Food Quality and Food Safety in Hungarian Dairy Farms

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Abstract

In Hungary the introduction of quality assurance and food safety systems have achieved considerable results in the middle of the food-supply chain (i.e. in companies of food industry and trade sector), but in the ends of the chain (in agriculture and catering sector) there are still several problems.

This article and our presentation wish to show a general overview on the Hungarian milk sector, to describe the present situation of the Hungarian dairy farms and try to explore and examine the main difficulties of the building-up process, installation and operation of HACCP System in the Hungarian fresh milk producing sector and, furthermore its opportunities and threats, too.

We also give a short description of the Hungarian dairy sector, the main Hungarian and EU quality standards of fresh milk and the main regulations of milk quality in Hungary and the European Union.

In the final part of our article we wish to present a cost-benefit calculation model calculated for the Józsefmajor Experimental and Demonstration Farm, (a demonstration farm of the Szent István University) where the HACCP System was installed in the last year, and also to determine the strengths and weaknesses and some practical experiences of installation and operation of the system.

The situation outlined in our paper is not unique, it can be applied to the greatest proportion of Hungarian dairy farms.

Keywords

food safety, milk production, milk quality, HACCP System

Introduction

After the political changes in the 1990ies – as a consequence of the structural changes of the agriculture and the loss of the traditional foreign markets – the conditions of Hungarian dairy sector became very unfavourable. This situation developed as a consequence of the radical decrease in the number of cattle (including cows) and the serious lack of capital. More than ten years after the changes most sectors of Hungarian agriculture is still have many problems.

The number of agricultural workers (both skilled and unskilled) has also decreased. As the wages in the agriculture are at a very low level, many of the workers have left the sector. The proportion of unskilled workers increased, especially in animal husbandry, because of the low salaries.

There are different sized milk producer farms, from the smallest ones (1-5 cows) to the large (more than 100 cows) farms. There are many differences between them in size, the used technologies and milk quality.

The safety and quality of fresh milk as a basic material of food industry, is in the interest of the consumers, the producers and the processing industry, in equal proportion.

The most important thing for the *consumers* is to get a safe food without any risk, at the best quality level (nutrition value, aroma and taste) at a fair price. The more developed the country is, the bigger is the demand for quality food.

The *producers* can get their money according to quality classification: the higher quality means the higher price, therefore the quality improvement is a key question for all of them.

The quality plays also an important role in *food processing industry* as the fat and protein content of milk determines the end product. The safety of milk can be increased to the maximum level during the processing (sterile food products), but the main characteristics of these products are considerably changed and can be rejected by some consumers.

According to EU regulations the traceability of all members of the food-supply chain should be developed and the introduction of HACCP system or other equivalent food safety system must be compulsory for all them.

Despite the continuous quality improvements in the food processing industry which resulted safe food with an excellent quality level and which conformed to strict EU standards and regulations, some of the consumers are increasingly suspicious about food.

The food scandals and crises in the world of the recent years, the overproduction of food and the great number of brands, the increasing number of allergic diseases and nutrition intolerance as well as the new trends regarding healthy food and wellness are among the main reasons of this process.

Table 1: Main statistical data of milk production in Hungary between 1997 and 2001

Year	**1997**	**1998**	**1999**	**2000**	**2001**
Number of cattle on 1st December [thousand heads]	871	873	857	805	783
of which cows	403	407	399	380	368
Milk production [million litres]	1931,3	2045,2	2044,5	2080,5	2079,8
Average buying price [HUF/litre]	44	55,5	59,4	63	68,5
Average market price					
milk [HUF/litre]	72,2	80	87,9	104,5	123,7
Gross Production Value					
[million HUF]	-	-.	121910	133570	146430

Source: Hungarian Statistical Office

Fresh milk as a basic product of food processing industry

According to the internationally accepted definition the milk of good quality is dependent on its nutritional value, deliciousness and hygienic features.

The key target of the qualification and classification of milk is to evaluate the above mentioned features, to determine the price according to this evaluation and by this to stimulate milk producers to increase the quality level of milk by bringing new technologies and strict control in order to be interested in reaching the advanced quality level.

The quality of milk is mostly determined by its deliciousness and the nutritional value. The need for reaching a certain level of different components such as protein and fat content can also make influence on breeding and different technological steps and techniques in use.

The even quality level of milk and the stabilization of hygienic standards is in one hand an interest of public health (as milk for human consumption should be free from the pathogens of tuberculosis, brucellosis and mastitis etc.) and it is a critical starting point of food processing in the other as the final food product is influenced by them (such as total count, somatic cell count, fermentation inhibiting factors).

The quality of fresh milk also determines in an indirect way the technological background of the processing industry, as only the highest quality milk can be used safely only in fully mechanized or automatic technologies.

Milk quality standards in Hungary and the European Union

The meanings of the expressions 'food quality' and 'food safety' are very similar. In this paper we use these expressions by the following meanings:

Food safety means such conditions in which circumstances the given food products are not harmful to human health and life quality and don’t cause any damages to the consumers.

Food quality means that all requirements and standards needed in the marketing the product are fulfilled. Food safety should be established in order to protect the consumers' health, food quality is needed to maintain the real value of the products.

Hungary's accession to the European Union is quite near therefore the quality improvement should not be delayed.

The importance of food quality was recognized in Hungary a few years ago. It is quite well known that only those products can compete at the European market which are processed according to the European quality standards and fulfil the strict requirements. The introduction and installation of HACCP System in Hungarian food processing industry became compulsory from 1st January, 2002. The quality level of fresh milk is certified by different boards. The documentation of different examinations and controls and the main food safety and quality parameters should be recorded in the contracts and certified.

The standardization of different food quality products was conducted at first in the 1980ies in the EEC.

After a few years preparation period the Directive No. 85/397/EEC was taken into force in 1985, in which the minimum criteria of total count, somatic cell count and fermentation inhibiting factors was declared. This regulation was amended by the Directive 92/46/ EEC and its amendments in 1992. In this directive the requirements were stiffened and expanded by new ones such as freezing point and number of Staphilococcus aureus.

The requirements concerning fresh milk are influenced by this directive in the European countries – including Hungary – and should be compulsorily followed. The main features and requirements of fresh milk affected by this directive are summarized in Table 2.

Table 2: EU requirements of fresh milk quality

Quality	
Features	**Requirements**
1. Chemical and Physical	
protein content	at least 2,9 g/100 g (3 g/100 cm^3)
density	at least 1,028 g/cm^3
freezing point	-0,520 ºC, or lower
1. Hygienic	
– total count/cm^3	? 100.000*
– somatic cell count/cm^3	? 400.000**
– fermentation inhibiting factors	<0,004 I.U. Pen./cm^3
– Staphylococcus aureus***	3 from 5 samples below 500 Cfu/cm^3 2 from 5 samples between 501-2000 Cfu/cm^3

*Geometrical mean of the last four samples; ** Geometrical mean of the last three samples; ***In case of fresh milk products
Source: 92/46 EEC Directive and its amendments

By the fulfilment of these requirements concerning the physical and chemical features of the fresh milk, the original condition of it can be guaranteed. The main aim of hygienic conditions is actually to secure the human health standards. It is important to underline the correlation between hygienic standards of fresh milk and its quality.

In Hungary a common regulation No. 1/2003 of the Ministry of Agriculture and Rural Development and the Ministry of Health, Social and Family Affairs is in force, this regulates the hygienic conditions of production, processing and distribution of fresh milk, pasteurized milk and milk products.

Quality regulations of fresh milk production in Hungary

The Hungarian regulations on milk quality are in compliance with the EU conditions: the triple system of Food Act – regulations – Codex Alimentarius have been completed by 1998.

- At the present, the XC. Act (Hungarian Food Act) of 1995. is in force in Hungary, with its amendments;
- The microbiological and toxicological regulations of food products are determined by the common regulation No. 1/2003. of the Hungarian Ministry of Agriculture and Rural Development and the Hungarian Ministry of Health, Social and Family Affairs, based on 92/46 EC Directive;
- The limits of contamination of fresh milk are determined in regulation No 9/2003. of the Ministry of Health, Social and Family Affairs amending the former regulation No. 17/1999.
- Quality standards are determined in the Regulation No. 2-51/01 of Codex Alimentarius Hungaricus and No. 3698 of Hungarian National Standard;

Evaluation of Hungarian milk producers according to food safety, quality assurance and quality controlling aspects

The Committee of Integration and Trading Affairs of the Hungarian Milk Production Board started a survey by the involvement of Hungarian milk producers. The questionnaires were sent to 1600 producers, who produce fresh milk for processing milk products or selling it directly to the milk processing companies.

The questionnaire was filled in by 528 milk producers which represent 33% of the total number. The ratio of the answers was very low, but some conclusion can be determined.

In our paper two questions of this survey are to be evaluated:

- What is the knowledge level of EU milk standards among Hungarian milk producers?
- What kind of food safety, quality assurance or quality controlling system is in use in the given farm?

Food safety, quality assurance and quality control

According to the questionnaires the European milk hygienic regulations are well-known (36,7% of the producers), the knowledge of the rules and regulations is roughly known (by 55,3%) and only a small part (6,7%) did not heard about hygienic standards. 1,3% of the producers refused answer.

Table 3: Knowledge of the EU milk standards in Hungary (2002) according to the survey of Hungarian Milk Production Board

Number of milking cows (head)		**1-9**	**10-19**	**20-29**	**30-99**	**100-299**	**300-499**	**500<**	**Total**	**%**
Do you know the main EU quality standards of fresh milk?	yes	5	25	18	40	40	27	39	194	36,7%
	mostly	17	43	33	57	59	47	36	292	55,3%
	no	0	12	7	10	4	1	1	35	6,70%
	no answer	0	1	0	3	1	1	1	7	1,30%

Source: Hungarian Milk Production Board

The questionnaire of the Hungarian Milk Production was also concerned to the different food safety and quality management systems (Table 4)

Table 4: The number of producers using HACCP, ISO and TQM in the Hungarian milk sector (2002)

Size – Number of milking cows (head):	**1-9**	**10-19**	**20-29**	**30-99**	**100-299**	**300-499**	**500<**	**Total**
Answer	**HACCP**	**HACCP**	**HACCP**	**HACCP**	**HACCP**	**HACCP**	**HACCP**	**HACCP**
No quality assurance system	4	27	13	34	27	6	10	121
Under development	8	16	10	36	39	36	32	177
Installed (certified)	2	6	12	21	36	32	32	141

No answer	8	32	23	19	2	2	3	89
Answer	**ISO 900X**	**ISO 900X**	**ISO 900X**	**ISO 900X**	**ISO 900X**	**ISO 900X**	**ISO 900X**	**ISO 900X**
No quality assurance system	10	35	17	46	52	32	35	227
Under development	0	0	4	0	1	4	1	10
Installed (certified)	0	1	0	1	4	4	9	19
No answer	12	46	37	63	47	36	32	272
Answer	**ISO 14001**	**ISO 14001**	**ISO 14001**	**ISO 14001**	**ISO 14001**	**ISO 14001**	**ISO 14001**	**ISO 14001**
No quality assurance system	10	35	16	46	53	35	38	233
Under development	0	1	1	0	1	0	0	3
Installed (certified)	0	1	0	1	0	0	0	2
No answer	12	44	41	63	50	41	39	290
Answer	**TQM**	**TQM**	**TQM**	**TQM**	**TQM**	**TQM**	**TQM**	**TQM**
No quality assurance system	10	34	15	45	53	35	38	231
Under development	0	0	1	0	0	0	0	1
Installed (certified)	0	1	0	0	0	0	0	1
No answer	12	46	42	65	51	41	39	295

Source: Hungarian Milk Production Board

In 26,7% of the producers farms the HACCP System is installed, it is under construction in 33,5% and it is missing in 22,9% of the producers. 16,9% of the respondents refused the answer.

The situation is more unfavourable in case of ISO 900X Systems. The system is not installed in 43,0% of the respondents, it is under construction in 1,9% and it is installed in only 3,6%. 51,5% of the respondents refused the answer.

ISO 14001 system is missing in 44,1% of the producers, it is under construction in 0,6% and it is installed in only two farms, that represents 0,4%. 54,9% refused the answer.

The construction level of TQM is roughly the same.

As resulted from this questionnaire, an important proportion of the Hungarian producers, just before the accession, have not got enough knowledge about the EU standards for milk hygiene, but, as the present Hungarian regulations are conformed to EU ones fundamental changes will not be predicted.

The development of different quality controlling systems has already been started. The Hungarian Ministry of Agriculture and Rural Development guaranteed a 50% support for the development process of HACCP System. This financial assistance finances 50% of the costs of the advisory fee.

This support means a great help to the large farms, but for small producers the costs of development of the system (roughly 100.000-200.000 HUF) is an incredible huge amount of money.

Cost and Receipts calculations

Our calculations were conducted in Józsefmajor Experimental and Demonstration Farm, an educational and experimental farm, which is under the control of the Department of Farm Economics and Management of the Szent István University of Gödöllő.

A short description of Józsefmajor Experimental and Demonstration Farm

The Experimental Farm was established in 1992 by the Gödöllő Agricultural University (the present Szent István University, Gödöllő) by the help of Justus Liebig University of Giessen and Wageningen University. The main aims was to create an economically and ecologically viable or sustainable farm, which models a family-type farm, helps in education and training and demonstrate new technologies and management methods. By the help of different financial funds and Ministry support the Experimental Farm started crop production in 1993 and, in 1996 by the modernization of

the former buildings the dairy production also could be started. In Figure 1. a view of the farm can be seen, in Table 5. main features of the farm are shown.

Figure 1: View of Józsefmajor Experimental and Demonstration Farm

1: Cow barn; 2: Heifers barn; 3: Manure container; 4: Hay store; 5: Silage store; 6: Machinery field; 7: Offices, classroom, hostel; 8: Farmer's house; 9: Other houses

Table 5: Main features of Józsefmajor Experimental and Demonstration Farm (2002)

Total area		*270 ha*
of which	wheat and maize	149 ha
	lucerne and other fodder	90 ha
	grass	16 ha
	forest	10 ha
	roads and buildings	5 ha
Number of livestock	Cows (Holstein-fries)	101 head
	calves and heifers	98 head
Main products	milk	650 000 l
	wheat	500 t
	maize	300 t

The development of HACCP System in Józsefmajor was finished by the end of January 2002, it was certified in April.

Quality milk production in Józsefmajor Experimental and Demonstration Farm

In order to produce the appropriate quality of milk and to fulfil consumers' demand a food safety or quality assurance system should be developed and operated.

The need for HACCP System is increasing in the milk production and milk processing industry so as to be suitable for the EU– 'from stable to table'– principle.

The following model was worked out before the installation of the HACCP System in order to show the possible effects on the cost and receipts side.

Connections between HACCP System and the Receipts side of milk production

The basic year for our calculations was 2002. The quantities and price of milk (shared by different quality levels) and the Extra Milk supports are included in the *Receipts* side. The support depending on protein and fat content is excluded from the calculations.

In our model only the advisory fee represents the *Costs* side, because of a year before the installation of HACCP System (in 2001), an overall reconstruction was finished in the farm, as a preparation for the EU accession.

The following prices were used in our calculations (1 € = 260HUF):

- Price of Extra Milk: 72,0 HUF/litre;
- Price of First Class Milk: 68,0 HUF/litre;
- Price of Second Class Milk: 50,0 HUF/litre;
- Support on Extra Milk: 5,2 HUF/litre.

The Total Receipts of Józsefmajor Farm in 2002 are shown in Table 6 :

Table 6: Total Receipts of Józsefmajor Farm in 2002

Month	Quantity of Extra Milk [litre]	Quantity of First Class Milk [litre]	Quantity of Second Class Milk [litre]	Support of Extra Milk in Total [HUF]	Total Receipts [HUF]
01	35.325	16.475	0	183.690	3.847.390
02	50.260	0	0	261.352	3.880.072
03	55.085	0	0	286.442	4.252.562
04	52.880	0	0	274.976	4.082.336
05	19.455	19.415	14.860	101.166	3.565.146
06	55.153	0	0	286.796	4.257.812
07	57.663	0	0	299.848	4.451.584
08	0	36.100	18.005	0	3.355.050
09	48.995	0	0	254.774	3.782.414
10	48.510	0	0	252.252	3.744.972
11	47.965	0	0	249.418	3.702.898
12	15.670	32.485	0	81.484	3.418.704
Total	486.961	104.475	32.865	2.532.197	46.340.939

Source: Own calculations

Our assumption was that the level of milk production will be stable in 2003, i.e. the quantity of the produced milk will be the same as in 2002. The difference will be in quality as a consequence of the perfect operation of HACCP System, and the quality level of milk will be Extra. In this case the following results can be predicted (milk prices remained unchanged).The results are shown in Table 7.

Table 7: Changes in Total Receipts as a Result of the Introduction of HACCP System

Month	Quantity of Extra Milk [litre]	Support of Extra Milk in Total [HUF]	Total Receipts [HUF]
01	51.800	269.360	3.998.960
02	50.260	261.352	3.880.072
03	55.085	286.442	4.252.562
04	52.880	274.976	4.082.336
05	53.730	279.396	4.147.956
06	55.153	286.796	4.257.812
07	57.663	299.848	4.451.584
08	54.105	281.346	4.176.906
09	48.995	254.774	3.782.414
10	48.510	252.252	3.744.972
11	47.965	249.418	3.702.898
12	48.155	250.406	3.717.566
Total	624.301	3.246.365	48.196.037

Source: Own calculations

Difference between the two versions in Receipts [HUF]	+1.855.098
Cost of introduction of HACCP (advisory fee) [HUF]	-500.000
Support of the Hungarian Ministry of Agriculture and Rural Development (50% of the advisory fee) [HUF]	+250.000
Total	1.605.098

If HACCP System is working perfectly the quality of fresh milk will improve. The increase of the proportion of extra milk brings an increase in the receipts of the farm. According to our calculations the improvement of milk quality gives 1.855 million HUF surplus in receipts of Józsefmajor farm, as a consequence of the good operation of HACCP System.

It shall be underlined, that it is only a model, which is very optimistic. The Józsefmajor Experimental and Demonstration Farm will not be able always to produce Extra milk, as fresh milk production is a biological process, with the possibility of many hidden hazards. On the other side other items can be calculated on the Costs side, as the continuous prevention of the possible hazards can give extra costs for the farm.

Unfortunately, the real results of the year 2003 were not so good, because a new system has been developed in terms of payment and new different techniques were used for the examination of milk.

Special problems and deficiencies during the installation and operation of HACCP System in a Hungarian farm

- the perfect separation of clean and contaminated area is nearly impossible as a result of the old constructions in most of the Hungarian dairy farms;
- the destroying of rodents are often made by the farmers themselves instead of using the help of specialized firms in order to decrease the costs;
- the placing of dangerous waste is another critical point as most of the farmers think of this irresponsibly;
- some farms haven't got any authorization, or it is under permission;
- the calibration of measuring instruments cannot be verified in some farms;
- instead of determination of different own limits of Critical Points, they use standard rules in the farm's HACCP Manual;
- the administration is more than it is needed in some farms, which increase the aversion of the farmers to the HACCP;

The main conclusion of our examinations is that the key person is the farmer/manager/owner of the farm. His attitudes determine the successful functioning of the HACCP System. Without the positive attitude of the farmer the system cannot work. It is quite hard to generalize the food safety and quality assurance systems in Hungary because of the aversion of many farmers/managers.

Summary

The quality of fresh milk is equally important for all members of the food-supply chain, from the producers through the processing companies to the consumers.

In Hungary the situation of fresh milk production in taking milk quality into consideration is very favourable.

Roughly 87% of produced milk is at Extra quality level, which conforms to strict EU regulations. After 1st May, 2004, the date of Hungary's EU accession only Extra milk will be eligible for human consumption and food processing. The high quality level is due to the Hungarian system of milk prices, which have been paid according to quality level for nearly twenty years.

In the contrary, the installation and operation of quality assurance and food safety systems is not very well-developed. The are a few applications for supporting this process, financed by the Hungarian Ministry of Agriculture and Rural Development, but it could be used by only producers with bigger herds. The small farmers – mainly for their lack of capital – could not use these funds.

Their future is very uncertain, as the only possibility is to install and operate the HACCP System, in spite that their product cannot be marketable.

References

1. Bánáti Diána: The EU and the candidate countries: How to cope with food safety policies? – in Food Control (2003) p 89-93
2. Ducsay Tamás: A hatósági élelmiszer- és borellenőrzés 2002. évi tevékenységéről és megállapításairól I., Élelmiszervizsgálati közlemények, 2003/1. kötet, p8-19
3. Juhász Csaba: Minőségbiztosítás a mezőgazdaságban. Mezőgazdasági Szaktudás Kiadó, Budapest, 2001. p11
4. Pallaginé Dr. Bánkfalvi Emese: Minőségbiztosítás. Mezőgazda Kiadó 1999. p27, p 34-35, p43
5. Szakály Sándor: Tejgazdaságtan. Mezőgazda Kiadó 2001. p115-118
6. Vágány Judit – Dunay Anna: Az élelmiszer.biztonsági rendszer gazdasági hatékonyságának vizsgálata a Józsefmajori Kísérleti és Tangazdaság tehenészetében. EU Konform mezőgazdaság és Élelmiszerbiztonság Nemzetközi Tudományos Konferencia, Gödöllő, 2003.