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STOWARZYSZENIE EKONOMISTÓW ROLNICTWA I AGROBIZNESU
Roczniki Naukowe ● tom XVI ● zeszyt 6

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APPLES OR ORANGES? RECENT HOUSEHOLD FRUIT CONSUMPTION IN POLAND

JABŁKA CZY POMARAŃCZE? TENDENCJE SPOŻYCIA OWOCÓW W GOSPODARSTWACH DOMOWYCH

Key words: farm households, town size, families with children

Słowa kluczowe: gospodarstwa rolników, wielkość miasta, rodziny wielodzietne

Abstract. The study examines the recent changes in per capita consumption of apples and exotic fruits focusing on the competition between the two fruit categories. In particular, the per capita consumption of apples declined from about 21 kg in 2004 to about 15 kg in 2012, while the consumption of exotic fruit increased from about 9 kg to kg in 2005 to 12.5 kg in 2012. The examination stresses the inadequacy to analyze consumption using the concept of "an average household" because the concept does not reflect the potential differences in households with inadequate fresh fruit consumption such as families with a large number of children. Using GUS data for the period 2008-2012, the paper illustrates the differences in the consumption of both fruit categories according to households classified applying demographic and socio-economic characteristics. Graphic presentation of per capita consumption volume and statistical test results show the large differences in the consumption of apples, the primary domestic fruit, and imported fruits. Poland's apple growers, fruit importers, distributors and retailers as well as public health agencies are offered insights useful in making decisions about apple promotion, marketing strategies and consumer education programs.

Introduction

According to FAO [www.faostat.fao.org, 2014] Poland was the only European country, among the world leading apple producing countries in 2012, including China, the United States, and India, placing fourth with 2.87 mln ton crop. Poland's apple producer association maintains that the country is the largest apple producer in Europe and the largest apple exporter in the world. In 2013, Poland exported 1.2 mln tons of apples, 2/3 of the exported volume was destined for Russia. Because of the shrinking Russina market for Polish apples, the European Commission (EC) decided to promote Polish apples in China and in the UAE with the framework of the program organized by Stowarzyszenie Polskich Dystrybutorów Owoców i Warzyw „Unia Owocowa" in cooperation with Związek Sadowników. The program costs about 5 mln euros [*Eksport polskich*… 2014].

More than one half of the annual apple crop is consumed by domestic customers. In 2008, 2010, and 2012 the annual per capita apple consumption averaged about 15 kg. In 2009, the figure was slightly higher, 16.2 kg per capita annually, but it dropped to 13.2 kg per capita in 2011 [Trajer, Dyngus 2013]. However, the per capita apple consumption has declined in recent years. As recently as in 2004, an average consumer in Poland ate 20.88 kg of apples per year [*Biuletyn Informacyjny ARR* 2013]. The decreasing consumption of apples in Poland seems to follow a similar trend observed in Canada [Carew et al. 2012). Apples also are consumed in smaller volume in the United States although the decrease is small and over a longer period of time [ERS, 2012], while in Scotland the weekly volume of apple purchases per capita has also declined between 2002 and 2011 [Revoredo-Giha, Florkowski 2013]. It appears that the declining per cpait apple consumption in Poland resembles the tendencies observed in a number of countries located in the temperate zone.

The most important competitor of apples on the domestic market is exotic fruits, primarily citrus and bananas. Among the leading world orange producers were Brazil, the United State, China, India and Mexico in 2012 [www.faostat.fao.org, 2014]. However, none of the listed countries is

among the main citrus exporters to Poland because the majorty of imported citrus volume originates in the Mediterenean basin. The exotic fruit (citrus and bananas) consumption represented somewhat different tendency than apple consumption during the period 2008-2012. In 2011, the average annual exotic fruit consumption was the highest, 12.84 kg per capita, while the lowest per capita consumption was 11.40 kg in 2009. Although in recent years the per capita consumption of exotic fruit stabilized and fluctuates around 12.5 kg per year [*Biuletyn Informacyjny ARR* 2013], it was only 8.64 kg per capita in 2005, the first full year of Poland's membership in the European Union. The tendency observed in Poland follows trends in other countries, for example in the United States apples have been surpassed by banans in terms of per capita consumption between 1970 and 2010 [*Bananas and apples...* 2012].

Overall, the average monthly per capita fruit consumption in kg per capita has been decreasing, from 3.59 kg in 2008 to 3.45 kg in 2012 [*Budżety gospodarstw…* 2013]. Among the specific fruits, apple consumption declined most, although it was earlier the most often consumed fruit. IERiGŻ reports that during the period under consideration, Polish consumers purchased increasingly larger volume of citrus and bananas [*Coraz mniejsze…* 2012].

GUS noted the steady decrease in the average monthly per capita consumption of the majority of basic foodstuffs [*Sytuacja gospodarstw…* 2013], however, Florkowski et al. [2014] noted that the"average housholds" or the "average" consumption in a household inaccurately portrays the fruit consumption because the consumption varies across household types, for example given their size. Although the foodstuff consumption declined in Poland in 2012, fruit consumption increased by 3.6% including the 13.6% increase in apple consumption. A substantial consumption increase, 14.3%, was noted in farm households. This is most likely the result of 3.4% increase in real expenditure, the only socio-economic group that experienced an increase in the real disposable income of 7.5% in 2012. For example, the pensioners' income grew only by 0.9%. Besides income, the apple price played a role despite the slight price increase, by less than 20 gr/kg, in the 4th quarter of 2012 in comparison to other available fruit on the domestic market [*Ceny jabłek…* 2014].

This paper compares the consumption of apples, the main domestically produced fruit, with exotic fruit consumption, the primary substitute of the domestic fruit. Although general comparisons in per capita consumption of fruits or specific fruits have been made (for example [*Apple consumption*...2014]), the comparisons are not found that account for specific characteristics of a consumer that are relevant from the marketing standpoint or from the perspective of national policy addressing specific issue with public consequences. The comparison in the current paper focuses on per capita consumption measured in kg in the "average" co-person households and households categorized in terms of the educational attainment level reflected in the type of occupation, income and place of residence. Not without importance are the health benefits and flavor of apples, a fruit that is particularly suited to Poland eco-zones. Therefore, the comparison has been broadend by including families with a large number of children as the group that is potentially characterized by inadequate fresh fruit consumption and, as a consequence, threatened by the inadequate supply of nutrients esssential for proper growth and health maintenance. Results of comparison show possibilities of increasing promotion and apple consumption as well as the exotic fruit in relation to the household size, its location and several other characteristics and the need for continuing consumer education about benefits from increased consumption of the available domestic and imported fruit. The results and their implications can benefit domestic producers, fruit importers, and agencies engaged in public health issues in order to modify the existing marketing strategies or the implementation of programs promoting healthy diet.

Several initiatives aiming at fruit consumption increase have been pursued in Poland in recent years, but have since been discontinued. To maintaint the traditional domestic fruit consumption, including apples, the EU introduced a program promoting food products. Since 2009, Agencja Rynku Rolnego (ARR) has been implementing nine programs supporting farm product marketing and stimulating farm product consumption. The programs included promotion of fruits and vegetables. A program „Owoce w szkole" ("Fruit at school") has been financed from the EU budget.

In the school year 2012/2013, Poland placed third among the recipients of the funds with the share of 10.25% of the funds allocated for all EU countries. The share increased to 15.37% (13.66 mln euros) in 2013/2014 moving Poland up a notch, right behind Italy, but ahead of Germany [*Krajowa produkcja*... 2013]. Since the onset of the program in the school year 2009/2010, the number of children benefiting from the program trippled, and the number of participaitng schools quadroupled. The largest number of children participating in the program in the second semester in the year 2012/2013 was from Mazowieckie, Śląskie and Wielkopolskie Voivodships (a total of 951,000 children benefited from the program in Poland). Fruit eating promotion among children will lead to fruit consumption in the future.

Materials and methods

The study applies GUS data and includes the descriptive methods to depict the differences and similarities in the consumption of two fruit categories, i.e., apples, the primary domestic fruit, and exotic fruits. The latter are the primary imported fruits and the main competitiors of domestic fruits. The exotic fruit category (which includes fresh, chilled and frozen fruit) is defined by GUS and includes citrus (e.g., lemons, organes, mandarins, grapefruit, and other), and bananas [*Budżety gospodarstw*... 2013]. The available data do not allow the distinction of fruit kinds or varieties included in a category.

The GUS household panel is representative of the country population. As such, the general conlcusions can be made with a degree of accuracy that encompass all households in Poland [*Budżety gospodarstw*... 2012]. For the purpose of this study, the authors selected two-person and six persons or larger households, where a household is defined as a multi-person group living together and sharing a common sources of income [*Budżety gospodarstw*... 2012]. A two-person household has attributes of the "average" household, while the households of six or more persons are the households, whose consumption pattern differs due to the number of household members. In large households, fruit consumption is likely to deviate from the level recommended for healthy living. The study focuses on the period 2008-2012 and uses annual consumption figures.

GUS data account for the household income level and report households by quantiles accroding to per capita disposable income. To create quantiles, GUS orders the researched households from the highest per capita disposable income applying a system of weights. Once ordered, households are divided into five even size groups. The first quantile represents the bottom 20% in terms of disposable income, while the fifth quantile represents 20% of households with the highest income [*Budżety gospodarstw*... 2013].

For further discussison households have been separated according to several criteria, including income, the educational attainment level, and place of residence. Education is important in influencing the product selection and is commonly considered in empirical studies. Education level is a measure of knowledge, in the case of this study, it is knowledge about benefits of eating fruits. The available data classify individuals by their education level: college or university, post-secondary, secondary general or technical, vocational or middle school, elementary, and "lack of formal education".

The empirical analysis also encompassed the place of residence and its possible link to fruit consumption. Therefore, the study considers changes in fruit consumption with regrad to town and city size and residing in rural areas. Such approach provides an in-depth information at the association between selected factors and fruit consumption as well as insights about groups of consumers who may become a target of promotional efforts on one hand, and identify groups that may be recommended to increase fruit consumption because of health considerations.

Research methods

Demand-related factors – consumer preferences

Demand for a product reflects consumer preferences, which are shaped by a number of factors. Those factors are education, experience, culture, traditions, habits, including consumption habits, region or place of residence. Preferences remain unobserved, but they are demonstrated in the actual consumption and in case of fruit consumption, they are visible in the actual total fruit consumption. The condition of excercising preferences is the amount of disposable income in a household.

Fruit demand, measured by the annual per capita apple and exotic fruit consumption in kg in Poland, is considered under the assumption that all consumers encounter in retail outlets similar prices. This assumption is applied in empirical research when there is lack of information about prices, and the comparison referes to the same time period, in the case of this study, to the monthly or annual per capita consumption. This is a simplification, but it implies that consumers face a similar selection of retail outlets that offer similar variety and quality of seleted fruit kinds available year-round. Similarly, the discussion ignores the role of self-supply because, under Poland's conditions, it is not meaningful with regard of exotic fruits, while in case of apples applies only to some households, for example, those having apple orchard. However, in Poland (like in many EU countries apple producing countries), the self-supply of apples year-round is extremely rare due to the required storage conditions.

The assumption about prices allows to focus on consideration of the realtionship between the consumption for two fruit categories, i.e., apples and exotic fruit and the selected factors influencing the demand. Demand of a household has been captured by the available data reported by GUS through the creating quantiles.

The differences in per capita consumption of both fruit category for every combination of comparisons were tested using the independent t-test, for pair-wise comparisons, or the one-way analysis of variance (ANOVA) for three-or-more-sample comparison. The independent t-test is also called the two sample t-test or student's t-test, and the null hypothesis was that population means from the two independent groups are equal [Laerd Statistics 2014]. Similarly, in ANOVA test, the null hypothesis is that samples in three or more groups are drawn from population with the same mean value. The ANOVA, producing an F-statistics, is used to test whether there are any significant differences between the means of three or more independent groups [Laerd Statistics, 2014]. In the current study, both the independent t-test and one-way ANOVA test were conducted using the software R [*Analysis of varaiance* 2014].

Results and discussion

The average monthly apple and exotic fruit consumption per capita in households according to quintile groups during the period 2008-2012

The disposable income and fruit consumption in a household is found to be positively related. The general tendency of fruit consumption is characterized by the fact, that fruit consumption of both fruit categories increases as income grows. Across all quintile groups, the highest per capita consumption level for apples was reported in 2009, while for exotic fruit was reported in 2010 and 2011 (Fig. 1).

Particular attention needs to be paid to consumption in the fourth and fifth quintile group. In quintile IV, the apple and extic fruit consumption was almost even in 2011 (1.26 kg of apples vs. 1.28 kg of exotic fruit), while in quintile V, the exotic fruit consumption surpassed the apple consumption in both 2010 and 2011, but in 2012 the consumption evened out at the level of 1.61kg. The finding indicates that in recent years, households in Poland tend to consume more exotic fruit than before, especially in better-off households.

Results of ANOVA analysis indicate that monthly per capita consumption of apples and exotic fruits are significantly different across quintiles (the calculated value of F-statistics for apple and exotic fruit consumption are 33.856 and 354.8, respectively; both results are statistically significant with the p value of less than 0.0001).

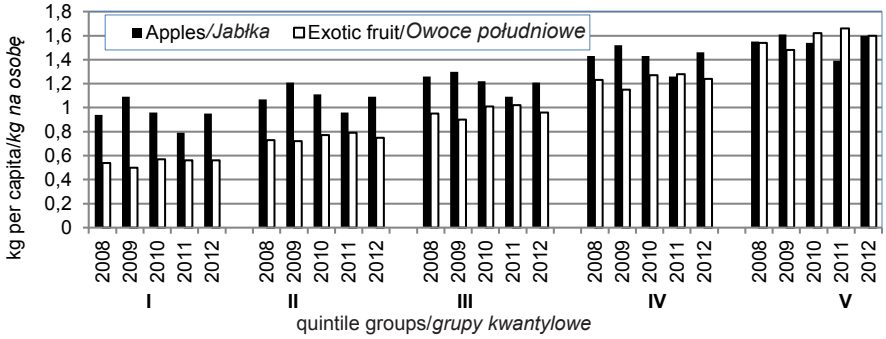
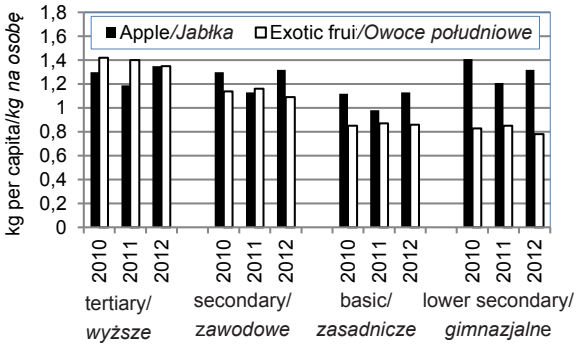


Figure 1. The average monthly per capita consumption of apples and exotic fruit in hosueholds according to five quintile groups during the period 2008-2012
Rysunek 1. Przeciętne miesięczne spożycie jabłek i owoców południowych na 1 osobę w gospodarstwach domowych według grup kwintylowych w latach 2008-2012
Source/*Źródło:* [*Budżety gospodarstw*… 2008-2012]

The average monthly apple and exotic fruit per capita consumption according to the educational attainment level between 2010-2012

Education plays an influential role in the consumer product selection. The highest apple consumption level (1.41 kg) was reached in 2010 in the households with lower secondary education (i.e., the completed middle school, elementary education, or lacking formal education), while in 2012 the highest level of 1.35 kg was associated with those having college or university education. The choices might be influenced by knowledge about the positive influence of fruit consumption (i.e., apple consumption) on health. Meanwhile, in the case of exotic fruit, the highest consumption levels were reached in 2010 and 2012 by college or university educated individuals, with the value of 1.42 kg and 1.35 kg, respectively. Oppositely, the lowest consumption of exotic fruit was reported among individuals with lower secondary education, with the value of 0.83 kg and 0.78 kg in 2011 and 2012, respectively. Overall, in the period 2011-2012, there was an increasing tendency in apple consumption, but a slightly decreasing trend associated with the exotic fruit consumption (Fig. 2).

Results of ANOVA analysis indicate that monthly per capita consumption of apples and exotic fruits are significantly different across households with a different attained education level. The corresponding F-statistics value are 9.015 and 38.382 for apple and exotic fruit consumption, respectively. The respective p values are 0.006 and less than 0.0001.



Note: According to GUS, the educational attainment level/ tertiary/, post secondary, secondary vacational and secondary general, basic vacational, lower secondary, primary, no formal education/ *Według GUS poziom osiągniętego wykształcenia*: *wyższe, policealne, średnio zawodowe i ogólnokształcące*, *zasadnicze zawodowe, gimnazjalne, podstawowe ukończone, bez wykształcenia*

Figure 2. The average monthly per capita consumption of apples and exotic fruit in hosueholds according to the educational attainment level during the period 20010-2012
Rysunek 2. Przeciętne miesięczne spożycie jabłek i owoców południowych na 1 osobę w gospodarstwach domowych według poziomu wykształcenia osoby odniesienia w latach 2010-2012
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Źródło: jak na rys. 1

The average apple and exotic fruit consumption per capita according to the household place of residence during the period 2008-2012

Fruit consumption level is also influenced by urbanization, specifically in terms of the town size and the place of residence (i.e., urban or rural setting). During the period under consideration, the highest fruit consumption level (1.33 kg in 2009) and exotic fruit (1.36 kg in 2010) was reported in cities with 500,000 or more inhabitants. However,, the lowest level of apple consumption (0.97 kg in 2011) was in cities with 100,000-199,000 residents, while the lowest exotic fruit consumption level (0.95 kg in 2009) was reported in the category with the smallest town size (i.e., towns with less than 20,000 residents). The offered interpretation for the observed patterns is based on the observed expansion of supermarket chains, the increased fruit offer-mix, including the wider offer of apple and exotic fruit varieties (Fig. 3).

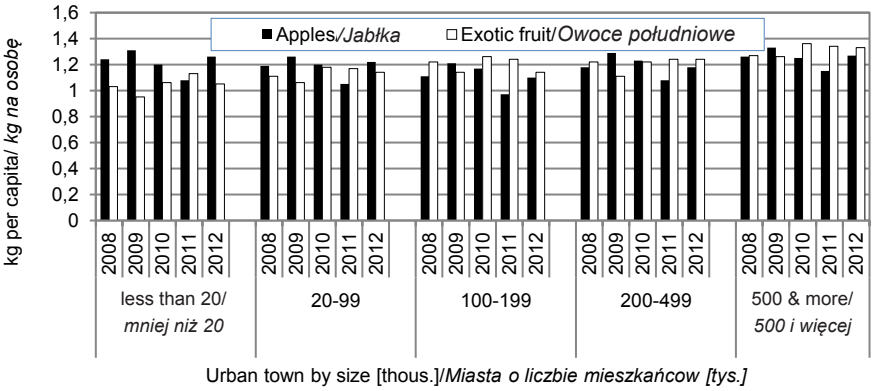

Figure 3. The average monthly per capita consumption of apples and exotic fruit in hosueholds according to selected town size categories during the period 2008-2012
Rysunek 3. Przeciętne miesięczne spożycie jabłek i owoców południowych na 1 osobę w gospodarstwach domowych według pięć klas wielkości miast w latach 2008-2012
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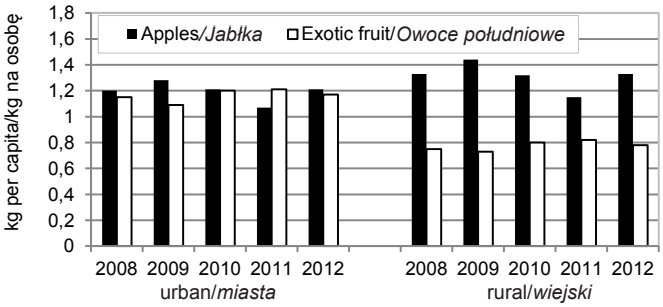
Results of ANOVA analysis indicate that monthly per capita consumption of apples is not statistically significantly different across five town sizes. It may because that apples are primary domastic produced fruit in Poland and consumed regardless of the town size. The value of F-statistics is 1.853 with the p value of 0.1582. However, in case of exotic fruit consumption, results of ANOVA analysis confirm that its consumption significantly vary by the town size, with F-statistics value of 15.224 and p value of less than 0.0001. Also, it seems that households in large size towns consume more exotic fruit than households in small size towns.

It has to be noted, that the consumption patterns differed between urban and rural areas. In 2009 and 2011, the tendency of both fruit categories was not very clear. The highest apple consumption was in towns (1.28 kg) and rural areas (1.44 kg) in 2009, the lowest in towns (1.07 kg) and villages (1.15 kg) in 2011. The opposite tendencies were observed in the exotic fruit consumption, where the highest consumption was recorded in towns (1.21 kg) and in rural areas (0.82 kg) in 2011. While two years earlier, in 2009, the observed consumption was the lowest, 1.09 kg in towns and 0.73 kg in rural areas, respectively. Results of independent t-test indicate that monthly per capita consumption of apples and exotic fruits are significantly different between urban and in rural households. Apple consumption is significantly higher in rural households, while exotic fruit consumption is significantly higher in urban households. For apple and exotic fruit consumption, the corresponding t-statistics are -2.042 (with p value of 0.0756) and 14.44 (with p value of less than 0.0001), respectively. Although in term of p value of t-test, the difference of apple consumption



Rysunek 4. Przeciętne miesięczne spożycie jabłek i owoców południowych na 1 osobę w wiejskich i miejskich gospodarstwach domowych w latach 2008-2012
Figure 4. The average monthly per capita consumption of apples and exotic fruit in urban and rural hosueholds during the period 2008-2012
Source: see fig. 1
Źródło: jak na rys. 1

between rural and urban areas is weaker than in exotic fruit consumption. However, the urban-rural comparison may not be fair. Where as the consumption level of both fruit categories in towns was relatively even, with the higher exotic fruit consumption in 2011, the consumption of apples in rural areas was uncomparable against the exotic fruit category as well as the level (Fig. 4).

The average apple and exotic fruit consumption per capita in two- person and six or more person households during the period 2008-2012

The comparison between the two types of households is not only critical from the standpoint of marketing strategy and merchandising, but also for public health and policy in formulating in-school fresh fruit consumption. Whereas a two-person household can be viewed as largely typical (although not demographically desirable), a six or more persons in a household may create tensions in the food budget leading to limited purchases of fresh fruit. Because of the highly beneficial effects of fruit consumption on health, the risk of inadequate in fruit consumption is of public concern.

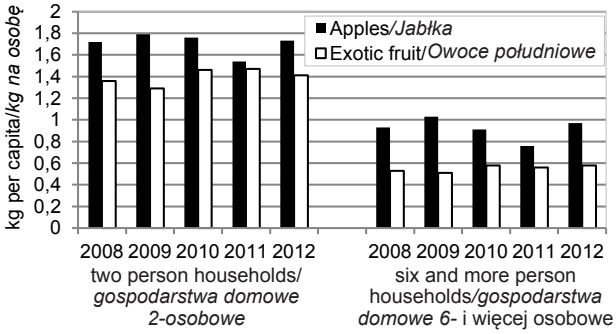


Figure 5. The average monthly per capita consumption of apples and exotic fruit accroding to the number of household members during the period 2008-2012
Rysunek 5. Przeciętne miesięczne spożycie jabłek i owoców południowych na 1 osobę w dwu- oraz sześcio- i więcej osobowych gospodarstwach domowych w latach 2008-2012
Source: see fig. 1
Źródło: jak na rys. 1

Figure 5 shows that per capita apple and exotic fruit consumption in two-person households is considerably higher than in six or more person households duiring the period 2008-2010. The overall tendency in the level of consumption is quite similar in both the small and large size households, for example the highest consumption was in 2009 and the lowest in 2011. Although the period is short, it seems that in both household sizes the consumption of exotic fruit increases, while the apple consumption remain roughly the same. Results of the independence t-test indicate that monthly per capita consumption of apples and exotic fruits are significantly different between two household sizes. The value of t-statsitics relevant to apple consumption is 12.564 and for exotic fruit consumption its value is 23.392, respectively, both with the p value of less than 0.0001.

Furthermore, a higher per capita apple consumption was recorded in two-person households as compared to six or more person households regardless of their occupation (Fig. 6). In particular, the differences were large in farm households and households of manual laborers. A positive development is the increase in apple consumption in farmer and non-manual laborers' households

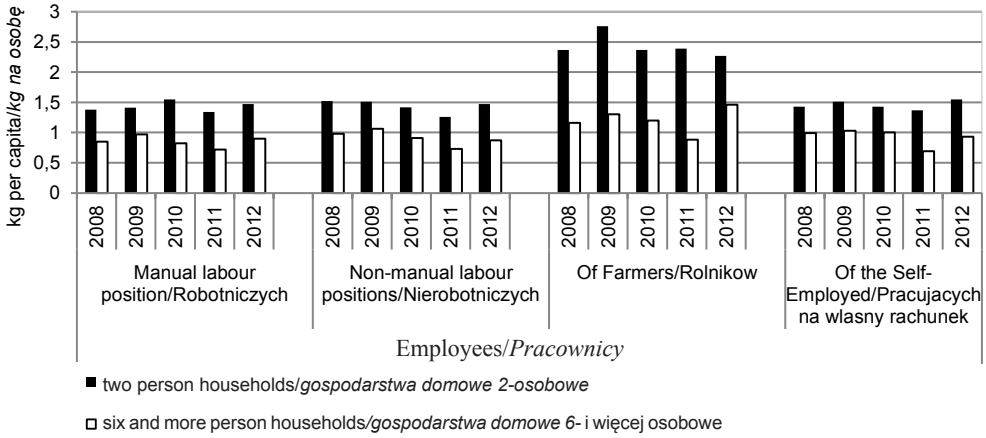


Figure 6. The average monthly per capita consumption of apples accroding to the number of household members during the period 2008-2012
Rysunek 6. Przeciętne miesięczne spożycie jabłek na 1 osobę w 2- oraz 6- i więcej osobowych gospodarstwach domowych w latach 2008-2012
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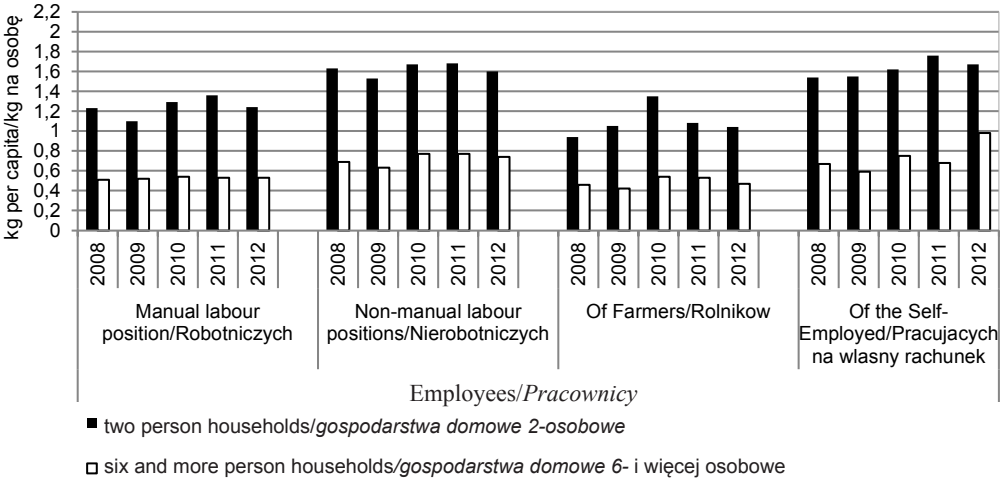

Figure 7. The average monthly per capita consumption of exotic fruit accroding to the number of household members and their socio-economic profiles during the period 2008-2012
Rysunek 7. Przeciętne miesięczne spożycie owoców południowych na 1 osobę w dwu- oraz sześcio- i więcej osobowych gospodarstwach domowych w latach 2008-2012
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in 2011-2012, where the increase of apple consumption in large households contrasted with the decrease of the consumption in two-person households. The differences were tested in two ways. In two-person households, F test confirmed that apple consumption significantly varies across occupation categories (with the value of F-statistics 83.333 and p value of less than 0.0001). Similar results are in six or more person households (F-statistics of 5.4397 and p value of less

than 0.009). In case of exotic fruit, the same type of test yielded values of 32.918 for two person households and 11.803 for six or more person households, respectively.

In addition, for each occupation type, independent t-test is applied to test whether there is a difference between small size households and large size households in terms of their apple and exotic fruit consumption, respectively. Results of t-test indicate that for all the occupation types (i.e., manual, non-manual, farmer, and self-employee), small size households have significantly higher per capita consumption than large size households in term of both apple and exotic fruit consumption.

Summary and conclusions

Poland is the largest producer of temperate zone fruit in the EU and the largest apple producer generating 28% of the total EU volume. Apples represented 75% of the fruit volume produced in Poland in 2012. The answer to the question "apples or oranges?" is not straightforward. Because a number of socio-economic factors (including income, education, or place of residence) influence fresh fruit consumption. Undoubtedly, apple is a traditional fruit in Polish households, but the influence of wide offer mix and accessibility of exotic fruit on the domestic market is closely tied to fruit consumption.

The positive relationship between income and per capita apple and exotic fruit consumption was confirmed. Apple was consumed in a volume larger than exotic fruit in all but the highest income quintile group. In the latter, the per capita exotic fruit consumption exceeded the per capita apple consumption. Income in general stimulates fresh fruit consumption [Florkowski et al. 2014] in countries of different income level. Such development stimualtes fruit production and marketing, benefits health of consumers, but attention needs to be paid to groups within the society that may suffer from the lack of consumption such as large households. They represent a small share of all households, but a considerably larger share of consumers.

Consumer educational attainment level is associated with substantial differences in apple and exotic fruit consumption. Apples tend to dominate the per capita fruit consumption in households of consumers who graduated from the elementary school. College-educated consumers tend to eat more exotic fruit than apples as compared to all other education categories. Such consumption pattern offers opportunities for marketing apples (or exotic fruit) to both groups, but the message may have to be differentiated by, for example, stressing the value of domestic fresh apple.

Residents of large towns showed a slightly higher preference for exotic fruit, while those in the smallest towns ate more apples. The lowest per capita apple consumption was in towns with 100,000 to 199,000 residents. In general, more exotic fruit was consumed in per capita terms in towns, while decidely more apples was consumed by rural residents. The distinction is more interesting from the standpoint of fruit distributors than public health specialists, except for the differences in per capita consumption in six or more person households. Reaching large households in rural areas may pose a challenge, but is essential to assure satisfactory fresh fruit consumption.

When compared directly, households of non-manual laborers and the self-employed consumed relatively more exotic fruit in both the two-person and six or more person households. Apples were particularly popular among farm households, which consumed this fruit in the highest per capita volume among all considered household types.

Results of the applied statistical tests confirmed close relationships between per capita fruit consumption and several selected socio-economic characteristics, but the extend of the analysis is determined by the available data disseminated by GUS. The inadequate amount of details about characteristics of households participating in the panel prevents an in-depth study and quantification of the effects of specific household or personal features on fresh fruit consumption. Therefore, the amount of practical knowledge the study generates is limited although it is highly probable that decision-makers responsible for marketing and distribution as well as public health officials would welcome greater amount of details. This can be accomplished if data avaiablity limitations are overcome.

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Streszczenie

Celem badań było porównanie konsumpcji jabłek i owoców południowych w latach 2008-2012 przez mieszkańców Polski. Podkreślono nieadekwatność pojęcia „przeciętnego gospodarstwa domowego", które nie odzwierciedla potencjalnych różnic pomiędzy przeciętnymi gospodarstwami a takimi, które cechuje niewystarczająca konsumpcja świeżych owoców, np. gospodarstw wielodzietnych. Analizy dokonano na podstawie danych GUS za lata 2008-2012. Zilustrowano różnice w konsumpcji obu kategorii owoców oceniając cechy demograficzne i socjoekonomiczne. Wyniki badań potwierdziły duże różnice pomiędzy konsumpcją jabłek, najważniejszego owocu krajowego a importowanymi owocami południowymi. Wyniki mogą być przydatne polskim sadownikom, importerom owoców, dystrybutorom i detalistom, a także agencjom odpowiedzialnym za zdrowie publiczne do podejmowania decyzji o promocji jabłek, strategii marketingowych i programów edukacji konsumenta.

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