



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

SELECTED ECONOMIC RELATIONSHIPS ON THE FRUIT AND VEGETABLE MARKET IN POLAND (1994–2013)

Andrzej Czyżewski¹✉, Dariusz Czakowski²

¹Uniwersytet Ekonomiczny w Poznaniu

²Kujawsko-Pomorska Szkoła Wyższa w Bydgoszczy

Abstract. The article presents the development of selected variables and relationships describing the fruit and vegetable market in Poland during the ten years before and after accession to the EU. Hence, most of the comparisons are shown from the perspective of the two sub-periods: 1994–2003 and 2004–2013. Price fluctuations of the fruit and vegetable purchase market were discussed, including inflationary changes and the level of the price index for agricultural production. Determinants of the size of the harvest of fruits and vegetables in Poland and the size of their purchase are also specified. In addition, results of research on the economic situation of selected farms, taking into account the value of production, costs, and revenues are presented. Based on the estimated models they established that the form of household income has indeed been statistically determined through the production value. Among the most important observations, it's indicated that in the period after Polish accession to the European Union procurement prices showed a positive development for producers in relation to those of 2004, which certainly had an impact on export growth. In the period 2004–2013, compared to 1994–2003, the size of the harvest of fruits increased while that of vegetables fell slightly. It should also be noted that the volatility index of purchase prices in the post-accession period fell for fruit, while in the case of vegetables it rose.

Key words: European integration, prices of agricultural raw materials, fruit and vegetable market

INTRODUCTION

Vegetables and fruits thanks to their multitude of species and varieties are grown practically worldwide. Their greatest producers, i.e. China, India and the USA, are countries with humid subtropical and tropical climates. In 2013 the EU-28 countries produced 62.2 million ton fruits (9.2% global production) and 64.7 million ton vegetables¹ (5.7% global production) (GUS, 2016). Among the EU countries the largest amounts of fruits and vegetables are produced by the Mediterranean countries with warmer climates, i.e. Italy, Spain and France. Poland is an important producer of temperate climate fruits and vegetables. With its harvests of 5 million ton vegetables and 4.1 million ton fruits in 2013 Poland ranked fourth in the EU. Among the EU members Poland is a leading producer of apples, cherries, raspberries, currants and blueberries and a major producer of strawberries as well as gooseberry and chokeberry (Kapusta, 2014).

The fruit and vegetable market in Poland is regulated by the common organisation of the market in fruit and vegetables, established in 1996 in the EU. These laws regulate issues connected e.g. with the quality of marketed merchandise and protection of the domestic market (Kapusta, 2014). In turn, key regulations for producers and processors concern subsidies. In 2007 the European Commission decided to increase the level of

¹ Including melons.

✉ Prof. dr hab. dr h.c. Andrzej Czyżewski, Katedra Makroekonomii i Gospodarki Żywnościowej, Uniwersytet Ekonomiczny w Poznaniu, al. Niepodległości 10, 61-875 Poznań, Poland, e-mail: kmigz@ue.poznan.pl

payments for producer groups and organisations. The reform, which entered into force on 1 January 2008, motivated many small farms to form greater entities and organisations (Filipiak, 2014). An additional incentive for integration was related with a stronger negotiation position when closing cooperation contracts with retail chains (Bieniek-Majka, 2013).

The aim of this paper is to present selected variables and relations determining operations of producers on the fruit and vegetable market in the periods before and after Poland's accession to the EU and after that. For this purpose factors modifying wholesale purchase prices, yields and purchase volumes, income from agricultural production as well as relationships between these variables.

METHODS

The study covers the period of 1994–2013. It was selected so that it comprised an identical number of years before (1994–2003) and after Poland's accession to the EU (2004–2013), thus providing interesting comparisons taking into consideration these two subperiods. Only in the case of analyses of wholesale purchase price dynamics other subperiods were distinguished including two years from their beginning and end. This was done to reduce an error resulting from seasonal price fluctuations. Source data used in this study were obtained from the Institute of Agricultural and Food Economics, the Central Statistical Office and the Farm Accountancy Data Network (FADN). In order to reach this research objective dynamic indexes were applied in the comparisons of the investigated phenomena in time and annual average values of individual parameters. Annual average indexes for vegetable and fruit wholesale purchase prices were calculated using a weighted mean, when the share in the final price was calculated based on the share in the wholesale purchase volume for each fruit and vegetable. These indexes are presented in adjusted prices using the price index of commercial agricultural production expressed in prices of 2013. In turn, analyses concerning the interdependencies between variables were conducted using correlation and regression analyses.

LEVELS AND DYNAMICS OF WHOLESALE PURCHASE PRICES FOR FRUITS AND VEGETABLES

Accession to the European Union resulted in the inclusion of Poland to the Common European Market, which

significantly influenced domestic fruit and vegetable prices. Elimination of trade barriers, introduction of new customs tariffs and principles of market regulation between Poland and the EU countries led to the uniformisation of prices between the domestic and EU agricultural produce markets, while also guaranteeing their greater stabilisation (Figiel and Hamulczuk, 2008). This also determined a relationship with changes in prices on the world market.

Fruit and vegetable prices undergo seasonal fluctuations, mainly due to the effect of agrometeorological conditions causing marked variability of yields. When analysing average annual wholesale purchase prices of fruits and vegetables we may easily see that vegetable prices underwent relatively mild fluctuations, while in the case of fruit prices these changes were more dramatic (Fig. 1). The greatest increase in fruit prices was recorded in 2007 as a result of huge losses in yields caused by late frosts. Also in the years 1999, 2003 and 2010–2011 fruit prices were high due to lower domestic yields. In turn, vegetable prices were exceptionally high in 2010 due to adverse weather conditions in July (torrential rains preceded by a heat wave). Also lower vegetable yields in 2013 were reflected in higher wholesale purchase prices. The coefficient of variation for vegetable prices corrected by the price index of commercial agricultural production was 12.1% in the years 1994–2013. Its value in the pre-accession period (1994–2003) was 8.76%, at 11.28% in the post-accession period (2004–2013). In the case of fruits the values of the coefficient of variation were higher at 32.6% in the years 1994–2013, 36.32% in the years 1994–2003 and 30.72% in the years 2004–2013. It also needs to be stressed that following Poland's accession to the EU the coefficient of variation of prices increased by 29% for vegetables, whereas in the case of fruits its value decreased by 25%. This was caused e.g. by increased fruit imports, which stabilised prices.

Surprising results are obtained when comparing average annual wholesale purchase prices of fruits and vegetables from the years 1994–2003 and 2004–2013 (Table 1). It turns out that in the pre-accession period only nominal wholesale purchase prices for fruits and vegetables were higher than after Poland's accession to the EU. In turn, wholesale purchase prices corrected by the rate of inflation and wholesale purchase prices corrected by the price index of the price index for commercial agricultural production were lower in the post-accession

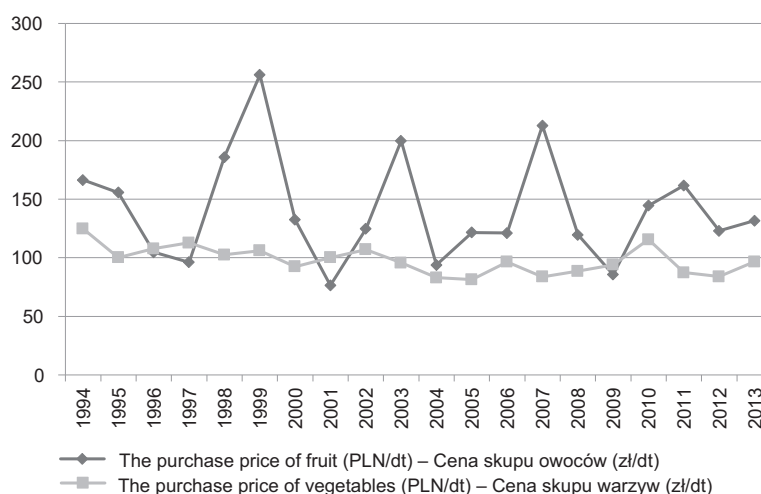


Fig. 1. Average annual wholesale purchase prices for fruit and vegetables in Poland in the years 1994–2013 (PLN/dt, according to weighted averages, corrected by the price index of commercial agricultural production, base year = 2013)

Source: own calculations based on GUS (1995–2014a), GUS (1995–2014b).

Rys. 1. Średnioroczne ceny skupu owoców i warzyw w Polsce w latach 1994–2013 (zł/dt, ceny według średnich ważonych, urealnione o wskaźnik cen towarowej produkcji rolniczej, rok bazowy = 2013)

Źródło: obliczenia własne na podstawie GUS (1995–2014a), GUS (1995–2014b).

Table 1. Dynamics index of fruit and vegetable wholesale purchase prices and their average annual values (PLN/dt) in the years 1994–2013 in Poland (base year = 2013)

Tabela 1. Indeks dynamiki cen skupu owoców i warzyw oraz ich średnioroczna wartość (zł/dt) w latach 1994–2013 w Polsce (rok bazowy = 2013)

| Specification Wyszczególnienie | | Purchase prices of fruits Ceny skupu owoców | | | Purchase prices of vegetables Ceny skupu warzyw | | |
|---|---------------------|--|-------|-------|--|------|-------|
| | | A | B | C | A | B | C |
| Arithmetic average (PLN/dt) Średnia arytmetyczna (zł/dt) | 1994–2003 | 75.4 | 134.3 | 149.8 | 53 | 95.8 | 104.9 |
| | 2004–2013 | 107.7 | 121.1 | 131.6 | 74 | 83.2 | 91.1 |
| | 1994–2013 | 91.6 | 127.7 | 140.7 | 63.5 | 89.5 | 98 |
| Index dynamics Indeks dynamiki | 2003–2004/1994–1995 | 148% | 66% | 91% | 134% | 58% | 79% |
| | 2012–2013/2003–2004 | 142% | 110% | 87% | 161% | 125% | 101% |
| | 2012–2013/1994–1995 | 210% | 72% | 79% | 215% | 73% | 80% |

A – current prices; B – prices adjusted for inflation (CPI); C – prices adjusted by price index of commercial agricultural production.

Source: own calculations based on GUS (1995–2014a), GUS (1995–2014b).

A – ceny bieżące; B – ceny skorygowane o wskaźnik inflacji (CPI); C – ceny skorygowane o wskaźnik cen towarowej produkcji rolniczej.

Źródło: obliczenia własne na podstawie GUS (1995–2014a), GUS (1995–2014b).

period. However, in order to correctly interpret these results we need to stress the decisive effect on their fluctuations observed for high wholesale purchase prices from the beginning of the investigated period (before 2000). In turn, after accession we observed price development advantageous for producers, as prices increased in relation to 2004. This was the consequence of e.g. an increase in trade exchange, particularly exports, in the post-accession period. This dependence is evident when comparing the index of dynamics between wholesale purchase prices for fruits and vegetables corrected by the rate of inflation from the years 2012–2013 in relation to prices from 2003–2004 (Table 1). For fruits this index was 110%, while for vegetables it was 125%. In the case of fruits the value of this index may have been higher if it was not for the market increase in wholesale purchase prices in 2003, caused mainly by low yields. An increase in prices

following Poland's accession to the EU was accompanied by an increase in efficiency and concentration of production, determined by the increasing competition on the domestic and foreign markets (Nosecka et al., 2011).

RESOURCE BASE OF FRUIT AND VEGETABLE MARKET

Production of fruits and vegetables is an important sector of Polish agriculture. Despite the relatively limited area cropped to fruits and vegetables, their share in the value of commercial agricultural production in 2013 was 9% for vegetables and 6.9% for fruits, while jointly it was 15.9% (GUS, 1995–2014a). Data for the years 1994–2013 in terms of averages from the pre- and post-accession periods show a marked increase in fruit crops (Table 2). Average annual orchard fruit and nut yields

Table 2. Average annual yields and purchases of selected fruits and vegetables in Poland in thousands tons in the period 1994–2013

Tabela 2. Średnioroczna wielkość zbiorów oraz skupu poszczególnych owoców i warzyw w Polsce w tysiącach ton w latach 1994–2013

| Specification Wyszczególnienie | Yields – Zbiory | | | Skup – Wholesale purchases | | |
|--|------------------|------------------|-----------|--------------------------------------|--|-----------|
| | 1994–2003 (1) | 2004–2013 (2) | (2) / (1) | 1994–2003 (1) | 2004–2013 (2) | (2) / (1) |
| Fruits, including: Owoce, w tym: | 2 679 | 3 297 | 123% | 822 (31% harvests 31% zbiorów) | 1 719 (52% harvests 52% zbiorów) | 209% |
| Stone fruit – Owoce pestkowe i ziarnkowe | 2 223 | 2 748 | 124% | 645 | 1 388 | 215% |
| Owoce jagodowe – Berries | 414 | 468 | 113% | 162 | 300 | 185% |
| Others – Pozostałe | 41 | 80 | 195% | 41 | 80 | 195% |
| Vegetables, including: Warzywa, w tym: | 5 572 | 5 355 | 96% | 627 (11% harvests 11% zbiorów) | 1 368 (26% harvests 26% zbiorów) | 218% |
| Cabbage, cauliflowers (cruciferous vegetables) Kapusta i kalafiori (warzywa kapustne) | 1923 | 1422 | 74% | 88 | 214 | 245% |
| Carrots and beets (root vegetables) Marchew i buraki (warzywa korzeniowe) | 1315 | 1202 | 91% | 175 | 335 | 192% |
| Tomatoes and cucumbers (fruit vegetables) Pomidory i ogórki (warzywa owocowe) | 669 | 670 | 100% | 80 | 197 | 247% |
| Onion – Cebula | 980 | 1182 | 121% | 154 | 273 | 177% |
| Others – Pozostałe | 684 | 880 | 129% | 131 | 348 | 266% |

Source: own calculations based on GUS (1995–2014b), Rynek... (1996–2015).

Źródło: obliczenia własne na podstawie GUS (1995–2014b), Rynek... (1996–2015).

increased to a comparable degree (by 24%), while yields of berry fruits increased by 13%. What is interesting, the average annual area cropped to berry fruit culture following Poland's accession to the EU was by 18% higher than before that date. Thus it shows how the development of production of such fruits was extensive in character. The situation was different for orchard fruits, as the average annual cropped area was comparable before and after accession. In this case the increase in yields was determined by the share of dwarf trees and an increase in the area of apple growing. Average annual yields of vegetables in the years 2004–2013 were by 4% lower than in the years 1994–2013. This was a consequence of an 11% decrease in average annual yields of field-grown vegetables despite a simultaneous increase in the average annual yields of vegetables grown in tunnels by 85%. These changes were accompanied by a reduction of the average annual area cropped to vegetables by 18%. For field-grown vegetables the decrease in cropped area amounted to 19%, while in the case of vegetables grown in plastic tunnels it increased by 68%.

The average annual share in purchased fruits in the yields harvested in the period following Poland's accession to the EU was 52% (Table 2), while prior to Poland's accession to the EU it was 31%. In turn, the volume of fruit purchases increase over two-fold. Analogical value for vegetables changed at a similar rate. However, despite the increase by 119%, the average annual share of purchased vegetables in the total yields in the years 2004–2013 was 26%. The increase in the purchases of fruits and vegetables in the period following Poland's accession to the EU was determined by changes taking place on the domestic market. We need to mention here first of all concentration and specialisation of production. Between 2002 and 2010 the number of orchard farms decreased from 317 thousand to 285 thousand. In turn, the number of farms specialising in field vegetable growing dropped within the same period by over 50%, i.e. from 222 thousand in 2002 to 110 thousand in 2010. These changes were accompanied by an increase in the mean area of farms (Ziętara and Sobierajewska, 2012). Thus the number of small producers supplying produce to the market in direct sales.

The increase in wholesale purchases of fruits and vegetables was also promoted by investments in that market, which made it possible for processors and agents to develop their warehousing facilities to increase the volume of purchases. Finally we also need

to stress a strong competitive position of the Polish fruit and vegetable sector, which was manifested in the dynamically developing exports.

BASIC INTERDEPENDENCIES ON THE FRUIT AND VEGETABLE MARKET

At present on the agrifood markets we may observe the effect of the so-called technological treadmill. This mechanism forces farmers to constantly increase labour efficiency leading to cost reductions, which however is not manifested in an increased income due to the decreasing prices of agricultural produce. Moreover, the immobility of land as a resource and the indivisibility of capital investments on farms result in a situation when farmers are not able to transfer their production factors to alternative applications (Czyżewski and Czyżewski, 2015).

When comparing average annual data² concerning fluctuations in values of production, costs and revenue on the fruit market, in the years 2002–2013 we may observe several regularities (Table 3). The first is connected with the comparable dynamics for the decrease in the average annual value of production and total costs between 2002–2003 and 2012–2013. In contrast, opposite trends were observed for changes in direct costs, which were increasing and indirect costs and external factors, which were decreasing. The increase in direct costs was connected first of all with increased expenses for the purchase of cuttings and fertilisers. In turn, the reduction of indirect costs and external factors was mainly determined by lower costs of hiring workers.

Fluctuations in income with subsidies for the conducted agricultural activity were crucial for the operations of farms. Annual averages in the years 2002–2003 were 3009 PLN/ha (in current prices). Towards the end of the investigated period, i.e. in the years 2012–2013, they increased by 60% to 4806 PLN/ha. In turn, after correction of income values of farms to include the rate of inflation, the annual averages in the years 2002–2003

² Collective data concerning fluctuation in values of production, costs and income on the fruit and vegetable market over a longer time period are incomplete. This is connected with the considerable diversity of crops. Only partial data are relatively easily available, referring to specific species or varieties. Thus, we only present values for farms growing fruit trees and shrubs for the fruit market for the period 2002–2013, prepared by the Polish FADN branch.

Table 3. The average annual value of production, costs and income of agricultural farms growing fruit trees and shrubs in the years 2002–2013 (in PLN per 1 ha of crops, at current prices)

Tabela 3. Średnioroczna wartość produkcji, kosztów i dochodów rolniczych gospodarstw uprawiających drzewa i krzewy owocowe w latach 2002–2013 (w zł na 1 ha upraw, w cenach bieżących)

| Specification Wyszczególnienie | 2002–2003 | 2004–2005 | 2006–2007 | 2008–2009 | 2010–2011 | 2012–2013 | 2012–2013/ /2002–2003 |
|---|-----------|-----------|-----------|-----------|-----------|-----------|--------------------------|
| Value of production Wartość produkcji | 11 516 | 10 975 | 12 147 | 10 085 | 12 006 | 12 781 | 111% |
| Total costs Koszty ogółem | 8 501 | 8 222 | 7 663 | 8 428 | 8 412 | 9 263 | 109% |
| Direct costs Koszty bezpośrednie | 1 492 | 1 992 | 1 905 | 2 097 | 2 090 | 2 372 | 159% |
| Indirect costs and external factors Koszty pośrednie i czynniki zewnętrzne | 4 045 | 3 025 | 3 062 | 3 463 | 3 391 | 3 786 | 94% |
| Depreciation Amortyzacja | 2 965 | 3 207 | 2 697 | 2 868 | 2 932 | 3 106 | 105% |
| Subsidies Dopłaty | 53 | 388 | 737 | 753 | 1 081 | 1 253 | 2387% |
| Income with subsidies Dochód z działalności z dopłatami | 3 009 | 3 258 | 5 164 | 2 278 | 4 717 | 4 806 | 160% |
| Income without subsidies Dochód z działalności bez dopłat | 2 957 | 2 871 | 4 427 | 1 525 | 3 637 | 3 553 | 120% |

Source: own calculations based on FADN data (2016).

Źródło: obliczenia własne na podstawie danych FADN (2016).

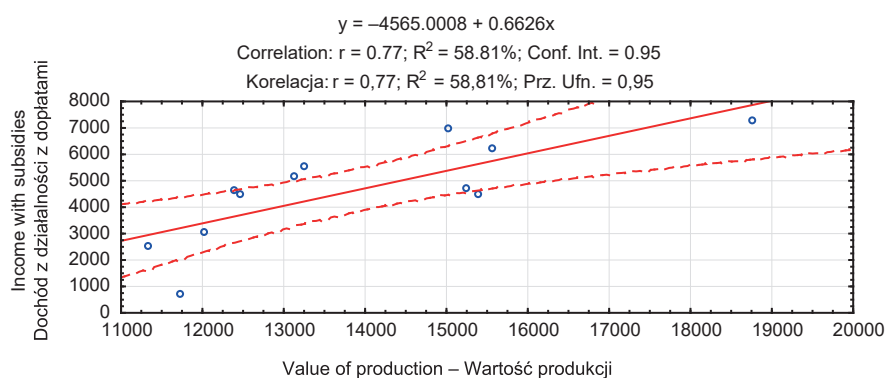


Fig. 2. The model of linear regression between income from farm operations and the value of production on the fruit market (data for farms growing fruit trees and shrubs) in the years 2002–2013 (in PLN per 1 ha of crops, in constant prices with 2013)

Source: own calculations using STATISTICA ver. 12.

Rys. 2. Model regresji liniowej pomiędzy dochodem z działalności a wartością produkcji na rynku owoców (dane dla gospodarstw uprawiających drzewa i krzewy owocowe) w latach 2002–2013 (w zł na 1 ha upraw, w cenach stałych z roku 2013)

Źródło: obliczenia własne z wykorzystaniem programu STATISTICA ver. 12.

were 3978 PLN/ha (base year 2013). In the years 2012–2013 they increased by 21% to 4829 PLN/ha. However, it needs to be stressed that this increase was determined to a considerable extent by direct payments.

Three regression models were calculated for the basic variables modifying the financial situation of farms growing fruit trees and shrubs. Unfortunately, the model between income and costs proved to be of very poor fit ($R^2 = 2.51\%$). Also the model between the value of production and costs was characterised by a very low coefficient of determination ($R^2 = 25.13\%$). Only in the analysis of the interdependence between income from agricultural operations including subsidies and the value of production the model was better fitted (Fig. 2).

The power of this relationship was still not very high. Fluctuations in values of production were responsible for as little as 58.81% income variability. An increase in the value of production by 1 PLN/ha resulted in an increase in income from agricultural operations by 0.66 PLN/ha. This confirms that fluctuations in income was to a greater degree determined by the value of production than the level of costs.

Based on the above-mentioned analyses it was attempted to determine the dependency between selected variables describing the fruit and vegetable market in Poland in the period before and after Poland's accession to the EU and for the entire investigated period (Table 4). One of the many interesting relationships we need to

Table 4. Values of Pearson's correlation coefficients for selected variables of the fruit and vegetable market in Poland in the years 1994–2013 (constant prices adjusted for inflation)

Tabela 4. Wartości współczynników korelacji liniowej Pearsona odnoszących się do wybranych zmiennych na rynku owoców i warzyw w Polsce w latach 1994–2013 (ceny stałe skorygowane o wskaźnik inflacji)

| Explanatory variable Zmienna objaśniająca | Explained variable Zmienna objaśniana | 1994–2003 | 2004–2013 | 1994–2013 |
|--|--|-----------|-----------|-----------|
| Fruit yields Wielkość zbiorów owoców | Wholesale purchase price for fruits Cena skupu owoców | –0.74 | –0.53 | –0.59 |
| Vegetable yields Wielkość zbiorów warzyw | Wholesale purchase price for vegetables Cena skupu warzyw | 0.25 | –0.68 | 0.16 |
| Volume of fruit purchases Wielkość skupu owoców | Fruit yields Wielkość zbiorów owoców | 0.83 | 0.7 | 0.77 |
| Volume of vegetable purchases Wielkość skupu warzyw | Vegetable yields Wielkość zbiorów warzyw | –0.46 | –0.15 | –0.42 |
| Fruit yields Wielkość zbiorów owoców | Vegetable yields Wielkość zbiorów warzyw | –0.64 | –0.28 | –0.49 |
| Wholesale purchase price for fruit Cena skupu owoców | Wholesale purchase price for vegetables Cena skupu warzyw | 0.36 | 0.48 | 0.4 |
| Fruit yields Wielkość zbiorów owoców | Value of fruit production Wartość produkcji owoców | – | –0.49 | – |
| Wholesale purchase price for fruits Cena skupu owoców | Value of fruit production Wartość produkcji owoców | – | 0.01 | – |
| Total costs (fruit market) Koszty ogółem (rynek owoców) | Value of fruit production Wartość produkcji owoców | – | 0.51 | – |
| Wholesale purchase price for fruit Cena skupu owoców | Profitability with subsidies (fruit market) Dochodowość z dopl. (rynek owoców) | – | 0.75 | – |
| Total costs (fruit market) Koszty ogółem (rynek owoców) | Profitability without subsidies (fruit market) Dochodowość bez dopl. (rynek owoców) | – | –0.5 | – |

Source: own calculations based on GUS (1995–2014b), Rynek... (1996–2015), GUS (2016).

Źródło: obliczenia własne na podstawie GUS (1995–2014b), Rynek... (1996–2015), GUS (2016).

focus on the negative correlation relationships between the volume of fruit yields and their wholesale purchase prices, both before and after Poland's accession to the EU, as well over the entire investigated period. Thus it shows that the volume of yields markedly determined the level of wholesale purchase prices. However, it also needs to be stressed that this relationship in the post-accession period (2004–2013) lost strength. It may be assumed that this was connected with the opening of borders and as a result increased trade exchange. Thus it led to a partial independence of wholesale purchase prices on the situation on the domestic market. In turn, on the vegetable market there was no long-term dependence between yields and wholesale purchase prices. Only in the years 2004–2013 a significant negative correlation was observed, which was determined by a gradual increase in prices on this market and a regular decrease in yields.

Despite the growing volume of fruit and vegetable purchases, yields were increasing only in the case of fruits. In contrast, yields of vegetables were decreasing slightly. In turn, a significant negative correlation was found between yields of fruits and vegetables throughout the entire analysed period. It also needs to be stressed that a statistically non-significant positive correlation was recorded between wholesale purchase prices for both markets in the investigated periods. The value of fruit production in the post-accession period (2004–2013) was not significantly determined by production volume, price levels or costs. Nevertheless, we need to add here that the price level was the strongest stimulant for the modification of values of fruit production. This confirms the fact that costs incurred for crop growing was decisive for the value of yields. Analysis of determinants for the profitability index in the case of farms showed that it depended to the greatest extent on fluctuations in wholesale purchase prices. In turn, the level of costs was its destimulant; however, its effect was not sufficiently strong to produce a statistically significant correlation.

CONCLUDING REMARKS

The aim of this paper was to present selected variables and relationships determining the operations of producers on the fruit and vegetable markets in the period before Poland's accession to the EU and afterwards. Summing up, it may be stated that:

- In the post-accession period (2004–2013) price development was advantageous for producers, as prices were increasing in relation to those of 2004. This contributed e.g. to an increase in trade exchange, particularly exports. It also needs to be added here that the coefficient of variation indicated that seasonal fluctuations in wholesale purchase prices on the fruit market were greater than in the vegetable market. However, in the post-accession period the coefficient of variation for fruit prices decreased, which was obviously influenced by an increase in fruit imports, while it increased for vegetables.
- Average annual volume of fruit and vegetable wholesale purchases in the period following Poland's accession to the EU increased over two-fold. In the case of fruits in the years 2004–2013 over 50% fruit yields were purchased wholesale, while the share of wholesale purchases for vegetables was 26%. The above-mentioned changes were determined by concentration and specialisation of production, accompanied by a reduction in the number of orchard and vegetable growing farms. The dynamically growing export and investments in the processing industry, promoting development of warehousing and processing infrastructure, was also an essential factor.
- Income of farms growing fruit trees and shrubs increased after Poland's accession to the EU. The annual average in the years 2002–2003 was 3978 PLN per hectare of cropped land (in constant prices for 2013). In turn, towards the end of the investigated period, in the years 2012–2013, it increased by 21% to 4829 PLN/ha. However, we also need to add here that this increase was to a considerable degree a consequence of direct payments.
- Negative correlations were found between fruit yields and fixed wholesale purchase prices, both before and after Poland's accession to the EU, as well as over the entire investigated period. This confirms that fruit yields considerably determined the level of wholesale purchase prices. In turn, on the vegetable market no long-term dependence was observed between yield volume and wholesale purchase prices.

REFERENCES

- ARR (2014). *Rynek owoców w Polsce*. Biuletyn Agencji Rynku Rolnego. Warszawa: ARR.

- Bieniek-Majka, M. (2013). Współpraca z sieciami handlowymi jako dostosowanie się producentów owoców i warzyw do wymagań współczesnego rynku. *Rocz. Ekon. Kuj.-Pom. Szk. Bydg.*, 6, 171–180.
- Czyżewski, A., Czyżewski, B. (2015). Ziemia i jej renty w nowym paradygmacie rozwoju rolnictwa. In: A. Czyżewski, B. Klepacki (Eds.), *Problemy rozwoju rolnictwa i gospodarki żywnościowej w pierwszej dekadzie członkostwa Polski w Unii Europejskiej* (p. 32). Warszawa: PTE.
- FADN (2016). Retrieved Jan 12th 2016 from: http://ec.europa.eu/agriculture/rca/database/report_en.cfm?dwh=SO.
- Figiel, S., Hamulczuk, M. (2008). Zmienność cen wybranych produktów rolnych i żywnościowych przed i po akcesji Polski do UE. In: A. Kowalski, M. Wigier (Eds.), *Ekonomiczne i społeczne uwarunkowania rozwoju polskiej gospodarki żywnościowej po wstąpieniu Polski do Unii Europejskiej* (p. 54). Warszawa: IERiGŻ-PIB.
- Filipiak, T. (2014). Zmiany na rynku warzyw i w gospodarstwach warzywniczych w Polsce po integracji z Unią Europejską (p. 24–26). Warszawa: Wyd. SGGW.
- GUS (1995–2014a). *Mały Rocznik Statystyczny Polski*. Warszawa: Główny Urząd Statystyczny.
- GUS (2016). Roczne wskaźniki cen towarów i usług konsumpcyjnych od 1950 roku. Retrieved Jan 15th 2016 from: http://www.stat.gov.pl/gus/5840_1634_PLK_HTML.htm.
- GUS (2014–2015). *Rocznik Statystyczny Rolnictwa*. Warszawa: Główny Urząd Statystyczny.
- GUS (1995–2014b). *Skup i ceny produktów rolnych*. Warszawa: Główny Urząd Statystyczny.
- Kapusta, F. (2014). Rynek owoców w Polsce w okresie przedakcesyjnym i po akcesji do Unii Europejskiej. *Ekon. XXI Wieku*, 1(1), 9–10.
- Nosecka, B., Pawlak, K., Poczta, W. (2011). Wybrane aspekty konkurencyjności rolnictwa (p. 33–43). Warszawa: IERiGŻ-PIB.
- Rynek owoców i warzyw – stan i perspektywy (1996–2015). *Analizy Rynkowe* (p. 8–46). Warszawa: IERiGŻ-PIB.
- Ziętara, W., Sobierajewska, J. (2012). *Gospodarstwa ogrodnicze w Polsce i w wybranych krajach Unii Europejskiej* (p. 28–29). Warszawa: IERiGŻ-PIB.

WYBRANE RELACJE EKONOMICZNE NA RYNKU OWOCÓW I WARZYW W POLSCE (1994–2013)

Streszczenie. W artykule przedstawiono kształtowanie się wybranych zmiennych i zależności opisujących rynek owoców i warzyw w Polsce w okresie dziesięciu lat przed akcesją i po niej. Większość porównań ukazano zatem z perspektywy dwóch podokresów: 1994–2003 oraz 2004–2013. Przybliżono wahania cen skupu owoców i warzyw z uwzględnieniem zmian inflacyjnych oraz poziomu wskaźnika cen towarowej produkcji rolniczej. Określono również determinanty wielkości zbiorów owoców i warzyw w Polsce oraz wielkości ich skupu. Ponadto zaprezentowano wyniki badań dotyczących sytuacji ekonomicznej wybranych gospodarstw rolnych z uwzględnieniem wartości produkcji, kosztów i dochodów. Na podstawie oszacowanych modeli ustalono, że kształtowanie dochodów gospodarstw było statystycznie istotnie determinowane poprzez wartość produkcji. Zaobserwowano również, że w okresie po wejściu Polski do Unii Europejskiej ceny skupu kształtowały się korzystnie dla producentów w stosunku do tych z roku 2004, na co z pewnością miał wpływ wzrost eksportu. W latach 2004–2013, w stosunku do lat 1994–2003, wzrosła również wielkość zbiorów owoców, a warzyw nieznacznie spadła. Warto też odnotować, iż wskaźnik zmienności cen skupu w okresie poakcesyjnym spadł dla owoców, a wzrósł w przypadku warzyw.

Słowa kluczowe: integracja europejska, ceny surowców rolnych, rynek owoców i warzyw

Accepted for print – Zaakceptowano do druku: 21.10.2016