



## Examining traceability with primary customer questionnaires

V. Solymosi, P. Biacs, I. Magyar

Kaposvár University, Kaposvár, H-7400 Guba Sándor str. 40.

### SUMMARY

*Ensuring the traceability is obligatory in the agro-food industry so more enterprises and teams of researchers developed methods. These systems can be grouped into 3 main groups: there are paper-based, electronic and mixed versions. It is stated that the consumers prefers traceability but they think its part of the guaranteed (expected) quality, because most of them regard it rather a feature of food-safety than a feature of food-quality. That is why they will not pay more for the products that are more expensive owing to the electronic traceability system. According to the survey the mixed version fits best to the consumers' demands. The mixed version of traceability systems besides paper-based registering uploads the collected data into a central database so they can be digitally searched and categorized. Furthermore the consumers are needed to be informed of the traceability's advantages because twenty percent of them are not able to identify the traced foods.*

(Keywords: traceability, food quality, consumer questionnaires, marketing, origin of food)

### ÖSSZEFOGLALÁS

#### A nyomon követhetőség vizsgálata primer kérdőíves fogyasztói kutatással

Solymosi V., Biacs P., Magyar I.

Kaposvári Egyetem, 7400 Kaposvár, Guba Sándor út 40.

*A nyomon követhetőség biztosítása kötelező az élelmiszeriparban, emiatt több élelmiszeripari vállalkozás és kutatócsoport fejlesztett jól működő rendszereket. Ezen eljárások 3 fő csoportba oszthatók; egyrészt a papíralapú, az elektronikus és a kombinált változatokéba. Megállapítást nyert, hogy a fogyasztók preferálják a nyomon követhetőséget, viszont azt az elvárt minőség kategóriájába pozícionálják, többségük véleménye szerint az inkább élelmiszer-biztonsági, mintsem élelmiszerminőségi jellemző. Ezért nem hajlandók többet áldozni az elektronikusan nyomon követett termékek magasabb árára. A fogyasztói igényeknek a felmérés alapján legjobban a kombinált rendszer felel meg. A nyomon követhetőség kombinált változata papíralapú regisztrálás mellett az adatokat feltárolja egy központi adatbázisba, így azok digitálisan kereshetők és rendszerezhetők. Szükség van továbbá a fogyasztók tájékoztatására a nyomon követhetőség előnyeiről, mivel húsz százalékuk nem képes azonosítani a nyomon követett élelmiszereket.*

(Kulcsszavak: nyomon követés, élelmiszerminőség, vásárlói kérdőívek, marketing, élelmiszerek eredete)

## INTRODUCTION

It has been obligatory to ensure traceability along the entire food chain from field to plate since 01.01.2005 according to regulation 178/2002/EC. However, the directive does not give guidelines for the modes of introducing traceability systems. These must be developed by each primary producer, animal feed and food operator for their own business, so that they are able to certify the origins of their products all through the retail chain. It has been and still is the aim of several research projects to develop appropriately working systems, but these are primarily meant to ensure traceability in food processing (European Meat Expert Group 2005, QLK1-2001-CT-02229 R&D EU Project, 2001-2005). The DNA examination is perfectly suitable to verify the developed systems, since it can prove the link between the animals and the products made from them; and the procedure is cheap (Milán, 2004; Ghirardi, 2004a; Bonastre, 2005).

The initial introduction of traceability systems has revealed that while setting up a system, primary producers as well as feed and food operators should consider the principle of easy operation and that of 'one step back, one step forward'. The latter means that it is enough to identify the supplier of the particular raw material and the buyer of the product made from it (Szabó, 2005a). In the frames of the so-called integrated traceability enterprises operating at the different stages of the food chain are supposed to store the information in a central Internet database, which makes entire food chains observable. (Solymosi and Magyary, 2006a). Products traced in this way are likely to have additional value for the consumers (Biacs, 2005). Moreover, in the onward march of globalisation, they contribute to filtering out irresponsible enterprises operating on a plant far from the location of trading.

In order to ensure traceability a single invoice is not enough; special documentation methods have to be developed. (Szabó, 2005b). Producers have to batch-mark their products, so that each product can be identified by matching the date of shelf-life with the batch marks. In some more advanced systems identification is done with RFID technology or bar coding. (Webber, 2004; Eiler, 2005). A great fault of the present approach is though, that enterprises operating the prevalent quality assurance and quality management systems take traceability for granted in spite of the deficiencies of the systems (Sebők, 2005).

As several groups of researchers and meat processing experts have developed traceability systems, in some cases in the frames of projects evaluated to be eligible for state subsidies, different varieties can be clearly identified having different purposes as well as different advantages and disadvantages (Solymosi and Biacs, 2007a). In order to introduce the variety which is most appropriate for the particular segments of the food chain, it is crucial to examine the characteristics of the different varieties.

Examining the systems by the purpose of their introduction, one can differentiate between food safety-purposed and market-purposed traceability systems. The basic criteria of the food safety-purposed traceability systems are regulated by relevant measure, the main aim of which is to ensure the possibility to recall non-suitable products. There is a wide range of expectations in connection with market-purposed traceability systems, from meeting market demands to fulfilling marketing purposes (Szabó, 2005a).

It is also possible to categorise the traceability systems by the registered data. In this way traceability systems can be divided into qualitative and quantitative varieties. The quantitative systems can be further divided into two groups; systems tracking and registering raw materials and ones tracking a uniquely marked product or a batch of

products. Feeding sheets or forage diaries are a typical component of the quantitative procedures tracking raw materials; given feed amounts are matched with particular livestock. The systems registering a unique product or a batch of products do not supervise the quantities but follow and control the channels of the particular product and the raw materials which were used in it. By contrast, the qualitative system is an essential element of research focusing on the food chain, and it is also the purpose of several corporate management software (CSB). This means that the qualitative and/or food safety features of the unique products or product batches are also registered and tracked (*Solymosi and Magyary, 2006b*). However, this variety is operable only if there are certified and uniquely quantitative traceability systems operating through entire food channels (*Solymosi and Biacs, 2007b*).

The most important basis of the categorisation of the varieties is dividing them by the mode of operation; here one can differentiate between manual, electronic and mixed varieties. While the operation of the manual (paper-based) system is time-consuming, the costs of its introduction and operation are remarkably low. Good examples of this variety are the herd book and the information indicated on the bottles of quality wine, which allows for appropriate traceability. Operating the electronic system requires less time, but its introductory and operational costs are higher. (*Caja, 2005; Ghirardi, 2004b*). In certain branches (e.g. plant cultivation) the electronic system is impossible or at least very difficult to introduce. (*Solymosi and Magyary, 2005*). It must be emphasised, though, that this variety is suitable for Internet-tracking, i.e. those gaining authorisation may check the origins of products on a website by typing in batch numbers. In the case of the mixed system the documentation of the traceability is done on paper, and then manually stored on an Internet database. In this way the cost of the introduction and the operation of the system barely exceed that of the manual system, but it is suitable for Internet tracking and for other functions (e.g. stock recording).

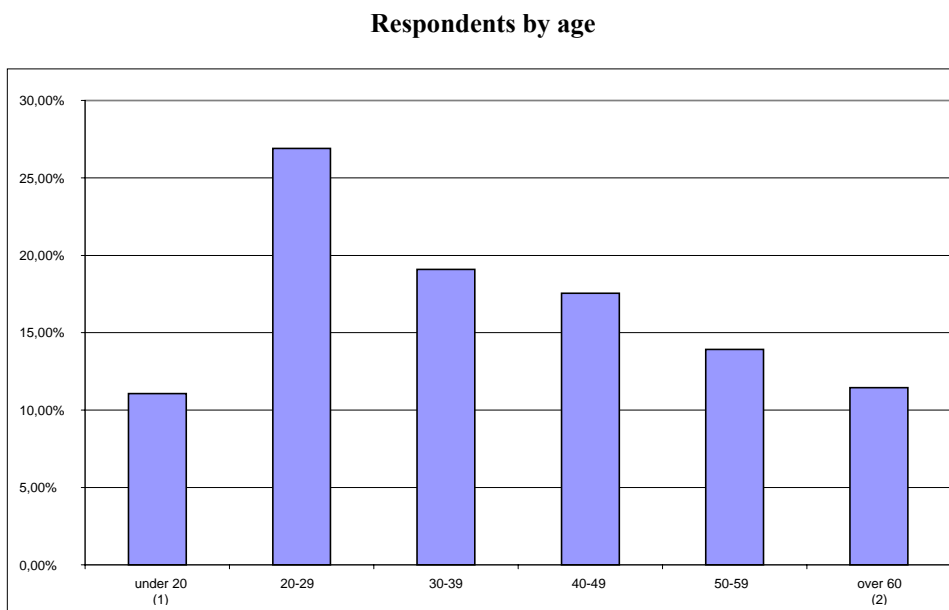
## **MATERIAL AND METHOD**

The research was carried out in 2007 with personal questionnaires, on several locations simultaneously. The questioning was random, the respondents were selected by the interviewers immediately after completing the previous questionnaire, randomly; and always the first person willing to respond was asked to complete the questionnaire. The interviewers participated actively in the completion; they frequently helped with understanding and interpreting traceability as a notion, which was, in fact, defined in the first few lines of the questionnaire. A total of 460 valid questionnaires were evaluated. The ambiguously or carelessly completed questionnaires had been removed from the sample (for example those where respondents gave contradictory answers to control questions).

The respondents were consumers over 14 years of age, who tend to do their own shopping by themselves, since the questioning was carried out in front of or at the entrance of food stores (often hypermarkets). The samples were analysed and evaluated with SPSS and Microsoft Excel. The distribution of respondents by age is shown in the *Figure 1*.

While the sample is representative by gender, the distribution by age shows that the group of 20–29 year-old respondents is overrepresented. However, in addition to the fact that the primary aim was to survey the most innovative groups of consumers, the result of the research can be evaluated by applying the quotas published by KSH (Hungarian Central Statistical Office).

Figure 1.



1. ábra: A választadók életkor szerint (év)

20 év alatt(1), 60 év felett(2)

The age of the respondents also suggests which groups of shoppers are the most receptive to food-safety issues. The interviewers asked in all cases if the shoppers were willing to complete a short questionnaire about food-safety, and the respondents who agreed to do so have the age distribution above.

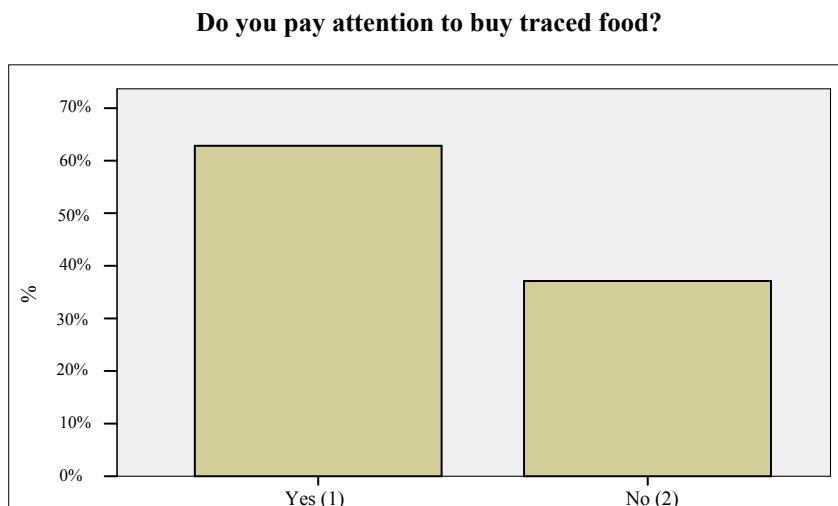
In the scope of this research we mainly hope to find out, which features of the system varieties in the categorisation by the operational mode are important for the consumers. In this way, it will be possible to choose the alternative to be suggested as suitable for food operators.

## RESULTS AND DISCUSSION

The *Figure 2* shows the answers to the question which is one of the most important ones for the evaluation of the results.

The figure shows that the answer 'yes' accounts for slightly less than two thirds of all answers, which suggests that traced food products play a vital part in everyday shopping. The distribution of the answers to this question also indicates that at least two thirds of the respondents are familiar with the notion of traceability in food processing. It has to be noted, though, that the format of the questionnaire has undoubtedly contributed to this result, since respondents could read the precise definition of the expression on the questionnaire. Therefore it is possible to conclude from the figure above that if appropriate information is provided, 60% of the respondents pay attention to buy traced food.

Figure 2.



2 ábra: Odafigyel-e amikor nyomon követett élelmiszert vásárol?

Igen(1), Nem(2)

It can be concluded even from this single figure that the respondents who are looking for traced products represent such a large segment, that they are worth dealing with for food processing enterprises, and it is worth paying attention to satisfying these consumers' demands in marketing strategies and developments. Therefore it is to be concluded that traceability systems should not only be used for food-safety purposes, but, in addition, they should be introduced to serve marketing interests.

The *Figure 3.* shows how the consumers evaluate the statements in connection with traceability from 1 to 5 (1: not important at all; 5 very important).

The figure shows that it is the food safety aspect that is considered most important by consumers when it comes to traceability, but this should not be categorised as food safety-purposed traceability in the terminology presented at the beginning of the article. The appropriate explanation and emphasis of the traceability of a product can be especially advantageous in times of food scandals. The consumers trust these food products more, and they much rather buy them. By contrast, they are not willing to pay more for products traced on the Internet, or, in fact, for traced products in general. This may suggest that from two products with identical price and quality, consumers will buy the product, the producer of which operates a traceability system.

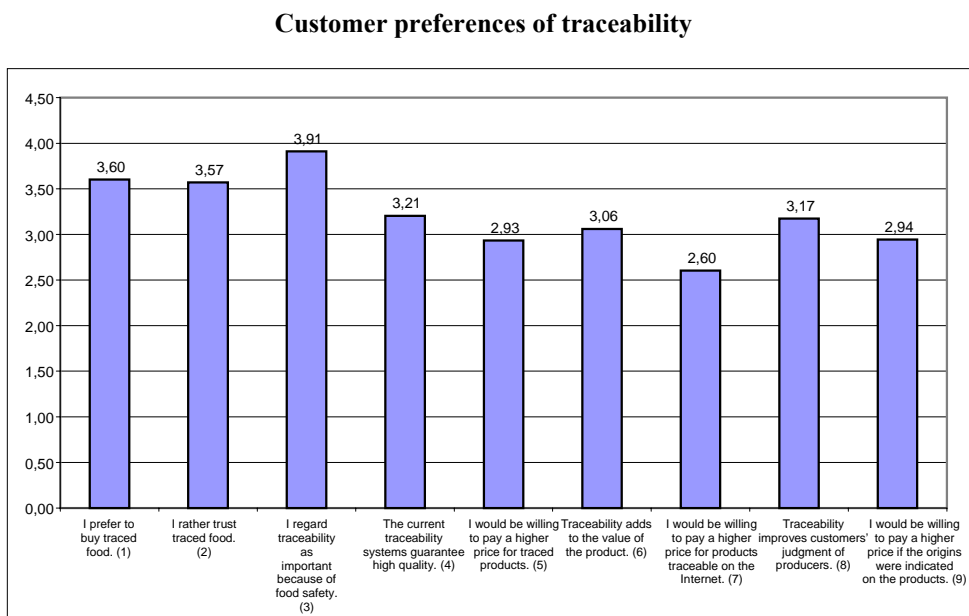
This is also confirmed by the fact that the respondents are split on the question whether traceability adds to the value of the products. However, the consumers seem to trust manufacturers somewhat more who produce such products.

Examining the absolute values of the figure above we can say that traceability does not arouse consumers' attention to the extent of some other current issues (e.g. cholesterol level). This can also be concluded from the summarising tables of similarly, with points evaluated representative market research questions.

The most important conclusion from the figure above is that food processing enterprises have to develop systems which do not increase product prices on the one

hand, but on the other hand ensure Internet-based tracking. Consequently, IT solutions must definitely be applied in the introduction of the system, notwithstanding that only those solutions are acceptable which do not increase the cost price of the product.

Figure 3.



3 ábra: A vásárlók nyomon követési preferenciái

*Előnyben részesítem a nyomon követett élelmiszert(1), Jobban bízom a nyomon követett élelmiszerben(2), Az élelmiszerbiztonság szempontjából fontosnak tartom a nyomon követést(3), A jelenlegi nyomon követési rendszerek magas minőséget biztosítanak(4), Hajlandó vagyok nagyobb árat fizetni nyomon követett termékekért(5), A nyomon követés hozzáadódik a termék értékéhez(6), Hajlandó vagyok nagyobb árat fizetni azokért a termékekért, melyek az Interneten nyomon követhetők(7), A nyomon követés javítja a vásárlók értékítéletét(8), Hajlandó vagyok nagyobb árat fizetni azokért a termékekért, melyeken a termék eredetét feltüntetik(9)*

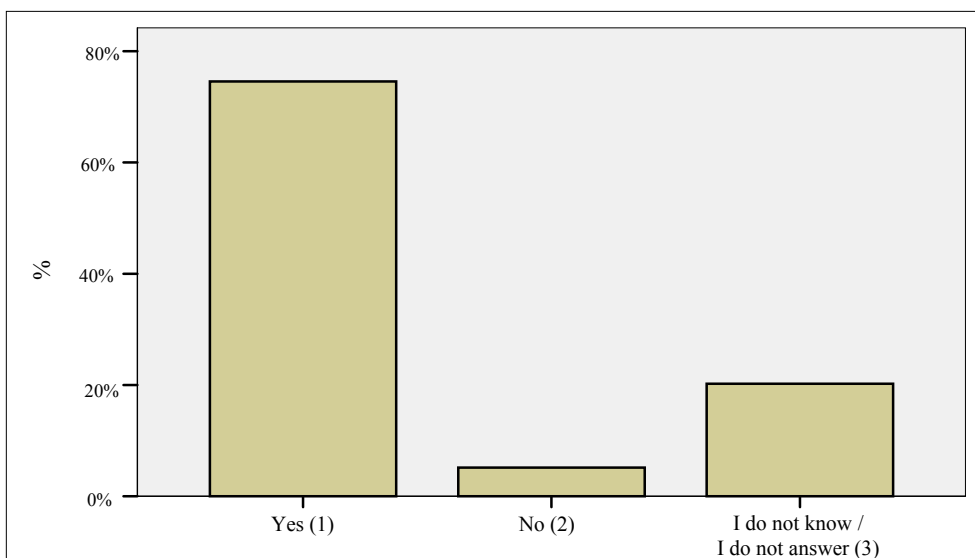
The reason for this is that consumer's regard traceability rather as guaranteed (expected) than functional (adding value) quality, so they expect the product to have this feature. Moreover, this suggests that with appropriate marketing communication it is possible to have consumers take it for granted that food products are traceable, consequently, food processing firms which are putting less emphasis on this system will be forced to ensure traceability with up-to-date methods. In this way with a raising awareness of consumer behaviour the traceability systems that have been introduced for marketing purposes will not only provide additional advantage in the first place, but they could become part of the essential criteria of selling a product.

Consequently, it can be concluded that buying products controlled with electronic traceability systems cannot be a solution for consumers in large numbers, because the

price of these products is higher than that of alternative ones of similar qualities. However, it is crucial to operate a less costly (mixed or manual) traceability system, since, in addition to meeting the requirements set by food-safety regulations, it is important for the consumers, too.

**Figure 4.**

**Have you bought traced food in the last 5 years?**



*4. ábra: Vásárolt-e nyomon követett élelmiszert az utóbbi öt évben?*

*Igen(1), Nem(2), Nem tudom/Nem válaszolok(3)*

The last figure shows that the majority of the respondents have bought traced food, but there is a high proportion of consumers who are not at all familiar with these products, even after the initial guidance. As the interviewers have explained to the respondents what traced food is, the answers given to this question indicate the actual status, i.e. even those answered 'yes' who had not fully understood the concept of traceability and tracing. Thus, we can say that as long as traced food products are available for consumers, they will recognise them. Appropriate information and guidance is necessary, however, for the advantage of traceability to manifest itself.

## CONCLUSION

In this article different systems capable of ensuring traceability in food processing were categorised into several groups according to relevant literature, and it was examined with a consumer survey which varieties are particularly suitable for being a rational solution for a wider range of food processing enterprises.

In the survey the respondents completed fewer than 500 valid questionnaires. The research can be considered representative by the proportion of gender, but by age and

education the consequences are possible to be drawn for the total population only after corrections with quotas.

The most important result of the research is that consumers categorise traceability in food processing rather as a guaranteed (expected) product quality, therefore it is exceedingly important to be careful in the positioning of the product so that traceability does not increase consumer prices. This can be concluded from the fact that most consumers have already bought traced food products, and are interested in traceability, but they are not willing to pay a higher price for it. They particularly do not prefer the more expensive Internet based system. By contrast, they emphasise that traceability is important for food safety reasons, and that they rather buy traced food products, which they trust more.

It is advisable therefore to introduce a traceability system which does not make the products more expensive, but which the consumers know and are familiar with. Therefore from the three system varieties (manual, electronic and mixed) it is suggested to introduce one, which includes the elements of the mixed systems, and, thus, takes the aspect of cost-efficiency into account for an increasingly wider range of food processing enterprises.

## REFERENCES

- Biacs, P.Á. (2005). Az élelmiszer-biztonság hatása a termékek piaci versenyére Magyarországon. *Élelmiszer, táplálkozás és marketing*. 1-2. 13-16.
- Bonastre, S.A. (2005). Methodology of sampling and analysis for DNA fingerprinting in cattle, sheep and pig. <http://uab.es/tracing> (QLK1-CT-2001-02229 R&D Project).
- Caja, G. (2005). Traceability in the future. [Http://uab.es/tracing](http://uab.es/tracing) (QLK1-CT-2001-02229 R&D Project).
- Eiler, O. (2005). Vonalkódtechnika alkalmazása az agrárágazatban. [www.pointernet.pds.hu/ujsgagok/agraragazat/2005-ev/05/agrarag-21.html](http://www.pointernet.pds.hu/ujsgagok/agraragazat/2005-ev/05/agrarag-21.html).
- Ghirardi, J. (2004a). Implementation and validation of a double EID and DNA system for tracing beef cattle. [Http://uab.es/tracing](http://uab.es/tracing) (QLK-CT-12001-02229 R&D Project).
- Ghirardi, J. (2004b). Implementation and validation of a double EID and DNA system for tracing lambs. [Http://uab.es/tracing](http://uab.es/tracing) (QLK-CT-12001-02229 R&D Project).
- Milán, M.J. (2004). Cost evaluation and cost-benefit analysis of the QLK1-2001-CT-02229 R&D EU project. [Http://uab.es/tracing](http://uab.es/tracing) (QLK-CT-12001-02229 R&D Project).
- Sebők, A. (2005). Az új élelmiszerbiztonsági követelmények gyakorlati érvényesítése. [www.keki.hu](http://www.keki.hu) (publications).
- Solymosi V., Biacs, P. (2007a). Nyomon követés a takarmányelőállításban és állattenyésztésben. *Állattenyésztés és takarmányozás*. 2. 171-182.
- Solymosi, V., Biacs, P.Á. (2007b). Traceability in focus. *Hungarian Agricultural Research*. 3. 17-20.
- Solymosi V., Magyar I. (2005). Nyomon követés növényi termékpályák esetében. *Östermelő Gazdálkodók Lapja*. 6. 91-93.
- Solymosi V., Magyar I. (2006). Nyomon követés állati termékpályák esetében. *Östermelő Gazdálkodók Lapja*. 2. 101-104.
- Solymosi V., Magyar I. (2006). Az integrált szemléletű nyomon követés lehetőségei. *Östermelők Gazdálkodók Lapja*. 3. 109-110.
- Szabó E. (2005/a): Nyomon-követhetőség az élelmiszerláncban. [www.cfri.hu](http://www.cfri.hu).



- Szabó M. (2005/b). Szigorúbb előírások, hatékonyabb ellenőrzés, javuló élelmiszerbiztonság. [www.keki.hu](http://www.keki.hu) (publications).
- Webber, R. (2004): 2<sup>nd</sup> dissemination meeting of the QLK1-CT-2001-02229 R&D Project. [Http://uab.es/tracing](http://uab.es/tracing) (QLK-CT-12001-02229 R&D Project).

Corresponding author (*Levelezési cím*):

**Solymosi Viktor**

Kaposvár University, Faculty of Economics

H-7400 Kaposvár, Guba Sándor str 40.

*Kaposvári Egyetem, Gazdaságtudományi Kar*

*7400 Kaposvár, Guba Sándor u. 40.*

e-mail: [solymosi.viktor@gmail.com](mailto:solymosi.viktor@gmail.com)