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MILK SECTOR TRENDS: THE CASE OF ALBANIA

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ABSTRACT

Since the transformation of Albania's agricultural sector in 1992, it has shifted from subsistence farming to a thriving commercial industry, making a significant 17.7% contribution to the country's GDP. Among the agricultural subsectors, animal production, particularly in the dairy sector, plays a pivotal role in both farm income and market supply, contributing about 40% to the total agricultural value. Despite this positive trajectory, the dairy production sector is confronted with a set of challenges. This paper conducts a comprehensive analysis of the dairy sector in Albania, using a systematic methodological approach that involves primary and secondary data analysis. The analysis underscores the need for substantial improvements in various aspects of primary production. These improvements should primarily focus on feed and forage practices, specialized dairy breeds, and advanced animal husbandry techniques. Attention is also required for milking and milk collection, which includes maintaining high standards of hygiene, animal health control, milk safety, quality controls, and effective cooling systems. Furthermore, the conclusions highlight the significance of strengthening public extension services, motivating agricultural advisors, and providing financial support to address the knowledge gaps among farmers. Additionally, it is crucial to emphasize that Albania currently depends on net imports for various agricultural products, including milk, as it aligns with EU standards. This underscores the need for efforts to enhance competitiveness and food quality within the dairy sector. The findings of this study are based on the information and data accessible at the time of the analysis, and thus, they may not capture the entirety of the complexities within the dairy sector in Albania. The dairy industry is subject to various external factors, such as changes in global markets, trade policies, and economic conditions, which can influence its performance. In summary, while this research provides valuable insights into the challenges and prospects of Albania's dairy sector, readers should consider these limitations to understand the potential constraints and biases in the study, as well as the dynamic nature of the industry beyond the scope of this analysis.

Keywords: Milk; Animal production; Challenges; Trends.

INTRODUCTION

Albania is a small European country located in the south-eastern part of the continent, covering an area of 28,748 square kilometers. The population of Albania as of 1 January 2023, amounts to 2,761,785 inhabitants¹. The total land size of Albania is 2,875,000 ha, from which 699,000 ha or 24% is agriculture land, 36% forestry, 15% pastures and meadows, and 25% is classed as “others”.

Albania is transformed from the poorest countries in Europe to an upper-middle-income country [23, 21]. According to [4], Albania pursued major reforms, especially in the area of the rule of law, but also in other areas closely monitored by the European Union in the context of EU enlargement conditionality's and the approximation of legislation with the *acquis communautaire*. However, the state of economic reform is less optimistic, mostly due to the negative effects of the earthquake at the end of 2019 and the outbreak of the pandemic in 2020.

Structural, institutional, and legal changes are expected to yield long-term benefits. Since 2014, Albania's economy has steadily improved and economic growth reached 3,5% in 2022, from 1,8 and 2,8% in 2014 and 2015, respectively [23, 21]. Average annual inflation fell from 1,9% in 2015 to 1,3% in 2016, but it rose during 2022 and reached 8,3% in October of that year [21]. Remittances, a significant catalyst for economic growth, declined from 12-15% of GDP before the 2008 financial crisis to 5,1% of GDP in 2020, primarily from Albanians residing in Greece and Italy [7]. GDP per capita in 2022 stood at only 32% of the EU 27 PPS² [7]. Public debt in 2016 was 84,06% of GDP [24].

Albania remains primarily a rural economy, with agriculture contributing 17,7% of GDP [7]. Presently, 38,89% of the population continues to live in rural areas [18], and farming remains the primary employment option for people in these areas. Agriculture and services sectors employed 33,8 % and 44,3 % of the total workforce in 2021 [10]. Agriculture in general and especially livestock farming, plays a vital role in income generation for a significant number of families living in rural areas. Livestock production is considered the backbone of Albania's agriculture and occupies a crucial place in the Albania's overall agricultural production. In 2019, the animal production provided 45% of the value of agricultural production compared to 42% in 1992 and

¹INSTAT: Population of Albania on 1st January 2023, <https://www.instat.gov.al/en/themes/demography-and-social-indicators/population/publication/2023/population-of-albania-on-1st-january-2023/>

² Purchasing Power Standards

35% in the 80ies [15,19]. Dairy products constitute a main source of food, and a significant proportion of production still serves subsistence purposes.

Albania has a rich tradition of milk production due to its favourable natural resources for cattle and small ruminants. Livestock is an important component of the farming system for the rural people. It generates cash income through the sale of animals and their products, serves as draught power for small holder farm operation, as a means of transportation, and also is used for direct consumption, as fertilizer, etc. Mixed crop-and-livestock and dairy farms are labour-intensive: typically, the average Albanian small livestock farm is managed by 1 to 2 family members. Family labour continues to be the most important, while in large farms except the family members there are also employees being hired.

Cattle production dominates in the plains, while hilly and mountainous regions are more suitable for small ruminant breeding. Albania boasts extensive pastures and hay land (15% of its territory) and animal breeds adapted to its natural conditions, particularly small ruminants.

The total milk production is 970 thousand tons and 85,05% of it comes from cows [11]. Most of milk producers are semi-subsistence households, and their production is used for self-consumption, direct sale to consumer, or for animal feeding. However, the dairy sector in Albania has faced challenges such as outdated farming practices, lack of modern infrastructure, and inconsistent milk quality standards. These challenges have affected the sector's competitiveness and its ability to meet European Union (EU) quality and safety standards. Improving farmers' knowledge should start with enhancing the public extension service, motivating advisors, and providing financial support. Albania's pursuit of EU membership has driven efforts to increase competitiveness and food standards.

In parallel with the process of sector consolidation, polarisation is ongoing. A segment of the sector is improving (investing to overcome weaknesses to exploit opportunities), while another is in a defensive position (i.e. facing threats that risk exacerbating weaknesses): i) From one side, a formalised, modernised and enlarged segment of dairy farms works with an equally formalised and modernised segment of dairy industry, which made important investments in scaling up size, increase quality and widened range of products. ii) On the other side, small dairy farms are scaling down their output and use most of their raw milk for self-consumption, as animal feed, informal direct sales, sales to small and micro dairy plants. Many of these small plants are semi-formal, produce two-three traditional types of dairy products (always the same); relevant products are much less controlled at any level (raw milk quality, milk processing, risk of commercial sophistications etc.).

A more complex phenomenon is the decline of eco-pastoral systems in inner and mountain areas, with related decline of traditional small ruminants breeding and all related supply chain. In the last decade, small sheep farms (those with 50 ewes or less) witnessed a 35% reduction in number, with an important impact on the whole commodity chain. At the same time, the few successful examples of large goat farms adopted a completely rupture with the past, establishing large new farms with imported breeds and an intensive production structure adapted to hilly areas and lowland, which represent a total discontinuity with the traditional goat farms, which are increasingly located in mountain areas: another, different type of polarisation.

Despite agriculture's importance for the national economy, Albania imports 70% of its total food requirements, with processed and imported foodstuffs being costly. Albania is a net importer of protein meals for animal feed. Albania imports all its soy-related products, mostly from neighboring countries, as soybeans are not locally produced. Albania produces a significant amount of maize, mainly for animal feed. During 2020, 96,000 tons of animal feed worth \$45 million were imported into the country. The demand for animal feed is rising due to growing investment in the livestock sector [13].

Apart from land fragmentation, the Albanian agriculture suffers from critical structural problems such as: i) underdeveloped irrigation and drainage systems, ii) deficient infrastructure, iii) limited access to markets, iv) underdeveloped agro-food industry, v) low technological level, vi) lack, and when in place weakness of farmer organizations, and vii) limited access to credit [6, 8].

As Albania aims for closer ties with the EU, it strives to enhance competitiveness and food standards for better import/export relations in agriculture and food products.

This research aims to assess Albania's dairy industry, highlighting its current condition, performance of dairy sector, analyze the dairy sector challenges, and key factors affecting milk production and distribution efficiency within the sector. In addition, few suggestions are provided to improve the situation.

2. MATERIALS AND METHODS

The milk sector analysis combines qualitative and quantitative methods utilizing both primary and secondary data sources. The primary data was gathered through semi-structured interviews and a structured survey conducted with milk producers.

More specifically, there are two categories of primary data:

- (i) Semi-structured in-depth interviews.

- a. Interviews with value chain operators. The interviewed farmers were all commercial or semi-commercial operators. Whereas processors were of different typology (as shown in the relevant section).
- b. Interviews with sector experts from both the public and private sectors and with leading operators at each stage in the value chain.

For semi-structured in-depth interviews, there were prepared interview guidelines, which were tested and fine-tuned before implementation.

- (ii) Structured survey with extension surveys. This questionnaire, has detailed questions related to farm structure, trends of the number of farms by size, and also past trends and expected trends of investments. Another similar section is designed for agro-processing, differentiating by subsector and size when applicable.

The secondary data was retrieved from data published by the Ministry of Agriculture of Albania³, INSTAT, desk studies, detailed information collected from dairy farms, and input from focus group meetings with livestock experts from public and private organizations were used. Numerous field visits were carried out to identify sector issues and obtain a comprehensive understanding of its structure and performance. Stakeholder opinions on policy intervention were also collected during these focus group meetings. A review of previous studies, along with relevant reports, was undertaken. However, the main constraint encountered was the absence of statistics for certain indicators, with some data points stemming from 2018 and 2019 due to a lack of recent statistics.

Secondary data had various gaps in availability and quality. The primary gap pertained to structural statistics, such as farm-level data by structure and processing capacities, and the absence of market information. Farm-level data remains absent in Albania, and the implementation of the Farm Data Accountancy Network (FADN) has not yet occurred.

Limitations in milk production data also stemmed from factors like highly variable yields, self-consumption, or the use of milk for young animals. Inconsistencies in data arose from the informality prevalent in the Albanian economy, where industries do not always declare their output out of fear that it will be disclosed to tax authorities. Additionally, inadequacies in the agricultural statistical system further exacerbated these issues.

3. RESULTS AND DISCUSSIONS

³Ministry of Agriculture full name was Ministry of Agriculture and Food (MoAF) for the period 1992-2005; Ministry of Agriculture, Food and Consumer Protection (MAFCP) during 2005 and 2013; Ministry of Agriculture, Rural Development and Water Administration (MARDWA) during 2013-2017; and as of 2017, following institutional changes, it is named Ministry of Agriculture and Rural Development (MARD),

In Albania, the livestock sector has undergone full privatization and notably initiated this process even before land privatization, successfully completing it in 1993. Both the Albanian government and the Ministry of Agriculture and Rural Development (MARD) exhibit a strong inclination to support primary production. A key objective they have declared is the enhancement of product competitiveness, with the ultimate aim of reducing imports.

Milk production occupies a central role in Albania's livestock industry and has garnered top priority status from the government [15, 17]. Dairy products constitute a primary source of sustenance, and a significant portion of the production continues to serve subsistence needs. Several fundamental factors closely interlink with milk production, including:

- Historical management practices for dairy animals in Albania.
- The ongoing demand for dairy products.
- The daily income generated from milk sales.
- Milk's pivotal role in augmenting protein-based diets.

3.1 Dairy Farm Structures

The land privatization program, initiated in 1991, led to a primary production structure characterized by exceedingly small plot and herd sizes. Official data [9] from 2013 revealed a total of 355,436 farms, of which 305,839 were engaged in livestock keeping. There was a slight decrease in farm numbers by 2019, with 351,600 units reported [12].

Farms in Albania exhibit characteristics of limited arable land and high fragmentation. Over the last decade, the average farm size has grown by 21%, from 1.04 ha per farm in 2002 to 1.26 ha per farm in 2020[1], though it remains exceptionally small. The average plot size stands at a mere 0.26 ha.

Concerning *bovine dairy farming*, the majority of milk production units in 2018 were very small, with one to four cows per farm and their offspring. Specifically, 63.7% of farms were breeding only one cow, 32.8% were breeding two to four cows, 2.65% were breeding 5-10 cows, and a mere 0.85% of farms were breeding more than 10 cows, with an average of 1.82 cows per farm [16].

In terms of dynamics, the period between 2015 and 2018 witnessed a decline in all cow farm groups, resulting in an overall 3.8% reduction in the total cow herd in Albania, as depicted in Figure 1 below. This trend reflects both an increase in productivity per head in semi-commercial farms and the overall fragility of the milk sector.

Milk production is highly fragmented, but it's important to note that most farms with one or two cows primarily produce milk for self-consumption or as animal feed. Despite the reduction in the

number of heads in the last decade, particularly in small farms (3-5 dairy cows), 96.5% of dairy cattle are found on farms with fewer than five dairy cows, which is considered the minimum viable size for a dairy cattle farm. Larger farms, although lacking precise data, contribute more than 15% to the cow milk supply due to significantly higher productivity.

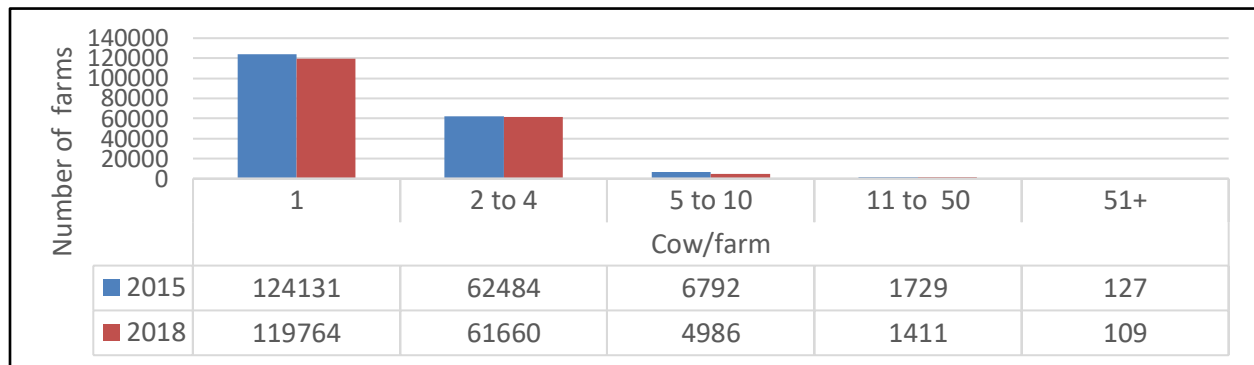


Figure 1: Cow farm structure in 2015 and 2018. (Source: Elaboration of the author on MARD data, 2016 and 2019).

In small ruminants' dairy farming, only 21.1% of sheep farms and 16.1% of goat farms have flocks exceeding 50 ewes/does. These farms are not only small but also inadequately equipped. The primary goal of post-collective agricultural farms was subsistence [14]. Farming practices revolve around cereals and vegetables, mainly for family consumption and surplus sales.

This situation leaves minimal room for farmer-driven strategies or adaptable public policy instruments. The available data shows that only 8.6% of sheep farms and 7.2% of goat farms maintain populations exceeding 100 ewes/does. According to a study by AGT and DSA⁴, a sustainable small ruminant farm requires a minimum of 130 ewes/does.

Table 1: Number of ewes and does in 2018

Description	Total		Ewes/does/farm	Number of farms by ewes and does (heads)				% of farms more than 50 heads
	Farms	Number of animals		1-50	51-100	101-200	201+	
Sheep	36,555	1,366,100	37,4	28,832	4,583	1,917	1,223	21,1
Goats	24,244	698,975	28,8	20,349	2,141	1,178	576	16,1

Source: MARD, unpublished reports, 2019,

⁴Milk Sector Study Report, Carrying out selected sectorial analysis as a solid ground for the preparation of IPARD III programme and of Strategy for Agriculture, Rural Development and Fishery 2021 – 2027, Project number: 2017.2192.7-001.00

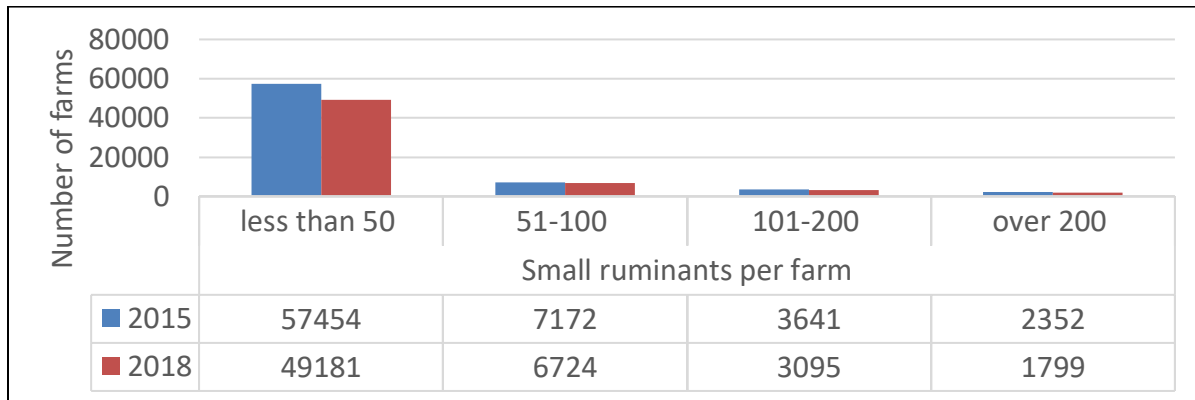


Figure 2: Small ruminant’s farms by size in 2015 and 2018
 (Source: Elaboration of the author on MARD data)

Figure 2 (above) illustrates the disparity in small ruminant farm numbers between 2015 and 2018. The count of dairy farms specializing in small ruminants (ewes and does) experienced a substantial overall decline from 2015 to 2018 (-14.4%). The decrease in farm numbers was more pronounced among larger dairy establishments, with farms having more than 100 ewes/does witnessing a 15% reduction, and those with over 200 ewes/does experiencing a noteworthy 23.5% decrease in just four years (2015 to 2018).

3.2 Dairy Animal Population and Farms Profile

Cattle Population Trends: The cattle population in the region initially declined between 1991 and 1992 due to livestock privatization and subpar production, resulting in widespread slaughter. However, from 1993 to 1996, cattle numbers rebounded, reaching a peak of 806,000 (including 483,000 cows). The subsequent decline can be attributed to farmers retaining their best cows for breeding. In 2022, compared to 2000⁵, there was a significant decrease in the numbers of cows, ewes, and does by 41.8%, 25.1%, and 29.6%, respectively, with 298,000 cattle and 261,000 cows recorded. There is scepticism about the accuracy of these figures, especially regarding calves and heifers kept for replacement and non-productive animals.

In 2018, on average, each farm family was responsible for overseeing 2.48 cattle, with 1.82 of them being milking cows. The majority of cattle are kept in lowlands, and farms can be categorized into three groups: small farms, medium farms, and large farms.

⁵The highest number of cows and ewes.

Small farms, which breed fewer than 10 cows⁶, provide limited concentrate during the morning feed and allow cows to graze near canals and harvested plots during the day. In the afternoon/evening, they are fed hay, straw, and concentrates (corn and wheat bran). Cows in small farms are often kept tied and housed in poorly ventilated shelters. Hand milking is common, and cooling tanks are not available. A recent trend among small farmers is to refrain from milking cows altogether. When one cow calf, they purchase a seven-day-old calf from medium or large farms and let both calves suckle the cow since they are not interested in milk due to higher price of meat. Waste management is a significant issue at the farm level, with most of the slurry left uncollected.

Medium farms (11-50 heads) typically provide cows with the same feed ration throughout the year, including silage, hay, and a concentrate mixture. They often use movable milking machines and cooling tanks, especially those with more than 20 cows. Hygiene in stables, cow management, and milking processes is lacking. Some farms with up to fifty cows have improved shelters to meet National Minimum Standards. A new trend is the use of beef breeds for insemination (approximately 40%-50% of cows are inseminated with breeds like "Belgian Blue," "Charolais," and "Limousine"). Mastitis is a problem as they do not use the California Mastitis Test (CMT) to prevent subclinical mastitis.

Large farms (more than 51 heads) typically feed cows the same ration year-round, including corn and grass silage, hay, and compound feed with corn, wheat bran, soybean meal, vitamins, and mineral premix. These farms produce over 7,000 liters of milk per cow per year. They utilize milking parlors and have cooling systems in place. The milk quality meets standards for UHT milk, with low somatic cell counts (SCC) and microbiological load. They have invested in collecting manure and slurry, either for use on their land or sale to other farmers.

Table 2: Number of dairy animals 1990-2022

Description	Years													
	1990	1992	1996	1997	1998	2000	2002	2005	2010	2015	2017	2019	2021	2022
Cows	301	324	483	432	423	448	435	430	355	357	349	316	278	261
Ewes	1,143	1,234	1,453	1,372	1,395	1,448	1,414	1,312	1,337	1,417	1,407	1,257	1,116	1,085
Does	776	857	895	840	764	800	698	701	576	700	717	671	599	563

Source: Statistical Year books of MoAF, MARD, INSTAT for the period 1991-2023

Small Ruminant Population Trends: The sheep population increased between 1992-1996 and has since been stable. Conversely, goat numbers declined by about 25% in 1997 due to financial pyramid schemes, with figures from 1992-1996 being unreliable. While numbers increased from

⁶Law "On Livestock Breeding", No 9426, date 6,10,2005, article 15,

1998-2002, they fell again after 2017. Most farms that have sheep also keep goats. The average size of sheep flocks and goat herds is 37.4 ewes and 28.8 does, respectively, with small herds for family consumption remaining common.

Small ruminant farming methods include extensive systems with transhumance, semi-intensive systems, and grazing near the farm or natural pastures. These animals are often kept alongside dairy cattle. However, manure and slurry management remains problematic.

Grazing and Winter Feeding: Grazing is a primary dietary source for small ruminants, with careful selection of grazing locations. In winter, animals rely on a mixture of pasture hay, hay from ditches, straw, and crop by-products[6], cited by [3]. The winter feed ration is low in protein and vitamins, with pregnant ewes and does receiving concentrate feed around lambing/kidding. Some farmers have shifted from milk to meat production.

Most small ruminants are kept in the highlands in the north and south of the country, where abundant pastures are crucial natural resources. In recent times, medium and large herds of small ruminants' graze at high altitudes in summer when pastures are productive, moving to lower altitude pastures in autumn. Grazing is a primary dietary source, and herders select grazing locations with care. After October, animals are brought to the valleys for winter and rely on a mixture of pasture hay, hay made in ditches, straw, and crop by-products.

Specialized Farming: A few farms specialize in breeding exotic breeds such as Alpine and Saanen goats, and Lacuna or Awasi sheep, achieving higher milk yields of 600-800 litres per goat or sheep. They maintain a year-round breeding system[2].

Regional Distribution: The regions with the highest cattle populations are Fier and Korçë, accounting for 13.74% and 11.76%, respectively. Vlorë and Korçë have the largest numbers of ewes at 24.71% and 17.70%, and does, with 18.79% and 12.84%, respectively [11].

In summary, the cattle population in the region has experienced fluctuations over the years due to factors like privatization and breeding practices. Small, medium, and large farms each have distinct characteristics in terms of feed, milking, and waste management. The small ruminant population, consisting of sheep and goats, has faced its own challenges, with some farms focusing on specialized breeding and shifting from milk to meat production. Regional distribution patterns also highlight the concentration of cattle, ewes, and does in specific areas.

3.3 Milk Production

For the period spanning from 1991 to 2017, there was a consistent increase in milk production, except for the years 1997 to 1998⁷. The peak production was achieved in 2017, surpassing 1990 levels by more than double. Initially, the rise in the number of animals was the primary factor driving this production increase, but starting from 1997, there was a noticeable increase in yield.

However, since 2018, milk production has been on a decline. One of the contributing factors to this decrease is the reduction in the number of cows and ewes, resulting in a 16.1% drop in cow milk production, a 20.7% decrease in sheep milk, and a 12.7% decrease in goat milk production in 2022 compared to 2017.

The primary reason for this decline in milk production is that many farmers have chosen to sell their cows and transition to vegetable production in greenhouses, particularly in areas like Fier, Lushnje, and Berat. This shift is driven by relatively high production costs and low profitability in the dairy sector. Additionally, economic challenges and insufficient policies to support livestock production have led to many farmers leaving the country. Another contributing factor, especially for small ruminants, is that the younger generation is not interested in managing sheep and goat herds.

In terms of milk sources, approximately 85.1% of raw milk is produced by cows, 7.1% by sheep, and 7.8% by goats (as indicated in Table 3).

Table 3: Milk production 1990-2022 (1000 tons)

Description	Years													
	1990	1992	1996	1997	1998	2000	2002	2005	2010	2015	2017	2019	2021	2022
Total milk	517	612	1044	849	861	948	1010	1076	1070	1131	1156	1112	1013	970
Cow milk	421	486	895	707	722	807	878	930	930	964	983	946	859	825
Sheep milk	44	55	70	68	72	70	69	75	77	87	87	82	74	69
Goat milk	52	71	79	74	67	71	63	71	63	80	87	84	80	76

Source: Statistical Year books of MoAF, MARD, INSTAT for the period 1991-2023

3.4 Milk Yields in Albania's Dairy Sector

⁷The milk production decreased for several reasons such: (i) as a result of the financial pyramid schemes, (ii) the Government of 1992-1996 had the tendency to increase the figures out of reality, (iii) as well as the Government that took power in 1997 decreased the figures just to show in the years to come that their policies were effective.

Cattle: In 2022, the average milk yield per cow in Albania reached 3,114 litres, which represents a significant improvement compared to the 1990 figure of 1,398 litres. However, this yield remains notably lower than the EU-27 average, which stands at nearly 7,000 litres per cow annually. Several factors contribute to this lower yield:

- ⇒ Crossbreeds Predominance: The majority of cows in Albania are crossbreeds rather than purebred, which can limit their milk production potential.
- ⇒ Feeding and Nutrition Practices: Inadequate feeding and nutrition practices, often relying on low-quality feed consisting mainly of alfalfa hay and silage, hinder milk production.
- ⇒ Fertility and Health Challenges: Challenges related to the fertility, health, and overall welfare of the cows' further impact milk yields.

In lowland areas, where farming is more intensive, crossbred cows with Holstein genetics make up 45% of the cattle population. In hilly areas, which are less intensive, crossbreeds with Jersey genetics dominate, constituting 34% of the population. Other breeds like Simmental, Brown Swiss, NRF⁸, Tarentaise, and a few local breeds also exist. It's worth noting that only 60% of cows undergo artificial insemination, with all bull semen being imported [16].

Another factor affecting small-scale dairy farms is the relatively small body weight of the cows. These farms often rely on natural mating, and the cows' small body weight, typically ranging from 350 to 450 kg, contributes to the lower milk yield.

Small-scale dairy farms in Albania typically house their cows in basic stables and feed them fresh forage while allowing grazing on grasslands and meadows during the spring and summer. In the winter, cows are fed hay and supplemented with concentrate feed and minerals. Modern stabling systems and more sophisticated production practices are mainly adopted by larger farmers.

Small Ruminants: Albania has a rich tradition of sheep breeding. Around 33% of the sheep population comprises local breeds, suitable for both milk and meat production, known for their adaptation to local conditions. Key local breeds include Recka, Ruda, and Bardhoka. The remaining 67% of the sheep population is crossbred with imported breeds. Over the years, breeds focusing on milk production, such as Awasi, Lacuna, and Greek breeds, have been introduced. As for goats, approximately 89% of the goat population consists of native breeds or ecotypes, preserving their unique characteristics in various regions, with names like Hasi and Mati in the north, Capore of Mokrra and Liqenas in the southeast, and Dukati and Muzhake in the south.

⁸Norwegian Red Breed

Farmers typically rely on empirical traits and information for selecting rams and bucks, often exchanging them every second year to prevent inbreeding. Natural mating is commonly used for sheep and goats bred in pastures far from populated areas. These autochthonous sheep and goat breeds, adapted to harsh environmental conditions and quality pastures, are cost-efficient for milk and meat production. The average live weight for sheep ranges from 30 to 55 kg for females and 45 to 80 kg for males. In contrast, goat ecotypes weigh between 35 and 55 kg for females and 40 to 80 kg for males [20].

A few specialized farms focus on milk production and maintain exotic breeds like Alpine and Saanen goats and Lacuna or Awasi sheep. These farms achieve milk yields ranging from 600 to 800 litres per goat or sheep, employing year-round breeding systems.

In conclusion, Albania's dairy sector faces challenges in achieving higher milk yields, attributed to factors like crossbreeding, feeding practices, and smaller body sizes of cows. However, the country maintains a diverse landscape of breeds, emphasizing local adaptation and efficiency. Some specialized farms achieve higher milk yields through the use of exotic breeds and modern practices.

Table 4: Milk yield 1990-2022 (in liters)

Description	Years													
	1990	1992	1996	1997	1998	2000	2002	2005	2010	2015	2017	2019	2021	2022
Cow	1,398	1,500	1,853	1,636	1,707	1,801	2,018	2,163	2,620	2,700	2,817	2,981	3,090	3,114
Ewes	38.5	44.6	48.2	49.6	51.6	48.3	48.8	57.2	57.6	61.4	61.8	65.2	66.3	63.6
Does	67.0	82.8	88.3	88.1	87.7	88.8	90.3	101.3	109.4	114.3	122.5	125.4	133.5	129

Source: MARD (2010), INSTAT (2015-2023) and author calculations.

The region of Fier records the highest cow yield, reaching 4,319 kg, which is 39% higher than the country's average. Conversely, the regions of Gjirokaster and Kukes report cow yields 30% and 38% below the national average, respectively. In Durrës, milk yields from ewes and does are significantly higher, with 96.5% and 52.7% more than the country's average, respectively [11]. This is attributed to the presence of newly established small ruminant farms in the area, which utilize highly productive imported breeds specialized for milk.

3.5 Profile of Main Value Chain Operators in Albania's Dairy Sector

The dairy sector in Albania is characterized by a multitude of cow breeders, each with distinct practices and challenges. These operators can be categorized into three main groups based on the size of their operations: small-scale cow breeders, small ruminants' breeders, and large farms.

3.5.1 Dairy Farmers

Small-Scale Cow Breeders Profile:

Small cow breeders in Albania typically have fewer than 10 cows. They often lack knowledge regarding animal health and welfare, leading to issues with milk quality standards. Market difficulties result in relatively low milk prices, and some farmers sell the milk directly to the open market or deliver it to households, at higher price.

Medium-sized farms (with more than 20 cows) generally provide better animal care, maintain improved hygienic conditions, and adhere to higher milk quality standards.

They often sell their milk to dairy processors, enjoying better relations with these processors and achieving slightly higher prices compared to smaller farms.

Large farms (100 or more cows) have significantly increased milk production and quality meeting UHT milk standards. They receive a price of 50% more than the small farms. A recent trend is the sale of calves at just seven days old, particularly by farms specialized in milk production.

Small Ruminants' Breeders Profile:

Small ruminants' breeders usually maintain herds of fewer than 50 animals, often a mix of 2-3 cows and 10-20 small ruminants. These herds are typically found in villages and are grazed in communal pastures. Milk from these herds is supplied to local milk collectors or processors.

In highland regions, large herds of small ruminants are common due to abundant pastures. The overall quality of milk is often low due to issues with milking hygiene. Some specialized goat farms prioritize quality, have supply contracts with dairy plants, and even operate their own processing facilities and retail shops. Prices for sheep and goat milk vary by region, ranging from 160-200 ALL per litre.

3.5.2 Feeding System and Input Supply:

Permanent pastures covering around 440,000 hectares and approximately 217,660 hectares of forage crops are used to feed animals. Forage crop yields are relatively low, averaging around 32.8 tons per hectare. The total production of forage crops is approximately 7,138,798 tons [11]. Challenges include obtaining high-quality seeds and limited fertilizer use for forage crops.

Fodder crops have increasingly replaced cereals like wheat over the last 30 years. Major inputs in dairy production include farm-grown forage or pasture and family labour. Concentrate feed is used to a lesser extent. Animal feed prices are high, posing an obstacle to productivity increases, particularly in cows and fattening bulls. Consequently, a kilogram of compound feed for cows costs 25-35% more than 1 kilogram of milk. Animal feed is primarily produced by feed mills, including AGROTECH, AIBA, DRIZA, and ARNA, which sell to small, medium, and large dairy farms. Suppliers of agricultural and livestock inputs encompass several categories, such as traders of agricultural inputs (seeds, chemical fertilizers, pesticides, and in some cases, animal feed or ingredients). These traders include importers, wholesalers, and agricultural pharmacies. Their numbers are significant, with 130 of them being members of the AFADA⁹ association, which collectively controls over 80% of the market for these inputs.

3.5.3 Milk Processing Plants Profile:

The milk and dairy industry is the second-largest industry in Albania, accounting for 12.8% of total enterprises. In 2022, approximately 110,000 tonnes of milk were collected, with cow's milk decreasing by 7.8%, while sheep and goat milk increased. The number of enterprises has remained relatively stable over the last decade, ranging between 312 and 320 units. It's important to note that these figures only represent the formalized sector. The actual size of the industry may be much larger, as there are hundreds of informal processing plants not included in official statistics¹⁰. Large-scale processing plants have modernized, with medium-sized dairy plants also using modern equipment.

Milk processing plants can be categorized as small, medium, or large.

Small plants often use traditional technology (and hygiene standards can be a concern) and produce traditional cheeses and dairy products, supplying informal shops and households.

Medium-sized plants produce cheese, butter, and curd, supplying local shops and traders (several of them operate their own shops, exclusively selling their dairy products).

⁹AFADA- Albanian Fertilizers and Agro-Business Dealers Association (AFADA) was established in 1993, fully supported by IFDC-USAID project. **AFADA members' supply farmers with** fertilizers, plant protection products, quality seeds (wheat, corn, vegetables, fodder, etc.), animal feed, greenhouse building materials, spray pumps, sampling and seedling, etc. AFADA offers also a wide range of services for its members such as: information on agricultural inputs both, local and international; legal counsel; links with other donors and financial institutions; technical consulting with local and foreign experts.

¹⁰MARD and ADAMA unpublished report.

Large processors invest in technology, storage capacity, and produce various dairy products, supplying supermarket chains and other outlets. They produce a wide range of products, including pasteurized milk, skimmed milk, yogurt, butter, cheese, fruit yogurt, and UHT milk. They also organize their distribution logistics, including cold storage cars, supplying supermarket chains, traditional dairy shops, and other outlets throughout Albania.

Larger processors often provide guidance to farmers on milk treatment, antibiotic use, and milking and post-milking hygiene. To achieve and improve standards, larger processors tend to use written contracts specifying milk quality and financial aspects.

Milk processors often rely on *milk collectors* for the supply of raw milk. There are two types of collectors: employees of the processing plant who work for the company on a salary basis and independent intermediaries who purchase milk from farmers, add a margin for their costs and profit, and sell to processors under long-term arrangements. Larger processors may employ a combination of these collector types.

3.5.4 Market and Trading Channels:

Four main categories of traders exist in the dairy sector.

- i. Supermarket chains receive supplies from larger and medium-sized processors. Cheese is sold both packaged and unpackaged.
- ii. Specialized dairy product shops prioritize quality and are typically supplied by small processors.
- iii. Convenience shops found in every neighbourhood and offering a wide range of products, including cheese. They are supplied by small or medium-sized dairy processors and intermediaries.
- iv. Bakeries, some of which also sell dairy products alongside bread and bakery items. They often have refrigerated counters and connect with larger dairy processors.

Additionally, short value chains involve farmers supplying milk directly to households and processing dairy products on the farm.

3.5.5 Access to Advice and Information:

Small dairy farms have limited access to information about inputs and best practices. Farmers are often unaware of animal husbandry requirements and standards. However, even when farmers are aware of these requirements, they often fail to comply with them. For instance, many farmers are aware that they shouldn't use milk from cows treated with antibiotics, yet they still use or sell

such milk. Input dealers and AFADA members often inform them about the proper use of inputs, including plant protection products (PPP) for forage crops, but many farmers either forget or neglect this information, as there's little to no compliance control at the farm level.

3.6 Milk Quality, Animal Health and Environment Issues.

3.6.1 Milk quality:

The control of milk quality remains weak due to various factors, including direct sales by farmers and lack of awareness regarding milk hygiene. Small scale farms don't send milk samples for testing, primarily due to the cost involved. Large and medium-sized dairies have implemented quality control systems. Closed cooling chains from producer to consumer remain rare, and EU quality and food safety standards have yet to be fully implemented. Small and mixed farms often overlook quality considerations. Contracts between farmers and collectors are typically based on trust and longstanding relationships [3].

3.6.2 Health Situation and Use of Veterinary Medicines:

Microbiological contamination of food poses health threats. Brucellosis, Anthrax, and Tuberculosis (primarily affecting sheep and goats) affect livestock in various regions [23]. Poorly regulated use of antibiotics in animal production carries health risks, impacting both animal health (leading to infectious diseases) and human health, primarily due to the development of multi-resistant strains of microbes. Limited access to hoof care expertise leads to production issues and health problems for animals. The control of zoonotic diseases is often deficient.

In conclusion, Albania's dairy sector comprises diverse operators with varying practices and challenges. Small-scale farmers face knowledge gaps, quality issues, and low prices, while larger farms and processors invest in technology and quality control. Challenges related to animal health, food safety, and input use persist, highlighting the need for improved support and regulation within the sector.

3.6.3 Environment:

One of the primary environmental challenges faced by dairy farms is the management of animal manure and slurry. Except for large dairy cow farms, most do not have adequate manure storage facilities. Improvements are needed, including specific regulations for proper manure and slurry storage, along with raising awareness among farmers about air and water pollution, as well as the health risks associated with poor manure management.

3.7 Extension Service:

The Albania National Extension Service (ANES) is fully funded by the MARD, consists of 260 agronomists and livestock specialists spread across regional and district levels, complemented by 120 Agricultural Information Centers. Farmers access guidance from diverse sources, including the Public Extension Service (PES), Agriculture Technology Transfer Centers (ATTCs), the Agriculture University of Tirana, donor-supported projects, and private sector organizations. The structure is illustrated in Figure 3 below.

Field advisors are responsible for offering information, consultation, and training to farmers. ANES supports around 70,000 farmers annually, covering less than 25% of the total farming population.

ANES holds the potential to be a linchpin in Albania's Agricultural Knowledge and Innovation System (AKIS). However, a recent reorganization reduced regional units from 13 to 4, with minimal changes in their relationship with MARD despite their renaming as agencies.

Despite the changes and achievements in the extensive service, this sector still faces significant challenges:

- ⇒ A low specialist-to-farmer ratio (1:1,700).
- ⇒ Overly broad responsibilities for extension specialists, often extending beyond their specific areas of expertise.
- ⇒ Insufficient financial support, comprising investments and operational costs for extension activities, constitutes only 1.5% of the budget.
- ⇒ Aging specialists (average age: 55) with limited IT skills.
- ⇒ Limited expertise in farm management, marketing, and business planning.
- ⇒ Difficulty in providing up-to-date information, hindering technology adoption.

ANES possesses the potential to catalyse technological progress on farms. However, this potential remains unrealized due to inadequate funding, limited professional development opportunities, obsolete technology, lack of strategic direction, and leadership and management issues.

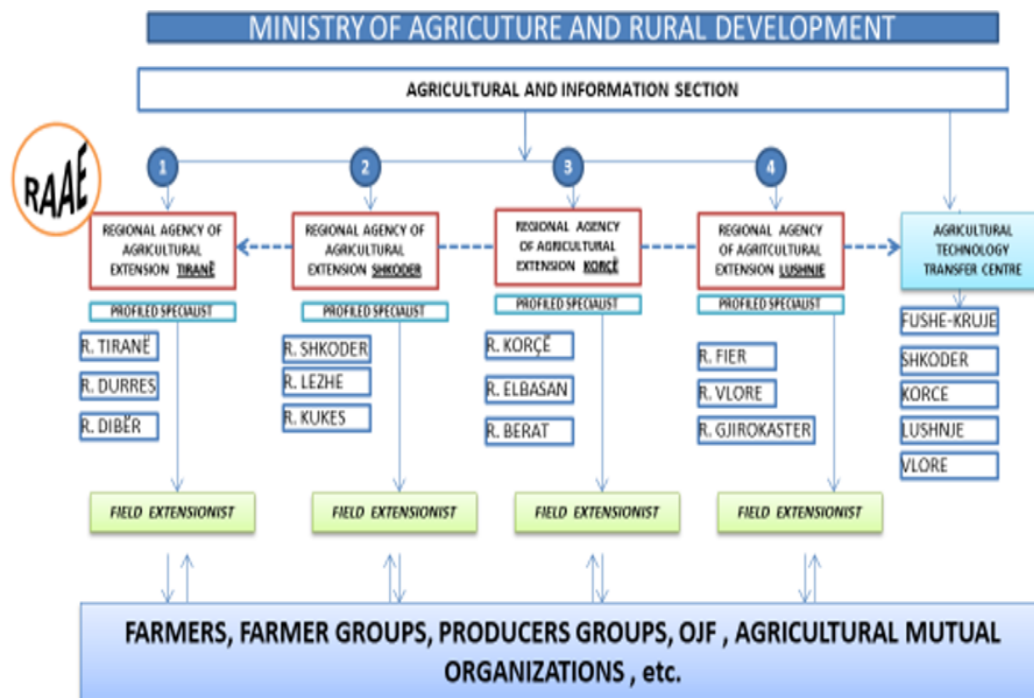


Figure 3: The organization of ANES

Source: IPESA- Strategic Action Plan 2020-2021

3.8 Main policy documents and financial support

Strategic Framework for Agriculture and Rural Development: The Ministry of Agriculture and Rural Development (MARD) in Albania operates within a strategic framework defined by two key documents:

National Strategy for Development and Integration (NSDI): This overarching document sets the goals and policies for agriculture and rural development in Albania.

Inter-Sectorial Agriculture and Rural Development Strategy (ISARD): ISARD further elaborates on NSDI by outlining sector-specific, sub-sector, and crosscutting strategies. It defines objectives, measures, and associated costs for policy implementation, all aligned with NSDI provisions. ISARD focuses on three policy areas:

- (i) National Support Schemes for Farmers, Rural Infrastructure Development, and Equal Opportunity Assurance: This encompasses programs to support farmers, enhance rural infrastructure, and ensure equitable opportunities.

(ii) Rural Development Policy: Specific policies aimed at rural development fall under this category.

(iii) Institutional Development, Implementation, and Enforcement of EU Regulatory Requirements: This area concentrates on strengthening institutions responsible for enforcing EU regulatory standards and policies.

Legal Framework for Agriculture and Rural Development: The Law on Agriculture and Rural Development¹¹ serves as the core legal framework for the sector in Albania. It lays the foundation for national support schemes, which are detailed annually in the National Action Plan. This law also designates the institutions responsible for implementing agricultural policies and establishes the Agriculture and Rural Development Agency (ARDA). It governs policy measures related to agriculture and rural development, guides public extension services, research, and training within the agricultural sector.

Support for the Milk and Dairy Sector: The milk and dairy sector in Albania has received significant support through various programs:

IPARD-like funding: During the first IPARD programming period (2007-14), approximately 1.54 million Euros were allocated to the dairy sector.

IPARD II: Covering the period from 2014 to 2020, IPARD II provided around 10 million Euros in support for the sector. These investments have had a notable impact on major dairy processing plants, resulting in improved product quality and the expansion of product lines. Some factories have also enhanced production technology, enabling them to export milk and cheese.

Despite the difficult environment and constraints, support to milk producers and processors has proved to be effective, if companies that have potential to generate large increases in employment and sales are supported to serve as a model to other farms and SMEs.

Support for the Agriculture Sector: The agriculture sector receives support through public programs, including the National Support Schemes (NSS), which operate on an annual basis. Additionally, national co-financing for IPARD II through the Rural Development Programme contributes to sector development.

¹¹No.9817, date 22.10.2007

Since 2013, NSS has allocated 44 million Euros¹² to support milk production through eight measures. These schemes typically span one to four years.

The NSS-2020 objective was the increase of competitiveness of livestock and agricultural products and by providing support to investment and reduce the production cost. The problem with NSS is that the subsidy schemes have traditionally been changing from year to year (often drastically), and the budget allocated always was not more than 25 million Euro, the lowest from the South West Balkan countries.

International Development Projects in the Milk Production Sector: While IPARD and NSS have been primary sources of support for the milk sector, a few international development projects have offered direct or indirect assistance to milk production in Albania since 2007. Notable projects include PROMALI¹³ (completed in 2012) and SARED¹⁴ (2014-18), both of which included components aimed at strengthening the small ruminants' sub-sector.

SARED, in particular, facilitated capacity building for 727 small ruminants' breeders and feta micro-processors. The project also administered a small grants program through ARDA, providing grants similar to IPARD-like funding. These grants primarily financed small investments, with an average size of approximately 25,000 Euros, focusing on equipment and machinery acquisition in the small ruminants' sub-sector.

According to the project monitoring and evaluation documents, the combination of the advisory services and grant facility was considered very effective in providing good results for farmers and processors; in this way capacity development proved to be effective in generating a sustainable impact of the project.

4. FINDINGS

These findings provide an overview of the state of the milk sector in Albania, highlighting its challenges and opportunities for improvement:

¹²ARDA data and author calculations

¹³PROMALI, a program funded by DANIDA and implemented by SNV focused on three value chains: (i) small ruminants, (ii) fruit, and (iii) MAPs). It provided capacity building and directly implemented some small investments.

¹⁴SARED (Support to Agriculture and Rural Economic Development), financed by DANIDA and GIZ provided support to four value chains: (i) medicinal and aromatic plants, (ii) fruits and nuts, (iii) small ruminants, and (iv) rural tourism. All SARED supported investments were under 10 M ALL. The average supported investment scored 3.2 M ALL.

Privatization and Government Support: Albania's livestock sector, including the milk industry, underwent privatization in the early 1990s. The Albanian government and the Ministry of Agriculture and Rural Development (MARD) have been committed to supporting primary production and enhancing product competitiveness to reduce imports.

Importance of Milk Production: Milk production is central to Albania's livestock industry, serving subsistence needs and receiving top priority from the government.

Small-Scale Dairy Farming: Land privatization resulted in small farm sizes, with many milk production units having only one to four cows. Larger farms significantly contribute to cow milk supply due to their higher productivity.

Small Ruminant Farming: Small ruminant dairy farming consists of inadequately equipped farms, focusing on subsistence with dwindling sizes, while larger farms have faced substantial declines.

Cattle Population Trends: Cattle populations in Albania experienced fluctuations, declining in the early 1990s due to privatization, rebounding, and more recently, facing significant decreases.

Milk Production Trends: Milk production consistently increased from 1991 to 2017, with a subsequent decline since 2018 due to factors like farmers transitioning to vegetable production and economic challenges.

Milk Yields: Average milk yields per cow have improved over the years but remain lower than EU averages, attributed to factors like crossbreeds, feeding practices, and cow health.

Profile of Main Value Chain Operators: The dairy sector in Albania encompasses small-scale cow breeders, small ruminant breeders, and large farms, each facing unique challenges and opportunities.

Feeding System and Input Supply: The dairy sector relies on pastures and forage crops for animal feed, facing challenges related to high animal feed prices and limited fertilizer use for forage crops.

Milk Processing Plants: Albania has various milk processing plants categorized by size, with small plants using traditional technology, and larger processors investing in technology and diversifying dairy products.

Market and Trading Channels: Dairy products are distributed through various channels, including supermarkets, specialized shops, and direct farmer-to-household sales.

Access to Advice and Information: Small dairy farms have limited access to information and often struggle with compliance, emphasizing the need for better guidance.

Milk Quality and Health: Milk quality control, particularly for small-scale farms, remains weak, and health issues like brucellosis and antibiotic misuse pose risks.

Environmental Challenges: Proper animal manure and slurry management present significant environmental challenges for small dairy farms.

Extension Services: The Albania National Extension Service (ANES) plays a vital role but faces challenges like limited funding and low specialist-to-farmer ratios.

Policy and Financial Support: Albania has established frameworks and financial support programs for the milk and dairy sector.

5. CONCLUSIONS

This research underscores the profound significance of Albania's agricultural and livestock sectors, particularly its dairy industry, which has undergone transformative changes over the past three decades. While challenges remain, the potential for positive impact on the nation's economy and the livelihoods of its citizens is substantial.

The findings point to the enduring nature of small-scale, fragmented, and low-input farming systems within the sector. These challenges underscore the pressing need for comprehensive strategies to enhance farm productivity and establish robust market connections. Despite these constraints, the steady increase in livestock output, attributed to advancements in techniques, feeding, and animal health care, is an encouraging sign of progress.

One of the most noteworthy aspects of this research is the centrality of the dairy sector within Albania's livestock industry. This importance extends to both economic development and the generation of employment opportunities. This finding should not be underestimated, as it highlights the critical role policymakers must play in promoting rural economic diversification and boosting farm productivity.

The research has illuminated both the government's commitment and the allocation of substantial resources to support the dairy sector through initiatives like the IPARD program. While these investments have yielded some positive results, they have also exposed persistent challenges. The research demonstrates the need for further efforts to formalize the dairy industry, ensure the safety of milk and dairy products, and create a more integrated and efficient supply chain. The

observed polarization trend in the dairy sector between formalized and semi-formalized segments emphasizes the urgency of this matter.

Furthermore, the research identifies the challenges faced by small ruminant dairy farms, including depopulation, inadequate pasture investments, and low milk prices. The exceptional success of goat milk production through intensive breeding provides a hopeful example for future endeavours.

Environmental concerns also come to the fore, with improper management of animal manure and slurry posing significant threats. Addressing these issues is not just a matter of environmental sustainability but also a means of ensuring the long-term viability of the dairy sector.

To fully unlock the potential of the dairy industry, there are key areas for primary production improvement, including optimizing feed and forage practices, introducing specialized dairy breeds, adopting advanced animal husbandry techniques, improving milking practices and hygiene, enhancing animal health control, and ensuring milk safety and quality throughout the supply chain.

In conclusion, the significance of this research is underscored by the pivotal role of the dairy sector in Albania's agricultural and economic landscape. While challenges persist, the findings offer a roadmap for policymakers and stakeholders to address these issues comprehensively. By bridging the gap between formalized and informal segments, enhancing environmental sustainability, and increasing access to qualitative raw milk sources, Albania's dairy industry can truly flourish and further contribute to the nation's economic growth and rural development.

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