

**OUR DAILY BREAD – CURRENT ISSUES CONCERNING FOOD SAFETY****ZOLTÁN GYŐRI**

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*"Who controls the production of food from its roots,  
handle all of our destiny, since nobody can live without food." (Jakob Meyer)*

Expectations regarding changes related to food production, transportation, distribution and marketing have changed considerably in several regions of the world over the past decades. This is especially true for highly industrialised countries, which initiated this world-wide integration and thus shifted the emphasis from isolated local markets to the world market (HUNT, 1993). In the course of this shift international businesses were established that embrace the areas of production-processing-distribution outside the companies operating within national frameworks. Especially since World War II this period has also been characterised by other social changes as well, out of which special emphases should be given to urbanisation, the improvement of industrial production and services, the increase in the living standard and the emergence of new consumer expectations. As regards food production, the relationship between agricultural production and the population has changed inasmuch as earlier the number of people living on agriculture or being closely linked to agricultural production had been higher and food processing had not been internationalised either. The changes setting in are illustrated by the following list:

**Intensification and its consequences of**

1. Increases in average yields (artificial fertilisers, new varieties, machinery, expertise)
2. Increases in yields
3. Concentration of production
4. Concentration of processing
5. Concentration of product distribution
6. Acceleration of urbanisation (houses without pantries)
7. Consequences:
  - increases in environmental pollution;
  - Salmonella, BSE, growth hormones, dioxin;
  - nitrate content, heavy metals, residues of plant protection agents, mycotoxins;
  - spread and increase of the utilisation of food additives;
  - a demand for using GMOs.

The concentration of production-processing-distribution, however, involves the danger that on the one hand products of unsuitable quality from the point of view of nutritional physiology and on the other hand ones that may contain substances harmful to human health will become widespread among consumers (BÁNÁTI, 2002). There were several examples to this effect in the last decades of the past century since salmonella epidemic, BSE and certain plant protecting chemicals occurred as well as

natural toxins of fungi caused or may have caused damage to consumers in some highly industrialised countries. This is the reason why in addition to food quality we have also to get acquainted with the concept of food safety, which refers to food consumption without doubts, i.e., they cannot harm the health of the consumer (RASPOR, 2008). Their nutritional physiology related qualities may be different since, according to research about 70% of possible contaminating substances may enter the human body together with food.

Today we must talk about the physical, chemical and biological hazards to food safety and the number of opportunities for these to occur is rather high and this whole issue is complemented by the new concept, which is called bioterrorism. In the process of agricultural production itself also there may appear new sources of danger, the number of which is only increased by the techniques and the materials related to them used in the course of processing raw materials. Their application may be justified by the increases in quality-related consumer expectations (taste, colour, texture, sell by date) in comparison to earlier periods and the demand for stable quality coming to the foreground. This latter concept is gaining in significance in our more and more global world (tourism, consideration for religious customs and habits, business trips). One highly controversial new source of danger in agriculture is the production of genetically modified plants as raw materials for food and feedstuff (BÁNÁTI, 2007a, 2008). Even today this area is characterized by stark contrasts with researchers as well and so it is not easy for the consumer to take sides or make choices. Increases in nutritional physiology values, resistance to pathogenic agents and pests as well as improvements in properties regarding processing technologies are to contribute to solving problems of the world's food supply and may also bring favourable results for mankind. In opposition, however, researchers dealing with the issue are claiming that there are also environmental, human sanitation, ethical-moral, legal, political and scientific concerns are also involved. It should be remembered, however, that it is the publication for the public of the findings of further research that may provide adequate knowledge on shopping choices for the consumer and so (s)he may have a choice, although within limited options, as regards shopping for items or choosing services.

Following certain problems regarding food safety in industrialised countries it was first the USA in 1977 and then the European Union in 2000 that drew up new strategies which implemented the "from the soil to the table" principle (MOLNÁR, 2002). This means that food safety should embrace all agricultural inputs and the primary agricultural production as well as food production and distribution. All the elements involved in the food chain are to be investigated according to the following scheme:

#### Links of chain involved in food safety

- ♣ Production of agricultural inputs:
  - ◆ Plant protecting agents
  - ◆ Medicines for animals
  - ◆ Feedstuff
- ♣ Primary agricultural production:
  - ◆ Impurities in crop products
  - ◆ Impurities in animal products
- ♣ Primary food processing:
  - ◆ Milk production
  - ◆ Slaughtering of animals

- ♣ Secondary food processing:
  - ◆ Food industry
  - ◆ Catering
  - ◆ Food trade
  - ◆ Preparing home-made foods

All the above calls for a regulation and administration of the processes that enable the verification and monitoring of the movement of pollutants from the field to the table of the consumer. This is accompanied by the so called risk analysis and assessment, which involves the provision of easy to understand information for the consumer as the immediate identification of mass diseases and giving information to the public are indispensable (BÁNÁTI, 2007b). According to this view a system of food safety includes the so called good practice in processing, which is then supplemented by good practices of management and hygiene and the ever stricter observance of catering and culinary regulations. The introduction and implementation of the obligatory HACCP system, which sometimes raises storms, is built on this approach. The completeness of the system of food safety is secured today by ISO 9000 series of standards and the ISO-22000 standard, the latter being formulated on the basis of the ISO and HACCP systems as well as the introduction and continuous maintenance of quality management.

Wheat, the raw material crop for a staple, offers an excellent opportunity for the presentation of the complex issues raised above, which is the base material of the daily bread in very many countries of the world with different populations. This claim is well illustrated by the fact that it has a total production area of 220 million ha and the total amount produced was 606 million tonnes in 2007 (out of which almost 100 million tonnes were involved in international trade). Out of its sowing area of over 1 million tonnes in Hungary the uses of this crop are as follows:

- Human nutrition: 1.5-1.6 million t
- Animal feeding: 1.5-1.6 million t
- Export commodity: surplus stock, on average 0.8-1.3 million t.

The daily bread itself is consumed in different forms on the Earth (FARIDI ÉS FAUBION, 1995) and it has leavened and unleavened variants and has different forms and shapes such as the different kinds of flat and risen loaves. With a crop produced in such high quantities under different climatic conditions it is only natural that there may be considerable differences in varieties, average yields, which call for measures such as the ones e.g. that can be seen in Russia these days. Increases in the frequency of the occurrence of extremities in the weather may entail making effective political decisions more often in order to address the “I am hungry and want to eat” type consumer demands and thereby further complicate the bonds of interest in a wheat-based food chain. KENT (1975) sets a fine example of how quality requirements change at the different levels of the production-processing chain (producer, miller, baker, consumer) within the vertical hierarchy of wheat.

The multiple interests in the food chain based on wheat above may best illustrate all the processes that have to be realised in order to secure both the quality and quantity of our daily bread. The complexity of the quality assessment of wheat and wheat products are well-illustrated by the following list, which is far from being a complete one. Table 1 below provides a good example of the tasks ahead of us, which can be arranged in three large groups as follows: nutritional value, technological properties and food safety. Of course, in countries and regions where the dramatic problem mentioned

earlier is raised, food safety would become the most important issue and that would be followed by technological properties and nutritional value would only come last.

Table 1: The most important indicators of wheat quality (GYÖRI AND GYÖRINÉ, 1998)

Quality characteristics	I, MSZ	1. Hectolitre weight
		2. Thousand kernel weight
		3. Grain hardness
Nutritional value	I, MSZ	4. Moisture content
	I, MSZ	5. Crude protein content and amino acid composition
	MSZ	6. Wet gluten content and expansion
Technological properties	I, MSZ	7. Sedimentation value
		8. Gluten index
		9. Fine structure of proteins
Food safety	I, MSZ	10. Falling number ( $\alpha$ -amylase activity)
	MSZ	11. Farinograph value, baking quality value
		12. Alveograph values (P, L, P/L, G, W)
		13. Baking test
		14. Ash content, contents of essential and non-essential elements
		15. Mycotoxins
		16. Residual plant protecting agents (pesticides and insecticides)
		17. GMO
		18. Radioactivity

Everywhere where the question of food supply has been solved at a high level the elements of this list can be considered of equal importance, what is more often it is the choice of the product based on nutritional value that comes first. According to “which one is the best for my health?”

The measures that constitute the wheat supply safety and food safety related activities of the wheat based food chain are to be organised and administered accordingly (Figure 1).

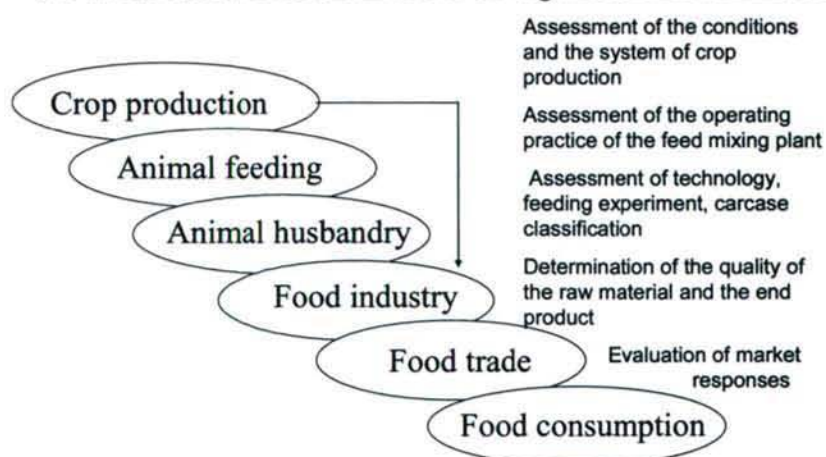


Figure 1: Tasks related to certain elements in the food chain

Thus any food safety system is to be constructed and operated with a view to addressing international expectations. In Hungary it is our membership of the European Union that forces us to act in this way but already since the early years of the last

century our governments have been doing their best in the interests of checking and monitoring food quality and food safety. In order to do so a world-level background of analysing laboratories has been created, whose operation – thanks to our system of higher education – due to the expertise of excellent veterinary doctors, chemists and agriculturists is secured at a high level. The other side of the coin concerns production, processing, distribution and trading cultures where the system of food safety ranging from the steps involved in the “good processing practice” through HACCP and ISO systems to Total Quality Management (TQM) are realised.

The third side of the coin is embodied by the not insignificant task that is put in words and directed at us at different levels of the educational hierarchy. This mass of tasks that embraces tasks from personal hygiene through the hygiene of production to that of catering and trade imposes massive loads on staff working in primary, secondary and higher education and so it is not enough to deal with and teach these issues at the level of higher education. The reader is kindly asked at this point to consider to what extent the relationship between families and agricultural production has changed, how the consumption of ready-to-eat food has increased and so the young generation is no longer in the position to obtain knowledge about quality and food safety that they could obtain from their parents or grandparent 50-60 years ago. This is why placing more emphasis on these issues than in currently done is of special importance in educating young people.

To summarise we can claim that wheat yields that provide the bases for our daily bread are expected to continue to meet human demands for this staple food under more and more extreme weather conditions despite the fact that its use is increasing at the expense of other grain crops. At the same time preparations are to be made in certain regions and countries that in case of calamities, the prices to be paid for this crop will greatly vary due to speculation and thus world market prices are also to be affected. Experience shows that these are the trends that are to lead the analysis requirements, which favour the analysis of numerous factors (in the case of high yields) or that of one or two indicators only and maybe under extreme conditions only tests for food safety may have to be conducted. This is where an adequate and well-applied monitoring system, by the use of which the food safety network may operate efficiently, will gain special importance.

The demands for this activity and its practical aspects are to be communicated more efficiently to the actors of the food chain at the level of education.

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