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Dairy Farmers Awareness about Food Safety Standards - the case of Kosovo

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Abstract

This is an exploratory study, aiming at assessing farmers' awareness about food safety standards and animal welfare. We expect that most farmers have limited awareness about national food safety standards, animal welfare and diseases given constraints in institutional framework and thereby such standards are not met in most cases – this survey provides insight into gaps in awareness and information at farm level looking into different aspects. A questionnaire-based study was conducted to assess the farmers' general knowledge about animal diseases, as well as preventive farm practices with regard to food safety. A total of 150 dairy farmers, with more than four cows per farm were interviewed. About 87 percent of the respondents do not possess cooling tanks; 44.7 percent of farmers stated that they do not know which is the institution in charge of food safety; 11.3 percent state that they never or rarely use the ear tags; in addition most farmers' state that they do not know symptoms of the Brucellosis (71.3%) and TBC (68.6%), indicating the low awareness level among farmers about animal diseases and food safety. General hygienic and disease control practices need to be integrated in the milk production process particularly at the smallholder level. Awareness, teaching and training programs for dairy farmers can improve diseases control in animals and reduce the public health risk of milk-borne zoonosis. Also public and donors support schemes for farmers should be strongly linked to food safety standard implementation.

Key words: Dairy farms, veterinary service, advisory system, food safety, animal diseases.

1. Introduction

1.1 Sector Background

The Republic of Kosovo is situated in the center of the western side of the Balkan Peninsula. Kosovo is rich of high quality agricultural land. Agriculture has always been a key sector of Kosovo economy despite the recession prior to and in the post-war period (1990-1999). The average agricultural land per capita in Kosovo is low (between 0.15 and 0.18 hectares) which is less than half of the EU average [18]. Fragmentation and small size of agricultural plots represent a major barrier for the agrifood sector growth and competitiveness.

Kosovo continues to be a predominantly rural economy with 12 percent of GDP generated by agriculture, which is also the largest employing sector, accounting for approximately 35% of total employment [27, 16, 20]. The majority of the Kosovo's population (61%) lives in rural areas [13]. Around 90 percent of the rural population own agriculture land, 55 percent own livestock, while 15 percent of farm production is used for domestic consumption [27]. The cultivation of forage crops is of special importance for the livestock fund. The overall area planted with forage crops was 110,314 ha which counts for 37% of the total cultivated area [1, 18].

Before the 1990s, Kosovo was largely food self sufficient with significant exports, while livestock production contributed to about half of total agricultural revenue. However, after the war, this trend was reversed so that traditional markets were lost and the livestock sector was marked by a stiff decline. Agricultural imports from Kosovo's trading partners, which apply production and export subsidies, place Kosovo farmers at a disadvantage and therefore Kosovo has a high trade deficit [27]. Kosovo has a structural deficit for the main agricultural commodities and the average annual per capita food consumption is estimated to be well below the European average. Since 2008, the GDP per capita has marked an increasing trend and reached €2 800 in 2013, equal to 11 percent of the EU-28 average [12], which represents an opportunity for the domestic production.

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Livestock production is one of the most profitable activity and is of economic importance. There are development resources to support livestock production, which promote the development of other agricultural activities such as plant production, processing industry etc. [18].

Cattle milk dominates raw milk production – small ruminant milk production is insignificant in Kosovo. According to the Kosovo Agency of Statistics (KAS), the cattle fund is 321,384 heads. Most dairy farms produce for self-consumption, thus small and middle-sized farms are the dominant farms. Cattle farms counting up to 20 heads account for over 90 percent of the farms. Dairy cows represent 55.6 percent of total number of cattle. Domestic raw production accounts for more than 4/5 of the milk consumption and processing. Only about 10 percent of milk produced is delivered to dairies for processing. The rest is used for feeding calves and for on farm processing and consumption or sold as raw milk on the various local informal (green) markets [19, 15, 8, 9].

Many small scale farms in Kosovo have experience in breeding the local breed, which is smaller in size, produces less milk and has modest feeding requirements. Therefore typical farmers apply same practice with imported cattle despite the fact that they have larger body frame, higher milk production capacity and special feeding requirements. This is one of the main causes behind the low production performance and high production cost. More specifically, typical local dairy farms face the following problems: a) low yield due to health problems and improper feeding, b) a high percent of culled cows due to mastitis and other pathological conditions, c) reproductive problems caused by varieties of factors among which the most important is poor farm management, hygiene conditions at the farm and thereby low revenues [14, 5].

Dairy production is considered as an activity with considerable nutritional, social, and economic importance in Kosovo. Therefore, the Ministry of Agriculture Forestry and Rural Development of Kosovo (MAFRD) considers dairy as a priority sector, providing direct payment support and investment support to dairy farmers in order to improve dairy production competitiveness and improve food safety and animal health standards.

Direct payments for dairy cows started in 2009 and were given to farmers that owned at least 5 ear-tagged dairy cows and were registered in Identification and Registration system (I&R system). In 2012 the amount of budget for the dairy cows' payment was three times higher compared to 2009 (first year of direct payment measures) [13]. In 2013, direct payments for dairy cows were distributed to 5,075 farmers with a total of 42,119 heads and the amount was 50 Euro/cow [18].

1.2 Regulatory and Institutional Framework

Veterinary service:

There are three approved laws which regulate veterinary policies. The Law on Livestock [26] which is the legal basis for the general functioning of livestock sector in Kosovo; the second is the Law on Animal Welfare [22] and the third one is Law on Veterinary [23].

Law on Veterinary [23] and Law on Food [24], regulate the circulation of live animals, products of animal origin, veterinary inspection for import/export and the transitional transport of live animals. These laws also determine rights and duties of the central government, municipalities and private enterprises operating in this field [11]. The veterinary inspection is present in all border crossing points and in the customs warehouses. There are (9) Border Inspection Points (BIP) in Kosovo. These laws are largely based on EU legislation or are in a process of continuous harmonization with it.

The animal health situation is hampered by the inability of the Veterinary Laboratory to undertake confirmatory tests for most of the diseases present in Kosovo due to lack of technical capacities and laboratory equipment needed to perform such tests. Most confirmatory tests are carried out in the accredited laboratories in other countries which imply increased costs and time delays in managing the diseases outbreaks and implementing control programs.

The key institutions in charge of food safety in Kosovo are the Ministry of Agriculture, Forestry and Rural Development (MAFRD), the Food and Veterinary Agency (FVA), and the Ministry of Health. Within MAFRD, the Kosovo Institute of Agriculture (KIA) and the Agricultural Policies, Markets and Trade Department are also included in designing food policies. Currently the role of MAFRD on food safety is still undefined. Within the Ministry of Health, the National Institute of Public Health is also responsible with food testing [21].

The FVA is the main authority to ensure food safety and veterinary in the Republic of Kosovo. FVA bears the sole responsibility for design and

implementation of policies and measures of monitoring, controlling and eradicating animal diseases. The animal health situation in Kosovo is monitored through regular sero-surveillance programs, annual vaccination schemes and passive surveillance systems whereby veterinarians and farmers report occurring disease to the Animal Health Department of the FVA.

With the adoption of the Law on Food (article 36), the FVA is linked directly to the Office of the Prime Minister. Based on article 38 of the current law, the Agency is responsible to verify and inspect food and food ingredients at all levels of the food chain. FVA is also responsible to fight and prevent transmittable disease among animals, to adjust the veterinary/medical practice, to inspect products of animal origin, to inspect imports, exports and the transitional passage of live animals and products of animal origin, and to regulate duties and obligations of the public, central and local government institutions and officials appointed to work in the mentioned institutions.

The FVA nevertheless adopted extensive standard operating procedures and guidelines for inspectors. Implementation and enforcement of existing legislation is not systematic. Four regional FVA offices are now operational and a further two need to be created. There have been limited developments to improve and systematize data management in the database for animal identification, movement, and registration. Kosovo needs to achieve full registration of slaughtered animals both in slaughterhouses and on farms, and to clear the database of all dead animals. Kosovo needs to systematically implement its own minimum national standards for operators to benefit from national payment schemes. The management and financial control of direct payments and rural development measures should to be strengthened by upgrading and updating the Farm Register and the Animal Register. Cooperation with other producers of official statistics needs to improve to ensure consistency and comparability [12].

Kosovo as part of its European agenda will be striving to implement the EU policy on animal health and the new Animal Health Strategy of the European Union (2014-2020). In this effort, major support is needed in designing and implementing appropriate measures to ensure safeguarding of animal health from introduction of so-called exotic diseases, to design and implement control and eradication plans for diseases present in the country, and to prevent risks of spreading the disease in the neighboring countries and wider.

Kosovo institutions have developed mechanisms and a comprehensive legal basis to enable implementation of legislation and policies on food safety, livestock breeding, animals and plant health. As noted in a number of reports on FVA the legislation is generally aligned with EU acquis and the mechanisms established are following EU best practices. However the mechanisms established are not sufficiently prepared in terms of capacities and knowledge as well insufficiently funded to properly implement the above policies and legislation. Significant investments are done both by the donors and Kosovo government in building and equipping the Food and Veterinary Laboratory. Currently the infrastructure is in place and most of the equipment installed and operational. ISO system 17025 is implemented and national accreditation is obtained. However, there are still gapes in the range and the quality of services provided by the food laboratory related to the tests and methods.

The **Kosovo National Institute of Public Health** (KNIPH) is an educational and scientific multi-disciplinary institution responsible for the development of health strategies in the field of epidemiology, education and health promotion, disease prevention, laboratory diagnosis and health information. The scope of KNIPH is regulated by Law No. 02/L-78 on Public Health.

Within the University of Prishtina, the Faculty of Agriculture and Veterinary (FAV), the Faculty of Geosciences and Technology (The Food Technology Department, FGT) and the Faculty of Natural Sciences (Departments of Chemistry and Biology) provide expertise regarding food safety.

Advisory Service: The Advisory Services for agriculture and rural development were established and have been operational since 2004; however the Strategy for Advisory Services 2012-2016 and the Law on Advisory Services for Agriculture and Rural Development [25] have been approved.

To strengthen the capacity of its rural advisory services, MAFRD implemented two EU-financed projects whereby the ministry staff (later transferred to the municipalities) and private service providers were trained and certified in modern agricultural technologies and value chain practices.

In 2012, MAFRD began restructuring and reorganizing the Advisory Services at the Ministry level and expanding the number of Advisory Services staff in order to be able to provide better technical and

professional services. All agriculture municipal advisers will be reassigned from the municipality management to MAFRD's Advisory Services (though still based at the municipal level). Each municipality will have at least 2- 3 experts for Advisory Services and in total there will be 68 advisers. The new Advisory Service's mission will be to promote changes in Agriculture and Rural Development such as: increased productivity, profitability, and product quality; better environmental protection; improved farm management; and the creation of relationships between producers, processors, traders, and input suppliers.

Municipal advisors are overstretched, have little access to training to update skills, and are largely immobile due to lack of transport and therefore unable to deliver all the basic specialist technical advice, advice on farm business management, as well as assisting in the preparation of business plans for rural development grants offered by MAFRD and other donors. A large segment of farm operators continue to lack the capacity, knowledge and skills for planning and financing on-farm and rural off-farm investments, including opportunities for alternative enterprise development. An improved and strengthened rural advisory system is crucial not only to deliver the services necessary to boost the country's agricultural production and export potential but also to facilitate the uptake of the EU IPARD grant funds by the rural communities when these funds become available [27] .

MAFRD is currently redefining the role of the Kosovo Institute of Agriculture of Peja (KIA) to transform it into a centre of excellence for technology generation and transfer, training and provision of advisory services. However, the strategy to guide agricultural research and development is still lacking and as well as the staff capacity, in terms of number and skills, and adequate infrastructure, limiting the scope of KIA activities [10].

During 2013, in the framework of the project "Development of Rural Areas through the Improvement of Extension Services" and "Training of Potential Applicants for Grants": have been undertaken several activities such as exchange experience of farmers' groups of the same sector; messages for farmers broadcasted in national TV stations as well as in the Farmers Show; brochures; study visits in regional countries (Albania, Croatia and Macedonia) for municipal advisors; a study visit for the management staff in Italy and United States with the aim to exchange of experiences; trainings on capacity building have been organized for all municipal advisors of agriculture and rural development.

Farmers' training will continue for the future (2014-2016), with support from development partners such as the EC - IPA program 2013 [20].

1.3 Dairy animal disease and food standards in Kosovo

Brucellosis is one of the world's major zoonosis responsible for enormous economic losses and human morbidity. In Kosovo this disease is endemic and occurs often in the forms of outbreaks causing massive economic losses and affecting human health through transmission of disease to humans. A study on determination/estimation of seroprevalence of brucellosis in ruminants in Kosovo, conducted by Jackson et al [17], has found a prevalence of 6.3 percent in sheep, 7.3 percent in goats and 0.6 percent in cattle.

From 2003-2007, the FVA with the support of the EU and other international support implemented a vaccination campaign against brucellosis in sheep and goats on hot spots were the prevalence and risk of brucellosis was higher. Based on the data from the Animal Health Department, a sero-survey of brucellosis prevalence in the whole country is as follows: sheep prevalence 8.1 percent; goats 22.3 percent and cattle 0.4 percent. Based on the epidemiological situation of brucellosis a 5-year mass vaccination strategy of small ruminants (sheep and goats) begun in 2010. Analytical check of tested samples for three fluoroquinolones resulted with positive cases or 15.7 percent of total samples. The prevalence of enrofloxacin in meat samples was 5.6 percent, of ciprofloxacin in 5.6 percent of beef samples and with flumequine residues were confirmed in 3.4 percent of beef samples [2].

The E. coli was found as contaminant in 22.5 percent of fresh butter samples collected from different areas in Kosovo. About 8% of fresh butter samples were contaminated with E. coli more than 10 cfu/g [3].

According to a study conducted by Berisha and Sulaj [4] for the presence of coagulase positive Staphylococcus aureus was concluded that only 30% of cattle farms fulfill the sanitary-veterinary conditions whereas the other cattle farms (70%) were confirmed with subclinical mastitis.

Clostridia diseases such as Enterotoxemia, Blackleg, Black disease and Necrotic hepatitis (in sheep also called as Black disease) are one of the

major causes for animal mortality in Kosovo. The data collected by the FVA Animal Health Department during last two years revealed that more than 1000 animals died due to Clostridia infection in all territory of Kosovo, only 15 – 20 percent of the susceptible animals are presently vaccinated, reportedly due to lack of awareness and economical constrains of the farmers. These observations are based on clinical reports by farmers and private veterinary practitioners (PVTPs). These losses are a heavy drain on commercial farming constraining future developments [16].

Food safety and quality: The main purpose of EU policies on food safety is to protect the interest and health of consumers by guaranteeing a proper functioning of joint policies for consumer protection.

Animal production and food security are considered strategic priorities in Kosovo, aiming to ensure quality and safe food based on international standards, further development of production and processing capacities, and improvement of the food chain. According to the Kosovo policy makers [21], through the sector it is also aimed the fulfillment of the local food demand, providing employment, reducing agriculture product imports and increasing the export capacities, integration to international organizations, improving rural livelihood, sustainable development and achieving economic growth in Kosovo.

Raw milk quality in Kosovo still is poor [6]. Milk produced on a small scale dairy farms can easily get contaminated by bacteria due to poor hygienic conditions maintained at "on farm" levels or due to inadequate handling, storage and transport conditions. Despite recent improvements in the dairy sector in Kosovo, it is still dominated by self-subsistence farming - about 85% of milk produced is consumed directly by the rural households (self subsistence farming) or sold in the so called "Green Market", where there is no official control of raw milk quality. The quality of fresh milk in Kosovo still remains quite low in comparison with existing standards and needs an immediate improvement by applying best practices advanced and appropriate intervention in infrastructure, such as milking equipment and adequate storage of milk, general hygiene on the farm, storage temperature, etc. [7].

2. Material and Methods

This is an exploratory study, aiming at assessing farmers' awareness about food safety standards. We expect that most farmers have limited awareness about national food safety standards, animal diseases and given constraints in institutional framework, and thereby such standards are not met in most cases – this survey provides insight into gaps in awareness and information at farm level looking into different aspects.

A structured questionnaire was developed to assess farmers' general knowledge about animal diseases, as well as preventive farm practices with regard to food safety. The questionnaire was subject to review by a panel of 5 livestock specialists. It was pre-tested with a pilot group of 10 farmers; in the case of inconsistent questions, it was modified accordingly. The questionnaire was used to collect data pertaining to the objective formulated for the survey including questions about farm profile and size and questions related to food safety and animal health standards awareness.

The survey was administered during July-September 2014, using direct interviews, by the leading author of the paper. The sample consisted of 150 dairy farmers that were randomly selected from the farmers' list prepared by the municipalities (with the condition of having more than 4 cows) in the communes of Gjilan and Ferizaj (which are part of the regions of Gjilan and Ferizaj respectively). These communes and regions were chosen because of accessibility facilitated by Extension Service.

Table 1: Main sample socio-demographic and farm indicators.

Sample farm household indicators	*Mean*	*Std. Dev*
Age	46.11	10.519
Owner's experience with livestock (years)	19.95	13.386
No. of cows	10.78	6.853
No. of calves	5.56	4.408

Since the typical sample farm had more than 4 cows and the average farm size was 11 cows, it may be concluded that they were market oriented (avoiding self-subsistence farms) (Table 1). The reason why we targeted market oriented farms, is that naturally they are more likely to have more awareness for standards, invest more in the future toward improving standards, and are also more likely to "survive" the growing competition in the future, as compared to small subsistence farms (with 1-2 cows).

The sample included 40 percent of the population of livestock farms with more than 4 dairy cows in the

targeted communes. The responsive rate was 100 percent which was far above typical surveys.

The data obtained were entered in Microsoft Excel and transferred into SPSS. The analysis is based on descriptive statistics, namely frequencies.

3. Results and discussions

This section analysis the current situation and the sector's developments with focus on food safety and animal health standards based on the structured farm survey.

Raw milk storage

Dairy processors collect the milk from the large farms every day (the farms that are located near the processors) or every second day. The small farms are processing the milk at home, or sell it directly to their neighbors, or sell to the milk collection centers, usually 1-2 hours after finishing the milking process. Then the milk is transported to the dairy plant by the intermediaries. According to Nushi and Selimi [19] a large number of small dairy farmers make milk collection expensive especially in the case of low-quality milk. Processors are aware of this problem and try to improve the quality of milk delivered by the system of higher prices paid for good-quality milk.

The control system for the milk quality is still weak and not functioning very well. A large share of the milk is still sold at the Green Markets or directly to the home door. Only a few larger mechanized dairies have implemented an internal system of quality control including raw milk. Closed cooling chains from producer to consumer are still rare. EU quality and food safety standards are not yet implemented. The milk-collecting centers are equipped with cooling tank (lacto–freezers) capacities of 1,000 liters each and are supplying the largest processing dairies in Kosovo. The quality and hygiene level of collected milk is generally low since Good Milk Handling (GMH) standards are not applied; the same results are reported by Bytyqi et al. [6]. Besides, problems arise due to significant oscillation in milk production on farms (low production in winter and high production in summer).

Our survey confirms the gap in milk storage capacity - about 87 percent of the respondents (Table 2) do not possess cooling tanks, which is a prerequisite for attaining milk safety and quality standards.

Table 2: Answer to the question: "Do you have cooling tank?"

Answer	*Frequency*	*Percent*
Yes	20	13.3
No	130	86.7
Total	150	100.0

Food Safety Institution.

Article 24 of Food Law gives information that the official control of food shall be carried out from the inspectorate of food and feed control and the laboratories of food safety and veterinary under the Food and Veterinary Agency.

One of the questions for farmers was to choose the institution in charge of food safety in Kosovo providing them several options from which to choose – 44,6 percent of farmers stated that they do not know (Table 3) – also among those that answered that they knew, few of them chose the wrong answer, indicating the law awareness level among farmers about food safety.

Table 3: Answer to the question: "Which is the institution in charge of food safety?"

Answer	*Frequency*	*Percent*
Food and Veterinary Agency	73	48.7
Ministry of Environment	2	1.3
MAFRD	5	3.4
I don't know	67	44.6
No answer	3	2.0
Total	150	100.0

Animal Health Certificate.

The Law on "Veterinary" (article 6, 14, 16, 19) emphasis that veterinary service is responsible for issuing veterinary certificate for: (i) the movement of the animal or the products of animal origin out of the holding of origin, (ii) trade of animals, (iii) slaughtering of animals.

Farmers were asked to choose the institution in charge of issuing animal health certificate providing them several options from which to choose – almost 40 percent of the farmers stated that they do not know (table 4) – also among those that answered that they knew, some chose the wrong answer, indicating the lack of information about this important aspect.

Table 4: Answer to the question: "Which is the institution that issues animal health certificate?"

Answer	***Frequency***	***Percent***
Food and Veterinary Agency	84	56.0
Municipality/Commune	2	1.3
MAFRD	3	2.0
Other	2	1.3
I don't know	59	39.4
Total	150	100.0

Stable standards.

Urban Planning Directory of Commune is responsible to issue the permission of stable construction based on the Law on Construction (No.04/L-110 dated 31.05.2012) and Law on Agriculture [25].

Fifty-three percent of the interviewed farmers stated that they do not know which is the institution that controls stable standards (Table 5) – also among those that answered that they know, most of them chose the wrong answer, indicating the lack of information about this important aspect.

Table 5: Answer to the question: "Which is the institution that controls stable standards?"

Answer	*Frequency*	*Percent*
FVA	23	15.3
Ministry of Environment	1	0.7
Municipality/Commune	21	14.0
Paying Agency	22	14.7
Other	3	2.0
I don't know	80	53.3
Total	150	100.0

Farm Register.

It is essential that farmers, veterinarians, and public health officials can identify which animals have recently been transported from one farm to another or from a farm to a processing facility. If that animal is found to be sick, they can trace the animal's path back and find any other animal it may have come into contact with and potentially exposed to a disease. The veterinarians can then determine if those animals need to be tested, treated, or even quarantined to prevent further spread of disease. While this is one more step the farmer must take, and one more round of paperwork that must be maintained, this is a very important step in securing the safety of our food supply.

According to the article 27 of law on "Veterinary" the farmer must keep the animal register. However, according the field survey, most of the farmers stated that they do not have a farm livestock book/register (table 6), they are not aware of the institution which is in charge of controlling them (Table 7).

Table 6: Answer to the question: "Do you have a farm book/register on livestock?"

Answer	*Frequency*	*Percent*
No Answer	4	2.7
Yes	38	25.3
No	108	72.0
Total	150	100.0

Table 7: Answer to the question: "Which is the Institution that should control animal book/register?

Answer	*Frequency*	*Percent*
FVA	81	54.0
Agriculture Directorate	1	.7
MAFRD	3	2.0
Municipality/Commune	6	4.0
I don't know	58	38.6
No answer	1	.7
Total	150	100.0

Animal Identification.

According to the law on "Veterinary" the owner is responsible for the animal's identification and for keeping the identification register. The penalty of 500-30,000 Euro is applied to the farmer who doesn't use the ear tag for his animals.

Table 8: Answer to the question: "Do you use ear tags for livestock identification"

Answer	*Frequency*	*Percent*
Always	122	81.3
Often	11	7.4
Rarely	3	2.0
Never	14	9.3
Total	150	100.0

The majority of the farmers (81.3%) state that they always use ear tags for the identification of their

animals, and only 11,3% state that they never or rarely use the ear tags (table 8).

Animal diseases.

Poor knowledge of brucellosis and in general for the zoonosis might significantly impede people who are infected with brucellosis from seeking medical services.

Most farmers' state that they do not know symptoms of the Brucellosis (71.3%) and TBC (68.6%) (table 9).

Table 9: Answer to the question: "Do you know the symptoms of the following diseases?"

Answer	***Brucellosis***		***TBC***	
	Freq.	**Percent**	**Freq.**	**Percent**
No answer	3	2.0	1	.7
Yes	40	26.7	46	30.7
No	107	71.3	103	68.6
Total	150	100.0	150	100.0

4. Conclusions

This is an exploratory study, aiming at assessing farmers' awareness about food safety standards. This is the first attempt to obtain in-depth understanding about farmers' awareness related to food safety standards and animal health, according the best author knowledge. These sample covers only 2 out of 7 regions of Kosovo due to financial constraints (this study was not supported by external funding), which might represent a limitation – however, the findings could be considered indicative for the Kosovo as a whole, since the legal and institutional framework is the same for the whole country.

According to the survey findings, about 87% of the respondents do not possess cooling tanks; 44.6% of farmers stated that they do not know which is the institution in charge of food safety; 11.3% state that they never or rarely use the ear tags; in addition most farmers' state that they do not know symptoms of the Brucellosis (71.3%) and TBC (68.6%), indicating the low awareness level among farmers about animal diseases and food safety.

The extension service and information dissemination needs to be strengthened to provide the private sector with the agricultural knowledge and information regarding food safety and animal health. The public sector should play an active role in this, as the social benefits of such services outweigh their private benefits. Public and donors support schemes for farmers should be strongly linked to food safety standard implementation. Donor organizations and private sector enterprises are the most dynamic units involved in information diffusion activities.

To overcome aforementioned problems the farmers first need to be trained on technical issues. In addition, to make use of the newly acquired technical knowledge farmers have to be trained to add value to their current business. Well established extensionist/veterinarians - farmer relationship will lead to economic gains for farmers.

An increasingly important role for food control systems is the delivery of information, education and advice to stakeholders across the farm-to-table principle.

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