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ANALYSIS OF FOOD SECURITY IN POLAND IN RELATION TO SUSTAINABLE DEVELOPMENT OF AGRICULTURAL PRODUCTION

Abstract: The objective of the article is to define food security and the means of measuring it and to analyze the state of agricultural production and food self-sufficiency in Poland. The country currently ranks 60th in the world and fifth in the European Union in agricultural land area.

The balance of trade in agri-food products in 2010-2014 was negative, i.e. imports dominated over exports, despite a considerable surplus in the production of commodities such as milk, poultry meat, beef, vegetables and fruits (particularly apples). Pork production was insufficient; Poland imported in order to meet demand. In 2015, Poland has achieved a positive balance of foreign trade. Nevertheless, in 2010-2015 Poland was predominantly food self-sufficient, as evidenced by the volume of production and consumption of certain agricultural products. Economic access to food, defined as the proportion of expenditures for food and non-alcoholic drinks in total consumer spending, remained stable. There are, however, population groups in Poland which are unable to afford a meal with red meat, poultry or fish every other day. This deprivation in Polish households affected on average 17.7% to 6.75% of families in the years 2008-2016.

Keywords: sustainable development, agricultural production, supply, food security, food safety

INTRODUCTION

Hunger and undernourishment have accompanied humankind throughout human history and are currently one of the greatest dangers facing humanity. The danger of this phenomenon has political, economic and humanitarian aspects. Hence food security remains a major challenge for agriculture in the European Union. According to Food and Agriculture Organization the demand for food will double by 2050 (FAO Rome 1996, 2002, 2003). This in conjunction with the worsening water shortage already observed in over 30 countries worldwide and climate change, which is already affecting EU countries and will have particularly severe consequences in tropical and subtropical countries already struggling with the problem of food, will pose a serious challenge for agricultural production, which ensures food security for the entire globe. According to Maslow's hierarchy of needs theory; only when basic physiological needs such as adequate food are met can needs of a higher order appear. Food security is currently one of the most important global challenges of the modern world, and should be examined not only on the scale of an entire country but also at the level of the family, as the basic unit of society (Michna 1988, Mięka 2012).

The aim of the article is to analyze the level of agricultural production in Poland in 2010-2015 in terms of ensuring adequate access to agricultural products for its people. Food self-sufficiency and economic access to food were assessed in the study. The level of food self-sufficiency was determined by analyzing the production and consumption volume of selected agricultural raw materials and products and calculating the balance of trade in agri-food products. Moreover, the issue of food safety is described in terms of the law and food self-sufficiency is defined. The means of measuring the Global Food Security Index is presented as well

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(<http://foodsecurityindex.eiu.com>). The main sources of data were reports published by the European Statistical Office (Eurostat) and the Central Statistical Office of Poland (GUS).

THE CONCEPT OF FOOD SECURITY

Food security is a complex and multifaceted problem currently facing the world and European countries, it includes food self-sufficiency, economic access to food, and food safety (Baranowska-Skimina 2012, Grębowiec 2012). The term “food security” appeared among concepts of food policy in the early 1970s; its negation is food insecurity. Previously the concept had been used by military staff in operations or in reference to the economic and political dependence of countries unable to produce adequate amounts of food (Michna 1988). Currently, food security refers to the ability to ensure self-sufficiency in supplying food products (Mikuła 2012).

An official definition of food security was first formulated at the World Food Conference in Rome in 1974. According to this definition, food security is the “availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices”, i.e. economic access to food at the individual, household, regional and national level (FAO 1996, 2002, 2003, Mikuła 2012). In the 1990s the concept of food security was expanded to cover food safety, the nutritional value of food, and food preferences influenced by social and cultural factors. Food security in Poland is written into its national security strategy. It is defined as the situation in which every household has factual access to the food needed for all persons and is not at risk of losing this access (MRiRW 2008).

The literature names three aspects of food security: availability, access, and adequacy. Availability means having a sufficient amount of food for the entire population at all times to sustain human life; access means that the supply of food is not restricted, and adequacy is understood as a nutritionally balanced food ration free of pathogens and toxins (Małyśz 2009, Leśkiewicz 2012).

The concept of “*food safety*” in legal language refers to the characteristics of a food product which ensure that it will have no harmful effects on the health of the consumer (the quality aspect), while “*food security*” refers to the aspect of quantity. In legal language, food security can be defined as a certain optimal state recognized by the legislature which should be achieved according to the relevant provisions of international, EU and national law (Leśkiewicz 2012, Krajewski 2014).

At the EU level, food security is defined by the objectives of the Common Agricultural Policy. In the international realm, food security is associated with the human right to food and the ability to provide it. The phenomenon of the impossibility of providing food is known even to the world’s most developed countries, and measures to combat it are taken in both the European Union and in the United Nations. Food safety, according to the Polish legislature, refers to the “conditions that must be met (...) and the actions that must be taken at all stages of production or marketing of food to ensure human health and life” (Dz.U. (Journal of Laws) 2010.21.105). The European Union has developed its own food safety system based on a Rapid Alert System, through the European Food Safety Authority with national checkpoints.

Food security is most often measured on the basis of the trade balance in agri-food products (Hałasiewicz 2011). We may also speak of global food self-sufficiency, which depends not only on the level of agricultural production and freedom of trade, but also on the development of processing and distribution. Currently there is enough food produced in the world to feed its entire population, while the undernourishment occurring in many parts of the world is primarily due to imperfect distribution and poor political and institutional solutions (Skrzypczyńska 2011).

FOOD SECURITY IN INTERNATIONAL LAW

The right food is part of the human right to life, nourishment and human dignity; a lack of food often involves humiliation and a poor psychological and physical condition. According to the Universal Declaration of Human Rights adopted by the United Nations on 10 December 1948 (art.

3), "Everyone has the right to life, liberty and security of person." Furthermore, art. 25 par. 1 of the Declaration states that "Everyone has the right to a standard of living adequate for the health and well-being of himself and of his family, including food, clothing, housing and medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond his control" (UNESCO). Issues associated with the right to food were also covered by the International Covenant on Economic, Social and Cultural Rights of 19 December 1966 (<http://www.IRINNEWS.org>). The issue of food safety in EU countries is discussed in a White Paper of the European Commission from 2000. It proposes a strategy for ensuring a high level of food safety, specifying about 80 measures, including legislation.

In the European Union food security issues are dealt with by the Treaty of Rome (now the Treaty of Lisbon, OJ 2007/C 306/01), which in art. 39 defines the objectives of the Common Agricultural Policy, which include ensuring security of supply and reasonable prices to the consumer.

The problem of food security is taken up again in CAP reform 2014-2020 (Chądzyński 2012). According to the provisions of CAP 2014-2020, the challenge during this period will be to solve problems related to food, natural resources and territorial challenges.

Food safety is one of the priorities of the EU food security system, including the Rapid Alert System for Food (Leśkiewicz 2012). The proper functioning of the system is to be ensured by institutions and government bodies set up to this end at the EU level and in the individual member states. The system also defines the appropriate operating procedures in crisis situations. The rules governing the production and distribution of food, as well as control and monitoring procedures, cover nearly every aspect of this area. It seems, therefore, that in the realm of regulations an exhaustive level has been attained.

MEASURING FOOD SECURITY

Taking into account the nature of food security, the Economist Intelligence Unit (EIU), sponsored by DuPont, developed the Global Food Security Index in 2012, in order to investigate the affordability, availability, safety and quality of food in 109 countries (currently 113), based on analysis of 28 factors, using data from the UN, IMF, FAO, World Health Organization and World Bank. An important category in this index is affordability, i.e. the ability of consumers to purchase food products. Calculation of affordability takes into account several factors, including the share of food consumption in household expenses, the percentage of the population below the global poverty line, per capita GDP, and access to financing for farmers. The next indicator is availability, which is calculated on the basis of factors such as the sufficiency of food supply, the level of political stability, the stability of agricultural production, and the level of food loss. The third indicator is food quality and safety, which includes diversification of the diet, food standards, the availability of micronutrients, and protein quality (Kraciuk 2016). According to the current estimation of the Global Food Security Index, Poland ranked 27th among 113 monitored countries in 2017 (<http://foodsecurityindex.eiu.com>). Its overall score was 72.1 of a possible 100, indicating a slight downward trend with respect to the previous year (74.2). This means that Poland is among the countries with the best results in the world. Among European countries, Poland is 17th, just below the Czech Republic and above Greece (<http://foodsecurityindex.eiu.com>).

RESEARCH RESULTS

1. AGRICULTURAL PRODUCTION

In terms of arable land area Poland currently ranks 57th (2010) and 60th (2015) in the world and 5th in the European Union. Poland has the sixth largest population in the EU, but is first in employment in the agricultural sector. In terms of the scale of agricultural production, it is at the forefront of countries in the world and in the European Union, especially in production of rye, oats,

potatoes, sugar beet, rapeseed and apples. In addition, Poland is a major producer of meat and milk (table 1).

Farmland in Poland covers nearly 15 million hectares (table 2). The largest portion of agricultural land is occupied by cereals, including wheat and rye, which are strategic plants for food security. There is also a significant share of vegetable crops and especially of fruit, including apples, of which Poland is the largest producer in the European Union. The state of livestock production is also good, with relatively large populations of cattle and poultry (table 2).

Table 1. Polish participation in the Agriculture of the World and in the EU (2010 and 2015)

Description	The World				EU			
	Share Polish (%)		Polish place		Share Polish (%)		Polish place	
	2010	2015	2010	2015	2010 UE-28	2015 UE-28	2010 UE-28	2015 UE-28
The surface	0.2	0.2	69	69	7.1	7.2	5	5
Agricultural area	0.3	0.3	57	60	7.7	7.7	5	5
The population	0.6	0.5	34	34	7.7	7.7	6	6
in this agricultural	0.2	0.2	48	49	27.4	28.1	1	1
Production:								
Wheat	1.4	1.6	16	14	6.9	7.4	4	4
Rye	23.9	18.3	2	3	38.7	31.4	2	2
Barley	2.9	2.3	12	12	6.6	5.4	5	6
Oats	6.8	6.4	4	3	18.1	18.5	1	1
Potato	2.5	1.9	7	9	15.3	13.1	2	3
Sugar beet	4.4	5.0	7	7	9.5	10.5	3	3
Raps	3.7	4.6	7	7	10.8	13.5	4	3
Apples	2.7	3.8	5	4	17.4	26.3	2	1
Meat	1.2	1.2	15	15	8.0	8.6	5	5
Milk	2.0	2.0	12	12	8.3	8.3	4	4
Number of cattle	0.4	0.4	45	43	6.4	6.6	7	7
Number of pigs	1.6	1.2	9	15	9.7	7.9	3	6

Source: Year of elaboration based on (Statistical Yearbooks of Agriculture. Section III. Review International, with subsequent years 2016e and 2017).

Analysis of trends in 2010-2015 shows a steady decrease in the area of sown crops, and from 2014 a decrease in fruit plantations as well. This is not a cause for serious concern, as it is not indicative of a threat to food security in terms of production of cereals, vegetables and fruits. As regards the livestock population in 2010-2014, we can see a diminishing decline in the size of the pig population, followed by a slight increase in 2015. This can be considered a favorable phenomenon, as pork accounts for the largest portion of meat consumption among Polish people (table 3). The decline in pork production in 2010-2013 was strongly influenced by very high production costs and the very low purchase price of livestock (table 2).

Consumption of cereal grains (processed grain) in Poland was 108 kg per person in 2010-2013, and this value remained constant. In 2014 and 2015 grain consumption decreased by 2 and by a next 3 kg per person. Similar trends were noted in consumption of potatoes, vegetables and fruit. Consumption of milk and poultry increased steadily, while that of pork and beef decreased. This is reflected in the consumption expressed in kcal, which decreased every year over the period analyzed. As shown in table 3, the energy value of daily food consumption by Poles in 2013 was 2,187 kcal, while in 2014 and 2015 it improved slightly, as the caloric value consumed per day increased to 2,280 and 2 217 kcal. In the case of certain age groups and groups of working people

this value was very low, possibly indicating undernourishment among Poles, as research by FAO indicates an average daily energy requirement of 2,350 kcal/person (Kwasek 2012).

Table 2. Area shown (in thous. ha) and the number of animals (in thous. phys. PCs.) in Poland in the years 2010-2015

Description	The size of the marketing year					
	2010	2011	2012	2013	2014	2015
<i>Plant production (in thous. ha)</i>						
Agricultural land	14 859.7	15 133.9	14 969.2	14 609.2	14 558.4	14543.3
Cereals	8 583	7 597	7 803	7 704	7 479	7 485
Potato	508	375	393	359	337	267
Vegetables	206	159	179	175	142	163
Fruit	404	410	421	427	420	381
<i>Herd of livestock (in thous. phys. PCs.)</i>						
Cattle	5 700	5 742	5 762	5 777	5 860	5 920
Including milk cows	2 688	2 646	2 626	2 578	2 530	2 479
Pigs	14 279	15 244	13 509	11 581	11 162	11 724
Poultry	126 744	142 460	152 213	125 424	129 122	133 087

Source: elaboration based on (Statistical Yearbooks of the Republic of Poland. Section XVI. Agriculture, with subsequent years 2015a and 2016a).

Table 3. The consumption (kg) of certain foodstuffs per capita in Poland in the years 2010-2015

Description	The size of the marketing year					
	2010	2011	2012	2013	2014	2015
<i>(kg)</i>						
4 grain cereals (products)	108	108	108	108	106	103
Potato	110	111	111	102	101	100
Vegetables	106	104	103	102	104	100
Fruit	44	42	46	46	47	53
Milk	189	194	193	206	205	213
Pork meat	42.2	42.5	39.2	35.5	69.5	70.9
Beef	2.4	2.1	1.6	1.5		
Poultry meat	24.6	25.0	26.1	26.5		
Intake of kcal	2 340	2 279	2 287	2 187	2 280	2 217

Source: elaboration based on (Production and foreign trade in agricultural products. Information and statistical of GUS, with subsequent years 2015b and 2016d)

Table 4 shows that Poland has not been and is not a surplus country in food production every year and for all types of agricultural products. In the 2010/2011 marketing year there was a deficit of demand for grain amounting to 91,000 metric tons. This can be explained by the fact that the cereal market is characterized by high fluctuations in supply, depending on weather conditions. The cereal supply and demand balance also depends to a large extent on changes in the demand for feed, which depends in turn on the situation in animal production. In 2011/2012 there was a potato deficit, which at 240,000 metric tons was relatively high.



Table 4. Domestic production and consumption of selected agricultural products for the period 2010-2015 (1000 tonnes)

Description	The size of the marketing year					
	2009 /2010	2010 /2011	2011 /2012	2012 /2013	2013 /2014	2014 /2015
<i>Basic cereals (wheat, barley, rye, oats) (1000 tonnes)</i>						
Production	28 020	25 088	24 255	24 413	24 262	27 325
National consumption	25 318	25 179	25 340	23 922	22 720	21 952
Surplus/deficit	2 702	-91	1 085	491	1 542	5 373
<i>Potatoes (1000 tonnes)</i>						
Production	9 703	8 448	9 362	9 041	7 290	7 690
National consumption	9 605	8 313	9 602	8 535	6 908	7 364
Surplus/deficit	98	135	-240	506	382	326
<i>Vegetables (1000 tonnes)</i>						
Production	5 601	4 878	5 575	5 430	4986	5 607
National consumption	5 183	4 575	5 092	5 057	4 809	5 144
Surplus/deficit	418	303	483	373	177	463
<i>Fruit (1000 tonnes)</i>						
Production	3 646	2 744	3 415	3 843	4 128	4 189
National consumption	3 642	3 245	3 406	3 341	3 696	3 953
Surplus/deficit	4	-501	9	502	432	236
<i>Milk (million l)</i>						
Production	11 921	12 052	12 299	12 348	12 607	12 859
National consumption	10 133	10 166	10 198	10 941	10 881	11 045
Surplus/deficit	1 788	1 886	2 101	1 407	1 726	1 814
<i>Meat in chilled weight (1000 tonnes)</i>						
Production	3 327	3 400	3 455	3 484	3 830	4 088
National consumption	2 690	2 698	2 591	2 458	2 675	2 724
Surplus/deficyt	637	702	864	1 026	1 155	1 364
<i>Beef in cold weight (1000 tonnes)</i>						
Production	373	361	350	341	397	441
National consumption	91	81	60	57	61	46
Surplus/deficyt	282	280	290	284	336	395
<i>Pork in cold weight (1000 tonnes)</i>						
Production	1 516	1 544	1 463	1 415	1492	1581
National consumption	1 626	1 636	1 511	1 367	1 504	1591
Surplus/deficyt	-110	-92	-48	48	-12	-10
<i>Poultry meat in cold weight (1000 tonnes)</i>						
Production	1 386	1 445	1 591	1 677	1 894	2 021
National consumption	948	962	1 004	1 020	1 084	1 043
Surplus/deficyt	438	483	587	657	810	978

Source: elaboration based on (Production and foreign trade in agricultural products. Information and statistical of GUS, with subsequent years 2015b and 2016d)

This is a cause for concern, as Poland has been and remains a leader in potato production in the EU and on a global scale. This is because most soils in Poland are conducive to the cultivation of potatoes, while other intensive crops can be unreliable. It should be noted, however, that in the 2013-2015 the balance in the production of potatoes was highly favorable. In 2010-2011 there was a deficit in fruit production. Not until 2013-2015 did production significantly surpass the demand for

the fruit. Vegetable production in the years analyzed substantially exceeded domestic demand, but the surplus in 2014 was much smaller - nearly 50% lower than in 2009-2013.

Production of milk, beef and poultry meat in Poland in 2010-2015 significantly surpassed domestic consumption. Pork production, however, did not cover the demand for it, which was linked to the reduction in the pig population. Only in 2013 did production meet the Polish population's demand for pork, but this was mainly due to a decrease in pork consumption in favor of milk and poultry meat. In the final year analyzed, 2015, domestic production of pork also failed to meet demand, so this situation is a cause for concern.

To measure foreign trade in food products, GUS (2015b and 2016d) takes into account four categories: processed food, live animals and animal products, vegetable products, and fats and oils. The data in table 5 show that in 2010-2014 the value of both exports and imports of agri-food products increased. However, during this period the foreign trade balance in agri-food products was negative. This was the result of a negative fat and oil balance in each year (2010-2014), and also a negative balance in vegetable products in 2010-2012 (GUS 2015a). These figures can be considered disadvantageous in terms of ensuring food self-sufficiency in Poland. In 2013-2014 the negative trade balance was nearly four times lower than in 2010-2011, which should be regarded as highly favorable for Poland, as the country has good natural conditions for agricultural production and is able to produce quantities of food and fodder surpassing its own needs. This also means that a portion of its products can be allocated for export, which may contribute to the purchase of other food products or industrial technologies from other parts of the world, e.g. tea, coffee or feed additives, thereby significantly diversifying food consumption. In 2015, Poland has achieved a positive balance of foreign trade (table 5).

Table 5. Foreign trade of agricultural and consumption products on background of foreign trade turnover in Poland in the years 2010-2015 (current process, million Euro)

Description	2010	2011	2012	2013	2014	2015
Import	134 055	155 843	162 032	164 024	176 141	185 168
Export	120 264	139 685	150 855	161 970	173 368	187 710
The balance	-13 791	-16 159	-11 177	-2 055	-2 774	2 466

Source: elaboration based on (Statistical Yearbooks of Agriculture).

Section II. Food industry. Foreign trade, with subsequent years 2015a and 2016d) (1 Euro = 4 PLN)

2. ECONOMIC ACCESS TO FOOD IN POLAND

The next condition of food security is economic access to food. Table 6 presents the price indices of consumer goods and services and food in Poland in 2010-2015, as well as the percentage of expenditures for food and non-alcoholic beverages in total household spending. In nearly all years analyzed the prices of food and non-alcoholic beverages decreased at a faster rate than total housing costs or the price of energy carriers. The percentage of food expenditures in total household expenditures in 2010-2015 was nearly constant, ranging from 24.6% (2010) to 24.9% in 2011-2013 and decreasing slightly to 24.4% in 2014 and to 24.0% in 2015.

The Central Statistical Office defines three economic poverty lines: (1) the extreme poverty line, (2) the statutory poverty line, and (3) the relative poverty line (Gulbicka et al. 2015). Table 7 presents the percentage of individuals in households below the relative poverty line, i.e., in which expenditures were less than 50% of mean expenditures for all households (based on the results of a household budget survey).

Table 6. Price indices of consumer goods and services, the consumption of individual food and non-alcoholic beverages, and the share of spending on food and non-alcoholic drinks in the general consumption expenditure of households in the years 2010-2015

The type of the pointer	The size of the year					
	2010	2011	2012	2013	2014	2015
Consumer goods and services price index (previous year = 100)	102.6	104.3	103.7	100.9	100.0	99.0
Individual consumption of food and non-alcoholic beverages (previous year = 100)	103.3	103.6	103.0	100.3	100.0	99.8
The share of expenditure on food and non-alcoholic drinks in the general consumption expenditure of households (%)	24.6	24.9	24.9	24.9	24.4	24.0

Source: elaboration based on (Siviak 2015, *Annual macroeconomic indicators of consumer prices of goods and services since 1950*; *Macroeconomic indicators GUS 2016b*)

Analysis of the data indicates that the poverty level in Poland in 2010-2015 was fairly stable, averaging over 17%. Both men and women were affected. It may be noted here that in 2015 the poverty rate among women declined more with respect to 2010-2014 than among men. Overall, however, the results of the analysis indicate that nearly every fifth person in Poland may have limited access to food. As the price of food increases it becomes less accessible, especially for families with the lowest incomes. This is confirmed by analysis of the material deprivation rate as regards households that can afford a meal with red meat, poultry or fish every other day (figure 1).

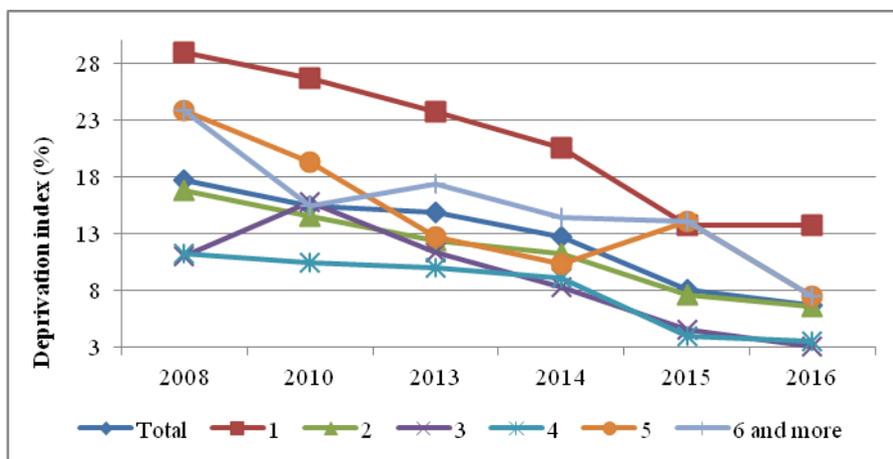
Table 7. Polish population (million) and the at-risk-of-relative poverty rate (%) after social transfers in Poland (total and by gender) in the years 2010-2015

Description	Years					
	2010	2011	2012	2013	2014	2015
<i>The population (in thous.)</i>						
Men	18 653	18 655	18 649	18 630	18 620	18 598
Women	18 655	19 884	19 884	19 884	19 859	19 839
Total	38 530	38 538	38 533	38 496	38 484	38 437
<i>The size of the pointer in a year (%)</i>						
Men	17.4	17.8	17.1	17.3	17.2	18.1
Women	17.7	17.6	17.1	17.3	16.8	17.2
Total	17.6	17.7	17.1	17.3	17.0	17.6

Source: elaboration based on (*Macroeconomic indicators, GUS 2016b*; *Economic poverty in Poland, GUS 2015c*; *The Demographic Yearbook, GUS 2016c*)

Polish households in 2008, 2015 and 2016 this need was unmet in 17.7%, 8.1% and 6.7% of families. A complete nutritious meal was more frequently unaffordable to individuals living alone or in households with more than six people. Single-person households were likely elderly individuals or people living on pensions. Households with three or four children were also unable to meet their basic needs at a satisfactory level. The situation of households consisting of four individuals was most favorable, and in 2016 three-person households; nevertheless, on average every tenth person in this category could not afford a meal with meat every other day. The

more favorable situation of families with children may also be due to the fact that social assistance in Poland in many cases involves providing meals at school, or partial financing of them. This is an important measure, but does not fully solve the problem of undernourishment in children.



Explanation: 1 - single adult, 2 - single adult with dependent children, 3 - two adults without 1 child, 4 - two adults with 2 children, 5 - two adults with 3 or children 6 - two adults more as 3 children

Figure 1. Material deprivation rate (%) for it is not possible to ensure that every other day a meal with meat, fish or poultry red in total households in Poland in the years 2008-2016

Source: (EU-SILC, 2010, 2013, 2014, 2017).

Currently, owing to state aid under the “500 Plus” program (Dz.U. 2016, poz. 195.), Polish families, including children, may not face such high deprivation rates, and food needs may be satisfied at appropriate levels for life and human dignity. In discussing the material deprivation rate only in regard to food, without considering other indicators (e.g. going to a movie, museum or restaurant), it is to be hoped that an appropriate social policy and attention to the development of Polish agriculture, including strengthening the position of Polish pork production, will help to maintain food security in Poland and, through balancing of supply and demand, will contribute to an appropriate level of consumption.

3. FOOD SELF-SUFFICIENCY

Food (raw material) self-sufficiency, according to Gulbicka et al. (2015), is understood as (1) the ability to satisfy food needs solely from the country’s own resources, with the complete elimination of imports (economic autarky); (2) meeting the food needs of the population with domestic production even with a high level of imports, which are compensated for by corresponding exports, where the import and export of food and agricultural commodities should be in balance.

Food self-sufficiency in the conditions of a closed economy (economic autarky) is justified in extreme conditions, such as international conflicts (Sobiecki 2007). Food self-sufficiency in the conditions of an open economy means specialization and highly developed business contacts. Sobiecki (2007) notes that the European Union should produce at least enough to meet 75% of the population’s demand for food—a level of internal production which is currently achieved. In most EU countries the level of agricultural production is high and the changes in demand for food are small, as they have reached a high level of food consumption in terms of caloric value and

nourishment (Gulbicka et al. 2015). In an open economy, food self-sufficiency means a balance of foreign trade in agri-food products while the nutritional needs of the population are met at the level of international standards.

In the conditions of globalization of the market economy, a measure of a country's food self-sufficiency is the balance of foreign trade in agri-food products. Table 5 shows that this balance was negative for Poland in 2010-2014. In 2015 balance was positive, which can be regarded as highly favorable for the country. This approach to self-sufficiency has the advantage of expanding the range of products available in Poland to include those which for various natural or economic reasons are not produced domestically (Sobiecki 2007).

Food (raw material) self-sufficiency can be evaluated by the index used by the European Statistical Office (Gulbicka et al. 2015). This index is expressed as a percentage and represents the ratio of domestic production to consumption of domestic agricultural products (irrespective of their source). Table 5 shows that in 2010-2015 Poland was essentially self-sufficient in products of plant and animal origin, except for pork.

RECAPITULATION AND CONCLUSIONS

The results of research on production and consumption of basic agricultural raw materials indicate that Poland is a self-sufficient country with surpluses in food production.

In 2010-2015, however, the degree of self-sufficiency in the grain of basic cereals was varied, with a deficit of 91,000 metric tons only in 2011. In 2012 potato production was insufficient to meet demand, with a deficit of 240,000 metric tons. During this period there was a surplus in vegetable production. Fruit production in 2010 and 2012 bordered on the level of domestic consumption. In 2011 there was a very high deficit of 501,000 metric tons, and in 2013 and 2014 and 2015 surpluses of 502,000 and 432,000 and 236,000 metric tons. In the case of milk production, throughout the period analyzed Poland was self-sufficient and even had surpluses. The milk surplus increased proportionally over the years. Despite the decrease in the size of the dairy cow population, unit productivity increased. In 2010-2015 Poland had large surpluses of poultry meat and beef, which increased every year. The level of self-sufficiency in pork varied substantially; in 2010-2012 there was a deficit, but it diminished with each subsequent year. In 2013 a surplus of 48,000 metric tons was achieved, but in 2014 and in 2015 a reduction in pork production was again observed, of 12,000 and 10,000 metric tons.

Analysis of the balance of foreign trade in agri-food products in Poland did not confirm food self-sufficiency in the years 2010-2014; Poland imported agri-food products for a sum exceeding exports of such products. The positive balance in 2015 can be regarded as relatively favorable. This can be considered a signal of positive changes for food security in Poland.

Economic access to food, despite the increase in prices, remained stable, probably owing to increased wages in the country. Nevertheless, among members of the population with the lowest income (about 15%), many households state that they cannot afford to have a meal with red meat, poultry or fish every other day. The systematic decrease in the caloric value of meals consumed, which in 2013 fell to 2,187 kcal per person per day, is also a cause for concern. In 2014, however, the caloric value of food consumed by residents of Poland increased, although this may have affected only certain groups, and not necessarily the neediest.

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