**Review paper**

# STATE, TRENDS AND PERSPECTIVES OF ORGANIC LIVESTOCK PRODUCTION IN THE REPUBLIC OF NORTH MACEDONIA: A REVIEW

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## ABSTRACT

This study explores the status and trends of organic livestock breeding in North Macedonia, focusing on cattle, sheep, and goats. While organic livestock breeding plays a vital role in sustainable agriculture, the cattle sector faces significant challenges, characterized by a decline of 41.12% in herd size from 2009 to 2023, primarily due to structural issues and economic pressures. Sheep breeding shows more promise, with organic sheep comprising 16.07% of the national flock, demonstrating resilience despite market challenges. Goat breeding, historically affected by governmental restrictions, has seen slow recovery, with organic goats representing 6.42% of the national herd. The research utilizes official data from relevant governmental and certification bodies to provide a comprehensive overview of the organic livestock sector. The findings highlight the need for enhanced market recognition and structural improvements to foster growth and sustainability in organic livestock breeding. As the sector continues to evolve, strategic investments in education, infrastructure, and marketing will be crucial for maximizing its potential and supporting local farmers.

**Keywords***:* North Macedonia, Organic livestock breeding, Ruminants, Sheep, Goat, Cattle

## INTRODUCTION

Organic agriculture is increasingly recognized as a sustainable alternative to conventional farming practices. In the world, there is an increasing demand for organic agricultural products, including organic animal products (Peng, 2019). Given its emphasis on sustainability and environmental stewardship, organic agriculture encompasses various practices, including organic livestock breeding. In the Republic of North Macedonia organic livestock breeding plays a significant role as a part of the organic agriculture, with cattle, sheep and goats being the three main livestock species Organic animal husbandry can serve as an effective approach to address various challenges in the agricultural sector—such as sustainability, food quality and safety, authenticity, and product traceability—while aligning with consumers increasing focus on animal welfare, health, environmental protection, and value-added products (Antunović et al., 2020). However, while consumers expect high animal health and welfare in organic farming, there are doubts about whether these organic systems achieve this better than conventional animal husbandry systems (Sundrum et al., 2010; Sutherland et al., 2013).

According to the latest data of North Macedonia State Statistical Office (SSO), the country has an agricultural area of 514375 ha, arable area of 514375 ha, meadows 59299 ha and pastures 735694 ha (SSO, 2024). Cattle breeding system in the country is characterized by high proportion of small farm holdings and low distribution of modern dairy cattle farms. The

presence of semi-nomadic extensive system and stationary extensive breeding system are specific for sheep breeding in the country, while goat breeding is defined as stationary extensive breeding system.

The above mentioned systems of livestock breeding are part of organic breeding, and farmers are continuously supported by the government through different level of subsidies for organic livestock breeding. The support measures are aimed at ensuring market-sustainable organic production and wider application of the agri-environmental approach. The measures are applied in the national program for financial support of agriculture as direct payments per organic cattle, sheep and goat heads and additional special direct payments for expert control and certification of organic production (Martinovska Stojcheska et al., 2022). Organic livestock breeding is characterized by providing appropriate animal welfare, environmental protection and producing food with added value (Senčić et al., 2011). Another specific of organic livestock breeding is defined by utilization of natural resources in remote areas ensuring better adaptation of animals to environmental conditions (Antunović et al., 2011). According to Sanders (2013) the existence of appropriate regulation is the foundation for national certification within EU member states and non-member states, even if the range of certifications may vary between countries. Organized activities in the field of organic agriculture in the Republic of North Macedonia have been noticed since 2000 (El Bilali et al., 2014). The legal framework in the country was established by adopting the Law on Organic Agricultural Production in 2004. The National Strategy for Organic Agriculture for 2008-2011 was adopted in 2007, and one of the national goals was to achieve 2% of the total agricultural area to be used for organic production. A revision of the national legislative framework was present in the following years, and finally the Law was completely harmonized with EU Regulations in 2016 (Isufi et al., 2021). In the Republic of North Macedonia, the first National Plan for Organic Agriculture 2013-2020 set even higher priorities, such as arable land under organic production to have a share of 4% in the total arable agricultural land in the country and 4% of the total certified animals in organic livestock farming (including beekeeping and fisheries) from the total livestock fund in the country (MAFWM, 2013). Regarding the control system of the organic production in the country, there are two certification bodies -Balkan Biocert and Pro-Cert-that are authorized by the Ministry of Agriculture, Forestry, and Water Management (MAFWM) for control and certification in organic production. Given the widely recognized importance of organic farming at the EU level and the significant differences in its development across European countries (Pânzaru et al., 2023), this paper aims to provide a general overview of organic livestock breeding in the Republic of North Macedonia while identifying current trends, and exploring perspectives and opportunities for further development in this sector.

## MATERIALS AND METHODS

An analysis of the state and potential of organic livestock farming in the Republic of North Macedonia was conducted using data from the SSO of the Republic of North Macedonia, the MAFWM, and published research from various authors. The analysis also incorporated findings from EU statistical reviews to provide a comprehensive overview of trends and perspectives in the sector. Additionally, a SWOT analysis was performed for organic ruminant farming, highlighting the challenges, opportunities, strengths, and weaknesses faced by this sector in the country. The results are illustrated through graphs and tables compiled by us, drawing on various sources to contextualize the findings (Eurostat, 2024; SSO, 2024; SSO,

2024a; MAFWM, 2024; MAFWM, 2023; MAFWM, 2022; MAFWM, 2021; MAFWM, 2019; MAFWM, 2016; MAFWM, 2013a; MAFWM, 2010; MAFWM, 2009).

## RESULTS AND DISCUSSION

### Short overview of the ruminant sector in the country

Animal husbandry plays an important role in the country's agricultural sector, although there are noticeable negative changes present in recent years. Ruminant breeding in the country in the last fifteen years is characterized by the presence of a negative trend, reflected in a decrease of the number of heads. Cattle breeding in the country is characterized by undesirable trend that indicates a continuous decline of the national herd (Figure 1).

The number of cattle heads in all categories decreased by 41.12% from 2009 to 2023, however, there is a trend of increasing the number of heads per farm (Figure 1). The trend of decreasing the number of cattle is also affected by the reduction of the total number of cattle breeders, the depopulation of the villages, the small holding of agricultural land per farmer, the unresolved legal matters for the legalization of farms, the increase in the price of the feed, the electricity, the labor, the low level of farm automation (MAFWM, 2021).

Several factors, like age structure of breeders, lack of labor force, farm size and breed structure, depopulation of rural areas, economic factors, climate change, and environmental conditions will determine the future development of the sheep breeding sector in the country (Porchu & Dzabirski, 2019). A negative trend is noted in sheep breeding, where we note a decrease of 22.27% in the number of sheep over the last fifteen years (Figure 1).

Goat breeding in the Republic of North Macedonia has a specific history. In 1947, the government of the former Socialist Republic of Macedonia imposed an administrative ban on goat breeding on the territory of Macedonia (Official gazette, no. 88, 1948, Y: IV), a measure that had disastrous consequences for goat production. Unfavorable state measures significantly affected the further development of goat breeding, resulting with the loss of goat breeding tradition, lack of scientific activities in the field, as well as the loss of consumption habits of goat products. The goat breeding prohibition period lasted for more than forty years (Porchu & Dzabirski, 2020). Although there have been fluctuations in the national goat flock, data analyzed from 2009 to 2023 reveals a decrease of 9.02% (Figure 1).

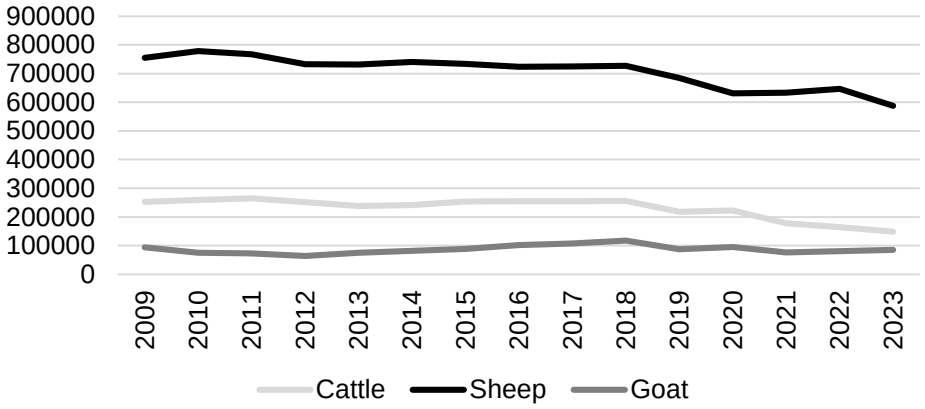


Figure 1. Trends in livestock populations: cattle, sheep, and goats, 2009-2023, (State Statistical Office, 2024)

### Organic ruminant sector in the country

Organic farming has gained attention in recent years as interest grows in assessing the impacts of CAP reform and how it can contribute to transforming EU agriculture into a more

sustainable model (Lampkin et al., 2000). Antunović et al. (2024), notes that in the last decade, organic animal husbandry has been increasing in the Republic of Croatia and across many EU countries, reflecting a positive trend towards sustainable practices in the region. In North Macedonia, this transformation encompasses various agricultural practices, including a notable emphasis on organic livestock, which is recognized for its environmental benefits, contribution to biodiversity development, and sustainability of rural areas.

The main ruminant species involved in organic livestock breeding in the Republic of North Macedonia are sheep, cattle, and goats. Data from the last fifteen years (2009-2023) reveal trends in organic livestock breeding, highlighting specific information for each species. Throughout this period, sheep have been the dominant species among registered organic ruminants in the country, with the lowest participation in 2021 (88.96%) and the highest participation in 2010 (94.63%) (Figure 2). In contrast, cattle and goats have remained significantly behind sheep, each representing less than 5% of total organic registered ruminants. Interest in organic goat breeding remained stable until 2016, when organic goats were the second most prevalent species, aside from a brief spike of organic cattle in 2011 (4.2% vs. 4.13%) (Figure 2). However, between 2017 and 2023, there has been a decline in the number of registered organic goats, while the number of organic cattle has been increasing, making them the second most abundant species in the country.

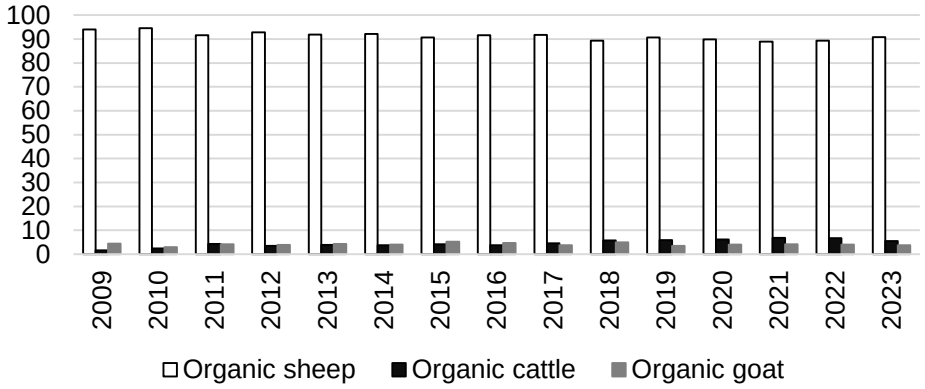


Figure 2. Analysis of organic ruminant species in North Macedonia: trends and changes, 2009-2023, (State Statistical Office, 2024a)

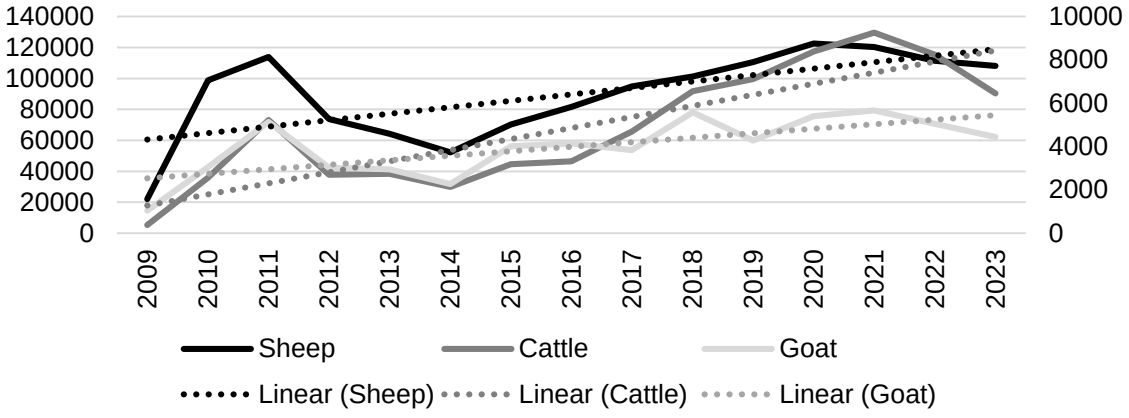


Figure 3. Trends in organic livestock certification as a percentage of total livestock, 2009-2023, (State Statistical Office, 2024a)

During the analyzed period, the number of organic ruminants in the country showed a positive trend in general, the number of cattle increased by 1610.07% from 377 to 6447; the number of sheep increased for 390.64% from 22052 to 108197; and the number of goats increased by 327.43% from 1039 to 4441 heads (Figure 3).

The total number of livestock certified as organic in relation to the total livestock fund in the country during the analyzed period ranged from 3.4% (2009) up to 5.51% (2021) (Figure 4). Although the goal of National Plan for Organic Agriculture 2013-2020 of certifying over 4% of the total livestock as organic was achieved in 2011, this figure fluctuated until it was again reached in 2019 (4.69%), in the period from 2011 to 2018, there is a decrease in the number of livestock certified as organic in relation to the total livestock fund. The upward trend continued into 2020 (5.11%) and 2021 (5.51%). However, this rate declined to 4.50% and 4.23% in 2022 and 2023, respectively (Figure 4).


Figure 4. Fluctuations in organic livestock certification rates in relation to total livestock fund (State Statistical Office, 2024a)

Official data for organic milk production in the country has been available since 2020. Sheep's milk accounts for the largest share of organic milk production, with production ranging from 84.24% in 2021 to 88.52% in 2023 (Figure 5). Organic goat milk production has shown stability but remains low, fluctuating between 9.73% (2023) and 12.87% (2020) of total organic milk. Conversely, organic cow's milk production has seen a significant downward trend (Figure 5). In general organic milk production in the country increased by 169.80% from 1020.53 t to 2753.34 t.

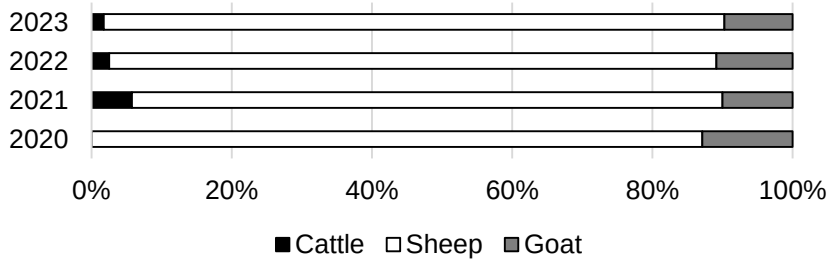


Figure 5. Trends in organic milk production by species, 2020-2023, (State Statistical Office, 2024a)

**Organic cattle breeding and milk production**

There has been low interest in organic cattle breeding in both categories, cattle in conversion and organic cattle. The organic cattle sector achieved the target set by the National Plan for Organic Agriculture 2013-2020 later than anticipated, reaching 5.22% in 2021. The

goal of maintaining over 4% of registered organic cattle was also met in 2022 (5.00%) and 2023 (4.03%), in conversion (1.99% and 2.29%) and organic (3.01% and 2.04%), respectively (Figure 6).

The organic cattle herd represents a small share of the national cattle herd, ranging from 0.15% (2009) to 5.22% (2021). Slight growth is noted in 2011 (1.97%) compared to the previous two years. In the period from 2012 to 2017, the number of organic cattle shows fluctuations with a presence of organic cattle below two percent, a gradual growth has been identified from 2018 (2.56%) to 2021 (5.22%). In the next period (2022-2023) there is a trend of slight decrease of the organic herd of cattle in relation to the national herd of cattle but it is still maintained above 4%. Continued decrease of cattle heads in the category organic is present from 2021 until 2023, (3.71%, 2.04%, respectively) however, an opposite trend was noted in the conversion category during the same years in transition, were number of heads in these categories raised from 1.59% to 2.29% (Figure 6). The organic cattle sector remains in its developmental phase, with growth lagging significantly behind that of EU member states. For instance, the Republic of North Macedonia has only 4.74% of its national cattle herd classified as organic, while leading EU countries such as Greece (45.78%), Sweden (23.88%), and Austria (23.03%) report much higher proportions (Eurostat, 2024).

Conventional cattle dairy farming remains dominant in the country, with organic cow's milk comprising a very small percentage of total production, less than 0.10 % (Figure 7). This limited share makes organic cattle milk production unattractive and unrecognizable to dairies. Although organic cattle breeders may focus on organic meat production, official data on organic cattle meat is lacking, and there is no separate classification for organic versus conventionally produced meat. As a result, buying centers and slaughterhouses do not differentiate organic products, leaving farmers without a pricing premium for their organic milk or meat. The organic cattle milk in the period from 2021 to 2023 decreased by 78.77% from 227.5 t to 48.3 t.

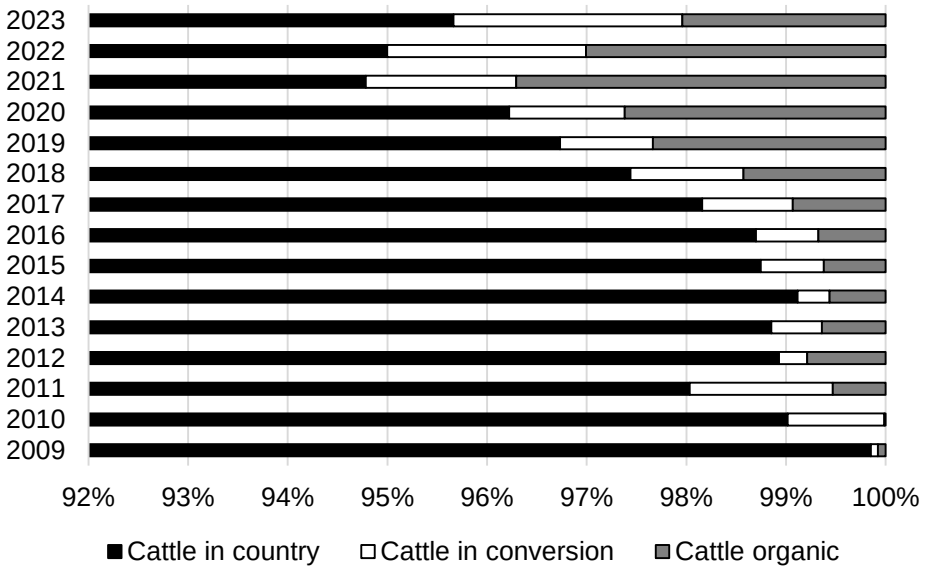


Figure 6. Trends in organic cattle breeding, 2009-2023, (MAFWM, 2009; MAFWM, 2010; MAFWM, 2013a; MAFWM, 2016; MAFWM, 2019; MAFWM, 2022; MAFWM, 2023)

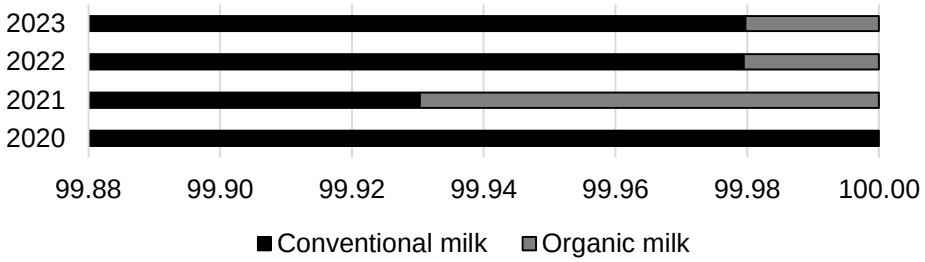


Figure 7. Cattle milk production conventional vs. organic, (State Statistical Office, 2024a)

**Organic sheep breeding and milk production**

The numerous advantages (favorable climatic conditions, the mountainous nature of the terrain, the ability to maintain economic capacities of the rural population, as well as the tradition of sheep breeding) are ideal for development of the sheep sector in the country. Sheep breeding in the country is characterized by presence of two main production systems: semi–nomadic extensive system and stationary breeding system. Sheep breeders often have a dual direction of production (excluding wool-low interest and low price), where milk production contributes two-thirds of the income, while the remaining income comes from meat production (Porchu & Dzabirski, 2019).

When comparing trends in sheep breeding within the country, two different trends can be observed. While the number of sheep in conventional breeding is declining, the number of sheep registered as organic has shown a consistent trend, namely the organic sheep herd takes significant share of the national sheep herd. The organic sheep sector exceeded the goal set by the National Plan for Organic Agriculture 2013-2020 as early as 2010 (12.69%) and maintained this trend throughout the analyzed period (Figure 8).

Organic sheep farming has been officially registered since 2009, when only a small proportion (2.92%) of the total sheep population was classified as in conversion or organic. Interest in organic sheep farming strongly increased in the following two years, reaching 12.69% in 2010 and 14.86% in 2011, as a larger part of the national flock was classified as organic. Between 2012 and 2015, the number of organic sheep prevailed over those in conversion; however, the total in both categories fell below 10%. In the following period, from 2016 to 2020, a continuous growth in the participation of the organic sheep flock in relation to the national sheep flock was observed. Organic sheep flocks represent 13.09% (2017) and 19.49% (2020) of the total number of sheep in the country. In 2020 and 2021, the number of organic sheep was greater than those in conversion, but in 2023, the trend reversed, with a higher percentage of sheep classified as in conversion (Figure 8).

Organic sheep production in the country follows the trends in the EU member states, among farmers in the country there is an increased interest in organic sheep production. According to Eurostat data for 2022, Greece leads with 38.14% of its sheep raised as organic, followed by Latvia (36.14%), Sweden (31.63%), Austria (29.2%), and Slovakia (25.25%). North Macedonia ranks sixth, with 16.07% of its national sheep flock classified as organic (Eurostat, 2024).

The primary products of sheep breeding in the country are sheep milk and lamb meat. A significant portion of sheep farmers process the milk into cheese, while others, especially in the eastern regions, deliver it to dairies. Organic sheep milk constitutes less than 10% of total sheep milk production, ranging from 3.30% in 2020 to 9.56% in 2021, with a decrease to 5.98% in 2022 and an increase to 7.93% in 2023 (Figure 9). The organic sheep milk in the period from

2020 to 2023 increased by 174.09% from 889.18 t to 2437.14 t. Similar to cattle milk, organic sheep milk, cheese, and lamb meat often lack market recognition, they are not recognized as organic and they do not receive added value as such. Although some farmers attempt to market their cheese as organic, its price frequently matches or falls below that of conventional cheese. There is no available data on the pricing and sales conditions for organically produced lambs, which are generally sold under the same conditions as those from conventional systems.

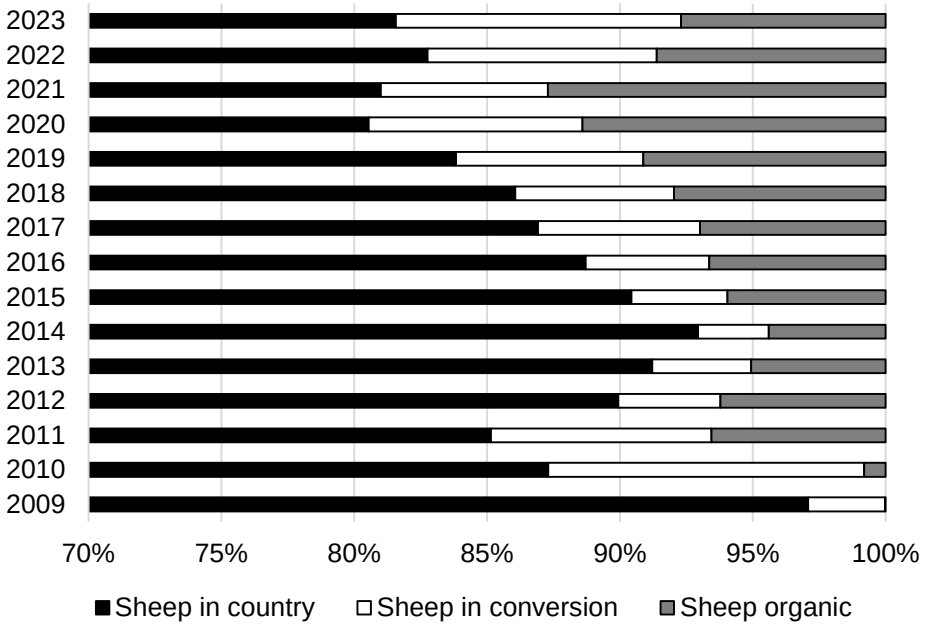


Figure 8. Trends in organic sheep breeding, 2009-2023, (MAFWM, 2009; MAFWM, 2010; MAFWM, 2013a; MAFWM, 2016; MAFWM, 2019; MAFWM, 2022; MAFWM, 2023)

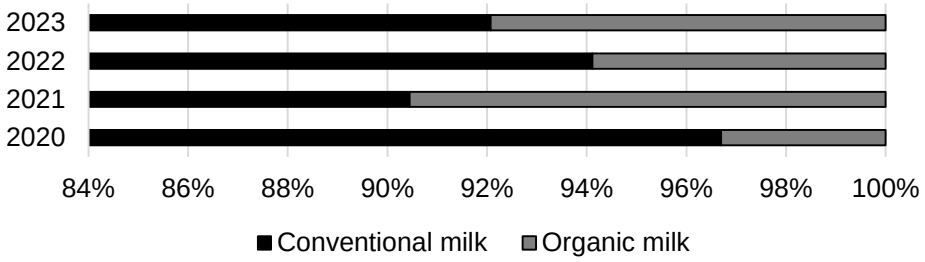


Figure 9. Sheep milk production conventional vs. organic, (State Statistical Office, 2024a)

**Organic goat breeding and milk production**

Goat breeding in the Republic of North Macedonia has a specific history and is characterized by slow development. Extensive to semi-extensive breeding system is the most prevalent in the country with moderate level of milk production.

In the organic goat breeding, taking into account the number of organic goats in relation to the national goat herd in the country, the goal set by the National Plan for Organic Agriculture 2013-2020 was achieved in 2010 (4.03%), with minor decreases noted in subsequent years. The organic goat herd in relation to the national goat herd takes share from 1.11% (2009) to 7.48% (2021) (Figure 10). Organic goats production in the analyzed period is characterized by the dominance of goats registered as organic in relation to goats that are in

conversion, this type of dominance is most expressed in 2012, 2013 and 2014. An exception to this trend is present in 2023, when the highest percentage of goats was found in the category in conversion regarding the organic category. After 2021, there was a decline in the percentage of organic goats, with values dropping to 6.29% in 2022 and 5.19% in 2023 (Figure 10). This decline may by influenced by different factors (farmers aging, limited market demand, small herds which are not appropriate for certification etc.). Similar to the trends in organic sheep breeding, organic goat breeding is not strongly affected by fluctuations of goat national herd. The increase suggests a steady but slower adoption of organic practices in goat farming. While interest in organic goat breeding has remained relatively steady, a declining trend was observed between 2012 and 2014. However, from 2015 to 2023, organic goat breeding has experienced slight growth and stability.

Organic goat farming in North Macedonia exhibits moderate development when compared to the EU member states. The leading countries in organic goat production are Austria (56.03%), Greece (27.73%), Latvia (20.51%), France (13.63%), and Italy (10.58%). North Macedonia ranks ninth, with organic goats comprising 6.42% of the national herd, just behind the Netherlands (9.69%), Croatia (8.39%), and Slovakia (7.61%) (Eurostat, 2024).

Milk and meat are the main products of the goat breeding in the country. Most of the raw goat milk is sold to dairies, while only a small percentage is processed into cheese by goat breeders. The trade and organization surrounding goat meat remain relatively low. Organic goat products, similar to those from cattle and sheep, are not sufficiently recognized in the market. Organic goat products, such as fresh milk, goat cheese and meat follows the current market trends of conventional goat products and in most cases they are not sold as branded organic product. Organic goat milk production has shown a small share of the total goat milk produced, fluctuating between 3.30% (2020) and 9.56% (2021). A decrease in organic goat milk production was recorded in 2022 compared to 2021, although there is a moderate growth trend in 2023 (Figure 11). From 2020 to 2023, the production of organic goat milk in the country increased by 103.96% rising from 131.35 t to 267.9 t.

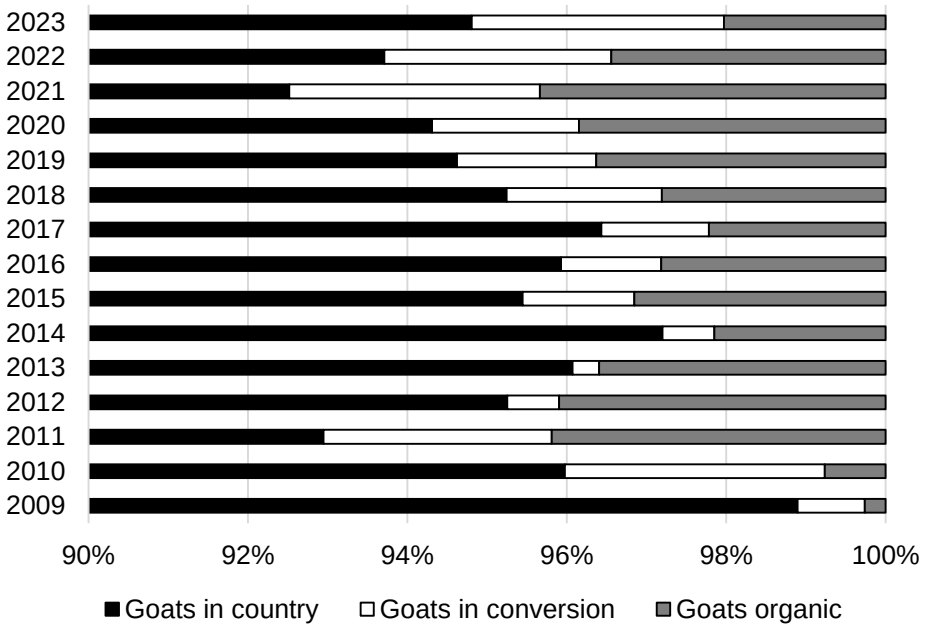


Figure 10. Trends in organic goat breeding, 2009-2023, (MAFWM, 2009; MAFWM, 2010; MAFWM, 2013a; MAFWM, 2016; MAFWM, 2019; MAFWM, 2022; MAFWM, 2023)

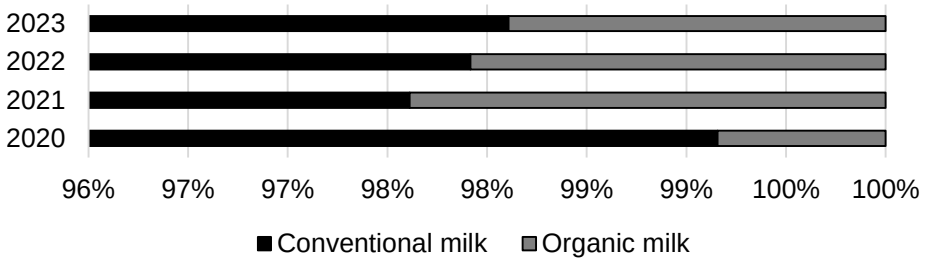


Figure 11. Goat's milk production conventional vs. organic, (State Statistical Office, 2024a)

## SWOT ANALYSIS

Reviewing the available literature, several SWOT analyzes related to the overall organic production in the country have been observed. The SWOT analysis is complemented by the knowledge obtained from the data analysis and current trends in animal husbandry over the last 15 years, specifically focusing on organic animal husbandry (Table 1). The preparation of an appropriate SWOT analysis focused on organic livestock farming is expected to enable the development and improvement of new strategies, but at the same time to enable the proper development of organic livestock farming itself.

Table 1. SWOT analysis of organic ruminant sector in the country

| Strength | Weaknesses |
|---|---|
| Area of pastures and natural meadows provides favorable conditions for the development of organic animal husbandry<br>Tradition of livestock breeding and presence of traditional sheep, goats and cattle breeding systems which are very close to organic production<br>Established system for identification of the animals<br>Established legal regulations<br>State subsidies for organic livestock production<br>Existence of autochthonous breeds contributes to environment and biodiversity preservation<br>Increased interest in organic livestock breeding in the country | Costly labor in traditional breeding systems<br>Low interest by organic dairy and meat processors<br>Lack of organic concentrated protein food<br>Lack of arable land for livestock breeders<br>Low level of education among livestock farmers<br>Low level of marketing of organic products<br>Depopulation of rural remote areas<br>Afforestation and usurpation of pastures, lack of digitization of the pastures, the quality of the pastures has not been audited<br>The potential for rural tourism remains undeveloped |
| **Opportunities** | **Threats** |
| Convenient agro-climatological conditions in the country<br>High nature value farming and maintenance of high nature value grasslands as existing potential for organic farming<br>Breeding of organic livestock ruminant species provides production of different types of food with added value<br>Increased interest in conversion to organic production<br>Available government support for organic livestock breeding<br>Development of rural areas by promoting eco-tourism | Slow development of organic animal husbandry<br>Presence of a decreasing trend in the number of heads in livestock farming<br>Possibility of greater competitiveness of imported organic livestock products<br>Increased costs for inputs at all levels of organic livestock production<br>Low level of interest in the processing industry to produce final organic product<br>Climate changes<br>Unfavorable age structure of the farmers<br>Emergence of new diseases that are atypical for the region |

## PERSPECTIVES ON ORGANIC RUMINANT FARMING IN NORTH MACEDONIA

The perspectives for organic ruminant farming in North Macedonia are promising but require concerted efforts to overcome existing challenges. By leveraging the strengths of

traditional practices and improving market recognition, organic cattle, sheep, and goat farming can thrive, contributing to sustainable agricultural development and rural revitalization. Escribano (2016) emphasized that addressing the depopulation of rural areas is crucial through the implementation of organic animal husbandry, noting that effective organic marketing strategies can enhance the profitability of production and improve the overall sustainability of the food sector. Continued government support and collaboration among stakeholders will be vital for development and realizing the full potential of the organic livestock sector.

As previously mentioned, utilizing favorable climatic conditions and a rich tradition of cattle, sheep, and goat breeding, North Macedonia holds significant potential for the continued development of organic ruminant farming. The positive trend in organic livestock numbers suggests an opportunity for expansion in organic husbandry. However, realizing this potential requires the implementation of several key initiatives. These include adopting appropriate practices from abroad, educating farmers and associations, and promoting organic food production through tourism. Additionally, enhancing product management and increasing the activity of associations to connect with the industry are crucial, particularly in terms of developing effective marketing strategies and promoting organic products to raise consumer awareness and demand. The development and application of new and improved subsidization practices can provide a more secure outlook for organic livestock farming. By fostering these initiatives, North Macedonia can strengthen its organic ruminant farming sector and contribute to a sustainable agricultural future.

## CONCLUSIONS

Organic livestock breeding in North Macedonia is a key component in promoting sustainable agricultural practices, supported by significant government initiatives and a growing legal framework. While the sector shows promise for growth, it also faces challenges, particularly within the ruminant sector, where declining animal populations and structural farming issues persist.

Organic cattle breeding in the country is slowly developing but remains significantly underdeveloped compared to EU standards. Additionally, improving awareness and education about the benefits of organic cattle farming can stimulate interest and investment in this sector, fostering a more sustainable and profitable future.

The organic sheep breeding sector has emerged as a leader, showcasing resilience despite low market recognition and pricing challenges. There is potential for further growth, particularly if enhanced market mechanisms are implemented to differentiate organic products, allowing farmers to secure better prices.

The organic goat breeding sector, while demonstrating moderate growth and interest, still accounts for a small percentage of the national herd. To improve market presence and pricing, efforts must be made to raise awareness of organic goat products and establish a stronger identity for them.

To maximize the potential of organic livestock farming, North Macedonia must address infrastructure needs, invest in education and resources, and implement effective marketing strategies.

By focusing on and promoting sustainable practices, the country can establish itself as a key player in organic agriculture, benefiting local farmers, consumers, and the environment alike.

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