THE AVAILABILITY FOR CONSUMPTION AND THE EXPENSES FOR PURCHASING AGRI-FOOD PRODUCTS IN ROMANIA IN THE PERIOD 2014-2019

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Abstract. *The paper aimed to study the dynamics of the consumption of agri-food products per inhabitant in close relationship with the average annual expenses used for purchasing this type of goods using the primary data available in the data base of National Institute of Statistics for the period 2014-2019, and as methods for processing the data: fixed basis index, structural indices, regression equations, coefficients of determination and Bravais-Pearson coefficients of correlation. Consumption depends first of all on production which, in the period 2014-2019, increased in case cereals, meat (animal live weight at slaughter), fish, vegetal oil, fruits, and honey, but it declined in case of milk, eggs, potatoes, and vegetables. In 2019, a Romanian consumed in average: cereals 204.3 kg cereals, meat 77.7 kg, fish 7.8 kg, milk 252.2 kg, fruits 111.3 kg, vegetables 196.6 and honey 0.7 kg, but lees than before, only 241 eggs and 92.3 kg potatoes. In 2019, a Romanian spent in average Lei 3,338 for buying agri-food products, being by +42.4% more than in 2014. In 2019, the share of the agri-food products by category in the average annual total expenses was: cereals 16.8%, vegetables 7.8%, meat 6.6%, fruits 6%, fish 3.9%, eggs 1.7%, vegetable oil 1.7% and honey 0.8%. Average annual consumption of agro-food products and average annual expenses for purchasing this category of goods are strongly dependent of each other, as confirmed by the linear regression equations and coefficient of determination (higher than 0.7) for almost all the agri-food products, except vegetal oil and eggs. The values of correlation coefficients between consumption and expenses were higher than 0.75 for almost all the products reflecting a positive and strong relationship, except vegetal oil, where it was found a moderate and positive correlation. All these reflect a better assurance of food security and the improvement of the living standard of the population.*

Keywords: agri-food products, availability for consumption, expenses for purchasing, Romania

14. Introduction

Food security of the population imposes to assure an adequate nutrition level and healthy products to the society [2].

Agro-food products play an important role in human consumption due to their chemical composition, the amount and structure of nutrients like proteins, fats, carbohydrates, vitamins, enzymes, minerals, which give them special properties and

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qualities [3]. Food consumption contributes to the final consumption which is one of the factors determining GDP [26, 36].
That is why agriculture and food industry are important sectors of the economy, as they assure a large variety of agro-food products for the population well-being and also availabilities for export, stimulate external trade, contribute to the creation of jobs, and economic growth [3, 5].

Food consumption directly reflects the living conditions of the population. More than this, one of the indicators reflecting the living standard is the share of expenditures spent on food consumption in the total expenditures per person. However, if total income per person increases, the share of the expenditures for agro-food consumption declines in the total expenses for buying goods [1].

The living standard of the population is characterized by the following indicators: consumption of goods and services, expenditures per person, the structure of total consumption expenditures, average annual consumption per inhabitant of the main food products (meat, milk, vegetables, fruits), the daily consumption of protein, fats and calories per inhabitant, the quality of the consumed products and services, the share of food expenditure in total consumption expenditure [4].

The consumption of agri-food products is closely linked to the utilizable production, therefore it depends on the quantity of primary products obtained and processed.

Agricultural production in Romania has continuously increased registering a significant growth rate with a positive impact on the domestic, but also on the external market. However, there are a few cases of agri-food products when internal production was not able to cover the consumption requirements and imports were needed to complete the offer.
Summing the volume of production with the volume of imports for each product category and subtracting the volume of exports, the availability of supply was sufficient for assuring food security.

In consequence, the consumption of agri-food products in Romania increased year by year but with some structural changes depending on the tendencies in the modern consumer's behavior looking for improving his living style by assuring, among other things, a healthier diet.
Consumption increased not only in total absolute value, but also in terms of food consumption per inhabitant, which is a precious and recognized indicator reflecting the living standard in a country and facilitating the comparison with other states.
Of course, food consumption is just a component of total consumption of goods per a household or person and it is strongly connected not only to the volume, structure and quality of the offer, but also to the level of the average income per

family or person, consumption needs, education level, life environment (urban or rural) and other determinants.
In this context, the paper aimed to analyze the dynamics the consumption of agri-food products per inhabitant and year and the evolution of the average expenses per person destined for purchasing food in the period 2014-2019, for which National Institute of Statistics could offer primary data. Also, another purpose was to study the dependence degree of average expenses spent for buying agri-food products on consumption using mathematical modeling based on regression functions, coefficient of determination and Bravais-Pearson coefficient of correlation in order to establish the relational intensity and orientation between these two indicators.

2. Materials and Methods

The study is based on the data available at National Institute of Statistics for the period 2014-2019 regarding the following indicators: availability of agri-food products for consumption by category of product and average annual expenses for purchasing agri-food products spent by the population by product type.

The group of the basic agri-food products used in this study includes: (i) cereals and other products made of cereals in terms of grains equivalent, (ii) meat and meat preparations, (iii) fish, (iv) milk and dairy products in terms of milk equivalent 3.5%, (v) eggs, (vi) vegetal oil, (vii) fruits, (viii) potatoes, (ix) vegetables and (x) honey.

The data were processed using the following methods
- *Fixed basis index,* $I_{FB} = (X_n/X_1)x100$, where X_1 is the level of the indicator in the year 2014 and X_n the level of the indicator in the year 2019;
-*Descriptive statistics* in terms of mean, standard deviation and coefficient of variation calculated for each indicator and by category of product;
-*Share of expenses for purchasing agri-food products* of each category in the total expenses;
-*Linear regression equation,* Y = bx +a, where Y is the dependent variable in terms of average annual expenses of the population for buying agri-food products and X is the independent variable in terms of availability of each category of agri-food products for consumption of the population.
- *Coefficient of determination,* R^2, was used to show in what measure the variation of the dependent variable Y- "expenses" is determined by the variation of the independent variable x- "availability for consumption";
- *Bravais-Pearson's coefficient of correlation, r,* was calculated based on it well known formula. The statistically significance of the correlation coefficient was checked for P-value 5% ($P<0.05$) which is the probability when r = 0 (null

hypothesis). If the probability is lower than the conventional P-value, r value could be considered significant.
The data were proceed using Excel facilities, and the results were presented in tables and graphics, accompanied by the corresponding explains. Finally, the main conclusions were drawn.

3. Results and Discussions

3.1. Availability of agri-food products for consumption of the population

Romania has a high agricultural potential both in vegetal and animal production. Agriculture supplies the domestic market and also assures availability for export. Therefore, it is the key sector for assuring food security and also gives an important contribution to Gross Domestic Product and trade and payment balance [12, 36].

Among the basic agri-food products destined for the consumption of the population, there are cereals, meat and meat preparations, aquaculture products (fish, see fruit etc), milk and dairy products, eggs, vegetal oil, fruits, potatoes, vegetables and honey.

Cereals availability
Cereals production registered an ascending trend so that in 2019, it reached 30.41 million tons, by 37.78% more than in 2014. However, the drought of the year 2019 and 2020 determined a decline of cereals production to 18.20 million tons in 2020.
Among cereals, maize and wheat are the most important for human consumption, and that is why Romania extended the cultivated area and made efforts for improving the crop technologies to grow the output [29].
Maize produced 17.43 million tons grains in 2019 compared to 11.98 million tons in 2014, meaning by 45.49% more. The highest production was 18.88 million tons registered in 2018, but since 2015 Romania is top producer of maize in the EU. In 2020, production declined to 10.15 million tons due to the drought and other extreme weather phenomena, this meaning a loss by 58.23% compared to the level achieved in 2019.
In 2019, the maize utilizable production accounted for 17.43 million tons, of which 13.62 million tons for internal use (78.16%) of which for human consumption 4,496.7 thousand tons that is 33%.
Wheat production accounted for 10.20 million tons in 2019, being by 35.75% higher than in 2014, but in 2020 it decreased by 62.29% compared to 2019 and reached only 6.41 million tons.

In 2019, the utilizable production of wheat was 10.20 million tons, of which the internal utilization accounted for 5.29 million tons (51.3%), and of which for human consumption 3,846.9 thousand tons, meaning 72.78%.
As a result, the availability of cereals and other products made of cereals, in grains equivalent accounted for 204.3 kg grains/inhabitant in 2019, being by 10% lower than in 2014. A slight declining trend was noticed in the period 2014-2019, when the maximum available amount of cereals for human consumption of 211.2 thousand tons was reached in 2015, while the minimum level was registered in 2019 (Table 1).
The reasons could be find in the reduction of food demand for bread and other bakery products in the last decade, on one side, due to the modern consumer desire to have a healthier diet, and, on the other side, due to the increased price for this category of products.
However, compared to the EU average bread consumption, 78 kg/capita per year, in Romania bread consumption is higher accounting for 82 kg/capita/year. New trends have appeared in bread consumption related to the consumer preference for high quality, sliced and packed bread despite that bread is still produce in a traditional way in many producing units.

Meat availability

Meat production, in terms of animal live weight at slaughter, registered a general increasing trend, so that in 2019 it reached 1,495 thousand tons compared to 1,316 thousand tons in 2014., meaning a surplus of +13.6%.
Pigs live weight at slaughter accounted for 512 thousand tons in 2019, being by -4.3% smaller than in 2014 when it accounted for 535 thousand tons. However, it maximum level was 588 thousand tons in 2016, but due to the pork crisis in Romania, the number of slaughtered pigs declined and pork production as well [18, 32, 33, 34].
Poultry live weight comes on the 2nd position having a volume of 672 thousand tons in 2019 compared to 488 thousand tons in 2014, and this means + 37.7% [10].
The live weight of slaughtered bovines accounted for 179 thousand tons in 2019, being by -2.72% smaller than in 2014 when it was 184 thousand tons. The peak of production, 206 thousand tons, was recorded in the year 2016, but since that time a more reduced number of bovines were slaughtered due to the decline in the livestock [19].
The live weight of the slaughtered sheep and goats increased year by year and reached the maximum level in 2019, 127 thousand tons compared to only 108 thousand tons in 2014, and this means a surplus of +17.59%.
Meat production structure points out that pork comes on the top position, because it is the traditional food in Romanians' consumption. The average consumption of pork per inhabitant and year being 38.5 kg, representing 49.5% of the total annual

consumption of 77.7 kg meat. Poultry meat comes on the 2nd position with an average consumption per capita of 27 kg, meaning 34.7% of total annual meat consumption. Beef is situated on the 3rd position with 9 kg in average consumed by a Romanian per year (11.6%) and mutton and goat meat accounts for 2.5 kg consumption/capita that is 3.2% of meat output.
The availability of meat and meat preparations in the period 2014-2019 increased by 27.585 from 60.9 kg/inhabitant in 2014 to 77.7 kg/capita in 2019, which is the maximum level so far (Table 1).

Fish availability

Fish production in Romania is still small, being below its potential, because the capacity of the fishing fleet is reduced, the productivity in the aquaculture farms is still low and marine aquaculture production is missing. Despite that, demand is higher and higher both for fish and aquaculture products. As production is not enough, about 80% of fish consumption is covered by import, especially from Spain, France, Italy, and Greece. In the country de most demanded fishes are carp and trout, and from the marine species: mackerel, salmon and tone, and also see fruits.
Fish and aquaculture has recorded an ascending trend year by year, and in 2016 reached 19.8 thousand tons and continued to grow to 22.7 thousand tons in 2017 and then to 20.5 thousand tons in 2018.
The availability of fish for consumption increased by 59.18% in the analyzed interval, from the minimum level accounting for 4.9 kg/inhabitant in 2014 to the maximum level of 7.8 kg/capita in 2019 (Table 1).

Milk availability

Milk production registered a declining trend from 46,615 thousand hl in 2014 to 42,113 thousand hl in 2019, meaning by 9.97% less. The highest contribution to total milk production is given by cow and buffalo milk, which accounted for 86% in 2014 and 84.7% in 2019, as the contribution of sheep and goats is increasing, but it has a small percentage.
The decline in milk production was caused by milk crisis meaning the reduction of the bovine livestock, mainly of dairy cows in close relationship with the negative impact of climate change on forage production and especially due to the low milk price offered by processors. For this reason, the internal demand for milk both for the consumption of the population and for milk processing industry was completed by imported milk [16, 22, 23, 35].
In consequence, the availability of milk and dairy products in milk equivalent 3.5% recorded a slight increase of 3.27% in the analyzed interval, from 244.2 kg/inhabitant in 2014 to 252.2 kg/capita in 2019 (Table 1).

Egg availability

Egg production registered a decreasing trend due to the diminished number of laying hens which are the main contributors to this sort of production. The increase of the price of the farm inputs as well as the import of eggs have diminished the interest of the poultry breeders for raising laying hens being much more oriented to poultry meat [9, 30].
As a result, in 2019, egg production in Romania accounted for 5,564 million pieces, being by -16.16% smaller than 6,636 million pieces in 2014. In 2020, it declined again to 5,428 million pieces.
As a consequence, the eggs availability for consumption of the population accounted for 241 pieces/inhabitant in 2019 being by -2.04% less than 246 pieces/capita in 2014 (Table 1).

Vegetal oil availability

Vegetal oil is the most preferred source of fats in the consumer diet. The vegetal oil is achieved by processing oil seeds especially coming from sunflower, but also from rape, soybean and maize [9, 28, 37, 38, 39]. But, the main contributor to vegetal oil is sunflower, and at present there are many processing plants and sunflower oil brands in Romania.
The dynamic of the sunflower seeds production has had a good impact both for producing oil for human consumption, for processing industry and also for export.
In 2019, Romania harvested 3.57 million tons sunflower seeds compared to 2.18 million tons in 2014, meaning a surplus of 63.76%. In 2020, due to the long and terrible drought of the year 2020, sunflower seeds production declined to 2.2 million tons. Romania is top producer of sunflower seeds in the EU [13].
The production of sunflower oil accounted for 167.3 thousand tons in the year 2017 and 233.9 thousand tons in 2018, meaning a surplus of +39.9% compared to the previous year.
Availability of vegetal oil for consumption of the population increased by 5.79% in the period 2014-2019 from 13.8 kg/inhabitant in 2014 to 14.6 kg/capita in 2019 (+5.79%) (Table 1).

Fruit availability

Fruit production has slightly increased to meet the market demand, but even at present it does not entirely cover consumers' needs which justify the imports of apples, pear, water melons. Also, the exotic fruits are more and more present among the consumers' preferences: bananas, oranges, tangerines, pineapple, mango etc.
In 2019, Romania produced 1.49 million tons of fruits compared to 2014 when production was 1.30 million tons, therefore the actual surplus is +14.61%. However, the highest fruit production was 1.81 million tons, recorded in the year 2018. During the last years, the orchards were very much affected by various meteorological phenomena like freeze at blooming, strong rainfalls and winds etc.

In 2020, fruit production was higher than in 2019 and reached 1.60 million tons [15, 20].
Plums and apples are the main fruits produced in Romania [25]. In 2019, plums production accounted for 0.7 million tons being by 42.85% higher than in 2014 when it accounted for only 0.49 million tons. In 2020, Romania produced 0.78 million tons of plums, by 11.41% more than in 2018.
Apples were on the top position in 2014, but after that they passed on the 2nd position after plums, because Romanians like to use plums not only for the consumption as fresh fruit but mainly for producing a traditional plum brandy. In 2019, apple production was 0.5 million tons, almost equal to the one registered in 2014. The highest apple production was 0.64 million tons, achieved in the year 2018.
The share in total fruit production belongs to plums representing 48.75% of the total fruit production, and apples come on the 2nd position with a share of 34.37% in the year 2020.
Availability for fruits destined for the consumption of the population increased by +33.77% from 80.2 kg/capita in the year 2014 to 111.3 kg/capita in 2019 (Table 1).

Potatoes availability

Potatoes are also a basic food of high importance in the Romanians' diet. However, potatoes production could not keep pace with the market requirements due to the climate change in the cultivation area (extend of the drought) and also due to the competition with the invasion of potatoes on the internal market coming from import at sell at lower prices than the ones produced locally. In 2019, Romania produced just 2.63 million tons potatoes compared to 3.51 million tons in 2014, that is by -25.08% less [11].
Availability of potatoes for consumption in the year 2019 accounted for 92.3 kg/inhabitant compared to 100.8 kg/capita in 2014, meaning by -9.44% less (Table 1).

Vegetables availability

The production of vegetables varied from a year to another, but in general the trend was a declining one. In 2019, Romania carried out 3.53 million tons vegetables in comparison with 3.8 million tons in 2014, that is -8% loss. In 2018, it was achieved 3.8 million tons vegetables similar with the one recorded in 2014. In Romania there are cultivated tomatoes, cucumbers, egg plants, cabbage, cauliflower, onion, garlic and other vegetables, but the most important are tomatoes which are used not only for internal market, but also for export [14, 17, 21].

Tomatoes production registered 0.69 million tons in 2019 being by 2.89% smaller than in 2014, when it accounted for 0.71 million tons. In 2020, tomatoes production reached again 0.71 million tons.
Romania occupies the 8th position in the EU for tomatoes production after France, Portugal, Spain, Greece, Italy, Bulgaria and Poland. Internal requirements are not entirely covered by the domestic production, so that important amounts of tomatoes are imported from Turkey, Spain and Netherlands.
In 2019, the share of tomatoes in total vegetable production was 20.28%, but cabbage had 28%, onion 9.2% and green peppers 6%.
The requirements for vegetables in the domestic market increased due to the change in the behavior of the consumer thinking of a healthy diet.
In 2019, the consumption of vegetables per inhabitant was 196.6 kg, being by +7.49% higher than in 2014 when it accounted for 182.9 kg/capita (Table 1).

Table 1. Availability of agri-food products for the consumption of the population in Romania, 2014-2019 (kg/inhabitant/year)

	Cereals and other prod. in grains equiv.	Meat and meat prep.	Fish	Milk and dairy prod. in milk equiv. 3.5%	Eggs	Vegetal oil	Fruits	Potatoes	Vegetables	Honey
2014	207.0	60.9	4.9	244.2	246	13.8	80.2	100.8	182.9	0.3
2015	211.2	66.4	5.5	243.4	262	14.6	87.8	98.3	182.6	0.3
2016	208.4	68.6	5.9	246.3	267	14.3	96.0	95.5	178.4	0.4
2017	209.2	71.5	6.3	244.1	255	14.5	96.1	96.6	187.8	0.4
2018	205.4	76.2	6.7	250.7	236	14.7	110.8	95.5	202.1	0.6
2019	204.3	77.7	7.8	252.2	241	14.6	111.3	92.3	196.6	0.7
2019/2014 %	90.0	127.58	159.18	103.27	97.96	105.70	138.77	91.56	107.49	233.33
Mean	207.41	70.21	6.18	246.81	251.16	14.41	97.03	96.5	188.4	0.45
St. Dev.	2.44	6.28	1.00	3.74	12.18	0.33	12.35	2.87	9.15	0.16
CV %	1.17	8.94	16.18	1.51	4.84	2.29	12.72	2.97	4.85	35.55

Source: Own calculation based on the data from NIS, 2021 [6, 7].

Honey availability

Honey production recorded a high increase as honey is both required on the domestic market and also on the external one, especially in the Western EU countries grace to its high quality [27].
In 2019, Romania produced 25,269 tons honey compared to 18,040 tons in 2014, meaning a surplus of + 49.97%. The year 2019 was an unfavorable year for pickings and production was not as high like the peak of 30,177 tons registered in the year 2017. The year 2020 was favorable for beekeeping, and it was achieved 30,714 tons production, the highest level in the analyzed interval. Due to the financial support offer by the EU for beekeeping, the number of bee families increased and honey production per apiary as well [8, 24].

Even thou honey production increased, internal consumption accounting for about 0.7 kg/inhabitant per year is still low compared to the quantity of honey consumed in average in the EU which is 2.5 kg/year/capita.
In 2019, average consumption of honey was 0.7 kg honey, by +133.33 more than in 2014, when it was used only 0.3 kg honey per capita (Table 1).

The values of the variation coefficients for average annual consumption of agri-food products per inhabitant reflect that in case of cereals and other products of cereals origin, in grains equivalent, milk and dairy products in milk equivalent 3.5%, vegetal oil, potatoes, eggs, vegetables, meat and meat preparations, where CV% had levels below 10%, the mean is representative because the data are homogenous. In case of fish and fruits, CV% had values between 10% and 20% reflecting that the data are relatively homogenous and the mean could be considered representative. In case of honey, CV was higher than 30% reflecting a larger variability and heterogeneity of the data and the mean is not considered representative.

3.2. Average annual expenses spent by the population for purchasing agri-food products

Consumption of agri-food products is closely related to the expenses for purchasing them, which in their turn depend on the average income per household, changes in consumer patterns and food price.

-Average annual expenses for buying cereals and products of cereals origin, reached Lei 561.48 per person in the year 2019, being by +26.97% higher than in 2014 (Table 2).
-An important increase of +29.33% was also registered in case of average annual expenses for buying meat and meat preparations in 2019, when a consumer spent Lei 221.16 compared to Lei 171 in the year 2014 (Table 2).
-In case of fish, a Romanian spent by +48.69% more money in 2019 when the average expense for buying this sort of food accounted for Lei 130.08 instead of only Lei 87.48 in the year 2014 (Table 2).
- In 2019, the average expense spent for purchasing milk and dairy products in equivalent milk 3.5% reached Lei 21.16/person, being by +29.33% higher than in 2014 (Table 2).
-Also, in 2019, for buying eggs, the average expense per person accounted for Lei 56.76 being by +41.19% over the level spent in 2014 (Table 2).
-For purchasing vegetal oil, the average expense registered a decline of -3.64% in 2019, when its level accounted for Lei 57.24 in comparison with Lei 59.4 in 2014 (Table 2).
-For buying fruits, in 2019, a Romanian spent Lei 202.32, while in 2014 he spent by 44.59% less (Table 2).

-Despite that the consumption of potatoes declined in the period 2014-2019, the average expense allotted for buying this product increased by +68.57% from Lei 42/person in 2014 to Lei 70.8 in 2019 (Table 2).
-The higher need for consuming vegetables determined consumers to allot more money for purchasing various products of this category like tomatoes, cucumbers, egg plants, cabbage, onion, garlic etc. In 2019, a Romanian spent in average Lei 259.44 compared to Lei 165.72 in the year 2014, meaning by +56.55% more.
-The highest growth in the expenses for buying food was recorded by honey, +102.77% in the analyzed interval. This was due to the more oriented behavior for consuming honey, which is a natural, high nutritive food, healthy, sweet, pleasant, a real medicine instead of refined sugar [27, 31].
In 2019, a Romanian spent in average Lei 26.28 for buying honey compared to only Lei 12.96 in 2014, that is more than double (Table 2).

Table 2. Average annual expenses spent by the population for buying agri-food products, Romania, 2014-2019 (Lei/person/year)

	Cereals and other prod. in grains equiv.	Meat and meat prep.	Fish	Milk and dairy prod. in milk equiv. 3.5%	Eggs	Vegetal oil	Fruits	Potatoes	Vegetables	Honey
2014	442.2	171.0	87.48	171.0	40.2	59.4	139.92	42.0	165.72	12.96
2015	443.52	178.2	94.68	178.2	41.64	54.36	146.07	38.04	166.8	15.96
2016	446.16	181.56	97.32	181.56	42.24	53.52	153.0	41.52	176.16	18.84
2017	469.80	194.4	108.12	192.24	51.12	54.6	171.8	42.22	196.56	21.00
2018	511.44	208.56	121.44	208.56	58.8	55.32	190.08	47.28	228.96	24.48
2019	561.48	221.16	130.08	221.16	56.76	57.24	202.32	70.8	259.44	26.28
2019/2014 %	126.97	129.33	148.69	129.33	141.19	96.36	144.59	168.57	156.66	202.77
Mean	479.1	192.48	106.52	192.12	48.46	55.74	167.36	46.97	198.94	19.92
St. Dev.	48.23	19.33	16.53	19.31	8.20	2.18	35.30	12.03	38.00	5.05
CV %	10.06	10.04	15.51	10.05	16.92	3.91	15.05	25.61	19.10	25.35

Source: Own calculation based on the data from NIS, 2021 [6, 7].

The values of the variation coefficients for the average annual expenses for buying agri-food products reflect that in case of vegetal oil, the data are homogenous and the mean is available because CV% is smaller than 10%. In case of cereals and other products of cereals origin, in grains equivalent, meat and meat preparations, milk and dairy products in milk equivalent 3.5%, fruits, fish, eggs and vegetables, the CV had values between 10% and 20% reflecting that the data are relatively homogenous and the mean could be accepted as being representative. In case of potatoes and honey, where the variation coefficient had values between 20% and 30%, the data used in this study are relatively heterogeneous and the mean is not representative.

3.3. The average annual total expenses for buying agri-food products

The average annual total expenses for purchasing agri-food products accounted for Lei 3,338.2 per person in the year 2019, being by +42.45 higher than in 2014, when it was Lei 2,344.2 (Fig. 1).

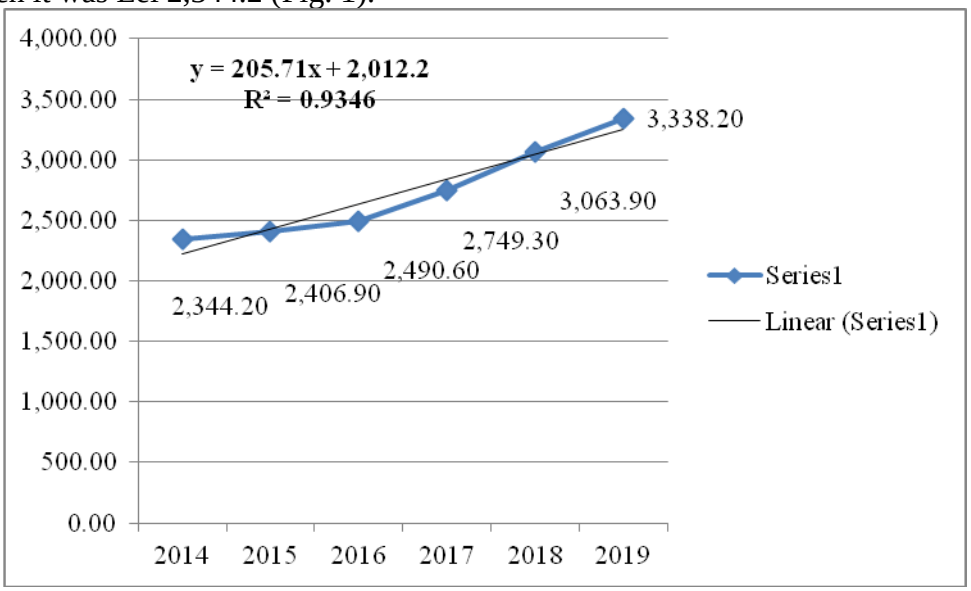

Fig.1. Evolution of average annual total expenses for purchasing agrofood products, Romania, 2014-2019 (Lei/person/year)
Source: Own design based on the data from NIS, 2021.

The share of the average annual expenses for purchasing various agri-food products in the average total annual expenses reflects the importance of different basic food in human consumption.

The highest share of 18.8% in the year 2014, but 16.8% in the year 2019 belongs to cereals and products made of cereals, in grains equivalent. The decline of 2 pp is explained by the reduction of bread and other bakery products in the diet, consumers being interested to buy healthier products and also because the bakery products have a higher price than in the previous years.

On the 2nd position are vegetables whose share in the average total expense for purchasing them increased from 7.1% in 2014 to 7.8% in 2019, this means +0.7 pp. On the 3rd position is situated meat and meat preparations, and also milk and dairy products in milk equivalent 3.5%, whose share declined from 7.3% in 2014 to 6.6% in 2019 in the average total annual expense allotted for buying these foods.

The share of fish in the average total expenses increased from 3.7% in 2014 to 3.9% in 2019.

Eggs registered the 5th position with a share of 1.7% in the average total expenses both at the beginning and at the end of the studied period.

The share of vegetable oil declined from 2.5% in 2014 to 1.7% in 2019.
About 6% of the average total expenses is spent for buying fruits in 2019. Besides fish, vegetables and honey, potatoes registered an increased share in the average total expenses from 1.8% in 2014 to 2,1% in 2019. Finally, honey comes on the last position, its share also increased but from 0.5% in 2014 to 0.8% in 2019 (Table 3).

Table 3. Share of average annual expenses for purchasing each product category in the average annual total expenses spent by the population for buying agri-food products in 2019 versus 2014 (%)

	Cereals and other prod. in grains equiv.	Meat and meat prep.	Fish	Milk and dairy prod. in milk equiv. 3.5%	Eggs	Vegetal oil	Fruits	Potatoes	Vegetables	Honey
2014	18.8	7.3	3.7	7.3	1.7	2.5	6	1.8	7.1	0.5
2019	16.8	6.6	3.9	6.6	1.7	1.7	6	2.1	7.8	0.8
2019-2014 pp	-2.0	-0.7	+0.2	-0.7	0	-0.8	0	+0.3	+0.7	+0.3

Source: Own calculation based on the data from NIS, 2021.

3.4. The dependence of average annual expenses for purchasing agri-food products on the availability of these products for consumption of the population

The results in terms of linear regression equations and the values of the coefficient of determination are presented in Table 4.
They reflect in what measure the average annual expense for buying agri-food products depended on the availability for consumption of the population.
The values of the coefficient of determination in case of meat and meat preparations, fish and fruits reflected that over 90% of the variation in average annual expense per person for purchasing agri-food products was determined by the variation of the consumption per inhabitant and year.

In case of milk and dairy products in milk equivalent 3.5%, the variation caused by the independent factor accounted for 82% and in case of honey for 88.7% in the variation of the dependent factors, that is average annual expense.

In case of vegetables, consumption variation determined a change of 74.8% of the average annual expense.

Also, in case of cereals, the variation caused by the independent factor on the dependent factor accounted for 66.6%.

The lowest R square values were registered for vegetal oil, 0.265 and for eggs 0.520 showing that the variation of the average annual expenses for buying these products was caused only 26.5% and respectively 52% by the change in consumption per inhabitant, the differences being determined by other factors (Table 4).

Table 4. Linear regression equations and coefficients of determination reflecting the dependence of Y variable, average annual expenses for purchasing agri-food products on X variable, availability of agri-food products for the consumption of the population

	Linear regression equations	R^2
Cereals and other prod. in grains equivalent	Y = -16.11x + 3,820.75	0.666
Meat and meat preparations	Y = 2.96 x - 15.78	0.911
Fish	Y = 15.94 x +7.947	0.945
Milk and dairy products in milk equivalent 3.5%	Y = 4.67 x - 961.08	0.822
Eggs	Y = - 0.48 x + 170.41	0.520
Vegetal oil	Y = -3.99 x + 113.31	0.365
Fruits	Y = 1.93 x - 20.67	0.901
Potatoes	Y = -3.21 x + 356.82	0.588
Vegetables	Y = 3.59 x - 477.80	0.748
Honey	Y = 28.97 x + 6.88	0.887

Source: Own calculation.

The correlation coefficients between consumption and expenses spent for buying agri-food products had higher values than 0.8 in case of fish, meat and meat preparations, fruits, honey, milk and dairy products in milk equivalent 3.5% and cereals and products of cereals origin in grains equivalent (Table 5).

In case of potatoes and eggs, the values of the correlation coefficients were r = 0.767 and, respectively r = 0.721, reflecting also positive relationships between the two indicators and enough high

Therefore, taking into consideration the interpretation of the values for correlation coefficient given by Colton (1974), for the agro-food products mentioned above which had the value of the correlation coefficient over 0.75 between the two variables, consumption and expenses per inhabitant per year, it is a very strong and positive relationship for $p < 0.5$.

Table 5. Coefficients of correlation (r) between availability of agri-food products for consumption (X) and average annual expenses of the population for purchasing agri-food products by category of product

Cereals and other prod. in grains equiv.	Meat and meat prep.	Fish	Milk and dairy prod. in milk equiv. 3.5%	Eggs	Vegetal oil	Fruits	Potatoes	Vegetables	Honey
0.816**	0.963***	0.972***	0.906***	0.721*	0.604	0.949***	0.767*	0.865**	0.942***

Source: Own calculation.

Vegetable oil had also a strong and positive coefficient of correlation between the two indicators, r = 0.604, but smaller compared to other products. In this case, the value of the coefficient of correlation ranging between 0.5 and 0.75, the relationship between consumption and expenses per inhabitant per year is a positive, but moderate one for p < 0.5 (Table 5).

Conclusions

(1) This research proved that between average annual consumption of agro-food products per inhabitant and average annual expenses for purchasing this category of goods it is a close relationship of dependence.
(2) Consumption depends first of all on production, an aspect which was analyzed in this study, but also on average consumer price of agri-food products, average income level per household and person, consumption patterns, health conditions, education level etc., aspects which could be approached in future studies.
(3) In the period 2014-2019, production increased in case of the following groups of products: cereals +37.7%, meat (animal live weight at slaughter) +13.6%, fish +3.5%, vegetal oil +40%, fruits +14.6% and honey +50%, but production declined in case of milk -9.9%, eggs -16%, potatoes -25% and vegetables -8%.
(4) In 2019 versus 2014, average annual consumption per inhabitant accounted for: 204.3 kg cereals (-10%), meat 77.7 kg (+27.5%), fish 7.8 kg (+59%), milk 252.2 kg (+3.2%), fruits 111.3 kg (+33.7%), vegetables 196.6 (+7.5%) and honey 0.7 kg (133%), but it declined in case of: eggs 241 pieces (-2%) and potatoes 92.3 kg (-9.4%).
(5) In 2019, average annual total expenses for agri-food products per inhabitant accounted for Lei 3,338 being by +42.4% higher than in 2014.
(6) In total annual expenses for purchasing agri-food products, the share of expense by group of product had an increasing tendency in the period 2014-2019 for almost all products, except cereals whose share declined. In 2019, the share of the products in the average annual total expenses was as follows: cereals 16.8%, vegetables 7.8%, meat 6.6%, fruits 6%, fish 3.9%, eggs 1.7%, vegetable oil 1.7% and honey 0.8%.
(7) The close relationship of the dependence between consumption and expenses was confirmed by the linear regression equations and coefficient of determination whose values were over than 0.7 in almost all the agri-food products, except vegetal oil and eggs where it had smaller values reflecting that the variation of the expenses depends much more on other factors than consumption.
(8) The values of the coefficients of correlations between consumption and expenses for buying agri-food products had higher values than 0.75 for almost all

the products reflecting a positive and strong relationship, except vegetal oil where it was found a moderate and positive correlation.
(9) As a final conclusion, in Romania average annual consumption of agri-food products per inhabitant increased and this has determined the growth of average annual expenses per person for purchasing this product. This reflects how food security is assured and also the improvement of the living standard of the population.

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