DAIRY AND MEAT PRODUCTS VALUE CHAIN IN AKHALTSIKHE, AKHALKALAKI, NINOTSMINDA AND KHULO MUNICIPALITIES

USAID UNITY THROUGH DIVERSITY PROGRAM
2023

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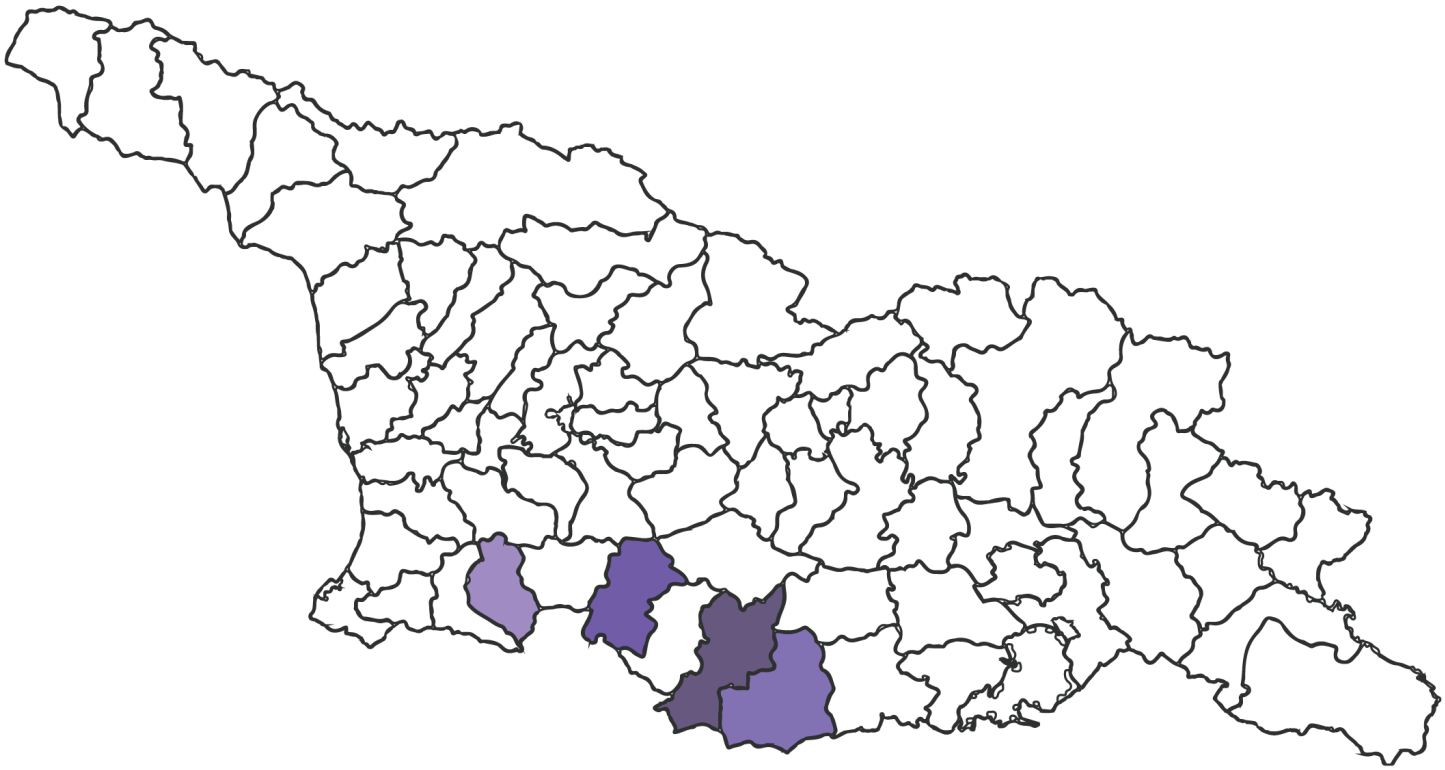

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Table of Contents

1. Introduction

The USAID Unity Through Diversity Program, implemented by UNA-Georgia and led by USAID, is a five-year initiative aimed at integrating ethnic and religious minorities into various aspects of Georgian society. PMCG, as a subcontractor of UNA-Georgia, contributes to expanding and strengthening socio-economic connections between the majority and minority communities, with the objective of establishing mutually beneficial business relationships.

One component of the program focuses on conducting value chain assessments in specific ethnic and religious minority municipalities. These assessments aim to identify gaps in each stage of production within the meat and dairy value chains and provide recommendations for increasing the integration of ethnic minorities into the value chain. Additionally, the assessments aim to explore opportunities for integrating the regional value chain into national or international value chains.

In the report, separate chapters are dedicated to examining each of the value chain actors within the meat and dairy sectors in Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda. These chapters provide detailed insights into various aspects of the value chain, focusing on specific topics and actors involved. The topics covered include:

- Methodology: Examining the quantitative and qualitative analytical approaches employed in the study of the beekeeping value chain in the selected municipalities.
- Sector Overview in Georgia: reviewing sector trends, consumption, production, import, export, prices, productivity, and other parameters.
- Value Chain Actors: overviewing the value chain actors and providing an understanding of the value chain processes.

Additionally, a SWOT analysis is conducted to assess the strengths, weaknesses, opportunities, and threats of the meat and dairy value chains in the target municipalities. This analysis helps to identify the internal and external factors that may impact the success and development of the value chains, providing a basis for formulating relevant recommendations and strategies for improvement.

The report provides recommendations to the program for the development of the meat and dairy value chains in Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda. These recommendations focus on the integration of ethnic minorities into the value chain and the integration of the regional value chain into national or international value chains. The aim is to support the sustainable progress of the meat and dairy industry in these municipalities, with specific attention to areas such as livestock farming, processing, quality control, and food safety.

By addressing existing obstacles, seizing available opportunities, and fostering cooperation among stakeholders, the report seeks to unlock the potential of these municipalities. The ultimate goal is to stimulate economic growth and generate positive outcomes for consumers and local communities. Through the implementation of these recommendations, the meat and dairy industry in these regions can thrive, creating economic opportunities and improving livelihoods while meeting market demands for high-quality products.

2. Methodology

The research on the dairy value chain in the target municipalities of Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda involved a combination of quantitative and qualitative analysis methods. The study incorporated desk research, field research, selection of interviewees based on their relevance to the value chain and conducted interviews.

The research started with an extensive desk research phase. This involved reviewing existing literature, reports, and studies related to the meat and dairy value chain in the target municipalities. The purpose was to gather background information, identify gaps in knowledge, and understand the existing research landscape. Before the shortlisting of the dairy sector, all of the sectors were assessed using three criteria: Concentration of produced products[1], import substitution and export potential, and infrastructure/warehouse accessibility. Following the identification of sectors that obtained the highest scores, additional desk research and validation workshops were conducted to enhance the understanding of the sector's influence on the local community, the integration of minority groups within the broader society and economy, and their alignment with municipal priorities.

After the consideration of all of the above-mentioned factors, the dairy value chain emerged as the sector with the highest opportunities and strengths in the municipalities of Khulo, Akhalkalaki, Akhaltsikhe, and Ninotsminda. Field research was conducted to collect primary data and gain firsthand insights into the meat and dairy value chain. This phase involved visiting the target municipalities and engaging directly with stakeholders involved in the value chain, including cattle feed suppliers, dairy farmers, milk processors, slaughterhouses, regulatory bodies, and supermarket representatives. Careful selection of participants was crucial in ensuring the representability and relevance of the stakeholders. Interview guides and questionnaires were prepared to ensure consistency and cover the relevant topics. The interviews aimed to gather qualitative insights, perspectives, and experiences from the participants regarding the meat and dairy value chain. Given the existing language barriers in the municipalities, some of the interviews had to be held in Russian, primarily in Ninotsminda and Akhalkalaki.

One of the most important parts of the research was the triangulation: in order to enhance the validity and reliability of the findings, multiple data sources, both quantitative and qualitative, were combined to provide a more comprehensive understanding of the dairy value chain. Geostat (National Statistics Office of Georgia) was used as a primary source for the quantitative data.

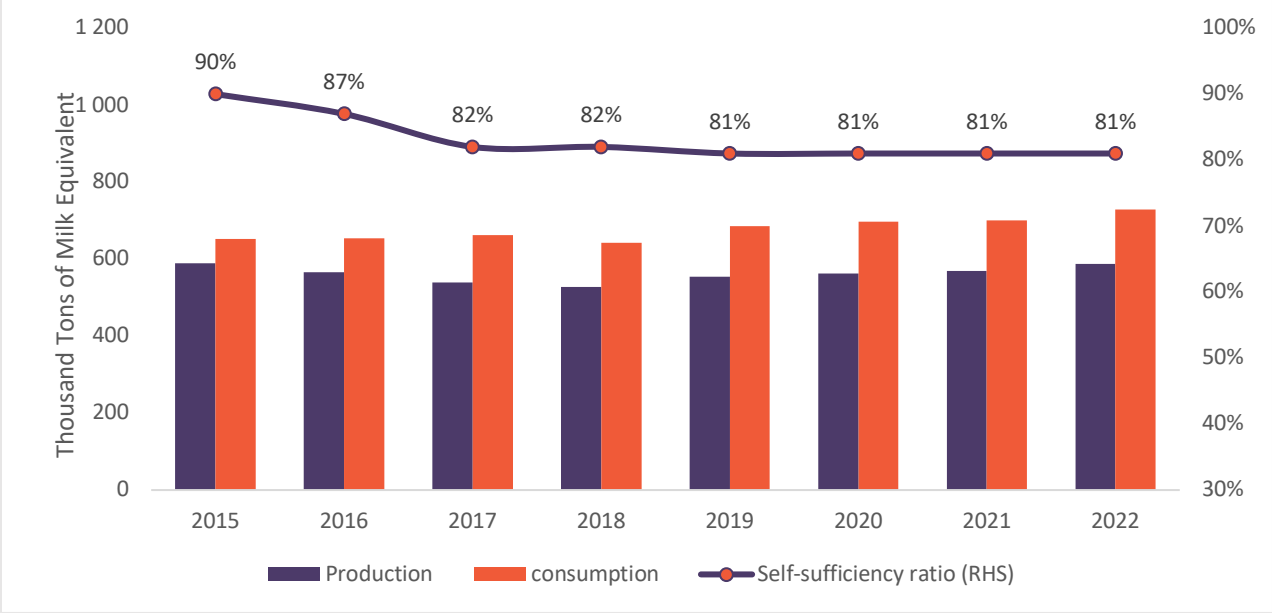
[1] Location Quotient (LQ) regional analysis method was used.

3. Sector Overview in Georgia

Dairy production plays a pivotal role in the agricultural landscape of Georgia. Situated at the crossroads of Europe and Asia, Georgia boasts a rich tradition of dairy farming and cattle rearing that dates back centuries. The dairy sector has not only served as an important source of nutrition for the Georgian population but has also contributed significantly to the country's economy and cultural heritage. In Georgia, dairy products are an integral part of the daily diet: in fact, the annual intake of dairy products per capita amounts to 191 kg per year, or half a kilogram a day.

The domestic production of dairy products has played a crucial role in satisfying the high demand for such products in the Republic of Georgia. Over the past eight years, the average annual production of dairy products has remained relatively stable, reaching approximately 560 thousand tons. However, consumption has experienced a notable increase of 12.8% during the same period. To compensate for the deficit, imports of dairy products have more than doubled, resulting in a declining self-sufficiency ratio. This ratio has decreased from 90% in 2014 to 77% in 2022, indicating a growing reliance on imported dairy products. The limited expansion of domestic milk production can be attributed to intense competition from exported dairy products, including powdered milk, which will be examined in greater detail later.

Graph 1: Balance sheet for dairy products in Georgia



Source: Statistics Office of Georgia

Among the total production of 560 thousand liters of milk in Georgia, the largest proportion is contributed by the regions of Kvemo Kartli (22.1%), Imereti (19.9%), and Samegrelo-Zemo Svaneti (13.5%). The distribution of milk production varies from year to year, and a notable trend is a significant decrease in the share of milk produced in the Adjara region, which has nearly halved over the past 8 years to 5.3%. This decline can be attributed to the increasing process of urbanization occurring in the region.

Table 1: Milk Production by Regions

	Mil. Liters.	Percentage
Tbilisi	6.2	1.1%
Adjara AR	29.2	5.3%
Guria	23.8	4.3%
Imereti	110.4	19.9%
Kakheti	53.6	9.7%
Mtskheta-Mtianeti	17.1	3.1%
Racha-Lechkhumi and Kvemo Svaneti	6.3	1.1%
Samegrelo-Zemo Svaneti	75.1	13.5%
Samtskhe-Javakheti	72.9	13.1%
Kvemo Kartli	122.4	22.1%
Shida Kartli	37.4	6.7%
Total	554.4	100%

Source: Statistics Office of Georgia

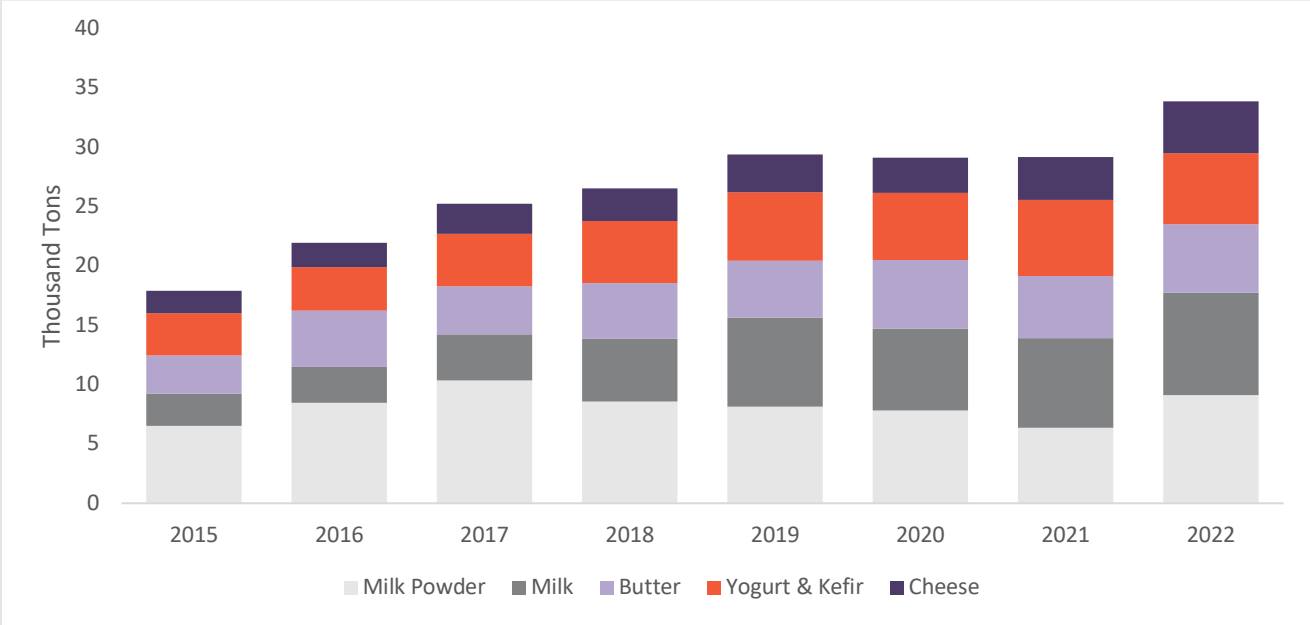
All of the domestic beef and dairy products are produced by more than 850 thousand bovine animals. In the regions of Samtskhe Javakheti and Adjara (regions of our interest), there are about 156 thousand bovine animals, or 18.3% of the total, with dairy production equaling 18.4% of the total number. However, the yield rates of dairy cows are quite different in the two regions, with 1326 liters of milk produced per cow annually in Adjara compared to 1621 liters/year in Samtskhe Javakheti. Still, both numbers are significantly lower compared to those in the EU countries by 4-5 times. With the high number of low-yielding breeds, grazing-based farm[2] and negligent nutrition feeding, such a high disparity in productivity should not be unexpected. Furthermore, the majority of the farms are family-owned small holdings. With a total of 207 thousand holdings in Georgia owning cattle, on average, a holding owns 4 cows. The economy of scale is crucial for the dairy sector as the price is the most important determinant when it comes to the buyer's preferences.

The growth in imports within the Georgian dairy industry can be attributed to the combination of low productivity and escalating consumer demand for milk products. Over the past 8 years, the total volume of imported dairy products, including milk powder, milk, butter, yogurt, kefir, and cheese, has nearly doubled, rising from 17.9 thousand tons to 33.9 thousand tons[3]. While the majority of the increase is observed in milk imports, it is crucial to recognize that certain products, such as cheese, have significantly higher milk liter equivalent ratios, with a ratio of one to ten. Consequently, although the import volume of cheese was only half of that of milk, it incurred nearly twice the cost for Georgian importers, amounting to USD 21.3 million compared to USD 9.5 million.

[2] Grazing-based, or pasture-based farms, sometimes known as open farms, provide cows with access to outdoor areas where they can roam and graze. Meanwhile, Confinement and feedlot farms keep cows in enclosed areas for most of their lives to ensure high productivity and low risks of infections.

[3] The weight for traded goods is calculated using the gross weights, that is including the packaging and other non-related mass, therefore, it is not comparable to the balance sheet data.

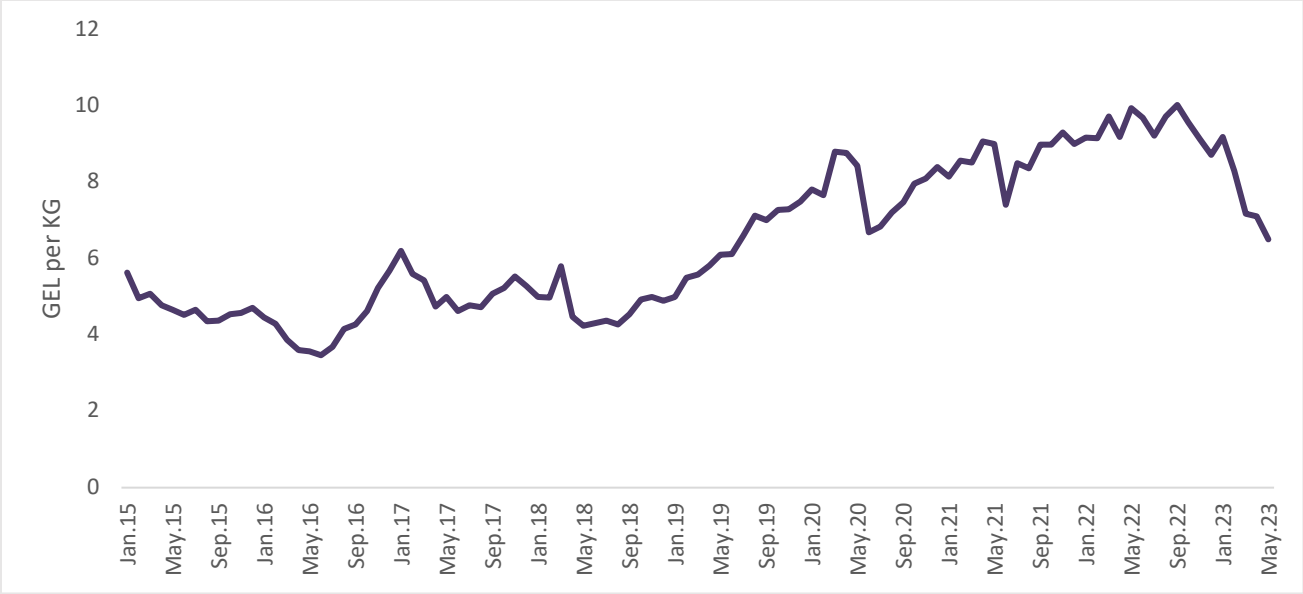
Graph 2: Imported dairy products by weight



Source: Statistics Office of Georgia

Looking at the graph above, the most acute issue in today's dairy industry would go unnoticed: the amount, or rather the weight, of powdered milk has not increased throughout the years. In fact, over the past eight years, the imports of powdered milk in Georgia experienced a peak in 2017. However, since the beginning of 2023, there has been a significant decline in the price of powdered milk. In 2022, the price per kilogram remained relatively stable, ranging between GEL 7 and 8 Georgian, but it has since dropped to GEL 6.5 and is anticipated to decrease further. Imported powdered milk presents direct competition to locally produced raw milk due to its longer shelf life and higher density, resulting in lower transportation costs. The majority of powdered milk imports originate from Ukraine, Belarus, and Iran, the latter offering one of the most affordable options available. With escalating input costs, such as cattle feed and wages, Georgian farmers are facing challenges in price competition. For example, the manufacturing cost of a kilogram of Karkhnuli cheese made from raw milk amounts to approximately GEL 16-18, whereas the same cheese made with powdered milk costs GEL 14. Intensified price competition has not only affected the cheese sector but has also had negative implications for the primary input of the industry, raw milk, consequently impacting the overall Georgian dairy industry.

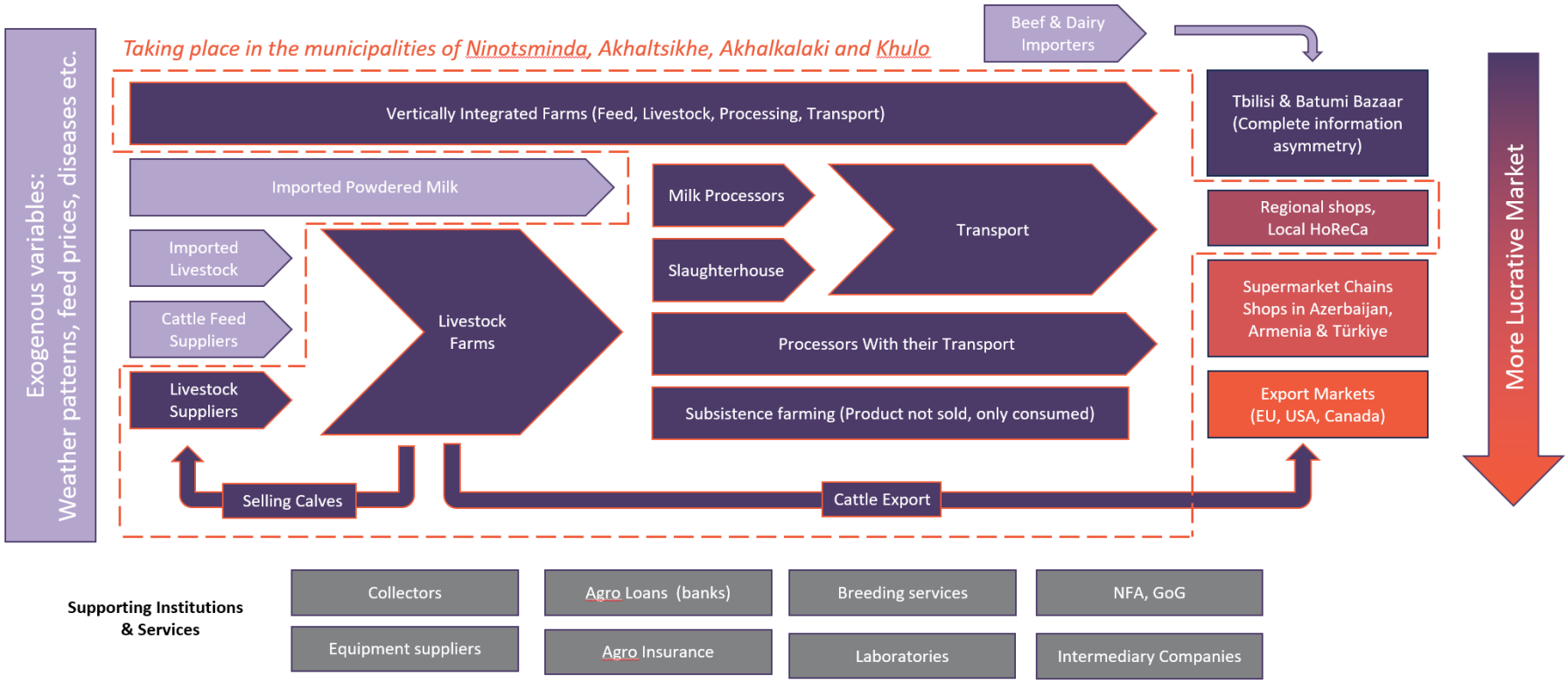
Graph 3: Monthly Price of Imported Powdered Milk per KG in GEL



Source: Statistics Office of Georgia, Authors Calculations

In comparison to the volume of imports, exports from Georgia are considerably negligible. In 2022, the total value of dairy product exports amounted to USD 1.8 million, which is approximately 60 times less than the value of imports. Cheese constituted more than half of the exported dairy goods. The primary destinations for Georgian dairy exports are Armenia, the United States, and Canada. Notably, a significant portion of cheese exported to Armenia originates from Ninotsminda municipality, situated near the Armenian border. Conversely, one of the exporters of cheese to North America is the Georgian company named "Milk Product Company Caesar", which, along with other farms and plants in Tsalka, has a large-scale processing plant in the municipality of Khulo, which was one of the primary sources of information for this research.

Graph 4: Value Chain Map of the Dairy Sector



4. Value Chain Actors

4.1. Primary Production

The livestock industry in the municipalities of Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda is significantly influenced by its geographical location, particularly due to the prevalence of alpine areas characterized by an ecosystem situated above the tree line in the mountainous regions. This geographical feature has notable implications for the characteristics of dairy products derived from livestock in these regions.

The pasture lands in these municipalities are predominantly situated in alpine areas, where the growth of alpine grasses predominates. Alpine grasses possess distinctive attributes that contribute to the unique characteristics of dairy products. Notably, these grasses exhibit a high fiber content, which enhances the nutritional value of the forage consumed by the livestock. The presence of fiber in the alpine grasses promotes proper digestion in ruminant animals, such as cows, thereby positively influencing the overall health and well-being of the livestock.

Moreover, the alpine grasses found in these regions harbor various phytochemicals, including polyphenols and flavonoids. These phytochemicals are naturally occurring compounds known for their antioxidant properties and potential health-promoting effects. When livestock grazes on these alpine plants, some of these phytochemicals can be transferred to the milk they produce. Consequently, the resulting milk acquires a unique taste profile and may offer additional health benefits to consumers. Akhaltsikhe stands out as a notable exception among the municipalities owing to its relatively lower altitude in comparison to other regions. The lower altitude of Akhaltsikhe municipality creates an environment that is relatively less conducive to dairy farming. Thus, the farmers emphasize more on beef production, compared to the above-mentioned regions.

The production and procurement of cattle feed exhibit considerable heterogeneity among individual farmers, wherein the availability of resources and financial capacity play a significant role. Farmers who possess the necessary means and resources often engage in the practice of stockpiling harvested forages as a primary source of cattle feed. The utilization of hay as a feed option is widespread and, in some cases, exclusively preferred, contrary to silage, alfalfa, and others. On average, the proportion of purchased cattle feed in relation to feed produced on-farm stands at approximately 50%. While the region of Samtskhe-Javakheti generally exhibits satisfactory feed availability, farmers managing herds of more than 50 cows find it necessary to purchase additional feed from external sources such as Akhalkalaki, Marneuli, or go as far as Kakheti.

Table 2: Distribution of holding by number of months when cattle operated by holding were fed with grazing, including scavenging, on the land operated by holding, 2021.

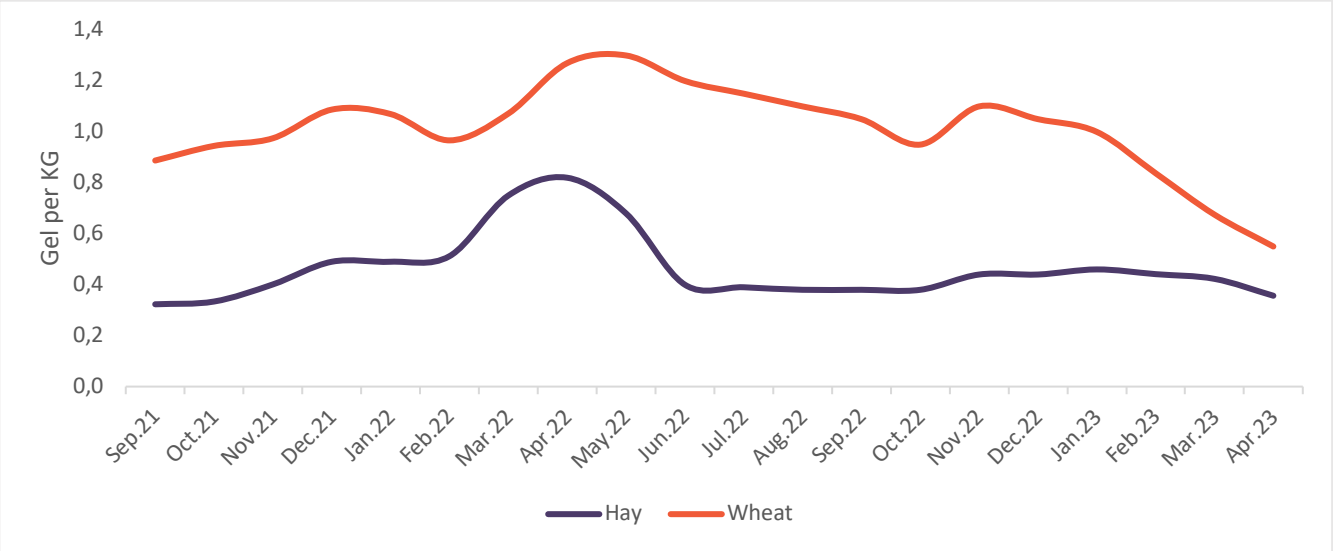
	Number of holding where cattle were fed with grazing, including scavenging on the land operated by holding (ths. unit)	of which, %				
		1 to 3 months	4 to 6 months	7 to 9 months	10 to 12 months	The Average number of months
Georgia	**144.0**	**21**	**35**	**29**	**14**	**6.2**
Adjara AR	15.8	15	42	33	9	6.2
Samtskhe-Javakheti	4.5	65	30	5	0	3.2

Source: Statistics Office of Georgia

Animal feed is solely required when the farm serves as the primary hub of production, encompassing the ownership of cows and engaging in the production of a combination of milk, beef, or other livestock products.

The type of production, or rather the vertical integration of farms, particularly dairy farms, is predominantly influenced by their geographical location. In order to ensure proximity to the pasture lands essential for grazing and forage production, dairy farms are primarily situated in rural areas outside of cities and villages rather than within urban centers. In contrast, the limited number of processing plants tends to be concentrated within the cities of Akhalkalaki, Ninotsminda, and Akhaltsikhe. Given the requirements of larger-scale dairy operations for extensive grazing lands, many of these farms are established in sparsely populated regions. The increasing costs associated with transportation, coupled with the absence of storage systems and the longer shelf life of cheese, prompt farmers to consider vertical integration as a more financially advantageous business model.

Graph 5: Price of Cattle Feed (Hay & Wheat) in Samtskhe-Javakheti Region



Source: Statistics Office of Georgia, SQIL MPIS, Respondent farmers and feed suppliers

4.2. Labor Force

The labor force in dairy and meat production in the municipalities of Khulo, Akhaltsikhe, Ninotsminda, and Akhalkalaki is characterized by its seasonal dependency and reliance on family members for employment. The majority of workers in this sector are family members, typically comprising 4-6 individuals. However, relatively larger producers employ a slightly larger workforce, ranging from 10 to 14 employees. Notably, Khulo is home to an exceptionally large company "Dairy Product Processing Company Caesar" that employs 40 individuals.

One of the significant challenges faced by dairy and meat producers in these regions is the limited access to training and educational opportunities. The absence of available courses and professional training programs hampers the development of skills and expertise among the labor force. Consequently, producers struggle to adopt modern practices and technologies, hindering overall productivity and efficiency. Interestingly, most of the farm owners have had multiple training sessions in the last few years, which cannot be said about the employees working on the farms.

Regarding gender distribution, all the individuals interviewed as owners were male, although when it comes to the family members working on farms, females outnumber males. Notably, there was no distinct gender differentiation observed in roles such as milkers, accountants, and managers, as both males and females were found to fulfill these responsibilities. However, roles such as drivers and other physically intensive roles were found to be predominantly occupied by males.

Traditionally, family members have been actively involved in the family farming business, however, due to recent wage increases, farmers have become increasingly reliant on the unpaid labor of family members to mitigate rising labor costs. The remuneration provided to hired workers is contingent upon various factors, with the farm's location being particularly influential. In remote regions where the labor force is scarce, farmers must recruit workers from nearby villages, and in some cases, workers have to relocate. In such areas, salaries range from GEL 1300 to 2000, surpassing those in more densely populated regions by approximately GEL 200-300. Farmers have acknowledged the mounting challenges of retaining workers without salary increases as demands for higher wages persist. In the past five years alone, wages have escalated by 20-30%, exacerbating the strain on farmers' finances. The farm's revenue is largely contingent upon milk and cheese prices, which have experienced a decline. Consequently, some farms have already implemented or are planning labor reductions to adapt to the changing economic landscape.

Language barriers are generally not a significant concern in the municipalities of Ninotsminda and Akhalkalaki, where workers predominantly belong to Armenian-speaking minorities, with Russian being their secondary language. Consequently, effective communication among these workers is not hindered. However, it was observed that very few interviewees in these municipalities were able to speak or comprehend the basic Georgian language. This linguistic gap becomes a notable issue when it comes to the incentives provided by supermarket chains for purchasing local products, particularly cheese and beef. To ensure the eligibility of these products for sale in local shops, supermarkets require on-site quality assessments, necessitating a labor force with specialized knowledge. Some supermarket chains interviewed expressed limited willingness to train local workers due to the substantial language barrier, especially considering the insufficient Russian language proficiency for the specific terminologies required in this sector.

4.3. Processing

Among dairy processors, a significant focus lies on the production of pasteurized milk and various dairy products, most notably cheese. Among the expenses incurred in this process, milk collection and its associated costs represent the largest portion, accounting for approximately 80% of the total expenses. Consequently, the quality of milk is of utmost importance as it can have a substantial impact on the profitability of processors.

According to reports from processors, there have not been significant issues concerning the quality of raw milk. Processors generally aim to source milk from large-scale farms; however, cost considerations emerge as a major determining factor in their procurement decisions. In contrast, small-scale farms have been known to augment milk volume by incorporating water, resulting in an increase in the overall weight of the product by approximately 5-10%. Although such practices were once prevalent, processors have recently adapted their strategies by implementing manual inspections of each farmer's milk. Among the most commonly employed methods is cryoscopy, which involves freezing the milk and subsequently comparing its freezing point to the expected value for raw milk. Despite being time-consuming, cryoscopy provides a cost-effective alternative to more elaborate techniques such as chemical tests, density measurement, ultrasonic testing, and refractometry.

Another potential hazard that poses a risk to milk quality is the contamination of milk during the milking process. Failure to adhere strictly to hygiene protocols and negligence in post-milking procedures, including inadequate cooling and storage in clean and hermetically sealed containers, can easily lead to the production of poor-quality milk. In response to such concerns, dairy processors have adopted pH testing as a means to mitigate such occurrences, mirroring the approach taken with water addition.

It is worth noting that the aforementioned issues affect less than 5% of raw milk samples. Given the constraints faced by milk-producing farmers, such as the inability to easily change their location, even a single instance of poor-quality raw milk has the potential to tarnish the reputation of the milk producer. Nevertheless, hormonal disorders resulting from imbalanced diets during the calving season still present negative effects on milk quality. Hence, despite efforts to address these challenges, the impact of hormonal imbalances on the overall quality of milk still persists.

Table 3: Use of hormones and antibiotics for cattle by region, 2021

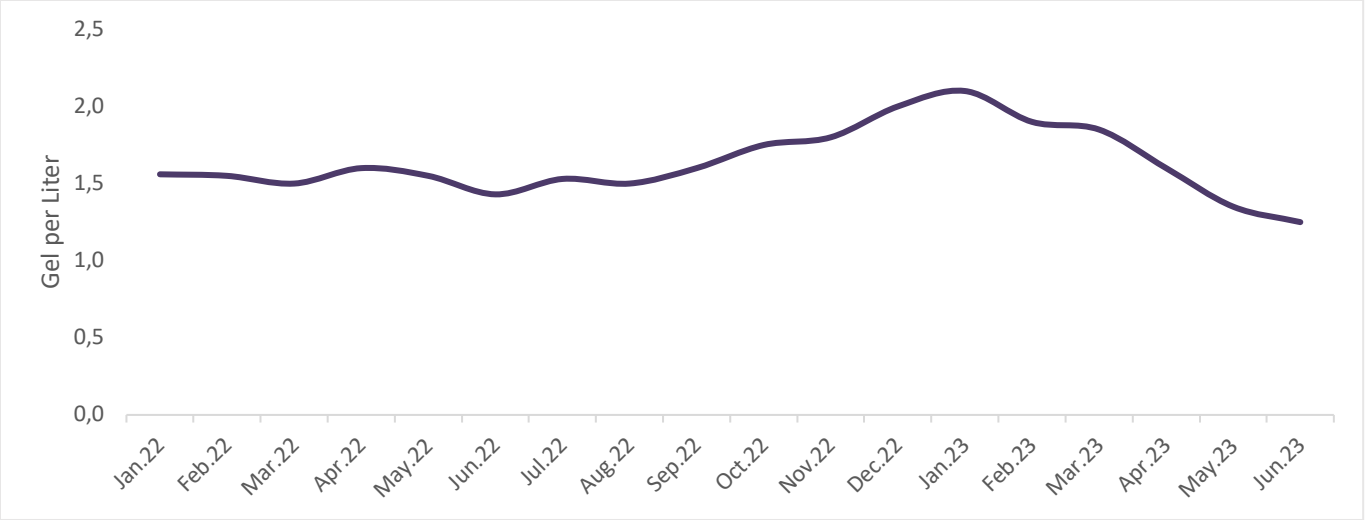
	Number of holdings reporting the cattle (ths. unit)	Share of holdings using hormones, %	Share of holdings using antibiotics, %
Geogia	**207.0**	**1**	**12**
Adjara AR	17.0	2	23
Samtskhe-Javakheti	16.6	0	9

Source: Statistics Office of Georgia*

All of the milk processors and slaughterhouses that were interviewed have implemented Hazard Analysis and Critical Control Points (HACCP) systems, although many of them require updating. Minimal compliance with regulatory requirements is evident as processors do not go beyond HACCP implementation for other international or Georgian food safety and quality control systems. Assurances were provided by all the interviewed processors that their products are safe for consumption, specifically targeting children. Among the various types of cheese produced, Georgian Karkhnuli cheese dominates the market, while Guda, Sulguni, and Armenian Lori are produced in smaller quantities. The popularity of Karkhnuli cheese can be attributed to a combination of cultural and market demands. Armenian Lori cheese, for instance, necessitates a different manufacturing process starting from the milking phase and the composition of milk, which restricts the use of the milk for other products. The expansion of processing activities faces significant challenges arising from both the supply and demand sides. Processors intending to increase their share of purchased milk from the market must raise the price by approximately 10-15% per liter of milk. However, the highly elastic demand for cheese in the local markets, particularly in Tbilisi, prevents them from increasing the price. This pricing strategy is primarily adopted by larger processors who supply their products to supermarkets and even export them abroad. One of the farmers even pointed out that a liter of milk had become cheaper than bottled water, as they sell the milk for GEL 1.3, while the same amount of bottled water is about 20 tetri more expensive. The low selling price has been named as a major disincentivizing factor in selling products in shops, as farmers would not be able to avoid paying the 18% value-added tax[4].

Graph 6: Price of Raw Milk in Samtskhe-Javakheti Region

[4] During 2018, there were initiatives to exempt the dairy industry from paying the 18% value-added tax on raw milk and cheese, but it was never implemented.

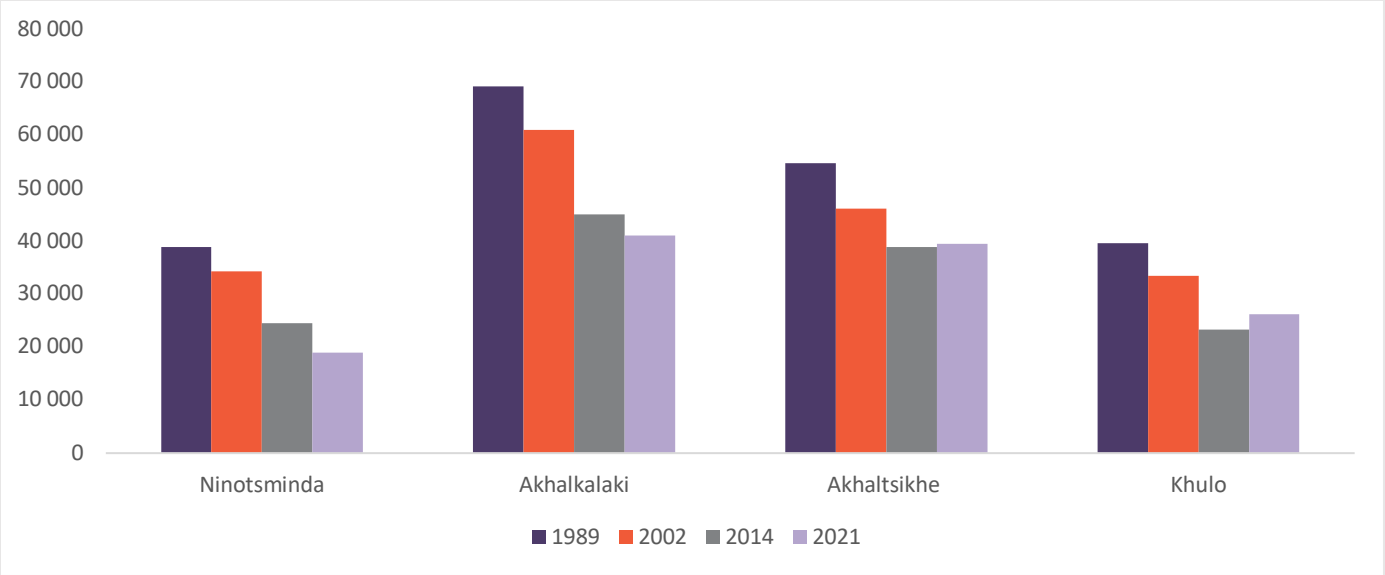


Source: Statistics Office of Georgia, SQIL MPIS, respondent farmers and collectors

Meanwhile, there exist a limited number of slaughterhouses that primarily cater to the local population. These slaughterhouses not only handle the slaughtering of cows and calves but also provide services for sheep slaughter. Slaughterhouses have the option to purchase calves/cows and engage in fattening practices or solely focus on offering slaughtering services. Additionally, in contrast to dairy processors, the main costs incurred by slaughterhouses are fixed rather than variable. These costs encompass infrastructure expenses, such as loan interest required for constructing the slaughterhouse itself, as well as laboratory costs.

The majority of slaughterhouses are located in Akhalkalaki and Khulo, as these municipalities do not exclusively prioritize dairy products. However, there are notable distinctions between the two regions. Slaughterhouses in Akhalkalaki primarily operate by providing services to the local population and selling meat within the region, while those in Khulo concentrate on supplying beef to the city of Batumi. With the population of Akhalkalaki having experienced a decline over the past decades, there has been a corresponding decrease in demand for meat and slaughtering services. Similar to dairy processors, all slaughterhouses operate in compliance with Hazard Analysis and Critical Control Points (HACCP) principles.

Graph 7: Population in the targeted municipalities



Source: Statistics Office of Georgia

4.4. Veterinary Services and Artificial Insemination

4.4.1. Veterinary Services

There is a severe lack of veterinary services in Akhalkalaki, Ninotsminda, Akhaltsikhe, and Khulo municipalities. Most of the farmers stated that they themselves or members of their family are taking the role of a veterinarian, however, none of them had professional training in the veterinary field. The lack of professional veterinary services poses several challenges and highlights the importance of high-quality veterinary services for dairy and meat primary production. Here are the key reasons:

- Disease Detection and Prevention: Veterinary services are essential for the early detection and prevention of diseases in livestock. Without adequate veterinary support, farmers may struggle to identify and manage diseases effectively. However, farmers see the mortality rates as the only need for disease detection, neglecting the issues some infections can cause to the final products.
- Diagnostic Testing and Treatment: Veterinary professionals are trained to conduct various diagnostic tests that are critical for identifying diseases, parasites, and other health issues in animals. In the absence of accessible veterinary services, farmers may lack the necessary expertise and equipment to perform these tests accurately. The majority of the farmers, especially in the remote farms outside of the cities, consider having a single veterinary doctor from their family as sufficient, though almost all of them lack sufficient training and knowledge.
- Animal Welfare and Management: Skilled veterinarians play a significant role in ensuring the welfare of livestock. They can provide guidance on proper animal management practices, including nutrition, housing, and overall well-being. Veterinary professionals with high qualifications can help farmers implement effective strategies to improve animal welfare standards, resulting in healthier and more productive livestock, increasing profitability. However, the cost-minimization mindset is more prevalent in the majority of the farms, which can be observed by looking at the quality of the infrastructure and the livestock shelter.
- Professional Education: Access to appropriate education and training programs is essential for veterinary doctors to enhance their qualifications and skills. With appropriate training, the issue of

non-qualified family members taking the roles of veterinarian can be mitigated, if not solved completely.

Table 4: Distribution of holdings by the main provider of breeding services and by regions

	Number of holdings reporting breeding services (ths. unit)	Of which, %		
		Private veterinarian	Self-provision	Other
Geogia	**186.6**	**6**	**94**	**0**
Adjara AR	11.8	13	84	3
Samtskhe-Javakheti	16.5	1	99	0

Source: Statistics Office of Georgia

4.4.2. Artificial Insemination

Animal artificial insemination (AI) is a reproductive technique widely used in modern meat and dairy production. It involves the transfer of semen from genetically superior male animals to females, resulting in improved genetic traits and increased productivity. While AI offers significant advantages, its adoption in Akhaltsikhe, Akhalkalaki, Ninotsminda, and Khulo municipalities is limited due to a lack of knowledge, resources, and trust in the process. This paper aims to highlight the importance and benefits of AI in livestock production and address the challenges hindering its widespread use in the mentioned municipalities.

- Genetic Improvement: AI allows breeders to access superior genetics by using semen from high-quality sires, leading to improved traits such as increased milk production, meat yield, disease resistance, and overall productivity.
- Disease Prevention: Natural mating carries the risk of transmitting diseases between animals. AI provides a controlled environment, ensuring the use of disease-free semen and minimizing the potential spread of infections.
- Efficient Resource Utilization: AI enables optimal utilization of valuable resources, such as superior sires, by allowing their semen to be used in multiple females, maximizing the genetic impact and reducing costs associated with maintaining large numbers of male animals.

Farmers commonly rely on natural mating as a means to maintain stable livestock populations. Given the occurrence of two mating seasons and the practice of bulls mating with individual cows only once, a single bull poses a significant limitation. Consequently, medium to large-scale farmers in remote regions like Ninotsminda and Akhalkalaki engage in annual bull exchanges as a strategy to mitigate this constraint. Such exchanges typically occur through bartering, focusing solely on the transfer of bulls. The use of natural mating relinquishes control over the breeding outcomes, potentially resulting in offspring with reduced production efficiency. Successful fertilization is not guaranteed in every instance, further complicating the assessment of bull quality within the short time frame available. This circumstance occasionally leads some farmers to exploit the system by disposing of unfavorable or substandard bulls, contributing to a certain lack of trust among farmers.

Table 5: Distribution of holdings by main reproduction techniques used for cattle and by regions

	Number of holdings reporting cattle (ths. unit)	Main reproduction technique, %			The holding did not breed cattle, %
		Natural mating with a sire selected within the herd operated by holding	Natural mating with a sire selected within the herd operated by other holding	Artificial insemination	
Geogia	**207.0**	**23**	**61**	**1**	**15**
Adjara AR	17.0	5	55	8	31
Samtskhe-Javakheti	16.6	27	70	0	4

Source: Statistics Office of Georgia

The limited adoption of artificial insemination (AI) methods in the region can be attributed to both demand and supply factors. Primarily, farmers exhibit a preference for the traditional practice of natural mating, considering it a simpler approach, while perceiving AI as a technique that necessitates rigorous protocols and significant time investment. Consequently, AI continues to be associated with perceived complexities that discourage farmers from pursuing its implementation. Moreover, the lack of demand for AI services further contributes to the underdevelopment of this practice within the municipalities. The scarcity of farmers seeking AI services has resulted in a limited number of experts or professionals offering such services in the region. This limited supply of AI expertise reinforces the perception among farmers that AI is not readily accessible or widely practiced.

4.5. Controlling Animal Health and Food Safety at each Level of the Value Chain

4.5.1. Farm Level

At the farm level of the value chain, controlling animal health and ensuring food safety involves several key activities:

- Preventive Vaccination: The veterinary department, specifically veterinarians working for the National Food Agency (NFA) on contract, provide preventive vaccination against diseases such as foot and mouth disease, anthrax, rabies, brucellosis, and lumpy skin disease. Vaccinations are essential to reduce the incidence and spread of these diseases among farm animals.
- Registration and Identification Program: During vaccination process, the veterinarians also carry out a registration and identification program. This program ensures that each animal is properly documented and identified, enabling traceability throughout the production chain. By registering and identifying animals, authorities can track their health status and implement appropriate disease control measures.
- Sample Collection for Laboratory Testing: In addition to vaccination and registration, veterinarians working for the NFA collect samples from animals for laboratory testing. These samples are sent to the Laboratory of the Ministry of Environmental Protection and Agriculture (LMA) to conduct diagnostics and detect the presence of diseases. Diagnostics help reveal and prevent the spread of animal diseases by identifying infected animals. However, due to limited resources, it may not be possible to cover the entire animal population for diagnostics.
- Disease Diagnostics: The NFA, in collaboration with the LMA, provides diagnostics services to detect and prevent the spread of animal diseases. In the past, the NFA conducted diagnostics of cows against brucellosis from 2015 to 2017. To further enhance disease control, assistance is needed to conduct diagnostics against diseases like bovine spongiform encephalopathy and

leucosis. Diagnostics help in early detection, enabling prompt treatment or implementation of control measures.

- Milk Quality Assurance: Ensuring milk quality and safety is an essential component of dairy production. Farmers adhere to strict milk hygiene practices, including proper milking techniques, cleaning and sanitizing of milking equipment, and proper storage and handling of milk. Regular milk testing is conducted to check for any abnormalities or contaminants, ensuring that only safe and high-quality milk enters the supply chain.
- Dairy farmers must comply with local and national regulations related to animal health and food safety. These regulations may include requirements for milk testing, record-keeping, and adherence to specific standards and practices. Compliance with these regulations helps to maintain the integrity and safety of dairy products.

As a preventive measure, the NFA established Veterinary Surveillance Points to control animals during the transhumance. Veterinary checkpoints control livestock when they leave for the pastures during the summer period. They check whether livestock is vaccinated and also provide treatment against parasites. NFA periodically conducts information campaigns to increase the awareness of local farmers about animal disease and help them to identify incidences of disease before it is too late. There are agro consultancy centers in each region where farmers can apply for consultation or obtain identification and registration for new animals. However, farmers do not use these services. Identification and registration of animals mainly take place during the periodic vaccinations. However, as some of the farmers have noted during the interviews, they are not sure whether or not their cattle have been vaccinated as they have been imported, mainly from European countries.

Despite implementing control measures, the National Food Agency (NFA) faces persistent challenges regarding animal health and food safety. The primary issue concerns the presence of unsafe meat products in the market. Regulatory guidelines strictly permit only certified beef from authorized slaughterhouses to be sold. A single veterinarian stationed at the slaughterhouses ensures livestock health, inspects meat conditions, and issues the necessary safety certificates. However, the practice of slaughtering animals outside authorized facilities persists, particularly among small-scale farms in Khulo, Ninotsminda, Akhalkalaki, and Akhaltsikhe municipalities.

4.5.2. Processing & Collecting Level

The collecting level of the value chain plays a critical role in ensuring animal health and food safety in dairy and meat production. However, it is important to note that there may be limited control at this level, primarily relying on the actions taken by collectors who transport cows and milk to slaughterhouses and processing plants. Here's how it impacts animal health and food safety:

1. Animal Health:
   - Traceability: If animals are registered and properly identified at the farm level, it enables traceability throughout the value chain. This means that the history and health status of the animals can be tracked from the farm to the shop. Traceability is vital for identifying potential health risks, monitoring animal health, and implementing necessary control measures.
   - Risk of Illegal Slaughtering: If animals are not registered, there is an increased risk of illegal slaughtering. Unregistered animals may not undergo proper health checks, vaccinations, or disease screenings, jeopardizing food safety and animal welfare. Illegal slaughtering can lead to the introduction of unsafe meat into the market.

2. Food Safety:
   - Control at Slaughterhouses and Processing Plants: While there may be limited control at the collecting level, strict regulations and control measures are typically enforced at slaughterhouses and processing plants. These facilities are responsible for ensuring food safety during the meat and dairy production process.
   - Compliance with Regulations: Slaughterhouses and processing plants must comply with food safety regulations, including hygiene practices, proper handling, and processing standards. This ensures that the meat and dairy products produced meet safety standards before they enter the market.
   - Traceability and Registration: If animals are registered and properly identified, it facilitates the traceability of meat and dairy products. This traceability allows authorities to monitor and verify the safety of products at each stage of the value chain.

4.5.3. Dairy Production Level

The National Food Agency (NFA) plays an important role in ensuring food safety at the dairy product production level in Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda regions of Georgia. Here's an overview of the NFA's responsibilities and activities in these areas:

- Inspections and Control: The NFA conducts periodic inspections of dairy production facilities in Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda. These inspections aim to assess the compliance of dairy producers with food safety regulations, proper hygiene practices, and adherence to quality standards. The NFA ensures that dairy products are produced under sanitary conditions, minimizing the risk of contamination and ensuring consumer safety.
- HACCP Implementation: The NFA encourages and oversees the implementation of Hazard Analysis and Critical Control Points (HACCP) systems in dairy production facilities. HACCP is a preventive approach to food safety that identifies, and controls hazards at critical points in the production process. The NFA ensures that dairy producers follow HACCP principles, helping to prevent potential risks and maintain high food safety standards.
- Laboratory Testing: The NFA's Laboratory of the Ministry of Environmental Protection and Agriculture (LMA) plays a crucial role in dairy product safety. The laboratory conducts various tests on milk and dairy products to assess their quality and safety. These tests may include microbiological, chemical, and physical analyses to detect potential hazards and ensure compliance with regulatory standards.
- Training and Awareness: The NFA provides training and awareness programs to dairy producers in Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda regions. These programs aim to enhance knowledge and understanding of food safety practices, hygiene standards, and proper dairy production techniques. By increasing awareness, the NFA empowers dairy producers to implement good manufacturing practices and ensure the safety of their products.
- Regulatory Compliance: The NFA ensures that dairy producers in these regions comply with food safety regulations, labeling requirements, and other relevant legal obligations. This includes the accurate and clear labeling of dairy products, which helps consumers make informed choices and promotes transparency in the market.

4.5.4. Market Level

At the market level of meat and dairy production, the National Food Agency (NFA) plays a crucial role in ensuring food safety. Here's an overview of the NFA's control measures and requirements:

- Periodic Inspections: The NFA conducts periodic inspections of marketplaces to assess the compliance of shops selling meat and dairy products with food safety regulations. These inspections aim to ensure that proper hygiene practices, storage conditions, and handling procedures are followed to maintain the safety and quality of the products.
- Prohibition of Non-Slaughterhouse Beef: Shops are strictly prohibited from selling beef that is not produced in registered slaughterhouses. This regulation ensures that the beef available in the market has undergone proper inspection and meets the required food safety standards. By restricting the sale of non-slaughterhouse beef, the NFA aims to minimize the risk of unsafe and unregulated meat entering the marketplace.
- Certificate Form #2 and Marking: Beef placed in shops should have a certificate known as Form #2, which indicates that the meat has been inspected and deemed safe by the NFA. This certificate serves as evidence that the beef has undergone the necessary control measures and is fit for consumption. Additionally, the beef should be appropriately marked, allowing consumers to identify the certified products.
- Time Limit for Sale: The NFA mandates that beef at the shop should be sold within 48 hours of its arrival. This requirement ensures that the beef is sold while it is fresh and safe for consumption. It helps prevent the sale of expired or spoiled meat, reducing the risk of foodborne illnesses.
- Special Fridge Storage: The NFA specifies that beef should be kept in a special fridge at the shop. This requirement ensures proper storage conditions to maintain the freshness and quality of the meat. Adequate refrigeration prevents bacterial growth and helps preserve the safety of the beef.

4.6. Packaging and Transportation

The packaging and transportation challenges faced by farmers and producers in Akhaltsikhe, Akhalkalaki, Ninotsminda, and Khulo municipalities can significantly impact their ability to deliver products safely and efficiently to the market. The issues mentioned by the farmers highlight the following problems:

- Lack of Packaging Infrastructure: The absence of proper packaging facilities limits farmers and producers from packing their products adequately. Packaging plays a crucial role in preserving product quality, extending shelf life, and ensuring food safety. Without access to suitable packaging equipment and materials, farmers may struggle to maintain the freshness and integrity of their products.
- Limited Transportation Resources: Insufficient transportation resources, especially refrigerated vehicles, pose significant challenges for maintaining the cold chain during product transportation. Many perishable goods, including meat and dairy products, require specific temperature controls to prevent spoilage and ensure food safety. The absence of refrigerated transportation options can result in compromised product quality and safety during transit.
- Financial Constraints: The high cost of packaging materials and transportation equipment, particularly refrigerated vehicles, creates financial barriers for farmers and producers. Investing in such resources can be prohibitively expensive for small-scale producers who may not have the necessary capital. Limited access to financing options or support further exacerbates the financial constraints faced by these farmers.
- Compliance with Food Safety Requirements: Proper packaging and transportation are essential for meeting food safety standards and regulations. Without adequate resources and infrastructure, small-scale farmers and producers struggle to comply with these requirements, putting the safety of their products at risk. This can result in limited market access, reduced consumer trust, and potential legal consequences.

The aforementioned challenges have significant implications that impose substantial constraints on producers at the early stages of the value chain. These constraints originate from the pronounced reliance on self-employed individuals for the transportation of goods from municipalities to major urban centers such as Tbilisi and Batumi. Payment for these transportation services is typically deferred and contingent upon prevailing market prices. A considerable portion of the transported cheese, facilitated by the local shuttle bus service, is sold within local markets in Tbilisi and Batumi. As reported by local farmers, there have been instances where the aforementioned self-employed individuals responsible for the sale of cheese have failed to fulfill their payment obligations, resulting in significant financial repercussions for the already low-margin business.

The limited storage infrastructure hampers farmers' ability to accumulate and sell cheese during periods of favorable market conditions, particularly in winter when prices tend to be high. Whereas, with the provision of adequate storage facilities, cheese can maintain its integrity over several months. The absence of such infrastructure renders farmers vulnerable to abrupt price fluctuations. However, some of the medium-sized processors stockpile the cheese throughout the year and start selling them in Fall. When faced with logistical challenges preventing the transportation of cheese to Tbilisi, Batumi, or local markets, most interviewed farmers indicated that they sell their goods at the earliest opportunity. Although instances of spoilage are infrequent, the lack of proper packaging exacerbates the issue by hindering consumers to differentiate between pure cheese and products derived from powdered milk. Certain farmers explain the absence of packaging on their farms with consumer behavior in Georgia, whereby price is frequently more important compared to quality. Consequently, they perceive the investment required for packaging and branding as not worthwhile.

4.7. Funding and External Stakeholders

4.7.1. MEPA

Georgia has a range of agricultural development projects funded by international donors and the state. These initiatives aim to strengthen various aspects of the agricultural sector. Technical and financial support is provided to enhance institutional arrangements at the national and regional levels, support the development of small and medium-sized enterprises (SMEs), empower women engaged in agriculture, strengthen primary production, and promote the growth of agricultural enterprises, food processing factories, and storage facilities. International donors collaborate closely with the Ministry of Environmental Protection and Agriculture (MEPA) to implement projects based on the specific needs of Georgia's agriculture sector, including areas such as animal husbandry and meat production. Currently, several ongoing projects are focused on strengthening market systems and developing agricultural production value chains.

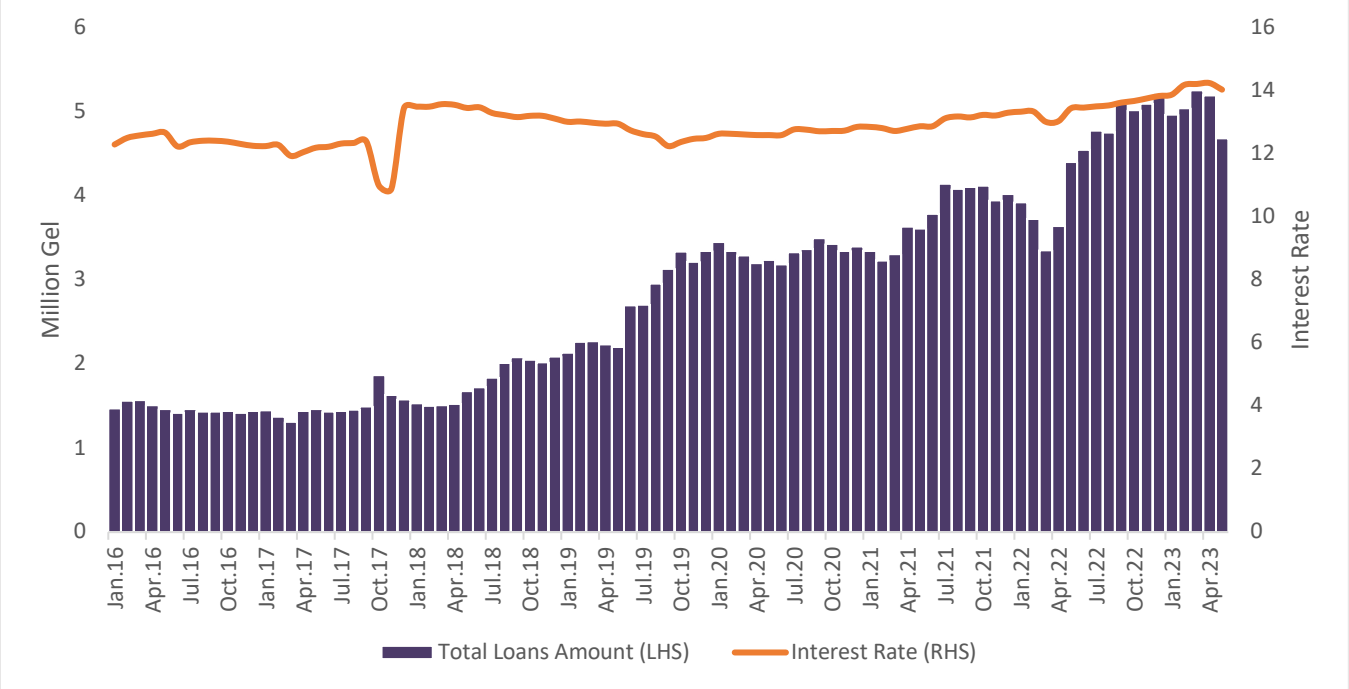
The Ministry of Agriculture and Environmental Protection (MEPA) takes the lead in initiating state programs for agricultural development, which are then implemented by its affiliated agencies. The Agriculture Projects Management Agency (APMA) provides direct financial and technical support to primary producers and agricultural enterprises. The Agricultural Cooperative Development Agency (ACDA) focuses on projects that support the development of agricultural cooperatives. The National Food Agency is responsible for projects related to food safety and security, as well as the protection of animal health and sanitary norms in the production process.

Established in 2012 under the MEPA, the Agricultural Projects Management Agency (APMA) aims to support rural development in Georgia. It operates under the framework of the "Unified Agro Project"

initiated by the Ministry. APMA's projects offer support schemes for the development of primary production and agro-processing enterprises in various agricultural fields such as tea production, horticulture, gardening, animal husbandry, and related services like the development of dry and cold storage facilities. Noteworthy APMA projects targeting animal husbandry and its supporting industries include:

- Preferential Agro Credit Program: Launched in 2013, this program aims to increase financial access for individuals involved in agriculture. Beneficiaries can obtain preferential loans to establish new enterprises or expand existing ones. The program covers primary production, agro-processing factories, packaging, and storage facilities. Banks make the loan decisions, with the state covering a portion of the interest rate (around 10%) and the agency providing secondary collateral. Loan amounts vary from 20,000 GEL to 5 million GEL, depending on the project type. Preferential agro loans also offer a grace period of up to 24 months for repayment, with the length depending on the loan amount and project type. As of June 2023, the total value of agricultural loans in the region of Samtskhe-Javakheti is over GEL 12 million. During the interviews, there were no farmers who had not taken an agricultural loan with preferential credit.

Graph 8: Agricultural Loans and Interest Rates in Samtskhe-Javakheti Region



Source: National Bank of Georgia

- Young Entrepreneur Project: Initiated in 2018 and supported by the Ministry of Environment and Agriculture (MEPA) in collaboration with the Denmark International Development Agency (DANIDA), this project aims to support young entrepreneurs in rural areas. It provides co-financing of 40% of the initial investment (up to 60,000 GEL) for establishing new enterprises in primary or secondary agricultural production. Beneficiaries also receive technical assistance through consultancy services and training to establish efficient management systems and processes. The program covers expenses related to drafting business plans.

- Farms/Farmers Registration Project: Started in 2018, this project aims to create a unified database of entities engaged in agricultural activities. The unified database will assist the state in developing targeted support mechanisms and selecting proper target groups.
- It is worth mentioning that organized farms and slaughterhouses actively utilize preferential agro loans to improve infrastructure and purchase necessary equipment for production processes. Both the preferential agro credit program and the young entrepreneur program provide funding for acquiring high-productivity cattle breeds as defined by Government Decree N139 of 2014, which includes breeds suitable for both beef production and milk production.

4.7.2. RDA

The Rural Development Agency (RDA) in Georgia is a government institution operating under the Ministry of Environmental Protection and Agriculture. Its main objective is to promote sustainable and inclusive rural development by focusing on enhancing agricultural productivity, improving rural infrastructure, and supporting rural communities.

The RDA plays a significant role in Georgia's rural development through various functions. It formulates and implements policies and strategies related to rural development, agriculture, and rural entrepreneurship. This includes conducting research and analysis to identify priority areas and develop action plans for effective rural development.

The RDA also administers funding schemes and grant programs aimed at supporting rural development initiatives. It provides financial assistance to farmers, agricultural enterprises, rural cooperatives, and community-based organizations to promote agricultural growth and enhance rural livelihoods.

4.7.3. SQIL

For the improvement of food safety and quality standards in Georgian bovine milk and beef production value chain, with the financing of United States Agriculture Department (USDA), within the scope of Food for Progress 2018 program, the US organization Land O'Lakes Venture 37 in partnership with the Georgian Farmer's Association started the market accessibility project "Safety and Quality Investment in Livestock" in 2019.

The main objective of SQIL project is to reduce the losses in dairy and beef production, improve safety and quality of the product, and increase competitiveness, productivity, and trading potential. The implementation of those objectives is done with five main components:

- Running a farm – SQIL offers various training activities for livestock farmers. In conjunction with the training, up to a dozen books were written as manuals, starting from setting up a farm, dealing with infections, increasing the productivity of the livestock, and satisfying quality standards. Recently, SQIL has started offering manuals for consumers, explaining in detail how to detect issues with dairy and beef products when buying them and how to store them afterward.
- Improvement of market access and strengthening sectoral associations – SQIL has created strategic documents for improving market accessibility, started online trainings in marketing, and had multiple meetings with B2B business representatives (soplidan.ge, glovo, wolt, mymakret.ge) to better facilitate and utilize the existing dairy and beef market.
- Market price analytics (MPIS) – Market Price Information Systems, or MPIS, started collecting pricing data in 2021. The data includes prices of raw milk, and various dairy products both in

supermarket chains and local markets, as well as cattle feed prices and the cost of veterinary services. MPIS data is used both by farmers for better planning and research centers.

- GeoGap – SQIL offers Global Good Agricultural Practices (GlobalGAP) certificates tailored for the Georgian market, named GeoGap. GeoGap certificate encompasses a broader range of criteria compared to HACCP, including food safety, environmental sustainability, worker health and safety, and animal welfare. SQIL offers professional help in implementing those criteria. As of now, there are 20 active GeoGap certified large and medium-sized farms in Georgia, one of which is in Samtskhe-Javakheti.
- Agro Map/Agronavti – Agro Map facilitates the integration of farmers with artificial insemination specialists, professional veterinarians, and clinics, as well as milk and beef processors. This is accomplished in collaboration with Agronavti, a service that provides tailored mentoring and expertise to meet the specific requirements of individual farmers.

As of now, 53 farms and educational institutions have been funded by the SQIL project, the total funding as of now amounts to USD 1.4 million. Initially being a 6 year project (2018-2024), it has been extended until 2026.

4.7.4. DIMMA

The Dairy Modernization and Market Access Project (DIMMA) is a project funded by the International Fund for Agricultural Development (IFAD) and is scheduled to be implemented from 2018 to 2024. The total budget allocated to the project is $53.4 million USD. DIMMA focuses on the dairy sector in Georgia with the objective of strengthening the country's dairy market system and supporting income growth for small dairy farms, particularly those located in mountainous regions.

The project targets the regions of Imereti, Samegrelo Zemo Svaneti, and Samtskhe-Javakheti. As part of the program, Georgia will receive a loan of approximately 16 million Euros for a duration of 18 years. This loan is intended to support institutional development and enhance the resilience of the dairy production value chain.

By strengthening the local dairy market system, DIMMA aims to create a positive impact on overall beef production as well. Since dairy farms are among the suppliers of livestock for beef production, improvements in the dairy sector can have indirect benefits for the beef industry. The project is implemented by the Ministry of Environmental Protection and Agriculture (MEPA), which plays a key role in overseeing its successful execution.

Through the Dairy Modernization and Market Access Project, IFAD aims to enhance the dairy sector in Georgia, improve the livelihoods of small dairy farmers, and contribute to the development and resilience of the dairy production value chain.

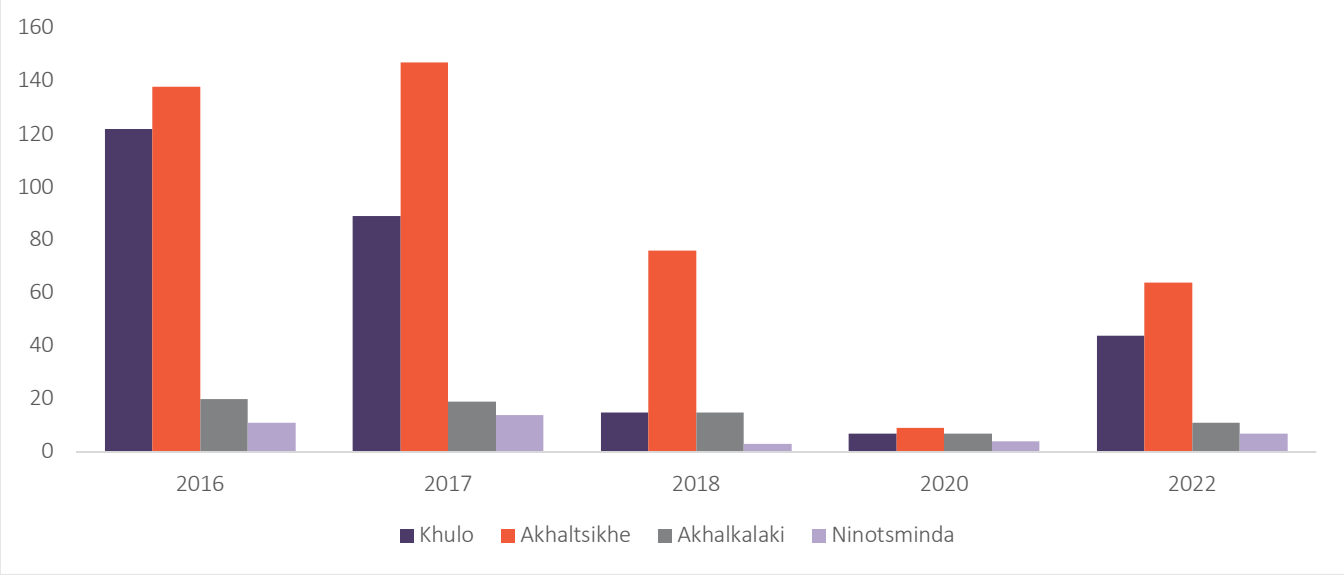
4.7.4. Enterprise Georgia

Enterprise Georgia, a legal entity of public law (LEPL) under the Ministry of Economy and Sustainable Development of Georgia, is actively involved in promoting entrepreneurial culture in the country, facilitating the establishment of new businesses, and providing grants and co-financing opportunities. Among the various programs administered by Enterprise Georgia, the Micro and Small Business Support (MSBS) Program (a program awarding micro-grants) is particularly relevant to the target area. The locals are well-informed about the program, and some of them have (successfully) participated in it. The program,

however, does not cover the activities that fall into section A (Agriculture, Forestry, and Fishing), as it mostly focuses on secondary rather than primary processing. This includes some activities of meat and dairy production.

According to the data from Enterprise Georgia, in the first five calls (2016-2022), a total of 8 million GEL was awarded to finance 823 business ideas in the municipalities of Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda. The following figure (figure 1) shows the distribution of these business ideas by municipality.

Graph 9: Beneficiaries of the MSBS program by year and municipality



Source: Enterprise Georgia

Out of these, only 5 business ideas, funded by a total of 106,000 GEL, were related to meat and dairy production. 4 of the 5 businesses are located in Akhaltsikhe municipality, and one business is located in Ninotsminda. In Khulo and Akhalkalaki, meat and dairy production-related ideas have not been funded within the program.

5. SWOT Analysis

SWOT Analysis	
Strengths	**Weaknesses**
• Abundant natural resources: The region possesses ample grazing land, favorable climate conditions, and water resources, providing a conducive environment for livestock production. • Cultural heritage: The municipalities have a rich tradition of livestock rearing and dairy production, which can be leveraged to promote unique and traditional products. • Local demand: There is a significant local market for meat and dairy products, providing a base for initial sales and growth opportunities. • Potential for export: The municipalities' strategic location and proximity to the Armenian border offer opportunities to tap into export markets for meat and dairy products. • Strong community networks: The close-knit communities in the region can foster cooperation and collective action among value chain actors.	• Limited infrastructure: Inadequate processing and storage facilities, outdated equipment, and weak transportation infrastructure hinder the efficient production and distribution of meat and dairy products. • Lack of value addition: The focus on primary production limits the potential for higher-value products, such as processed meats, specialty cheeses, and value-added dairy products. • Limited market linkages: Insufficient market integration and weak market information systems make it challenging for producers to connect with potential buyers and explore new market opportunities. • Skills gap: The absence of specialized training programs and limited technical knowledge in areas such as quality control, marketing, and value chain management pose challenges to competitiveness and innovation. • Sprawl: larger farms are in isolated rural areas, which further exacerbates transportation and labor deficit issue to the extent that relocation is sometimes necessary for the worker and their family. • Traditional farming methods: farmers are less willing to replace the traditional approaches of farming with newer methods while conserving unique cultural heritage. • Lack of AI: without advanced breeding methods like artificial insemination, it is impossible for farms to reach high-yielding rates. • Language barriers: although not an issue for locals communicating with each other, it clearly disincentivizes supermarket chains to purchase local dairy products.

Opportunities	Threats
• Growing consumer demand for quality products: Increasing consumer awareness and demand for safe, locally sourced meat and dairy products provide opportunities for value chain actors to cater to this niche market segment. • Tourism potential: The municipalities' natural beauty and cultural heritage can attract tourists, presenting an opportunity to develop agri-tourism initiatives and promote locally produced meat and dairy products. • Linkages with HoReCa: with the increasing tourism sector in Adjara region, farmers have the opportunity to supply the HoReCa sector with dairy and beef products. • Government support: The government's focus on agricultural development and rural economic growth provides opportunities for accessing funding, technical assistance, and policy support. • Collaboration with research institutions: Partnerships with agricultural research institutions can facilitate the adoption of innovative technologies and best practices in the sector, improving productivity and product quality. • Export potential: Expanding export markets and international demand for high-quality meat and dairy products present opportunities for value chain actors to diversify revenue streams. • Creating direct linkages with supermarket chains to avoid uncompetitive markets where	• Competing imports: The influx of cheaper imported meat and dairy products poses a threat to the local industry, especially if there is a perception of higher quality or lower prices. • Disease outbreaks: Outbreaks of livestock diseases can significantly impact production, trade, and consumer confidence in the meat and dairy value chain. • Climate change and environmental factors: Climate change-related challenges, such as extreme weather events and shifts in rainfall patterns, can affect livestock health, forage availability, and overall production. • Stricter regulatory constraints: Evolving regulations, sanitary and phytosanitary standards, and compliance requirements can create additional burdens for small-scale producers, limiting their ability to compete in formal markets. As of now, most of small-scale farmers comply with the minimum regulatory requirements, and even there they have financial trouble updating the certificates. • Limited access to information and technology: The lack of information dissemination channels and limited access to modern technology hinder innovation and competitiveness within the value chain. • Decreasing population: falling population rates of the municipalities can result in falling demand for local sellers, as well as strip farmers of valuable services and labor force.

knowledge of the quality of products is completely lost. • Horizontal integration: farms with larger output have higher reach, sufficient finances for packaging, and better-quality control to be able to sell directly to the high-end consumers.	

6. Recommendations

Based on the research conducted on the meat and dairy value chain in Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda municipalities, recommendations were elaborated for the development of the value chain focusing on economic growth, veterinary education, and service providers, governmental projects, animal health and food safety, artificial insemination support, labor force skills development, financial support and affordability, information campaigns, marketing, and managerial skills development:

6.1. Recommendations for Farmers

Breed replacement: Small to medium-scale farmers who own mainly endogenous Georgian breeds should start investing in more productive breeds. Though the price of high-yielding breeds can reach USD 3000, for households with cattle as their main source of income, replacing the breeds can increase the milk output by 100% without increasing the number of cattle. Furthermore, to avoid the high transport costs, such breeds can be bought from local large-scale farmers.

New breeding methods: Medium to large-scale farmers who already own high-yielding breeds, like Holstein, Jersey and Brown Swiss, should implement artificial insemination as the main breeding method instead of natural service (bull replacement every year). Though the service for AI is quite limited due to virtually nonexistent demand, a slow but steady transition can lower prices and make the use of AI ubiquitous. AI is a far safer method with far more noticeable results for productivity increase.

Financial Bookkeeping: One of the most important parts of running a farm is recording financial data. Unfortunately, most of the farmers in the target municipalities avoid bookkeeping altogether. To manage the farm more effectively and minimize the costs, financial documentation is heavily advised.

Confinement farms: Almost all of the farms in the selected municipalities are pasture-raised farms, where cows are free to graze outside of the farms. Implementing confinement-type farms, where cows will be in a somewhat controlled environment, will allow farmers to have more oversight over nutrition, diet, health, etc.

Better diet: Livestock food intake is mostly limited to grass and hay, especially in the municipalities of Ninotsminda and Akhalkalaki. Farmers should start by including energy-rich ingredients like corn, barley, and other protein sources in the livestock's diet. In conjunction with mineral and vitamin supplements like salt, calcium, selenium etc. the yields can be vastly improved with minimum financial costs.

Packaging: One of the main issues that milk processors face is the inability of consumers to differentiate their products from powdered milk-based products. Packaging dairy products and highlighting their advantages, safety, and quality should incentivize consumers to pay extra for better products.

Horizontal integration: A significant number of farmers have pursued vertical integration in their businesses, which involves activities such as feed collection, maintaining their own livestock for milking, milk processing, and transportation. Unfortunately, this approach often results in high prices due to the inefficiencies of a spread-out business model. Instead, farmers should consider horizontal integration within the value chain, focusing on the specific areas where they are most competitive. By consolidating raw milk suppliers and processors, benefiting from economies of scale, costs can be reduced while selling prices can increase. Furthermore, larger dairy farms and processors gain greater bargaining power, visibility with supermarket chains, and the financial strength to implement packaging innovations and higher quality standards.

Land management: Over-grazing is a common problem in the targeted municipalities. With the decreased quality of pasture, the yields of livestock also decrease. Farmers ought to be managing the usage of pasture lands to avoid over-grazing. This problem is especially relevant in Akhalkalaki, Akhaltsikhe, and Ninotsminda, but less relevant in Khulo.

Veterinary services: Professional veterinarians should be hired during calving and other necessary cases. In most cases, local veterinarians can give far better assistance than family members with limited knowledge of veterinary.

Higher quality and safety standards: Farmers should aim for the implementation of quality and safety standards other than HACCP, starting from Georgian standards like GeoGap to international standards like ISO 22000, GlobalGap, EU standards, and so on. Higher standards will ensure not only safer product but higher output as well as higher visibility for domestic and international markets.

6.2. Recommendations for public entities and international partners

Language trainings: offering sector-specific language trainings to the Armenian minorities in Ninotsminda and Akhalkalaki municipalities to overcome the language barriers between the targeted municipalities and the rest of Georgia.

Infrastructural projects: Improving road conditions and mountainous regions in the targeted municipalities to have better accessibility to markets and cattle feed during winter.

Labor force skills development: Collaborating with vocational training institutions to offer specialized programs on meat and dairy production, processing, quality control, and farm management. Offering workshops and training to veterinarians and promoting veterinary services.

Development of business-plan writing skills: Most potential grant applicants from target communities lack practical skills of business-plan writing, thus it is recommended to provide coaching sessions for addressing this issue. Moreover, this is most relevant for those minorities who have little or no knowledge of Georgian or English languages and are currently completely isolated from funding opportunities.

Facilitating connections: Due to the low visibility of farmers and processors in the targeted municipalities, effort should be put in increasing the visibility and facilitating connections between local producers and Georgian and international markets.

Smarter co-financing: Grants and funding should be aimed more at incentivizing farmers to increase the productivity of their farms, like purchasing various breeds, artificial insemination, and packaging, rather than funding various equipment, which only reduces the cost of running the farm.

Foreign expertise implementation: Due to the lack of expertise in the targeted municipalities (and the rest of the country), foreign experts should be invited to help the locals implement modern dairy production know-how.

Incentivizing certified standards: As of now, there are no short-term incentives for farmers to implement higher certified standards. Lump sum rewards or being a requirement for co-financing can encourage farmers to get the desired certified standards.

Incentivizing retail trade: Supermarket chains should be encouraged to purchase and selling dairy products produced from the targeted municipalities in their supermarkets. The initial phase of selecting the suppliers and hiring the workforce for quality control is the most expensive and vital step. Once the preliminary phase is complete, if this arrangement proves economically viable for all stakeholders involved, including market chains, consumers, and suppliers, the system should be self-sufficient, devoid of any reliance on external funding or additional incentives.

By implementing these detailed recommendations, the meat and dairy value chain in Khulo, Akhaltsikhe, Akhalkalaki, and Ninotsminda municipalities can experience significant advancements in economic growth, veterinary services, governmental support, primary production standardization and certification, animal health and food safety, artificial insemination support and breed improvement, labor force skills, financial accessibility and affordability, information dissemination, marketing strategies, and managerial capabilities. These efforts would contribute to the overall development and sustainability of the meat and dairy sector in the target municipalities.