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THE IMPORTANCE OF PRODUCTION AND IMPORT FOR ENSURING FOOD AVAILABILITY IN ROMANIA

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Abstract

The paper analyzed the importance of production and import in food availabilities in Romania in the period 2015-2020,using the data provided by National Institute of Statistics. the following indicators were studied: total consumption, consumption per inhabitant, production, production/consumption rate, import, import/consumption rate, export, trade balance, import/export ratio, food availabilities, production share and import share in food availabilities, self-sufficiency rate. Dynamic analysis, mean, growth rate in 2020 versus 2015, comparisons were the main tools used for data processing. The results showed that consumption increased for fruits, vegetables, meat, fish, and declined for potatoes, cereals, sugar and eggs, as consumers are more oriented to a healthier diet. Production increased for fruits (26.7%), meat(3.3%), potatoes (2.8%), but it declined for sugar (-65%), eggs (-17%), milk (-5%), fish (-5%), and vegetables (-2.7%). In 2020 vs.2015, production covered consumption of cereals, potatoes, fruits, eggs and milk, but not for meat and fish. Imports increased for all the products, the growth rates varying between 136.7% for sugar and 17% for fish and cereals. The coverage rate of consumption by import was 101% for cereals, 97% for sugar, 91% for fish, 64% for fruits, 39% for meat, 38% for fats, 29% for potatoes, 23% for milk, 17% for vegetables and 10% for eggs. Agro-food export increased for all the products, but with a lower rate than import, resulting a negative trade balance, cereals and honey being excepted. Import/export ratio was the smallest for cereals (0.34), but high for the other products (21.5 for potatoes, 13.7 for fish, 12 for fruits, 10.1 for vegetables, 4 for milk, 3.8 for sugar, and 3.6 for meat). Self-sufficiency rate was over 100% for cereals and honey, and below 100% for all the other products, the lowest level being for fish and sugar. The share of import in food availabilities was 91% for fish, 89% for sugar, 39% for meat, 35.9% for fruits, 32.4% for cereals, 30% for fats, 20.7% for vegetables, 18.4% for milk, 17.6% for potatoes, and 8.1 % for eggs. As a conclusion, the high share of imports is a result of the incapacity of agricultural production to cover market needs for all the product categories. Farmers have to increase productivity, product quality, to join in associative forms, and create short supply food chains to sell their products. Imports are justified mainly in cases where production is not sufficient to cover the internal market.

Key words**:** *production, import, export, food availabilities, self-sufficiency, Romania*

INTRODUCTION

Food is a fundamental item of human existence. Food availability, everyone's access to it and consumption of healthy food are the key components of food security destined to ensure life on the Earth. In 1996, FAO defined food security as follows: "each person has physical, social and economic access at all times to sufficient, safe and nutritious food to cover food requirements and preferences imposed by a healthy and active life" [9].

Food security has a positive economic and social impact as it could ensure economic development, growth and stability, a lower unemployment rate by creating new jobs, a higher productivity, new opportunities for commercial transactions and trade development, reduction of poverty and health improvement [54].

To cover the demand, food supply has to correspond as volume, diversity, quality and sufficiency, and agriculture is called to

achieve a higher production and of a higher quality.

To enhance agricultural production, farmers have to improve yields, using new technologies based on the use high value varieties and hybrids for different crops, an improved crop structure and a corresponding crop rotation, a higher plant density, integrated pest and weeding control, a rationale fertilizer, soil and water management, modern machinery and equipments, to optimize livestock and increase animal production by efficient breeding programs and using high quality forages and quantitatively sufficient, paying attention to animal health and welfare etc [57].

Also, for developing agricultural production, the trade exchanges between various countries could offer and improve the access to resources, equipments, technologies, other goods and services for agriculture and other connected fields of activity. Therefore, the participation to international trade has an economic, social and political importance for any country [13, 53].

Exports and imports in terms of net exports could contribute to the increase of GDP, besides personal consumption expenditures, gross private investment and government purchases [32, 56].

The importance of production to assure domestic market with agro-food products cannot be denied and has to be closely related to the access to resources as volume and structure, labor input, and processing technologies in order to obtain high value and quality products [52].

However, it is not possible as a country to produce all sorts of agro-food products taking into consideration the geographical position, soil quality and climate conditions, crop and livestock structure, labor qualification, productivity level, efficiency along the product chain.

For this reason, imports play their role in completing domestic production for covering the market needs. Import volume and structure is determined by the development level of agricultural production and its potential to cover the internal needs of the population and processing industries in a country. In general, agro-food products subject to import cannot be produced in the country or are achieved in small amounts. Imports also depend on production costs, delivery price, commercial relationships among various countries, trade agreements, comparative advantage etc. [24].

Imports of equipments and technologies could be welcome to strengthen agriculture to develop to produce more and of higher quality, to improve the competitiveness of the products which could be exported [12].

Also, import of agro-food products could be destined for re-export when prices on the international market are favorable, and the exporting country could benefit of the difference between a low import price and a higher export price.

Beside import, export is also very important for any country, as it is a source of foreign currency which could improve trade and payment balances, and create a resource for economic development. Export could diminish labor migration, offer jobs, increase labor qualification, technological level and value added, enhance internal production efficiency, and stimulate export itself.

If exports exceed imports, the country registers a trade surplus and stimulate economic growth and increase GDP [2, 50].

When the difference between export and import is negative, the country is a net importing country, dependent on resources, technologies, agri-food products from outside the frontiers, and this is very costing and reflects that the potential of the country is not enough exploited [1].

Trade exchanges have to be efficient favoring export/import ratio for assuring food safety and also export earnings to cover import expenses and improve the trade balance [11].

An unbalanced demand/offer ratio in the domestic market reflects a food crisis and oblige the country to stimulate production and to complete it by imports of agri-food products, which could produce a negative trade balance [8].

The export/import ratio has a deep impact of the efficiency of foreign trade, also

influencing GDP, exchange rate, inflation rate etc.

Adding agro-food production to import and substracting export, we may obtain food availabilities for consumption [49] and dividing production by food availability we can determine self-sufficiency ratio (SSR), which reflects the share of production in food supply availability [4, 10].

As production to cover consumption needs, the ratio must be over 100%. If it is less 100%, agro-food production is not able to cope with the population's demand. Therefore, the higher the ratio between production and food availabilities, the higher the self-sufficiency rate [16].

Romania is a country with a high agricultural potential, both in crop and animal sector. It could produce cereals, especially maize and wheat [45], oil seeds cultivating sunflower, rape, soybean [26, 46], potatoes [20, 21, 51, 55], vegetables [7, 37], fruits [6, 18, 36, 41], sugar [3], milk and dairy products [27, 30, 39, 42], eggs [5, 47], meat [28], of various sorts like: pork [33, 34, 48], poultry meat [19], beef [38], sheep and goat meat [42], fish [15, 22], honey [17, 25, 35, 40].

Also, Romania has an intense foreign trade mainly with the EU member states, being both as an importing and as an exporting country [29, 31, 43, 44].

In this context, the purpose of the paper was to study the dynamics of production, import, export, food availabilities, self-sufficiency rate, production/consumption ratio, import/consumption ratio, export/import ratio in Romania in the period 2015-2020 using the data from National Institute of Statistics. The comparison between the 2020 level versus 2015 was used to quantify the changes by 10 groups of agro-food products: Cereals and cereal products, Potatoes, Vegetables and vegetable products, Fruits and fruit products, Sugar and sugar products, Milk and dairy products, Eggs, Meat and meat products, Fish and fish products, and Fats of vegetal and animal origin. Finally, it was aimed to evaluate in what measure production and import assure the domestic market with agro-food products and if imports are really justified.

MATERIALS AND METHODS

In order to set up this paper, the data were collected from National Institute of Statistics for the period 2015-2020.

The following indicators were studied in the period of reference mentioned above:

-*Total consumption of agro-food products* as a reflection of demand;

-*Average annual consumption of agro-food products per inhabitant;*

-*Usable Production (P_u)* including the amounts of obtained primary products, producers' self-consumption and processed products;

-*Coverage rate of consumption by production* (C/P%) calculated as a ratio between production and consumption reflecting in how much of total consumption is assured by internal production;

- *Import (I)* including the amounts of agro-food products bought from other countries;

-*Coverage rate of consumption by import* (I/P%) determined as a ratio between import and total consumption, reflecting how much of total consumption is assured by import.

-*Export (E)* including the amounts of agro-food products sold by the country to other countries;

-*Agro-food trade balance* was determined as a difference between the exported amounts of agro-food products and the imported amounts.

-*Agro-food export/import ratio* was calculated in order to establish Romania's status of exporting or importing country in the international trade and to reflect the efficiency of its agro-food trade.

-*Stock variation ($\pm Vs$)* representing the difference between the stock at the end and at the beginning of the year.

-*Supply of agro-food availabilities (S_a)* including all the amounts of available agro-food products destined to cover the domestic needs of the country. It was calculated based on the formula [14]:

$$S_a = Pu + I - E - (\pm Vs) \quad (1)$$

-*Share of import in the availabilities of agro-food products for consumption ($I_{\%}$)* according to the formula:

$I_{\%} = I / S_a \times 100$ (2)

-*Self-sufficiency rate* (SSR) reflects in what measure domestic production meet the internal consumption requirements and it was determined using the formula:

$SSR = P_u / S_a \times 100$ (3)

-*Almost all indicators mentioned above* were analyzed by 10 groups of products: Cereals and cereal products (in equivalent grains), Potatoes, Vegetables and vegetable products (in equivalent fresh vegetables), Fruits and fruit products (in equivalent fresh fruits), Sugar and sugar products (in equivalent of refined sugar), Milk and dairy products (in equivalent fresh milk with 3.5% fat), Eggs, Meat and meat products (in equivalent fresh meat), Fish and fish products (in equivalent fresh fish) and Fats of vegetal and animal origin.

For the quantitative indicators it was calculated the sum for the period 2015-2020 and the average level according to the formula:

$\bar{X}_i = \sum X_i / n$ (4)

where: X_i = the analyzed indicator in the period 2015-2020 and n the number of years

Also, it was determined the Fixed basis index ($I_{FB\%}$) in 2020 versus 2015, using the formula:

$(I_{FB\%}) = (X_n/X_1)x100$ (5)

Comparison method was also used to identify the positive or negative differences between the levels of indicators in 2020 versus 2015.

The results were tabled and interpreted, and finally the main conclusions were drawn.

RESULTS AND DISCUSSIONS

Dynamics of total consumption of agro-food products as a reflection of demand

Consumption of agro-food products registered various trends in the analyzed period, depending on the group of products, changes in consumers' behavior looking for healthier diets and the evolution demographic aspects.

In 2020 versus 2015, consumption increased by: +19.1% for fruits and fruit products (in equivalent of fresh vegetables), +13.2% for meat, +12% for fish and fish products (in equivalent fresh fish) and +3.5% for vegetables and vegetable products (in equivalent fresh vegetables), +0.8% for milk and dairy products (in equivalent fresh milk with 3.5%), and +0.7% for fats of vegetal and animal origin. But, total consumption declined in case of cereals (-6%), potatoes (-7.7%), sugar (-3%) and eggs (-13%) (Table 1).

Table 1. Dynamics of total consumption of agro-food products by group of products, Romania (Thousand tons)

	2020	Total consumption 2015-2020	Mean	2020/2015 %
Cereals and cereal products	3,936	24,264	4,044	94.0
Potatoes	1,788	11,169	1,861.5	92.3
Vegetables and vegetable products	3,745	22,301	3,716.8	103.5
Fruits and fruit products	2,073	11,903	1,983.6	119.1
Sugar and sugar products	492	2,996	499.3	97.0
Milk and dairy products	5,011	29,918	4,986.3	100.8
Eggs	228	1,472	245.3	97.0
Meat and meat products	1,490	8,559	1,426.5	113.2
Fish and fish products	121	751	125.1	112.0
Fats of vegetal and animal origin	428	2,552	425.3	100.7

Source: Own calculation based on the data from NIS, 2022 [14].

The detailed situation by group of products is as follows:

-in case of cereals, it was noticed a decline in consumption for wheat and rice, but an increased consumption for maize;

-while the total consumption of tomatoes and other vegetables increased, consumption of cabbage, onion, and roots declined;
- apples, cherries, other indigenous fruits and exotic fruits registered a higher consumption, while total consumption of grapes, plums, peaches and nectarines decreased;
-in case of meat, pork, poultry meat, sheep and goat meat registered a higher consumption while the total consumption of beef and veal declined;
-while total consumption of vegetal oil and margarine decreased, butter and pork fat recorded a higher consumption.

Average annual agro-food consumption per inhabitant

This indicator is a reflection of the variation in total consumption and the number of the population and characterizes, besides other indicators, the living standard.

The average annual consumption of cereals accounted for 20.4 kg grains/capita in the year 2020, being by -3.3% lower than in 2015. The decrease by type of cereals was different as follows: -1.85 for wheat, -8.3% for maize and -11.5% for rice, but the order of cereals importance in consumption remained the same: wheat, maize and rice.

The average consumption for potatoes reached 93.4 kg/capita in 2020, reflecting a decline by 5% compared to 2015.

Consumption of vegetables was by +6.45 higher in 2020 versus 2015, but the situation by type of vegetables was as follows: +9.1% for tomatoes, +3.5% for cabbage, +11.3% for other vegetables, but -1.45 for onion and -1.4% for roots.

Also, fruits have become more important in the Romanians' diet. In 2020, the average annual consumption accounted for 107.6 kg/capita being by +22.5% higher than in 2015. Important increases were noticed for almost all the categories of fruits: +12.3% for apples, +14.5% for grapes, +71.7% for plums, +7.9% for cherries, +33% for other indigenous fruits and + 32.5% for exotic fruits. The only exception is represented by peaches and nectarines whose consumption declined by -22.1%.

Table 2. Average annual consumption of agro-food products per inhabitant in 2020 versus 2015 (kg/capita)

	2015	2020	2020/2015 %
Cereals	211.2	204.4	96.7
-Wheat and rye	163.4	160.5	98.2
-Maize	42.3	38.8	91.7
-Rice	5.2	4.6	88.5
Potatoes	98.3	93.4	95.0
Vegetables	182.6	194.4	106.4
-Tomatoes	38.6	42.1	109.1
-Cabbage	42.1	43,6	103.5
-Onion	21	20.7	98.6
-Roots	14.2	14.0	98.6
Other vegetables	42.6	47.4	111.3
Fruits	87.8	107.6	122.5
-Apples	25.9	29.1	112.3
-Grapes	6.9	7.9	114.5
-Plums	4.6	7.9	171.7
-Cherries	3.8	4.1	107.9
-Peaches and nectarines	5.9	4.6	77.9
-Other local fruits	10.9	14.5	133.0
-Exotic fruits	29.8	39.5	132.5
Sugar and sugar products	25.6	25.5	99.6
Milk and dairy products	250.7	260.2	103.8
Eggs	13.1	11.8	90.0
Meat	63.4	77.4	122.1
-Pork	31.3	37.3	119.2
-Poultry	23	28	121.7
-Beef and veal	6.3	5.4	85.7
-Sheep and goat	2.2	2.6	118.2
Fish	5.5	6.3	114.5
Fats and oils	21.5	22.2	103.2
-Vegetal oil	14.6	15.6	106.8
-Margarine	3.6	2.7	75.0
-Butter	1.0	1.5	150.0
-Pork fat	2.3	2.4	104.3

Source: Own calculation based on the data from NIS, 2022 [14].

The average annual consumption of sugar and products made of sugar recorded a slight decline (-0.6%).

The average annual consumption of milk and dairy products increased by +3.8% in 2020, accounting for 260.2 kg.

In case of egg consumption, it was noticed a decrease by 10% in 2020 when its level accounted for 11.8 kg/capita.

The average annual meat consumption increased by +22.1% in 2020, when it reached the record of 77.4 kg per capita. However, by sort of meat, in the year 2020, a Romanian consumed in average: 37.3 kg pork, 28 kg poultry meat, 5.4 kg beef and veal, and 2.6 sheep and goat meat.

In the interval 2015-2020, consumption increased by +21.7% for poultry meat, +19.2% for pork, +18.25 for sheep and goat meat, but it declined by -14.3% for beef.

The average annual consumption of fish and fish products had an ascending trend reaching 6.3 kg/capita in 2020, being by 14.5% higher than in 2015.

The consumption of fats reached 22.2 kg/capita in 2020, by +3.2% more than in 2015. Vegetal oil is the most consumed, 15.6 kg/capita in the year 2020, followed by margarine and pork fat and butter. While the consumption of vegetal oil, butter and pork fat increased by +6.8%, +50% and, respectively, +4.3%, the consumption of margarine decreased by 25% (Table 2).

Dynamics of agro-food production

The increased demand for agro-food products in the domestic and also in the EU market has been a key factor to stimulate production growth mainly after Romania's adhesion to the common market in 2007. Despite that farm structures and size characterize a subsistence and semi-subsistence agriculture, production recorded an ascending trend grace to the efforts to improve technologies and the efficiency of land and labor input, to diversify and raise the offer volume and quality.

In the period 2015-2020, agro-food production had a different evolution from a group of products to another, from a year to another and from a region to another in Romania.

The statistics proves that in 2020 it was recorded either a higher or a lower production compared to 2015 depending on the group of agro-food products.

From a quantitative point of view, the achieved production was higher for the following groups of products: fruits (+26.7%), fats of vegetal and animal origin (+12.1%), meat (+3.3%), potatoes (+2.8%), and cereals (+0.6%). In case of the other groups of products, the production declined as follows: by -65.4% for sugar and sugar products (in equivalent of refined sugar), by -17.1% for eggs, by -5.2% for milk and dairy products (in equivalent milk of 3.5% fat, butter excluded), by -5% for fish and fish products (in equivalent fresh fish), and by - 2.7% for vegetables (in equivalent fresh vegetables), leguminous grains and melons (Table 3).

Table 3. Dynamics of agro-food production by group of products, Romania (Thousand tons)

	2020	Total production 2015-2020	Mean	2020/2015 %
Cereals and cereal products	19,089	147,331	24,555.16	100.6
Potatoes	2,699	16,831	2,895.16	102.8
Vegetables and vegetable products	3,605	22,464	3,744	97.3
Fruits and fruit products	2,527	14,049	2,341.5	126.7
Sugar and sugar products	187	2,058	343	34.6
Milk and dairy products	5,439	33,040	5,506.6	94.8
Eggs	272	1,773	295.5	82.9
Meat and meat products	1,075	6,418	1,069.6	103.3
Fish and fish products	19	134	22.3	95
Fats of vegetal and animal origin	453	2,557	426.16	112.7

Source: Own calculation based on the data from NIS, 2022 [14].

However, it worth to mention that the highest level of production accounted for: 31,112 thousand tons cereals etc in 2018, 3,117 thousand tons potatoes in 2017, 3,990 thousand tons vegetables etc in 2018, 2,958 thousand tons fruits in 2018, 539 thousand tons sugar and sugar products in 2015, 5,732 thousand tons milk and dairy products in

2015, 328 million eggs in 2015, 1,084 thousand tons meat and meat products in 2017, 25 thousand tons fish and fish products in 2017 and 453 thousand tons fats in 2020.

The lowest production was achieved in 2015 for cereals, potatoes, meat and fats, in 2016 for vegetables and fruits, in 2017 for milk and dairy products, in 2018 for sugar, and in 2020 for eggs and fish.

The variations were caused by the diversity of technologies applied, farm size, crop structure, livestock level and structure and climate factors.

The EU unique market favored commercial exchanges between the member states, and Romania's market was invaded by imports which affected local producers especially in case of potatoes, fruits, vegetables, milk and pork meat.

In the year 2020, among cereals, the top products were maize and wheat and rye grains whose share in total output accounted for 57.3% and, respectively, 35.5%.

Vegetable production was dominated by cabbage (27%), tomatoes (19.3%), onion (9%), roots (5.7%), and other vegetables (21%).

Within fruits, the highest contribution to production was given by grapes (37%), plums (30.4%), and apples (21.6).

Cows and buffaloes contributed by 97% to milk production, the difference coming from sheep and goats.

The structure of meat production included: 45.3% poultry meat, 36.9% pork, 8.1% beef and veal, 5.1% mutton, lamb and goat meat.

Vegetal oils dominates the production of fats with a share of 79%.

The coverage rate of consumption by production

Analyzing the rate in 2020 versus 2015, it was noticed the best coverage in case of cereals, production exceeding consumption 4.84 times in the year 2020, when the coverage rate was by +31.9% higher than in the first year of the studied period. This reflects that there are important amounts of cereals which could be destined to export.

In case of potatoes, the coverage rate accounted for 150% in 2020, being by +15.4% higher than in 2015. Therefore, also, it was recorded a surplus which could be valorized to export, and the imported amounts are justified only for diversifying the offer.

In case of fruits, the production was able to cover the demand, in 2020, the coverage rate being 121.95, by +7.45 higher than in 2015.

Analyzing the situation by fruit category, production was not able to cover the requirements for apples, cherries, peaches and nectarines and of course, for exotic fruits, which cannot be produced in Romania. Therefore, the imports are compulsory for these categories of fruits for satisfying consumers' needs.

For vegetables, the coverage rate declined by -6.25 from 102.4% in 2015 to 96.25 in 2020, showing that production could not meet the domestic market requirements. The critical situation was for tomatoes, onion, roots and other vegetables, which need to be supplied from other countries.

In case of sugar and sugar products, the coverage rate of consumption declined by 62%, accounting for only 38% in 2020 due to the failure in sugar beet growing and processing industry. Therefore, sugar production requires to be completed by imports to meet market needs.

In case of milk and dairy products, consumption is covered by production, the coverage rate in the year 2020 being 108.5%, but by -6.8% smaller than in 2015, which justify imports to satisfy better the market with a more diversified offer.

Egg consumption is covered by internal production, but the coverage rate declined from 125.1% in 2015 to 119.3% in 2020, meaning by -5.8% less.

Meat is in a critical situation during the analyzed period, as demand is higher and higher, while the offer in terms of domestic production is not enough. If in 2015, the coverage rate of consumption by production was 79%, in 2020, it declined by -6.9%, accounting for 72.1%. This explains why imports are needed to complete the local offer and cover consumers' requirements. Therefore, at present, imports of pork, poultry and beef are justified.

Fish consumption could not be covered by domestic production in the analyzed interval.

In 2015, the coverage rate was 18.5% and in 2020, the rate was just 15.7%, by -2.8% smaller. The need of fish in the domestic market is compulsory to provide the required quantities and a large range of fish sorts to consumers.

The consumption of fats is covered by internal production, the coverage rate being 105.8% in 2020, by +10.8% higher than in 2015. But, it is still necessary to provide more margarine and butter in the market (Table 4).

Table 4. The coverage rate of consumption by production (%)

	2015	2020	2020-2015 (pp)
Cereals and cereal products	453.0	484.9	+31.9
Potatoes	134.6	150.0	+15.4
Vegetables and vegetable products	102.4	96.2	-6.2
Fruits and fruit products	114.5	121.9	+7.4
Sugar and sugar products	106.3	38.0	-68.3
Milk and dairy products	115.3	108.5	-6.8
Eggs	125.1	119.3	-5.8
Meat and meat products	79.0	72.1	-6.9
Fish and fish products	18.5	15.7	-2.8
Fats of vegetal and animal origin	95.0	105.8	+10.8

Source: Own calculation based on the data from NIS, 2022 [14].

Dynamics of the import of agro-food products

Import is required to cover the deficit between demand and offer in the internal market as production cannot supply 100% agro-food products for covering the population' needs. In the analyzed period 2015-2020, the imported quantities of food products increased as follows: +137.8% for sugar, +89% for potatoes, +84.5% for milk and dairy products, +68.3% for fats, +42.6% for vegetables, +30.6% for meat, +26.4% for fruits, +21% for eggs, +17.2% for cereals and +17% for fish (Table 5).

Table 5. Dynamics of agro-food imported amounts by group of products, Romania (Thousand tons)

	2020	Total import 2015-2020	Mean	2020/2015 %
Cereals and cereal products	3,981	18,523	3,087.16	117.2
Potatoes	518	2,449	408.16	189.0
Vegetables and vegetable products	910	4,757	792.8	142.6
Fruits and fruit products	1,328	7,444	1,240.6	126.4
Sugar and sugar products	478	2,195	365.8	237.8
Milk and dairy products	1,159	5,719	953.16	184.5
Eggs	23	120	20	121.0
Meat and meat products	584	3,179	529.8	130.6
Fish and fish products	110	654	109	117.0
Fats of vegetal and animal origin	165	866	144.3	168.3

Source: Own calculation based on the data from NIS, 2022 [14].

In 2020, in the cereals import, various types of grains had the following shares: maize (36.8%), wheat (37.7%), other cereals (22.5%) and rice (2.9%).

The share of various vegetables in the imported amounts was: 35.6% tomatoes, 3.2% cabbage, 8.9% onion, 9.6% roots (carrots, celery, parsley, parsnips etc) and 31.9% other vegetables.

Also, the amount of imported melons increased reaching 55 thousand tons in 2020.

Leguminous grains (peas, beans, lentils etc) also registered an increased import accounting for 42 thousand tons in the same year.

As fruit production was deeply affected by the extreme meteorological phenomena during the analyzed period and could not meet the requirements of the domestic market,

important amounts of fruits were imported. In 2020, the highest share in fruit imports belonged to: apples (13.1%), grapes (5.9%), peaches and nectarines (5.5%), plums (2%), and cherries (0.8%), and also to the Mediterranean and exotic fruits which cannot be produced in Romania (62.6%, especially including: bananas, oranges, tangerines, lemons, pineapple, kiwi, kaki, avocado etc).

In 2020, regarding the structure of meat import, the shares of various meat sorts were: pork 59.4%, poultry meat 27%, beef 4.3% and other types 5.1%.

The import of fish and fish products reached 110 thousand tons in 2020, the import being 5.8 times higher than production and compulsory to cover consumer's demand which has continuously raised looking for a healthier diet. The imported fats had the following structure: vegetable oil 67.2%, margarine 14.5%, butter 9.7% and other fats 8.5%.

The coverage rate of consumption by agro-food import

Taking into account the dynamics of import and total consumption, the calculated coverage rate of consumption by import in the year 2020 was higher than in 2015 for almost all the groups of products in various proportions, except vegetables where the rate declined by -0.6 pp.

The results proved a high share of import in consumption as follows: 101% for cereals, 97.1% for sugar and sugar products, 90.9% for fish and fish products, 64.1% for fruits, 39.2% for meat, 38.5% for fats, 28.7% for potatoes, 23.1% for milk and dairy products, 17% for vegetables and 10.5% for eggs (Table 6).

Table 6. The coverage rate of consumption by import (%)

	2015	2020	2020-2015 (pp)
Cereals and cereal products	81.1	101.1	+20.0
Potatoes	14.0	28.7	+14.7
Vegetables and vegetable products	17.6	17.0	-0.6
Fruits and fruit products	60.3	64.1	+3.8
Sugar and sugar products	39.6	87.1	+57.5
Milk and dairy products	12.6	23.1	+10.5
Eggs	7.2	10.1	+2.9
Meat and meat products	33.9	39.2	+5.3
Fish and fish products	87.0	90.9	+3.9
Fats of vegetal and animal origin	23.0	38.5	+15.5

Source: Own calculation based on the data from NIS, 2022 [14].

Dynamics of the export of agro-food products

Most of agro-food production is consumed on the domestic market, but exports are also intensified bringing foreign currency in trade and payment balance stimulating the economic growth.

Romania has a high potential for food export, but there are still problems related to production level and diversity, gross value added, product quality and competitiveness, and the unbalanced demand/offer ratio in the domestic market.

The exported amount of agro-food products, its structure and dynamics differ from a group of products to another.

In the year 2020 versus 2015, the volume of export increased by +162% for fats, by +100% for fish, by +42.8% for vegetables, by +27.3% for milk and dairy products, by +19.6% for cereals, by +5.25 for meat and by +2.4% for sugar. In case of potatoes, eggs and fruits, the exported quantities declined by -20%, -11.2% and, respectively, -6.1% (Table 7).

Table 7. Dynamics of agro-food exported amounts by group of products, Romania (Thousand tons)

	2020	Total export 2015-2020	Mean	2020/2015 %
Cereals and cereal products	11,525	70,470	11,745	119.6
Potatoes	24	208	34.6	80.0
Vegetables and vegetable products	90	783	130.5	142.8
Fruits and fruit products	108	622	103.6	93.9
Sugar and sugar products	126	743	123.8	102.4
Milk and dairy products	256	1,481	246.8	127.3
Eggs	16	103	17.1	88.8
Meat and meat products	160	977	162.8	105.2
Fish and fish products	8	38	6.3	200
Fats of vegetal and animal origin	76	429	71.5	262.0

Source: Own calculation based on the data from NIS, 2022 [14].

Among cereals, maize and wheat grains are the top exported products with a share of 50.2%, and 38%.

The volume of exported vegetables included a mix of sorts (roots, cucumbers, pumpkins, onion, cabbage, eggplants etc) summing 72% and tomatoes 10%.

Apples accounted for 28.7% in fruit exported amount, being followed by grapes (4.6%), cherries (4.6%), and other sorts.

Meat exports are dominated by poultry meat, representing 65% and pork 13.1%, beef 4.3%, mutton and goat meat 3.1%, and other sorts 10%.

Vegetal oil accounts for 93.4% of the total exported amounts of fats.

Dynamics of quantitative agro-food trade balance

Even though both agro-food export and import increased, the growth rate of import exceeded the export almost every year and this resulted in a higher and higher negative trade balance for almost all the food products, except cereals and honey.

Table 8. Difference between the quantitative agro-food export and import by group of products, Romania (Thousand tons)

	2015	2016	2017	2018	2018	2020	Total 2015-2020	Mean	2020/ 2015 %
Cereals and cereal products	+6,240	+8,122	+8,188	+10,002	+11,851	+7,544	+51,947	+8,657.8	120.8
Potatoes	-244	-347	-298	-361	-497	-494	-2,241	-373.5	202.4
Vegetables and vegetable products	-575	-626	-511	-712	-710	-820	-3,974	-662.3	142.6
Fruits and fruit products	-935	-1,136	-1,163	-1.167	-1,201	-1,220	-6,822	-1,137	130.5
Sugar and sugar products	-78	-118	-151	-383	-370	-352	-1,452	-242	451.2
Milk and dairy products	-427	-606	-680	-787	-835	-903	-4,238	-706.3	211.4
Eggs	-1	-7	-3	+4	-3	-7	-17	-2.83	700.0
Meat and meat products	-295	-310	-336	-425	-412	-424	-2.202	-367	143.7
Fish and fish products	-90	-93	-98	-106	-127	-102	-616	-102.6	113.3
Fats of vegetal and animal origin	-69	-75	-78	-72	-54	-89	-437	-72.8	128.9

Source: Own calculation based on the data from NIS, 2022 [14].

Therefore, we could affirm that Romania is a net exporting country for cereals and honey and a net importing country for the rest of food products.

In 2020 in comparison with 2015, the quantitative difference between import and export was higher as follows: 7 times for eggs, 4.5 times for sugar, 2 times for potatoes, 2.1 times for milk and dairy products, 1.43 times for fats, 1.31 times for fish and fish products.

In case of cereals, the export exceeded import by +7,549 thousand tons, meaning by +20.8% compared to 2015 (Table 8).

Dynamics of agro-food import/export ratio

As a consequence of the evolution of the absolute values of import and export amounts, the import/export ratio had the smallest level in case of cereals, accounting for 0.34 and reflecting that imports only 34% of exports, which is a positive aspect in Romania's trade.

In case of all the other products, where the imported quantities were higher than the exported ones, the import/export ratio registered higher levels than 1.

In 2020, compared to 2015, this ratio reflected an increasing trend in case of potatoes, fruits, sugar, milk and dairy products, eggs, meat, while in case of fish and fats it was noticed a declining tendency.

Based on the level of import/export ratio, the decreasing order of the groups of agri-food products was the following one in the year 2020: potatoes (21.58), fish (13.75), fruits (12.29), vegetables (10.11), milk and dairy products (4.52), sugar (3.79), meat (3.65), fats (2.17) and eggs (1.43).

In 2020, compared to 2015, the import/export ratio increased and decreased in various percentages from a group of products to another.

In case of potatoes, sugar and sugar products, milk and dairy products, fruits and fruit products, meat and meat products, it increased by +136.3%, 132.5%, +44.8%, +34.6%, and, respectively, +24.1%.

But, also, it decreased by -41.5% for fish, by -36.5% for fats, by -4.7% for eggs, by -2.9% for cereals and by - 0.1% for vegetables, which is a positive aspect (Table 9).

Table 9. Import/export ratio for agro-food products, Romania, 2015-2020

	2015	2016	2017	2018	2018	2020	2020/2015 %
Cereals and cereal products	0.35	0.32	0.26	0.17	0.16	0.34	97.1
Potatoes	9.13	14.88	7.34	9.20	14.07	21.58	236.3
Vegetables and vegetable products	10.12	6.85	3.00	6.35	6.40	10.11	99.9
Fruits and fruit products	9.13	12.36	14.21	12.90	11.62	12.29	134.6
Sugar and sugar products	1.63	1.86	2.20	4.45	4.03	3.79	232.5
Milk and dairy products	3.12	3.87	3.50	3.74	4.28	4.52	144.8
Eggs	1.05	1.53	1.18	0.8	1.16	1.43	95.3
Meat and meat products	2.94	2.94	2.99	3.51	3.45	3.65	124.1
Fish and fish products	23.5	32.0	20.6	18.66	11.58	13.75	58.5
Fats of vegetal and animal origin	3.37	2.09	2.11	1.91	1.51	2.17	64.3

Source: Own calculation based on the data from NIS, 2022 [14].

Dynamics of the share of production in the availabilities of agro-food products for consumption

Taking into account the level of production, import, export and stock variation, the degree of self-sufficiency, reflecting the weight of production in total availability of food products for consumption, exceeded 100% only in case of cereals. For all the other groups of products, the share of production was below 100%, in various proportions along the studied period.

In 2020, in the descending order of the self-sufficiency rate, the hierarchy of the analyzed groups of agro-food products was the following one: cereals, eggs, potatoes, milk and dairy products, vegetables, meat, fruits, sugar and fish.

The critical situation is in case of fish and fish products, where the self-sufficiency rate is the smallest in comparison with all the other products. But, it had a declining trend from 18.5% in 2015 to 15.7% in 2020, showing that internal production is not enough to cover the market needs and but it is increasing [15].

The causes could be find in the fact that local production covers just about 10% of consumption, the low production is determined by the high production costs, the lack of offer from the retailers' side, the small amounts delivered to "horeca" sector which does determines a continuous production cycle, an existing modest fleet of modern fishing boats etc. [22].

Also, in case of sugar, internal production decreased due to the reduced surfaces cultivated with sugar beet, the lack of labor force, high cost per ha, the failure of processing industry, sugar low price and reduced consumption of sugar as consumers are more conscious that a healthy diet means low sugar. In consequence, the self-sufficiency rate decreased from 100.6% in 2015 to only 34.9% in 2020, which justified to call imports to complete the market offer [3].

Fruit production is not enough to cover consumption for many reasons among which the most important ones are: the existence of old plantation of low productivity, the high investment cost for setting up new plantations, the low consumption of fruits per inhabitant in the country compared to other EU countries, the lack of modern air-conditioned warehouses and firm contracts with supermarkets [6, 18, 36, 41].

Meat production declined due to the decrease in pig, cattle, and poultry livestock, high production cost, a low live weight at slaughter, a low acquisition price per kg live weight, and a low concentration of meat processing companies in the country. For covering the market requirements, imports are justified but affect local producers [33, 34, 38, 41, 47].

Vegetable production has also problems regarding climate change for field vegetables and high cost for vegetables grown in green-houses and plastic tunnels, the lack of labor input, high cost of farm input, lack of producers associations, lack of air-conditioned warehouses, low acquisition price from retailers [7, 37].

Production of milk and dairy products decreased due to the decline in dairy cows livestock, high price for farm input, high production cost per kg, low milk yield and quality, low gross margin, low milk acquisition price offered by processors and low income for dairy farners. For these reasons, more milk and dairy products are imported to cover consumption [23, 30, 39].

Potatoes production is not able to cover the needs of consumption due to increased prices for farm inputs, high production cost per ha, climate change, low acquisition price, invasion of imported potatoes in the market which affects Romanian farmers [20, 21, 51, 55].

Honey production has followed an ascending trend due to the high demand on the EU market especially in the Western countries as Romanian honey has the highest quality. For this reason the number of bee hives and apiaries increased and honey production as well assuring a good income to beekeepers [17, 25, 35]. In Romania, consumption is still low compared to other countries.

Table 10. Self-sufficiency rate in agro-food products, Romania, 2020 versus 2015

	2020 (%)	2020-2015 (pp)
Cereals and cereal products	155.6	+5.2
Potatoes	92.1	+5.4
Vegetables and vegetable products	82.3	-5.9
Fruits and fruit products	68.5	+1.3
Sugar and sugar products	34.9	-65.7
Milk and dairy products	86.4	-6.7
Eggs	96.8	-5.7
Meat and meat products	72.1	-6.9
Fish and fish products	15.7	-2.8
Fats of vegetal and animal origin	83.9	+1.5

Source: Own calculation based on the data from NIS, 2022 [14].

Despite that imports have appeared during the last years, they represent unimportant amounts compared to domestic production

and high potential of Romania for export, for this product the country being a net exporting country. Therefore, self-sufficiency for honey is also over 100%, like in case of cereals [40].Compared to the level of the year 2015, in 2020, the self-sufficiency rate declined in percentage points as follows: - 65.7 pp for sugar, -6.9 pp for meat, -6.7 pp for milk, -5.9 pp for vegetables, -5.7 pp for eggs, -2.8 pp for fish. Also, the rate increased by +5.4 pp for potatoes, +5.2 pp for cereals, +1.5 pp for fats and +1.3 pp for fruits (Table 10).

Share of import in the availabilities of agro-food products for consumption

Taking into consideration that production has in general a declining trend in the availabilities of food products for consumption, the share of import registered an ascending trend in case of all the groups of products.

In 2020, the highest share of import was recorded as follows: fish 90.9%, sugar 89.17%, meat 39.19%, fruits 35.9%, cereals 32.45% and fats 30.55%, followed by vegetables 20.77%, milk and dairy products 18.4%, potatoes 17.67% and eggs 8.18%.

Also, in 2020 versus 2015, the share of import in the availability for consumption increased for all the groups of food products. The difference in percentage points was therefore positive and ranged between +0.55 pp for fats and +51.67 pp for sugar (Table 11).

Table 11. The share of import in the availabilities of agro-food products for consumption, Romania, 2015-2020 (%)

	2015	2016	2017	2018	2018	2020	2020-2015 (pp)
Cereals and cereal products	26.47	28.55	22.17	15.80	17.55	32.45	+5.98
Potatoes	9.10	12.5	11.09	13.26	18.49	17.67	+8.57
Vegetables and vegetable products	14.9	18.07	17.67	18.36	19.36	20.77	+5.87
Fruits and fruit products	35.3	39.83	37.53	31.42	35.06	35.99	+0.69
Sugar and sugar products	37.5	47.29	50.00	94.27	92.30	89.17	+51.67
Milk and dairy products	10.19	13.18	15.60	17.31	17.13	18.40	+8.21
Eggs	5.9	6.25	6.25	6.02	7.71	8.18	+2.28
Meat and meat products	34.0	34.70	36.01	39.73	38.56	39.19	+5.19
Fish and fish products	87.0	81.33	83.73	86.15	91.44	90.90	+3.90
Fats of vegetal and animal origin	30.0	29.38	29.48	30.50	32.92	30.55	+0.55

Source: Own calculation based on the data from NIS, 2022 [14].

CONCLUSIONS

The analysis showed that in the period 2015-2020, consumption of agro-food products in Romania increased for fruits, vegetables, meat, fish, and declined for potatoes, cereals, sugar and eggs, reflecting that consumers are more oriented to a healthier diet.

Agro-food production succeeded to increase by 26.7% for fruits, 3.3% for meat and 2.8% for potatoes, but it decreased for sugar (-65%), eggs (-17%), milk (-5%), fish (-5%), vegetables (-2.7%).

As a result, in 2020 versus 2015, the coverage of consumption by production increased 4.8 times for cereals, 1.5 times for potatoes, 1.3 times for fruits, 1.19 times for eggs and 1.08 times for milk. But, for meat and fish, production was able to cover just 72%, and respectively, 15.7%, which reflected the need of imports.

Imports increased for all the groups of products, the highest rate belonging to sugar (136.7%), potatoes (+89%), fats (68%), vegetables (43%), meat (31%), fruits (26%), eggs (21%), fish (17%) and cereals (17%).

As a result, the coverage of consumption by import in 2020 versus 2015 was: 101% for cereals, 97% for sugar, 91% for fish, 64% for fruits, 39% for meat, 38% for fats, 29% for potatoes, 23% for milk, 17% for vegetables and 10% for eggs.

The dynamics of agro-food export reflected an increase for all the groups of products, which is a good point for Romania's trade. But, the growth rate of exports was exceeded

by the import growth rate, which led to a negative balance for almost all the products, except cereals and honey.

Import/export ratio was the smallest for cereals (0.34) as the exports are higher than imports. In case of all the other groups of products, import/export ratio was high: 21.5 for potatoes, 13.7 for fish, 12 for fruits, 10.1 for vegetables, 4 for milk, 3.8 for sugar, and 3.6 for meat.

Self-sufficiency rate was over 100% for cereals and honey, and below 100% for all the other products, the lowest level being for fish and sugar.

In food availabilities, import accounts for 91% for fish, 89% for sugar, 39% for meat, 35.9% for fruits, 32.4% for cereals, 30% for fats, 20.7% for vegetables, 18.4% for milk, 17.6% for potatoes, and 8.1 % for eggs.

Romania has a high share of imports caused by the fact that agricultural production is not able to entirely cover consumption needs for all the product categories.

Low productivity level in many farms, product quality which does not meet quality standards and the lack of associative forms to assure low cost farm inputs and an efficient product marketing disadvantage Romanian producers which cannot meet the requirements of the domestic market.

Also, the high share of retailers favor imports and does not stimulate local producers, who are not able to compete. For this reason, for many agro-food products carried out by small producers, it is needed to develop short supply food chains which could ensure a close contact producer-consumer and encourage production and its valorisation.

Imports are justified mainly in cases where production is not sufficient to cover the internal market.

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