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STUDY ON THE AGRICULTURAL PRODUCTION EVOLUTION IN CĂLĂRAȘI COUNTY, ROMANIA

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Abstract

Romania is one of the European countries with the most favorable soil and climate conditions in order to obtain quality agricultural productions and in significant quantities, which can cover an important segment of the domestic demand for agri-food products. Despite the considerable potential, the profitability in Romanian agriculture is still modest, indicating a use of production factors below the level of optimal values. Based on these considerations and predicting that in 2021, the population need for agri-food products consumption will increase, as a result of the repatriation of approximately two million Romanian citizens, who worked in the European Union countries due to the crisis generated by Covid-19, we initiated the present study on the agricultural production evolution in Călărași county, in comparison to South Muntenia Region, of which it is part and with the production at national level. For the data processing and interpretation, the method of statistical indicators was used, respectively, the comparative analysis of the researched phenomena. The comparison method was used in the analysis of the data series that covered time periods between 2000 and 2007 and 2008 and 2018, depending on the available data. For each period, the indicators were calculated: average, standard deviation, coefficient of variation and annual growth rate. It results clearly that for the next period it is important to intensify some measures to provide subsidies, to use on large scale the need for irrigation, fertilization and other activities that will give perspective to evolution in this area and lead to the agrio-food security and independence of Romania.

Key words**:** *Calarasi County, agricultural crops, indicators, agricultural production, resources*

INTRODUCTION

Experts appreciate that there is a process of structural transformation worldwide, following the occurrence of new global challenges with long-term effect, that requires the elaboration of a strategic vision in the field and the implementation of concrete actions by the competent authorities in our country [1, 4, 20]. The highly numerous global population, increase of pressure on the natural resources and global warming determine a new framework at national and international level [12].

In Europe, the population aging process is also an additional challenge. All these aspects will have profound implications for agriculture and rural areas [11].

World food demand is growing, increased urbanization, higher prices in input, pressure on water resources and increasing vulnerability of crops and animals to climate change will limit food production [3, 12]. Globally, the food demand is projected to increase by 70% until 2050 due to the growing population and income increasing [7, 8]. The developing countries will contribute the most to this trend, with their demand for food that will double in the next years. It is estimated that the world population will increase from the current 7 billion to 9 billion by the middle of this century, and 95% of this growth will take place in the least developed countries [20]. The growing global income will be largely associated with the increased urbanization (70% of the world population is expected to live in urban areas until 2050, compared to 49% today) and with rapid economic growth in some the most populated countries (namely Brazil, China, India and Russia). For the agri-food sector, these aspects are both an opportunity and a challenge. The growth prospects of the agri-food market are a significant advantage for the farmers worldwide [19, 6].

Agriculture plays an important role in Romania, in relation to the size of the rural population and the degree of employment. About 45.7% of the Romanian population lives in the rural area, compared to about 23.6% in EU member states [4]. There are major differences between rural and urban areas, the former being marked by a significantly higher level of poverty and a correspondingly lower living standard [21]. The development of agriculture and the supply of public goods in rural areas is therefore essential for the European integration of Romania and for achieving the social cohesion objectives [2, 11].

The insufficiency of the domestic food supply to support the population consumption needs has become more acute in Romania in the last decade, under the pressure of increasing consumption of products with high nutritional value (animal products, vegetables, fruits, fish), due to economic growth and implicitly the increase of the population income. [7, 9].

In 2019, Romania compared to some EU States registered positive results in the agricultural sector. The agricultural production index in 2019 compared to 2018 was 96.2% on the total branch, of which 94.4% on plant production and 99.2% on animal production [13]. Thus, for maize grains and sunflower it was on the first place, both in the grown area and in the achieved production; wheat in fourth place, both grown area and production, after France, Germany and Poland, and potatoes in fourth place grown area, after Poland, Germany, France, and in seventh place in production, after Germany, France, Poland, Holland, the United Kingdom and Belgium [13, 12].

In 2020, over 44% of farms in Romania were economically affected by the Coronavirus crisis, feeling an impact especially on supplies of inputs and spare parts for machinery and equipment [16, 2].

For Romania, included in the group of the developed countries, according to the results of the FAO study, the degree of exposure to Covid-19 shock is high intermediate on the supply side and low intermediate on the demand side [15, 12]. According to these evaluations, Romania is in a somewhat different situation from other EU member states, through a higher exposure to the shock of demand (due to the high share of food costs) and lower to the shock of supply (due to relatively low total exports) [22].

MATERIALS AND METHODS

The research methodology is specific to the study; the bibliographic sources cited in the paper were used, such as studies in the field, statistical reports elaborated by the National Institute of Statistics and Calarasi County Directorate of Statistics, reports of the Ministry of Agriculture and Rural Development, the European Commission, Călărași County Council and the County Directorate for Agriculture and Rural Development in Calarasi. [19, 20, 5,18, 13].

We analyzed the agricultural production of Călărași county through vegetable production with areas, crops and average productions and animal production through livestock and productions obtained for periods of time starting with 1990 and until 2018, depending on the data available at national level, for comparisons between the counties of South Muntenia Region and the situation at national level.

For the data processing and interpretation, the method of statistical indicators was used, respectively, the comparative analysis of the researched phenomena. The comparison method was used in the analysis of the data series that covered time periods between 2000 and 2007 and 2008 and 2018, depending on the available data. As this period is quite long, we divided it into two: until 2007 and 2008-2018, which meant 11 years, depending on the available data. For each period, the indicators were calculated: average, standard deviation, coefficient of variation and annual growth rate. The data obtained for the two periods were compared by the differences between the averages and growth rates of the analyzed technical-economic phenomena and the statistical evaluation of these differences for probabilities of 95%, 99% and 99.9% [17].

As this period is quite long, we divided it into two: until 2007 and 2008.

We calculated the average achieved for the analyzed period, with the formula:

$(x) = \Sigma(x)/ n,$

where:

x is the technical, economic or social analyzed phenomenon;

n is the number of years.

The coefficient of variation (C%) is given by the formula:

$C\% = \sigma/ x *100,$

where:

x = average of phenomenon during the analyzed period;

σx = standard deviation, which is calculated as a square average of the deviations of all series elements from their arithmetic average [10].

The significance of the coefficient of variation is evaluated if the values obtained are: less than 10% - small variation; between 10.1% and 20% - medium variation; over 20 – high variation.

The annual growth rate (r%) was calculated with the formula:

AGR (annual growth rate) = $((\text{sqrt}(\prod p1/po)^{1/n})-1)*100,$

where:

$\prod p1/po$ = chained growth indicators;

n - the number of years of the period [4].

RESULTS AND DISCUSSIONS

Călăraşi County has the most productive agricultural lands in Bărăgan, an aspect that was not ignorant by investors, among the few foreign investments being highlighted those made in agriculture [5].

It is a real "horn of abundance" for agriculture, being on the second place in the average cereal production by counties, on the third place according to the share of agricultural lands in total and on the fifth place according to the agricultural area. Almost everything in Călăraşi implies the production of cereals, sunflowers and rapeseed, and a large part of the business in the industry is in animal husbandry and meat processing, which means a close connection with farmers crops [14].

From the analysis of the areas by use, during 1990-2018, in Călărași county, it is found that the agricultural area of the county decreased by 1.2%, as a share of the total area of the county, from 430,825 ha in 1990 to 425,798 ha in 2018.

Significant increases are found in the category of pasture use, where the area increased by 5,711 ha, and in hayfields by 104 ha, respectively an increase of 200%. A dramatic decrease is recorded in orchards, where the area decreased from 820 ha to 207 ha, which represents only 25.2% of the area of 1990. The analysis of the structure of crops shows the following aspects: a slight increase in areas with cereals that occupied in 2018 an area of 251,844 ha (102.6% compared to 1990); an increase in the share of wheat crop to 31.7% (128,306 ha); a decrease in the areas of barley by 3,207 ha and maize by 11,184 ha, the area of sunflower was increased by 3,025 ha (from 8.2% to 9.3%), the rapeseed crop was introduced which reached 17%; vegetable areas were reduced by 8,863 ha. This image shows a reduction in the areas that needed labour force consumption and crops that provided animal feed. Highly mechanized crops extended and those with a high consumption of nutrients, especially K_2O and P_2O_5, such as rapeseed (Table 1).

Analyzing the degree of irrigation compared to the developed areas, it is found that during 2008-2018, it remains relatively low, respectively around 7% at the country level, a decrease from 5.74% at the level of South-Muntenia Region in year 2008 to 3.74% in 2018, a share of around 4%, at the level of Călărași county. An important decrease occurs in Teleorman county, from 6.53% in 2008 to 0.39% in 2018 (Table 2).

From the analysis of the average productions per hectare of crop, for the periods 2000-2007 and 2008-2018 it is found the following: in Călărași county, in 2018, an average production of 5,579 kg/ha was obtained for wheat crop, with an average of 2008 -2018, of 3,780 kg/ha. Although the production obtained during this period is higher by 1,230 kg/ha, this increase is not significant compared to the previous period.

Statistically significant increases are registered at country level, and in Giurgiu, Ialomița, Prahova counties, and insignificant

in Dâmbovița (N) and Teleorman (N) counties (Table 3).

For rapeseed crop, in Călărași county for the period 2008-2018, the average production was 2,457 kg/ha, 976 kg/ha higher than the average of the period 2000-2007, which is a significant increase. Significant increases in the average production of rapeseed are also found in South Muntenia Region (2,440 kg/ha), in Giurgiu county (2,858 kg/ha) and in Ialomița county (2,195 kg/ha). At the level of the country and at the level of the other counties, the increases of the average productions for the rapeseed crop were insignificant [13].

Analyzing the livestock, in Călărași county, during the years 1990-2018, very large decreases are found (Table 4).

Analyzing the evolution of the number of animals per 100 ha at the level of Călărași county, we find very significant decreases to all species of animals (Table 5).

For the cattle species per 100 ha, at the level of Călărași county the herds decrease from 13.8 head/100 ha, with 7 heads/100 ha to 6.8 head/100 ha.

For the total pig species per 100 ha, at the level of Călărași county, the herds decrease from 111.8 heads/100 ha, with 76 heads/100 ha to 35.8 heads/100 ha. In the species of breeding sows, per 100 ha, at the level of Călărași county, the herds decrease from 9.5 head/100 ha, with 6.4 heads/100 ha to 3.1 head/100 ha.

Table 1. The structure of crops, in Călărași county

Crops	1990		2000		2010		2018		2018 vs 1990	
	Ha		Ha		Ha		Ha		(+/-)ha	
Total	420,631	*100.0*	392,909	*100.0*	412,599	*100.0*	404,528	*100.0*	-16,103	*6.2*
Grain cereals	245,456	*58.4*	252,587	*64.3*	251,151	*60.9*	251,844	*62.3*	6,388	*102.6*
Maize and rye	90,111	*21.4*	126,112	*32.1*	146,230	*35.4*	128,306	*31.7*	38,195	*142.4*
Barley	30,523	*7.3*	14,819	*3.8*	29,072	*7.0*	27,316	*6.8*	-3,207	*9.5*
Grain maize	103,343	*24.6*	105,455	*26.8*	64,118	*15.5*	92,159	*22.8*	-11,184	*89.2*
Grain legumes	14,207	*3.4*	3,815	*1.0*	5,332	*1.3*	12,940	*3.2*	-1,267	*91.1*
Sunflowers	34,505	*8.2*	71,117	*18.1*	62,370	*15.1*	37,530	*9.3*	3,025	*108.8*
Rapeseed	145	*0.0*	10,116	*2.6*	65,744	*15.9*	68,869	*17.0*	68,724	*47495.9*
Soy beans	25,896	*6.2*	19,817	*5.0*	5,637	*1.4*	17,228	*4.3*	-8,668	*66.5*
Legumes – total	10,328	*2.5*	3,797	*1.0*	3,047	*0.7*	1,465	*0.4*	-8,863	*14.2*
Fruit orchards	590	*0.1*	313	*0.1*	180	*0.0*	85	*0.0*	-505	*4.4*

Source: The County Directorate for Statistics, Călărași, series 2000 to 2019 [18].

Table 2. The evolution of the degree of irrigation of the arable areas arranged for irrigation at country level, South-Muntenia region level and by counties

Area, years UM	2008			2018		
	Arranged	Effectively irrigated	Degree of irrigation	Arranged	Effectively irrigated	Degree of irrigation
	thousand ha		%	thousand ha		%
Total country	2,895.4	204.2	7.05	2,892.7	209.4	7.24
South Muntenia Region	1,017.5	58.5	5.74	1,012.8	37.8	3.74
Argeș	28.2	1.1	3.74	27.7	-	
Călărași	***347.8***	***15.2***	***4.36***	***346.6***	***14.0***	***4.03***
Dâmbovița	35.5	1.4	4.02	35.1	-	
Giurgiu	156.6	7.0	4.46	157.6	3.9	2.46
Ialomița	199.6	18.1	9.06	198.7	18.5	9.32
Prahova	22.0	0.9	3.87	21.5	0.6	2.88
Teleorman	227.8	14.9	6.53	225.5	0.9	0.39

Source: NIS, 2019, Tempo online [13].

Table 3. Comparative analysis of average wheat and rye crop production, at country level, South-Muntenia region and counties level

Area, years, UM	Period 2000-2007				Period 2008-2018				Deviations	
	Average (M1)	Variation coefficient		Current rate	Average (M2)	Variation coefficient		Current rate	M 2-M1	
	kg/ha	%	Sign.	%	kg/ha	%	Sign.	%	%	Sign.
Total country	2,311	28	High	4.7	3,302	27.4	High	12.2	991	*
South Muntenia Region	2,258	45.9	High	0.8	3,397	31.5	High	15.1	1,139	N
Argeș	2,273	41.9	High	6.5	2,988	22	High	9.6	715	N
Călărași	***2,540***	***56.4***	High	***-0.7***	***3,780***	***37.4***	***High***	***16.9***	***1,230***	***N***
Dâmbovița	2,112	40.7	High	9.7	2,809	24.1	High	10.1	697	N
Giurgiu	2,177	37.3	High	-0.4	3,283	27.3	High	14.4	1,106	*
Ialomița	1,959	57.0	High	-3.8	3,861	37.8	High	17.4	1,902	*
Prahova	1,726	55.4	High	2.8	3,234	27	High	11.4	1,508	**
Teleorman	2,343	44.2	High	3.6	3,153	32.3	High	15.9	810	N

Significance (GL=16, tcal > t: >0.05 *; >0.01**; >0.001***;<0.05^{0} ;<0.01^{00}; <0.001^{000};<0.05:N)
Source: NIS, 2019,Tempo online [13].

Table 4. Analysis of the evolution of livestock, at the level of Calarasi county

Categories of livestock, years, UM	Period 1990-2018						Deviations	
	1990	2018	Average	St dev	Variation coefficient		2018 vs 1990	
	Thousand heads				%	Signif.	Thousand Heads	%
Cattle	113.6	22.7	39.2	21.3	54.3	High	-11.2	20.0
Cows, buffaloes and heifers	…	10.9	18.5	6,2	33.6	High	-8.7	
Pigs	597.2	132.4	264	172.1	65.2	High	-464.8	22.2
Sheep	352.8	139.3	183.5	74.6	40.7	High	-213.5	39.5
Goats	16.2	33.7	18.3	8.8	47.8	High	17.5	208.0
Poultry	2,737	3,461	2,882	847.4	29.4	High	724	126.5
Laying poultry	…	785.3	1,033.6	208.8	20.2	High		
Bees families	18.4	21.9	16.8	3.8	22.5	High	3.5	119.0

Source: The County Directorate of Statistics, Călărași, series 2000 to 2019 [18].

Table 5. Comparative analysis of the number of animals per 100 ha, at the level of Calarasi county

Area, years, UM	Period 2000-2007				Period 2008-2018				Deviations	
	Average (M1)	Variation coefficient		Current rate	Average (M2)	Variation coefficient		Current rate	M 2-M1	
	no/ha	%	signif	%	no/ha	%	signif	%	no/ha	signif
Cattle	13.8	42	High	-11.91	6.8	21.7	High	-2,28	-7	Θ θθ
Pigs	111.8	26.4	High	-10.02	35.8	9.8	low	-0,07	-76	θθθ
Breeding sows	9.5	29.6	High	-11.28	3.1	17.3	Medium	-1,84	-6,4	θθθ
Sheep	66	23.45	High	-7.17	37.7	10.44	Medium	0,19	-28,3	θθθ
Goats	47	21.4	High	-5.21	30.9	9.1	low	0,12	-16,1	θθθ

Significance (GL=25, tcal > t: >0.05 *; >0,01**; >0,001***;<0.05^{0} ;<0,01^{00}; <0,001^{000};<0,05:N
Source: the County Directorate of Statistics, Călărași, series 2000 la 2019 [18].

Table 6. Comparative analysis of the total agricultural value production at country level, South-Muntenia region and counties level

Area, years, UM	Period 2000-2007				Period 2008-2018				Deviations	
	Average (M1)	Variation coefficient		Current rate	Average (M2)	Variation coefficient		Current rate	M 2-M1	
	lei/ha	%	Signif	%	lei/ha	%	signif	%	%	semf
Total country	2,892	26	High	12,9	4,623	13,5	High	4.3	1,731	***
South Muntenia Region	2,982	28.4	High	11	5,187	17.8	Medium	6.3	2,205	***
Argeș	3,350	30.3	High	15.7	5,353	11.1	Medium	0.8	2,003	***
Călărași	**2,493**	**32.9**	**High**	**6.6**	**4,748**	**28.2**	**High**	**12.1**	**2,255**	***
Dâmbovița	5,144	28.1	High	16.3	8,951	6.9	Low	0.8	3,807	***
Giurgiu	2,925	27.6	High	6.8	4,862	25.1	High	8.9	1,937	**
Ialomița	2,469	33.9	High	12.1	5,026	30.3	High	14.5	2,557	***
Prahova	3,201	31.2	High	14	5,451	12.9	Medium	4.3	2,250	***
Teleorman	2,363	7.9	High	5.3	3,728	3	High	8.4	1,365	*

Significance (GL=25, tcal > t: >0.05 *; >0,01**; >0,001***;<0.05^{0} ;<0,01^{00}; <0,001^{000};<0,05:N
Source: NIS, 2019, Tempo online [13].

For the cattle species per 100 ha, at the level of Călărași county the herds decrease from 13.8 heads/100 ha, with 7 heads/100 ha to 6.8 heads/100 ha. For the total pig species per 100 ha, at the level of Călărași county, the herds decrease from 111.8 heads/100 ha, with 76 heads/100 ha to 35.8 heads/100 ha. In the species of breeding sows, per 100 ha, at the level of Călărași county, the herds decrease from 9.5 heads/100 ha, with 6.4 heads/100 ha to 3.1 heads/100 ha.

For the total number of sheep and goats per 100 ha, at the level of Călărași county the herds decrease from 66.0 head/100 ha, with 28.3 heads/100 ha to 37.7 head/100 ha). At the country level, the decrease is 12.4 heads, and in South Muntenia Region of 24.3 heads/100 ha [13].

There are also significant decreases at the county level. In the case of sheep and goat per 100 ha, at the level of Călărași county the herds decrease from 47.0 heads/100 ha, with 16.1 heads/100 ha to 30.9 heads/100 ha. At the country level, the decrease is 2.6 heads (N), and at the level of South Muntenia Region of 14.2 heads/100 ha. Significant decreases are also at the level of all counties in South Muntenia Region [13].

The synthetic indicator of agricultural activity is the value of agricultural production. We analyzed this indicator as total agricultural production and its component parts: vegetable agricultural production and animal agricultural production, at national level, of South Muntenia Region for the periods 2000-2007 and 2008-2018 as well as comparatively between these periods.

From the analysis of the total value production (lei/ha) it is found at the level of Călărași county that it increased from 2,493 lei/ha in the period 2000-2007 to 4,748 lei/ha, in the period 2008-2018, the increase being very significant of 2,255 lei/ha. At the country level, the increase is 1,731 lei/ha, at the level of South Muntenia Region of 2,205 lei/ha. (Table 6).

From the analysis of the agricultural value of animals, compared to the hectare of agricultural land, in Călărași county, the average increase is 489 lei/ha in the period 2008-2018, respectively at 1,339 lei/ ha, compared to 850 lei/ha, in the period 2000-2007. The annual rate of growth being 17.7% in the first period and 3.2% in the second period. At the country level, the increase was 500 lei/ha, with an annual rate of growth of 13.6% for the first period and 2.8% for the second period. At the level of South Muntenia Development Region, the increase of the value animal production per hectare was of 441 lei/ha in the second period, compared to the first period, with a growth rate of 14.1% for the first period and of 1.7% for the second period. And at the county level, the increases are very significant. Prahova county has an increase in animal production

of 820 lei/ha, the average being 2,146 lei/ha the period 2008-2018 of [13].

CONCLUSIONS

The chronic problem of Romania, that characterizes the period of the last decades after 1990, refers to the unsatisfactory level of agricultural production in many groups of food important for quantitative and qualitative aspects of food security, and we mention here mainly animal products (meat, milk), vegetables, fruits and processed products.

There is a growing global demand for agri-food products while supply is relatively the same. Romania has easy access to the world markets through the Black Sea and Danube ports, and being EU member has given it access to substantial funding, as well as access to important markets. Domestic demand is strong and is met both by domestic production and by imports of processed agricultural products.

Romania, gradually, and as a result of an agricultural year unfavorable to vegetable production in the first place, was not able to cover the necessary agri-food products required by the population. In this perspective, imports of agri-food products, especially dairy products, as well as processed, meat and other products have increased.

Climate change will have an increasing impact on EU food security in general. Global warming is expected to generate mixed and unfairly distributed effects across the EU. In a moderate warming scenario, it is expected that Europe as a whole will benefit from small increases in productivity in the plant sector, in parallel with regional variations.

For the next period, it is important to intensify the measures to grant subsidies in time, for the wider use of irrigation, fertilization and other activities that give perspective to the evolution in this field both regarding quantity and quality.

For Călărași County, due to a period, unfavorable to the agricultural sector, from October up to present, it is assumed that this year, 2021, the vegetable, animal and agricultural production will decrease.

This is also due to the fact that the level of agri-food production is determined by the source of agricultural raw materials (animal and vegetable), which will not be able to meet the needs.

Romania, included in the group of developed countries, according to the results of FAO study, the degree of exposure to Covid-19 shock is high intermediate on the supply side and low intermediate on the demand side. This crisis brought to our attention the vulnerabilities of the agri-food sector in Romania. Some of these vulnerabilities are not easy to solve, but it should start now with intervention measures that support medium- and long-term targets.

REFERENCES

[1]Alexandri, C.et al., 2017, Agriculture and rural area – Evaluations in 10 years from Accession, The Romanian Academy Publishing, Bucharest.

[2]Amazag, 2020, The first national evaluation study of Covid-19 crisis impact on the farms in Romania. https://amazag.ro/primul-studiu-national-de-evaluare-a-impactului-crizei-covid-19-asupra-fermelor-din-romania/, Accessed on 20.12. 2020.

[3]Anghelache, C., Dumitru, D, Stoica, R., , 2020, Study on agricultural activity evolution in 2019. Romanian Statistical Review - Supplement no. 4/2020.

[4]Buhociu, L., Buhociu, C.A., 2015, Water and agriculture in the perspective of humankind development, http://www.anif.ro/cnrid/contributii/20100322-APA%20SI% 20AGRICULTURA.pdf, Accessed on 2.11, 2020.

[5]Călărași County Council, 2015, County presentation, https://www.calarasi.ro/index.php/judetul-calarasi-meniu-stanga/ prezentare- judet, Accessed on 11.12, 2020.

[6]Europa Council, EU., Common Agricultural Policy, Common Agricultural Policy Consilium. Europa.eu., CAP Introduction, Politica agricolă comună (europa.eu), https://www.consilium.europa.eu/ro/policies/cap-introduction/, Accessed on 21.12, 2020.

[7]European Union (EU), Eurostat, 27.07.2019, Sustainable development in the European Union is an online Eurostat publication presenting recent statistics on sustainable development. PDF, doi: 10.2785/44964, Cat. No: KS-02-19-165-EN-N https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-02-19-165, Accessed on 21.12, 2020.

[8]Finantari agricole, 2020, How the agricultural production evolved at EU level and in Romania, https://finantariagricole.ro/ziar/cum-evoluat-productia-agricola-la-nivelul-ue-si-romania/, Accessed on 02.12, 2020

[9]ILO (18th March, 2020). Monitor 1st Edition. COVID-19 and the world of work: Impact and policy responses, https://www.ilo.org/wcmsp5/groups/public/---dgreports/--dcomm/documents/briefingnote/wcms_738753.pdf, Accessed on 01.10, 2020.
[10]MARD, 2020, Code of best practices of the European statistics https://www.madr.ro/docs/agricultura/2020/Codul_de_bune_pactici_al_statisticilor_europene_2017.pdf, Accessed on 11.10. 2020.
[11]MARD, 2020, Strategy for the development of agri-food sector on medium and long term period 2020-2030 https://www.madr.ro/docs/agricultura/strategia-agroalimentara-2020-2030.pdf, Accessed on 091.12, 2020.
[12]Mediafax, 2020, Agriculture between drought and epidemic, https://www.mediafax.ro/economic/agricultura-intre-seceta-si-epidemie-60-din-productia-de-cereale-e-compromisa-19094720, https://cor.europa.eu/ro/news/Pages/local-governments-share-experiences-of-, Accessed on 21.11, 2020.
[13]National Institute of Statistics, NIS, Tempo-online, series 2000, 2019.
[14]Razi, G., 2014, Economy of counties on report, the Financial Newspaper, thttps://www.zf.ro/eveniment/cum-arata-economia-judetului-calarasi-cornul-abundentei-din-agricultura-dar-si-un-fief-al-saraciei-si-subdezvoltarii-12938641/galerie, Accessed on 11.12. 2020
[15]Schmidhuber, J., Pound, B. Q., 2020. COVID-19: Channels of transmission to food and agriculture. Rome, FAO http://www.fao.org/3/ca8430en/CA8430EN.pdf Accessed on 02.12, 2020.
[16]Schmidhuber, J., Pound, B. Q., 2020. COVID-19.Food Security Dimensions of the COVID-19 Crisis: Scenario and Response https://docs.wfp.org/api/documents/091916e4f0c84c3fad7d97b51c028661/download/ Accessed on 11.12. 2020.
[17]Tănăsoiu, O., Iacob, A., 2017, Econometric models Volume I Second edition, Course, ASE Publishing, Chapter 2, p. 127.
[18]The County Directorate of Statistics, Călărași, series 2000 la 2019.
[19]The European Commission, 2013, Rural development 2014-2020, https://ec.europa.eu/agriculture/rural-development-2014-2020_ro, Accessed on 11.11, 2020
[20]The European Commission, 2019, Country report of 2019 on Romania, including a consolidated review of prevention and correction of economic imbalances, Brussels, https://ec.europa.eu/info/sites/info/files/file_import/2019-european-semester-country-report-romania_ro.pdf, Accessed on 5.10. 2020.
[21]The Romanian Center of European Policies, 2018, Creation and development of agricultural cooperatives, CRPE Policy Memo no. 74, December 2018.
[22]USDA, 2020, Romania: Preliminary Assessment of COVID 19 on Romanian Food and Agriculture, Foreign Agricultural Service, 9th April, 2020, https://www.fas.usda.gov/data/romania-preliminary-assessment-covid-19-romanian-food-and-agriculture, Accessed on 11.01, 2021.