Professional paper

Flows of raw materials and food safety of products of Slovenian manufacturers after EU entry

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ABSTRACT

In food production, the choice of suppliers and raw materials is very important and plays a key role in providing quality, appropriate healthy food. Selection of new suppliers and the planned verification of existing suppliers is also the key point in the HACCP system (Hazard Analysis Critical Control Point, which means the risk analysis and critical control points). The aim of our survey was to analyse the level of food safety in Slovenia before and after Slovenia joined the EU. The aim of our survey was to determine whether joining the EU had an impact on choice of food suppliers and control of the raw materials used in production of foods. The common thread of research was a comparison of answers, for periods before and after Slovenia joined the EU, gained from the survey of the Slovenian food producers.

The study has shown that after joining the EU there were some replacements of suppliers, as well as changes in control of suppliers, but the changes were smaller than expected. The analysis of the responses from the survey shows that the Slovenian manufacturers mostly trust domestic suppliers of raw materials. After Slovenia's accession to the EU, the use of raw materials from other EU countries, as well as the control over suppliers, has increased. After Slovenia's accession to the EU, the percentage of those Slovenian producers who control Slovenian supplier under looser criteria, has slightly increased, while the percentage of those Slovenian producers who control EU supplier under looser criteria has significantly increased. The survey results show partial distrust of free movement of goods. Producers on average partly agree that they equally trust the manufacturers in all EU member states.

Key words: foods, food producers, comparison before and after EU entry, control of foods, survey of food producers.

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POVZETEK

V proizvodnji živil je izbira dobaviteljev in s tem samih surovin zelo pomembna in ima ključno vlogo pri zagotavljanju kvalitetne, zdravstveno ustrezne hrane. Izbira novih dobaviteljev in načrtovano preverjanje že obstoječih dobaviteljev sta ključni točki tudi v HACCP sistemu (angleška kratica Hazard Analysis Critical Control Point, kar pomeni analiza tveganja in določanje kritičnih kontrolnih točk). Namen naše raziskave je bil analizirati izbiro dobaviteljev in nadzor nad surovinami slovenskih proizvajalcev pred in po vstopu Slovenije v EU. Cilj raziskave je bil ugotoviti, ali je vstop Slovenije v EU vplival na izbiro dobaviteljev in nadzor nad surovinami, ki se uporabljajo v proizvodnji živil. Rdeča nit raziskave je bila primerjava odgovorov, pridobljenih z anketiranjem slovenskih proizvajalcev hrane, za obdobje pred in po vstopu Slovenije v EU.

Raziskava je pokazala, da je po vstopu v EU prišlo do zamenjave nekaterih dobaviteljev, kakor tudi do sprememb pri samem nadzoru dobaviteljev, vendar so bile spremembe manjše, kot smo pričakovali. Analiza odgovorov iz raziskave je pokazala, da slovenski proizvajalci najbolj zaupajo domačim dobaviteljem in surovinam. Po vstopu Slovenije v EU se je povečala uporaba surovin iz drugih držav EU, prav tako tudi nadzor nad dobavitelji. Po vstopu se je nekoliko povečal odstotek tistih slovenskih proizvajalcev, ki obvladujejo slovenske dobavitelja po ohlapnejših kriterijih in ter tistih slovenskih proizvajalcev, ki nadzorujejo EU dobavitelja po ohlapnejših kriterijih. Rezultati ankete prikazujejo delno nezaupanje v prosti pretok blaga. Proizvajalci se v povprečju delno strinjajo, da enako zaupajo proizvajalcem v vseh državah članicah EU.

Ključne besede: živila, proizvajalci živil, primerjava pred in po vstopu v EU, nadzor nad živili, anketiranje proizvajalcev živil.

INTRODUCTION

Issues of flows of raw materials and foodstuffs and their safety represent a challenge for each country, which is in accordance with the Regulation (EC) No. 178/2002 laying down the general principles and requirements of food law, establishment of the European Food Safety Authority and laying down procedures concerning food safety [1]. In April 2011, Slovenian food producers were surveyed. A study of the production of Slovenian food producers before (1999-2004) and after (2005-2010) EU accession was conducted in order to determine the state of food manufacturers in Slovenia. On the basis of producer database, producers were chosen, according to their engagement in the production of food before and after joining the EU.

Understanding the flow of raw materials and products may indicate the potential hazard of the supply of the population with safe food. Thus, it is necessary to have a detailed knowledge of the purchase of raw materials, of the control of suppliers and of the opinion of Slovenian manufacturers and importers of food. According to the political and financial flows, it was expected that many food manufacturers replaced the raw material suppliers since Slovenia joined the EU. Amended legislation also offers various options of the safety management of food chains which is raising doubt that the producers loosened these systems and that after Slovenia joined the EU, suppliers from the EU began to be checked at lower criteria and less often than suppliers from the third countries. The purpose of this work is to examine how such thinking and speculation holds true and how the food flows run along the food chain.

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METHODS

The purchasing of raw materials, control of suppliers and the opinion of Slovenian manufacturers and importers of food, have been interested so the two six-year periods before and after joining the EU have been compared, namely from 1999 to 2010. Of 169 sent questionnaires, 76 responses have been received, representing 45 % of all sent questionnaires.

The hypothesis: “Many food producers, after Slovenia joined the EU, changed suppliers of raw materials” and “After the entry of Slovenia into the EU food producers examine their suppliers from the EU at lower criteria and less often than suppliers from third countries” have been tested.

For this purpose, a questionnaire that consists of several parts has been created. The application and purpose, a description of the composition of the questionnaire and instructions for completion are stated in the introductory part. The questionnaire itself is divided into four parts: A, B, C and D. Part A covers the production before joining the EU, part B covers the production after joining the EU and part C provides opinion and trust of the companies in raw materials and products from the EU. Parts A and B are divided into control of raw materials and control of

suppliers. Part D is designed in a way so that companies can enter the data of customer complaints, withdrawal and recall of food by periods. Purchases of raw materials and control of suppliers before and after Slovenia joined the EU and opinion of the companies are formed on the basis of an agreement scale, which is the five-step interval Likert scale with 1 representing "I strongly disagree", 2 "I mostly disagree", 3 "I partly agree", 4 "I mostly agree" and 5 representing "I totally agree".

Hypothesis were tested by comparing the means of responses, standard deviations of individual statements, and by statistical processing of responses using the Statistical Package for the Social Sciences (SPSS) software. Firstly, the Kolmogorov-Smirnov and Shapiro-Wilk tests have been performed to determine whether normal distribution can be adjusted to empirical data. The One-Sample Kolmogorov-Smirnov Test procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution, which may be normal, uniform, Poisson, or exponential. The Kolmogorov-Smirnov *Z* is computed from the largest difference (in absolute value) between the observed and theoretical cumulative distribution functions.

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On the basis of the results of these one-sample non-parametric tests, the nonparametric Wilcoxon Signed Ranks Test for two related samples has been chosen to test the hypotheses.

The sign test computes the differences between the two variables for all cases and classifies the differences as either positive, negative, or tied. If the two variables are similarly distributed, the number of positive and negative differences will not differ significantly. The Wilcoxon signed-rank test considers information about both the sign of the differences and the magnitude of the differences between pairs. The Wilcoxon signed-ranks method tests the null hypothesis that two related medians are the same and compare a single median against a known value or paired medians from the same (or matched) sample.

The mean is the central tendency of a collection of numbers taken as the sum of the numbers divided by the size of the collection.

Standard deviation shows how much variation or "dispersion" exists from the average (mean, or expected value). The low standard deviation indicates that the data points tend to be very close to the mean, whereas high standard deviation indicates that the data points are spread out over a large range of values.

RESULTS

Production before joining the EU

In this section the results of a survey of part A: Production before entering the EU from 1999 to 2004 have been presented. All results are gained from our own research.

The **Table 1** shows that the respondents on average partly or mostly agree with the statement that before Slovenia joined the EU the raw

materials of Slovenian origin were used, they partly agree that they used imported raw materials and also partly agree that they used materials of EU origin. They used raw materials of Slovenian origin, as well as raw materials of EU origin and imported raw materials from third countries. On average they mostly disagree that they used raw materials of Slovenian origin, raw materials of EU origin and raw materials from third countries in the same proportion: on average, they mostly agree that they gave advantage to the Slovenian raw materials (Mean: 3.95±1.142), but they did not give priority to raw materials from EU. Manufacturers, on average, mostly self-produced foods (Mean: 4.66±0.684), only a few, in addition to their own production, also imported final foods (Mean: 2.20±1.479) [2].

Table 1.
Mean and standard deviation of answers on purchase of raw materials before entering the EU.

	Number of answers	Mean	Standard deviation
A1. We used raw material of Slovenian origin.	76	3.45	1.237
A2. We used imported raw material.	76	2.93	1.170
A3. We used raw material from EU members.	76	3.03	1.070
A4. We used materials that were of Slovenian origin, originating from EU countries and imported raw materials from other countries in about the same proportion.	76	2.74	1.170
A5. Priority was given to raw materials, which are of Slovenian origin and to Slovenian suppliers.	76	3.95	1.142
A6. Priority was given to raw materials of EU origin and to EU suppliers.	76	2.39	1.072
A7. We have been producing final food products from raw materials.	76	4.66	0.684
A8. Final products were also imported.	76	2.20	1.479

Analysis of individual statements in the dimension of purchase of raw materials before joining the EU showed that respondents answered most dispersedly to the statement, “Final products were also imported”, with the standard deviation of 1.479, and least dispersedly to the argument that they produced final products by themselves; “We have been producing final food products from raw materials” (0.684). For arguments regarding the use of raw materials of different origins, the respondents answered the most dispersed to the statement, “We used raw materials of Slovenian origin” (1.237), and least dispersedly to the argument “We used raw materials from the EU members” (1.070). The argument, “Priority was given to raw materials, which are of Slovenian origin and to Slovenian suppliers” showed standard deviation of 1.142, and the argument “Priority was given to raw materials of EU origin and EU suppliers” showed standard deviation of 1.072 (**Table 1**) [2].

From the responses to arguments concerning the control of suppliers before entering the EU it can be made out, that HACCP (Hazard Analysis Critical Control Point) system has been in the process of promoting and enforcement [3]. On average, manufacturers partly agree that they had an established HACCP system in the period from 1999 to 2004 (**Table 2**).

On average they partly most agree that suppliers were checked before the first delivery, but they have not been verified on the content of contaminants. Also, on average, they partly agree that suppliers were regularly and periodically checked, but not regularly checked on the content of contaminants. On average, they mostly agree that all suppliers were checked under the same criteria and that Slovenian and EU suppliers were not checked under looser criteria. There is a small difference among the verification of Slovenian and EU suppliers. Slovenian suppliers had been checked less strictly (Mean: 2±1.244) than EU suppliers (Mean: 1.67±1.025). Manufacturers, on average, mostly agree that they had very few consumers' complaints, few non-compliant products and few withdrawals/recalls of food. They partially agree that very few foods were analysed (**Table 2**) [2].

Table 2.
Mean and standard deviation of answers on control of suppliers before entering the EU.

	Number of answers	Mean	Standard deviation
A9. We had set up the HACCP system.	76	3.49	1.194
A10. Suppliers were always verified before the first delivery.	76	3.58	1.146
A11. Before the first delivery, suppliers were always verified on the content of environmental contaminants.	76	2.49	1.291
A12. Suppliers were regularly periodically checked.	76	3.28	1.162
A13. Suppliers were regularly periodically checked on the content of environmental contaminants.	76	2.47	1.238
A14. All suppliers were examined under the same criteria.	76	3.82	1.241
A15. Slovenian suppliers were checked under "looser" criteria than suppliers from imports, because they are "domestic".	76	2.00	1.244
A16. EU suppliers were checked under "looser" criteria than other suppliers from imports, because of European goods.	76	1.67	1.025
A17. We had very few customers' complaints.	76	3.92	0.963
A18. We had very few non-compliant products.	76	4.16	0.713
A19. We had very few withdrawals/recalls of food.	76	4.58	0.497
A20. Very few final products were analysed.	76	3.16	1.386

The replies concerning HACCP system to the statement "We had set up the HACCP system" with the standard deviation of 1.194, were also dispersed.

Analysis of individual statements in the dimension of control of suppliers before entering the EU showed that respondents most dispersedly answered to the argument "Very few final products were analysed" with the standard deviation of 1.386, and least dispersedly to the argument "We had very few withdrawals/recalls of food" with standard deviation of 0.497. They also answered very dispersedly to the statements: "Before the first delivery, suppliers were always verified on the content of environmental contaminants" (1.291), "Slovenian suppliers were checked under "looser" criteria than suppliers from imports, because they are *domestic*" (1.244), "All suppliers were examined under the same criteria" (1.241) and "Suppliers were regularly periodically checked on the content of environmental contaminants" (1.238). The replies concerning HACCP system to the statement "We had set up the HACCP system" with the standard deviation of 1.194, were also dispersed. In addition to the argument: "We had very few withdrawals/recalls of food" the answers to the statements "We had very few non-compliant products" (0.713) and "We had very few customers'

complaints" (0.963) were much more unified. It can be concluded that they had quite different approaches to the implementation of the HACCP system and control of their suppliers, but still they all had very few customer complaints, non-compliant products and very few withdrawals and recalls of food (**Table 2**) [2].

Production after joining the EU

After joining the EU, the producers still mostly favour Slovenian raw materials (Mean: 3.87±1.124). Raw materials of Slovenian origin and EU origin are used in approximately equal proportions. According to the period before accession to the EU slightly more producers import final products (before joining the EU; Mean: 2.20±1.479, after joining the EU; Mean: 2.67±1.491) (**Table 3**). Analysis of individual statements on purchase of raw materials before entry into the EU showed that respondents most dispersedly answered to the statement, "We also import final products" with the standard deviation of 1.491, and least dispersedly to the statement "We are producing final products from raw materials" with a standard deviation of 0.683 (**Table 3**) [2].

Table 3.
Mean and standard deviation of answers on purchase of raw materials after joining the EU.

	Number of answers	Mean	Standard deviation
B1. We use raw materials that are of Slovenian origin.	76	3.42	0.942
B2. We use imported raw materials (from third countries).	76	2.32	1.122
B3. We use raw materials from other EU countries.	76	3.59	0.982
B4. We use raw materials that are of Slovenian origin, originating from other EU countries and imported raw materials in approximately equal proportions.	76	2.55	1.012
B5. We give priority to raw materials, which are of Slovenian origin and to Slovenian suppliers.	76	3.87	1.124
B6. We give priority to raw materials, which are originating from other EU members and EU suppliers.	76	3.07	1.024
B7. We are producing final products from raw materials	76	4.50	0.683
B8. We also import final products.	76	2.67	1.491
B9. Slovenia's entry into the EU has influenced our choice of supplier and raw materials. After joining the EU, we changed raw material supplier(s).	76	2.79	1.320
B10. After Slovenia joined the EU we selected supplier(s) within the EU.	76	2.89	1.281

Regarding control of the suppliers after joining the EU, producers on average mostly agree that the HACCP system is very effective, and that they review the suppliers before the first delivery and regularly periodically. On average manufacturers partly agree that suppliers are also checked on the content of environmental contaminants (**Table 4**). On average, they mostly agree that all the suppliers are checked under the same conditions and that there are few complaints of customers and non-compliant products. Because of entry into the EU, on average, they mostly disagree with the statement that their suppliers are more rarely periodically checked. On average, entry in the EU mostly did not have effect on the number of customer's complaints, on the number of non-compliant products and on the number of withdrawals/recalls. Com-

monly, no more final products are being analyzed than before the entry into the EU (**Table 4**) [2].

Table 4.
Mean and standard deviation of answers on control of suppliers after joining the EU.

	Number of answers	Mean	Standard deviation
B11. A HACCP system is very efficient.	76	4.14	0.761
B12. Suppliers are always checked before the first delivery.	76	4.12	0.894
B13. Suppliers are always checked on the content of environmental contaminants before the first delivery.	76	3.21	1.024
B14. Suppliers are regularly periodically checked.	76	3.88	0.909
B15. Suppliers are also regularly periodically checked on the content of environmental contaminants.	76	3.11	1.066
B16. All suppliers are verified under the same criteria.	76	4.07	0.971
B17. Slovenian suppliers are checked under "looser" criteria than suppliers from imports, due to "domestic" goods.	76	2.12	1.211
B18. EU suppliers are checked under "looser" criteria than suppliers from imports, due to European goods.	76	2.07	1.170
B19. We have very few customers' complaints.	76	4.11	0.723
B20. We have very few non-compliant products.	76	4.26	0.661
B21. We have very few withdrawals/recalls of food.	76	4.50	0.643
B22. Very few final products are analysed.	76	2.53	1.113
B23. Because of entry into the EU, suppliers are rarely periodically checked.	76	1.95	0.815
B24. We have more customer complaints than before entering the EU.	76	2.50	1.361
B25. We have more non-compliant products than before joining the EU.	76	2.33	1.148
B26. We have more withdrawals/recalls of products than before entering the EU.	76	2.11	1.150
B27. More final products are analysed than before joining the EU.	76	2.67	1.518

Analysis of the various arguments concerning the control of suppliers after joining the EU showed that respondents most dispersedly answered to the statement, "More final products are analyzed than before joining the EU" with a standard deviation of 1.518, and least dispersedly to the "We have very few withdrawals/recalls of food" with a standard deviation of 0.643. The following statements: "We have very few non-compliant products" (0.661), "We have very few customers' complaints" (0.723), "A HACCP system is very efficient" (0.761), "Because of entry into the EU, suppliers are rarely periodically checked" (0.815), "Suppliers are always checked before the first delivery" (0.894) and "Suppliers are regularly periodically checked" (0.909) result in low standard deviation (**Table 4**) [2].

Opinion of the producers-confidence in the materials/products of the EU

Replies were received from 76 producers. Manufacturers, on average, mostly do not agree that the safety of their products by entry into the EU is higher and that because of the entry more quality materials are used. On average, they partly agree that they more easily access raw materials of higher quality at the same or lower price. On average, they mostly disagree that due to EU accession they are surer of the quality of

their raw materials and final products. However, on average, they partly agree that after accession to the EU purchases of raw materials and final products from the EU increased while imports of raw materials and final products from third countries decreased. Also, on average, they partly agree that the entry of Slovenia into the EU did not influence the choice of raw materials and suppliers (**Table 5**) [2].

On average, they mostly agree that when selecting raw materials, they take into account both, price and quality (Mean: 4.38), but majority, on average, does not trust raw materials from different EU Member States (Mean: 2.74) equally. On average they partly agree that the scope of the inspection in Slovenia can be reduced at the expense of providing a high level of food safety within the EU, while on average, they mostly agree that the inspection should focus more on raw materials or food of those producers and origins which have had inadequate samples more often. On average they mostly agree, that inspection should be tightened at the import into the EU (**Table 5**) [2].

Analysis of individual statements on the opinion of the food producers in Slovenia showed that respondents answered most dispersedly to the argument "After Slovenia joined the EU, purchases of final food products from the EU have increased" with the standard deviation of 1.421, while least dispersedly to "Inspections in Slovenia should focus more on raw materials/products from those countries that often have inadequate samples" with a standard deviation of 0.667. They also respond very dispersely to the following arguments: "Slovenia's joining to the EU did not affect our choice of raw materials and suppliers" with a standard deviation 1.409, "After Slovenia joined the EU, purchases of raw materials from the EU have increased" with a standard deviation of 1.269, "After joining Slovenia to the EU, imports of final products from third countries have decreased" with a standard deviation of 1.233, and to the statement "After joining Slovenia to the EU, import of raw materials from third countries has decreased" with the standard deviation of 1.225. Less dispersion is found in the following statements: "When given the choice of raw materials, both the quality and the price are considered" with a standard deviation of 0.783, "Inspection at the external border, at the import into the EU, should be tightened" with the standard deviation 0.816, and in the statement "When selecting the preferred raw material, quality has priority regardless of the price" with a standard deviation of 0.883 (**Table 5**) [2].

On average, they mostly agree that when selecting raw materials, they take into account both, price and quality (Mean: 4.38), but majority, on average, does not trust raw materials from different EU Member States (Mean: 2.74) equally.

Table 5.
Mean and standard deviation of answers on business confidence in EU commodities/products.

	Number of answers	Mean	Standard deviation
C1. The safety of our products has increased by entering the EU.	76	2.38	1.107
C2. Joining the EU we use more quality raw materials.	76	2.43	0.929
C3. Easier access to raw materials of higher quality at the same price.	76	3.00	1.033
C4. Easier access to raw materials of higher quality at lower price.	76	2.86	1.092
C5. Because of entry into the EU we are more sure of the quality of raw materials and thus in the final products.	76	2.53	1.101
C6. After Slovenia joined the EU, purchases of raw materials from the EU have increased.	76	3.13	1.269
C7. After Slovenia joined the EU, purchases of final food products from the EU have increased.	76	2.92	1.421
C8. After joining Slovenia to the EU, import of raw materials from third countries has decreased.	76	2.79	1.225
C9. After joining Slovenia to the EU, import of final products from third countries has decreased.	76	2.62	1.233
C10. Slovenia's joining the EU did not affect our choice of raw materials and suppliers.	76	3.04	1.409
C11. When selecting the preferred raw material, quality has priority regardless of the price.	76	3.42	0.883
C12. When selecting the preferred raw material, price has priority irrespective of quality.	76	2.17	0.900
C13. When given the choice of raw materials, both the quality and the price are considered.	76	4.38	0.783
C14. When selecting raw materials we equally trust the manufacturers in all EU Member States.	76	2.74	0.985
C15. The scope of inspection in Slovenia could decrease, since the level of assurance of food safety within the EU is very high.	76	3.01	1.113
C16. Inspections in Slovenia should focus more on raw material/products from those countries that often have inadequate samples.	76	4.36	0.667
C17. Inspection at the external border, at the import into the EU, should be tightened.	76	4.00	0.816

DISCUSSION

Replacement of raw material suppliers

According to the results of the survey, producers, after entering the EU, approached very differently to the replacement of the raw material suppliers. When the results of the responses about purchases of raw materials before and after joining the EU, namely the mean values before and after joining the EU have been compared, the use of raw materials of Slovenian origin after joining the EU decreased by 0.87 % (Δ Mean is 0.03), use of materials from imports decreased by 21 % (Δ Mean is 0.61) while use of materials from the EU increased by 18 % (Δ Mean is 0.56). Priority in the selection of Slovenian producers after accession to the EU decreased by 2 % (Δ Mean is 0.08), but priority in the selection of suppliers from the EU and thereby on average also the raw materials from the EU, after joining the EU, increased by 28 % (Δ Mean is 0.68) (**Table 6**). Differences in responses to statements about raw materials before and after joining the EU are shown in **Figure 1** [2].

Table 6.
Mean and standard deviation of purchase of raw materials before and after joining the EU.

	Mean before	Mean after	Δ Mean (divergence)	Standard deviation (before)	Standard deviation (after)
Use of raw material of Slovenian origin.	3.45	3.42	0.03	1.237	0.942
Use of imported raw material.	2.93	2.32	0.61	1.17	1.122
Use of raw material from EU members.	3.03	3.59	0.56	1.07	0.982
We used materials that were of Slovenian origin, originating from EU countries and imported raw materials from other countries in about the same proportion.	2.74	2.55	0.19	1.17	1.012
Priority to raw materials of Slovenian origin and to Slovenian suppliers.	3.95	3.87	0.08	1.142	1.124
Priority to raw materials of EU origin and to EU suppliers.	2.39	3.07	0.68	1.072	1.024

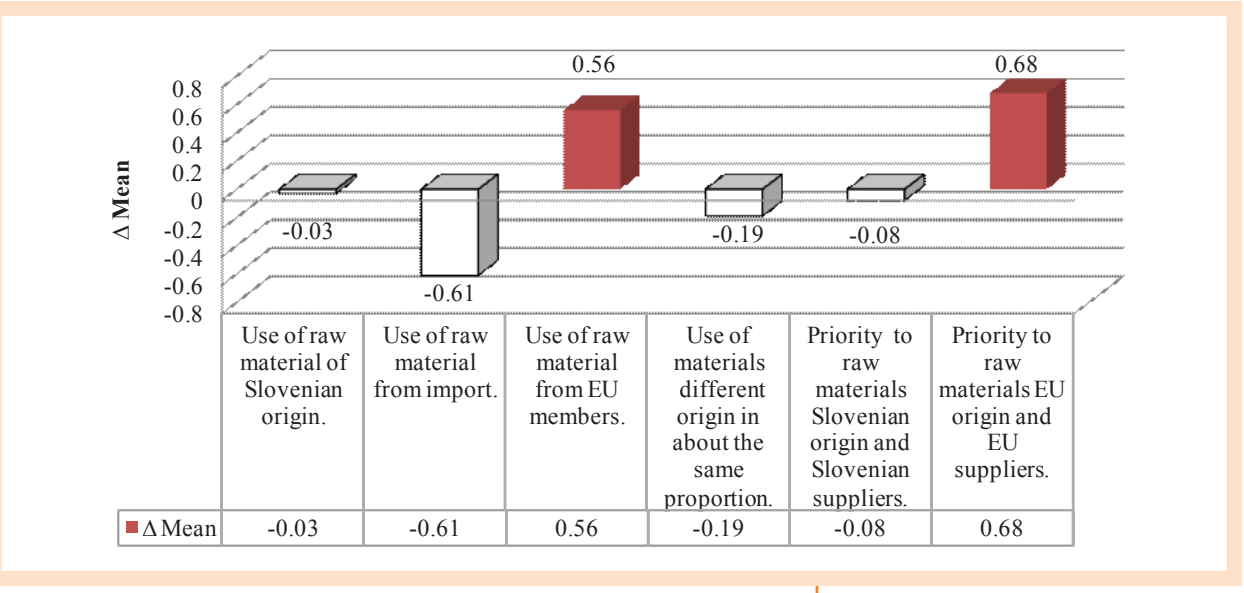

Figure 1.
Difference of mean values of answers of purchase of raw materials before and after joining the EU.

After joining the EU a slight decline in giving priority to Slovenian manufacturers can be detected and significant increase of favouring the EU producers. On the basis of this it is assumed that Slovenian producers which favoured the Slovenian manufacturers partly began to give priority to EU producers, while producers who gave preference to suppliers from the EU, mostly kept giving priority to EU suppliers and raw materials [2].

Table 3 shows that Slovenian producers, on average, partly agree with the statement "Slovenia's entry into the EU has influenced our choice of suppliers and raw materials. After joining the EU, we changed raw material supplier(s)" (Mean is 2.79). Responses to the argument are very dispersed with a standard deviation of 1.320. Also, on average, they partly agree that after Slovenia joined the EU they selected a supplier from the EU (Mean is 2.89). The statement "After Slovenia joined the EU we selected supplier(s) within the EU" was answered with a standard deviation of 1.281 (**Table 3**). According to the results of the survey it may be concluded that the producers, after Slovenia joined the EU have reacted variously and so variously adapted the purchase of raw

On average, they partly agree with the statement "After Slovenia joined the EU, purchases of raw materials from the EU have increased" (Mean is 3.13).

materials. Some have remained with previous suppliers of raw materials, others have changed suppliers [2].

When analyzing the responses of some opinions on the business confidence in the materials and products of EU origin (questions, part C), similar conclusions may be drawn. On average, they partly agree with the statement "After Slovenia joined the EU, purchases of raw materials from the EU have increased" (Mean is 3.13). From the responses it can be concluded that at least part of the producers increased purchases from the EU suppliers or switched their suppliers with suppliers from the EU. They answered quite dispersedly with a standard deviation of 1.269. On average, they partly agree with the statement "After Slovenia joined the EU, purchases of final food products from the EU have increased" (Mean is 2.92). From that it may be concluded that after the accession to the EU purchases of finished products from the EU have increased, but to a lesser extent than the purchase of raw materials originating in the EU. The standard deviation is 1.421, which means that manufacturers have responded very dispersedly. From that it may be concluded that operating of Slovenian producers varies greatly and can not be spoken about common characteristics of all manufacturers. On average they also partly agree (Mean is 3.04) with the statement "Slovenia's accession to the EU did not affect our choice of raw materials and suppliers". The results confirm our conclusion that some producers replaced their suppliers, but others did not and that there is no such thing as the common replacement of suppliers, which would be indicated in all Slovenian suppliers (**Table 5**) [2].

After joining the EU a slight 3 % decline in own food production is perceived (Δ Mean is 0.16) and a 21 % increase (Δ Mean is 0.47) of final product import (**Tables 1 and 3**) [2].

Testing of the hypothesis concerning changing of the suppliers

Hypothesis "Many food producers, after Slovenia joined the EU changed suppliers of raw materials" has been tested using the SPSS programme. Firstly, Kolmogorov-Smirnov test and Shapiro-Wilk tests have been performed to verify whether a normal distribution can be attributed to the data from statements A1 to A6 and B1 to B6. Test results are shown in the **Table 7**. Test results show that the sig. < 0.05, indicating that a normal distribution cannot be attributed to values of the studied variables (arguments A1 to A6 and B1 to B6), so the nonparametric test for two related samples has been chosen to test the above written hypothesis (**Table 8**). In Wilcoxon Signed Rank test the value is statistically significant at sig. <0.05, if its absolute standardized value z is greater than 1.96. On the basis of results it may be concluded that the data from statements can be attributed the statistically significant differences between the compared periods 1999-2004 and 2005-2010 [4, 5].

Table 7.
Tests of normality for statements from A1 to A6 and B1 to B6.

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
A1. We used raw material of Slovenian origin.	0.212	76	0.000	0.891	76	0.000
B1. We use raw materials that are of Slovenian origin.	0.225	76	0.000	0.893	76	0.000
A2. We used imported raw material.	0.220	76	0.000	0.903	76	0.000
B2. We use imported raw materials (from third countries).	0.216	76	0.000	0.867	76	0.000
A3. We used raw material from EU members.	0.280	76	0.000	0.869	76	0.000
B3. We use raw materials from other EU countries.	0.201	76	0.000	0.878	76	0.000
A4. We used materials that were of Slovenian origin, originating from EU countries and imported raw materials from other countries in about the same proportion.	0.170	76	0.000	0.912	76	0.000
B4. We use raw materials that are of Slovenian origin, originating from other EU countries and imported raw materials in approximately equal proportions.	0.223	76	0.000	0.891	76	0.000
A5. Priority was given to raw materials, which are of Slovenian origin and to Slovenian suppliers.	0.230	76	0.000	0.823	76	0.000
B5. We give priority to raw materials, which are of Slovenian origin and to Slovenian suppliers.	0.244	76	0.000	0.842	76	0.000
A6. Priority was given to raw materials of EU origin and to EU suppliers.	0.223	76	0.000	0.892	76	0.000
B6. We give priority to raw materials, which are originating in other EU members and to EU suppliers.	0.211	76	0.000	0.888	76	0.000

a – Lilliefors Significance Correction

df – degrees of freedom

Table 8.
Wilcoxon Signed Ranks Test – Test Statistics(b) for statements from A1 to A6 and B1 to B6.

	*z**	Asymptotic Significance (2-tailed)
We use raw materials that are of Slovenian origin. – We used raw material of Slovenian origin.	-0.119(a)	0.905
We use imported raw materials (from third countries). – We used imported raw materials.	-4.458(a)	0.000
We use raw materials from other EU countries. – We used raw material from EU members.	-4.485(b)	0.000
We use raw materials that are of Slovenian origin, originating from other EU countries and imported raw materials in approximately equal proportions. – We used materials that were of Slovenian origin, originating from EU countries and imported raw materials from other countries in about the same proportion.	-1.414(a)	0.157
We give priority to raw materials, which are of Slovenian origin and Slovenian suppliers. – Priority was given to raw materials, which are of Slovenian origin and to Slovenian suppliers.	-0.634(a)	0.526
We give priority to raw materials, which are originating in other EU members and to EU suppliers. – Priority was given to raw materials of EU origin and to EU suppliers.	-3.993(b)	0.000

The results of nonparametric test for 2 related samples obtained with SPSS programme (**Table 8**) show that the absolute value of the variable z for the use of raw materials of Slovenian origin, the use of raw materials of different origins in the same proportion, and for giving priority to Slovenian raw materials and Slovenian producers, is more than 1.96

According to the results of the survey, after joining the EU more effective control over the suppliers can be observed.

with sig.> 0.05, while for the use of raw materials of Slovenian origin, the use of raw materials of different origins in the same proportion, and for giving priority to Slovenian raw materials and Slovenian producers, absolute value of the variable *z* is less than 1.96 with sig.> 0.05 [2].

Control of suppliers

According to the results of the survey, after joining the EU more effective control over the suppliers can be observed. The results of the responses of control over the suppliers before and after joining the EU, namely the mean values before and after EU accession have been compared and it was found out that, the opinion of producers on the effectiveness of the HACCP system has increased by 19 % (Δ Mean is 0.65), checking of suppliers before the first delivery by 15 % (Δ Mean is 0.54) and verification of suppliers on content of contaminants prior to the first supply increased by 29 % (Δ Mean is 0.72). Periodical checks of suppliers have increased by 18 % (Δ Mean is 0.6) and periodical checks of suppliers on content of environmental contaminants increased by 26 % (Δ Mean is 0.64) (**Table 9**). Before joining the EU, producers answered quite dispersedly, but after joining the EU, the answers are much less dispersed. Reduction of the dispersion occurred due to the introduction and active implementation of the HACCP system. **Figure 2** shows the differences in the answers to the arguments on control of suppliers before and after EU accession [2].

Table 9.
Mean and standard deviation for control of suppliers before and after entering the EU.

	Mean (before)	Mean (after)	Δ Mean (divergence)	Standard deviation (before)	Standard deviation (after)
HACCP system.	3.49	4.14	0.65	1.194	0.761
Verifying of suppliers before the first delivery.	3.58	4.12	0.54	1.146	0.894
Verifying of suppliers before the first delivery on the content of contaminants.	2.49	3.21	0.72	1.291	1.024
Periodical checking of suppliers.	3.28	3.88	0.60	1.162	0.909
Periodical checking of suppliers on the content of contaminants.	2.47	3.11	0.64	1.238	1.066

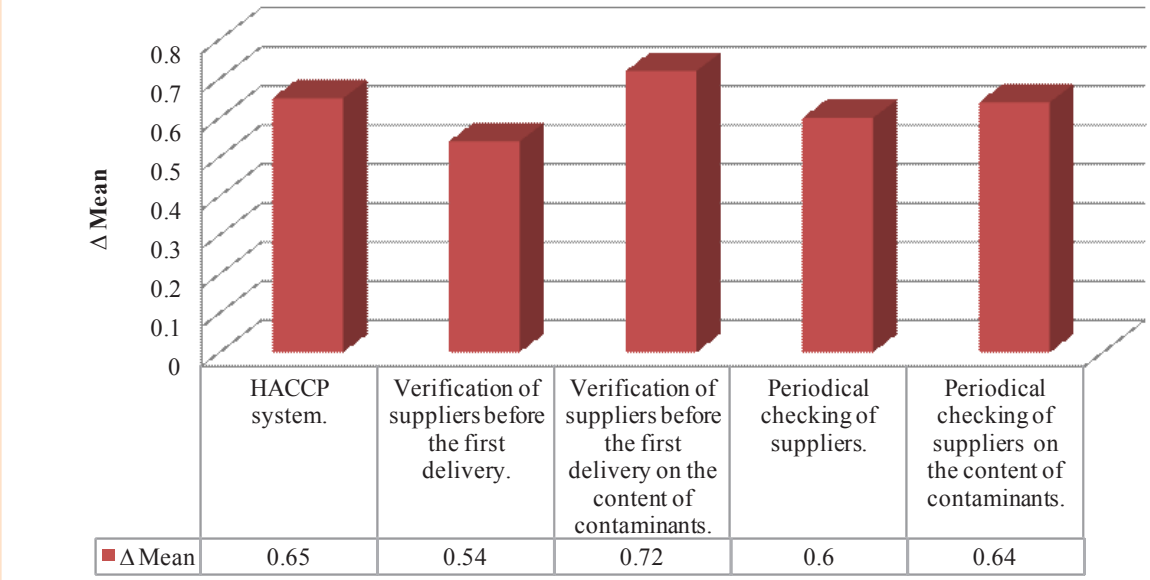

Figure 2.
Difference of mean values of answers for control of suppliers before and after entering the EU.

Before as well as after joining the EU, producers mostly agree that they monitor suppliers under the same criteria. The statement "All suppliers are verified under the same criteria" was on average evaluated with "mostly agree", before (Mean is 3.82) and after EU entry (Mean is 4.07). Before joining the EU the standard deviation was 1.241 and after joining the EU, 0.971, from which may be concluded that after joining the EU producers are more unified in the evaluation of suppliers. Producers, on average, did not agree with the argument "Slovenian suppliers are checked under "looser" criteria than suppliers from imports, due to "domestic" goods" and they before and after joining the EU, selected the statement "mostly disagree". Even in the standard deviation there is no significant difference, from which it may be concluded that the entry of Slovenia into the EU did not influence the selection of Slovenian producers under lower criteria. Also, on average, producers did not agree with the statement "EU suppliers are checked under "looser" criteria than suppliers from import, due to European goods", since they before and after joining the EU, on average, evaluated the statement with "mostly disagree" (before entering the EU, Mean: 1.67, after joining the EU, Mean: 2.07). It is interesting that the agreement with the statement after joining the EU rose by 24 % (Δ Mean is 0.4) and the standard deviation also slightly increased (**Table 10**) [2].

Table 10.
Mean and standard deviation for control of suppliers under "looser" criteria before and after entering the EU.

	Mean (before)	Mean (after)	Δ Mean (divergence)	Standard deviation (before)	Standard deviation (after)
Checking the suppliers under the same criteria.	3.82	4.07	0.25	1.241	0.971
Slovenian suppliers under "looser" criteria.	2.00	2.12	0.12	1.244	1.211
EU suppliers under "looser" criteria.	1.67	2.07	0.40	1.025	1.170

Before joining the EU 62 % of respondents strongly disagree with the statement "EU suppliers are checked on "looser" criteria than suppliers from import, due to European goods", while after joining the EU, only 43 % of producers strongly disagree with the statement. Before joining the EU 9 % of respondents answer "partly agree" and 16 % after joining the EU. Before joining the EU 8 % of respondents "mostly agree" with the statement and 13 % after joining the EU. On the basis of responses we concluded that most producers evaluate all of their suppliers, regardless of origin, under the same criteria, but the percentage of those who evaluate EU suppliers on the "looser" criteria after joining the EU has increased.

Examining the argument "Because of entry into the EU, suppliers are rarely periodically checked", it may be found out that most of the producers (53 %) chose the answer "mostly disagree" (Mean is 1.95), which is consistent with results of previous statements (**Table 4**). It is interesting that the standard deviation is low with 0.815. The answer "strongly disagree" was chosen by 29 % of respondents and answer "mostly disagree" by 53 % of respondents. Partly agree was chosen by 14 % of respondents, but only 4 % of respondents mostly or totally agree with the statement. From the results it may be concluded that entry into the EU did not affect the frequency of periodical checks of suppliers of Slovenian producers [2].

Testing of the hypothesis regarding the control of suppliers

Hypothesis "After the entry of Slovenia into the EU food producers examine their suppliers from the EU under lower criteria and less often than suppliers from third countries" was also tested using the SPSS software. Firstly, we performed the Kolmogorov-Smirnov test and Shapiro-Wilk test to determine whether normal distribution can be attributed to data from statements A9 to A16 and B11 to B18. Test results are shown in **Table 11**. Using the test results it is evident that the sig. is < 0.05, indicating that normal distribution cannot be attributed to values of the studied variables (statements A9 to A16 and B11 to B18), so the nonparametric Wilcoxon Signed Rank test for two related samples has been chosen to test the above written hypothesis (**Table 12**).

Table 11.
Tests of normality for statements from A9 to A16 and B11 to B18.

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
We had set up the HACCP system.	0.198	76	0.000	0.886	76	0.000
A HACCP system is very efficient.	0.293	76	0.000	0.775	76	0.000
Suppliers were always verified before the first delivery.	0.206	76	0.000	0.879	76	0.000
Suppliers are always checked before the first delivery.	0.259	76	0.000	0.801	76	0.000
Before the first delivery, suppliers were always verified on the content of environmental contaminants.	0.200	76	0.000	0.860	76	0.000
Suppliers are always checked on the content of environmental contaminants before the first delivery.	0.239	76	0.000	0.901	76	0.000
Suppliers were regularly periodically checked.	0.173	76	0.000	0.908	76	0.000
Suppliers are regularly periodically checked.	0.262	76	0.000	0.844	76	0.000
Suppliers were regularly periodically checked on the content of environmental contaminants.	0.254	76	0.000	0.865	76	0.000
Suppliers are also regularly periodically checked on the content of environmental contaminants.	0.224	76	0.000	0.899	76	0.000
All suppliers were examined under the same criteria.	0.217	76	0.000	0.831	76	0.000
All suppliers are verified under the same criteria.	0.236	76	0.000	0.824	76	0.000
Slovenian suppliers were checked under “looser” criteria than suppliers from import, due to “domestic” goods.	0.289	76	0.000	0.772	76	0.000
Slovenian suppliers are checked under “looser” criteria than suppliers from import, due to “domestic” goods.	0.256	76	0.000	0.826	76	0.000
EU suppliers were checked under “looser” criteria than other suppliers from import, because of European goods.	0.362	76	0.000	0.693	76	0.000
EU suppliers are checked under “looser” criteria than suppliers from import, due to European goods.	0.253	76	0.000	0.819	76	0.000

a – Lilliefors Significance Correction; df – degrees of freedom

Table 12.
Wilcoxon Signed Ranks Test – Test Statistics(b) for statements from A9 to A16 and B11 to B18.

	*z**	Asymptotic Significance (2-tailed)
A HACCP system is very efficient. – We had set up the HACCP system.	-4.348(a)	0.000
Suppliers are always checked before the first delivery. – Suppliers were always verified before the first delivery.	-4.449(a)	0.000
Suppliers are always checked on the content of environmental contaminants before the first delivery. – Before the first delivery, suppliers were always verified on the content of environmental contaminants.	-4.948(a)	0.000
Suppliers are regularly periodically checked. – Suppliers were regularly periodically checked.	-4.341(a)	0.000
Suppliers are also regularly periodically checked on the content of environmental contaminants. – Suppliers were regularly periodically checked on the content of environmental contaminants.	-4.587(a)	0.000
All suppliers are verified under the same criteria. – All suppliers were examined under the same criteria.	-1.813(a)	0.070
Slovenian suppliers are checked under “looser” criteria than suppliers from import, due to “domestic” goods. – Slovenian suppliers were checked under “looser” criteria than suppliers from import, due to “domestic” goods.	-0.863(a)	0.388
EU suppliers are checked under “looser” criteria than suppliers from import, due to European goods. – EU suppliers were checked under “looser” criteria than other suppliers from import, because of European goods.	-3.170(a)	0.002

a – Based on negative ranks; b – Wilcoxon Signed Ranks Test; * standardized test statistic

The analysis results (**Table 12**) showed that the absolute value of the variable *z* for the use of the HACCP system, for the control of suppliers before the first delivery, control of suppliers on the contaminants before the first delivery, periodical checks of suppliers, periodical control of suppliers on the contaminants, and for control of EU suppliers under less restrictive conditions, is greater than 1.96 with sig. < 0.05, so differences of this mean values before and after EU accession are statistically significant. For control of all suppliers under the same conditions and for the control of Slovenian suppliers under less restrictive conditions, the absolute value of the variable *z* is less than 1.96 with sig. > 0.05, so differences of this mean values before and after EU accession are not statistically significant.

Opinion of producers

Considering the responses of part C: Opinion of the producers' confidence in the materials/products from the EU, the following has been established. Producers, on average, mostly disagree with the argument "The safety of our products has increased by entering the EU" (Mean is 2.38), on the basis of which it may be concluded that manufacturers think that due to the entry into the EU the safety of their products has not increased (**Table 5**). The standard deviation is 1.107, which means that they answered quite dispersedly. Only 4 % completely agree with the fact that the safety of their products by entering the EU has increased, 13 % mostly agree, 24 % of them partly agree and 59 % of the producers mostly or strongly disagree with that [2].

On average, producers also mostly disagree with an argument "Joining the EU we use more quality raw materials", (Mean: 2.43).

On average, producers also mostly disagree with an argument "Joining the EU we use more quality raw materials", (Mean: 2.43). According to their opinion, because of entry into the EU, they do not use higher quality materials than before entering the EU. The dispersion of responses is lesser and totals 0.929 (**Table 5**). Only 8 % of manufacturers totally agree and mostly agree with the statement. 46 % of the producers partly agree with the statement, and the remaining 46 % mostly or strongly disagree with the statement. From these responses, it may be concluded that, on average, most producers do not agree that they use more quality materials because of entry into the EU [2].

The statement "Because of entry into the EU we are more sure of the quality of raw materials and thus in the final products" was evaluated with partly agree by 33 % producers and with mostly or strongly disagree by 49 % producers, while 18 % producers assessed the statement with mostly or totally agree. Mean of the statement is 2.53 and standard deviation 1.101 (**Table 5**). From the responses we can conclude that on average producers mostly disagree to partly agree with the statement and that because of entry into the EU itself they are not surer in quality of raw materials and final products [2].

Producers on average partly agree with the statement "After Slovenia joined the EU, purchases of raw materials from the EU have increased" (Mean 3.13). They answered quite dispersed with a standard deviation of 1.269 (**Table 5**). 48 % of producers evaluated the statement with "I

totally agree" and "mostly agree", 18 % of producers partly agree with the argument, and 34 % mostly or strongly disagree. From the responses we conclude that the opinion of manufacturers about purchase of raw materials originating from the EU after accession to the EU varies. Some, after accession to the EU, decided to purchase the raw materials of EU origin, while others stayed with their suppliers [2].

Producers also responded very dispersed to the statement "After Slovenia joined the EU, purchases of final food products from the EU have increased". Mean value is 2.92 and standard deviation 1.421 (**Table 5**). 45 % of manufacturers evaluated the statement with "I totally agree" and "mostly agree", while 14 % of producers partly agree and 41 % of producers mostly or strongly disagree with the statement. We can conclude that the producers, after joining the EU, decided very differently about the purchase of final food products originating from the EU. Some, after the EU entry, began with the purchase of final products from other producers in the EU, the rest still produced foods on their own or still purchased a part of them at the original producers [2].

Producers on average partly agree with the argument "Slovenia's joining the EU did not affect our choice of raw materials and suppliers" (Mean: 3.04). They answered very dispersedly, with a standard deviation of 1.409 (**Table 5**). 42 % of producers answered "I totally agree" and "mostly agree", 18 % of producers answered "partly agree", and about the same number of the producers that agreed with the statement, disagreed with it. 40 % of producers decided for the answer "mostly disagree" and "strongly disagree". On the basis of this data it may be seen that the opinions of Slovenian manufacturers are very different and that not all producers equally and uniformly proceed after EU entry [2].

On the basis of this data it may be seen that the opinions of Slovenian manufacturers are very different and that not all producers equally and uniformly proceed after EU entry.

Answers to the statement "When selecting raw materials we equally trust the manufacturers in all EU Member States" are very interesting. It is evident that Slovenian producers do not equally trust all producers of different EU member states, despite the fact that within the EU the same rules are applied. The mean of these answers is 2.74 with standard deviation of 0.985 (**Table 5**). 20 % of producers answered "I totally agree" and "mostly agree", 41 % of manufacturers answered "partly agree" while the answers "mostly disagree" and "strongly disagree" were chosen by 39 % of the producers [2].

CONCLUSION

On the basis of the results of comparing the producers' responses and mean values, it can be concluded that after Slovenia joined the EU there has been an increased purchase of raw materials from other EU countries, as well as increased preference of suppliers from the EU and thereby also of the raw materials from the EU.

On the basis of the results of the nonparametric test for two related samples (**Chapter** "Testing of the hypothesis regarding the control of suppliers") it can be concluded that the differences between the mean values in the compared periods 1999-2004 and 2005-2010 are not

statistically significant for the use of raw materials of Slovenian origin, for the use of materials of different origins in the same proportion, and for giving priority to Slovenian raw materials and Slovenian producers. However, the differences between the mean values in the compared periods 1999-2004 and 2005-2010 are statistically significant for arguments on the use of raw materials from third countries, on the use of raw materials originating from the EU and for arguments of giving priority to raw materials from the EU. The hypothesis for changing the suppliers based on processing with SPSS software is therefore partially confirmed.

Processing of survey responses and the mean values regarding the control of suppliers showed that Slovenian producers, after joining the EU, control their suppliers better than before entering the EU. The control of the suppliers before the first purchase has improved, as well as periodical control. The control of the suppliers on the content of contaminants has also improved. The credit for this shift may be attributed to effective performance of HACCP system. On the basis of responses it may be concluded that the majority of Slovenian producers all of their suppliers, regardless of origin, verifies under the same conditions. But the finding can not be ignored, that after joining the EU, the number of replies to the statement, that EU suppliers are evaluated under "looser" criteria than suppliers from import, because of European goods, has increased.

After joining the EU, the use of raw material of Slovenian origin slightly decreased and the use of raw materials from other EU countries increased.

On the basis of the results of the nonparametric test for two related samples (**Chapter** "Testing of the hypothesis regarding the control of suppliers") it can be concluded that the differences between the mean values in the compared periods 1999-2004 and 2005-2010 regarding the control of all suppliers under the same conditions and the control of Slovenian suppliers under less strict conditions, are not statistically significant. However, the differences between the means of the compared periods 1999-2004 and 2005-2010 regarding the use of the HACCP system, control of suppliers before the first delivery, control of suppliers on the contaminants before the first delivery, periodical control of suppliers, periodical control of suppliers on contaminants and control of EU suppliers under less strict conditions, are statistically significant. The hypothesis concerning the control of suppliers can therefore be partially confirmed.

The analysis of the responses from the survey shows that mostly domestic suppliers and raw materials are trusted by the Slovenian manufacturers.

After joining the EU, the use of raw material of Slovenian origin slightly decreased and the use of raw materials from other EU countries increased. After joining the EU, the use of raw materials from import decreased. The analysis of the responses from the survey shows that mostly domestic suppliers and raw materials are trusted by the Slovenian manufacturers. It can be concluded that the imports decreased at the expense of a more simple procedure of the free movement of goods, which is less demanding than the procedure of import. Suppliers within the EU are also familiar with the requirements of the HACCP system and must transparently ensure the quality of their raw materials.

After Slovenia's accession to the EU, the control over suppliers from other EU countries has increased. This is very important for ensuring food safety and competitiveness in the EU market. After Slovenia's accession to the EU, the percentage of those Slovenian producers who control Slovenian supplier under looser criteria has slightly increased, which indicates the confidence in Slovenian suppliers. It is interesting, that the percentage of those Slovenian producers who control EU suppliers under looser criteria has significantly increased. This suggests that suppliers in the EU are trusted by Slovenian producers and that this trust is based on EU requirements for the implementation of HACCP system. This confidence could be turned to great disadvantage in case of unsuitable raw materials.

The survey results also show partial distrust of free movement of goods. Interestingly, the HACCP system is in force in all EU Member States, but producers on average partly agree that they equally trust the manufacturers in all EU States.

Very dispersed responses suggest that the opinions and practices are different, they probably vary even within a single reporting period. It is also likely that the price of raw materials has more influence. Recent research has indicated some interesting findings that indicate the existing deficiencies in the provision of safe food. In order to obtain more detailed information on the status of the Slovenian food industry interviews with the interviewer will continue to be carried out. The questionnaire will also be defined in detail within each period, because a change of practice may occur within the six year period. It will also be interesting to obtain data on those EU Member States which the Slovenian producers trust and have confidence in as well as their reasons why they do so. The detailed questionnaire including the six year period would elucidate to what extent Slovenian producers trust the EU Member States.

Interestingly, the HACCP system is in force in all EU Member States, but producers on average partly agree that they equally trust the manufacturers in all EU States.

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