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APPLE CONSUMERS' PREFERENCES ON THE EXAMPLE OF THE POZNAŃ UNIVERSITY OF LIFE SCIENCES STUDENTS

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Abstract. The aim of this paper was to present the preferences of apple consumers (students) concerned on the functional and sensory apples' quality features: the apple cultivar and taste, skin colour, fruit size and fruit firmness. The survey data were collected in the years 2009 and 2011 among 265 and 208 students of the Poznan University of Life Sciences. The respondents completed the survey questionnaires in presence of the researcher. The respondents could choose no more than three of the listed apple cultivars. Furthermore the respondents could choose one answer from each list of the preferable apples quality features (taste, skin colour, fruit size and firmness of flesh). The most preferred apple cultivars were: Lobo, Jonagold, Szampion, Golden Delicious and Cortland. The percentage of students whose did not know the name of the apple cultivar they consumed was high and it amounted to 17% in 2009 and 24% in 2011. Students preferred sweet-winy taste of apples, the red colour of fruit skin, with blush, the fruits of medium size and tough. The colour of apple skin was the least important quality feature – it did not matter for more than 1/3 of respondents, mainly males. The differences between males and females students appeared in taste of apple fruits and firmness of flesh. The sour taste of apples was preferred by relatively more males than females and for bigger percentage of males the taste of fruits was not important. More females preferred sweet and very sweet apples and tough.

Key words: fruits, apple varieties, taste, color, size, hardness

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INTRODUCTION

The main elements of the human diet, according to the directions of rational nutrition, should be fruits and vegetables, which are the best source of vitamins and minerals. According to General Statistical Office data, the fresh fruits consumption in Poland amounted to about 30kg/person/year in the latest decade and half of this amount were apples [Rynek... 2012, p. 23]. Apples were also one of the most preferable fruits for Polish consumers [Marzec-Wołczyńska 1996]. Kierczyńska [2010] presents, that 80% of respondents chose apples as a favorite fruits.

The apples are also the main fruits produced in Poland. The quantity of apple production in Poland amounts to more than 2.5 million tons per year and it was about 70% of total fruit production per year in last decade [Rynek... 2012, p. 8]. The apples production was higher than apple consumption in Poland and it suggests that apple market should be consumers market. It means that consumers could decide what kind of apples should be on the market. A regular apple consumer can value the apple quality taking into consideration fruits: visual attributes (such as size, shape and colour on the other hand) and internal features (taste, firmness of flesh, flavour) [Tomala and Jeziorek 2005]. In the other side, the voice of retailers is also important because of the necessity of high quality and good product shelf presentation [Maziarka 2005]. According to Cyrek [2010], the correct recognition of consumer preferences and meeting of requirements relating to trade offer composition is connected with the trader's belief of maximalization of benefits for consumer. Furthermore it is claimed, that females should be the main receiver of the promotional activities because they usually buy food articles.

Taking into consideration the fact that producers and retailers are interested in the preferences of apple consumers, the research was carried out among the students of the Poznan University of the Life Sciences. The students will start their own households in the near future and they will take the decisions concerning the apple market.

Consumer preferences present consumers' liking or disliking of something and they result from the level of satisfaction and utility the consumer obtains from purchasing or consuming goods or various combinations of goods. The preferences allow the consumers to get their choices. According to Milewski and Kwiatkowski [2008, p. 82], the consumer preferences reflect subjective measures of the level of suitability of various goods and combinations of goods. Food preferences are determinated by demographic and socioeconomic factors, such as age, economic condition, education, gender, region of residence, size of place of residence [Roos et al. 1998, Czech and Grela 2003, Wądłowska et al. 2008] and food choice features, such as advertising, functionality, health, price, sensory and socio-cultural factors [Thompson and Kidwell 1998, Wądłowska et al. 2008]. The impact of these factors can be manifested in different food behaviour.

The aim of this paper was to present the preferences of apple consumers (students) concentrated on the functional and sensory apple quality features: apple cultivar and fruit taste, skin colour, fruit size and fruit firmness. The base of the analysis was the survey data collected in the years 2009 and 2011 among the 265 and 208 students of three faculties of the Poznan University of Life Sciences: Faculty of Economics, Faculty of Horticulture and Faculty of Food Nutrition. The surveys were undertaken among the students of fourth and fifth (the last) year of study because of the assumption, that they were adult enough to have their own preferences on apple consumption. There were 139

students of the fifth year of Economics and 126 students of fourth year of Horticulture who correctly filled the surveys in the year 2009 and there were 69 students of fourth year of Horticulture, 69 students of fifth year of Economics and 70 who of Food Nutrition correctly filled the surveys in 2011. Among the respondents predominated the females. There were 212 females and 53 males in 2009 and 148 females and 60 males in 2011.

The respondents completed the survey questionnaires in presence of the researcher during classes. The survey included questions on the favoured apple cultivars, the preferred apple quality features (such as taste, skin colour, fruit size and firmness of flesh) and socio-demographic factors (gender).

The respondents could choose no more than three of the listed apple cultivars. The number of selections for each apple cultivar were totalized (summed up) and then the percentage of respondents' choices was calculated for each cultivar. Furthermore, the respondents could choose one answer from each list of the preferred apples quality features (taste, skin colour, fruit size and firmness of flesh). The frequency of choice was calculated according to the gender. The significance of the differences between males and females in their preferences were verified by the test for two structure ratios (percents) [Stanisz 1998, p. 171]. The results were given separately for 2009 and 2011 because the consumer preferences could reflect the quality of trade offer of apples in a particular year.

The data presented in this article were collected and utilized for the purpose of the diploma works [Sobkowiak 2009, Hepel 2011] under the supervision of the author of the article.

THE PREFERRED APPLE CULTIVARS

The respondents could choose maximum three the most preferable apple cultivars from the list of ten cultivars listed in the questionnaire. The respondents could also choose answer: "I don't know" or "I don't eat apples" or "Other" and put the names of cultivars not listed. Majority of the respondents were able to choose the name of apple cultivar they usually consume (Fig. 1). Lobo was the most favoured apple cultivar in 2009 (40% choices), but only 23% chose this variety in 2011. Jonagold was favourite apple cultivar for 20% students in 2009 and 32% in 2011. Szampion and Golden Delicious, were favourite for 26% and 27% in 2009 respectively, but 22% respondents chose Szampion and 20% – Golden Delicious in 2011. A lot of students chose Cortland and the choices were similar in both years (22% and 23%). Quite popular were also other two apple cultivars: Gloster and Gala – 18% and 16% chose them in 2009, but it was 13% and 11% in 2011. Idared was chosen by 8% respondents in 2009 and 9% in 2011. The cultivar Elstar was not willingly consumed – it was favourite only for 4% and 5% in 2009 and 2011 respectively. Some students –3% both in 2009 and in 2011 – answered, that the favourite apple cultivar they consumed was Kosztela. It is a traditional Polish apple variety, but it was exactly not available in the market. The students also (11% and 7% in 2009 and 2011 respectively) chose the option "Other" and put the names of their favourite apple cultivars not listed in the questionnaire, but available in the market, such as Ligol, Rubin, Boskoop, Koksa Pomarańczowa, Granny Smith, Topaz and Spartan.

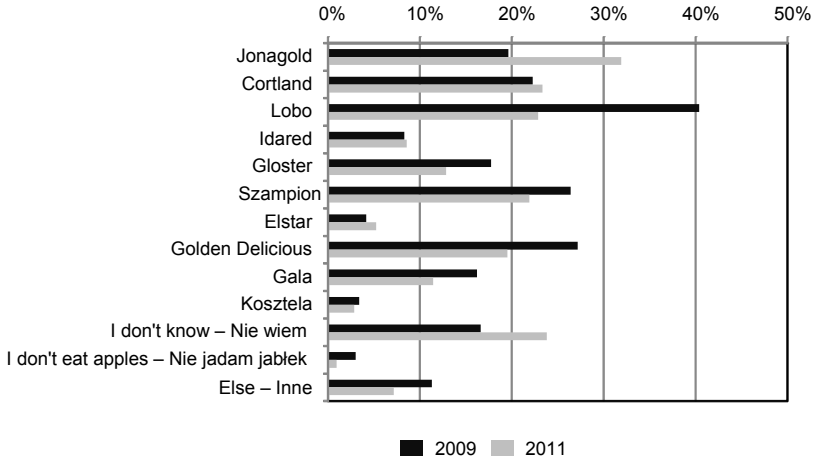

Fig. 1. Preferences of the surveyed students concerning apple cultivars
Source: author's calculations based on: Sobkowiak [2009], Hepel [2011].
Rys. 1. Preferencje odnośnie odmian jabłek wśród ankietowanych studentów
Źródło: obliczenia własne na podstawie: Sobkowiak [2009], Hepel [2011].

About 17% in 2009 and about one-fourth respondents in 2011 chose answer "I don't know" and it suggests that they did not have their favourite apple cultivar or they could not name the cultivars they consumed willingly. It also suggests, that more important than the name of the cultivar for them could be the quality features of apples. It could be also the suggestion, that there were too many different apple cultivars on the market and they did not link the name of cultivars with quality features they preferred.

The research concerning the preferred apple cultivars was carried out on groups of adults other than students. Marzec-Wołczyńska [1996] states that most respondents indicated as their favourite the traditional cultivars in Poland, such as Lobo, McIntosh and Cortland and only few the new cultivars (new in Poland at that time) such as Jonagold, Gloster, Elstar and Szampion. The author noticed that a lot of respondents listed Malinowa or Kosztela, not present in the market at that time. The most preferred apple cultivars in the Zmarlicki [2001] research were Lobo (17%), Cortland (16%), Szampion (14%) and Jonagold (11%). Similar results were obtained by Czernyszewicz [2005] – the most preferable apple cultivars were Lobo (16%), Szampion (12%), Jonagold (9%) and Golden Delicious (7%).

According to Marzec-Wołczyńska [1996] only 30% of respondents were able to name three of favourite apple cultivars but one-fourth of the asked persons did not know the name of apple cultivars they like. In Zmarlicki's [1995] research the respondents were asked to name the apple cultivar based on the appearance and taste of the fruit given to them. His results indicate, that only 24% respondents correctly named the apple cultivar they tested. Zmarlicki [1995] suggests that marketing programs for promotion of apple consumption should be based on the particular apple features, recognised and accepted by consumers, such as skin colour, taste or fruit size.

The results of the previous research and the currently presented results indicate that Lobo was the most preferable apple cultivar for consumers. The fruits of Lobo cultivar are tasty, medium size, with intense red skin colour covered a big part of fruit, juicy,

tender and winy-sweet. Lobo gets its matururity for consumption from October to December [Pomologia... 1994]. Maziarka [2005] says that it is useful for supermarkets to offer to consumers limited number of cultivars which can be offered for a long time and that is why they prefer for selling the Szampion, Jonagold, Gloster, Golden Delicious and Gala, not Lobo. Markets are not interested in apple cultivars with fragile fruits, such as Lobo, McIntosh and Cortland because they are easy to injure, drubbing and gall and with injuries they become inattractive for consumers and could bring about big wastes for markets [Maziarka 2005]. Lobo disappears from shop shelves, and apple producers more willingly grow apple cultivars wanted by trade – the share of Lobo in fruit production in Poland decreased from 8% in 2003 to 4% in 2011 [European... 2012], and more than 73% of Lobo cultivation area in 2007 were gained by ten and more years old trees [Produkcja... 2008].

PREFERENCES IN APPLES' QUALITY FEATURES

The survey included some questions about the preferable quality features of apples, such as taste, skin colour, fruit size and firmness of flesh. Majority of the asked students had their preferences regarding the apples taste, and more that 50% of the asked female students and less than a half males preferred the sweet-wine taste of apples (Table 1). Nearly the same percentage of males and female students liked sweet apples, but three times more females than males in 2011 preferred very sweet fruits (9% and 3% respectively). On the other hand, more male respondents indicated the sour taste as the favourite both in 2009 and 2011. About 16% of males in contrast to less than 1% of females in 2011 did not have their favourite taste of apples – the taste of consumed fruits did not matter for them.

The results of this research indicate that the investigated consumers preferred sweet-wine and sweet taste of apples more than sour and very sweet. The other researchers presented similar outcomes. The sweet-wine taste of apples was preferred by the majority of the respondents in the research of Zmarlicki [2001] – 49% of respondents pointed these tastes, in research of: Licznar-Małańczuk et al. [2001] – 42%, Czernyszewicz [2005] – 46%, Marzec-Wołczyńska [1996] – 47%, Czernyszewicz [2007] – 56%. The results of the research presented by Kurzawiński [2001] and Jesionowska et al. [2007] indicate that the most preferable taste of apples for the biggest part of their respondents was sweet. In Czernyszewicz's [2008 a] research the gender of the respondents was a statistically unimportant factor for the consumer preferences regarding apples quality features, however the females paid a greater attention to the fruit taste.

The skin colour of apples was important for the majority of the asked students (Table 2). About 41% in 2009 and 61% in 2011 preferred the red colour of apples' skin, much less respondents pointed yellow or green colour as the favourite. Nearly the half of the respondents, both genders, preferred apples with blush. Only 14% of females and 9% of males in 2009 and 15% in 2011 chose the answer "without blush". Even though most of the students assigned their preferences concerned with the colour of apple skin and presence of blush, these quality features proved to be not important for a relatively high percentage of the respondents. Furthermore, both the skin colour and the presence of blush, did not matter for a higher percentage of males students than females. The colour of apples' skin was not important for about half of the asked male students and

Table 1. Preferences of the asked students in apples' taste (%)
Tabela 1. Preferowany smak jabłek wśród ankietowanych studentów (%)

Feature Cecha	2009			2011		
	females kobiety	males mężczyźni	total razem	females kobiety	males mężczyźni	total razem
Taste Smak						
sour kwaśny	6	11	7	14	19	15
sweet-wine słodko-kwaśny	54	49	53	51*	36*	47
sweet słodki	25	23	24	26	24	25
very sweet bardzo słodki	8	9	8	9	3	7
It doesn't matter Nie ma znaczenia	4	8	5	1*	16*	5
I don't eat apples Nie jadam jabłek	4	0	3	0	2	0

*Significant at $p \leq 0.05$.
Source: author's calculations based on: Sobkowiak [2009], Hepel [2011].
*Istotne dla $p \leq 0,05$.
Źródło: obliczenia własne na podstawie: Sobkowiak [2009], Hepel [2011].

1/3 females in 2009 and 18% and 23% males and females in 2011 respectively. The presence of blush was not important for more than half of male students in 2009 and about 1/3 respondents of both genders in 2011.

According to Zmarlicki [2001] colour is one of the essential quality features for consumer's perception and determines decision making for apples purchasing. This research presents that most of the asked students prefer the apple skin red colour of and fruits with a blush. Similar results were obtained by other authors [Marzec-Wołczyńska 1996, Kurzawiński 2001, Zmarlicki 2001, Licznar-Małańczuk et al. 2001, Czernyszewicz 2007, Jesionowska et al. 2007] – more than half of their respondents preferred red apples with big blush on more than half of the fruit surface. The skin colour was unimportant for 29.5% of Czernyszewicz's [2007] respondents. A relatively high percentage of respondents, for whom the colour of apple skin was unimportant, could be the result of the market situation, the fact in that most apples in trade have exactly red colour of skin (blush) and the alternative for consumer is seeming.

The size of apples was an important quality feature for the majority of the asked students (Table 3). About 60% of the asked students preferred medium size of apples. The differences between males and females students covered exactly every size – 18% and 22% females (in 2009 and 2011 respectively) preferred the big apples, but only 9% males students in 2009 and 30% in 2011 chose big apples. Only a few percent of respondents of both genders chose answer "small" and more males students than females answered that the size of consumed apples did not matter for them – it was 9% in 2009

Table 2. Preferences in apple skin colour (%)
Tabela 2. Preferowane wybarwienie jabłek (%)

Feature Cecha	2009			2011		
	females kobiety	males mężczyźni	total razem	females kobiety	males mężczyźni	total razem
Skin colour Kolor skórki						
green zielone	14	9	13	10	9	10
yellow żółte	6	6	6	9	9	9
red czerwone	42	36	41	63	57	61
It doesn't matter nie ma znaczenia	34*	49*	37	18	23	19
I don't eat apples Nie jadam jabłek	4	0	3	0	2	0
Blush Rumieniec						
with blush z rumieńcem	45	38	43	53	47	51
without blush barwa jednolita	14	9	13	14	15	14
It doesn't matter Nie ma znaczenia	37*	53*	40	33	35	34

*Significant at $p \leq 0.05$.
Source: author's calculations based on: Sobkowiak [2009], Hepel [2011].
*Istotne dla $p \leq 0,05$.
Źródło: obliczenia własne na podstawie: Sobkowiak [2009], Hepel [2011].

and 14% in 2011 for females and 21% and 16% for males students in 2009 and 2011 respectively.

The size of apples is important for consumer because of functional usage – a big apple could be too big for consumption at once, takes a lot of space while it is taken with them, but the consumption of small one can leave the feeling of insufficiency. The most optimum size of apple fruits appeared to be the medium size and most of the asked students chose it. Jasiulewicz [2008] indicates, that suitable size of fruits is one of the quality features that affects fruits consumption motivation, and too large size of fruits is one of the barriers in fruits consumption. In Czernyszewicz's [2008 b] research, the fruit size was the apple quality feature which differentiated preferences of males and females – the fruit size was more important for males than females.

The last question concerned the fruit firmness. Majority of asked students, both males and females preferred tough apples, but the percentage of females was advantageous both in 2009 and 2011 (Table 4). About 1/3 of respondents in 2009 and less than

Table 3. Preferences in apples' fruit size (%)
Tabela 3. Preferowana wielkość jabłek (%)

Feature Cecha	2009			2011		
	females kobiety	males mężczyźni	total razem	females kobiety	males mężczyźni	total razem
Fruit size Wielkość owocu						
big duże	18	9	16	22	30	24
medium średnie	62	68	63	62	48	58
small małe	7	2	6	3	3	3
It doesn't matter Nie ma znaczenia	9*	21*	12	14	16	14
I don't eat apples Nie jadam jabłek	4	0	3	0	3	1

*Significant at $p \leq 0.05$.
Source: author's calculations based on: Sobkowiak [2009], Hepel [2011].
*Istotne dla $p \leq 0,05$.
Źródło: obliczenia własne na podstawie: Sobkowiak [2009], Hepel [2011].

Table 4. Preferences in apples' firmness of flesh (%)
Tabela 4. Preferowana twardość jabłek (%)

Feature Cecha	2009			2011		
	females kobiety	males mężczyźni	total razem	females kobiety	males mężczyźni	total razem
Firmness of flesh Twardość miąższu						
tough twarde	55*	38*	51	64	56	61
tender kruche	34	40	35	30	28	29
soft miękkie	4	8	5	2	7	3
It doesn't matter Nie ma znaczenia	4*	15*	6	5	7	5
I don't eat apples Nie jadam jabłek	4	0	3	0	3	1

*Significant at $p \leq 0.05$.
Source: author's calculations based on: Sobkowiak [2009], Hepel [2011].
*Istotne dla $p \leq 0,05$.
Źródło: obliczenia własne na podstawie: Sobkowiak [2009], Hepel [2011].

1/3 in 2011 chose the tender apples as their favorite. The soft apples were preferred by the least percentage of respondents and more males students preferred soft apples in the both years. Also for more males than females the firmness of flesh didn't matter.

According to Maziarka [2005], the tough apples prefer children, teenagers and young adults against to the older adults, because of their teeth. Asked students preferred tough apples, similar results presented the: Marzec-Wołczyńska [1996], Licznar-Małańczuk [2001] and Czernyszewicz [2007]. Kurzawiński [2001] presents that the preferences between the tough and tender fruit firmness didn't differ.

CONCLUSIONS

1. The results are related to the students of The Poznan University of Life Sciences. The most preferred apple cultivars were: Lobo, Jonagold, Szampion, Golden Delicious and Cortland. The percentage of students who did not know the name of the apple cultivars they consumed was high and it amounted 17% in 2009 and 24% in 2011. This big part of respondents which pointed out the apple cultivars not in evidence in the trade and who did not know the name of apple cultivars indicate that apples consumers, during apples selection, did not attention to the name of the apple cultivar. This result could be an advice for the trader to put besides the name of apple cultivar, the information concerning the internal apples quality features.

2. Most students preferred sweet-winy taste of apples, red skin colour fruits with blush, the fruits of medium size and tough.

3. The colour of apple skin was the least important quality feature – it didn't matter for more than 1/3 of respondents, mainly males.

4. The differences between male and female students apeared in taste of apple fruits and firmness of flesh. The sour taste of apples was preferred by relatively more males than females and for higher percentage of males the taste of fruits was not important. More females preferred sweet and very sweet apples and tough. Because of the fact that females buy food articles, the results of this research concerning apples quality features preferred by females could be an advice for fruit producers and traders.

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ZRÓŻNICOWANIE PREFERENCJI KONSUMENTÓW JABŁEK NA PRZYKŁADZIE STUDENTÓW UNIWERSYTETU PRZYRODNICZEGO W POZNANIU

Streszczenie. Celem pracy było przedstawienie preferencji konsumentów jabłek (studentów) w zakresie funkcjonalnych oraz sensorycznych cech jakościowych jabłek, takich jak: odmiana oraz smak, kolor skórki, wielkość owocu i twardość miąższu. Podstawą analizy były wyniki badań ankietowych przeprowadzonych wśród studentów Uniwersytetu Przyrodniczego w Poznaniu w dwóch okresach: w 2009 roku (265 ankiet) oraz w 2011 roku (208 ankiet). Respondenci wypełniali ankietę w obecności osoby przeprowadzającej badanie. Studenci mogli wybrać maksymalnie trzy spośród wymienionych odmian jabłek lub jedną z odpowiedzi: „Nie wiem", „Nie ma znaczenia", „Nie jadam jabłek", „Inne" i wpisać swoją propozycję. Ponadto respondenci mogli wybrać jedną odpowiedź z każdej listy dotyczącej preferencji w zakresie cech jakościowych jabłek (smaku, koloru skórki, wielkości owocu i twardości miąższu). Ulubionymi odmianami jabłek były: Lobo, Jonagold, Szampion, Golden Delicious i Cortland. Odsetek studentów, którzy nie znali nazwy ulubionych odmian jabłek był wysoki i wynosił 17% w 2009 roku oraz 24% w 2011 roku. Większość studentów preferowała słodko-winny smak jabłek, owoce koloru czerwonego, z rumieńcem, średniej wielkości oraz twarde. Cechą, która nie miała znaczenia dla relatywnie największego odsetka ankietowanych (ponad 1/3 ankietowanych), był kolor skórki. Różnice w preferencjach pomiędzy mężczyznami a kobietami pojawiły się w przypadku smaku jabłek oraz twardości miąższu. Kwaśny smak jabłek preferowało relatywnie więcej badanych mężczyzn, a dla większości z nich smak nie miał znaczenia. Więcej kobiet lubiło jabłka słodkie, bardzo słodkie oraz twarde.

Słowa kluczowe: owoce, odmiany jabłek, smak, kolor, wielkość, twardość

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