

## **DEMAND OF POLISH HOUSEHOLDS FOR FRUIT AS AN OPPORTUNITY FOR THE DEVELOPMENT OF DOMESTIC FRUIT PRODUCTION**

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**Abstract.** The basic research material comprised empirical data on household budgets conducted by GUS (Central Statistical Office), between 2005 and 2012. The changes in Polish demand for fruit and their products were analyzed, excluding bananas and citruses as they are not native to Polish fruit production. The changes in the consumption volume of fruit and their products in the households as well as in the structure of product type consumed were investigated. In order to determine the basic economic factors that might affect the demand development, the author presented the changes in incomes and general consumption structure and its transformations where the fruits are not considered to be basic goods (are not a basic need). The fruits represent a negligible part in the pattern of consumption, and with low incomes, the spending on them can be limited (are not necessary for life). Another key factor forming the volume of the consumed fruit is their prices which influenced the periodical changes in demand for particular species. These changes are partly attributed to variations in domestic production highly dependent on atmospheric conditions. The changes in demand were presented against this overall production showing its rate of utilisation and its potential changes in this respect.

**Key words:** households, demand, fruit consumption, fruit production

### **INTRODUCTION**

The Institute of Food and Nutrition (IZZ) recommends to incorporate 2–4 portions of fruit into a rational diet per day. They are a rich source of vitamins, folic acid, antioxidants and many mineral components. They provide human organism with natural fiber containing very few calories and 80–90% water (<http://www.izz.waw.pl>, accessed April 2014).

However, the recommendations of doctors and dieticians are not observed and the Polish was ranked low among the EU members in terms of fruit consumption. It is over

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3.5 times lower than in the Mediterranean countries and over 2 times lower when compared to the Scandinavian countries<sup>1</sup>.

According to the Central Statistical Office (GUS) data, orchards account for approx. 2.4% of agricultural lands (343,265 ha in 2013), while home gardens cover 0.2% – however their area has decreased since 2012 [Land use... 2014].

It was observed that a differentiation of cultivation area takes place in particular years due to a special character of fruit production involving plant replacements.

In 2012 the orchards covered 368,400 ha and their area increased by 6,300 ha when compared to the previous year [Agricultural Statistical Yearbook 2014]. The tree fruit crop accounted for 3,286,000 t (an increase by 400,000 t when compared to the previous year and by roughly 1,070,000 t since 2010). In 2012 a hike in berry crop to 557,000 t was reported. The commercial fruit farming amounted to 4,522,000,000 PLN (6% of overall agricultural output).

In comparison with the rest of European countries we are the leader in apple production (in 2012 the apple crop represented 26.5% that of the EU) as well as raspberries and currants (approx. 70% of the EU) [Poland in EU 2014]. Over the last years the overall fruit production in Poland has accounted for 70% of the EU-12 fruit production and 10% that of the EU-27 [Fruit and vegetables market 2013]<sup>2</sup>.

Based on the Central Statistical Office data, the apple is the most predominant crop in Polish orchards accounting for 71% (2012) of the agricultural land area with Idared being the most popular cultivar [Orchard production... 2013]. It is in accordance with other findings [Pizło 2011].

The remaining crops included: cherry – 13%, plums – over 6%, sweet cherries – 4.4% and pears – 2.9%. Other crops cultivated were as follows: walnut approx. 1.5%, peaches and apricots making up mere 1% of total orchard area. Since 2007 the apple and sweet cherry cultivation acreage increased whereas that of sweet cherry and walnut decreased<sup>3</sup>.

As for berry fruit, the production of currants (mainly black), strawberry and raspberry predominated [Fruit and vegetables market 2013].

The fruit production concentrated in small farms covering up to 1 ha (67% fruit farms) widespread mainly in the following provinces: Mazowieckie, Łódzkie, Lubelskie and Świętokrzyskie (around 76% of orchard area).

The fruit are produced for consumption and industrial purposes. In 2012 the industry received 41% of apple production, 1/3 of plum crop and 17% of pear harvest as well as the overwhelming part of gooseberry (86%), currants (85%), raspberry (81%) and sour cherry (72%) cultivation. The production of fruit products in season 2012/2013 increased to 950,000 t (by approx. 10%) out of which 300,000 comprised concentrated apple juice (an increase by 30%).

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<sup>1</sup>Per capita in 2005–2007; based on FAO database (<http://www.fao.org/economic>, accessed database March 2014) Food consumption and population growth.

<sup>2</sup>The fruit production is characterized by a high variability due to a considerable effect of atmospheric conditions on crop volume being diverse in particular years.

<sup>3</sup>Since 2005 the cultivable area of walnuts significantly increased (10-fold) thanks to the EU subsidies. Then, they were reduced leading to a drop in the cultivable area of walnuts since 2012.

A high domestic production level of fruit and their products results in generating a positive balance in foreign trade due to twice higher value of fruit product export (approx. 800,000 t) in relation to their import [Agricultural Market 2013].

## **RESEARCH METHOD**

The research was based on the empirical data on the household budgets conducted by the Central Statistical Office between 2005 and 2012 (34,700 households of 2005 year and about 37,500 in the following years). The households were selected at random leading to generalization of obtained results<sup>4</sup>.

The empirical data were supplemented with an analysis of secondary materials obtained from the studies of the Central Statistical Office, the IERiGŻ-PIB<sup>5</sup> and the Eurostat.

The aim of the study was to characterize the changes in demand for fruit and their products in Polish households between 2005 and 2012. The changes in volume and pattern of fruit consumption were evaluated against the changing crop volumes, and thus, against the price changes in particular cultivars. As Poland does not have favorable climate conditions for banana and citrus cultivation, these fruit were excluded from the studies and only their consumption volume was presented.

## **RESULTS AND DISCUSSION**

The obtained results indicate that between 2005 and 2012 on average almost 75% of Polish households consumed fruit and 18.5% – fruit products<sup>6</sup>. Nearly 53% of the investigated households admitted to consuming fruit juices<sup>7</sup>. In the analyzed period a concurrent increase in the percentage of households consuming both fruit (by 2.4 p.p.) and their products (by 4.2 p.p.), was observed, whereas the percentage of households consuming fruit juices dropped. Yet, there was a considerable decrease in the consumption of fruit and their products whose consumption amounted to approx. 4,413 t in 2012 (about 3.8 kg per capita per month) out of which 29% accounted for bananas and citruses. In addition, the consumption of fruit juices lowered to approx. 8,885,000 l (about 1.2 l per capita per month).

The decrease in consumption volume of fruit and their products was accompanied by a significant increase in the value of this consumption between 2005 and 2012 (Fig. 1).

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<sup>4</sup>The two-stage stratified sampling with different variants of choice was performed in the first stage. At first, so called space-based elements were selected and in the stage II – particular households were chosen [Methodology of household... 2011].

<sup>5</sup>Institute of Agricultural and Food Economics – National Research Institute.

<sup>6</sup>In the questionnaire survey conducted by Central Statistical Office of Poland between 1998 and 2003 almost 4% households could not afford to buy fruit at all, and 1/3 could not satisfy full demand for fruit [Welfare of agricultural households... 2014].

<sup>7</sup>The consumption of fruit-vegetable juices – though existed – was not studied since it was impossible to determine the fruit content in the composition of the product.

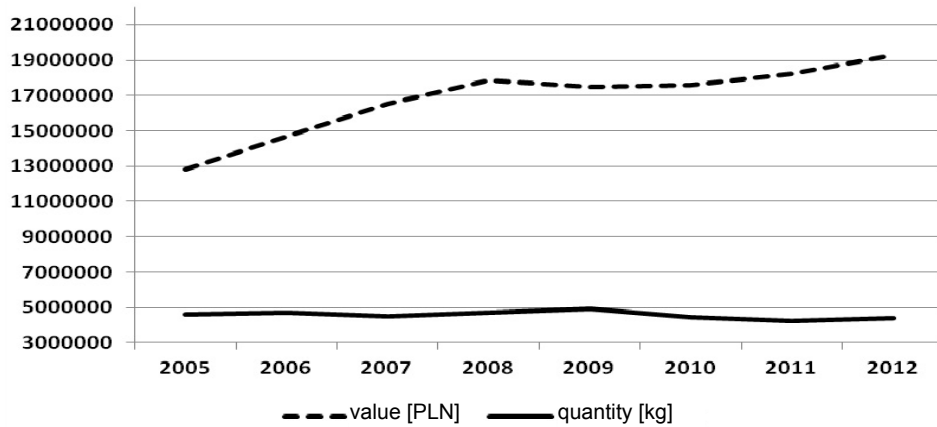


Fig. 1. The consumption of fruit and fruit products in the households in 2005–2012 (value and quantity)

Source: Own study based on unpublished data from the Central Statistical Office.

It means that in the studied period the prices of fruit and fruit products were increasing while the growth rate kept varying. Only in 2009 a marginal drop in fruit consumption was reported resulting from a decrease in the prices of domestic production.

Although the volume of consumption lowered, but there were some positive tendencies, not always corresponding to a price drop. The amplitude of changes in the volume of consumed fruit was much lower than the changes in its value which might be attributed to some species being substituted with the other as well as a big impact of other factors. Besides, it was observed that a price hike in the recent years have influenced negatively the demand for fruit – something unknown e.g. in 2006 as the present fruit prices are simply too high<sup>8</sup>. As a consequence, the prediction assuming a stable growth in consumption of fruit and fruit products until 2025 at the annual rate of 1.62 kg per person seems to be a fallacy [Włodarczyk and Adamowicz 2011].

The volume and pattern of the demand is also affected by the income level which was characterized, though, by an increase in a real value in the analyzed period. The growth rate was faster till 2008 [Stolarska 2014].

Therefore, regardless of constantly rising incomes, the fruit consumption in the investigated households lowered<sup>9</sup>, thus deteriorating the downward tendency observed in the previous years [Stolarska 2009].

To alleviate the problem, the self-supply for fruit was increased, which is certainly the biggest among farmers and home garden holders e.g. pensioners accounting for 14% of consumption [Demand... 2013].

In 2012 the spending on fruit made up 6.3% of food expenditures and 1.5% of total consumer spending. The percentage of spending on food and soft drinks accounted for 26% of total consumption and increased by 5.1 p.p. since 2005. It was attributed to a significant

<sup>8</sup>Additionally, the costs of other commodities and consumption services are growing.

<sup>9</sup>Unfortunately, income growth was accompanied by an increase in prices of commodities and consumer services.

rise in food prices where meeting the demand for fruit is ranked as the last one. CCCI<sup>10</sup> had negative values giving further evidence to the worsening consumer mood, especially after 2010. What is more, the evaluation of consumer main purchases also showed the deepening downward trend [Consumer economic situation 2014].

The demand both, for fruit in total, and for particular fruit species is influenced by many factors and is also affected by various consumer preferences. The price volume and their relations are important as well as specificity of particular fruit species, their seasonal character, taste, availability, weight, transport and storage facilities (unit weight), modes of employment (e.g. in confectionary industry) and many other factors<sup>11</sup>.

For many reasons apples are the core fruit in Polish households<sup>12</sup>. Not only do they come from the domestic production, but they can also be grown in home gardens or allotments and, first of all, are available all year round and can be easily transported and stored. They can be consumed raw as well as in various forms of fruit products. Finally, they have universal health properties and as such they can be consumed by small children and people on specific diets (it is sometimes necessary to cook or roast them). They can be easily taken to work, school or on a trip being a nice snack or a small lunch.

In 2012 on average 5 kg of apples were consumed per month in the analyzed households while in 2005 it was 7 kg. The demand for apples in Polish households dropped (Fig. 2). In the same period, the domestic production increased by 38% (in 2012 the crop amounted to 2,877,000 t).

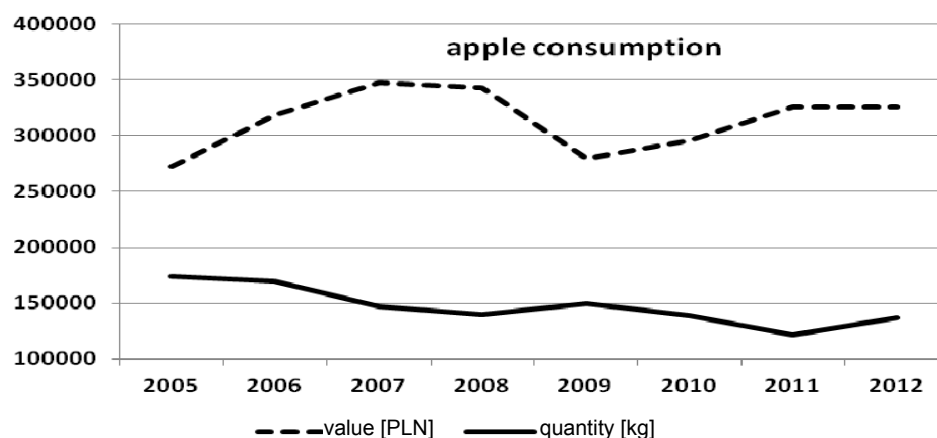


Fig. 2. Monthly apple consumption in the analyzed households, 2005–2012 (value and quantity)  
Source: Own study based on unpublished data from the Central Statistical Office.

<sup>10</sup>Current Consumer Confidence Index is determined on the questionnaire results of Economic Situation.

<sup>11</sup>Weather conditions exert influence not only on crop volume and its distribution over time, but also on their taste and product shelf-life e.g. rain or drought during strawberry harvest; Another important factor can be e.g. the size of fruit (pineapple) and possibility to buy only a part of it e.g. it can be too big for somebody who lives alone so this person has to give up on not only buying it but also eating it.

<sup>12</sup>And, then, bananas and citrus fruits which have not been analyzed.

Figure 2 indicates the correlation between the demand for apples and their price<sup>13</sup>. The higher prices the lower consumption and vice versa. However, there is no correlation with the volume of domestic production (Fig. 3).

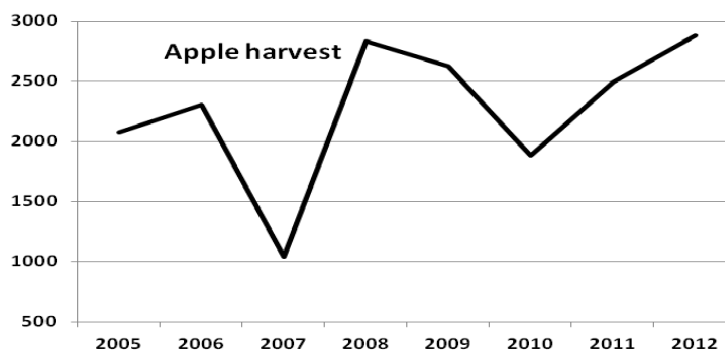


Fig. 3. Apple harvest in Poland, 2005–2012 (thousand t)

Source: Based on the Central Statistical Office data.

Whereas 2012 and 2008 witnessed the biggest apple harvest, the consumption, on contrary, was the lowest, and the lower apple harvest by half in 2007 (adverse weather conditions) did not cause so significant drop in consumption.

The demand for pears was declared by 17% of the analyzed households. This percentage slightly grew (from 14%) since 2005. The consumption in the investigated period (a little over 2 kg per month per a household) was stable accompanied by an increase in 2009 (both in quality and quantity) and a drop 2010 (Fig. 4).

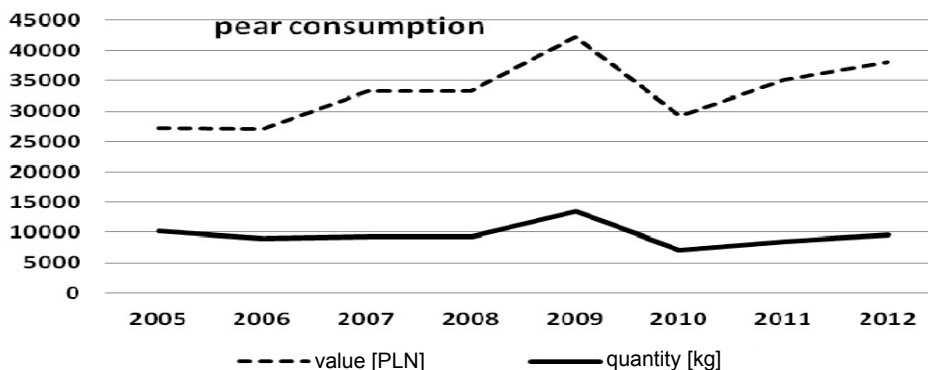


Fig. 4. Monthly pear consumption in the analyzed households, 2005–2012 (value and quantity)

Source: Own study based on unpublished data from the Central Statistical Office.

The pear harvest amounting to 73,000 t was the highest in 2008, while 2007 saw the lowest harvest (similarly to the apple harvest) with mere 31,000 t. The character of pear crop changeability was similar to that of apple production.

<sup>13</sup>The higher value in relation to a lower quantity indicates an increase in prices.

In over 44% of the studied households there existed a real demand for stone fruit. Though, their consumption decreased by nearly 21%, on average, to less than 2.9 kg per month (Fig. 5).

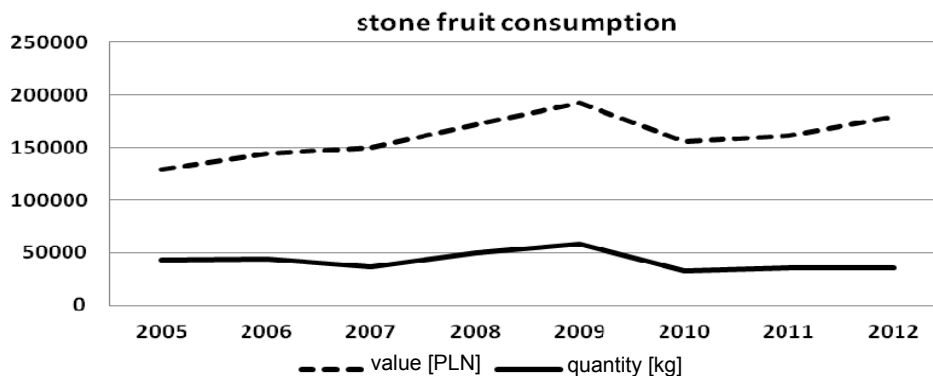


Fig. 5. Monthly stone fruit consumption in the analyzed households, 2005–2012 (value and quantity)

Source: Own study based on unpublished data from the Central Statistical Office.

The changes in stone fruit harvest were characterized by a considerably higher amplitude than their consumption and they did not completely correspond to its level. This level was the lowest in 2007 while the highest in 2008–2009 (two-folded difference). The higher crop volume in the recent years did not improve the consumption, which in fact dropped. The changes in stone fruit consumption corresponded to the changes in their prices, except for 2012 when they grew by about 12%<sup>14</sup>.

Over the half of the studied households declared the consumption of berry fruit and their percentage increased. However, the consumption figures dropped (Fig. 6).

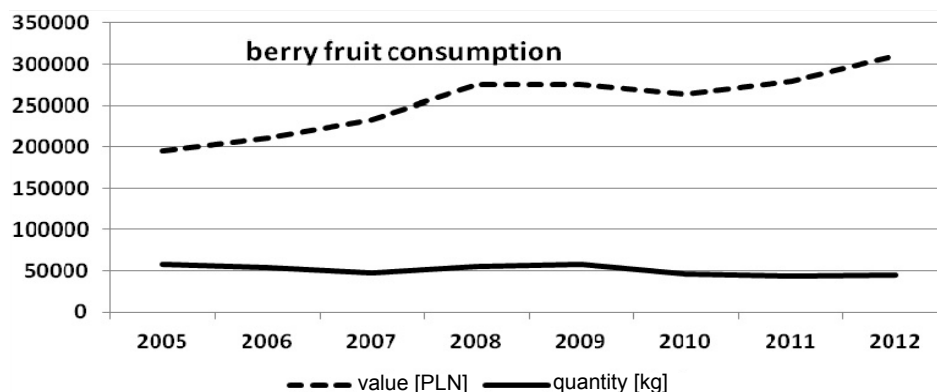


Fig. 6. Monthly berry fruit consumption in the analyzed households, 2005–2012 (value and quantity)

Source: Own study based on unpublished data from the Central Statistical Office.

<sup>14</sup>At other time intervals the prices of particular species were unstable, but the consumers could substitute one fruit with another due to a large variety of stone fruit.

Furthermore, in the analyzed period, the discrepancies between the berry fruit consumption in terms of quantity and value were reported resulting not only from price increases, but also, in part, from the consumption of their more expensive varieties.

The volume of domestic berry fruit production was much less diversified in particular years than that of other fruit species (Fig. 7)<sup>15</sup>.

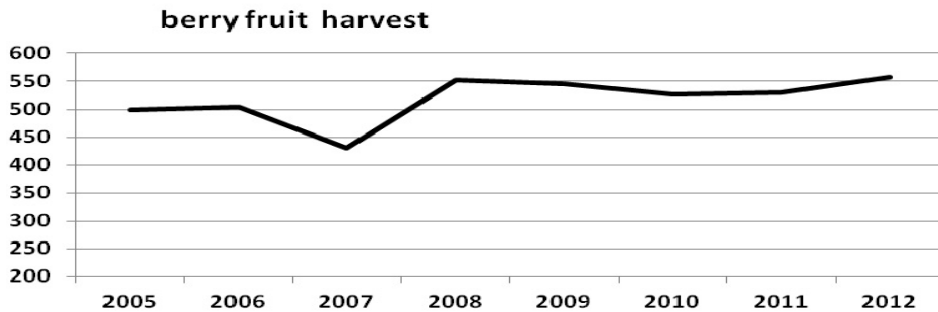


Fig. 7. The berry fruit harvest in Poland, 2005–2012 (thousand t)

Source: Based on the Central Statistical Office data.

A considerable collapse of crop output was found only in 2007, after which the figures bottomed out. The maximum domestic output was reported in 2012.

In 3% of households there was a demand for nuts, seeds and dried fruit. Between 2005 and 2012 the consumption volume grew by 39% for dried fruit and by 20% for nuts and seeds. The value of its consumption almost doubled showing an upward trend.

In 2012 1/4 of the investigated households declared the consumption of fruit products and since 2005 it grew by roughly 38%. However, the consumption lowered from 1 kg to 0.9 kg on average per one household<sup>16</sup>. Simultaneously, a considerable (almost 85%) increase in consumption of fruit products was reported accompanied by the price increase.

The apples accounted for over 50% of total non-tropical/exotic fruit (i.e. except for bananas and citruses) consumed and Poland boasts to be its biggest producer. This result has slightly decreased in the analyzed period and its drop in 2008 and 2009 was offset by an increase in the consumption of stone fruit (around 15%) and vice versa in 2010.

Another 18% of consumed fruit of moderate climate comprised berry fruit (a small drop in the last year). In addition, 3.5% pears were consumed whose share almost did not change.

Alongside with the fruit consumption – nearly 66% of households (over 71% in 2005) there existed the demand for fruit juice. On average from 4.6 l in 2005 to 4 l in 2012 was consumed per month per a household.

<sup>15</sup>The smaller cultivation acreage of individual crops and various production specificity lead to a partial compensation of negative influence of adverse weather conditions (flooding, frost-protection, e.g. strawberries).

<sup>16</sup>Globally, the demand for fruit products increased (by 26%) owing to a greater number of households interested in their consumption.



Based on the received results and additional evaluations taking into the consideration the number of Polish households<sup>17</sup>, the total consumption of raw fruit in Polish households was calculated. Comparing these results with the crops from the previous year it was observed that the employment of fruit production for the direct consumption in our country was diversified for individual fruit species (Fig. 8).

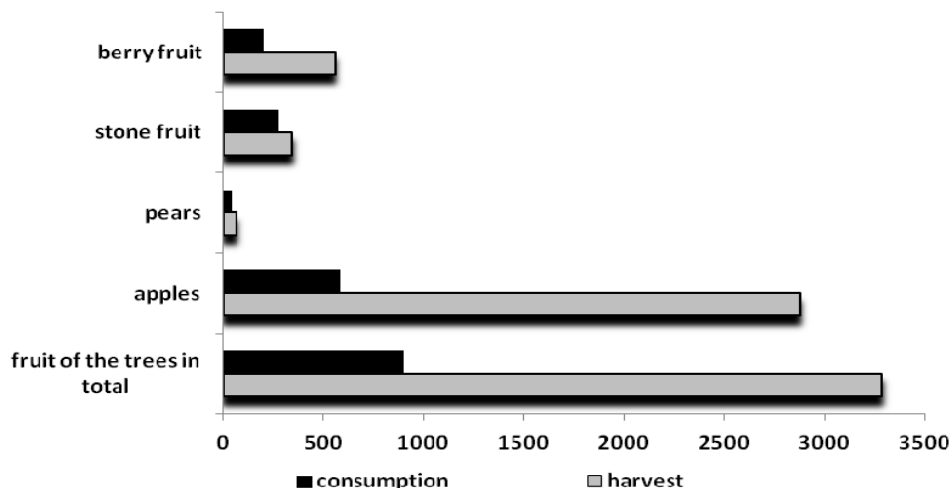


Fig. 8. Fruit harvest in Poland in 2012 and average consumption, 2010–2012 (thousand t)

Source: Based on own and the Central Statistical Office data.

The stone fruit were the most popular ones whose 80% production was consumed raw in Poland. The findings of other fruit were as follows: pears 65%, berries 35% and only 20% for apples – although they were mainly used for fruit juice and other fruit products (41% in 2012). The consumption of fruit products (and earlier their production) further boosts the efficient use of domestic fruit production.

## CONCLUSIONS

1. Between 2005 and 2012 only 75% of Polish households showed a real demand for fruit: 53% for fruit juice and 18.5% for fruit products.
2. The percentage of households showing the consumption of fruit and fruit products increased whilst the percentage of households consuming fruit juices insignificantly dropped testifying to Poles' health-oriented dietary habits.
3. The consumption volume of fruit, fruit products and fruit juices lowered. Though, it was accompanied by a significant increase in the abovementioned consumption in the studied period being a sign of price increases and a bigger share of more expensive fruit species (e.g. blueberry).

<sup>17</sup>The 2011 National Population and Housing Census collected data on 13,572,000 households in Poland. Considering this fact and the average fruit consumption in the analyzed households for the last three years, the rough annual consumption volume for the whole country was computed.

4. A decrease in real demand for fruit and fruit products in Polish households was concurrent with an increase in volume of domestic fruit crop.
5. A drop in consumption volume of fruit and fruit products was attributed to the increases of their prices and prices of goods and consumer services in total, which grew faster than the real incomes of the population. The spending on food and soft drink rose up to 26% while the spending on fruit made up only 6.3%.
6. Insufficient fruit consumption volume in Poland and the education program into their role in balanced diets may create a growth in demand and, consequently, boost the production, especially, of stone fruit and pears being used at a relatively high level in the domestic market.
7. Future possibilities for an increase in demand for fruit are limited by low incomes of local population and disproportionately rising food prices, including those of fruit.
8. The production of some fruit species, particularly apples, exceeds the domestic demand, thus, its further development is mainly dependent on the development of export.

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## **POPYT POLSKICH GOSPODARSTW DOMOWYCH NA OWOCE SZANSĄ ROZWOJU KRAJOWEJ PRODUKCJI SADOWNICZEJ**

**Streszczenie.** Podstawowy materiał badawczy stanowiły niepublikowane dane empiryczne, pochodzące z badań budżetów gospodarstw domowych przeprowadzonych przez GUS w latach 2005–2012. Badano zmiany popytu na owoce i ich przetwory w Polsce, z wyłączeniem cytrusów i bananów, gdyż nie pochodzą one z krajowej produkcji sadowniczej. Badaniom poddano zarówno zmiany poziomu konsumpcji owoców i przetworów owocowych w gospodarstwach domowych, jak również struktury spożywanych gatunków. W celu wskazania podstawowych, ekonomicznych czynników mogących wpływać na kształtowanie się badanego popytu, scharakteryzowano zmiany poziomu dochodów ludności oraz ogólną strukturę konsumpcji, gdzie owoce nie są dobrem podstawowym. Stanowią one znikomy odsetek w strukturze konsumpcji, a przy niskich dochodach wydatki na nie mogą być ograniczane. Kolejnym ważnym czynnikiem kreującym wielkość spożycia owoców są ich ceny, które wpływały na okresowe zmiany popytu na poszczególne gatunki. Zmiany cen wynikały częściowo z wahań wielkości krajowej produkcji w znacznym stopniu uzależnionej od czynników atmosferycznych. Zmiany popytu przedstawiono na tle owej produkcji, pokazując stopień jej dotychczasowego wykorzystania oraz możliwości zmian pod tym względem w przyszłości.

**Słowa kluczowe:** gospodarstwa domowe, popyt, spożycie owoców, produkcja owoców

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