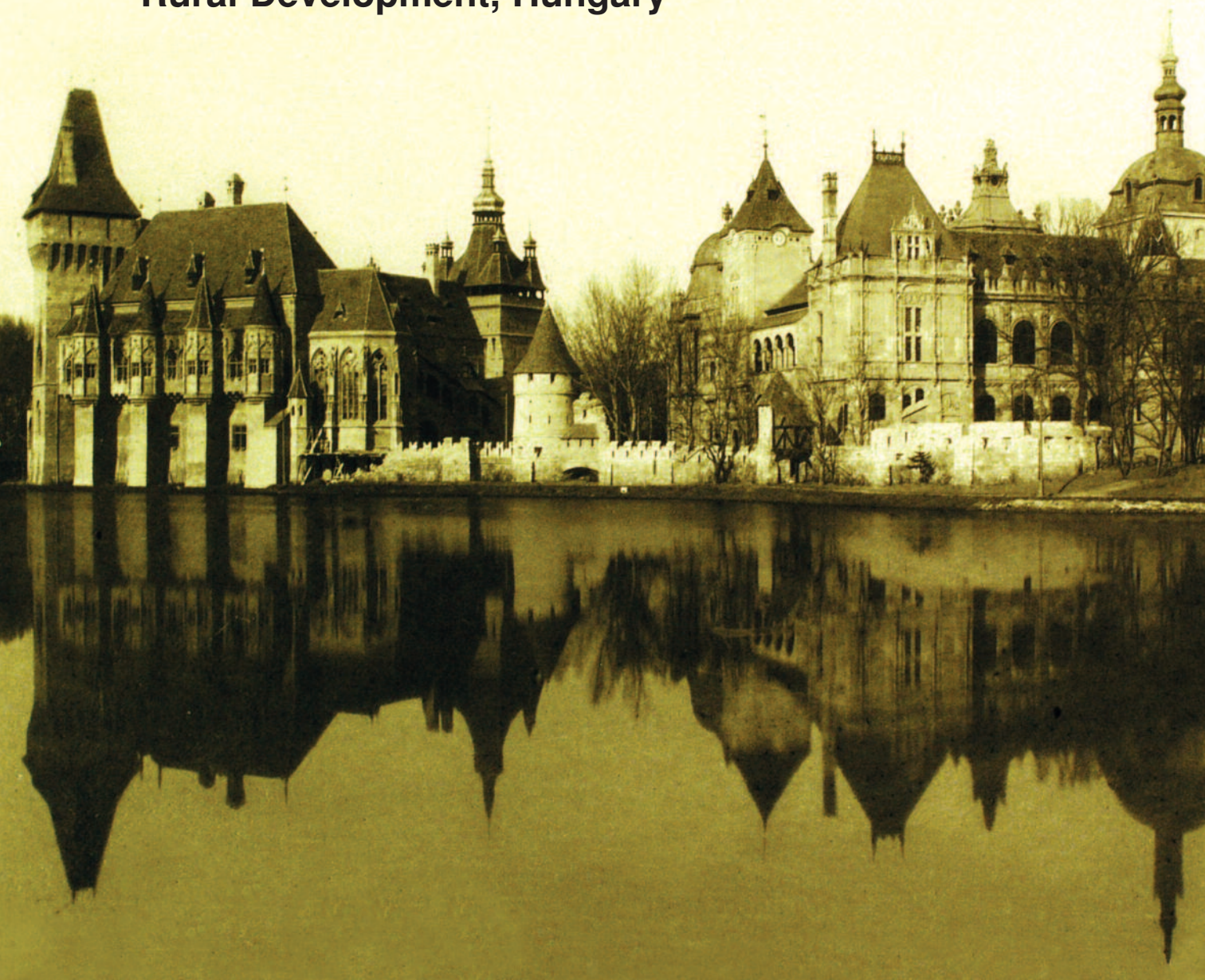
HUF 440/ $ 4

HUNGARIAN AGRICULTURAL RESEARCH

September 2007
Journal of the
Ministry of Agriculture and
Rural Development, Hungary



Centenary of Vajdahunyad Castle

2007 saw the celebration of 111 years of the foundation of the Museum of Hungarian Agriculture and 100 years of the opening of Vajdahunyad Castle, the home of the museum. The foundation of the museum and the birth of Vajdahunyad castle were the results of several favourable coincidences, in particular the success of the Millenial Exhibition in 1896. The show presenting the country's agriculture was also highly popular, while at the same time the previous concept of an independent agricultural museum also gained momentum. An important step towards the realization of this aim was the passing of Act 36 of 1900, according to which 2.4 million crowns were guaranteed 'for the construction of a permanent building to house the agricultural museum'.

Planning and construction was again, as in 1896, assigned to Ignác Alpár. The construction, starting in 1901, was quite quick; by 1904 the Renaissance and Gothic wings were finished and within three years the Baroque wing was also completed. According to the unanimous verdict of public opinion, both the internal and external decoration of the complex were outstanding. Each unit of the complex had its own special atmosphere, as Alpár strived to achieve a harmonious unity not just in the outer, but also in the inner development of the building. This goal was served by the uniquely designed furniture and the magnificent stained glass windows by Miksa Róth.

The monumental building complex was opened on 9 June 1907 with great ceremony. The contemporary press waxed eloquent about the event: 'It will be one of the biggest museums in the world and an apt reminder of its duty to represent the greatest industry that was decreed by nature's will to an agricultural country'. Its founder, Minister Ignác Darányi, pronounced that the main task and calling of the museum: 'is to present everything which is interesting and important for Hungarian agriculture, and from which Hungarian agriculture, horti- and viniculture and forestry can draw dependable and practical lessons'. According to contemporary notions, this unique institution could only fulfill its task if 'not only the farmer finds instruction of how to protect against small and large pests, and where and how to market his produce, but also the consumer is informed about which region produces what in which form and where can he purchase the best at a fair price'.

The museum retained its informative role in the interwar period, though this was no longer its only duty. After World War II, especially after 1956 the historical character of the institution became more marked, which not only manifested itself in the exhibitions but also in its role as a research venue for agrarian history: apart from several independent scientific works an increasing number of agricultural publications were also conceived here. Among these are the international bibliography of agricultural history, the museum's proceedings and the Agricultural History Studies, but the museum also edits the Agrarian History Review, published by the Hungarian Academy of Sciences.

The museum has always had a symbolic importance, but its task has to be adapted to the changing circumstances. It is no longer enough to collect and present the agricultural-historical

specimens of the past. It also has to apply both for the present and the near future. As in Western Europe, where education now involves environmental consciousness, as children are instructed on the primary level to attain its values, the preference of home-grown products should be encouraged in Hungary as well. It should be taught why certain Hungarian products are better than foreign ones, and that their purchase should not only be a manifestation of patriotism but a real appreciation of their value. The majority of the museum's visitors are children, therefore museum pedagogy has an important role: an environmental consciousness can best be developed at this susceptible age.

In the future the museum has to provide a venue for the scientific and other programmes of the agrarian administration and agricultural federations. The number of over 200,000 yearly visitors can further be increased if governmental and other elected officials of the agrarian sector take advantage of the unique possibilities of the venue. Agrarian society should consciously use the largest agricultural museum in Europe and utilize it for the successful realization of the New Hungary Regional Development Programme. The museum could also help in the effective use of EU grants by participating in the preparation and control of these programmes.

During its century-long existence the castle has survived some hard times. In 1944-45 six bombs and several shells hit the building; especially the Renaissance and Baroque wings were damaged. The renovation was finished in 1948 with the cooperation of Alfréd Hajós. In 1956 the building suffered new damages. These were repaired again, but the full reconstruction of the complex was only undertaken in 1978-85. The museum became a listed building in 1991.

Vajdahunyad Castle in City Park is a harmonious complex of the most outstanding architectural mementoes in the Carpathian Basin, a unique example of imitation and creation. Its characteristic yet picturesque design makes it a focal point of tourism in Budapest. With its renewing exhibitions and collections it remains uniquely the largest agricultural museum in Europe.

György Fehér – Sarolta Szatmári

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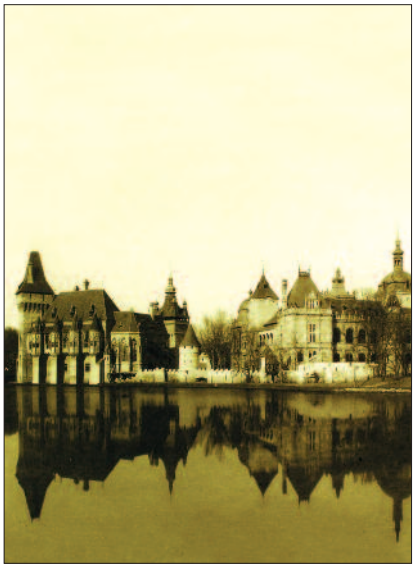
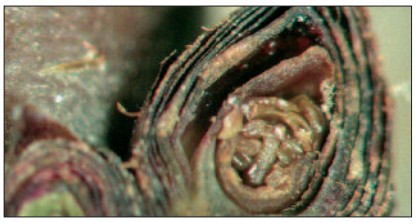


Hungarian Agricultural Museum



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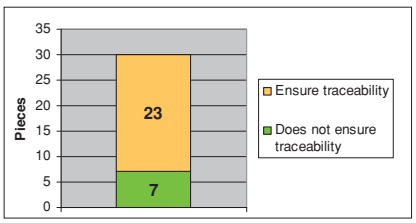

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Published by AGROINFORM Publishing
H-1149 BUDAPEST, Angol u. 34. Hungary
www.agroinform.com

Editorial Office
Department of Mechanics and Engineering Design
Szent István University, Gödöllő
H-2103 GÖDÖLLŐ, Hungary

Subscription request should be placed with the Publisher (see above)
Subscription are HUF 1200 (only in Hungary) or
$16 yearly plus $5 (p & p) outside Hungary
HU ISSN 1216-4526

László Szalay[1]

Investigations into frost hardiness of heat loving stone fruit species in Hungary

Introduction

The cultivation of not indigenous fruit species involves higher risks than that of those with ancestors still occurring in the wild in the natural plant communities. Of the stone fruits, it is the apricot, the peach, the almond and the Japanese plum that are not to be considered as indigenous, they have high heat requirements and are sensitive to frosts. We are on the northern border of their growing area. One would think that with the warming of the climate they would have better conditions, but unfortunately this is not always the case. Their heat requirements in summer, indeed, are ever easier to meet for our growing areas. The problems occur during the dormant period in winter. A number of tasks are to be solved in the field of proper choice of variety and of the elaboration of the suitable technology in order to be able to continue the production of these fruit species in Hungary successfully and economically. The first key step in the work towards crop safety is the determination of the frost and winter-hardiness of the varieties. A great deal of data have been collected on the frost hardiness of the varieties in cultivation, through the experiences gained from cultivation and through the assessment of frost damage in the field, these, however, do not offer a clear picture of the differences in the frost hardiness of overwintering organs and of the physiological processes occurring during winter. Their understanding requires laboratory analyses. In our research programmes, started 15 years ago, we set ourselves the objective of carrying out these analyses.

Frozen buds of 'Mariska' peach

Biological bases

The adaptation to the environmental conditions is in close correlation with the length of time for which a given species has been in cultivation and with the types of its varieties that have been formed in the given area. In this aspect, the four fruit species treated in our study differ from one another. The cultivation of the apricot (Prunus americana) and the peach (Prunus persica) has an approximately 2000 year old tradition in the Carpathian Basin. In the case of these two plants, huge growing areas have developed both on the Great Plain and on the hilly parts of the country. Cultivation of the almond (Amigdalus communis) was given a stimulus only at the end of the 19th century during the Phylloxera epidemic, when in many parts dead vines were replaced by almond trees. Of the latter, two growing areas have developed: in the vicinity of Buda-Nagytétény and in the vicinity of Pécs. The importance of the

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Frozen buds of apricot

almond, however, is much smaller than that of the apricot and the peach. The cultivation of the Japanese plums (Prunus salicina) was started only 20 to 25 years ago in Hungary. Therefore, cultivation experience and related experimental results are very scarce. The importance of a species in a given area is also indicated by the way of propagation and by the trade figures of the varieties. In the case of the apricot and the peach, the vegetative propagation method and the generative one have existed in parallel from the beginnings, and both have contributed to the increase in the genetic diversity. The propagation of the almond had long been carried out by means of seedling trees grown wild or by means of suckers and grafting was not in use until the end of the 19th century. On the one part, it is the different role in cultivation, on the other, it is the different ecological requirements that account for the fact that the apricot and the peach have much more genotypes that are adapted to the climate of the Carpathian Basin than the almond and the Japanese plum. In our experiments we included the typical representatives of both the traditional and the new varieties. We studied 20 apricot varieties, 12 peach varieties, 3 almond varieties and 3 Japanese plum varieties.

Table 1. *Total production of heat loving stone fruits in Hungary (thousand tons)*

	2000	2001	2002	2003	2004	2005	2006
Peach	70	50	29	30	56	46	70
Apricot	19.5	20	12	37	35	32	42

Of the fruit species tested, the produced quantities of the peach and the apricot in Hungary are included in *Table 1*. There are no detailed statistical data on the almond and the Japanese plum. The total annual almond production in Hungary ranges between 200 and 300 tons, while the total

Frozen flower bud of 'Springtime'

production of the Japanese plum is less than 100 tons.

Frost hardiness of overwintering organs

Of the overwintering organs of fruits trees, it is the flower buds, the shoot buds and the twigs that suffer most frequently damage from frosts. Therefore, these must be investigated in order to determine the frost and winter-hardiness of each variety.

The frost hardiness of the overwintering organs was established by means of climate chamber experiments, 2 to 3 times a month. We modelled the natural temperature decrease in our experiments. The temperature was diminished each hour by 2 °C, the samples were kept at the experimental temperature for 4 hours and then the temperature was raised at the same rate as the rate of the temperature decrease. The treatment was carried out at several temperatures at each point of time investigated. We determined the level of frost damage in consequence of the different temperatures and calculated the mean frost hardiness (LT_{50}) which denotes the temperature causing 50% frost damage at the given point of time.

During the winter the most frost sensitive tree parts are the flower buds. Shoot buds are able to tolerate temperatures 2 to 3°C lower, while twigs even 6 to 8°C lower than flower buds. The frost hardiness of the overwintering organs varies continuously over the dormant period in winter. The changes in winter hardiness are illustrated in *Figure 1* which shows the mean frost hardiness of flower buds of 6 peach varieties at different points of the winter of 1999–2000. Frost hardiness develops gradually in autumn with the

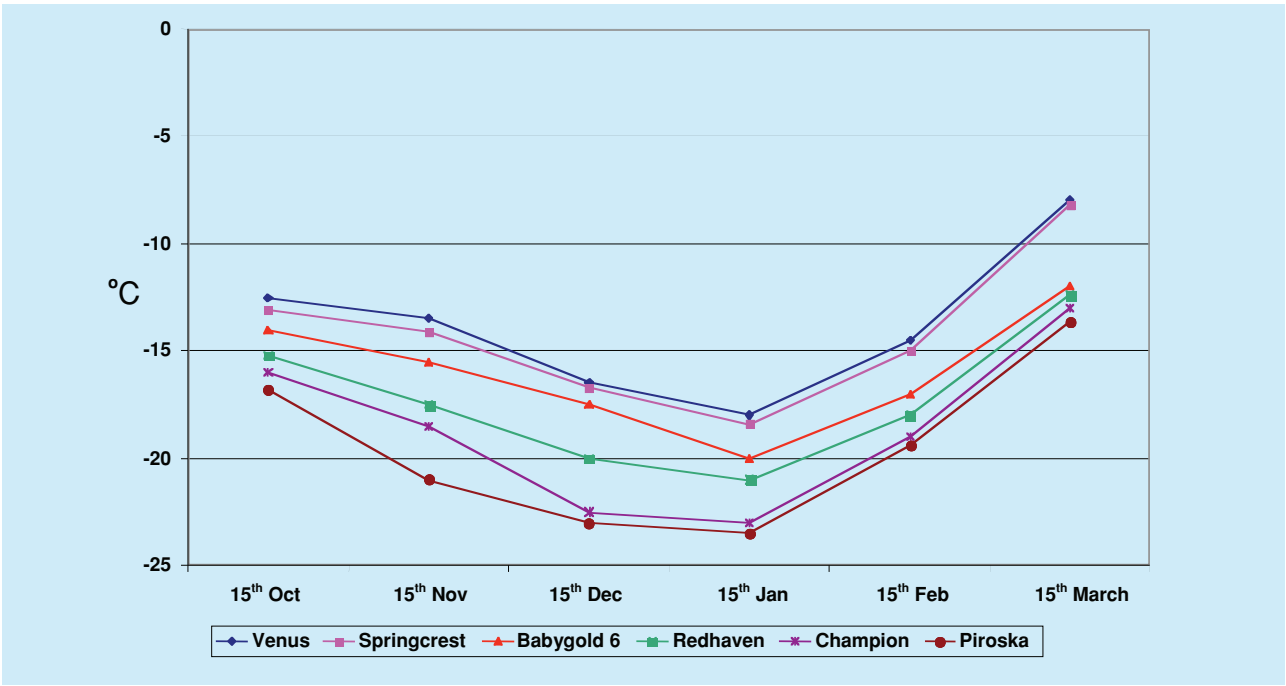

Figure 1. *Mean frost hardiness of flower buds of peach varieties (LT50)*

decrease in temperature and the organs get hardened against cold step by step. Flower buds are most resistant to frost in December and in January. Frost hardiness is on a gradual decrease in the second part of winter and by the end of the blooming period generative tree parts will lose completely their frost tolerance. A great diversity in frost hardiness can be seen within the species. Of the peach varieties in our variety collection the most frost sensitive variety was 'Venus' while the most frost resistant 'Piroska'. There was a 5.5 C difference between the mean frost hardiness of the flower buds in the middle of winter. The frost hardiness of the varieties is lower at the beginning and at the end of the dormant period. The frost hardiness of the apricot and the Japanese plum fell into similar ranges to that of the peach, while the almond varieties proved to be much more frost sensitive. According to our test results, the flower buds of the frost hardy almond varieties were characterized by a frost hardiness almost identical with that of the frost sensitive peach variety 'Venus'. From the aspect of practice, it would be very useful to be able to predict with precision what temperature in C the generative organs are able to resist in the individual phases of the dormant period in winter and of blooming and what levels of frost damage are likely to occur. The actual level of frost damage, however, depends on several things. It is basically determined by the inherited stress tolerance of the variety and the rootstock, by the phase of development in which the decrease of temperature takes place, as well as by the minimum temperature. On the other hand, it also depends on the speed of the temperature drop, on the length of exposure of the tree to the low temperature and on the speed of the temperature increase after the action of the frost. The level of frost damage is, furthermore, influenced by the conditions of the tree, by its state of health, age and several other factors, as well. Consequently, we are only able to determine ranges of frost tolerance for the individual phases of development, in which damage is likely to occur *(Table 2)*.

Frozen twig of 'Springtime'

The results from our trials over 15 years help in selecting the varieties that can be successfully grown in Hungary, as well as in determining the suitability of the growing areas. We are going to continue the experiments, with the involvement of new varieties and candidate varieties.

Table 2. *Frost hardiness ranges of flower buds and flowers in different phases of development of three stone fruit species, in °C*

Fruit species	Phase of development						
	leaf drop in autumn	end of deep dormancy	tetrad state	petal–bud	beginning of blooming	main blooming	end of blooming
Almond	–10; –12	–15; –18	–8; –10	–3; –6	–2; –5	–1; –3	0; –2
Apricot	–12; –16	–18; –24	–10; –16	–4; –8	–3; –7	–1; –5	–0,5; –4
Peach	–13; –18	–18; –25	–11; –16	–4; –7	–3; –6	–1; –4	–1; –3
Japanese plum	–12; –19	–18; –25	–10; –17	–4; –8	–3; –7	–1,5; –5	–1; –3

[1]Szakály, Z., Szigeti, O., Biacs, P. Á., Szente, V.

The marketing challenges of branded, new generation hungaricums

The natural capabilities of Hungary are particularly favourable for agricultural and food production. There are good possibilities both in cultivation of plants and in animal husbandry on plough- and grasslands. Hungary's share and its competitive position, however, decreased on European and world market in the past years. Therefore our research focused on developing new animal products meeting changes in consumer demands regarding their nutritional benefits and by their natural way of production. The study highlights four products, namely goose-liver produced by considerately fattening up the geese, rabbit meat with low fat and cholesterol levels, beef rich in omega-3 fatty acids and selenium enriched eggs. The final goal is to form the basis of test-marketing necessary to sell new branded products. By performing it we can introduce marketable products on national and international markets.

Agriculture is characterised by low overall volume growth, efficient new product development is essential for gaining competitive advantage. However, product development is a risky business, with 80% of food product launches failing to have a market presence after two years. Success with new consumer products requires constant input from consumers, where the development of new product ideas, the screening of ideas, the development and testing of prototypes, the development of the overall marketing mix, and finally the launch on the market are all consumer-led.

In this part of our research we introduce the production, export and import as well as the consumer trends of goose-liver, rabbit meat, beef and egg. We enhance the nutrition benefits of the products, too.

Branded, new generation hungaricums

Goose-liver

More than half of the world goose-liver production is carried out in Hungary (60%). The share of France is 23% and Israel 9%. 75–80% of the Hungarian goose liver is exported each year, which is bought mainly (90%) by France. The volume of the sales could reach the favourable 1,400–1,500 tonnes after the turn of the millennium but today we can witness a decreasing tendency and the rate of exportat is decreasing. It is so because goose liver is a one-market product, therefore the French market determines the prices which decreased by 40% compared to the 90s. The poor quality of Hungarian goose-liver is mentioned as an objection which can cause a drastic position weakening not just in France but in the world market as well. The main objection is the unequal quality which can be noticed in the field of largeness, congestion, colour and substance of the liver.

70% of the entire production is consumed by France and this rate has been continuously increasing since the second half of the 90s with 10–15% despite of spreading of duck-liver their liver consumption is about 300 g per capita. France is followed by Japan, Hungary, Germany and the Benelux States *(Vida, 2004).*

Strict rules determine the production of the world-wide known product known as "foie gras" made by feeding the fowles forcibly, which specify the different parts of the liver quality in Europe and France. For being qualified as "foie gras" the minimum liver mass is 400 g according to French regulations. Liver is not allowed to contain forbidden hormonal preparations and other chemical, biological materials with a harmful effect on human body or any residues of these materials.

Forced feeding acts upon the mass and measurement of the liver which sometimes increases tenfold. Its fat content increases 8.5-fold but its protein content decreases 2.7-fold and the water content 0.5-fold. The total fat quantity in the liver may reach 50%, 95% of which is triglyceride and 1–2% cholesterol-ester. The rate of phospholipids is 1–2% and the free cholesterol level is less than 1%. The fatty acid profile changes due to forcible feeding. The rate of the oleic acid doubles and it amounts to the half of the whole fat content. The palmitoleic acid increases tenfold of the origi-

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nal level but it cannot reach a significant part at the end of cramming but the linoleic acid decreases tenfold. Forced feeding has not been able to change during the liver-making process yet but there are researches in progress in Israel and France to develop a method without the classical forcible feeding e.g.scientists are attempting to increase the appetite of the animals by light effects and diverse watering orders. The animal welfare societies urge faster and more radical steps: they want ban not only on the production but also on the distribution of the foie gras in Europe. This ambition is supported by some noticeable consumer attitudes saying that consumers increasingly select what kind of products they put on the table *(Vida, 2004).*

Rabbit meat

Global rabbit meat production is currently estimated at 1,107,025 Tonnes Equivalent Carcases (TEC) corresponding to 856.797,000 slaughtered animals. Rabbit production is concentrating in two major areas (Europe and Asia). Production areas are also found in some regions of Africa (86 thousand TEC) and America (21 thousand TEC).

Italy is by far European's leading producer of rabbit meat, with Spain second, and France third. Europe is 99% self-sufficient

and net import is very low (6,000 TEC). In the EU, Hungary, Spain and France are the main exporters, while Germany, Portugal and Belgium are the main net importers.

In Hungary the amount of purchased rabbit meat decreased continually, in 2000 it was only 32% compared to 1990. From that time the amount of purchased rabbit meat stayed on the same level with small fluctuations. It can also be seen well that the export reduced significantly from 17000 tons in 1990 to 5000 tons today, and it rendered stable on this level. At the same time the return in sales decreased slightly due to the rise in rabbit meat export price. In Hungary the export return in sales in the rabbit sector was slightly more than 30 million dollars in 2004, and it is almost the same as it was in 1996. In 2003, the total quantity of Hungarian rabbit production was about 10,000 TEC with 2–3% going into national market, and the remainder being exported to Italy (44%), Switzerland (28%) and Germany (18%).

Rabbit meat consumption varies around the globe, where various factors affect consumers' demand. Among these factors are consumer preference, tradition and price. At the top are Malta, Cyprus and Italy. In spite of its significant export Hungary has very low rabbit meat, consumption per inhabitant hardly reaches 0,1 kg per year. Surveys – apart from one or two – to find the reasons for low consumption have not yet been made in Hungary, but at the same time two influencing factors are evident: only a tiny part of the produced meat reaches the Hungarian retailers *(Bodnár et al, 2003),* and partly due to this rabbit meat consumption has no traditions in Hungarian dining culture (according to a survey made in Hungary most housewives were not able to name more than two ways of making dish from rabbit meat). Almost half of the questioned people (46%) regarded rabbit meat as too expensive, on the other hand non-consumers reuse rabbit meat firstly not become its

high price, but rather because it is hard to get and because they are averse to it *(Bodnár et al, 2003).* In other EU countries such as Great Britain, and Scandinavian Countries, where rabbits are often kept as pets, rabbit meat consumption is very low *(EFSA, 2005).*

In Hungary rabbit meat consumption could be increased with making consumers who are responsive to healthy way of life realise its benefits. Rabbit meat has low fat and cholesterol levels, high protein content ad it is especially rich in some vitamins and minerals. The cholesterol level and fat content of rabbit is lower than that of poultry, turkey, beef or pork. Another benefit of rabbit meat is that its unsaturated fat content reaches 63% among all tats, and the ratio of n-6 and n-3 fatty acids is 7,4–7,5, which is advantageous from nutritional-biological point of view.

Beef enriched with Omega 3 fatty acid

Today the global trends show an obvious increase of cattle stock. This upswing is not characteristic in European countries but it is in Asia and South-America. In case of European countries a little decrease of stock can be observed (under 1.7%). Countries with the biggest cattle stock are France, Germany, and Great Britain on our continent. Hungary takes a very little part of the world's cattle stock (0.06%) and gives 1 percent of the stock of the European Union.

According to the production tendency it can be calculated that the beef consumption in the world will increase further in the future. In the EU member countries the level of consumption will be 20 kg/capita/year and in the new EU-10 countries only about 6.7 kg/capita/year can be expected. In Hungary between 1970 and 1980 beef and veal consumption was about 10 kg and that level has progressively decreased, now it stagnates about on 3.8 kg. Increase of consumption could not be expected in the near future.

Decrease of consumption is influenced by high prices in Hungary and in other countries with same economic conditions. However, the changing, health-oriented consumer behaviour has an impact on beef consumption in the wealthy West-European countries. There BSE crisis, however, is far not forgotten, meat consuming itself is not more important than animal welfare and environmentally sustainable production.

In the past human nutrition biologist advised less red meat consumption including beef, as

well. At the end of eighties the American and Canadian recommendations tended to eliminate beef products from human nutrition and offered a 25% drop in the consumption of milk and dairy products. Fortunately that drastic step could not happen.

Today we already know that it has very valuable components which have health conditioning and positive physiological effects. Beef's essential fatty acid (linoleic acid, linolenic acid) content is necessary for the evolution and normal function of the nervous system and retina that is why it is advised to pregnant and nursing mothers. Beef has a favourable polysaturated and unsaturated fatty acid proportion which plays an important role in health protection mostly because of its anti thrombosis effect *(French et al, 2004).* Beef has a high protein and amino acid content and taurin for babies in an easy eligible form. Beef is reach in minerals like potassium, phosphorus and magnesium but mainly it is indispensable in human nourishing of its iron and zinc content. In beef iron can be found in hemo- or mioglobulin that is why it assimilates and benefits better then the iron in plants. This specific feature of beef plays an important role in the prevention and healing of anaemia. The dietetic estimation of beef is even favourably influenced by that the anticarcinogen conjugated linoleic acid's (CLA) main source is the product of ruminant origin *(Csapó et al, 2001),* and of its omega-3 and omega-6 proportion corresponds to the recommendations of health support diet (≤5:1).

Selenium Enriched Egg

According to international statistical data *(FAO, 2006)* nowadays world wide egg production has increased from 15,5 million tonne in 1961 to 55 million tonne. The unbroken increase of the world egg production is caused by the expansion of the production in the developing countries, mainly in China. China is still the largest egg producer in the world: its production was 22,3 million in 2000. The egg production exceeded the 6,3 million tonnes in 2004 in the European Union (EU-25).

The average egg consumption of the world is 7,8 kg per capita/ year (about 130 pieces). The largest consumer countries are: Japan (19,4), the Czech Republic (18,2), and the Netherlands (18,1). Hungarian consumption stabilized at the level of 300 pieces/capita/ year and the forecasts show further moderate increase. This is an outstanding number in international comparison as well and it provides the first place for us in the EU (17kg/capita/year according to statistical data from 2003).

In the middle of 1980s a lot of articles were published that condemned egg – and other foods with high cholesterol level e.g. butter – in the leading papers of Europe claiming that its consumption increases the risk of the formation of the heart- and cardiovascular diseases. Now we are the witnesses to re-targeting of egg. Instead of the negative discrimination marketing endeavours to emphasize the benefits and favourable nutritional ingredients *(McNamara, 2003).* Egg is considered a health-protecting, so called functional food because of its valuable ingredients.Egg is rich in polyunsaturated (omega-3) fatty acids: the rate of unsaturated

and saturated fatty acids is 2/3 and 1/3 which is ideal for the human body.

Being the carrier of fat soluble vitamins (A, D, E in case of egg), proteins with their good effect on bile, promote their faster absorbing. Egg can be considered the most important vitamins D source which is remarkable considering the wide-spread osteoporosis. The most important natural source of the lecithin containing cholin is the yolk. Moreover egg has a low calorie level, therefore it is recommended for people on a diet.

Nowadays enrichment in Selenium is a stressed field because it is an antioxidant: the increased n-3 fatty acid consuming has an overburdened effect on human antioxidant system therefore it should be strengthened by selenium at the same time. Selenium is proved to decrease risk of the formation of the heart- and cardiovascular diseases *(McNamara, 2003).* Nowadays egg is enriched in vitamins, minerals, Omega-3 fatty acids, lutein, it is made in organic and naturally way, and these features are used by marketing during the targeting on the markets.

Conclusions

All the four product groups (presented) in the study have important nutritional-biological benefits, while at the same time they satisfy special consumer needs as well (e.g. goose liver and rabbit meat). First fact defines the necessary marketing activity trending their sales that is besides the health protective function it is important to highlight the special character as well. The marketing means of the product strategy can be the following: distinctive trademark strategy, nice and attractive pacing, unique product qualities, as well as target-group centred quality. Companies can connect their trademark strategy with the healthiness of foodstuffs that is we can highly improve the acceptance of business trademarks if we highlight "health image". The use of collective trademarks which certify healthiness offers great, unexploited possibilities. The new product features have to concentrate on those nutritional benefits that are considered important by most of the population. Quality has an outstanding role in the judgement of foodstuffs. In spite of this a lot of people say that the Hungarian consumers are more sensitive to price than quality.

It is very important to plan integrated communication carefully in order to spread health protective foods. At present the greatest problem is that consumers are not aware of the nutritional-biological benefits of health-protective foods. The only biggest problem is that general practitioners are not always properly trained concerning the connection between healthy nutrition and health diseases. In this situation the most important communication task is the objective, factual informing and education which is free form industrial interests.

The appearance of health protective, niche products necessitates the forming of a new type collective marketing conception in the centre of which there are new trademarks, the establishment of so-called regional trademark communities and origin-protection. In this field Hungary has excellent possibilities and the profiting of the benefits has to be helped by both the branch and national collective marketing strategies. The EU also gives financial support to activities the aim of which is to acquaint agricultural products and foodstuffs, or to promote trade in the market of the EU.

Acknowledgment

We would like to thank for the Hungarian leadership of the NKFP project for supporting our researchwork (research topic number: NKFP 4/024/2004).

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Economic connections in food chain as part of agribusiness

Introduction

If you begin to analyze the modernisation of Hungarian agriculture it is obvious that all the possibilities in agribusiness should be taken into consideration, as agribusiness involves the system of activities and organisations in connection with agricultural production. A harmonised development serves the interest of all the participants of the system and can favourably influence the related processes as well.

Like all other human activities, the production and consumption of food have an impact on the environment. The food chain covers the agricultural production and its inputs and the processing, distribution and consumption of food. The concept of "sustainability" has been integrated into manufacturing industry in the recent years, but only recently has this concept been incorporated into food production, where it mainly focuses on agricultural production processes and the conversion of agricultural products into final food products.

1. The essentials of agribusiness

Originally the word agribusiness was used in American professional jargon. It covers all organisations related to agriculture and all the connecting activities.

It is well known that the straight agricultural activity is preceded by a range of other activities. A significant part of production inputs comes from different industrial plants, outside the agriculture. It is well illustrated by the data of *Table 1*.

It is also obvious, that a huge amount of products produced in agriculture will be input to industrial productions.

If we take a look at the *organisations involved*, we can see that agribusiness is the integration of those contributors that make the economically reasonable farming possible by fulfilling a particular task before or after the agricultural production.

According to **Udovecz** (2002) the share of agribusiness from the GDP of the production branches in Hungary is about the same (13–14%) as in the USA. However, while the American agribusiness quintuples the GDP of foodstuff economy (agriculture and foodstuff industry), the Hungarian agribusiness can increase it only by 50%. This circumstance makes it especially reasonable to develop the factors and connecting system of agribusiness harmonised.

2. Processes in agribusiness

a) The "material" version of the linkage system related to

Table 1. *Average farm inputs in EU countries, in 1990's*

Type of input	Distribution of percentage
Animal feed	35
Farm implements	18
Fertilisers and soil improvers	10
Energy and lubricants	10
Crop protection products	6
Seeds	5
Other inputs and services	16
All input	**100**
Share of input in production value	52

Source: Own calculation based on Tracy, 1993.

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agribusiness *(Figure 1.)* demonstrates what kind of linking net runs the entire system.

Nowadays, the competition in the market of *industrial inputs* that are necessary for agricultural production is quite keen. Thereupon the quantitative and qualitative characteristics of the supply have reached a level never seen before. As an example, today in Hungary a farmer can choose from 76 thousand (!) different agricultural machines. The situation is similar in case of other industrial inputs. However, it is regrettable that above high quality suppliers, some low-quality suppliers appeared on the market offering goods even with expired warranty.

Farmers short of capital often decrease their costs by omitting some work phases, even if they were necessary from technological point of view.

This might be the main reason of the drastic drop in average crop and in most cases the qualities of harvested crops also diminish. **In economic respect,** this is a great problem, as products of low-intensify farming can be delivered to the foodstuff and other industries only with extra capacity. A further problem is that storing and delivering raw materials of low quality and low value take unnecessary capacities and decrease competitiveness.

b) From economic point of view, the most critical problem related to the changes in **agriculture** is that farm sizes have been frittered away. While inside the European Union a land concentration has increased as never seen before, in Hungary the land has been frittered away. It is obvious that under these circumstances delivery costs more and at the time being there is not even a faint chance for using up-to-date logistic methods. Larger farm and land sizes can be argued in several ways.

There are different strategies that aim at an environmental-friendly food production paradigm. Organic agriculture can be defined as a production system that relies on natural products and processes to foster crop growth, maintain or improve soil quality, control pests, and encourage biodiversity. Because of its emphasis on soil health and prohibition of the use of certain chemical input, it is expected that organic agriculture can make an important contribution to sustainable agricultural production.

Farmers may be faced with additional costs when they have to produce in an environmentally more benign manner. This is regarded as a main obstacle to such foods obtaining a larger market share. However, the authorities might develop corrective measures to overcome this problem. On the other hand, foods produced in an environmentally conscious way have an added value compared to foods that are produced in a traditional way. The issues of 'health' and 'safety' might contribute to this added value.

c) The main characteristics of the transform of **foodstuff industry**:

– Privatisation started in the foodstuff industry in Hungary. The incoming foreign capital saw favourable possibilities in privatising special branches of foodstuff industry (sugar, tobacco, beer, vegetable oil) that could be featured with relatively homogeneous technology, with mono or oligo market positions and with safe home market.
– The privatisation of different foodstuff branches went on as the time passed by. Meat, poultry, canned goods and wine industries suffered a lot by having lost the former markets, a significant number of companies went bankrupt.
– The marketing system of foodstuffs has been transformed as well. The previously monopole foreign trade companies disappeared and their roles have been taken over by a huge number of competitors.
– The big changes in economic surroundings of food-industry, both on input and output sides, asked for new requirements in the logistic systems of the companies. As to the development of input side logistics is concerned, it is particularly important to purchase suitable agricultural raw materials at reasonable prices. Nowadays one of the main input-side logistic problems in the Hungarian food industry is the disintegration of the production background. The increasing difficulty on the output side is the growing ascendancy and the high market shares of multinational trading companies.

Packaging in particular has to be considered as a critical issue by the food processing industry, since consumers often correlate the environmental friendliness of a food product with its packaging.

Producers may develop strategies to increase consumer's demand for environmental friendly foods by influencing wholesale and retailing. The environmental friendliness of food products has to be communicated to consumers.

Minimization of packaging and packaging waste is a critical issue here too, for the above mentioned reasons.

Environmental issues are important to the food processing industry for both ecological and economic reasons. The key challenges are reduction of packaging wastes, efficient use of production inputs, and the minimization of pollutant discharges to air, water and land. The development and

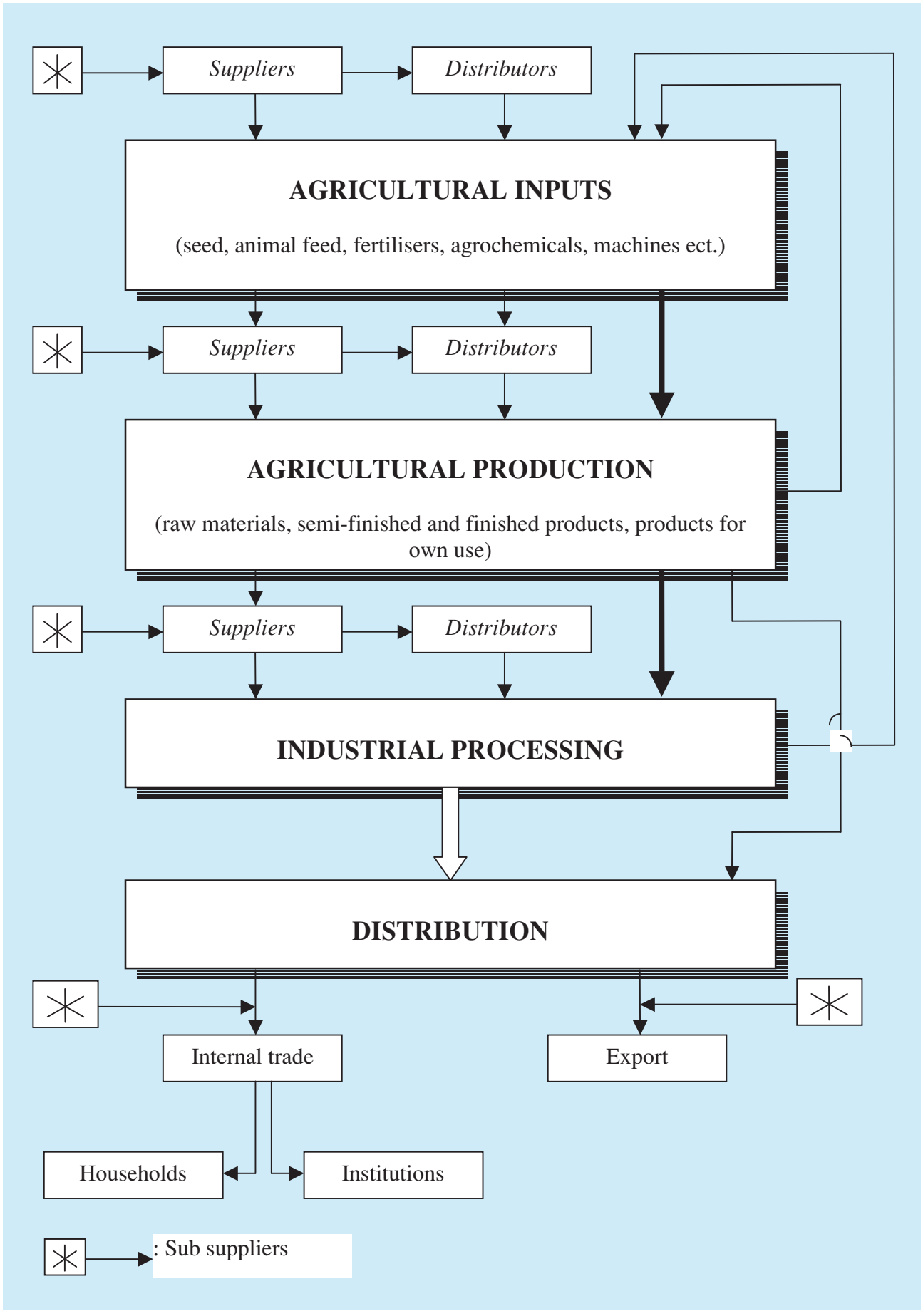

Figure 1: *Material and Economic Connections in Agribusiness*

implementation of pollution prevention and cleaner technologies should be enhanced and environmental auditing and certification may be a way of stimulating this.

d) In the **foodstuff trade** both wholesale and retail are dynamically concentrated.

This is partly favourable as multinational food traders knowing market demands, require high-standard logistic services (timing, quality, package etc.), prepare home suppliers for the EU requirements after the accession. However, on the other hand , there is a real risk that the huge trading companies will take advantage of their economical power and rewrite a range of otherwise normal market processes. *On the whole:* we can forecast that the generators of implementing the agribusiness conception can and will be the multinational food traders.

Wholesale and retail companies can develop purchasing criteria for their suppliers. Products have to meet certain environmental performance criteria before they can be sold in a shop.

3. How to develop the supply chain?

The **five key steps** to develop a supply network strategy are:

– Understand what supply chains you have
– Define what service is driven by customers – aligning with customers and suppliers
– Understand the cost drivers of each supply chain and the total cost/reward impact
– Minimise the number of different supply chains that are required to deliver the required level of service and to respond to the dynamics of the market place
– Develop the network that allows these multiple supply chains to make best use of resources and assets

The **five principles** of intelligent supply chains:

1. Manage Information Not Assets
   – Take control of the Supply Chain decision process – be the Kingmaker
   – Out-source non-core capabilities but maintain visibility of the internal and external supply chain

2. Collaboration
   – Process integration is more important than technology integration
   – Make joint ”Win-Win” decisions using shared information

3. Build Flexibility Not Capacity or Inventory
   – Built flexibility into the Supply Chain at all levels
   – Manage flexible arrangements with contract manufacturers, 3PLs (Third Party Logistics providers)

4. Speed
   – Speed to Market
   – Speed to Customer
   – Speed to Change

   Use Technology as an Enabler
   – Implement a robust and scalable architecture to integrate internal supply chain functions
   – Ensure the architecture is ”open and easy” to support collaboration with Supply Chain partners

Using the above mentioned principles we can improve our results in agribusiness.

4. Conclusions

The model diagram *(Figure 1.)* illustrates the material and information processes and shows the necessary economic aspects. In the lack of reasonable economic connections the system is unable to achieve the expected results.

In respect of economics four elements of the system are worth to be considered:

- production of agricultural inputs;
- agricultural production;
- industrial processing and
- distribution.

The tasks above mentioned come from the individual system elements, it is seriously worth considering the material and information processes in the agribusiness as a whole that is among the sub-systems as food chain problems.

This study – undertaking the agricultural bias – is going to contribute to the solution of the problems in question and gives some basic principles to develop an “intelligent” supply chain in the Hungarian agribusiness.

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P. Á. Biacs[1], V. Solymosi

Traceability in focus

Introduction

All the primary producers, feed and food operators have to ensure traceability, but there are no official rules on how this is to be done. In this article the authors try to place the possible versions into groups and evaluate them. Based on primer and secondary resources the advantages and disadvantages of the versions are demonstrated.

Traceability in scientific literature

Ensuring the traceability has been obligatory along the entire food chain by special methods since 01.01.2005., according to the 178/2002/EC. Because the directive does not provide guidelines on how to establish such a system the food operators have to develop their own convenient methods. Several research projects were capable to improve properly working systems, but these solutions were mainly appropriate for the phase of food-processing (European Meat Expert Group 2005, QLK1-2001-CT-02229 R&D EU Project, 2001-2005). In the frame of the project methods for DNA examination was improved to verify the link between the particular animal and the meat product made of him (Milan, 2004, Ghirardi, 2004).

According to Szabó, the primary producers, feed and food operators should take into consideration the principles of easy operation and of "one step back, and one step forward". The previous one means that all segments of the food-chain should have the simplest method to ensure traceability and the least one says that each enterprise should not have to know more than the supplier and the buyer of a particular product. Besides registering the necessary data, the operators are supposed to upload all the collected information into a central database, this way the entire products' channel becomes accessible via the Internet (Solymosi and Magyary, 2006). This kind of the traceability systems is likely to provide additional advantages for the product.

As was mentioned above, a traceability system has to be built up from unique methods, so to ensure traceability, a single invoice is not enough. Generally, the producers have to sign each of the products with a unique batch-mark, because this way each of the products can be identified by pairing the batch-mark with the date of shelf life.

Grouping the versions of traceability

Evaluating the permanently working versions, we are able to claim that the traceability systems can be grouped into several groups. In one aspect food-safety-purposed and market-purposed versions can be differentiated. The principles of the food-safety purposed traceability systems are in the relevant law and its main aim is providing the possibility to recall the non-suitable products. The point of this study is to scrutinize the willingness to let this kind of system work at food and feed operators. On the other side there are large scales of expectations with the market-purposed systems from the fulfilling of the market-demands to the marketing (Szabó, 2005).

According to another point of view the traceability systems can be divided into qualitative and quantitative versions. The quantitative systems are capable tracing or tracking uniquely marked products or batches of products. This way the top-up and top-down following can be implemented. A qualitative system is based on a quantitative one and controls one or more feature beside the product itself. While this version needs a well-working quantitative system it is working mainly under experimental circumstances but it can be a great possibility for the future.

In this article we are to evaluate the traceability in the aspect of the way of their working. According to this standpoint, we can divide them into 3 main group; the manual, the electronic

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and the mixed versions. A conventional and well-working method can be a system that is registered on paper (manual system). In this case the food-operator develops a registering system that includes a sheet for reception of goods, for the processes that include mixing different kinds of raw materials and for the sales besides marking the animals and goods with conventional methods. We suppose that this version can be developed and operated cheaply.

We are able to use IT solutions both for marking and registering. That version is called the "electronic" one. Typical instruments are transponders (antenna, capacitor and chip in a capsule) and the EAN-128 bar-codes. The word "transponder" comes from the transmitter and responder terms. It is used under the livestock's' skin to identify them by a unique code. Great advantage of this version is the opportunity to trace back all the products via Internet. We suppose that the cost of the introduction and operating are higher than the previous one's.

The third way to ensure traceability is the mixed method. This way of tracing includes solutions from the electronic systems and sheets from the manual systems. This is a relatively new version that enables avoid the disadvantages of the mentioned two meods.

Manual systems

We surveyed 30 Hungarian primary producers. The results can be seen in the following *figure 1*.

On *figure 1* we can see that 23 of the 30 surveyed enterprises let traceability systems work. All of the systems was based on the methods of the manual systems, because they solved registering in different sheets due to other registering obligations (eg. feeding sheet) The rest of the enterprises also tried to ensure traceability but one ore more links (sheets) was missing of their manual systems that is why we can not claim that they have a properly operating system.

In the food-producing the most essential part is the meat-processing plants. In a Hungarian meat-processing plant (in Csurgó) which uses 2000 kg of raw materials daily, the length of registering time can be seen in the following *table 1*.

In the first table we can see that the time of monitoring and registering takes about 57 minute a day. Due to the fact that the operation of that kind of the systems does not need real investments, we are able to establish that the daily cost the operation of a manual traceability system is approximately equal with the cots of an employee's fee and commissions in an hour.

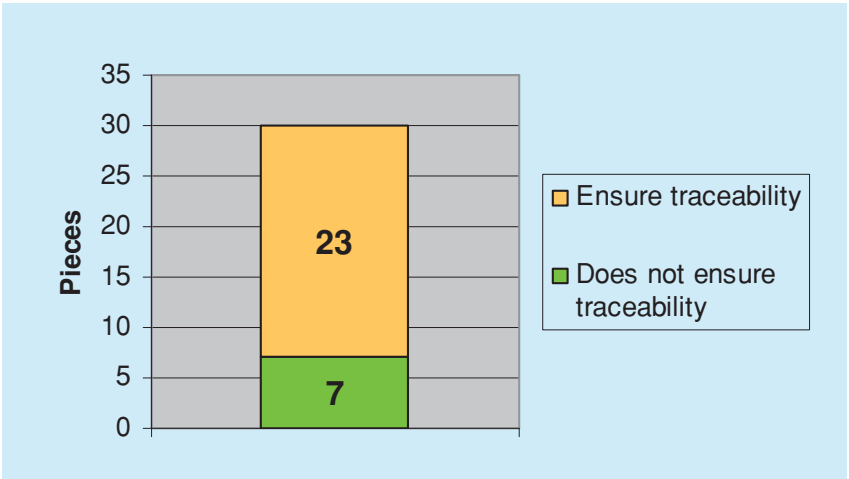

Figure 1. *Traceability at primary producers*

Electronic identification Radiofrequency identification

In the primary production the RFID (Radio Frequency Identification) system means injecting a special tool (transponder) under the livestock's skin or intraperitoneally. The transponders can be used in 4 different frequency,

Table 1. *The daily average registering and monitoring time in a food-processing plant*

	Raw-material receiving	Preparation	Curing	Smoking	Stuffing	Melting
Daily average registering and monitoring time (sec)	688.8	417.24	940.68	1249.9	3.34	96

Source: Solymosi, 2006.

Table 2. *The recovery rate of the transponder*

Breeds	Piece	Identifying before cutting		Succesful identifying at the cutting hall	
		Piece	%	Db	%
White hybrid	384	375	97.66%	375	97.66%
Iberian small sized extensive	247	229	92.71%	235	95.14%
Iberian small sized intensive	943	938	99.5%	–	–

Source: Alves and Valdovinos, 2005

among these the 125 kHz and the 134.2 kHz are convenient for the primary production because that kinds can be read throw the tissues. The recovery rate of the transponders can be seen in the following *table 2*.

On the *table 2* we can see that the identifying rate of the transponders are close to 100%, but the rate in extensive Iberian pigs is only 95% that may mean too much fault in the field of operating the systems.

Bar-codes

Electronic identification and traceability is widespread in the phase of food-producing, mainly at the firms of greater volume. The EAN/UCC standard is a common solution that represent the uniting of the EAN (European Article Number) and UCC (United Council Code). This is the way the GS1 coding form was established and since than over than 1 million enterprises have been using it all over the world. The EAN/UCC-13 bar code uses only 13 characters that is why it is not convenient for the unique traceability. It can identify a group of products that is a huge help for the shop-assistants and for accountancy. The food-safety purposed traceability however, demands the EAN/UCC-128 bar codes that makes available the identification of a unique product because these contain the application identifier codes in line with the 1760/2000/EC and the 178/2002/EC.

The bar-code identification is an element of the electronic traceability systems as well as RFID-technology. The cost of this kind of system was measured and evaluated in the frame of the greatest relevant project, in the QLK1-CT-02229 project referring to whole product channels (from the primary production to the retailers). Livestock were identified by transponder and from the cutting hall each of the products had a unique EAN/UCC-128 bar code. All the data were collected into a central database that could be reached through Internet. The operation of the system was certified by DNA-examinations. The costs in the aspects of each product channels can be seen in the following *table 3*.

Evaluating costs we can establish that the electronic traceability system surely raises the products prices.

Cost comparison of the manual and electronic systems

The cost comparison in pig product-channels that use the data from the surveys of the manual and the electronic systems can be seen in the following figure, referring to a 2000 kg raw-material using meat-processing plant.

Table 3. *The costs of electronic traceability*

Breed	€/identified animal/year	€/carcass kg
Sheep and goat	4.64	0.49
Cattle	17.99	–
Pig	7.98	0.066

Source: QLK1-CT-02229 project, 2005

On *figure 3* we can see that there is a huge difference between the costs of the two systems. However, evaluating the variations we should not scrutinize only the costs because the rises in prices (due to the higher cots) may be compensated by the additional advantages of the electronic system (eg.: the Internet trace-back). So that the relevant researches beside food-science should focus on the marketing-surveys to find out the consumers preferences of the Internet trace-back.

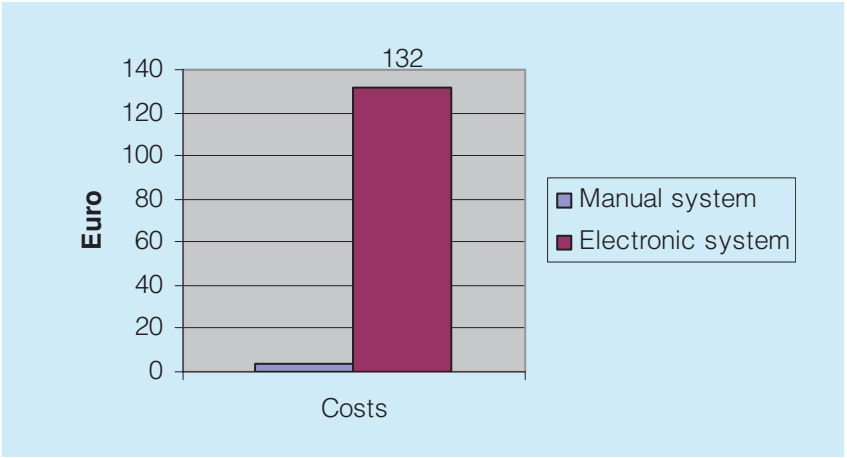

Fig. 3. *Daily Costs of the manually registered and electronical traceability systems*
Source: Solymosi, 2006. és QLK1-CT-02229 project

Mixed identification

The mixed way of the traceability includes methods both from the manual and also from the electronic one. Because it is a new version of the systems, we do not have as many data as were measured in the cases of the previous versions. That is why we claim that the mixed way should be scrutinized in the frame of research projects to be able to compare trustworthy information.

We have tried that version in a meat-processing plant in the town of Kaposvar. They collected data in sheets and uploaded them into a central database. This way the costs were a bit exceed the cost of the manual system but the same advantages can be reached than we experienced at the electronic one.

Conclusions

Traceability can be ensured in 3 different ways: in the frame of the manual systems the food operators register the data in special sheets. The electronic system collects the data itself however, the investing and working costs are much higher. The manual system is characteristic in the primary production, but can not provide the Internet trace back in contrast to the electronic one.

To eliminate to disadvantages of the two main versions, a new way called mixed system is developed. We do not have the same volume of data compare with the other methods but the results of the first survey are promising. Our advice is that the relevant researches should focus on developing mixed traceability methods.

We were able to describe the 3 main versions of traceability systems aiming that further research should choose the appropriate method for each phase of the food-chain.

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How the consumers judge the food safety of traditional horticulture products?

Introduction

The demand for traditional products is on the rise in the world of globalisation. Therefore in the south Plain region an effort is made to sell special products that are specific to the region instead of producing mass products. These unique products are competitive even on the world market. Well selected marketing tools can enhance the popularity and the market volume of Hungaricums produced in the South Plain Region.

In the developed Western-European countries a process has started in the 1980s, in which the consumers' demand has increased for the top quality goods, which are typical of regions and produced traditionally. In the world of globalisation nowadays more and more people realise the need to launch on the market those products with great tradition which are typical of regions and represent additional values. Products, suitable for strict requirements of origin-defence or certificate system of traditional, unique feature, can expect liberalised regulation on the EU markets (Lakner, 2004).

Consumers in every country expect healthy and safe foodstuffs. In our work we tried to find answer for the question how the Hungarian customers see the safety of the foodstuffs. It is our interest to eat healthy and safe foods, and as our old proverb says: "What we eat, that we are." Several surveys have been made about the food purchasing habits, but we have started to analyse food safety recently in Hungary.

The economic relations of the food safety are very significant. Every household spends 20% of its income on foodstuffs in the European Union (Ferencz, 2005). Competitiveness of domestic and foreign foods is increasing because of the rise of consumer confidence, and production is also on the rise.

Foodstuff safety policy put more and more weight on the government. They have to take effective measurements to guarantee the safety of the foods (Totth, 2005). Hungary cannot avoid to work out a national strategy.

Material and method

We made primary examinations in the autumn term of 2005 on the College of Kecskemét and the Food-industry Department of Budapest Corvinus University. Both of them have a nationwide attraction-zone, so the sample is almost representative. The questionnaires reached all parts of Hungary, and made sure the distribution age, qualification, occupation and residence.

The questionnaire is the most important device of the primary market research methods. During our quantitative research we used standardised questionnaires, which suited to give numerical data. The standard characteristic of the questionnaire makes it possible that the answers of different consumers are comparable.

During the primary research collected data were evaluated by statistical-mathematical methods. We used the SPSS 10.0 for Windows and LISREL 8.30 program-package during the examinations. We used the following main methods: factor-analysis, multi-dimensional scales and Correspondence analysis.

The behaviour of consumers can be measured easily with the change in the relationship between risk and confidence. Risk is an inner and hidden feature of the foodstuffs. It is very difficult for the consumers to realise the risk. Confidence measures that people do not exploit each other's sensitivity. I make known the results of a qualitative examination which relates to the relationship of the risk and confidence in connection with the food safety.

The consumers' opinion about the food safety can be seen on *Figure 1*. It can be seen that the 13% of the respondents think the foods safe, and the 9.3% of them think them unsafe. I could not find significant difference between the "yes" and "no" answers. Those are also determining who answered that the foods are "generally safe".

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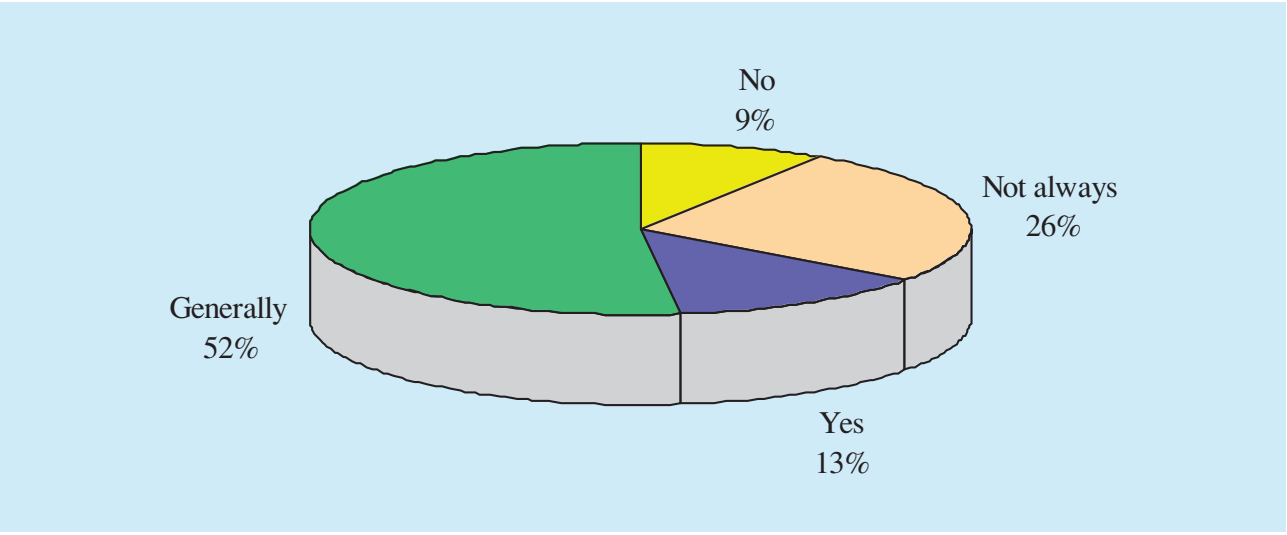

Figure 1. *The safe of the traditional foods*

On *figure 2–3*. I examined whether the customers know the products what they buy during the purchase. 70% of the respondents read very rarely the information about the components on the products, 4% do not read at all. Customers buy most of the products without knowing the materials in the products and knowing their proportion.

On *figure 4*. the rate of additional materials are come out of the scale. It is a very important requirement in connection with the additional materials, that they cannot be harmful for health, and their usage is connected to permission by the authorities. It is thought-provoking why toxins and poisonous materials get to the last place.

Conclusions

Nowadays, with penetration of globalisation become forgotten the food preparing skills that were transferred from one generation to another, and included safeness of the process, as well. Culinary habits and style of living of people, families have changed; tourism involves more and more people. Claim for unknown dishes, foodstuffs increased in Hungary, too.

Consumers in every country rightly expect to get safe and healthy food.

- Consumer's judgement of foodstuff safety is: only 13% of respondents answered with definite Yes to the question whether the foodstuffs are safe or not. Other respondents have objections relating to safety; they believe that with penetration of globalisation the uncertainty is more and more increasing. When classifying the dangers of the foodstuffs safety the respondents emphasized the role of additives; toxins were put on the last place. These results require further investigations.

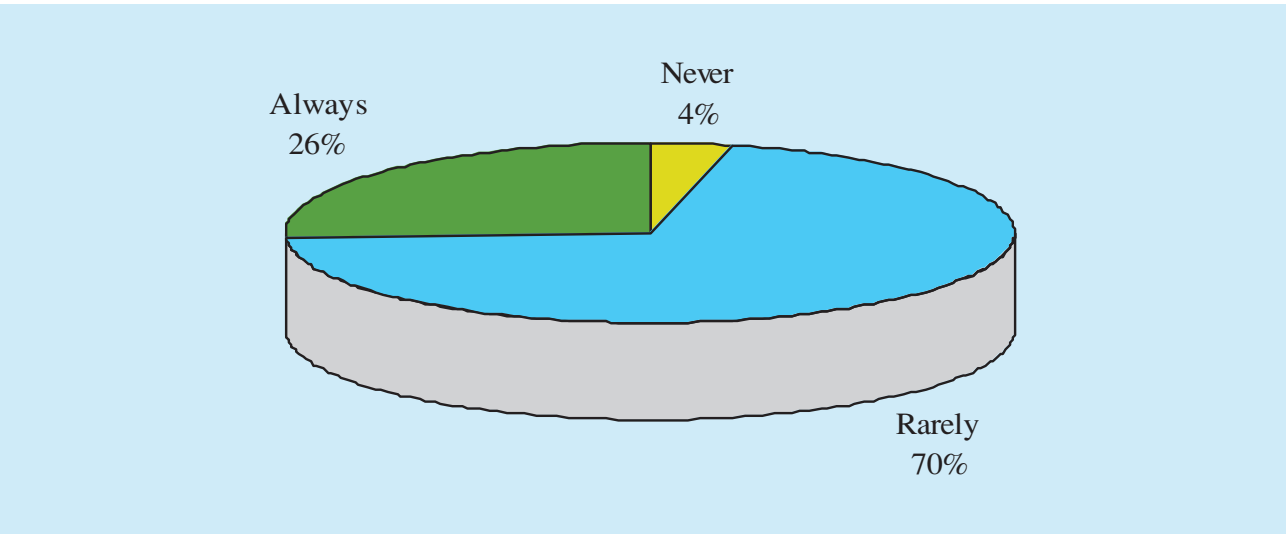

Figure 2. *Knowledge of the components of foods*

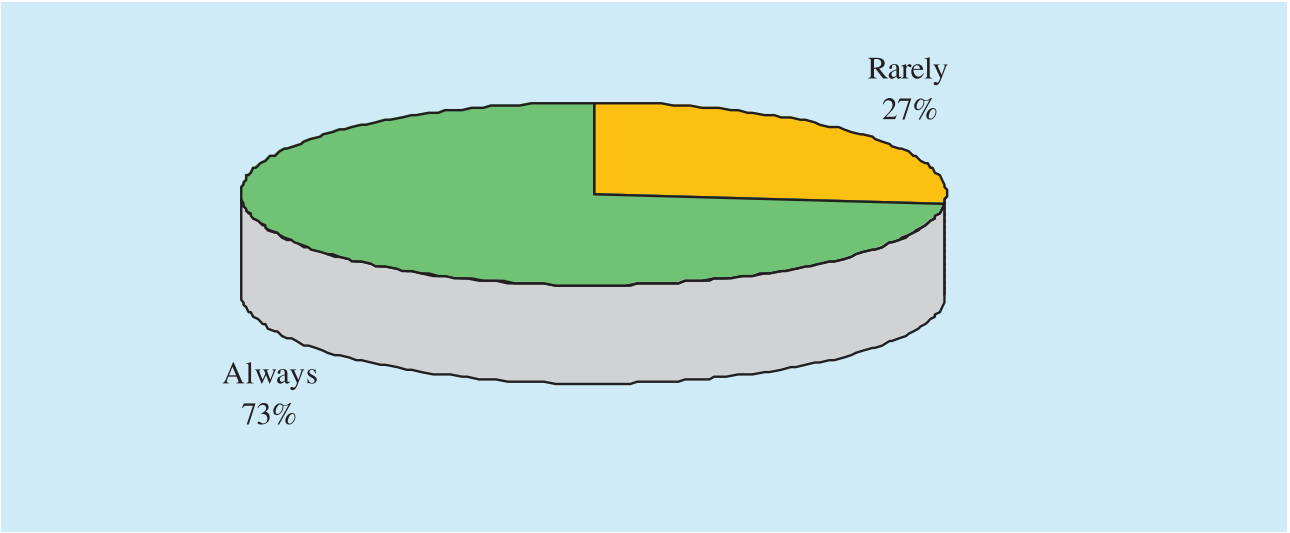

Figure 3. *Knowledge of warranty time*

- From among the factors influencing foodstuffs safety the respondents deemed hygiene circumstances to be of great importance; they identified as the largest problem the unprofessional application of chemical insecticides.
- The respondents prefer to purchase traditional foodstuffs in trade shops. From further answers it can be seen that most respondents deem the price to be as important as the foodstuffs safety.

The health safety of foods means that they do not cause any damage in the health of people, and foods have to be the basic factor of healthy environment and lifestyle. Illnesses caused by lack of food quality cause more and more problems today. Illnesses caused by the lack of food safety:

- Threaten the health and life of individuals,
- Mean great economic and social burden,
- Causes economic and health catastrophe,
- Threaten with the collapse of a product domestic and international market in hours.

In case of quality improvement of products:

- Costs of medical treatments are decreasing,

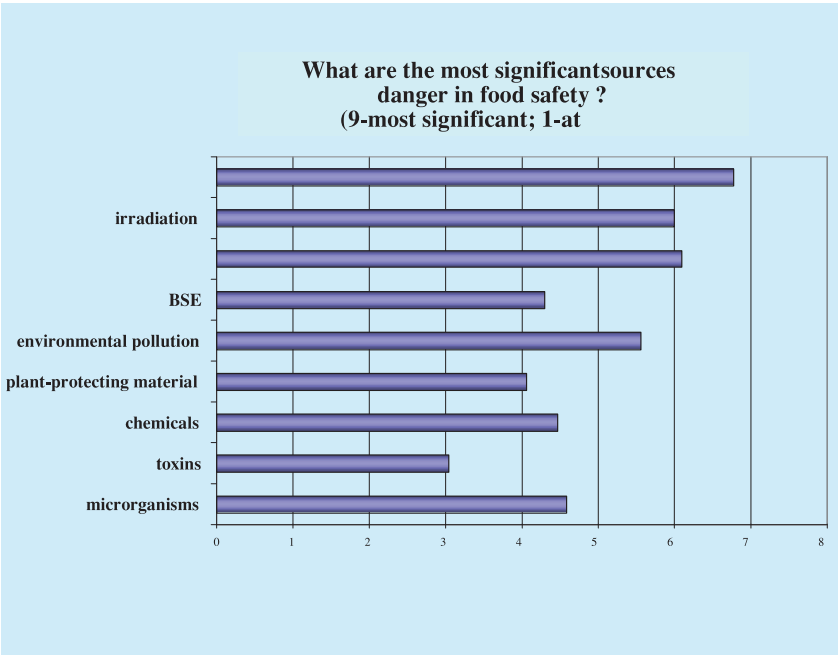

Figure 4. *Rank of the sources of danger according to the Hungarian customers*

- Absence from work is decreasing,
- Productivity and export is increasing,
- Employment, social welfare and incomes are increasing.

In the next years the big issue of the Hungarian food industry will be stabilising and communicating of foodstuffs safety. This will require further, continuously updated, comprehensive and representative assessments and further research.

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