**217**

The Southern and Western Provinces represent another major BVC hub, with respectively an estimated number of 740 actors (22.80%) and 607 (18.70%) in the West. The 2 provinces remain the only major actors in the cross-border trade of livestock and meat, with an estimated number of 10 traders (0.30%) located in the South compared to 42(1.30%) cross-border meat/livestock traders[27] active in the Western Province.

3.2.5. Beef value chain employment analysis

3.2.5.1. Employment supply and demand in the value chain

According to Rwanda Livestock Master Plan (2017), The red meat produced is predominately for domestic consumption, with little exports. Rwanda imports a good deal of its meat and has a long way to go to meeting its domestic demand for red meat, and be able to export. A stable meat supply value chain is yet to be developed to meet increasing demand, which is largely driven by international conferences and tourism and expert to DRC. As demonstrated by BNR ICBT and RRA Customs data on Rwanda livestock exports to DRC, which shows a 64% increase from RwF8 billion in 2010 to RwF13 billion by 2015) (Minicom, 2016).

According to Rwanda Development Board (RDB), availability of good quality locally processed meat is said to be difficult as a result of loopholes in the value chain. Therefore, high-end hotels and flight catering services are purchasing meat imported from as far as South Africa avoiding embarrassment of serving locally produced meat of poor quality.

The value chain presents a gap in demand and supply where additional investments are needed to promote beef farming (feedlots system) as it still relies on Ankole cattle, which is not reared for beef meat.

Basing on RLMP, the total red meat increased from 58,579 tons in 2016/17 to 79,586 tons in 2021/22, an increase of 36% The increase in meat production must continue to help meet the nutritional requirements of the rapidly growing human population, expected to reach 16.3 million people in 2031/32.

At the level of cattle farming, the levels of labor management are still low and mainly farmer worker's/cow keepers are hired. According to Mazimpaka Eugene (2017) study, family labor prevalence was (72.8%), hired labor was lower (23.8%). Very few farmers (9.1%) hired more than three casual laborers on their farms and majority (76.1%), of the farms were managed by owners. As mentioned in dairy value chain chapter, the employment opportunities will continue to increase to respond to the government's efforts and current meat demand to boost meat value chain.

3.2.5.2. Constraints and opportunities in the value chain

Table 22: summery of constraints and opportunities in the beef value chain[28]

Value chain segments	Constraints	Supporting interventions/ market opportunities
Farmer level	➢ Poor animal nutrition due to shortage of feed and poor ration formulation are the biggest constraints for productivity. ➢ Lack of sufficient grazing areas to meet the feed needs of the animals ➢ Limited marketing infrastructure and marketing system. ➢ Lack of technical knowledge on best animal husbandry practices ➢ Lack of awareness regarding beef farming/ feedlots beef production system. ➢ Inadequate knowledge on the use of crop residues and by-products and forage production skills ➢ Local breed with low genetic potential for meat production ➢ Inadequate proximity veterinary interventions for health and breeding services.	o Ongoing government efforts to invest and promotion of beef farming (specific semen available in RAB) and Gako beef special area as Hub model. o Availability of crop residues across the country at affordable cost coupled with forage seeds for fodder production o Increasing price of live cattle and meat across the country predicts more engagement in professional beef farming. o Increasing Live cattle market fin the DRC export. o High demand for meat in the DRC and Congo Brazzaville
Meat processing facilities	➢ Inadequate value-addition skills for beef meat carcasses (processing) especially processing technicians. ➢ Low capacity for quality meat production and supply, ➢ Low level of value addition by local abattoirs due to lack of facilities or underutilization of installed capacity. ➢ Low level of abattoir's compliance to meat quality and safety standards. ➢ Difficult for local meat value chain actors to meet international certification requirements.	o High domestic meat consumption o Available meat market regionally and internationally, especially high demand for export in DRC/Congo Brazzaville. o High demand of certified high quality meat accepted for high-end hotels and flight catering services (Marriot, KVC, Rwanda air catering services, etc.).

[28] Consultant's design

	➢ Lack of financial support services to further improve services--expensive meat processing equipment.	
Butchers and supermarkets	✓ Lack of knowledge and skils on meat-cutting and –grading ✓ Inadequate quality control in abattoirs (supply of poor-quality meat) ✓ Use of substandard equipment for meat cutting and dispensing.	❑ Increasing middle class Rwandans are a sustainable source of meat products ❑ Promotion for the consumption of ASF has been the government's priority ❑ Limited investment is needed to start meat selling business (butcher operation) ❑ Abundant butchers are available across the country for selling of meat products
Hides and skins	✓ Low utilization capacity of tanneries and or low skills in hides and skins treatment, due to worn out machinery and equipment and outdated technology, as well as a low investment capacity (63% of hides and skins are exported in raw stage and 37% are tanned or crusted). ✓ Lack of qualified hides and skins graders ✓ Lack of standards hides and skins storage facilities ✓ Poor system of skins and hides drying /treatment ✓ Most of the tanneries in Rwanda lack proper effluent treatment plants; as a result, they contribute to environmental pollution. ✓ Poor quality hides/skins leading to rejection, ✓ low awareness especially among primary producers on the economic value, ✓ low prices of hides and skins.	✓ Available domestic demand of hides and skins' leather products ✓ Increasing number of artisans making shoes, hand bags, wallets etc. ✓ Available demand for export in Kenya.

3.2.5.3. Identification of key actors on the beef value chain[29]

Actor or player	Role	Public / private	Level of influence in the vc
Gako beef investment	-to develop the beef cattle industry through improved breeding of local cattle with improved beef cattle through genetic improvement using AI/bulls To implement intensive beef cattle production through; ranching/grazing and feedlots To slaughter and process beef meat - supply beef to domestic consumers and for export	Private/PP	The GAKO beef project has become popular due to its unique meat quality compared to other meat products in the country Gako beef company has a well-advanced abattoir with all amenities and modern technologies suitable for any high-level slaughter facilities would require Gako beef has captured niche markets in the supermarkets and five-star hotels in Rwanda GAKO beef company has a network of local producers in the country as background producers of beef cattle for fattening
RAB	Government institution responsible for livestock development. It has put in place beef cattle development strategies based on the livestock master plan 2017-2022.	Public	RAB's influence in the meat sector is by responsibility, it is responsible for the production of the sub-sector at national level; providing necessary inputs and support services for improved beef cattle farming. Strategies and programs to improve beef cattle production undertaken by RAB
RICA (Minicom)	Government institution responsible for meat inspection and certification at post-harvest level RICA is responsible for the operation of all abattoirs, slaughter houses and slaughter slabs in Rwanda	Public	The institute is well known to stakeholders due to its great role in the inspection, certification of meats products at the abattoir and butcheries level They confirm and authorize veterinary meat inspectors

[29] Consultant's design

	They provide technical intervention as regards to matters related to meat trade, management of slaughter facilities etc. They conduct training of vets in good hygienic production of meat, HACCP and other SOP's Train meat sellers-butcher operators on the hygienic handling and cutting of beef at the premises Train hides and skins attendants on best way of handling hides/skins Controls. Supervises management of abattoirs and other slaughter facilities		They conduct training of meat inspectors aimed ta imparting meat inspection skills as a move aimed at protecting consumers from zoonotic diseases
MINICOM	The ministry responsible for meat and hides/skins trade Responsible for improving meat products suitable for niche markets in domestic and external markets Conducts regular training of meat inspectors Elaboration of meat value chain strategy	Public	The ministry is known for its roles as the ministry of trade and industries It has put in place various policies and regulatory framework regarding meat sector/ hides and skins as well as trade Support stakeholders in the meat sector to improve their businesses especially exporters of meat products
RCVD	A regulatory body responsible for providing professional licenses for vets. The council conducts professional test before issuing licenses. For one to be certified for meat inspection should possess a license.	Private/PP	The popularity of RCVD is based on its role in regulating vet professionals and paraprofessionals and issuing licenses allowing them to practice in Rwanda. The council has limited public influence other than being professional organization sorely responsible for regulation of practice and ethics
Rugari Meat processing Ltd	A private company operating under APTC (Agri-Processing Trust Company) The only advanced meat processing entity in the city of Kigali and in Rwanda. They process beef, pork, poultry and rabbits	Private/PP	The company is popular on its good quality meat and various types of processed meat cuts Supplies its high-quality meat to various supermarkets ads hotel in the city of kigali

Sundry meat processors	A significant number of supermarket operators have the ability to process meat into various meat products; Nziza meat processing; Peniel meat processing; KANE meat processing; Ineza butchery etc.	Private companies	These are few companies that process meat products majority of the products are sold in local supermarkets
Rwanda TVET Board (RTB)	Technical skills development: RTB is at the forefront of all efforts to promote TVET from level one (1) to level (5) of the Rwanda TVET Qualification Framework.	*Public*	RTB is responsible for designing and distributing national-wide curricula, teaching materials, trainer's guides, methodologies, and training methods for all Level 1-5 TVET institutions; majority of meat inspectors at local level-slaughter slabs/houses are done by TVET graduates
Rwanda Polytechnique (RP)	Technical skills development: RP implements TVET skills development across the country. It goes further than RTB to oversee TVET education on tertiary/university level.	*Public*	RP prepares technical and vocational education curricula for use at various technical vocational training levels. RP offers technical and vocational courses' certificate, diploma, bachelors, and higher levels.
University of Rwanda (UR)	UR develops interdisciplinary, problem based academic programs aligned with Rwanda's development needs.	*Public*	With more than 25,000 students enrolled, UR is the biggest tertiary education institution/university in Rwanda. The university is at the forefront of labour supply in different fields like, STEM, business, etc.

3.2.5.4. Potential interventions to address the constraints in the beef value chain

The HA interventions in the beef value chain would be similar to the dairy value chain. However, special attention should be put on meat inspectors, abattoirs improved and capacity building on modern technologies that may result into jobs creation.

Table 23: Potential interventions to address the constraints in the value chain[30]

[30] Consultant's design

#	Potential interventions	HA direct interventions	Potential Partner (s)	Level recommendation	Gender inclusion rating opportunities
1.	Improve production of beef cattle through grazing and feedlots; addressing feeding challenges; training of veterinary technicians on meat inspection skills; train beef farmers on commercial beef cattle farming and management (feeding, breeding, tick control, etc.)	HA may intervene at two level: ➢ Providing capacity building program to identified farmers on commercial beef farming and special interventions for having suitable breeds for feedlots. ➢ Training of veterinary meat inspectors on good inspection practices and on HACCP	RAB RCVD RICA MINICOM All the above have the capacity to provide training and capacity building to farmers and vets	Medium	High: the meat sector is gender inclusive in all aspects of the value chain; butchers; majority run by women, meat cutters are youth, transporters are youth, etc.,
2.	Provide capacity building to service providers regarding commercial beef farming and promote meat quality assurance.	➢ Provide training program on meat inspection across the country. ➢ Provide training of trainers to veterinarians from potential zones of beef cattle farming. ➢ Provide training to abattoir workers to upgrade the workers' competence and the level of abattoir's compliance to meat quality and safety standards. *HA by doing this, a number of certified Meat inspectors and farm advisors is increased and employment improved/ created.*	Districts RICA RAB RCVD The above organizations have the capacity to partners with any for the provision of capacity building and training of stakeholders in the meat sector/ value chain	High	High: in terms of gender inclusivity, beef sector is characteristically well set for the recruitment of youth in certain value chain segments; abattoir works are youths by majority; veterinarians also as it stands today are youth under 35 yrs of age; females are integrated in meat selling and processing activities;

3.	Support for capacity building for meat processors on diversified milk by processing technologies for abattoirs and slaughter house workers	HA may intervene in the following; ➢ To provide training to butcher operators on the knowledge and skills for meat grading, cuttings and packaging ➢ Support meat processors to develop new meat processing technologies ➢ To support abattoirs and butchers to access modern equipment in order to produce new meat by-products as well as packaging machines	RAB RICA MINICOM UR These government institutions can provide capacity building on various processing technologies	Medium	High: in terms of gender inclusivity, the meat sector as elaborated above has as many women as possible in the selling of specific meat parts-the offal are often sold by women as prepared soups in bars and local restaurants; women and youth in supermarkets are the custodians of meat sales at the deep freezers etc.
4.	Modernize available local tanneries, with updated equipment and technology to curb environmental pollution. *Note that 63% of hides and skins are exported in raw stage and 37% are tanned or crusted.*	o Provide training of tannery personal on modern hides and skins treatment o Support the existing centre for the processing of leather products at Gatsibo . o Provide capacity building to individual involved in the production of leather products [belts, shoes, wallets, handbags etc	RICA RAB MINICOM The above institution are capable of recruiting experts in hides and skins tanning as well as leather production and processing	High	Medium: Gender inclusivity is limited except on selling of processed leather products where majority are women and youth for certain products such as hand bags, belts and wallets

3.2.5.5. Other beef value chain development projects in place in Rwanda

The table below elaborates few beefs industry related development projects in place that are currently being implemented and relevant for job creation. In this way, Hanga Akazi may maximize opportunities through collaboration with such programs while limiting any possibility of duplication of interventions.

Table 24: Other beef development programmes in Rwanda[31]

Programme	Programme description	Areas of intervening in the BVC	Opportunity for HA
Gako Beef investment	This is a government-initiated beef cattle production project. The project covers over 7,000 ha of land in Gako-Bugesera district in the Eastern province. The project is jointly owned by a group of investors under single company " GAKO Meat Investment Company". The company is rearing local beef cattle mainly through grazing. Mature beef cattle are slaughtered at the modern abattoir in the vicinity. Meat produced is sold in the supermarkets in Rwanda and elsewhere in the country. A significant amount of excess meat may be exported. Good quality meat from there also is delivered to Rwanda air. The project has outgrowers (backgrounding) for the supply of beef cattle for fattening, stimulating the growth of the sector at national level	• Production: Feeds development and feeding; fattening for quick weight gain, animal health care services and herd management • Slaughter: Mature/Complete cattle are systematically slaughtered at Gako abattoir which is one of the modern slaughter facility in the country • Meat grading and processing: meat produced from Gako is technically graded and processed at Rugali meat processing facility located in Kigali-Nyarugunga sector-Kicukiro district • Meat marketing and distribution: as described above, meat cuts from the abattoir are transported via designated trucks to butchers and supermarkets for retail selling operations	The meat value chain can create significant number of employment if well tapped. In this regard, Hanga Akazi program may intervene in the following value chain segments; ✓ Slaughter and processing: young persons and women are involved at this segment-intervening for improvement may raise opportunities for jobs creation ✓ Distribution and Marketing: also this segment attracts youth and women; supermarkets have employed women and young men to take charge of selling meats-youth do the cutting and measurement while ladies are supervising cash collection and receiving orders from clients

[31] Consultant's design

Meat Value Chain Trade Competitiveness Project.	The project, was implemented between September 2020 and August 2022, targeted areas; Rubavu, Nyagatare, Bugesera (Gako) and Rusizi districts. Directly to benefit more than 650 producers, processors and merchants; 74% of whom are women working in informal cross-border trade. The project focused on the training of trainers. It indirectly impacted about 1,950 producers, processors, merchants, and customs agents, as well as 1,560 community animal health agents, 416 sector veterinarians, 30 district veterinary officers and 20 veterinary cross-border meat inspectors from RAB abd RICA. The project also supported few abattoirs such as Koadu, Rugano, Rugari, Santra and Saban. The project covers two of Rwanda's busiest cross-border trade frontiers where large trucks haul goods between RubavuDRCt, and "Rusizi I," connecting Kamembe to Bukavu in the DRC	• Training and capacity/skills enhancement for meat inspectors: veterinarians on GHPS; HACCP; meat inspection including practical demonstrations at abattoirs • Training of community animal health workers through Training of trainers (TOT's) on best animal husbandry practices (ill-health detection, control and prevention of diseases; dehorning, castration (closed method), etc. • Training of laboratory technicians: these were persons involved in meat quality control from RICA and RAB. Basically, were trained on ways of meat contamination; laboratory identification of contaminants of meat (bacteria); food borne diseases (zoonosis); characterization and isolation of food contaminants (bacteria); culture and drugs sensitivity tests and helminths affecting quality of meat from beef cattle.	Hanga Akazi may intervene in collaboration with other stakeholders to: i) improve quality of meat cuts through capacity building of meat inspectors by equipping the vets with equipment and Personal Protective Equipment (PPE's) for vets and other value chain operators: ii) Support butcherers to access cold chain maintenance equipment (refrigerators, deep freezers, and cold rooms at abattoirs; meat transportation truck-mounted with cold chain system: iii) Support abattoirs to attain international standards in order to process meat for export-equipping them with cold chain system (cold rooms, refrigerators, deep freezers); training inspectors and processors of meat products

3.3. Small Ruminants Value Chain

Small ruminants, predominantly sheep and goats, were among the first livestock to be domesticated for food and fiber. The primary agricultural products of these animals are milk and milk products, meat, wool, mohair, and cashmere[32]. From an economic perspective, small ruminant value chains have had a number of benefits. More importantly, small ruminant is likely to increase access to participation in commercial, inclusive value chains and market-oriented producers; contribute to the self- reliance and resilience of rural households, empowering them to meet their needs in a safe, sustainable and dignified manner; and finally contribute to their host economies.[33]

3.3.1. Goat value chain

Goats have played a role in Rwandan societies for centuries, serving not only as a means of income and food, but also fulfilling more expansive roles[34] .Goats are reserved for meat production in Rwanda. Goat milk is not of value in Rwandan population. Actually, almost all goat farmers are using same production system whereby goat are kept tethered at home without specific goat sheds and they are fed in two forms: fully traditional which involves allowing goats to graze in open areas or fed at home especially during rainy season. Few goats' large farmers (22 farms) are found in Eastern province (Bugesera, Kayonza, Kirehe, Gatsibo & Nyagatare districts).

Ownership of goats also tends to empower women in the Rwandan society. The current proportion of women involved in goat herding in Rwanda is 41.9%[35] .As more women continue to make strides in the goat production sector, even as a sideline business, they will become more capable of generating their own income and supporting themselves. Investment in goat and sheep production would be a wise and potentially profitable action.

The average dressing percentage of sheep carcass is 50 percent of the live weight. That figure can vary a little. Lambs of wool sheep breeds when carrying some wool will often "dress out" a little less than 50 percent. Hair sheep breeds tend to dress out a little above 50 percent.
While the dressing percentage of goat's carcass varies between 40% in very young animals and 56% in entire mature males.

As per AHS 2020, in Rwanda there are 1,745,806 goats. The Eastern Province and Southern Provinces have the biggest number of 718,408 and 513,334 respectively whereby Western has 242,128, Northern 216,035 and Kigali 55,900 only. That is because goats like hot climate and savanna places rather than high mountains.

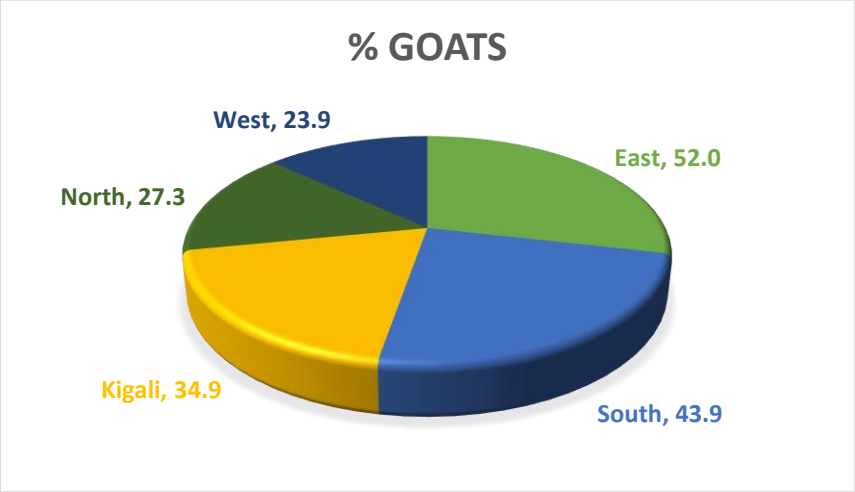
[32]Herzog et al,2019.
[33] RISCHKOWSKY and ,2021.
[34]Taylor 1988.
[35]NISR, AHS 2017.

3.3.2. Goat distribution in Rwanda

Goat production has become a profitable family business, as it only requires a very low investment given its multi- functionality utilities raison and it doesn't conflict with Rwandan culture so as it is found in all 30 districts. The big number of goats are reared in Eastern and South provinces due to their conducive environment suitable for goats to thrive well.

Countrywide, 1.9 million agricultural households reportedly reared livestock in 2020. Among them 37.6 percent reared goats, (714,400 households). According to NISR large-scale farmer was defined as any individual person, institution, company, association or cooperative rearing at least 100 goats. In Rwanda 22 for big goats" farmers were identified[36]. That indicates that the goats are reared by small farmers. The survey conducted indicates that 10% rear only 1 goat while more than 73% rear between 2 and 10 goats, making 83% rearing less or equal to 10 goats.

Figure 11: Pie chart showing goats distribution in Rwanda



Source: NISR, AHS 2020

3.3.3. Trend of goats' production in Rwanda.

The number of goats has been growing steadily during early years of the past decade, but their number started declining towards the few last years of the decade. The figure below shows the partner of rise and fall. Reasons for the decline not well established but is could be related to increased export to DRC and Burundi as demand for the animals went up in the past few years to date.

[36] NISR, AHS 2020

Figure 12: Growth of number of goats in Rwanda[37]

3.3.4. Goats value chain components

The value chain of goats categorized of the following segments;

- **Producers:** These are households that own and rear one to three goats at substance level usually for sale, meat and for production of fertilizer. However, there are also few large farmers of goats who keep relatively big number of goats commercially for sale.
- **Goats' aggregators**: these are agents of merchants who are involved in goats selling businesses; this is a group of young persons who move house to house searching for goats to buy. They negotiate prices, and upon purchase they re-sale the same to the big buyers at a high cost.
- **Goats traders**: these are persons/companies that buys goats as a business for sale to government institutions, NGO's responsible for distribution to poor families. They also buy for slaughter in order to supply meat to bars, restaurants and hotel across the country.
- **Abattoirs/Slaughter houses/slabs**: these are owners of slaughter premises. Goats intended for meat are slaughtered here at a cost. Agreements are made between abattoir owner and trader for a cost and skins management. The slaughter charges are paid or in exchange of the skins.
- **Butchers**: after slaughter, goats' meat are brought at the butchers across the country for sale; butchers are recommended premises for sale of raw meats. Buyers of goat's meat would buy from the butchers. Owners of bars, restaurants, hotels and individuals do buy from the butchers.
- **Skins traders**: these are again young men who goes around countryside collecting skins for sale to big hides and skins traders in the city of Kigali.

[37] *RAB/PRISM Project, 2022*

- **Exporters of live goats and meat**: these are individuals who buy goats and export to DRC/Burundi. They are few in number but they are critical in the value chain. However, informal cross border trade of live goats has been observed.
- **Service providers**: includes veterinary extension agents and suppliers of necessary inputs during the course of rearing goats.

3.3.5. Markets and trade

i) Domestic market

Domestic market for goats' products is available. Goats' meat is highly needed in restaurants, hotels, bars and at household consumption. The trend for consumption of goat meat can be well established upon targeted specific meat consumption areas such as bars, restaurants and hotels across the country. Household consumption of goat meat may not well be established because such meat cuts are not available in majority of supermarkets and butchers.

Goats and sheep traded in domestic markets illustrated on the table below

Table 25: Goats and sheep traded in domestic markets[38]

Animal Type		Number of animals			
		Born	Purchased	Sold	Consumed by HHs owners
Goats	Exotic	1,381	166	1,396	262
	Cross	12,333	1,941	4,212	1,323
	Local	773,747	309,764	324,346	36,758
	Subtotal	787,461	311,870	329,954	38,342
Sheep	Exotic	24,845	9,571	9,966	460
	Local	146,602	74,333	73,291	5,078
	Subtotal	171,447	83,904	83,257	5,538

That table shows that during the year 2020, 311,870 goats were purchased by HH'S whereby 329,954 were sold. The same table indicates that 38,342 goats were consumed by farmers themselves. For sheep, the number of sheep purchased is a bit higher than those sold as they are 83,904 and 83,257 respectively. Also 5,538 sheep were consumed by farmers.

[38] NISR, AHS 2020

ii) Export markets of live goats and goat products

Live goats and meat have been exported to the neighboring countries of Burundi, Uganda, Kenya and DRC. The records that are available combining sheep and skins are highlighted in the tables below. Note that, at cross border, report for small ruminants (sheep &goats) have been combined.

Table 26: value of exported product by country in 5 years ($)[39]

	Burundi	DRC	Uganda	Kenya
Live goats	127,122	16,391,956	2,081,696	0
goat meat	1,302	2,590,274	313	0
Mutton	-	1,082,681	1,112	0
Live sheep	10,569	795,538	242,796	0
Hides and skin	23,443	22,021	2,871,552	10,577,559
Total	**162,436**	**20,882,470**	**5,197,469**	**10,577,559**

During the last five years, exports have been dominated by live goats and hides and skins.Live goats are mostly exports to DRC whereby hides and skins are exported to Kenya: DRC, KENYA, and UGANDA are the main Export Destination of Rwanda's Exported live animals and animal products (CUM 2017-2021).

Table 27: Regional Exports per year ($)[40]

Products	2017	2018	2019	2020	2021
Live goats	3,427,888	4,217,670	3,616,401	1,517,284	5,821,533
Goat meat	707,363	323,681	491,239	155,911	913,695
Mutton	711,166	193,213	111,426	19,202	48,786
Live Sheep	318,336	325,550	169,029	65,072	170,915
Hides and skin	5,918,643	2,567,319	1,867,989	1,471,667	1,668,957
Total	**11,083,396**	**7,627,433**	**6,256,084**	**3,229,136**	**8,623,886**

DRC is the main export destination for small ruminants' products occupying 89% of exports to neighboring countries and 56% when Kenya is considered. Note that hides and skins are the main products exported to Kenya. Exports to DRC have been growing as follows:

[39] BNR, 2022

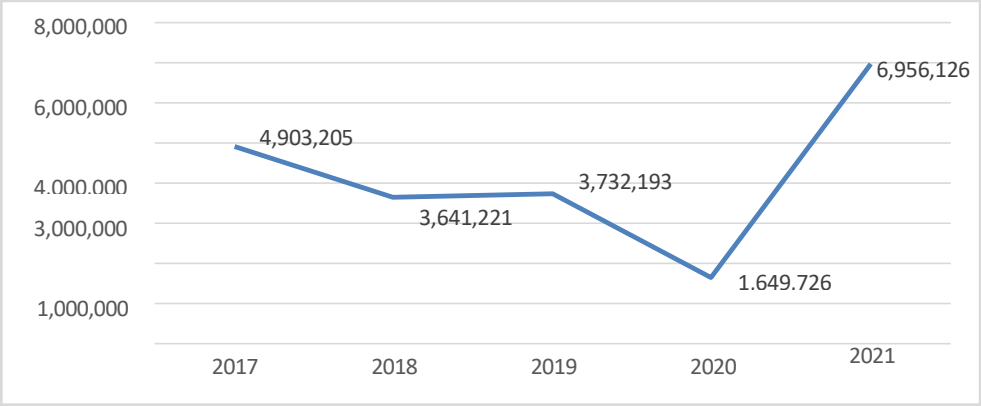
[40] BNR, 2022

Table 28: Goats and sheep export to DRC

	2017	2018	2019	2020	2021	Total
goat meat	706,490	323,051	491,133	155,905	913,695	2,590,274
Live goats	3,196,001	2,919,147	3,032,218	1,423,057	5,821,533	16,391,956
Hides and skin	11,725	7,835	1,072	192	1,198	22,021
Live sheep	278,900	198,009	96,344	51,370	170,915	795,538
Mutton	710,089	193,178	111,426	19,202	48,786	1,082,681
Grand Total	**4,903,205**	**3,641,221**	**3,732,193**	**1,649,726**	**6,956,126**	**20,882,471**

The following graph indicates growth of exports to DRC

Figure 13: Growth of exports to DRC



3.3.6. Imports of small ruminants' products

Imports of small ruminants" products have been dominated in the last five years by live goats as well as hides and skins. Small ruminants have been imported from neighboring countries main during livestock restocking program in Rwanda. NGO's and Government institutions supporting poor families with livestock. Traders would cross the border in search of goats, sheep and even pigs to sustain the market demand for live animals.

Table 29: Imports of goats & sheep

	2017	2018	2019	2020	2021	TOTAL
Burundi	427,191	320,563	295,401	47,899	0	1,091,054
DRC	60,637	92,840	65,783	10,920	10,505	240,685
UGANDA	203	8,631	0	0	0	8,833
UGANDA	35,379	75,848	24,838	2,981	0	139,046
TOTAL	**523,410**	**497,882**	**386,023**	**61,800**	**10,505**	**1,479,619**

3.4. Sheep value chain

The sheep value chain characteristics not complex but has its unique significance in Rwanda; production of wool. Sheep production is concentrated in the highlands where weather conditions are cold and very conducive for sheep rearing. Wool type species of sheep are dominant in those areas as it could be seen on the map above. Sheep meat (mutton) is not commonly consumed in Rwanda basically due to old traditional taboos (almost phasing out due to increasing literacy). Trading in Skins of sheep make another segment of the value chain but much as the number of sheep reared is limited and also the land for rearing huge number of sheep not permitting, little attention is paid to sheep rearing. Nonetheless, the significance of the breed remains high in terms of business opportunities at domestic level[41].

Sheep are kept under different production systems such as intensive, semi-intensive and extensive production systems depending on the availability of land. Currently, almost all sheep are kept under one production system whereby they are tethered at home without specific shelter and they are fed traditionally by allowing sheep to graze in open areas (nearly road) and or fed at home especially during rainy season.

Apart from that, the sheep represents small number of livestock (9.9 %) due to the culture and religious myths which exclude some Rwandans from eating mutton (sheep meat) which is the reason behand few farmers rearing sheep in Rwanda. Consequently, there are only 3 large-scale farmers in the country with at least 100 sheep as defined by NISR, AHS 2020.

Particularly, the sheep wool is of great value as it serves to produce different garment products. According to experts, one Merino sheep can produce up to 4 kg of wool per year. Cooperative Umuzabibu, Musanze is the only farmers with 340 flocks involved in wool production in Rwanda.

3.4.1. Sheep distribution in Rwanda

As per the recent AHS 2020, in Rwanda there are 420,365 sheep. The Western Province and Northern Provinces have the biggest number of 160,162,408 and 178,971 respectively whereby Eastern has 36,234 Southern 41,035 and Kigali 3,752 only.

[41] MINAGRI, PRISM 2022

Table 30: Sheep distribution by sex and province[42]

By sex	Age	Provinces					Rwanda
	category	Kigali	South	West	North	East	
Male	Ram/lamb	459	5,928	20,406	23,861	3,734	54,388
	Ram/tup	554	3,206	11,376	14,084	3,061	32,281
	Total	1,013	9,134	31,782	37,945	6,795	86,669
Female	Lam	651	7,532	27,472	28,020	5,473	69,147
	Ewe	2,088	24,569	100,907	113,006	23,978	264,548
	Total	**2,739**	**32,100**	**128,380**	**141,026**	**29,451**	**333,696**

3.4.2. Mutton and wool processing facilities, distribution and marketing

Sheep production from sheep can be found more in medium and high rainfall areas. Mutton is produced at a small amount as there are not many sheep for slaughter and also its meat not liked by many in the community. Available record of production is 3,674MT. Mutton meat is highly used as roast meat in bars and hotels and at family events. No specific processing is done for mutton except being used as part of the meal in hotels, restaurants and bars.

3.4.3. Wool and skins products

In the country, wool production is done by one cooperative operating in Musanze district but, raw materials are not sufficient as a complement, they import more wool from Kenya every year in order to make production of different fabrics and other clothing items such as pullovers, huts, toys, etc. The sheep skins are used to produce small items like jackets, purse, toys, handbags, etc. So far, their domestic turnover is still small.

3.4.4. Small ruminants value chain employment analysis

3.4.4.1. Employment supply and demand in the value chain

The actual small ruminants value chain is "trader" dominated and many "intermediaries in-between". For exports, they are mostly exported live animals. The small ruminants value chain provides employment mostly at two levels: at family level (owners) and very few care takers in farms and the second level is traders of live animals and fresh meat.

However, there is a gap in exports of live goat and goat meat. National wise the demand is growing for goat meat while the sheep presents the advantage in wool production (merino sheep farming). According to Rwanda Livestock Master Plan, the increases in red meat production from cattle, sheep and goats to 2021/22 was 32%, 33%, and 50%, respectively and this trend seems to continue the same growth.

[42] *Source: NISR, AHS 2020*

The employment is moderately created through live animal's aggregations, local and regional trading, slaughtering activities, collection of skins and bars & restaurants (like Nyama choma and roasts) workers. Also, the employment opportunities will continue to increase to respond to the governmental efforts to boost the meat value chain in Rwanda.

3.4.4.2. Constraints and opportunities in small ruminant value chain

Table 31: summery of constraints and opportunities in the small ruminant value chain[43]

Value chain segments	Constraints	Opportunities for growth of the sector
Farmer level	➢ Lack of sufficient grazing areas to meet the feed needs of the animals ➢ Lack of technical knowledge on best practices and low awareness regarding of commercial sheep farming especial merino breed. ➢ Inadequate knowledge on the use of crop residues and by-products and forage production. ➢ Lack of good breeds of goats and sheep with increased meat productivity. ➢ Inadequate knowledge and skills in managing small ruminant production as a business. ➢ Inadequate proximity veterinary interventions for health, feeding and breeding services.	o Availability of crop residues across the country at affordable cost and forage seeds. o Increasing price of live goats/sheep and meat across the country predicts more engagement in commercial farming. o Unsatisfied live goats' market for DRC export - High demand. o Small ruminants" business is easy to start for youth and contribute to job creation. o RAB/PRISM project is supporting the development of small ruminants" value chain in Rwanda.
Slaughtering and meat processing facilities	✓ Inadequate animal markets and slaughter facilities specific for small ruminants. ✓ Unorganized marketing of live goats/sheep and products for both domestic and export ✓ Low level of abattoir's compliance to meat quality and safety standards.	❖ High domestic consumption of goat meat in hotels, bars and family events. ❖ Available meat market regionally and internationally, especially high demand for export in DRC.
Butchers and supermarkets	✓ Lack of knowledge and skill on meat-cutting and –grading ✓ Inadequate quality control in abattoirs (supply of poor-quality meat) ✓ Use of substandard equipment for meat quality.	❑ Rwandans are essential and priority customers ❑ Government efforts in ASF consumption ❑ Butchers and supermarkets are available across the country.
Skins and sheep wool	✓ Low skills in hides and skins treatment ✓ Insufficient wool production in Rwanda	o The Government of Rwanda is determined to support the Leather industry o High demand of sheep wool (Cooperative Umuzabibu at Musanze).

[43] Consultant's design

4.4.4.3 Identification of key actors on the small ruminant value chain[44]

Actor or player	Role	Public / private	Level of influence in the small ruminants' value chain
Cooperative Umuzabibu-Musanze	The cooperative is involved in collecting wool for making handmade clothes, sweaters, gloves etc. for export and domestic use.	Private	Farmers sheer the sheep (at sheering centers), the wool is collected and brought to workshop, where it goes through many stages before wool products are made.
Selina Wamucii platform	A company involved on end-to-end pr sourcing food and agricultural produce from cooperatives. The platform facilitates the actual purchase of produce, logistics management, inspection, quality control, payments and risk management, and delivery to the destination port. They pack Rwanda wool in bales.by grade.	Private	They provide high-quality Rwanda wool to the local and export markets. They source the raw fresh Rwanda wool from family herders in the country. The main wool production area is Western and northern Provinces (, Musanze, Karongi,, burera, Rutsiro districts) There are many shearing centers, some of which are government runs. A typical sheared sheep offers between 1 and 14.5 kilos of wool annually.
Musanze: Handspun Hope,	Teaches women how to make hand-made knit apparel out of merino sheep and angora rabbit wool	NGO	Its main role is to train women on weaving different styles and types of wool products that are sold in the domestic markets as well as for export.
RAB	A government institution responsible for the development of the sector of small ruminants; elaborates strategic actions for development of goats and sheep. Identifies projects aimed at improving and developing small ruminants	Public	The work of RAB covers the entire nation. Its functions are known by citizens and appreciated by all. RAB provide regular interventions targeting poor families by placing goats and sheep to enhance livelihoods and economic gains as well as nutrition.

[44] Consultant's design

	Follows health and reproduction of the animals Organizes markets outlets and sets procedures for export of live animals and products		RAB implements policies and strategies related to small ruminant production; based on the provisions of LMP, PSTA4 and NST1. RAB prepares development projects for small ruminant production and scaling up of their products as an alternative source of animal proteins.
Project for Inclusive Small Livestock Markets (PRISM)	The overall objective of the programme is to reduce poverty by empowering poor rural men, women and youth to participate in the transformation of the Rwanda livestock sector and to enhance their resilience. The Program's Development Objective (PDO) is to improve food and nutrition security and incomes of poor rural households through better performance of the value chains	Public	The project offers the following to Rwandan families/communities; ✓ Social mobilization and graduation of vulnerable households: ✓ Improve animal health status and genetic potential of small livestock: ✓ Support climate smart innovations ✓ Productive Alliances with input suppliers and market facilitation in small livestock value chains ✓ Support to animal feed industry: ✓ Support to youth entrepreneurship in production: ✓ Support national producers' organizations and multi-stakeholder fora: *The programme targets 1,530 unemployed rural youth, who are interested to start small livestock production enterprises, by assisting them to establish viable and profitable production units and linking them to markets as well as services through productive alliance arrangements.*
The Rwanda Environment Management Authority (REMA): Green Amayaga Project	In the sectors of Busasamana, Busoro, Muyira, Ntyazo, Kigoma and Kibirizi of Nyanza district, 1139 households were provided with goats		The project improved the livelihoods of local communities, increased agricultural productivity and food security, created green jobs as well as promoting gender equality and expanded forest management knowledge. More than 1.3

			million people benefited from the project, the majority being women and young people.
Rwanda TVET Board (RTB)	Technical skills development: RTB is at the forefront of all efforts to promote TVET from level one (1) to level (5) of the Rwanda TVET Qualification Framework.	*Public*	RTB is responsible for designing and distributing national-wide curricula, teaching materials, trainer's guides, methodologies, and training methods for all Level 1-5 TVET institutions
Rwanda Polytechnique (RP)	Technical skills development: RP implements TVET skills development across the country. It goes further than RTB to oversee TVET education on tertiary/university level. Graduates of RP are certified with advanced diploma in animal health & production with hands on skills	*Public*	RP prepares technical and vocational education curricula for use at various technical vocational training levels. RP offers technical and vocational courses' certificate, diploma, bachelors, and higher levels.
University of Rwanda (UR)	UR develops interdisciplinary, problem based academic programs aligned with Rwanda's development needs.	*Public*	With more than 25,000 students enrolled, UR is the biggest tertiary education institution/university in Rwanda. The university is at the forefront of labour supply in different fields like, STEM, business, etc.

3.4.4.4. Potential interventions to address the constraints in the small ruminant value chain

The HA interventions in the small ruminant's value chain may not presents huge opportunities in terms of job creation, the reason why the interventions will be limited to production level and support services.

Table 32: Potential interventions to address the constraints in the value chain[45]

#	Potential interventions	HA direct interventions	Potential Partner (s)	Level of recommend ation	Inclusion rating for potential partner
1.	Promote and support use of cross breeding program to improve the productivity of goats and sheep with emphasis on Merino breed in North-West zone for wool production.	HA may intervene on three levels: ➢ Provide professional trainings on commercial goats farming and farm management ➢ Provide professional trainings on commercial sheep (Merino breed) farming and wool production ➢ Provide support to establish a category of role model commercial farmers (improved parent stocks). This intervention will result to have confidence for the expansion of the business and then recruitment of new farm workers and on the other hand increase of wool and meat production.	RAB MINICOM MINAGRI MINALOC (districts)	Medium	High: In terms gender inclusivity, small ruminants are owned by majority of women at HH level. Also youth in rural areas have started small and medium size goats production projects. Disabled persons could also manage goats and sheep since they are tethered as main production system in place
2.	support to increase efficient use of crop residues and production of fodders as alternative animal feeds.	HA to support the interested investors/ farmers to acquire modern equipment/ materials, technology and training of persons	RAB MINALOC MINAGRI	High	High: after harvest, crops residues are owned by women and youth who

[45] Consultant's design

		involved transform of crop residues to valuable animal feeds.			are the majority of farming community in the rural setting of Rwanda.
3.	To provide training of trainers (selected farmers /LFFS) on small ruminant's commercial farming system Training of vet practitioners in order to increase extension advisory services delivery to farmers	HA to provide structured trainings to respond to the field skills gaps (full package) o Goat commercial farming, genetics farm management and diseases management o Sheep commercial farming, Merino breed specialties, farm management, diseases management and wool production.	RAB RCVD MINALOC	Medium	High: there is high potential of gender inclusivity especially for the TOT's capacity building.
4.	Establishing close collaboration and support the expansion of Cooperative Umuzabibu activities	By assisting and supporting Cooperative Umuzabibu through wool production, collection, processing and garments' fabrication, HA will create new jobs	Cooperative Umuzabibu-Musanze Musanze District	Medium	High: weaving is primarily the work of women, therefore, any support targeting sheep for wool will benefit more women due to weaving skills that men do not have.

3.4.4.5. Other small ruminants' value chain projects that are operating

Table below elaborates the roles of other small ruminant's programmes that are currently being implemented and relevant to job creation in the small ruminants' value chain.

Table 33: Other small ruminant's programmes in this space[46]

Programme	Programme description	Areas of intervening on the small ruminant value chain	Opportunity for HA
RAB/ PRISM project	The overall objective of the programme is to reduce poverty by empowering poor rural men, women and youth to participate in the transformation of the Rwanda livestock sector and to enhance their resilience. The Program's Development Objective (PDO) is to improve food and nutrition security and incomes of poor rural households through better performance of the value chains	The project offers the following to Rwandan families/communities; ✓ Social mobilization and graduation of vulnerable households: ✓ Improve animal health status and genetic potential of small livestock: ✓ Support climate smart innovations ✓ Productive Alliances with input suppliers and market facilitation in small livestock value chains ✓ Support to animal feed industry: ✓ Support to youth entrepreneurship in production: ✓ Support national producers' organizations and multi-stakeholder fora:	Women and youth have highest opportunity as they are the majority owners of small ruminants; improving shorts would increase level of rural employment of youth& women
The Rwanda Environment Management Authority (REMA): Green Amayaga Project	The project improved the livelihoods of local communities; increase agricultural productivity and food security, create green jobs as well as promote gender equality;	Distribution of goats to poor farming communities	The livestock were mostly placed to women and youth, thereby creating jobs for the category of those groups receiving the animals

[46] Consultant's design

	More than 1.3 million people benefited from the project, the majority of whom are women and young people. The project will create approximately 150,000 jobs during the six years of implementation and provided 7,500 households with livestock to improve food security and increase incomes. In the sectors of Busasamana, Busoro, Muyira, Ntyazo, Kigoma and Kibirizi of Nyanza district, 1139 households were provided with goats		
Orora wihaze (USAID) implemented by venture 37 (LO'L)	The goal of Orora Wihaze is to sustainably increase the availability of, access to, and consumption of animal sourced foods (ASF) through the development of a profitable market. Through applying a Market Systems Development (MSD) approach, Orora Wihaze will achieve its goal by implementing two objectives: 1) Strengthen private sector led ASF value chains and 2) Increase demand for ASF consumption for women and children.	**Development of women's empowerment programming** Partnering with private sector actors to pilot new ideas that make the ASF sector more inclusive of women, youth and persons with disabilities.	The project is gender inclusive in its core objectives, thus HA can intervene at any value chain segment to capture and attract majority of youth and women through direct support to enterprises run by youth/women.

3.5. Pigs, Poultry and Rabbits Value Chain

3.5.1. Pig value chain

In the very recent past, pigs' production has become a popular enterprise among smallholder farmers. Pigs are usually confined and sometimes left to scavenge when not tethered. The rural family pig system involves keeping 1 – 2 local breed sows in the backyard which are fed on crop residues and kitchen waste. Some piglets are also kept for fattening or sold to other farmers where there are insufficient resources to keep them.

The intensive pigs' production system is also practiced where improved breeds are kept and some commercial pig production management principles applied. Pig farming in Rwanda has experienced professional growth in the last few years through the support and intervention of different projects among others Orora Wihaze, ENABEL/PRISM, RTI/Hanga Akazi. Currently, there are 165 large-scale farmers in the country with at least 40 pigs for each as defined by NISR, AHS 2020.

Table 34: Number of pigs raised, by type and province

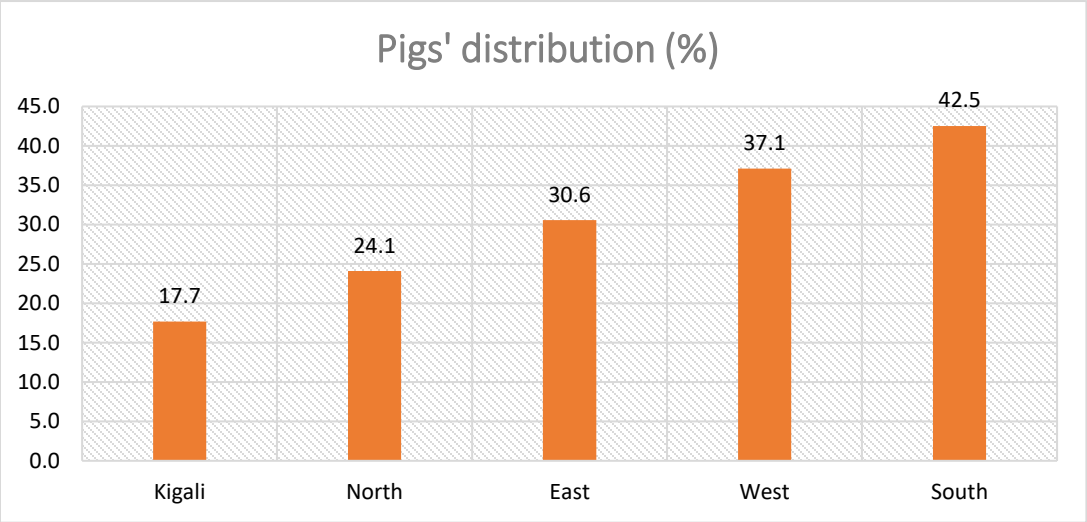
Type of livestock		**Provinces**					**Rwanda**
		Kigali	South	West	North	East	
Pig	**Total**	**32,884**	**403,937**	**319,031**	**181,768**	**309,271**	**1,246,891**
	Exotic	14,906	12,180	34,361	15,786	34,498	111,731
	Cross	6,990	32,704	44,893	73,948	56,028	214,562
	Local	10,988	359,054	239,778	92,034	218,745	920,599

Pig production and marketing: Most farmers often sell pigs irrespective of their age. Weaned pigs are the most category of marketed pigs among buyers. The common system of marketing pigs is by farm gate sales. There are few public markets in the in Rwanda for pigs. Breeding is by natural mating. However, artificial insemination (AI) services are now available across the country through 7 pig AI centers that are used for semen production. Semen delivery is done by drones. The pig inseminators have been trained intensively by RAB, Orora Wihaze, PRISM/ENABEL projects, and recently Hanga Akazi (2023) has trained other new 200 pig inseminators. AI service cost remain as a constraint to farmers.

3.5.1.1. Pigs' distribution in Rwanda

In Rwanda there are 1,246,891 pigs. High population density of pigs is in the southern and western parts of the country (42.5% and 37.1%) respectively followed by Eastern, North and Kigali city (NISR, AHS 2020). However, the large-scale pig farmers are concentrated in Eastern province, Kigali city and Northern provinces.

Figure 14 : Pigs distribution



Source: NISR, AHS 2020

3.5.1.2. Pigs' meat production

According to MINAGRI annual report 2019/2020, the pig meat production was estimated at 168,687MT. Live pigs' traders provide transport to slaughterhouses (available improved slaughterhouses/slabs) or live pig markets. The main outlets for pork and pork products include export to the DRC, hotels, restaurant, supermarkets and bars. Most of the pork sold in the local markets is slaughtered in unhygienic conditions (at the house backyards) posing a risk of food borne and zoonotic infections. Such meat is often not inspected.

Dressing percent is highest of the three meat animal species. Due to the fact that pigs are only monogastrics. Dressing percent of market hogs with adequate condition should grade choice. The normal range is 68-77 percent with an average of 72.

3.5.1.3. Pig processing facilities, storage and transportation

Processing technologies and technical capacity in the PVC in Rwanda are inadequate. The most common practice is fresh meat cuts and traditional sausage processing. Lack of value addition to pig products precludes producers and processors from gains from value added products[47]. Out of reported 107 slaughter facilities across the country, official sources indicated that only 50 of them are registered as "Abattoirs". The remaining facilities, mostly managed by Districts and/or cooperatives, are labelled as **"slaughterhouses or slabs"** and mainly serve the local market. Of these abattoirs, 48 are multiple species and only 3 are mono-species, specialized in pork meat[48] . According to PRISM project (2023), there are 10 modern abattoirs specific to pigs are under constructions, and will contribute a lot to meat quality and creation of employment.

[47] RAB, ENABEL 2020.
[48] ENABEL, Self Help Africa 2021

Currently the transportation of pork meat like other meat was highly improved where special vehicles are used and only Rugari Meat Processors Limited keeps pork meat in cold room (chilling) for 24 hours as requested.

3.5.1.4. Pig products distribution and marketing

The supply of pork meat in the country and export to DRC is carried out by individuals and cooperatives on daily basis. Inform pigs and pork trade causes prices fluctuations at farm gate and at end-market. With the opportunity of DRC market, the demand is still high compared to what the Rwandan market can offer. Eastern Democratic Republic of Congo is an important export market. According to the Rwanda Strategy for Export of Meat to the DRC, 25,920 head of pigs are exported monthly to the DRC.

a) Production of pigs at farm level

In the very recent past, intensive swine production has made a turnaround from substance production to commercial-oriented production. Currently, many people have joined the business of rearing pigs in relatively big numbers targeting a booming market demand for pork meat. Intensive production created more jobs in the rural areas as it employs majority of unskilled labor force available in the vicinity. For instance, taking 165 large scale pig farmers identified by NISR, AHS 2020 each could hire 2 to 5 employees, meaning about 330 to 825 youths will be employed.

b) Processing and products distribution and marketing

Processing of pork begins at the slaughter facility for pigs. As a universal conditionality, pigs slaughter houses are not shared with other livestock because of Islamic religious customs. Respecting, this international obligation, and for the fact pork consumption was still at the very low until recently, slaughter premise for pigs' ware limited.

Swine production is rapidly growing and presents an interesting opportunity for the private sector and investors. Furthermore, it provides trading opportunities for women, who are the most active traders along Rwandan border posts.

3.5.1.5. Markets and trade

i. Domestic market

Domestic market for live pigs and pork is at the increase across the country. Domestic demand for pork meat is increasing. With the increasing number of commercial pig farmers, there has been a corresponding increase in demand for weaned piglets for breeding. Also, improved pig breeding using modern technologies is at the rise-the use of artificial insemination.

ii. Export market

Live pigs and pork have gained very good market especially in the DRC. Exports of the animals to eastern parts of the DRC-Goma and Bukavu have been increasing year after year.

Table 35: Spotted Pigs cross border selling points-DRC

Province	District	Rwanda - DRC Border	Observation
South Province	Ruhango	Live animals exported toDRC via Rusizi1(DRC-Bukavu)	Poultry and pigs from Southern province exported to DRC live
	Nyanza		
West Province	Nyabihu	Pigs slaughtered in Rubavu abattoirs and exported as meat to DRC, Rubavu (DRC-Goma)	Livestock from Southern province slaughtered in Rubavu abattoirs
	Nyamashe keDistrict	Livestock informal export by boat	Livestock from Nyamasheke exported to DRC informally through unofficial crossing points
	Rutsiro District	Livestock informal export by boat - Nkora	Livestock from Rutsiro District exported to DRC throughunofficial crossing point - Nkora
	Karongi District	Livestock informal export by boat - Karongi crossingpoint	Livestock from Karongi District exported to DRC throughunofficial crossing point - Karongi
	Rusizi District	Rusizi 1 - Livestock Rusizi2 – Meat	Rusizi 2 – slaughtered animal products
North Province	Musanze (Byangabo mkt)	Livestock slaughteredeither in Nyabihu or Rubavu Rubavu to (Goma)	Slaughtered either in Nyabihu or Rubavu

There has been a lot of informal livestock and products across borders of Rwanda to Burundi, DRC, Tanzania and Uganda. The table below show the level and products exported through informal border posits.

Table 36: Informal export of pigs and poultry products (value in USD)

Row Labels	2016	2017	2018	2019
BURUNDI	**161,561**	**177,081**	**72,268**	**349,621**
Chicken meat	-	7	94	6
Eggs	41,258	7,503	5,449	242,509
Live pigs	105,885	127,489	61,021	98,261
Pork meat	4,135	2,617	2,244	2,801
Poultry live	10,272	39,160	3,383	5,956
DRC	**13,439,760**	**21,178,134**	**15,315,102**	**17,203,079**
Chicken meat	47,385	30,000	61,103	84,566
Eggs	1,746,680	1,767,401	1,912,575	2,470,270
Live Pigs	4,400,627	9,106,822	4,530,147	5,491,903
Pork meat	3,046,479	6,127,576	5,927,004	5,239,144
Live poultry	4,169,360	4,136,001	2,875,833	3,904,189
TANZANIA	**486**	**891**	**38**	**1,100**
Eggs	465	76	-	1,088
Live poultry	21	815	38	12
UGANDA	**805,497**	**604,085**	**331,721**	**213,003**
Chicken meat	774	432	304	-
Eggs	496	739	402	745

Source: BNR informal trade database

Table 37 :summary of informal exports of pig and poultry products (Value in USD $)

Row Labels	2016	2017	2018	2019
DRC	**13,439,760**	**21,178,134**	**15,315,102**	**17,203,079**
Chicken meat	47,385	30,000	61,103	84,566
Eggs	1,746,680	1,767,401	1,912,575	2,470,270
Live pig	4,400,627	9,106,822	4,530,147	5,491,903
Pork meat	3,046,479	6,127,576	5,927,004	5,239,144
Live Poultry	4,169,360	4,136,001	2,875,833	3,904,189

Source: BNR ICBT Database

The below table from BNR ICBT data for the period of 2017-2019 indicates that livestock exports to DRC take place across formal borders and informal crossing points the lead borders/crossing points for export of live pigs are Poids Lourds, Rugali, Karongi and Rusizi 1.

Table 38 :ICBT data on Pigs per crossing points: 2017-2019 (in RWF)

Border post or Crossing Point	Live pigs			Pork (meat)		
	2017	2018	2019	2017	2018	2019
Poids Lourds	404,164,950	428,093,600	417,269,074	2,393,561,600	19,119,350	23,835,572
Brasserie	1,474,000	40,000	2,208,922	727,200	1,275,700	4,109,894
Corniche	11,219,000	17,145,000	89,841,644	5,746,300	16,729,500	3,563,389
Nkora	90,505,900	100,307,673	78,209,600	1,500	4,909	16,000
Ruganda	2,930,970,400	1,826,389,828	2,011,586,400	0	0	
Mugonero	21,811,200	12,211,964	18,478,400	0	0	0
Kirambo	11,372,000	22,596,349	116,388,333	200,000	235,000	54,933
Rugali	494,754,800	594,996,545	848,099,333	142,000	0	58,667
Rusizi I	5,595,000	8,960,182	5,505,333	341,872,000	259,615,636	496,705,333

3.5.1.6. Pigs value chain employment analysis

i. Employment supply and demand in the value chain

The demand of live pigs and pork meat is still high to the supply for the export to DRC. In terms of contributing to business development, although commercial pig farming started growing recently, the pig value chain has successfully led to contribute of other businesses such as animal feed producers, pig by products processors, traders as well as input suppliers and service providers. Also, the export trading holds many potential opportunities for employment.

These businesses created jobs employing many Rwandans including women and youths hence contributing to the realization of improved livelihoods and poverty reduction.

Motivated by the gap in Recommended Level of Investment (RLI) for increased production of meat, to meet the demand remains high; for pig meat, the gap was 24,06 MT to 67,1 MT (178.89%) in 5 years ago (RLMP, 20217) and seams to continue the same trend. And according to Enabel study (2020), the potential benefits of upgrading, extending and optimizing technology use in the piggery value chain to meet the demand include: increase in annual live animal sale by 48.2% with a value of USD 14,328,904; Increase in sale and export of processed pork products to USD 3,729,385; a 13-fold increase in feed processing worth USD 54,355,319; 100% increase in annual on-farm employment income of USD 1,127,774; 50% increase in employment income in veterinary and AI services and 400 direct jobs created in feed manufacturing. It concluded that there is vast investment potential for up-scaling and extending technology in pig breeding, processing and marketing. On the other hand, the government efforts and its supportive livestock projects towards improved breeds genetically (AI centers, boar semen delivery by drones), new infrastructures, capacity building program, all those guarantee the progressive growth of the value chain and availability of opportunities in job creation.

ii. Constraints and opportunities in the pig value chain

Table 39: summery of constraints and opportunities in the pig value chain[49]

Value chain segments	Constraints	Linked opportunities for growth of the sector
Farmer level	➢ Shortage of pig feed ingredients (maize, soy beans and other raw materials)- High cost of commercial feeds. ➢ Insufficient specialized commercial pig breeding farms to adequately supply well-bred high yielding pig stocks (to apply Pig Breeding Pyramid). ➢ Low productivity of pigs in the family mixed system partly due to low genetic potential and inbreeding. ➢ A problem of ASF disease that could cause heavy mortality losses. ➢ Poor animal health extension advisory services ➢ Lack of skills for proper farm waste management.	❑ As growing value chain, more professional farmers engaged, increases pig production and income. ❑ Pigs are a productive livestock, generating fast and high returns. ❑ High growth in the export market of pork and live pigs to Congo, motivates farmers for business expanding. ❑ Availability of new technology for production of BSF maggots as alternative source of protein for pig feeds, a promise for decrease of animal feed price ❑ High pricing for improved and well managed pig breeds, increases necessity for professional and commercial farming (pyramid breeding system). ❑ First generation of 60 pig multipliers in Rwanda trained and coached by Hanga Akazi will be certified by RAB in October 2023. ❑ Existence of farmers' interest group (RPFA, PFO) to champion the interest of pig farmers.
Pig aggregation& Markets	➢ Unorganized pig trading and marketing arrangements ➢ Weak pig marketing arrangements- unstable live pigs price	❑ This system of pig aggregation is likely to continue if the anatomy of pigs is considered- difficulties of pigs to make long distance for market place.
Slaughtering and meat processing facilities	➢ Lack of pig slaughter facilities/abattoirs and absence of cold chain system ➢ Lack of modernized technologies across the value chains- low level of pork meat processing in the country	❑ High growth in the export market of pork and by-products to Congo, market not yet satisfied. ❑ Pork by-products (sausage, cuts) are known on Rwandan market ❑ The 10 modern pig slaughterhouses under construction by PRISM project (2023) for quality assurance and value addition.

[49] Consultant's design

	➢ Lack of specialized skills for value addition ➢ Low level of abattoir's compliance to meat quality and safety standards.	
Butchers and supermarkets	➢ Lack of cutting and processing facilities to produce market suitable pork meat products ➢ Preparing pork meat needs special skills (specialist cookers).	❑ Low income households are the largest pork consumers, as domestic market. ❑ Pork is highly consumed in restaurants and bars (Akabenzi) ❑ Available domestic demand of pork sausage and meat cuts.

iii. Identification of key actors on the pig value chain[50]

Actor or player	Role	Public / private	Level of influence in the vc
ENABEL Project	PRISM-Enabel livestock programme aims at empowering poultry and pig farmers to transition from traditional to commercial-oriented livestock farming by improving animal husbandry practices and business management skills to increase productivity, profitability, and job creation.20 Mar 2023	Public	Intervention: Develop Sustainable Value Chains Specific Objective: Develop Inclusive and Sustainable Feed, Pig & Poultry Value Chains in Which All Actors run a profitable business Inclusive and sustainable value chain development in the pig and poultry sector
PRISM Projects	Responsible for distribution and placement of pigs Support small holder swine farmers to access breeding pigs Provide capacity building to pig farmers on pig production best practices Provides extension advisory services including artificial insemination	Public	The project has become popular among rural farming communities as it supports the sector of pigs and poultry production. Distribution of pigs is one way of its visibility.

[50] Consultant's design

RWANDA ORORA WIHAZE Project	The goal of Orora Wihaze is to sustainably increase the availability of, access to, and consumption of animal sourced foods (ASF) through the development of a profitable market. Through applying a Market Systems Development (MSD) approach, Orora Wihaze will achieve its goal by implementing two objectives: 1) Strengthen private sector led ASF value chains and 2) Increase demand for ASF consumption for women and children.	NGO	Development of women's empowerment programming. Partnering with private sector actors to pilot new ideas that make the ASF sector more inclusive of women, youth and persons with disabilities.
RAB	along the value This is the institution responsible for the development of swine production sector. The entity elaborates policies and strategies for piggery sector improvement. Also provide breeding systm and key priorities for pig production. The LMP is a guding document on the pathway to improved piggery production chain segments. RAB translates into actions the broad objectives of the sector as are imbedded in PSTA 4 and NST1 policy documents. The strategic plan for meat value chain by MINICOM highlights the great role played by pig value chain as a complement to meat from beef cattle.	Public	RAB is a government institution established by law with clear mandates of developing livestock value chains for increased production and productivity. Its level of engagement in all livestock species specific value chains is highly elaborated and known to beneficiaries.
Rwanda TVET Board (RTB)	Technical skills development: RTB is at the forefront of all efforts to promote TVET from level one (1) to level (5) of the Rwanda TVET Qualification Framework.	*Public*	RTB is responsible for designing and distributing national-wide curricula, teaching materials, trainer's guides, methodologies, and training methods for all Level 1-5 TVET institutions
Rwanda Polytechnique (RP)	Technical skills development: RP implements TVET skills development across the country. It goes further than RTB to oversee TVET education on tertiary/university level.	*Public*	RP prepares technical and vocational education curricula for use at various technical vocational training levels. RP offers technical and vocational courses' certificate, diploma, bachelors, and higher levels.

University of Rwanda (UR)	UR develops interdisciplinary, problem based academic programs aligned with Rwanda's development needs.	*Public*	With more than 25,000 students enrolled, UR is the biggest tertiary education institution/university in Rwanda. The university is at the forefront of labour supply in different fields like, STEM, business, etc.

iv. Potential interventions to address the constraints in the pig value chain

The HA interventions in the pig value chain present huge opportunities in terms of job creation due to necessity of farmers to hire at least 1 to 2 farm workers when rearing at least 5 pigs.

Table 40: Potential interventions to address the constraints in the value chain[51]

#	Potential interventions	HA direct interventions	Potential Partner (s)	Level of recommendation	Gender inclusion rating
1.	To support the establishment of commercial pig breeding pyramid system (pig breeders, multipliers, producers & fatteners)	HA will intervene at different level to create important and complete employment: ❑ Provide training and coaching of medium and large-scale pig farmers on commercial pig farming and genetic management- introducing Pig Breeding Pyramid System) ❑ Provide full package training to private veterinarians/technicians on pig artificial insemination technique, deep pig production and pig diseases management (competent Pig AI inseminators, Farm advisors & Vet clinicians).	Medium and large-scale pig farmers private veterinarians/ technicians RAB RCVD Pig farmers association/ organization	High	High

[51] Consultant's design

2.	Support new initiatives on production of Black Soldier Flies/ maggots as alternative source of protein for pig.	o Provide deep training and coaching program to interested pig farmers. And support for startups (seeds and materials). *By doing this activity, trained farmer will hire new workers and expand farm business.*	Interested Medium and large scale pig farmers	High	High
3.	Support pig farm waste management and environmental protection.	HA will intervene in two levels: o Provide training on pig farm waste management and environmental protection. o Provide training on farm manure production *By doing this activity, trained farmer will hire new workers/casual labors.*	Interested Medium and large-scale pig farmers	Medium	High

3.5.2. Poultry value chain

3.5.2.1. Poultry production

Rwandan poultry sector is growing rapidly along with the population and demand for animal protein. In Rwanda, poultry farming is prevalently rural and family-based, with 69% of all poultry farmers rearing one to two chickens.

The sector has started to attract entrepreneurs that set up medium to large-scale farms, initiating the development of the commercial poultry system in Rwanda.

The Government of Rwanda recognizes the important and strategic role the poultry sector can play. Its vision for the sector is described in the Livestock Master Plan, published in 2017 and covered market prospects up to 2022. The objective is to transform the country's poultry industry from dominantly subsistence-based to knowledge-intensive and market-oriented.

The aim is to raise the number of hens from 5.2 million in 2016 to 7.1 million in 2026. The government wants to enhance productivity in three coexisting sub-systems: Improved Traditional Family Chicken (ITFC), Crossbreed Family Chicken (CFC) and Specialized Commercial Chicken (SP) production. This transformation would result in a more advanced poultry sector, better income for chicken growers and improved food and nutrition security for the Rwandan people. (Poultry Sector Analysis, 2019).

- **Traditional system**

The traditional system is relatively well-distributed throughout rural, urban and peri-urban areas. It is characterized by minimal biosecurity measures and by a direct connection between producers and consumers. In the village poultry system, farmers usually consume eggs and chicken meat themselves, or sell/give it to family and neighbors, often in exchange for other agricultural products they lack. In village poultry farming, flock size is usually between 2 and 20 birds per household, with the majority being below 10 chickens per household. Traditional poultry farmers initially buy the birds from neighbors or village markets. Cross breeding of local chicken with high performing improved/pure breed is very scarcely applied in traditional poultry, despite evident positive effects in terms of both meat and egg production. Scavenging and free-range are by far the most diffused chicken farming systems amongst low-cost poultry production

- **Commercial system**

The commercial poultry sector in Rwanda still remains in the initial phase of development. It is characterized by larger flock sizes than village poultry and sales of chicken meat and eggs produced in the farm. Moreover, commercial farm implement (basic) biosecurity measures and make use of (semi)automatic feeding systems. In commercial poultry production, a distinction must be made between broiler poultry, aimed at chicken meat production, and layer poultry, aimed at egg production. In addition to selling meat and eggs, commercial poultry farms generate some income from selling chicken manure to farmers and the remains of birds processing (heads, innards and feet) to pig growers. In Rwanda, the majority of commercial poultry farms are small (meaning their capacity is less than 1000 chickens) and

medium, with a capacity of 1000–5000 chickens. There are approximately twenty-six small farms, eleven medium-size farms and five large-scale broiler poultry farms with the capacity above 10,0000 chickens.

The commercial specialized system is efficient producing more meat and eggs per chicken compared to the traditional village chicken production system. Traditional Family Chicken (TFC) constituted 57.8% of the chicken population in 2020; they produced 32% of the chicken meat and 34% of the eggs. 68% of the chicken meat came from specialized broilers and layers and 66% of the eggs from specialized system (layers) which collectively constitute 23.3% of the total chicken production[52] . As per NISR-AHS 2020, chicken meat production was 43,100MT and 117,430,896 eggs.

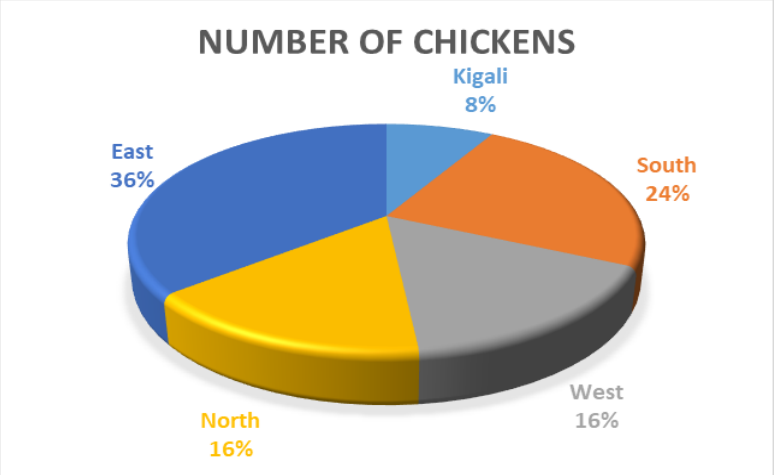
The carcass dressing percentage is as follows:

Chicken (broiler)		70-72%	35 days
	Commercial	75%	45 days
	Slow Growing	67-69%	60 days

3.5.2.2. Poultry distribution in Rwanda

As per AHS 2020, in Rwanda there are 3,954,836 chickens. The Eastern and South provinces occupy the first and second places respectively.

Figure 15: Poultry distribution in Rwanda



3.5.2.3. Poultry meat processing facilities, transportation and marketing

Processing technologies and technical capacity in the Poultry value chain in Rwanda is bases on common practice of fresh meat cuts. The transportation of live chickens and poultry meat is progressively

[52] ENABEL, 2020

regulated in the country. Most poultry slaughtering process is done at farm level except few modern farms like Poultry East Africa Ltd (PEAL)-that has Broiler Slaughter facility.

Growth potential of poultry subsector depends on the domestic market. The internal consumption of chicken meat has been growing by 16% per year, on average, from 23,700 tons in 2015 to 42,700 tons in 2019. At the same time, Chicken meat exports declined from 463 tons exported in 2015 to only 278 tons exported in 2017. However, the industry grew up again from 351 tons in 2018 to 442 tons in 2019 (ENABEL, 2020).

The domestic market absorbs 99% of the country's chicken meat production. Attracted by this growing demand, Rwanda chicken meat production increased from 24,100 tons in 2015 to 43,100 tons in 2019, averaging 16% growth per year. Despite the increasing domestic demand for chicken products, Rwanda exports live chicken to DRC. In 2019, the country exported 842,000 live chickens (about 72,200 chicken a month).

In average, the country consumes 6,400 tons of egg per year (about eight eggs per person per year). On the same trend, the egg production remained stable, between 7,400 tons (2015) and 8,000 tons (2019), averaging 7,600 eggs per year. The demand for egg export is also unstable. Egg exports declined from 1,500 tons (2015) to only 600 tons in 2017, before growing again up to about 1,700 tons in 2019 (MINAGRI /Livestock Unit, 2020).

One of the major factors behind huge poultry export versus chicken meat to DRC is the lack of chilled orfrozen meat products for transportation to distant cities and lack of infrastructure thereof in DRC.
The table below highlights the trend of poultry and by-products export in DRC for 3 years.

Table 41: ICBT data on Poultry per crossing points: 2017-2019 (in Rwf)

Borderpost	Poultry	Eggs			Chicken meat		
	2019	2017	2018	2019	2017	2018	2019
Poids Lourds	447,886,606	126,350,140	505,575,400	8,750,611	37,882,80	35,204,500	5,517,556
Brasserie	975,822	7,585,150	1,626,400	-	429,800	2,944,620	2,932,233
Corniche	87,333,400	119,614,500	13,932,900	256,222	1,327,400	22,653,400	213,889
Nkora	3,042,667	117,500	257,900	-	-	-	-
Ruganda	11,043,867	-	-	-	-	-	-
Mugonero	11,050,273	5,000	-	-	81,000	-	86,667
Kirambo	16,919,000	1,277,100	702,982	4,035,000	-	-	-
Rugali	31,346,933	-	309,600	137,350	-	-	-
Rusizi I	1,121,624,000	499,286,900	494,602,473	1,152,241,200	8,542,000	12,419,000	7,178,66
Bugarama	3,266,000	67,189,900	159,947,236	105,657,333	8,000	-	-
Total	**1,734,490,587**	**821,428,207**	**1,176,956,909**	**1,271,079,735**	**48,273,067**	**73,223,538**	**15,931,031**

Source: BNR ICBT Data

3.5.2.4. Poultry value chain employment analysis

i. Employment supply and demand in the value chain

On the contrary to pork meat, where the highest growth potential is in exportation, the poultry subsector depends on the domestic market which absorbs 99% of the country's chicken meat production. Attracted by this growing demand, Rwanda chicken meat production increased from 24,100 tons in 2015 to 43,100 tons in 2019, averaging 16% growth per year.

Demand from urban consumers for indigenous meat and eggs is increasing, and this could prove a major opportunity for small-scale family poultry producers, processors and retailers.

Considering the nature of chicken's businesses in the country, live chickens and eggs trading through their collection from farm gates to the market place is the dominating and have created jobs employing many Rwandans including women and youths hence contributing to the realization of improved livelihoods and poverty reduction. Currently, there are quick establishment of eggs collection centers which facilitate the demand and supply system.

Additionally, motivated by the government efforts and its supportive livestock projects towards to target for the chicken development indicated in RLMP which is to more than double the annual chicken meat production from the 15.2 thousand to 35 thousand tonnes and the egg production from the 244 thousand to 513 thousand eggs by 2021/22 guarantee the progressive growth of the value chain and availability of opportunities in job creation.

ii. Constraints and opportunities in the poultry value chain

Table 42: summery of constraints and opportunities in the poultry value chain[53]

Value chain segments	Constraints	Linked opportunities
Farmer level	➢ Shortage of pig feed ingredients (maize, soy beans and other raw materials)- High cost of commercial feeds. ➢ Limited availability of concentrates and feed supplements, when needed. ➢ Lack of technical skills in commercial chicken farming, and farm management. ➢ Low genetic potential of the local chicken breeds ➢ Inadequate or lack of day-old chicks: the national supply of day-old chicks is very low. Almost all the chicks are imported. ➢ Low institutional capacity to control quality of chicken feed produced and processed across the country. ➢ Poor animal health extension advisory services	❑ As growing value chain, more professional farmers engaged, increase of chicken meat and eggs production. ❑ Availability of new technology for production of Black Soldier Flies/ maggots as alternative source of protein for chicken feeds, which predict the decrease of animal feed price. ❑ Recent introduction of dual purpose crossbred chickens (SASSO), which have far higher genetic potential for both eggs and meat. ❑ Increasing preference for small stock farming due to increasing pressure on land related to increasing of population. ❑ Global trend encouraging demand for the consumption of white meat and Rwanda targeted small stock to be main source of meat. ❑ Existence of farmers' interest group (RPIA,) to champion the interest of pig farmers. ❑ Many projects are operating in small stock for development of poultry value chains (Prism-Enabel, OW, …).
Eggs aggregation (Eggs collection centers)	➢ Limited number of eggs collection centers_ new approach in poultry value chain.	❑ Available successful eggs collection centers, to be role models to the others.
Slaughtering facilities and meat processing	➢ Lack of slaughtering facilities for chicken ➢ Lack of chicken meat processing facilities to produce market suitable chicken meat products ➢ Lack of specialized skills for value addition.	❑ Spreading and copying of new technology which spreads quickly with leading farmers- ABUSOL Farm as role model to the others. ❑ The African Continental Free Trade Area Agreement (AfCFTA) likely to attract investment ❑ Political willing through provision of enabling environment such as policies and strategies.

[53] Consultant's design

Butchers and supermarkets	➢ Lack of cutting and processing facilities to produce market suitable chicken meat products. ➢ Consumers not preferring exotic chicken meat and eggs	❑ High domestic demand of chicken meat and eggs.

iii. Identification of key actors on the poultry value chain[54]

Actor or player	Role	Public / private	Level of influence in the vc
ENABEL Project	PRISM-Enabel livestock programme aims at empowering poultry and pig farmers to transition from traditional to commercial-oriented livestock farming by improving animal husbandry practices and business management skills to increase productivity, profitability, and job creation.20 Mar 2023	Public	Intervention: Develop Sustainable Value Chains Specific Objective: Develop Inclusive and Sustainable Feed, Pig & Poultry Value Chains in Which All Actors run a profitable business; Inclusive and sustainable value chain development in the pig and poultry sector
RWANDA ORORA WIHAZE Project	The goal of Orora Wihaze is to sustainably increase the availability of, access to, and consumption of animal sourced foods (ASF) through the development of a profitable market. Through applying a Market Systems Development (MSD) approach, Orora Wihaze will achieve its goal by implementing two objectives: 1) Strengthen private sector led ASF value chains and 2) Increase demand for ASF consumption for women and children.	Private	Development of women's empowerment programming. Partnering with private sector actors to pilot new ideas that make the ASF sector more inclusive of women, youth and persons with disabilities

[54] Consultant's design

RAB	along the value This is the institution responsible for the development of swine production sector. The entity elaborates policies and strategies for piggery sector improvement. Also provide breeding systm and key priorities for pig production. The LMP is a guding document on the pathway to improved piggery production chain segments. RAB translates into actions the broad objectives of the sector as are imbedded in PSTA 4 and NST1 policy documents. The strategic plan for meat value chain by MINICOM highlights the great role played by pig value chain as a complement to meat from beef cattle.	Public	RAB is a government institution established by law with clear mandates of developing livestock value chains for increased production and productivity. Its level of engagement in all livestock species specific value chains is highly elaborated and known to beneficiaries
Rwanda TVET Board (RTB)	Technical skills development: RTB is at the forefront of all efforts to promote TVET from level one (1) to level (5) of the Rwanda TVET Qualification Framework.	*Public*	RTB is responsible for designing and distributing national-wide curricula, teaching materials, trainer's guides, methodologies, and training methods for all Level 1-5 TVET institutions
Rwanda Polytechnique (RP)	Technical skills development: RP implements TVET skills development across the country. It goes further than RTB to oversee TVET education on tertiary/university level.	*Public*	RP prepares technical and vocational education curricula for use at various technical vocational training levels. RP offers technical and vocational courses' certificate, diploma, bachelors, and higher levels.
University of Rwanda (UR)	UR develops interdisciplinary, problem based academic programs aligned with Rwanda's development needs.	*Public*	With more than 25,000 students enrolled, UR is the biggest tertiary education institution/university in Rwanda. The university is at the forefront of labour supply in different fields like, STEM, business, etc.

iv. Potential interventions to address the constraints in the poultry value chain

The following interventions present opportunities in terms of job creation due to the facts that all commercial chicken farmers must have workers. Any business expansion means increase of farm workers.

Table 43: Potential interventions to address the constraints in the value chain[55]

#	Potential interventions	HA direct interventions	Potential Partner (s)	Level of recommendation	Potential for gender inclusion rating
1.	Provide capacity building program on commercial chicken farming and farm management to create confidence and expansion of the businesses.	HA will intervene at different level to create employment: ❑ Provide training and coaching of medium and large-scale chicken farmers on commercial chickens farming, farm management and disease preventive measures. ❑ Provide training and support women and PWD to own businesses by rearing SASSO chickens or layers _ need of start-ups and or on farm contracts. ❑ Provide full package training to private veterinarians/technicians on deep chicken commercial farming and poultry diseases management (competent Farm advisors & Vet clinicians).	RAB MINICOM Districts RCVD	High	High: gender inclusivity is eminent commercial poultry employs many women and youth

[55] Consultant's design

2.	Support new initiatives on production of Black Soldier Flies/ maggots as alternative source of protein for pig.	o Provide deep training and coaching program to interested chicken farmers. And support for startups (seeds and materials). *By doing this activity, trained farmers will hire new workers and expand farm business.*	Interested Medium and large-scale farmers	High	High: Feeding of chicken is the business of stock owners, therefore, youth and women will employed in the process of BSF production
3.	Provide training on needed business skills to professionally aggregate eggs through eggs collection centers	o HA will intervene to organize and train youth and women involved in eggs aggregation to create eggs collection center- it may require support of startups.	Youth Women Districts	Medium	High: eggs from village chickens are collected and sold by youth and women. Therefore, supporting any intervention aimed to boosting village chicken production is directly facilitating the youth/women in business

3.5.3. Rabbits value chain

Rabbits have greater potential of contributing to food security and income generation, as they are easily integrated in farming systems, because they can convert plant materials with low nutritive value, to high quality meat, in a small space and with low investment; while also providing manure from feces and urine which is rich in nutrients, and can be used to nurture the soil. Local, feeds have been used in growing rabbits at low cost and for the sustainability of integrated farming systems.

3.5.3.1. Rabbit production

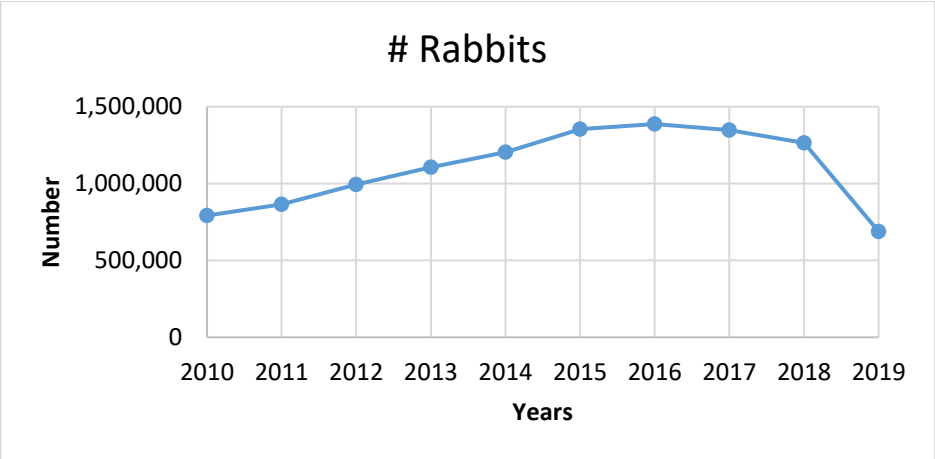
The common production systems include backyard, semi-intensive and intensive where the major systems in Rwanda are backyard and intensive. Raising rabbit can be a great income source to the unemployed educated people and landless farmers. Also, commercial rabbit farming business can be a great source to meetup the food or protein demand and a great source of employment.
Apparently, there is limited literature and reports on rabbit farming in Rwanda apart from the figures provided below.
As per NISR-AHS 2020, 1.9 million agricultural households reported to be rearing livestock. In regards to livestock distribution, 8.6 percent reared rabbits with a total of 749,917 rabbits.
The rabbit carcass dressing percentage is about 50% to 54% of live weight.

Table 44: Number of rabbits raised, by type and province

Types of livestock		Provinces					Rwanda
		Kigali	South	West	North	East	
Rabbit	**Total**	**53,168**	**208,870**	**85,111**	**165,124**	**237,645**	**749,917**
	Cross	5,600	13,153	8,051	15,269	44,810	86,883
	Local	47,567	195,717	77,060	149,854	192,835	663,034

Source: NISR, AHS 2020

Figure 16: Trend of rabbit's population (2010-2019)



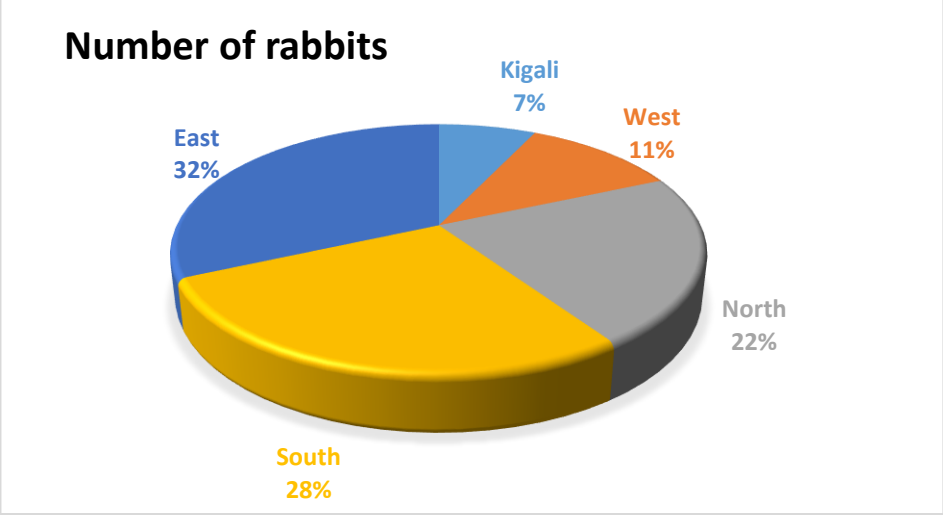
Data source: (MINAGRI, Annual report 2019/2020).

Note that, there is neither data on rabbit meat processing nor for export in Rwanda.

3.5.3.2. Rabbits' distribution in Rwanda

As per the recent AHS 2020, in Rwanda there are 749,917 rabbits. The Eastern and South provinces occupy the first and second places respectively. The hot climate may justify the dominance of Eastern and South provinces for both rabbits and poultry farming.

Figure 17: Rabbits' distribution in Rwanda



3.5.3.3. Rabbit value chain employment analysis

i. Employment supply and demand in the value chain

Although rabbits value chain is at its infancy stage, it presents huge investment opportunities and can be an outlet for jobs creation especially for majority of youth and women and persons with disabilities since it requires small land/space for production.

Currently there are no specific interventions towards this value chain directly provided by the government institutions compared to other livestock value chains. Additionally, there is no records for other key actors in value chain apart from farmers themselves and some few rabbit distributions from NGOs.

This subchapter will deal only with current challenges and opportunities identified during this study and proposed interventions.

ii. Constraints and opportunities in the rabbit value chain

Table 45: summery of constraints and opportunities in the rabbit value chain

Value chain segments	Constraints	Linked opportunities
Farmer level	➢ Inadequate or lack of new genetic for rabbits breeding and prevention of inbreeding. ➢ Limited supplementation and inadequate use of available feed resources for rabbits ➢ Inadequate knowledge on the use of crop residues and hay in rabbit feeding ➢ There are very few large-scale farmers in rabbits farming ➢ Inadequate knowledge and skills in managing rabbit production as a business ➢ Lack of experienced technicians for rabbit's health and production ➢ Lack of special support services from the government or partners on rabbits' development in the country.	➢ Rabbit products have the potential to contribute to food and nutrition security ➢ Increasing preference ➢ High potential of increasing employment in small stock production due to small land needed and easy business startups ➢ Rabbits are a productive livestock, generating fast and high returns. ➢ Growing demand for rabbit meat.
Slaughtering & Butchers and supermarkets	➢ Lack of infrastructure for rabbit meat slaughtering ➢ Lack of specialized skills for value addition (making cuts, …)	❑ Rwanda is an essential market ❑ Rabbit meat is mostly consumed in bars and rural areas.

iii. Potential interventions to address the constraints in the rabbit value chain

The following interventions present opportunities in terms of job creation due to the facts that to start the business or expansion is possible with limited resources and any commercial farming needs workers.

Table 46: Potential interventions to address the constraints in the value chain[56]

#	Potential interventions	HA direct interventions	Potential Partner (s)	Level of recommendation	Potential gender inclusion rating
1.	Promote and support rabbit genetic improvement to increase meat productivity	HA will intervene in different levels: ❑ Provide trainings to medium and large-scale farmers on commercial rabbits farming and genetic management and disease prevention measures. ❑ Support potential farmers with improved genetic parent stocks and served as rabbit multipliers. ❑ Provide training to private vet technicians on deep rabbits farming and diseases management (competent farm advisors & vet clinicians) This such intervention will bring confidence to expand businesses and avail competent vet service providers towards profitable businesses.	RAB RCVD Rabbit farmers	High	High: rabbits' production in the rural areas is an economic activity for the majority of youth and women. Therefore, any interventions carried out will benefit youth/women
2.	Provide capacity building program to medium and large-scale rabbit farmers on proper rabbit feeding for commercial farming	❑ Provide technical training on forage production under **Hydroponic technology as green jobs** and **use of Chloris hay and crop residues** for rabbits feeding. ❑ Provide skills development to increase the use factory feeds and even homemade feed for rabbit feeding. This intervention will boost the increase in rabbits' number per farm.	Rabbit farmers	High	High: gender inclusivity on such medium and large-scale rabbits production also will attract youth/women as employees in the units/houses.

[56] Consultant's design

Section Four: SWOT Analysis

4.1. A SWOT analysis of the Livestock landscape Value Chain

An analysis of the strengths and weaknesses of the livestock value chain as shown on table below was critical in this study in identifying key areas where investing that would create job opportunities.

Table 47: SWOT analysis matrix of the Livestock Value Chain in Rwanda

Positive		**Negative**
Internal	○ **STRENGTHS:** ❖ **Cattle VC** ❖ Different new national programmes have been established to support the Cattle VC/Meat VC/ Dairy sector, etc. ❖ Availability of Rwanda Livestock Master Plan, Guidelines for slaughterhouse project in Rwanda, Law establishing Rwanda Council of Veterinary Doctors, among others to guide the sector. ❖ Improved breeds have been introduced in the country, and Excellent climate for dairy production, ❖ Increasing investments in the feed production, cross border markets, and meat processing. ❖ Good road network ❖ Availability for the capacity to slaughter and process the available livestock on the local market and collect milk production in the country. ❖ Having a long rainy season is an advantage. ❖ Important participation of private sector. ❖ **Small stocks VC (Pigs, Poultry & Rabbits)**	**C. WEAKNESSES/CONSTRAINTS** **Cattle VC** ➢ Limited land; Rwanda is a land-locked country with an area of 26, 338 sq.km. With a population growth rate estimated at 2.9% per annum, land scarcity will worsen, ➢ Local breeds are still the majority ➢ Limited use of veterinary services by the livestock keepers ➢ Limited supplementation and inadequate use of available feed resources, ➢ Lack of entrepreneurship skills and culture: livestock husbandry is still largely considered as subsistence activity, ➢ Poor investment in livestock industry: Livestock farming especially is usually done with minimum inputs, ➢ Lack of coordination within the Institutional framework involving all stakeholders, etc. ➢ Absence of a consistent regulation (Policy) and strategies for sound livestock breeding to match with adequate choice of animal genetic resources and competitive production systems, for quality meat production and supply, ➢ Insufficient milk quality control and enforcement mechanisms **Small stocks VC (Pigs, Poultry & Rabbits)** • Low productivity of existing pig breeds and infertility related to inbreeding and diseases

	❖ Existence of a strong enabling environment/ Institutional support ❖ Wide base of farmers practicing small stock farming and private sectors players already presents, ❖ Existence of farmers' interest group (RPFA, PFO, RPIA) to champion the interest of pig farmers ❖ Short production cycles for Rabbit, Chickens and even pigs with faster returns on investment ❖ Availability of veterinary inputs/drugs/vaccines factory feeds/ingredients ❖ Availability of high hybrid Day-Old- Chicks (DOCs). ❖ Good weather and day/night cycle ❖ Huge market for small stock products both locally and regionally ❖ Poultry and rabbits have the potential for rural development as incomes can be generated in the poor parts of the society and on regular basis in the country. ❖ Growing trend in livestock species population during the past decade, especially for the small livestock notably poultry, pigs and rabbits. ❖ A growing market for Rwandan poultry products due to increasing demand in the neighboring cities near Rwanda and consumer preferences in DRC toward Rwandan poultry products ❖ Existing policies and regulations to address key challenges facing the poultry subsector (fiscal and non-fiscal incentives) ❖ Increasing investments in the feed production, cross border markets, and meat processing ❖ Rwanda government and development partner's involvement in the sub-sector.	• Low rate of technology adoption at all levels of the value chains and poor husbandry, and inadequate extension services. • Lack of sufficient or accessible quality slaughter facilities • Limited skilled staff available on the job market • High costs of feeds and access to finance, • Insufficient storage especially cold rooms at exit points. • Political relations between DRC and Rwanda (public view) • Competition from imported frozen meats • Poor market access due to lack of market organization • Weak VCs regulations, standards and certification • Competition with similar products from the region • Cultural, attitudinal behaviors on poultry products consumption leading to low/ poor consumption habits as poultry products are not seen as essential food commodity by local community • Informal slaughter ventures outcompete the existing formal slaughter houses/processors • Weak internal sustainable capabilities along production value chains. **Small ruminant VC (Goats &Sheep)** ▪ Lack of formal contracts for small ruminants" breeders ▪ Export of live meat without any value addition ▪ Lack of farmers" associative organization ▪ More farmers lack enough grazing space ▪ Predominance of local breeds with low yield ▪ Low skills in hides and skins treatment ▪ Slaughterhouses and abattoirs providing only service of slaughtering small ruminants without any value addition ▪ Low quality consideration in small ruminants processing ▪ Low access to improved genetic breeds and lack of record-keeping by farmers

	❖ **Small ruminant VC (Goats &Sheep)** ❖ Goat and sheep production requires small initial capital investment. ❖ Ability to thrive on low quality vegetation (shrubs, bushes, and tree leaves) ❖ Small ruminants are less susceptible to infectious diseases and low diseases in small ruminants in Rwanda ❖ A high percentage of Rwandans (37.6% for goats and 9.9% for sheep) of Rwandan households rearing small ruminants ❖ RAB - Nyagatare station provides do research on improved genetic materials (goats) ❖ Availability of some large-scale farmers (22 for goats, 3 for sheep) who can serve as model to other farmers	▪ Lack of effective data collection and processing in small ruminants" industry ▪ Lack of planning tools in small ruminants" sector (like strategic plan) ▪ Insufficient data on small ruminants in Rwanda ▪ Predominance of small farmers without business stance in small ruminants" industry ▪ Lack of insurance scheme for small ruminants ▪ Inadequate knowledge and skill in managing small ruminant production as a business
External	**OPPORTUNITIES:** **Cattle VC** ✓ Positive livestock population trend, ✓ RDDP project is ready in supporting this value chain ✓ Rwanda is developing fast, and the country side is also urbanizing fast; demand for new processed dairy products is likely to increase, ✓ A variety of dairy products can be made requiring a packaging, ✓ Big market in the region, particularly Democratic Republic of Congo (live animals/bulls/meat) ✓ Decrease of meat imports; **Small stocks VC (Pigs, Poultry & Rabbits)**	❖ **THREATS:** ❖ **Cattle VC** ❖ Shortage of water (Draught): It reduces water for the animals and hence low milk production. ❖ Weak compliance to quality standards, policy and regulation in place, ❖ Outbreak diseases such as FMD, RVF, … ❖ Reducing grazing areas and on other hand, high cost of concentrates ❖ Lack of experience in some innovative animal feeding systems like hydroponics and hay ❖ Fluctuations in milk collection due to seasonality (dry and wet seasons) and volatility of milk prices. ❖ Shortage of dairy technologists/ experienced workers for new products development

	• A large unmet demand of live pigs and pork, and chicken products in DRC • Great potential to become a strong export market due to good quality of Rwandan products and their relatively competitive prices in the CEPGL market • Increasing preference for small stock farming due to increasing pressure on land related to increasing of population. • Increasing local demand for pork • Private interests in feed production and processing is continuing to grow • High potential of increasing employment in small stock production, feed processing, marketing and processing • Spreading and copying of new technology which spreads quickly with leading farmers • Poultry and rabbit products have the potential to contribute to food and nutrition security • Global trend encouraging demand for the consumption of white meat and Rwanda targeted small stock to be main source of meat. • The African Continental Free Trade Area Agreement (AfCFTA) likely to attract investment • Political willing through provision of enabling environment such as policies and strategies. • Many projects are operating in small stock for development of both Poultry and Pig value chains (Prism-Enabel, OW, …). **Small ruminant VC (Goats &Sheep)**	❖ Lack of organized/structured meat value chain, resulting in insufficient linkages between livestock markets, transport and abattoirs (Operators); ❖ Low compliance to meat quality and safety standards. ❖ An increasing intensity of feed insecurity: "70% of costs in livestock production is the animal feed, which typically rely on a high-quality maize and soja", **Small stocks VC (Pigs, Poultry & Rabbits)** o Weak compliance to quality standards o Infectious Diseases such as African Swine Fever (ASF) o Lack of technical skills veterinarians who cannot identify some diseases and manage on time, o Competition with similar products from the region (e.g Uganda,…) o Lack of modernized technologies across the value chains o Lack of specialized skills for small value chain actors o Inadequate local production of raw materials during off season period and expensive feed imported ingredients make feed supply expensive and unreliable supply. o Dependence on imported fertilized eggs lead to unreliable supply and expensive Day –Old- Chicks o Poor supply for vaccines and essential veterinary drugs o Poor market access for producers due to lack of market organization (middlemen, price bargaining) o Poor infrastructure in rural areas and poor transport systems for small stock and by products. o Poor value chain management and coordination o Limited financing and investment along the entire value chain – investors consider poultry sector as a risky venture or enterprise o Few actors in large scale production (165 for pigs, 288 for chicken, 7 for rabbits). ❖ **Small ruminant VC (Goats &Sheep)**

	✓ PRISM project is already supporting small ruminants‟ VC. ✓ High consumption of goat meat by Rwandans, hotels and bars ✓ Big market in the region, particularly Democratic Republic of Congo ✓ Small ruminants can be a quick source of household incomes and food security ✓ Small ruminants have a high turnover due to their short generation intervals. ✓ National high commitment to promote small stock development (source of meat). ✓ Small ruminants‟ business is easy to start for youth and contribute to job creation.	❖ Low consumption of mouton by Rwandans ❖ DRC which is a good export destination for Rwandan small ruminants is highly instable ❖ Growing robbery targeting small ruminants ❖ Low prices offered to farmers compared to their investment and time ❖ Reducing grazing areas for small ruminants and on other hand, high cost of concentrates ❖ Lack of experience in some innovative animal feeding systems like hydroponics and dried grass ❖ Lack of appropriate infrastructure at cross – border markets ❖ Lack of appropriate transport equipment for small ruminants‟ meat ❖ Lack of appropriate loan products for small ruminants‟ farmers

4.2. Enabling policies, laws and regulatory frameworks

The Government of Rwanda put in place conducive environment for livestock production through formulation and development of policies, laws, regulations, ministerial orders, strategic plans and sector development projects for the smooth implementation of livestock development programs. The following are key documents that supports livestock sector development actions;

Table showing key policies, strategies and related regulatory frameworks in livestock sector[57]

S/N	Policy/ Strategy/ Law/ Regulatory framework	Purpose
1	National Strategy for Transformation (NST1, 2017-2024),	NST1 will provide the platform and pillars for accelerated transformation on the pathway to the prosperity sought by Vision 2050. The formulation of NST1 has been guided by the following considerations which will also be critical for its delivery: • Laying the foundation for Vision 2050 implementation and removing binding constraints to achieving the longer-term Vision 2050 targets • Adopting and scaling up Home-Grown Solutions based on Rwandan culture, values and the country's unique developmental context • Further developing the Private Sector as the engine/driver of economic growth • Ensuring Sustainability for long-lasting results • Ensuring Inclusiveness for all to benefit without leaving anyone behind • Completing unfinished business from EDPRS 2 and Vision 2020
2	Vision 2030 agenda for sustainable development and vision 2050	to end poverty and hunger everywhere; to combat inequalities within and among countries; to build peaceful, just and inclusive societies; to protect human rights and promote gender equality and the empowerment of women and girls; and to ensure the lasting protection of the planet
3	National Agricultural Policy;	The revised policy identified four main strategic and enabling pillars upon which core policy guidance and actions have been based on; -productivity and commercialization for food security -nutrition and incomes

[57] Consultant's design

		-resilience and sustainable intensification -inclusive employment and improved agrifood systems' skills and knowledge -an effective enabling environment and responsive institutions
4	Strategic Plan for Agricultural Transformation (PSTA4, 2019-2024)	To make agriculture a central driver for Rwanda's economic transformation, by recognizing the central role of youth and women. To achieve this strategic plan targets, the Government of Rwanda will continue to invest in agricultural innovations, extension, resilience, market linkages, and in the creation of an enabling environment and responsive institutions. Currently, the Rwanda food system contributes 40% to the national GDP. Beyond the GDP, it covers 90% of the country's food needs, generates 50% of national export revenues, and provides jobs to 76% of the population. 69 % of these jobs are in primary agriculture while the rest 7% are in input supply, trade and transport, agro-processing, and food services.
5	Rwanda Livestock Master Plan (2018 – 2022).	the Rwanda Livestock Master Plan (LMP) is a national sectoral plan of Rwanda for the period of 2017/18-2021/22. The main objectives of the Plan include reducing poverty, achieving food and nutritional security, increasing economic growth, increasing exports, contributing to industrialization and employment, and mitigating climate change. The LMP aims to achieve food and nutritional security by increasing household herd and national production levels and by also increasing availability of animal source foods to meet FAO individual consumption targets. Further, it sets out measures concerning investment interventions which could help meet the national development plan targets of Rwanda by improving productivity and total production in the key livestock value chains for cow dairy, red meat-milk, poultry, and pork.
6	National Export Strategy II	The National Export Strategy is a national sectoral strategy applicable to the export sector. The instrument seeks to improve Rwanda's export performance by enhancing the trade and business environment and improving the competitiveness of firms and sectors. It provides sector-specific measures to enhance key exporting industries, improve the bureaucratic processes for exporters, and strengthen a range of supporting services such as trade information and finance, export quality management, trade facilitation, branding, and trade promotion. : objectives: ✓ Direct Interventions in selected segments of the export sector with high growth potential: ✓ Improving Access of Rwanda's Exports of Goods and Services to Markets ✓ Upgrading Firm Capacity to Enter and Grow in Export Markets:
7	National food and nutrition policy-2014	The policy updates and revises NNP OF 2007. The linkage of nutrition, household food security and social protection is reinforced through this new policy expanded multi-sectoral ownership and implementation responsibilities.
8	Competition and Customer Protection Law (N°36/2012 of 21/09/2012)	The law aims at encouraging competition in economy by prohibiting practices that undermine the normal and fair course of competition practices in commercial matters; also ensuring consumers 'interests promotion and protection

9	Meat value chain strategy	The ministry of trade and industry realized the many gaps in the meats value chain and in order to develop the sector addressing the urgent need of meat products, a policy and strategic actions have been developed by the MINICOM
10	National dairy strategy (2013-2019)	To enable inclusive and efficient agricultural and food systems; the strategy plans to increase volumes of Rwandan dairy products sold within the region through emphasis on branding, quality, value addition, product diversification, and targeted trade missions. The production objective of NDS was to increase milk productivity at the farm level while maintaining high-quality milk along the value chain. The NDS emphasized the importance of public and private partnership (PPP) to achieve its objectives of improved production, stable marketing, and required policies that support the dairy sector
11	The Ministerial Order for marketing of milk and dairy products	Dairy value chain is complex and has many informal and formal business operators whose roles are interrelated but not connected in business terms. Informal marketing of raw and processed milk has complicated attaining and maximizing business profits due to unorganized milk and dairy products businesses due to rampant informal sector.
12	Policy on inclusion of persons with disabilities	The Constitution of Rwanda forbids discrimination on the basis of physical and mental disability while committing the nation to supporting genocide survivors with disabilities and to providing special measures to educate persons with disabilities. Rwanda adopted a national policy to help ensure that persons with disabilities enjoy full inclusion in society and equal participation in Rwanda's transformation agenda.
13	Gender Equality Strategy:(2019-2022) with 8 broad objectives addressing 16 challenges	Gender equality is considered a development goal in its own right. However, gender also intersects with a variety of other social factors and must therefore be considered within larger frameworks
14	National youth policy	The overall objective of the national youth policy (2005) is to promote the "economic, social, cultural, intellectual and moral welfare" of youth. Today, the Rwandan youth are mostly affected by the management of direct and indirect consequences of genocide, poverty, unemployment, HIV/AIDS, illiteracy and limited possibilities of accessing education. The youth is facing with many challenges due to the current social and economic situation of our country.
15	National gender policy	Aim at establishing equality between man and woman; Gender-based partnership among men and women is necessary if sustainable and profitable development is to be achieved. In the strong efforts to reduce poverty, all actions should take into the necessity of reducing gender related imbalances.

Section Five: Opportunities, anticipated number of decent jobs and proposed intervention's Models for job creation

5.1. Prioritization of livestock value chains and number of jobs to be created

The analysis below facilitates the identification of value chains with the highest potential for inclusive job creation and number of jobs anticipated, from livestock farming and processing to distribution. By determining those two points, Hanga Akazi can strategically channel its resources towards high-impact value chains, fostering inclusive job creation.

5.1.1. Selecting the key value chains and Jobs available

The consultant team have discussed on 7 livestock value chains existing in Rwanda and based on the potential for job creation along the value chain, potential for inclusivity (gender, youth, people with disabilities) and the existing off-takers in the value chain**,** they have scored 4 key value chains that hold a high job creation potential.

Table 48 : Key value chains in Rwanda's livestock sector[58]

#	Value Chains (VC)	Level of priority	Justifications
1	Dairy VC	High	The sector is one of the fast moving among agriculture sector. Girinka program has brough about tremendous changes in terms of increased milk production triggering massive investments along the value chain segments
2	Poultry VC	High	The commercial poultry industry has leapfrogged in the past decade to the unexpected transformation with such short period of time; Rwanda now has large poultry farms with slaughter facilities for broilers and eggs and poultry meat are exported to neighboring countries
3	Pig VC	High	The commercial swine production has evolved massively in the recent couple of years; demand for pork is increasing year after year; slaughter facilities for pigs have been established as a justification of the growing industry
4	Rabbit VC	High	Equally, rabbit farming has emerged as an economically important segment of the livestock industry. Large commercial rabbit farmers have emerged in the recent past-demand for white meat is expanding thus, opportunities for rabbits farming have become high
5	Beef VC	Moderate	Inadequate land for beef production through grazing with supplementary feeding has continued to affect fast development of beef industry in Rwanda. Efforts to encourage private sector to invest in more advance beef production using small land (feedlots system) are ongoing but the challenge remain availability

[58] Consultant's design

			of feeds for such capital-intensive beef production. However, market for red meat is available.
6	Sheep VC	Low	Sheep meat (mutton) is not a priority for Rwandan community. However, sheep for wool production have high demand due to products that are highly needed. The challenge is the availability of sufficient population of wool sheep for shearing.
7	Goat VC	Low	Goats' meat is highly needed in the country. The population of goats are high compared to sheep but infrastructure for smooth marketing of goats are scarce. Large scale goats' production in Rwanda is hampered by lack of land and sufficient feeds. However, goats production in the rural set up is done by the majority of youth and women

5.1.2. Number of predicted jobs opportunities

In accordance with a list of interventions recommended to HA for each value chain, the exercise for determination of number of jobs to be created in Rwanda somehow difficult due to lack precise livestock data on employment elasticity in Labor market.

The only available displays agriculture in whole where according to NISR/ RPHC5 (2022), the employment in agriculture sector was 53.4% of total employment. From the same source, Rwanda's population was 13,246,394 as of August 2022 whereby the youth constituted 27.1% (3.6 million) of the total population while females representing 51.5% of the population and the disability prevalence rate was 3.4%.

The distribution of the unemployed population by area of residence shows that 63% unemployed persons live in rural areas. This is obvious because a great number of working-age persons live in rural rather than urban areas (82% and 18% respectively).
In the same regard, employment rate in Rwanda averaged 45.11% from 2019 until 2023, reaching an all-time high of 49.5% in the second quarter of 2023. Youth Unemployment rate in Rwanda increased to 21.5% in the second quarter of 2023 from 20.4% in the first quarter of 2023.

Table 49: Status of Employment Rate in Rwanda (May, 2023)

Related	Last (%)	Previous (%)
Unemployment Rate	16.80	17.20
Youth Unemployment Rate	21.50	20.40
Labor Force Participation Rate	59.50	57.60
Employment Rate	49.50	47.70

Source: NISR

Basing on the above data given in the sub chapter on employment analysis done for each value chain which holds constraints and related opportunities and recommended interventions, livestock targets available, and the assumptions done, the following table presents the number of jobs to be created by considering the employment opportunities that create decent jobs through the recommended interventions.

Table 50 : Number of decent jobs available by segments of VCs and recommended interventions[59]

Segments in the value chain	Recommended interventions to HA	Involved values chains	Current status/ targets	Assumptions	Number of decent jobs to be created /targeted	Inclusion – Women, Youth & PWD	Time frame
Production/ farmer level	Providing capacity building program to identified farmers to skill them on commercial farming, genetic improvement and farm management = *confidence for expansion of their businesses*	**Cattle**	According to RAB discussion and recommended interventions from Rwanda Livestock Master Plan (2017), Training of farmers was highly recommended as the pillar along the value chains. Reference is made to Annex 2 for the number of medium and large-scale farmers.	The number of farmers to be trained will depend on HA available budget as may highly appreciated by RAB and farmers themselves. Assume that a trained farmer will have confidence to expand the business and consequently, at least 2 farm workers will be hired. Let's target for 10% *1,143= 114 # workers= 114*2=228	228	Mostly youth (males) are more employed for farm activities. Limited involvement of people with disabilities due to nature of their work.	Medium term
		Poultry		It is the same scenario Let's target for 20% *393= 80 # workers= 80*2=160	160		
		Pigs		It is the same scenario Let's target for 20% *517= 100 # workers= 100*2=200	200		
		Rabbit		Assume that a trained farmer will have confidence to expand the business and	50		

[59] Consultant's design

				consequently, at least 1 farm worker will be hired. Let's target for 50 # workers= 50*1=50			
		Sheep-Merino breed		Assume that a trained farmer will have confidence to expand the business and consequently, at least 1 farm worker will be hired. Let's target for 20 # workers= 20*1=20	20		
	Provide support to establish a category of breeds multipliers and role model commercial farmers (improved parent stocks). = *Breeder and or multiplier farmers*	**Pig, Rabbit, Goat & Sheep VCs**	HA has already trained 60 pig multipliers. This category of farmers is not well known in structured way, only large-scale farmers serve as breeding and multipliers of available breeds in the country.	According to RAB, and Rwanda Livestock Master plan, genetic improvement is a key path toward high productivity. Reference made to Annex 2, the targeted number of suppliers for improved breeds (as multipliers) may be proposed as follows Pig VC= 100 Rabbit VC =20 Goat=10 Sheep=5 Assume that every farm will hire at least 2 farm workers and the business owner will be suppliers of improved breeds to producer farmers (*ref to Breeding pyramid system).* # workers: 135*2=270	270 workers	Mostly youth (males) are more employed for farm activities. Limited involvement of people with disabilities due to nature of their work.	Short term

	HA to support the interested investors/ farmers to acquire modern equipment/ materials, technology and training of operating workers to transform available crop residues to valuable animal feeds.	**Ruminants VCs**	Normally farmers use crop residues without any treatment. Many ways of crop residues treatment and conservation are available internationally.	According to RAB and farmers, the other source of animal feeds are highly demanded. Depending to HA budget any high number supported can be appreciated, said cattle farmers. Assume 1 medium investor/farm may employ 15 workers (collection, operate machines and loading-offloading…) Let's target 5% of total medium and large scale farmers # farmers/investors= 5% *1330=66 **# workers: 66*15= 990**	990 workers	Limited involvement of people with disabilities due to nature of their work, however, number of females and youth both at field is significant.	Medium term
	Provide support to interested investors/ farmers to cultivate Chloris gayana for production of Hay as business	**Ruminants & Rabbit VC**	It has become a business in Eastern province and solution for cattle feeding in dry season. Napier grass was the main planted forage (93.2%), followed by Chloris gayana (3.1%) and Brachiaria (1.2%). Land planted with improved forages was 4,558 ha (Minagri, 2022) has increased to over 6,000 ha (3,480 ha for	The market is available and it is employing business in rural mostly for women. According to RAB and farmers, the demand is high for Hay. Depending to HA budget, any high number of investor can but supported. Assume HA support 10% of total ha cultivated in 2022-2023, It means 10%*6,000= over 600 ha. One ha can be cultivated by 80-120 man-day. The cultivation works have to be 4 times from land preparations to harvesting.	Casual labors= 17,600 per season on 220 farms/sites; And 1,100 farm workers per season.	Limited involvement of people with disabilities due to nature of their work, However, a number of women are dominates in agricultural activities.	Medium term

			in 2023 (RAB, 2023).	Suppose an investor/farmer will be supported for 3 ha and above And then we shall have 660ha/3ha=220 farmers If 1 farm/investor hire at least 80 casual labors per season Then, we have # casual labors= 220*80=17,600 per season. Additional to that, there is a need to employ at least 5 farm workers for hay preparations (machine/ hands) and loading. # farm workers= 220*5=1,100 per season.			
	Provide technical training and support on forage production under Hydroponic fodder technology as green jobs and source of animal feed	**Rabbit, Poultry &** Ruminants **VCs**	It is new technology to farmers There is no rich information in Rwanda.	From field consultation, such trainings are needed to create other alternative for their animal feeding. For a medium business, 1 trained investor/farm may employ 5 workers Let's target a small number of 5% of recommended VCs Number of farmers= 5%*1729=86 # Workers= 86*5=430	430 workers from 86 farms	Due to nature of their work, a significant number of females and youth and PWD at field is available.	Medium term
	Provide training on BSF farming, and Maggots production for animal feeding.	**Poultry & Pig VCs**	It is new technology/farming in Rwanda (RAB, 2019).	Basing to the number of medium & large-scale pig & poultry farmers, HA may target 30% of the total (annex 2).	For Pig farms: 1030 workers from 103 farms	Mostly farming activities	Medium term

	And complementing training on pig farm waste management and environmental protection and farm manure production		A number of interested farmers and veterinary technicians are being trained in various sponsors (RAB, VSF, ENABEL,). According to Mr Baptiste (ABUSOL Ltd) "We get the waste materials from juice-making companies as well as markets where we have about 50 youth who collect and deliver to us at a fee," He added "my business employs 108 staff who work on the layers and the insect farms" Another youth investor: Young Rwandan agriprenuer ventures said, he employs 12 workers in his medium BSF farming.	Assume that after trained and related support, 1 trained farmer will install a medium BSF farming and recruit at least 10 workers. **For Pig farms:** Number of farmers= 20%*517=103. Assume that 1 trained farmer may employ at least 10 workers **Total= 103*10=1,030 workers in whole chain.** **For Poultry:** Number of farmers= 20%*393=78 Assume that 1 trained farmer may employ at least 10 workers **Total= 78*10=780 workers in whole chain.** By treating farm wastes, additional number of casual labors will be hired**.**	For Poultry farms: 780 workers from 78 farms Total workers= 1,810	invite young males And casual works invite women. For BSF farming and maggots processing, persons with disabilities are also hired.	
Aggregation (Eggs)	Identifying and training of youth and women involved in eggs aggregation to create eggs collection center.	**Poultry VC**	Currently, the eggs production stands at 8,665 MT. *Orora Wihaze field case*:	The egg production under the Rwanda Livestock Master Plan was to increase to 110% in 2022 compared to the base year (2017). And this trend may relatively continue in the following years.	100 from 10 ECCs	Mostly youth and young women are more involved in this business.	Medium term

			Almost three years since they started, GACOPROCO (Gakenke collection center) is now able to aggregate and sell (on average) 8,000 egg trays every week (240,000 eggs). There are 77 chickens and eggs collection centers (ECC) in Rwanda (Minecofin, 2021).	Assume that 1 ECC may employ 10 workers (according to existing ones). Let's target to support 10 ECCs*10 workers=100			
Milk collection centers (MCCs/ MCPs) & Aggregation (Milk)	Support the capacity of MCCs to operate as MCC Hub Model through stable cooperative management and strong linkage with farmers and milk aggregators. Strengthening the milk aggregation model (collection & transportation) by training and supporting to establish formal framework and	**Dairy VC**	Currently there are 132 MCC's and each has a group of aggregators delivering milk. Current milk production stands at 999,976 MT As a result of various efforts invested in developing milk value chain, milk production increased by 132 % (491,633 Mt) in the last 10 years; from 372,619 Mt to 864,252 MT in 2019.	Due to increased milk production more milk collection centers and collection points will be put in place. According to new projections, about 2024 MCC' shall be established by 2033; meaning that, 24 MCC's per year will be constructed. MCC will have the capacity of 3,000 liters; then about 72,000 liters will be collected and delivered every day creating about 720 new jobs each year (assuming each collector delivering 100 liters per day). Second assumption: Upgraded MCC to Hub model will recruit at least 4 new employees and increase of 2000 liters of the quantity of milk collected.	720 from new MCCs established & 360 from new MCCs Hub models (15) supported.	Mostly milk collection activities involve youth (males) and young women due to the nature of related works. At MCCs level, persons with disabilities are also hired.	Medium term

	linkage with MCCs and farmers.			It means one MCC Hub =4 staff + 20 aggregators=24 Suppose HA has capacity to support 3 MCCs per milk shed zones (5)=15 Total jobs created=15*24=360.			
Slaughter houses & markets facilities	Provide training to abattoir workers to upgrade the workers' competence and the level of abattoir's compliance to meat quality and safety standards.	**Ruminants & Pig VCs**	According to Minicom study and RICA field survey, there are 107 slaughterhouses/slabs and above 200 slaughter premises Workers range from 5-100	According to RICA, the demand is high, any support can be appreciated. Assume that 1 slaughter houses/ slabs supported can hire new 5 workers Let's take 2 per district= 60* 5 workers=300	300	Mostly youth are more involved in this business.	
	Support and provide trainings for involved companies on modern hides and skins treatment in each province and establishment of hides and skins collection centres	**Ruminants VCs**	10 traders in hides and skins under association: RHSA. Example" RICS Ltd can hire more than 100 employees. Hides & Skins produced in 2021/22 was 6,087MT	The analysis of the estimated national demand, for leather products, shows a gap varying between 88% and 99% (Minicom). Assume that 1 tannery supported can hire new 10 workers and 1 collection center 20 workers. Let's take 2 per 2 province= 10* 10 workers=100 and 5 centers per province=20*20 workers= 400	500	Mostly youth are more involved in this business.	Medium term
Processing (milk, meat, & wool)	Support dairy SMEs through modern equipment, new technology and training of staff to	**Dairy VC**	There are dairy processing units: 7 large processing plants and *43 Dairy SMEs* with total	Let's take an example where HA can support small processing units that may process up to 1500 liters of milk and may employ one or two persons and upgrade them to medium processing	300 jobs from 10 SMEs	Due to nature of their work, a significant number of	Medium term

	increase number of products on market in quality and quantity.		processing capacity of 254,000L/day. But Milk recorded to be supplied to agro processing plant: 77,508,138 litters by year. Example: 8 Milk Collection Centres (MCCS) were upgraded into SMEs (Minagri, 2021-22)	facilities that can process up to 5,000 liters of milk per day-these facilities may employ more than 10 persons including skilled personnel in processing. By such support: 1 SME supported adds at least 5 new employees; aggregators= 20 for transport 2000 increased liters; and at least 5 sellers of products. Total= (5+20+5) jobs *10 SMEs to support= 300.		females and youth and PWD is available.	
	Support meat processors and butchers to develop new technology, acquiring modern equipment to produce new by-products and to make meat cuts.	**Beef & Pig & Poultry VCs**	Current meat production stands at 185,989 MT In 2021, number of slaughtered cattle for meat was 401,077 thousand heads. This is unit is still under development and main products are sausages and meat cuts. Butcher 400; Meat exporter 16; Meat processor 5 *(Minicom, 2021)*. To above number, small processors were not counted.	According to Livestock sector analysis, the meat production will be 663 thousand metric tons in 2031/32. The RLMP recommends the increasing training of meat processing staff to cover the skills gaps identified. Let's take Pig and Beef VCs and target 6 meat processors Assume 1 meat processing unit may employ 10 workers. 1 supported meat processing (MP) unit may hire at least 5 additional workers Total= 6* 5 jobs=30. Butcher men may be trained to support only that value chain cluster.	30 from 6 MP units	Due to nature of their work, a significant number of females and youth and PWD is available.	Medium term
	Provide support to cooperative Umuzabibu	**Sheep VC**	In terms of job creation for sheep value chain, only the wool production	The demand of wool available (the cooperative imports over 1 tonne of wool from Kenya).	74 women & PWD	Mostly women and	Medium term

	(Musanze) through wool production, collection, processing and garments' fabrication.		to procession is interesting. Only one cooperative is involved in this business with 246 workers and rearing 340-400 Merino sheep.	Collaboration with this Cooperative respond to both increase of wool and meat production while creation job along the value chain. According to the President of cooperative Umuzabibu, they are ready work with HA and expand their production which will lead to the recruitment of new workers. Let's target the increase of 30% of 246 present workers= 74.		PWD are employed.	
Service providers	Provide a full package training to private veterinarians/technicians on livestock husbandry and diseases management to upgrade their knowledge and skills to become **competent Farm Advisors & Vet clinicians.**	**Ruminants** (Cows, Goats & Sheep)	No data for full package training, According to RLMP (2027), livestock sector is facing inefficient animal health services and it has proposed to promote private service providers/ Enhance and encourage private animal health service delivery.	According to RAB, the demand is very high for such Model: ***Livestock Health Hubs Model.*** Depending to the HA budget, any big number can be trained *(around 3,482 animal technicians without stable employment). 15 districts *20=300*	300	Both males and females are invited and mostly young graduates are more considered.	Short term
		Small stocks (Pigs, Chickens & Rabbits)	Received packed training: 115 private vets trained by Hanga Akazi, and 71 by VSF. The same information from RLMP (2027).	According to RAB, the demand is very high for such Model: ***Livestock Health Hubs Model.*** Depending to the HA budget, any big number can be trained *(around 3,482 animal technicians without stable employment).*	300	Both males and females are invited and mostly young graduates are	Short term

				*15 districts *20=300*		more considered.	
	Provide training on technique of Meat inspection Bovine artificial insemination And Pig artificial insemination to boost meat quality/ safety and genetic improvement.	Meat Inspectors	For one meat inspector= not exceed 50 cattle, 150 small ruminants, 150 pigs and 1500 poultry per day. And for one inspector to only one type of animals. Ex. In 2021, number of slaughtered cattle for meat was 401,077 thousand heads	According to RICA specialists, Only 63 meat inspectors were certified Through field survey done (2022) there are Slaughter houses, slabs & premises over 300 across the country**.** **The demand is very high** and RICA is ready to collaborate**.** ***2 meat inspectors * 416 sectors= 836***	832	Both males and females are invited and mostly young graduates are more considered.	Short term
		Bovine Inseminators	Trained inseminators in FY 2021-22= 256; The crossbred dairy cow herd increases by 46% (2017-22); AI covers less than 15% of breed able.	Data from field discussion says= around 1200 inseminators. According to RCVD, demand is very high. **Target for HA:** ***30 districts * 20 vet technicians =600*** (will depend on available budget).	600	Both males and females are invited and mostly young graduates are more considered.	Short term
		Pig Inseminators	According to RLMP, Pig meat production to raise from the 19,945 tonnes in 2016/17 to 67,076 tonnes by 2021/22, an increase of 239%.	According to RAB= around 1,000 pig inseminators. The demand is moderate. Target= 200 Artificial insemination is a key tool for genetic improvement.	200	Both males and females are invited and mostly young graduates are more considered.	Short term

Note: Summery number of decent jobs available in Livestock Value Chains in Rwanda

Description	Number of decent jobs
Farm workers/ animal keepers	10,584
Casual works per season (casual labors)	18,700

5.2. Potential opportunities for expansion in the livestock value chains in terms of job creation

In consideration of results gained from livestock value chains actors consulted, the consultants have come up with potential opportunities for expanding the livestock industry in Rwanda paying attention to new market opportunities through export market, and increasing demand for new products;

- **High demand of live animals and by-products for export, especially to Eastern DRC**: There has been increasing cross-border trade of live animals to DRC
- **Growing internal consumption of eggs, milk, beef and chicken meat:** due to increased number of middle-class people, eggs and poultry consumption demands have gone up tremendously
- **Available demand of processed milk and by-products - many SMEs**: again, increased number of middle-class people has resulted into the increase in demand for high quality dairy products-calling for more investment in processing sector; big number of MSME's have emerged to this effect
- **Possibility for meat processing in various by-products and packaging**: a number of supermarkets and butcheries have started processing of certain types of meat products due to increasing demand for certain types of meat products
- **The 10 modern pig slaughterhouses under construction by PRISM project**: pigs production is at the increase, especially large swine production farms are at the increase and pork is at high demand
- **The modern Nyagatare milk powder industry under construction**: This new milk plant will have the capacity to process 500,000 litters of milk per day and the main product of the plant will be powdered milk. The Nyagatare milk powder plant when completed will increase the country's milk processing capacity from 300,000 litters to 850,000 litters. It will be a huge opportunity for new employments in dairy value chain.
- **Secondary cities and localities near the borders are expending quickly**: the emergency and growth of cities and towns in Rwanda has consequently brough about increased demand for animal source foods; the demand has triggered improvement in production across livestock value chains.
- **Government efforts to support livestock sector is a blessing for the majority of farmers and private investors in the sector.**

5.3. Proposed Models for job creation program interventions

This sub-section provides a preliminary overview of models for logical interventions, prioritizing what Hanga Akazi could implement from a list of opportunities above presented. Also, they were designed directly to respond the constraints identified and corresponding opportunities that would promote job creation at different level of the livestock value chains. However, the list of opportunities and interventions may be long, but limited in terms of job creation.

Hanga Akazi has to promote the partnerships and linkages with key stakeholders, especially to local and central government & its institutions, and other projects, NGOs, and private sectors for business

hub development, animal health, feeds and legal reinforcement to enhance the continuity of project interventions beyond the proposed inventions.

There are 5 intervention models holding high potentials for both job creation and while solving the constraints hindering the livestock sector.

Provide structured livestock capacity building and professionalism farming program to livestock farmers.

Provide capacity building program to transform crop residues to animal feeds/ cultivation of Cloris gayana as alternative & affordable source of forage.

Promote and support meat and milk processing value chains actors for products' quality assurance and for innovation of new products.

Provide capacity building program to private veterinaries/veterinary technicians towards Livestock Health Hubs Model (Full package: Inseminators, Meat inspectors, Competent vet clinicians, Insurance agents and Competent farm advisors).

Promote and support the MCCs to achieve Hub Model businesses (supply of services, inputs and strong linkage to farmers and milk aggregators).

The following designs are illustrating the showcases for the implementation and the levels of jobs are to be created.

1. **Provide structured livestock capacity building and professionalism farming program to livestock farmers.**

Constraints/Failure	Solutions	Interventions
Inadequate knowledge and skills for professional farming (best practices), specialized commercial farming (breeds, markets, etc.). Limited skills on animal nutrition and feeding, related to the productivity. In all value chains, the study has revealed the failure of farmers to comply to the farm best practices, feeding, use of appropriate genetics, farm management and marketing strategies leading to low productivity and failure for business expansion.	Provide well-structured capacity building to livestock value chains farmers with technical, specialized and marketing skills. Insure the categorization of farmers by targeting potentiality on job creation. Support with startups and or equipment/ materials to step-ups in professionalism dimensions. Special trainings and support for the establishment of fattening farms (pigs, feedlots, ..).	HA activity may not reach all livestock farmers across the country, but in the spirit of job creation, the target groups may be including medium and large scale farmers who can serve as role models to the rest of categories in different aspects of the value chain. The interventions will involve close collaboration with central and local government (MINAGRI, RAB, Districts) and Farmers associations. Awareness raising amongst farmers on the importance of professionalism and specialization in the development of livestock value chains may be promoted.
➢ Poor production, fear for expanding ➢ High loss, uncertain profit ➢ Limited number of farm workers	➢ Confidence for the profitability of the business ➢ Increase of production (milk, meat, wool) ➢ Ready for business expansion	➢ Profitable livestock business ➢ High farm production ➢ **Increase of farm workers (new employments)**

1. **Promote and support meat and milk processing value chains actors for products' quality assurance and for innovation of new products**

Constraints/Failure	Solution	Intervention
Processors lack the knowledge and skills on diversification of milk and meat by-products Many processors (SMEs) lack the knowledge and existence and importance of standards and technical regulations. Consequently, these processors are not complying to the regulations and have limits on markets Insufficient quality control and enforcement mechanisms, promotes informal trade. Lack of marketing skills for processed products.	Increasing the awareness of the existence and benefits of standards and technical regulations. Well-developed capacity building programme to facilitate processors (SMEs) to improve the existing businesses, inspection and for innovation of new and quality products (cheeses, butter,etc.). Support slaughterhouses that could offer frozen and chilled meats at the crossing points.	In collaboration with public institutions (RICA, RSB, MINAGRI, Districts) and processors, HA to provide technical trainings and follow up program for producing convictive products on local and regional markets. For expansion and new job creation, specific training and coaching program to come up with new products satisfying quality and market requirements. An awareness campaign to disseminate information on the benefits of complying with standards and other technical regulations in processing businesses.
➢ Limited markets, fear for expanding, few products on markets ➢ Low level profits ➢ Limited number of workers	➢ Confidence for the profitability of the business ➢ Increase of products in number and market space ➢ Increase of production, growing business	➢ Profitable business ➢ High growing business on marketplace ➢ All milk produced during rainy season is well used ➢ **Increase number of workers and new job positions**

2. **Provide capacity building program to transform crop residues to animal feeds/ cultivation of Cloris gayana as alternative & affordable source of forage**

Constraints/Failure	Solution	Intervention
Feed is the biggest constraint to animal productivity improvement. Scarcity and low quality of feed stuff (forage, concentrate). Expensive cost of feeds. Lack of sufficient grazing areas to meet the feed needs of the animals. Inadequate knowledge on the use of crop residues and by-products and forage production conservation. Milk production fluctuations collection due to seasonality (dry and rainy seasons). In cattle farming, this challenge is found in all districts and limits the growth of smallholders to the medium level and then to large scale farmers (for more job creation).	Find other alternative& affordable source of forage/feeds: Training and skills development to transform crop residues and by products to the animal feeds/forage. Promote, training and support to cultivate Cloris gayana to produce Hay as business and or hydroponic fodders as alternative & affordable source of forage along the year.	Through awareness and mobilization of interested investors/farmers, And close collaboration with Minagri/RAB, Districts and farmers' associations, HA may intervene and record a big number of job created: 1. Trainings on the required technologies and work with agriculture cooperatives. 2. Support demo plots/ essay as piloting phase 3. Provide startups and equipment to extension and related awareness campaigns. 4. Provide coaching and study tours
➢ Poor production, and seasonally ➢ High production cost compare to revenues ➢ Moderate number of animals (ruminants). ➢ Limited employments	➢ Confidence in changes ➢ Readiness for business expansion ➢ **First batch of workers employed (casual labors)**	➢ Availability of affordable forage, high livestock production (milk & meat) ➢ Increase of big farms ➢ **High increase of workers (new employments)**

3. **Promote and support the MCCs to achieve Hub Model businesses (supply of services and inputs) and strong linkage to farmers and milk aggregators**

Constraints/Failure

The MCCs operate only one business of receiving and selling milk to processors/ retailers at place.

Limited income for growing and diversify services to farmers (milk suppliers) and clients

Lack of capacity to supply farmers some inputs and even transport milk to the processors/ retailers.

- Low level of income
- Unstable milk supply (no strong linkage with farmers and milk aggregators)
- Farmers may decide to sell their milk through informal route

Solution

Training entrepreneurship business management skills.

Elaboration of business plan for MCC Hub model and managerial training

Support MCCs to transit and become MCC Hub Model:

- ✓ Access to veterinary services, artificial insemination, extension services
- ✓ Veterinary and farm inputs & animal feeds
- ✓ Transportation and other needs from farmers.
- ✓ Support to social services

- Confidence for capability and secured future
- Transitional preparations
- Increased membership to MCC's
- Improves members' ownership of the MCC's and cooperatives

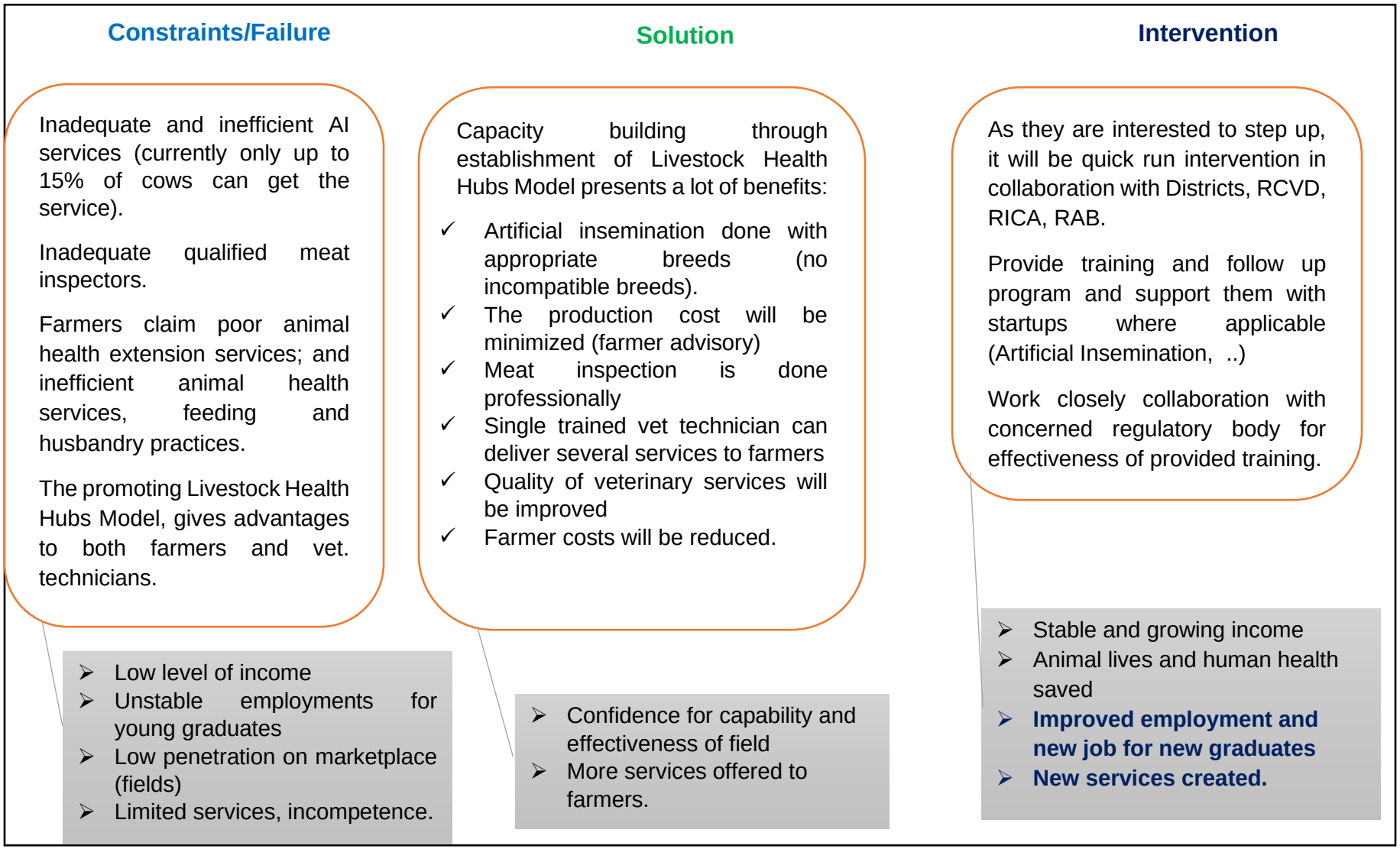
Intervention

As they are interested to step up, it will be quick intervention in collaboration with Districts and farmers' representatives.

- ✓ Provide training and follow up program and Business plan
- ✓ Training of new staff to be competent for new services delivery
- ✓ Training and mentorship of cooperative members
- ✓ Support them with:
  - Startups equipment and equipment
  - Means of transport (Motorcycle, vehicle ..etc.).

- Improved marketing power
- Stable milk supply and demand
- Increased milk reception and linkage with milk aggregators
- Growing income.
- **New employment (vet. technicians, drivers, workers)**

4. **Provide capacity building program to private veterinary technicians towards Livestock Health Hubs Model (Inseminators, Meat inspectors, Competent vet clinicians, Insurance agents Competent farm advisors)**



Section Six: Conclusion and Recommendations

6.1. Conclusion

This study has come at the right moment when livestock industry has started to attract investments in various value chain segments of livestock landscape. Livestock sector has over the ten years made a tremendous stride in terms of increased production, productivity, value addition and marketing. Consumers of livestock products are at the increase due to increasing number of economically capable group of middle-class people. Milk, meat, pork, eggs, poultry products their consumption has shown a sharp rise to call for more concerted efforts to provide interventions.

Employment opportunities in the livestock value chains are massive if the operators of chain segments are given support (skills and technical) to be able to run their businesses professionally. It is evident that, each livestock value chain has a lot to offer in terms of job creation, improving food security, economic gains as well as contributing strongly to the national economy.

6.2. Recommendations

The study has outlined several areas where Hanga Akazi should intervene in each value chain (see affiliated tables on each value chain). However, the consultants are suggesting additional recommendations as follows;

i) Farmers' capacity enhancement to transform them from substance livestock farming is highly needed. Turning the mind-set towards business-oriented livestock production to cope with ambitions of PSTA 4, NST1, LMP and Agricultural policies is essential for increased production and productivity. In this regard, Hanga Akazi may invest its resources to conduct training to producers across all livestock value chains in order to impart the theory of change.

ii) Primary livestock production in Rwanda, is hampered by inadequate animal feeds basically originating from inadequate supply of appropriate feeds (fodder). Despite the fact that, land availability is a challenge, but even the available one is not fully utilized because of lack of climate resilient fodder grass and legumes. Efforts to improve feeds for livestock has been ongoing but the journey is stll far from reaching. In this aspect, Hanga Akazi, may intervene to support farmers with land to maximize fodder production through materials and financial support; provision of seeds, support to fodder seeds multipliers and upscaling of technologies of adding value to crop residues intended for animal feeding.

iii) When markets work efficiently and effectively, a pull effect spills over from end market to source of production. Final products are a product of processing facilities that as per analysis, not well functioning due to various technical and financial. It is therefore, recommended that, HA could provide both technical and financial (grants) to struggling processing facilities across the all-livestock value chain processing facilities in particular the SME's

iv) High quality and safe livestock products have been a challenge. Due to lack of knowledge on hygienic production of Animal Source Foods (ASF), substandard processing equipment; poor

dispensing equipment/ utensil; as a result, the industry is critically facing production of products that are contaminated by various food contaminants along value chain axis. E.g., Milk collection centers; processors (SME's); abattoirs/slaughter houses; butchers; supermarkets; etc. in order to produce safer and good quality products, these challenges must be addressed; therefore, it is recommended, apart from skills capacity building, support for the installation of appropriate equipment would be of paramount importance and at this juncture, HA may intervene.

v) The livestock value chain actors, more often than not fail to access technical support services from the would-be providers of technical advices. Rearing livestock require regular and consistent animal health and production follow up. The farmer advisory service has been found to be fragmented for various reasons; inadequate proximity extension agents; farmers' unable to pay for advisory and intervention services; expensive production inputs; fragmented market structures making or reducing income to farmers; all in all, farmers and other value chain operators require such technical support.

The analysis has revealed there is a lot of disconnection between technical services providers and people to be served. The extension agents lack or inadequate means (transport facilities and skills capacity) to serve value chain actors. in order to create better services to value chain actors, HA may in the first place provide capacity to such veterinarians to be able to provide accurate interventions, but also support them to reach all actors along the value chains through provision of motorcycle.

List of Annexes

Annex 1: List of livestock value chains actors consulted

Livestock farmers interviewed					
#	Name	Gender	District	Contact	Occupation/ Position
1	Ngurore Deogratias	male	Nyanza	780081747	Rabbit Farmer
2	Murangwa J. Bosco	male	Nyarugenge	788306197	Rabbit Farmer
3	Uwimana Jean d'Arc	Female	Kamonyi	788999508	Poultry farmer
4	MUSABYIMANA Jean Baptiste	Male	Bugesera	782235566	Poultry farmer
5	Nsengiyumva Vincent	Male	Musanze	785168422	Poultry farmer
6	TUYISHIME Jean De Dieu	Male	Musanze	784061749	Poultry farmer
7	NSHOZABAHIZI Naphtal	male	Bugesera	788777880	Goat farmer
8	Iyamuremye Faustin	male	Musanze	783443430	Sheep farmer, Wool producer, Sheep
9	Rutazinda Aimable	male	Nyanza	788636835	Cattle farmer
10	Munyebakwe Beatha	female	Kamonyi	785433131	Cattle farmer
11	MLAMBO Simon	male	Rwamagana	792106679	Cattle farmer
12	HODARI KWAGWENE Hilary	male	Nyagatare	788510429	Cattle farmer
13	Mumporeze Leonie	female	Musanze	788628461	Cattle farmer
14	Mutabazi shyaka	male	Nyabihu	788818965	Cattle farmer
15	NIYOYITA Peace	female	Bugesera	788892051	Pig farmer
16	Ndikumana Daniel	male	Nyamasheke	788520540	Pig farmer
17	NIYONZIMA Jean Bosco	male	Musanze	786059458	Pig farmer
List of livestock farmers interviewed					
#	Name	Gender	District	Contact	Occupation/ Position
18	Ayinkamiye Lehema	female	Nyanza	788627715	Milk processor, Nyanza
19	Mbarushimana Theresphore	male	Kamonyi	788413269	Service provider, Kamonyi
20	Mwumvaneza Ferdinand	male	Kamonyi	788512519	DARO Kamonyi
21	Nsengiyumva vincent	male	Musanze	785168422	Service provider, Poultry Musanze
22	Iyakaremye Emmanuel	male	Rubavu	783005880	Abattoir, Rubavu
23	Dusabimana Laurent	male	Nyanza	788477700	DARO Nyanza
24	Sindayiheba Felix	male	Nyamasheke	788762945	DARO Nyamasheke
25	Gashirabake Isidore	male	Gicumbi	788561263	DARO Gicumbi
26	Hakizimana Pierre Celestin	male	Gicumbi	788439685	IAKIB MCC representative, Gicumbi & Dairy farmer

27	Kanamugire Anicet	male	Nyamasheke	783072973	Live cattle trader, Nyamasheke
28	Harerimana Emmanuel	male	Rwamagana	788426538	Pig farmers organization representative
29	Hategikimana Pascal	male	Nyamasheke	788751150	Live pig traders, Nyamasheke
30	Mugiraneza Gilbert	male	Gasabo	788570459	Equity Bank loan analyst, Kigali
31	Nsengiyumva Cesar	male	Nyarugenge	788442698	Livestock inputs trader, Kigali
32	Twahirwa Janvier	male	Rubavu	788400402	Abbatoir, Gisenyi
33	Nsengiyumva Jean Bosco	male	Musanze	788613811	DARO Musanze
34	TUYISHIME Jean de Dieu	male	Musanze	784061749	Poultry cooperative repres., Poultry Musanze
35	Nsabimana Leonard	male	Nyabihu	788836124	MCC, Nyabihu
36	UWITONZE Hyacinthus	male	Bugesera	788218372	DARO Bugesera
37	Dr NIYITANGA Jean de Dieu	male	Rwamagana	788629884	DARO Rwamagana
38	Dr. NKURANGA John Bosco	male	Nyagatare	788494142	Service provider, Nyagatare
39	MUHUMUZA Isaac	male	Nyagatare	788204647	MCC Nyagatare
40	Dr Ngabonziza Geofrey	male	Kicukiro	788269030	vet service provider, Kigali
41	Ngirinshuti Fabien	male	Ngatare	788692978	DARO, Nyagatare
42	Dr Ndayisenga Fabrice	male	Kicukiro	785781138	RAB HoD, ARD
43	Uwambayingabire Yvonne	female	Musanze	788895083	Unguka Bank loan analyst, Musanze
44	Barongo Angelique	female	Kigali	788535668	Send a Cow Rwanda
45	Dr Nyabinwa Pascal	Male	Kigali	785324631	RAB, Large stock researcher
46	Dr Shumbusho Felicien	Male	Kigali	783866844	RAB, small stock researcher
47	Dr Hirwa Claire D'Andre	female	Kigali	784824250	RAB, Monogastrick Program leader
48	Ndorimana Jean Claude	male	Kigali	788455119	Minagri, DG Livestock
49	Dr Ngabo Gasana Methode	male	Kigali	788680333	RAB, Veterinary services
50	Dr Mutimura Mupenzi	male	Nyagatare	788884099	RAB, Ruminant Program leader
51	Myambi Celestin	male	Kigali	788592297	ENABEL, Livestock specialist
52	HATEGEKIMANA Sabine	male	Kigali	788516145	Minagri, Livestock specialist
53	Nshimiyimana Octave	male	Kigali	782803590	Minagri, Livestock value chain specialist
54	Nshokeyinka Joseph	male	Kigali	788860954	PRISM, Project Manager

55	Bahati Emmanuel	male	Kigali	788690283	HPI, Livestock Project Manager
56	Baho Hortense	female	Kigali	788482710	Orora Wihaze/ Land O' Lakes, Livestock
57	Dr Mwenadata Jean Claude	male	Rulindo	785518675	Service provider
58	Ingabire Alice	female	Kigali	788974553	RYAF
59	Dr Ntakirutimana Christophe	male	Musanze	788875885	New Vision Veterinary Hospital, Livestock
60	Dr Mahoro Janvier	male	Nyagatare	788809399	UR, HoD Veterinary Medicine
61	Dr Muganga Jean Pierre	male	Nyagatare	788827723	UR, Veterinary Medicine lecturer

Annex 2: Statistical representation of selected medium and big size farms in Rwanda

Group of farmers	**Female (N, %)**	**Male (N, %)**	**N/A (N, %)**	**Total Number**	**Estimated number of animals reared**	**Total country estimates[1]**
Cattle farmer (>10 heads)	53	588	13	654- 1,143[3]	25664	1,449,888
Goat farmer (>10 heads)	62	390	65	148	5219	2,844,001
Sheep farmer (>10 heads)	96	281	16	39	860	601,836
Pig farmer (>10 heads)	13	130	5	517	26982	1,441,077
Poultry farmer (>30 birds)	2	36	1	393	412486	5,442,152
Rabbit farmer (>30 heads)	2	1		6	422	801,490
Total number farmers	**229**	**1431**	**100 [2]**	**1,760- 2,249**		

Source MINICOM/MVC, 2021

[1] MINAGRI Annual Report (2020-2021).

[2] N/A: undetermined sex of the Owner/Manager, e.g., Cooperative, Firm, etc.

[3] NISR, AHS 2020. Number of large-scale farmers in Cattle.