THE ROMANIAN AGRIFOOD SECTOR – BETWEEN SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL RIGORS

BUCUR SORINEL IONEL*[1]
[1]***Institute of Agricultural Economics – INCE 'Costin C. Kirițescu', Romanian Academy***
*Corresponding author's e-mail: bucursorinelionel@yahoo.com

Abstract. *In the context of globalization trends, the expansion of markets, as well as the increase in competition, the Romanian agri-food sector is facing with major challenges. First of all, the actual international context, marked by armed conflicts, brings into question the ability of the Romanian agri-food sector to deal with massive imports of products at much lower prices than domestic ones. Secondly, the limited domestic resources require a use and combination in such a way as to ensure the sustainable development of the sector. To these two challenges is added another one related to complying with the environmental rigors/requirements imposed in the European and international area, respectively to reduce greenhouse gas emissions and achieve climate neutrality by 2050. Based on these considerations, the present approach aims to analyze these challenges from the perspective of the sustainability of the agri-food sector.*

Keywords: *sustainability, agri-food sector, climate changes, resources*

INTRODUCTION

Speaking about the agri-food sector and its sustainable development, we should not forget that this field also generates important greenhouse gas emissions. This fact comes in the context where climate change represents one of the biggest threats to the environment, social and economic framework. Promoting the efficient use of resources and supporting the transition to a low-carbon and climate-resilient economy in the agricultural, food and forestry sectors is a priority for all states in the context of the need to achieve climate neutrality by 2050.

MATERIALS AND METHODS

From a methodological point of view, the present approach is based on public data and information from community statistics [6]. Also, established methods of analysis are used, namely comparisons, dynamics and structures, the post-accession reference period, respectively 2007-2021.

RESERCH RESULTS

The state of knowledge

As an important area of any national economy and responsible for ensuring food security and safety, the agri-food sector regroups both primary branches of activity and the primary products processing industry. To these, in order to have an aggregated picture, the activities of transport and commercialization of agri-food products are added. Speaking about the sustainable, sustainable development of the agri-food sector, the rational use of the stock of available resources must be taken into account in order to meet the growing needs of the population.

According to the specialists [10], a wide process of structural transformation is taking place worldwide, including the agri-food sector, as a result of the emergence of new global challenges with a long-term effect, which require the development of a strategic vision in the field and the implementation of concrete actions from the authorities with attributions in the field. The increasingly numerous global population, increasing pressure on natural resources and global warming determine the implementation of a new working framework at the national and international level.

The manufacturing, processing, retailing, packaging and transportation of food products make a major contribution to air, soil, water pollution and the generation of greenhouse gas emissions and have a profound effect on biodiversity. As such, even though the EU's transition towards sustainable food systems has begun in many areas, food systems remain one of the main drivers of climate change and environmental degradation. Thus, there is an urgent need to reduce dependence on pesticides and antimicrobial substances, reduce excessive fertilization, develop organic agriculture, improve animal welfare and reverse the decline of biodiversity [4].

Moreover, the issue of climate change and the adaptation of different sectors of activity to the challenges generated by achieving climate neutrality have been the subject of multiple studies and research, as well as the adoption of measures to reduce greenhouse gas emissions [3].

Thus, for example, the Committee for World Food Security [8] published a report in which the contribution of agroecological practices to the transition to sustainable food systems, as well as the ways to approach this transition, are analyzed.

Another global food policy report [9] considers that, from a climate change perspective, the main challenge for food systems is to transform them to adapt production, distribution and consumption practices to better support rural communities and provide a healthy diet for the whole population.

Compared to other economic sectors, agriculture, the essential activity of the agri-food sector, is most affected by climate variability, through changes in annual temperatures, heavy rainfall, droughts, extreme temperatures, changes in diseases and pests, changes in atmospheric carbon dioxide, changes of sea level affecting coastal areas, reducing, as a result, agricultural areas [1]. Moreover, according to specialists [7], it is estimated that there is a 20% probability of global warming increasing by 4°C by 2060, and an 80% chance by 2100. Despite the efforts of the international community to maintain warming below 2°C, a warming of more than 3°C is expected. This is significantly higher than the pre-industrial level of 0.8 °C. Global warming can endanger food supplies, also increasing price volatility and increasing risk to farmers' incomes. The probability of reduced production, in some regions, the variability of production, changes in the seasonal structure of production, possible increased costs for farmers are consequences of climate change that have negative effects on consumers. These negative effects may take the form of food disruption and/or price variation.

In the European space, starting from 2013, climate actions constitute one of the main objectives of the common agricultural policy (CAP). In this sense, during the period 2014-2020, the European Commission has allocated no less than 30% of the budget for mitigating climate change.

In an attempt to reduce climate change, the European Commission adopted a series of proposals to adjust European climate, energy, transport and taxation policies to reduce greenhouse gas emissions by at least 55% by 2030 of the levels of 1990. Regrouped in the so-called Green Deal package [5], the proposals also target the field of agriculture and have as objectives:

- ensuring food security in the context of geopolitical uncertainties, climate change and biodiversity loss;
- reducing the environmental and climate footprint of the EU food system;
- strengthening the resilience of the EU food system;
- the global transition to competitive sustainability from farm to plate.

In the context of the above, the European Climate Law [14] which sets the objective for a climate neutral Union in 2050 should not be overlooked.

Speaking about the sustainable development of the agri-food sector, the provisions of the recent "Farm to Fork" Strategy should not be overlooked, a document that establishes a new approach to guarantee that agriculture, fisheries and aquaculture and the food value chain also contribute appropriately to reducing impact on the environment. Moreover, in order to support the global transition towards sustainable food systems, the EU will pursue through its external policies the development of ecological alliances regarding such systems, but also the trade policy can contribute to obtaining commitments from third countries (in the field of animal welfare or of pesticide use) [2].

In fact, the EU's objectives are to reduce the ecological and climate footprint of the EU food system and strengthen its resilience, to ensure food security in the face of climate change and biodiversity decline, to lead a global transition towards sustainability competitive farm-to-consumer and explore new opportunities.

In Romania, as an essential part of the Romanian agri-food sector, agriculture occupies an important place and has considerable prospects for development in the European context [11]. And at the national level, the issue of the impact of the agri-food sector on the environment continues to be the subject of multiple studies, but also of a national strategy on climate change and economic growth. This strategy, adopted in 2016, is currently under review by the Ministry of Environment, Water and Forests [12]. According to this document, a series of specific measures should be implemented in the field of agriculture to: develop an adaptation strategy in agriculture; achieving an efficient management of agricultural land; improving the level of knowledge of the agricultural field and the link with climate change; increasing risk management awareness and access to risk management tools.

However, speaking about the effectiveness of the proposed measures, i.e. reducing the impact on the environment, it should be noted that according to the latest report of the European Court of Auditors [15], despite the allocated funds, there is little impact on emissions from the agri-food sector, in especially from agriculture, the level of which has not evolved significantly since 2010. For example, in Europe, emissions from animal husbandry, mainly caused by cattle, account for about half of emissions from agriculture and have remained stable since 2010. Thus , most of the mitigation measures supported by the CAP had a low potential to mitigate climate change.

An approach similar to that of the European Court of Auditors is also found at the national level. Thus, according to the Court of Accounts, there is no overall vision of the necessary actions and mechanisms to be implemented by all public entities with attributions in the field, which has a negative impact on the elimination/reduction of structural deficiencies and vulnerabilities of the agri-food sector, including those related to the effects of climate change [13].

Evolution of the impact of the Romanian agri-food sector on the environment

In the context of the previously specified, the present approach aims to present the impact on the environment in terms of greenhouse gas emissions on the main sub-activities in the agri-food sector. From the analysis of the available information, it emerged that in the period 2007-2021, in the field of food processing, gas emissions resulting from the use of coal registered an increase of 55.9%, a visible trend also in terms of electricity consumption (+35 ,2%). If of the four energy sources, two register significant increases, the emissions from the use of natural gas and heat decreased in 2021 compared to 2007 by 11.6% and 39.8%, respectively. The same trend is also visible in terms of carbon dioxide and nitrous oxide emissions, whose decrease is around 28% (Table 1).

Table 1.

The evolution of gas emissions, by type, resulting from food processing

	Carbon dioxide emissions (kilotonnes - kt)	Emissions of nitrous oxide (kt)	Use of energy sources			
			Natural gases (Terra Jouli – TJ)	Coals (TJ)	Electricity(TJ)	Heat (TJ)
2007	2403.6	0.020	15870	89.4	5126.4	1225
2021	1720.3	0.014	14028	139.5	6929.5	737.7

Source: *Calculations on the FAOSTAT information, 2023*

By far, however, the largest increase in gas emissions comes from the transportation of food products. From this point of view, in 2021 compared to 2007, the emissions resulting from the use of natural gas increased by 81%, on the same upward slope, the emissions of carbon dioxide (+43.5%) and carbon monoxide of nitrogen (+11.4%) (Table 2).

Table 2.

The evolution of gas emissions, by type, resulting from the transport of food products

	Carbon dioxide emissions (kt)	Emissions of nitrous oxide (kt)	Use of energy sources	
			Natural gases (TJ)	Coals (TJ)
2007	1109.9	0.109	307	3.9
2021	1593.1	0.121	556	3.9

Source: *Calculations on the FAOSTAT information, 2023*

Regarding the marketing of food products, the largest increases in emissions are from the use of three energy sources, with percentages varying between 15.5% (heat) and 65.7% (electricity). Speaking about the marketing of food products, it is worth noting the visible reduction trend in carbon dioxide (-6%) and nitrous oxide (-3.9%) emissions, as well as those resulting from the use of natural gas (-4, 5%) (Table 3).

Table 3.

The evolution of gas emissions, by type, resulting from the sale of food products

	Carbon dioxide emissions (kt)	Use of energy sources	Use of energy sources			
			Natural gases(TJ)	Coals (TJ)	Electricity (TJ)	Heat (TJ)
2007	807.9	0.007	16588.1	60.4	6796.5	2993
2021	759.8	0.007	15837.4	71.1	11263.7	3457

Source: Calculations on the FAOSTAT information, 2023.

In the field of vegetable production, for three of the four products considered, we see a significant increase in gas emissions. Thus, in barley, nitrous oxide emissions have increased almost four times in 15 years, while in wheat they will triple (from 0.88 kt in 2007 to 2.58 kt in 2021). Nitrous oxide emissions from corn production are also close to tripling (+180.6%), the smallest increase being recorded in methane emissions from corn production (+12.9%). The only crop where significant decreases are recorded is the potato crop, where nitrous oxide emissions have decreased by 66.4% (Table 4).

Table 4.

The evolution of gas emissions, by type, resulting from vegetable production

	Barley	Maize		Potateos	Wheat	
	Emissions of nitrous oxide (kt)	Emissions of nitrous oxide (kt)	Methane emissions (kt)	Emissions of nitrous oxide (kt)	Emissions of nitrous oxide (kt)	Methane emissions (kt)
2007	0.14	0.90	6.11	0.18	0.88	2.04
2021	0.45	2.51	6.90	0.06	2.58	2.35

Source: *Calculations on the FAOSTAT information, 2023*

Regarding animal production (Table 5), it is worth noting that the highest values are recorded in the category of sheep, followed by dairy cattle. If, however, the tendency is for cattle to decrease (-35.2%), for sheep the trend is increasing, with an increase of 31.4% being recorded. Viewed dynamically, nitrous oxide emissions have doubled in goats, so that in broilers, as well as in pigs and the sales of pigs, a reduction has been recorded with percentages oscillating between -14.3% (broilers) and -46.9% (pigs, including their marketing).

Table 5.

The evolution of methane emissions resulting from animal production (kt)

	Cattle for milk	Broilers	Goats	Sheep	Swine	Sales of swine
2007	183.59	0.69	3.73	62.88	3.75	27.60
2021	119.01	0.59	7.66	82.62	1.99	14.66

Source: *Calculations on the FAOSTAT information, 2023*

Unlike nitrous oxide, methane emissions register significantly higher values in all analyzed categories of animals. Dairy cattle are in first place, sheep are in second place. Although the category of cattle, quantitatively speaking, the highest values of methane emissions are recorded, dynamically they tend to decrease by -35.2% in 2021 compared to 2007. The methane emissions resulting from sheep are on an upward slope. Thus, in 2021 compared to 2007, they increased by 31.4%. A doubling of methane emissions was recorded in the reference period in goats, in order to maintain the downward trend of methane emissions in chickens and pigs.

CONCLUSIONS

The sustainability of the agri-food sector cannot ignore the impact on the environment. From this point of view, according to the most recent studies, worldwide, agriculture generates 10% to 12% of global greenhouse gas emissions. The food system as a whole - which includes packaging, transport, consumption and waste management - generates a third of global emissions.

In Romania, the consumption of food products in households holds the first position with the highest levels of gas emissions, followed by food processing and transport. Emissions resulting from vegetable production register significant increases in the post-accession period, going up to tripling the values (barley). In terms of animal production, the tendency to reduce emissions should be noted, except for those resulting from raising goats and sheep.

In the context of the above, we believe that through the implementation by the decision-makers of the measures provided in various programmatic documents, correlated with the allocation of an adequate budget, the reduction of emissions can be intensified. However, other types of measures should not be overlooked, such as: orienting consumption towards organic products and reducing meat consumption; digitalization in the food field through rapid interventions in the early stages of the production process; protein diversification that can play an important role in reducing the demand for animal products.

REFERENCES

[1]. ISTUDOR N., ION R.A., PETRESCU I.E., HREBENCIUC A., 2019, Agriculture and the biunivocal relationship between food security and climate change in Romania, Economic Amphitheater, volume 21, issue 51, Bucharest.
[2]. LUCA L., ALEXANDRI CECILIA, IONEL I., LEONTE M., 2023, Food security, as an element of the common agricultural policy and Romanian agriculture in the European context. Challenges 2023 – 2027, Strategy and Policy Studies SPOS, IER, http://ier.gov.ro/wp-content/uploads/2023/01/Studiul-1_SPOS-2022_Securitatea-alimentara_Final.pdf.
[3]. *** Climate Change and Green, Low-Carbon Growth Program Component A1: Stocktaking Report, 2013, World Bank.
[4]. *** Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions A Farm To Fork Strategy For A Fair, Healthy And Environmentally-Friendly Food System, 2020, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX: 52020DC0381.
[5]. *** Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions The European Green Deal, COM/2019/640 final, 2019, https://eur-lex.europa.eu/legal-content/RO/TXT/?uri=COM%3A2019%3A640%3AFIN.
[6]. *** FAOSTAT database, 2023
[7]. *** Heat reduction. Why should warming of the planet by 4 degrees be avoided? A report made for the World Bank - Potsdam Institute for Climate Impact Research and Climate Analytics, 2012
[8]. *** HLPE, 2019, Agroecological and other innovative approaches for sustainable agriculture and food systems that enhance food security and nutrition. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome https://www.fao.org/3/ca5602en/ca5602en.pdf.
[9]. *** IFPRI, 2022, Global food policy report: Climate change and food systems, International Food Policy Research Institute, Washington, DC https://doi.org/10.2499/9780896294257.
[10]. *** Ministry of Agriculture and Rural Development, 2015, Strategy for development the agrofood sector on short and long term 2020-2030, https://www.madr.ro/docs/agricultura/strategia-agroalimentara-2020-2030.pdf.
[11]. *** National Strategy for Romanian Sustainable Development 2030, 2018, https://dezvoltaredurabila.gov.ro/files/public/10000001/SNDD-2030-_-versiune-finala-11-09-2018-procedura-SEA.pdf;
[12]. *** National Strategy on Adaptation to Climate Change for the period 2022-2030 with the perspective of 2050 – first version (SNASC) and the National Action Plan for the implementation of the National Strategy on Adaptation to Climate Change (PNASC)
[13]. *** Preventing and combating the effects of climate change in Romanian agriculture, 2023, Court of Accounts, Bucharest;
[14]. *** Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) no. 401/2009 and (EU) 2018/1999 ("European Climate Law"), 2021, https://eur-lex.europa.eu/legal-content/RO/TXT/?uri=celex%3A32021R1119;
[15]. *** The Common Agricultural Policy and the climate. Half of the EU's spending on climate action is related to agriculture, but the emissions generated by this sector are not decreasing. Special report of the European Court of Auditors, 2019