Level of Knowledge, Practices and Attitudes of Dairy Farmers Regarding Food Safety in Turkey

Nevin Demirbaş*, Figen Çukur**, Özlem Yildiz*, Evren Gölge***

1. Introduction

Environmentally-friendly processing techniques in food processing are currently gaining more and more importance. The consumer preference towards safe and quality products imposes the production of safe food. Without ensuring the food safety criteria, it is harder to compete especially on markets of developed countries. Due to the easily perishable nature of milk and dairy products, food safety is the most important quality criterion in the dairy sector. In some studies (Boor, 2001), it was mentioned that the fiercely competitive nature in the beverage industry could have pushed the fluid milk sector to focus on product quality and shelf-life aspects. As the expectations of consumers increase vis-à-vis milk and dairy products safety, it is possible to deduct that the milk farming needs are about to become increasingly important.

The food safety process in milk and dairy products begins on dairy farms and

Abstract

This study was aimed to reveal the knowledge levels, attitude and mentality regarding food safety of dairy farmers located in the Province of Izmir. 103 surveys were carried out; five counties and 20 villages in these five counties were involved in the surveys. In measuring the knowledge levels and in determining the current practices of farmers, a Five-Point Likert Scale was applied by setting «one» as «very low» and «five» as «very high». According to the obtained results, the knowledge level of farmers in the studied facilities was assessed to be quite poor. In consideration of the poor knowledge of farmers, the prior short-term objective should be the education of farmers on food safety issues. The extension activities should be started up for the sake of a continuous education and knowledge traffic. The current farming practices should be inspected by the raw milk buyers; furthermore, as prescribed by law, all stakeholders working in the sector must be systematically inspected by the Ministry of Agriculture. The survey was carried out on commercial facilities supplying raw material to the dairy industry that were chosen on the basis of their suitability to the purpose of the study. The paper adds to the body of knowledge on dairy farmers and their attitudes to food safety and suggests the implementation of various practices which could improve results.

Keywords: Dairy farm, Dairy Sector, Food Safety, Turkey, Food Regulation

Résumé

L'objectif de cette étude est de révéler les niveaux de connaissance, l'attitude et la mentalité des exploitants laitiers de la Province d'Izmir vis-à-vis de la sécurité alimentaire. En total, 103 enquêtes ont été menées dans cinq régions et 20 villages localisés dans ces régions. Pour mesurer les niveaux de connaissance et déterminer les pratiques mises en ouvres par les exploitants, l'échelle de Likert à 5 points a été utilisée où « un » correspond à « très bas » et « cinq » correspond à « très élevé ». D'après les résultats obtenus, le niveau de connaissance des exploitants auprès des structures étudiées s'est avéré très pauvre. Par conséquent, l'objectif prioritaire à court terme devrait être la formation des exploitants en matière de sécurité alimentaire. Les activités de vulgarisation devraient commencer pour garantir le transfert des savoir-faire et l'éducation. Aujourd'hui, les pratiques agricoles devraient être contrôlées par les acheteurs de lait cru; de surcroît, d'après la loi, toutes les parties prenantes doivent être sous le contrôle systématique du Ministère de l'Agriculture. L'enquête a été menée chez les structures commerciales qui fournissent les matières premières à l'industrie laitière. Ces fournisseurs ont été choisis sur la base des objectifs de l'étude. Cet article nous a permis d'améliorer les connaissances sur les exploitants laitiers et sur leurs attitudes vis-à-vis de la sécurité alimentaire; il suggère la mise en œuvre de nombreuses pratiques qui pourraient améliorer les résultats obtenus dans le secteur.

***Mots clés:** Exploitation laitière, Secteur laitier, Sécurité alimentaire, Turquie, Réglementation alimentaire.*

continues in dairy processing industries. In food safety programs carried out on farms, farmers and veterinarians should effectively manage animal health, cattle rearing, public health and daily environmental health procedures (Cullor, 1997; Creamer *et al.,* 2002).

In the EU and in the USA, food safety practices for milk products have great importance in the food regulatory framework. It is stated that these practices will be more important in the next future. The establishment of systems in the HACCP framework, the development of more efficient education programs, the certification of food safety as a comprehensive and cheap behaviour pattern for all groups and the need not to lose the perception of consumers on food safety have always been emphasized in different studies (Coleman, 1995; K-la and Tollefson, 1999; Payne *et al.,* 1999; Moore *et al.,* 2000).

Only taking care of the health of farming animals is not sufficient to guarantee the food safety. The whole production process should be considered in the milk farming facilities (Noordhuizen and Metz, 2005; IDF, 2007).

In Turkey, most milk producing facilities are family-run farms that are smaller than the European ones (DPT, 2006).

* Ege University, Faculty of Agriculture, Department of Agricultural Economics, Bornova/Izmir, Turkey.
** Muğla University, Milas Sıtkı Koçman Vocational School, Department of Economics and Administrative Programs, Milas/Mu la, Turkey.
*** Ege University, Faculty of Engineering, Food Engineering Department, Bornova/Izmir, Turkey.

This structural problem affects the size of milk processing facilities as a whole and makes them be generally classified as small or medium-sized. In the current situation, the main problem of the Turkish dairy processing industry appears to be the inability to satisfy the needs of the food safety obligations on dairy farms. Actually, the application of principles of Hazard Analysis and Critical Control Point (HACCP), Good Manufacturing Practices (GMP) and Good Hygienic Practice (GHP), or the implementation of quality management system standards (ISO) in the industry are not sufficient at all, unless safe and quality milk is supplied (Demirbaş et al., 2007; Demirbaş and Karagözlü, 2008).

In Turkey, the Food Law was issued by considering the harmonization with the EU sector regulation and it is still under revision. The Food Law and regulations impose a certain discipline in the milk sector in the framework of food safety. However, the knowledge level of milk farmers on the current legal status and their attitudes and behaviours towards food safety standard practices play a crucial role in safe processing operations.

The aim of this study was to determine the level of knowledge of milk farmers on legal and technical standards and to describe the food safety practices performed on milk farms of the province of İzmir, where both milk farming and dairy industry are quite developed. The secondary aim was to determine the attitudes of farmers towards food safety. The studies on the sensitivity to food safety in the milk industry are important and have priority, because the basic condition for a safe and quality production of dairy food is directly related to the supply of raw milk complying with standards. In addition, the knowledge and attitudes of milk farmers and practices on milk farms should be deepened, in order to solve problems related to food safety.

2. Materials and Methods

The material of this study was obtained through face-to-face surveys involving milk farmers in the İzmir province. The Aegean agricultural zone and the province of İzmir are important milk-processing centres due to the presence of modern dairy farms and dairy processing industries compared to other agricultural regions of Turkey. According to the average of the last three years (2004-2006), 12.2% of the milking cow population is located in the Aegean region. The implication of the province of İzmir in this statistic is quite impressing (31.5% of the total population) (TURKSTAT, 2008).

The number of surveys performed was 103; five counties and 20 villages located in these five counties were involved in the surveys. The proportional contribution of the counties to the milking cow population in the province was taken into account in the selection of these counties. Likewise, for the determination of the villages where the survey was carried out, the proportional contribution of the villages to milking cow population in counties was considered. Commercial facilities that supply raw material to the market (local dairies, cooperatives, dairy factories) represent the scope of the study. These facilities were chosen on the basis of their suitability to the purpose of the study. The very small family-run farms were set apart and farmers having at least three milking cows were surveyed. In measuring the knowledge level of farmers and in determining the currently applied practices, a five-point Likert Scale was used by setting «one» as «very low» and «five» as «very high» (Malhotra, 1996).

Surveys were done between November and December 2006 by visiting each facility. The knowledge of farmers on the standards to comply with during milk production were evaluated according to the answers they gave to questions asked in the survey, e.g. «I know», «I do not know» and «I know but I have limited conditions».

The practices of the farmers on food safety systems were evaluated with the frequency scale (i.e. 1: never, 2: rarely, 3: sometimes, 4: very often, 5: always); their attitudes towards food safety were evaluated by their degree of agreement (i.e. 1: strongly disagree, 2: disagree, 3: undecided, 4: agree, 5: strongly agree). The Likert technique presents a set of attitude statements. Subjects are asked to express agreement or disagreement according to a five-point scale. Each degree of agreement is given a numerical value from one to five. Thus, a total numerical value can be calculated from all the responses.

The Likert scale averages of the results obtained are shown in Tables 1 and 2. The increase in the averages indicates the correct application of food safety practices and a high accordance level (Sclove, 2008).

3. Results and Discussion

According to the research results, the number of milking cows per farm is 14.6, indicating a significant figure with respect to whole Turkey average of 2.34 milking cows per farm (TURKSTAT, 2008). For this reason, the region is thought to be more advantageous in food safety practices and could lead other regions of Turkey. The current cow population of the facilities consists of 91.4% exotic breed cattle, 6.4% cross cattle and 2.2% local cattle. The average age of farmers was 45.7 years, their experience in milk farming was 17.4 years and their average educational level was identified at the primary school level (6th grade). The Ministry of Agriculture supports milk-cooling tank installation investments in order to encourage raw milk production within the standards. Only seven of the studied facilities had a milk-cooling tank. However, in consideration of their low number, big-sized and specialized dairy cattle farms in the İzmir province have not been studied. In spite of their high capacities, these big-size modern dairy farms do not ideally represent the farming trend in the region. The average amount of marketed milk in studied facilities was 86.8% of milk produced in these facilities. 46.7% of the marketed milk was sold to local dairies, 34.3% to cooperatives, 16.2% to big dairy factories and only 2.8% directly to consumers. It is a crucial fact that almost half of the marketed milk is sold to big milk factories and cooperatives; it is a significant ele-

ment to consider in order to improve the knowledge level of farmers on food safety. Moreover, the improvement of the technical abilities and the level of knowledge of the cooperatives personnel might develop the benefit expected from cooperatives.

The milking area and waiting area have great importance for safe and quality milk production (TARYAT, 2008). Facilities with a separate milking area were 30%, only 9.7% of them had a waiting area.

In order to detect the knowledge level of farmers on food safety and raw milk standards, we decided to previously examine their knowledge on the Turkish Food Codex (OJ, 1997), the *Communiqué* on raw milk and heat-treated milk (OJ, 2000), Good Agricultural Practices (GAP), Good Veterinary Practices (GVP), Hazard Analysis and Critical Control Point (HACCP), and on the somatic cell count.

According to collected data, 74.8% of farmers have no information on the Turkish Food Codex, 93.2% have do not know the *Communiqué* on raw milk and heat-treated milk, 95.2% have not heard of HACCP, 83.5% have not any knowledge on GAP, and 86.4% have no clue of what GVP is. It was also remarkable that farmers have no idea of the standards requiring routine analysis such as dry matter, fat percent, and somatic cell count in the milk that they produce.

In order to reveal the degree of adaptation of farmers to food safety standards, the frequency of 20 different practices was measured. The results are shown in Table 1. When the farmers' answers were collectively evaluated, the «very often» and «always» type of practices were assessed as being practices demanding less knowledge and technical equipment. The practices such as the periodical California Mastitis Test (CMT) (Pritchard, 2008) applied to cows and the obligatory three and six-month periodical health control of the staff were scored almost «one» on the Likert scale, which was the lowest score. In spite of these results, farmers believe the milk that they produce is healthy and does not cause any threat to humans (Likert mean is 4.680).

The attitudes of farmers on the food safety systems, which are preliminary in the Turkish Food Codex and must be installed for the raw milk production, were evaluated in Table 2.

More than 70% of farmers were deter-mined to agree (total agreement) with food safety statements; conversely, 12.9% did not agree with the same statements.

The top priority of farmers was determined to be the governmental inspection on the compliance with standards for safe raw milk production (4.89); the second priority was listed as if the milk was subjected to pasteurization, raw milk always must be safely produced (4.85). Other option with a high Likert average was the proper sanitation of milking equipments (4.82). According to the farmers surveyed, the inspection of raw milk production must be done by governmental institutions and «milk production should not be left to the producers' remorse» (Table 2).

Conclusions

When the results were generally evaluated, the knowledge level of farmers in the studied facilities could be referred to as inferior. Standard practices for food safety should be improved. Both the knowledge level of farmers and the efficiency of the agricultural extension activities should be increased. Farmers should be informed on legal standards and educated on food safety. When the producer attitudes on food safety were examined, it came out that farmers accept food safety in the framework of sanitation. As for inspection activities, especially the government and the raw milk buyers (consumers, processing facilities, and milk collection centres) have great responsibilities. In addition, in order to extend food safety standards and practices, the government support must be sustained in the form of extension and credit services. However, the selective support to small and medium scale facilities is important for the sustainability of the milk supply. For these reasons,

Table 1 – *Food Safety Practices of Farmers (n = 103).*

	Frequency Scale (%)					Likert Scale Mean
	Always	Very Often	Sometimes	Rarely	Never	
Do you check the conformity of the feed, additive, vitamin, etc. used in the facility for human health?	25.24	11.65	8.73	1.94	52.42	2.553
Do you check whether the feed that you give to the cows presents moulds, etc.?	92.23	1.94	2.91	-	2.91	4.806
Is the aeration system of the barn functioning in a satisfying manner in all seasons?	89.32	2.91	4.85	-	2.91	4.757
Are the ground structure and ground material suitable for the animal welfare?	56.31	16.50	16.50	5.82	4.85	4.136
Is your barn clean?	66.01	17.47	13.59	0.97	1.94	4.446
Is the milking area in your barn clean?	80.58	13.59	5.82	-	-	4.748
Is the milk storage area in your barn clean?	92.63	4.21	2.10	-	1.05	4.495
Do you have all cows checked for Brucellosis and Tuberculosis?	41.17	11.76	13.72	3.92	29.41	3.282
Do you control the udders of cows before milking?	93.20	3.88	0.97	-	1.94	4.864
Do you wash the udders of cows before milking?	96.11	0.97	0.97	-	1.94	4.893
Does the washing water contain disinfectant?	43.68	0.97	3.88	2.91	48.54	2.883
Do you dry the udder of cows with a towel after washing?	19.41	3.88	0.97	5.82	69.90	1.970
Are the teat plugs rinsed after each milking?	44.89	6.12	2.04	1.02	45.91	2.495
Do you periodically perform CMT test on the cows in your barn?	1.90	1.00	-	1.0	96.10	1.116
Does the milking staff apply hygiene rules during and after milking?	74.75	18.44	4.85	0.97	0.97	4.650
Do you have your staff health checked by routine every 3 and 6 months?	1.94	-	4.85	1.94	91.26	1.194
Do you completely clean the milking machine you use?	89.89	8.08	2.02	-	-	4.689
Do you check the cleanliness of filters, containers, etc., which are used in milking, collection and transport?	94.17	4.85	0.97	-	-	4.932
Do you administer antibiotics without consulting a veterinarian?	5.82	2.91	20.38	2.91	67.96	1.757
Do you add any chemicals to the milk you produce in order to increase its stability?	-	-	-	-	100.00	1.000
Is the milk produced in your facility safe from a health point of view?	84.15	12.87	0.99	-	1.98	4.680

Table 2 – *Food Safety Attitudes of Farmers (n = 103).*

	Frequency Scale (%)					Likert Scale Mean
	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	
Food safety system must be installed on a milking farm	75.50	12.74	6.86	2.94	1.96	4.57
The food, additives, etc. used in the milking farming facilities could harm human health if not carefully used.	67.97	8.74	4.85	2.91	15.53	4.11
Any extra cost should be paid to ensure the sanitation in the barns	72.82	17.48	6.79	1.94	0.97	4.59
The milking staff health controls must be periodically executed	68.94	17.48	6.79	3.88	2.91	4.46
By law, the milking equipment should be made of proper material and kept clean	88.35	7.77	2.91	-	0.97	4.82
Farms with no manure storage areas must be punished	35.29	9.81	7.84	1.96	45.10	2.85
After milk analysis, the facilities that are found to produce unhygienic milk should be punished	73.80	12.62	3.88	4.85	4.85	4.45
The milk coming from unhygienic producers should not be bought	79.62	13.59	4.85	0.97	0.97	4.69
Even if subject to pasteurization process, the raw milk should be safely produced	86.14	12.87	0.99	-	-	4.85
The production of safe milk should be left to the producers' remorse.	16.66	2.94	1.96	1.96	76.48	1.81
The government institutions should perform inspections in order to control the compliance with standards for safe milk production	91.27	4.85	2.91	0.97	-	4.89
Buyers (individual, firm, cooperative) should make inspections to control the compliance with standards for safe milk production	83.50	10.68	2.91	-	2.91	4.71

extension strategies by producer unions must be developed. It is obvious that in Turkey big facilities can more easily adapt to food safety systems than «family-run» facilities. In the short and medium term, medium facilities should get organized as unions or cooperatives to install food safety systems even at minimal level. The current trend of the Regulation on Private Extension Services could be an opportunity for the extension of food safety systems. The results of this study are believed to contribute to the solution of the problems in the area and to the development of related policies. Furthermore, this study could be considered as a sort of guide for other countries with similar economic conditions and agricultural structure.

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