

MEAT PRODUCTION IN THE R. N. MACEDONIA IN COMPARISON WITH OTHER FORMER YUGOSLAV COUNTRIES

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A b s t r a c t: Over the past sixty-one years, global meat production has increased fivefold, rising from 70.57 million tons in 1961 to 355.54 million tons in 2022. Europe was the leading meat producer until the 1990s, after which Asia took the lead over the past thirty years. In North Macedonia, the average meat production from 2007 to 2022 was 22,998.44 tons of which pork meat accounts for 48.52%, beef meat 22.91%, lamb meat 19.46% and chicken meat 9.12%. Among the former Yugoslav countries from 2007 to 2022, the Republic of Serbia was the largest meat producer, averaging 493,604 tons, followed by the Republic of Croatia with 216,516.5 tons, the Republic of Slovenia with 136,646.6 tons, the Federation of Bosnia and Herzegovina with 79,325.86 tons, the Republic of North Macedonia with 22,998.44 tons, and the Republic of Montenegro with 9,940.07 tons. The Republic of North Macedonia and the Federation of Bosnia and Herzegovina in the period 2007–2022 are countries from the former Yugoslavia that have by far the lowest consumption of meat per capita. To ensure sustainable livestock production, it is necessary for countries to include a variety of measures and interventions in their strategic plans.

Key words: meat; production; strategies; animal husbandry

ПРОИЗВОДСТВО НА МЕСО ВО Р. С. МАКЕДОНИЈА СПОРЕДЕНО СО ДРУГИТЕ ЗЕМЈИ ОД ПОРАНЕШНА ЈУГОСЛАВИЈА

А п с т р а к т: Во изминатите шеесет и една година, глобалното производство на месо се зголемило петкратно, од 70,57 милиони тони во 1961 година на 355,54 милиони тони во 2022 година. Европа била водечки производител на месо до деведесеттите години, а во последните триесет години водечката улога ја презела Азија. Во Северна Македонија просечното производство на месо од 2007 до 2022 година изнесува 22.998,44 тони, од кои 48,52% отпаѓаат на свинско месо, 22,91% на говедско месо, 19,46% на јагнешко месо и 9,12% на пилешко месо. Меѓу земјите од поранешна Југославија, во периодот од 2007 до 2022 година, Република Србија била најголем производител на месо, со просечно производство од 493.604 тони, следена од Република Хрватска со 216.516,5 тони, Република Словенија со 136.646.6 тони, Федерацијата на Босна и Херцеговина со 79.325,86 тони, Република Северна Македонија со 22,998.44 тони и Република Црна Гора со 9.940,07 тони. Република Северна Македонија и Федерацијата на Босна и Херцеговина во периодот 2007–2022 се земјите од поранешна Југославија со најниска потрошувачка на месо по глава на жител. За да се обезбеди одржливо сточарско производство, неопходно е земјите да вклучат различни мерки и интервенции во своите стратешки планови.

Клучни зборови: месо; производство; стратегии; сточарство

INTRODUCTION

With the world's population increasing, there is a growing need for more food. To meet this demand, agricultural production must generate

sufficient quantities of food, with a special emphasis on providing adequate amounts of animal-based protein. The production of meat, milk, and eggs is both costly and complex, making animal husbandry a strategic branch of agriculture. Meat holds a

significant place in the human diet, and it is essential for proper growth and development (Silovska Nikolova and Belichovska, 2020).

Smith et al. (2022) emphasize that meat is rich in nutrients, particularly proteins, B vitamins, minerals, and trace elements such as zinc, selenium, iron, phosphorus, and copper.

Savell (2023) points out that meat production plays a crucial role in the global economy, fostering local, national, and international trade. For many countries, meat production is a major source of foreign exchange income.

The most common types of meat consumed worldwide are pork, chicken, beef and mutton. Pork is most popular globally, especially in East Asia and Europe. Chicken is widespread across all regions, with increasing demand due to its availability and variety. Beef is a vital part of the diet in countries such as the United States, Argentina and Brazil. Mutton is less common but still a diet staple in parts of the Middle East, North Africa and South Asia.

Global meat production in 2022 is 355.46 million tons. The world's largest meat producer is China, followed by the United States of America, Brazil, Russia, India, etc. China is the largest pork producer in 2022 with approximately 50 million tons, accounting for 50% of the world's total pork production. Germany and Spain are the largest pork producers in the European Union. The largest beef producer for 2022 are the United States, with approximately 12 million tons, and Brazil, with approximately 9 million tons. The United States of America in 2022 is the largest producer of chicken meat, with about 22 million tons, followed by China and Brazil, with a production of about 15 million tons. China and Australia are the largest producers of lamb and mutton. China produces around 2 million tons, while Australia contributes approximately 0.5 million tons in 2022 (FAOSTAT Statistical Database).

According to FAO data for 2021, the average global meat consumption per capita is 34.8 kg. In some regions of the world, such as Africa, the consumption of meat is very low, in contrast to the United States of America and Australia, where significantly more meat is consumed. In the countries of the European Union, the average consumption is 70 kg per capita, especially in the countries of Western and Southern Europe, there is a tendency towards a higher level of meat consumption. In the countries of the former Yugoslavia, the average consumption of meat per capita in 2021 is 67.65 kg.

The Republic of Croatia consumes the largest amount of meat per capita, 90.78 kg, while in the Republic of N. Macedonia consumes the least amount of meat per capita, 41.03 kg.

Animal husbandry is a crucial part of North Macedonia's agricultural sector, particularly significant for the socio-economic development of hilly and plain areas. Despite the favorable geographical position, relief, and climate conditions, the state of animal husbandry, especially meat production, is relatively poor. The challenges stem from an intensified restructuring process, low competitiveness, inadequate domestic market coverage, heavy reliance on imports, insufficient horizontal organization of entities, lack of partnership in the value-added chain, and the absence of minimum quality standards.

This research aims to analyze meat production in the Republic of North Macedonia from 2007 to 2022, comparing it with meat production in other former Yugoslav republics.

MATERIALS AND METHODS

The paper utilizes data from the Food and Agriculture Organization of the United Nations (FAO) website. It examines global meat production and production by specific regions from 1961 to 2022, segmented into the following sub-periods: 1961–1970, 1970–1980, 1990–2000, 2000–2010, 2010–2020, and 2020–2022. Meat production in the Republic of North Macedonia and other former Yugoslav countries is analyzed from 1997 to 2022. The production of different types of meat (pork, beef, chicken, sheep and other types) in the Republic of North Macedonia and other former Yugoslav countries for the period from 2012 to 2022 and the consumption of meat per capita for the period from 2012 to 2021 have been analyzed years in the Republic of North Macedonia and other former Yugoslav countries.

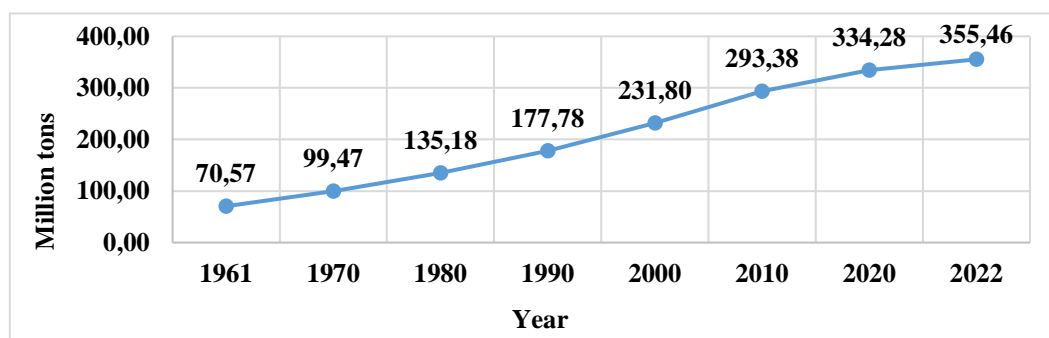
The statistical analysis of the data was performed using the statistical functions and tools of Microsoft Office Excel 2016. The data was processed using standard mathematical-statistical methods, including the arithmetic mean to determine average values, the variation interval (minimum and maximum values for a given area during the analyzed period), standard deviation, coefficient of variation, and the average rate of change (%), which indicates the percentage of increase or decrease.

RESULTS AND DISCUSSION

Meat production in the world

Graph 1 clearly illustrates a consistent annual increase in global meat production over the past six decades. In 1961 the world produced 70.57 million

tons of meat, while in 2022 this figure reached 355.46 million tons. This fivefold increase in global meat production from 1961 to 2022 can be attributed to the growing economic and nutritional significance of meat, the rising global population, increased consumer purchasing power, and other contributing factors.



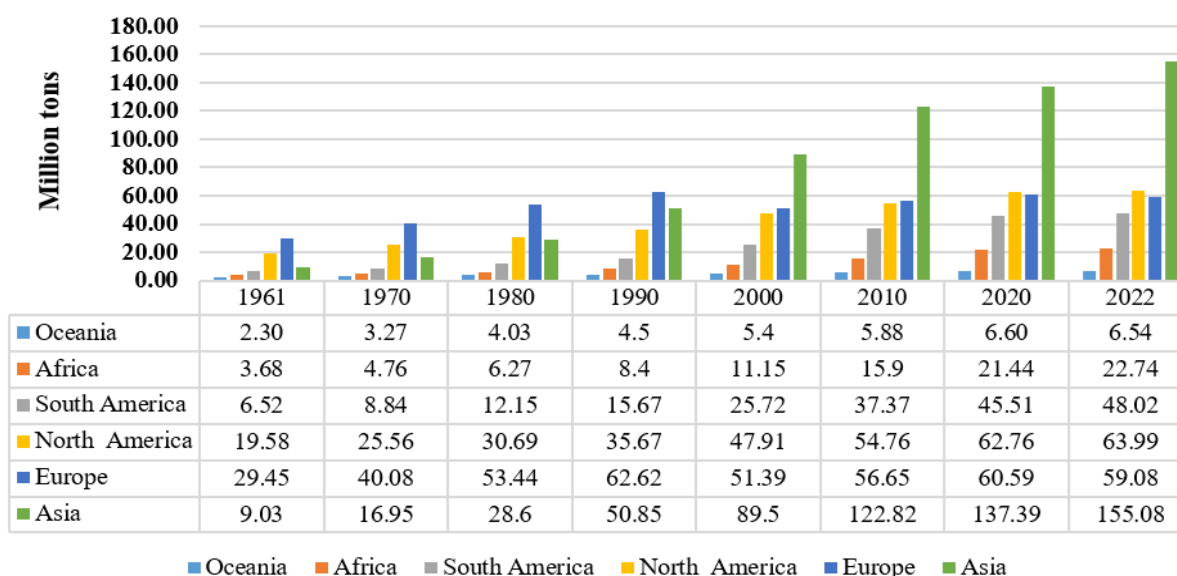
Graph 1. Overview of World Meat Production from 1961 to 2022 in million tons (source: FAOSTAT database)

Graph 2 shows that global meat production varies significantly by region. Between 1961 and 1990, Europe was the leading meat producer. However, since 2000, Asia has taken the lead and continues to see a steady increase in production.

In 2022, the world produced 355.46 million tons of meat. Asia was the top producer with 155.08 million tons (43.63% of the global total), followed by North America with 63.99 million tons (18%), Europe with 59.08 million tons (16.62%), and South America with 48.02 million tons (13.51%). Africa and Oceania had the smallest meat production, with

22.74 million tons (6.40%) and 6.54 million tons (1.84%) respectively.

Meat production is influenced by numerous natural, social, and economic factors, including the number, structure, and breeds of livestock and poultry, their growth, sales, purchases, and slaughter volumes, foreign trade, population demographics and purchasing power, economic development, advancements in agriculture and the food industry, scientific and technological progress, agricultural investments, especially in animal husbandry, and economic development policies.



Graph 2. Overview of meat production in certain world regions from 1961 to 2022 in million tons (source: FAOSTAT database)

Contrary to the global trend of increasing meat production, the Republic of North Macedonia has seen a steady decline in meat production year after year. From 2007 to 2022, the average annual meat production was 22,998.44 tons. The lowest production was in 2013, with 20,856 tons, and the highest was in 2021, with 24,584 tons. Table 1 indicates a downward trend in meat production, with a decline average rate of change of -0.57% .

The Ministry of Agriculture, Forestry, and Water Management of North Macedonia, in its National Strategy for Agriculture and Rural Development for 2021–2027, emphasizes the need to im-

plement legally prescribed minimum quality standards for the meat production subsectors. This should be based on detailed approaches tailored to market conditions. Additionally, there is a need to improve genetic potential, specialization, and knowledge transfer to enhance production practices and foster innovation. Policy interventions aim to address significant threats to the sector, such as the risk of infectious diseases (e.g., African swine fever) and frequent climate changes, necessitating appropriate measures. Supporting activities that promote knowledge creation, modern technologies, and digital tools is essential to maximize the benefits of the current restructuring process.

Table 1

Overview of meat production in the countries of the former Yugoslavia for the period 2007–2022

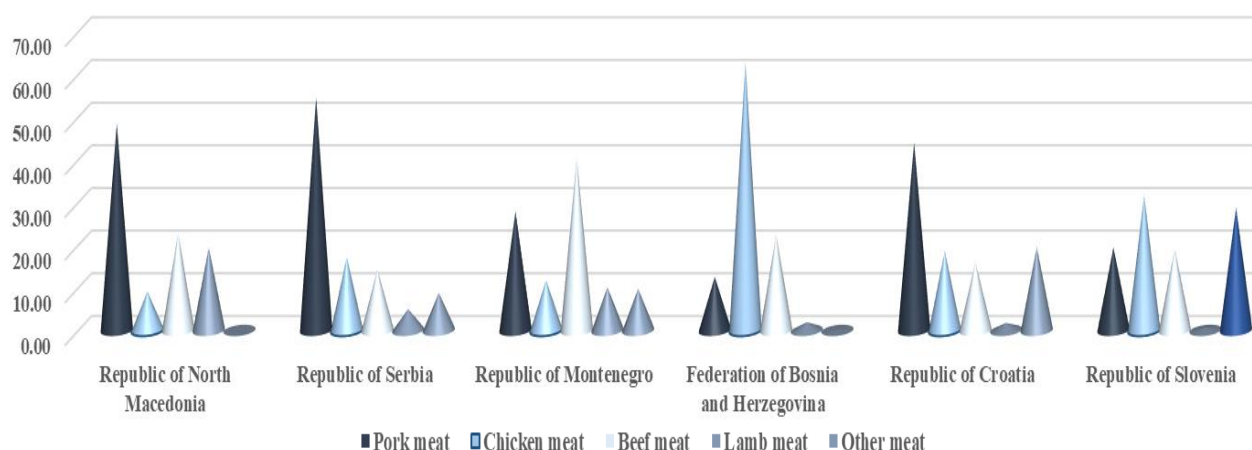
| Year | | Republic of North Macedonia | Republic of Serbia | Republic of Montenegro | Federation of Bosnia and Herzegovina | Republic of Croatia | Republic of Slovenia |
|----------------------------|-----|-----------------------------|--------------------|------------------------|--------------------------------------|---------------------|----------------------|
| 2007 | | 25996 | 476127 | 10285 | 54217 | 205198 | 153785 |
| 2008 | | 23937 | 466188 | 8511 | 65333 | 200569 | 152314 |
| 2009 | | 24142 | 459397 | 8557 | 67890 | 208708 | 141720 |
| 2010 | | 23336 | 473741 | 8657 | 76250 | 216210 | 143044 |
| 2011 | | 21632 | 480031 | 11203 | 87070 | 217436 | 134591 |
| 2012 | | 23124 | 492818 | 10322 | 94264 | 245469 | 130160 |
| 2013 | | 20856 | 488957 | 7862 | 72445 | 220025 | 120534 |
| 2014 | | 22146 | 510370 | 8835 | 66042 | 206543 | 122761 |
| 2015 | | 21410 | 462811 | 8889 | 81510 | 205765 | 121388 |
| 2016 | | 21994 | 488644 | 12570 | 83244 | 213615 | 131908 |
| 2017 | | 22879 | 491075 | 10354 | 86649 | 217906 | 137521 |
| 2018 | | 22255 | 524723 | 9747 | 82400 | 215650 | 137375 |
| 2019 | | 22349 | 515943 | 11895 | 88187 | 226010 | 139915 |
| 2020 | | 23493 | 517017 | 12225 | 89033 | 215880 | 140150 |
| 2021 | | 24584 | 523442 | 9426 | 85974 | 230400 | 141540 |
| 2022 | | 23842 | 526380 | 9703 | 88705 | 218880 | 137640 |
| Average 2007–2022 | | 22998.44 | 493604 | 9940.07 | 79325.86 | 216516.5 | 136646.6 |
| Variation interval | Min | 20856 | 459397 | 7862.1 | 66042 | 205764.6 | 120534 |
| | Max | 24584 | 526380.1 | 12570 | 94264 | 245468.8 | 143044 |
| SD | | 1286.4 | 22456.4 | 1382.8 | 10786.4 | 10635.8 | 9384.3 |
| CV | | 5.59 | 4.55 | 13.91 | 13.60 | 4.91 | 6.87 |
| Average rate of change (%) | | -0.57 | 0.67 | -0.39 | 3.34 | 0.43 | -0.74 |

Source: FAOSTAT database

Table 1 presents meat production in the countries of the former Yugoslavia from 2007 to 2022. Analyzing the average meat production during this period, the smallest producer is the Republic of Montenegro, with an average of 9,940.07 tons, followed by the Republic of North Macedonia with 22,998.44 tons. The Federation of Bosnia and Herzegovina produced 79,325.86 tons, the Republic of Slovenia 136,646.6 tons, the Republic of Croatia 216,516.5 tons, and the Republic of Serbia 493,604 tons.

Based on the analyzed data for the period from 2007 to 2022, it can be determined that from the average meat production, the share of average pork production in the Republic of Serbia is 54.67%, the Republic of North Macedonia is 48.52%, the Republic of Croatia is 44.03%, the Republic of Montenegro is 27.92%, the Republic of Slovenia is 19.49%, and the Federation of Bosnia and Herzegovina is 12.59% (Graph 3). The share of average chicken meat production from the total meat

production in the Federation of Bosnia and Herzegovina is 62.77%, followed by the Republic of Slovenia with 31.74%, the Republic of Croatia with 18.65%, the Republic of Serbia with 17.16%, the Republic of Montenegro with 11.80%, and the Republic of North Macedonia with 9.12% (Graph 3). From the average meat production, the share of beef production from the total average meat production in the Republic of Montenegro is 40.38%, the Republic of North Macedonia is 22.91%, the Federation of Bosnia and Herzegovina is 22.39%, the Republic of Slovenia is 19.15%, the Republic of Croatia is 16.03% and the Republic of Serbia is 14.37% (Graph 3). The share of average lamb production from the total average meat production in the Republic of North Macedonia is 19.46%, the Republic of Montenegro is 10.13%, the Republic of Serbia is 5.01%, the Federation of Bosnia and Herzegovina is 1.94%, the Republic of Croatia is 1.75% and the Republic of Slovenia is 0.79% (Graph 3).



Graph 3. Overview of the percentage representation of different types of meat, produced in the period from 2012 to 2022 in the countries of the former Yugoslavia (source: FAOSTAT database)

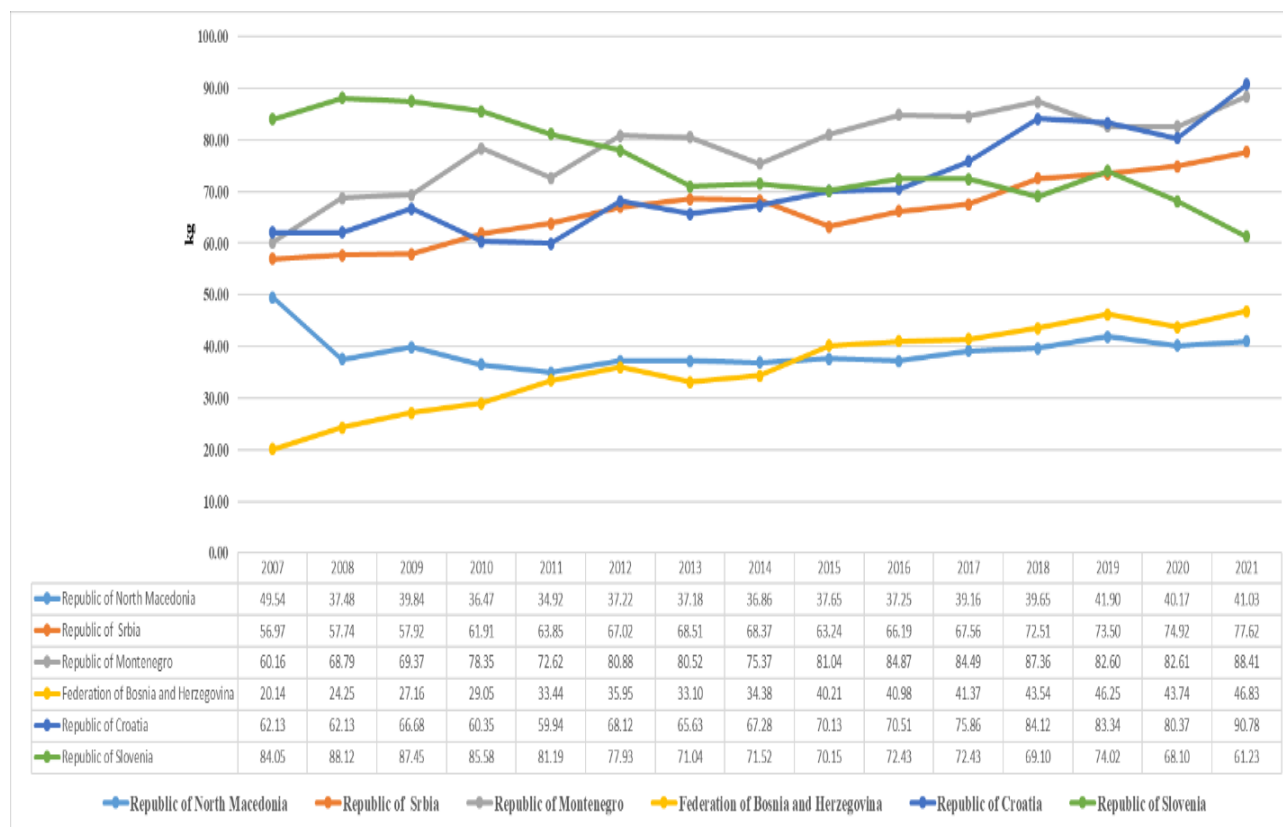
The largest consumer of meat per capita in 2021 from the other former Yugoslav countries is the Republic of Croatia with 90.78 kg, followed by the Republic of Montenegro with 88.41 kg, the Republic of Serbia with 77.62 kg, the Republic of Slovenia with 61.23 kg, the Federation of Bosnia and Herzegovina with 46.83 kg and the Republic of North Macedonia with 41.03 kg. As can be seen from the graph 4, the Federation of Bosnia and Herzegovina and the Republic of North Macedonia in the period 2007–2022 are countries from the former Yugoslavia that have by far the lowest consumption of meat per capita.

Among these countries, the Federation of Bosnia and Herzegovina shows the highest growth trend with average rate of change of 3.34%. The Republic of Serbia and the Republic of Croatia also show growth trends, though much lower, at average rate of change of 0.67% and 0.43%, respectively. Conversely, a decreasing trend is observed in the Republic of Slovenia (−0.74%), the Republic of North Macedonia (−0.57%), and the Republic of Montenegro (−0.39%).

In the strategy for agriculture and rural development for 2021–2027, the Federal Ministry of Agriculture, Water Management and Forestry of the

Federation of Bosnia and Herzegovina emphasizes the need for new investments in all sub-sectors of animal production. This includes technical and technological improvements, addressing racial composition, applying hygiene standards, and meeting

necessary norms related to animal welfare and the quality standards of agricultural products. The most significant issue identified in the analysis is the need for self-sufficient fodder production.



Graph 4. Overview of meat consumption per capita for the period from 2007 to 2021 in the countries of the former Yugoslavia (source: FAOSTAT database)

The Republic of Serbia's strategy for agriculture and rural development for 2014–2024 (Official Gazette of the Republic of Serbia, No. 85/2014) highlights that for developing the animal husbandry sub-sector aimed at meat production, it is necessary to increase the number of animals in the primary herd, produce fodder and concentrated fodder, improve facilities for animal accommodation and breeding, enhance meat quality, and improve animal welfare.

The strategic plan for agricultural policy of the Republic of Croatia for 2023–2027, prepared by the Ministry of Agriculture, states that ensuring social sustainability of the meat production sector, stable production income, and market supply security with sufficient quantities of meat is achieved through direct payments with interventions to support incomes related to meat production. Producers who raise fattened cattle ensure the production of quality

beef, lamb, and goat meat, meeting EU production standards, animal welfare, food safety, and traceability. These systems provide improved conditions for producing high-quality raw materials, offering consumers exceptional quality meat with a guarantee of high standards during cultivation.

In its strategy for the development of agriculture and rural areas for 2023–2028, the Ministry of Agriculture, Forestry, and Water Management of Montenegro outlines the need for expansion and professionalization of meat production. This includes specializing fattening breeds, improving the quality of both fresh and processed meat, and improving the meat industry to meet market demands for traditional meat processing. To achieve these goals, the strategy emphasizes the need for targeted support investments. Additionally, incorporating scientific knowledge into producer education and modernizing agricultural practices, while adhering to good

agricultural practices and focusing on animal welfare, are crucial for advancing the sector.

In Slovenia, animal husbandry is a leading sector in agriculture. For its sustainable development, not only environmental and climatic conditions are considered, but also animal welfare, which is crucial for the advancement of agriculture and animal husbandry. The strategic plan for agricultural policy for 2023–2027, developed by the Ministry of Agriculture, Forestry, and Food of Slovenia, highlights that animal welfare is a key component of food quality assurance. Consumers increasingly expect that animal-based food is produced in an ecological manner. However, the Slovenian livestock industry lags behind the EU average, primarily due to the prevalence of small, fragmented farms and challenging natural conditions such as areas with constraints on agricultural activity, water protection zones, and karst landscapes.

Overall, while the countries of the former Yugoslavia benefit from favorable climatic and natural conditions for animal husbandry and meat production, the sector still faces significant challenges and remains in a difficult state. To address these issues, it is crucial to develop and implement targeted development strategies that will stabilize the agricultural sector in the long term and foster further advancement. Slovenia and Croatia, in particular, have substantial potential for agricultural progress. Their European Union membership offers access to various financial supports, which can aid in improving their agricultural sectors.

CONCLUSION

Analyzing the data from 2007 to 2022 reveals that meat production in the Republic of North Macedonia, Slovenia, and Montenegro is on a decline, while Serbia, Croatia, and the Federation of Bosnia and Herzegovina are experiencing growth. Overall, meat production in the former Yugoslav countries is significantly lower than the global average.

For the Republic of North Macedonia and other former Yugoslav countries, developing a National Strategy for Agriculture and Rural Development is crucial. This strategic document should focus on setting and achieving goals, policies, and measures for advancing agriculture and rural development, including animal husbandry. Key areas for

improvement include enhancing genetic potential, adhering to good agricultural practices, implementing hygiene standards, meeting animal welfare norms, improving meat quality standards, incorporating scientific knowledge into producer education, and modernizing agricultural production. Additionally, it is important to address the challenges posed by frequent climate changes.

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