

**DAIRY FARM MANAGEMENT
AND
ADVISORY SYSTEMS
IN EU AND TURKEY**

Volume 2

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Preface

Almost all of the countries that comprehend the strategic importance of agricultural sector and are able to formulate and implement corresponding policies are included in the group of developed countries. Animal production has an important place in agriculture in which cattle breeding is one of the most contributing sub-sectors. Contribution of cattle breeding to animal production manifests itself mainly with milk and meat production.

Cattle breeding makes significant contributions to human nutrition by the production of important products as well as reviving the economy. It both provides the food and leather sector with important raw materials and is a notable customer of feed, machinery and drug industry. Furthermore, domestic and foreign trade of meat and milk products as well as livestock, embryo, semen, etc. increases each year.

The above-mentioned characteristics of the sector has not only ensured the widespread raising of cattle throughout the world, but also caused the procedures concerning cattle breeding to be evaluated among national policies. Milk production is always included in agricultural laws enacted in the US, while milk and meat have been among few products contained in the common agricultural policy of the EU, and common market regulations on these products have always been among the key tools of agricultural policies. Particularly most of the developed countries have not failed to implement effective policies regarding cattle breeding, generally for milk production. Policies implemented for years in the EU are among the most effective and prominent ones.

Whatever the tools used in the policies carried out within the scope of the EU are, the main purpose has always been to “increase productivity, raise the income of the people working in the sector, ensure market stability, guarantee the continuity of supply and keep the consumer prices at rational levels. The EU has taken various measures as required by this understanding. Establishment of this understanding in Turkey will resolve many associated problems.

Turkey is obliged to increase the competitiveness of the cattle sector with the leading producer countries in the world, mainly EU countries. This cannot be gained solely with the legislative changes made by the governments. In other words, even if the measures to be taken by the state are appropriate, they may be insufficient. At this point, what the breeders

have to do is to give priority to and implement practices that will provide the sector with competitive power. Briefly, the existing structure of the sector should immediately be transformed into a structure that is more efficient and that enables higher productivity. At this point, attention should be focused on short-term and medium-term practices that will facilitate this transformation.

In order to enhance the competitiveness of breeders, guide their activities in the light of science and developments, and be able to supply the protein demand of the country with high-quality animal proteins, it is important that the advisory services related to farm management are provided by the Cattle Breeders' Associations. As in most of the EU member countries, the implementation of a farm advisory system, which includes topics such as environment, public, animal and plant health, identification and registration of animals, reporting of diseases, and animal welfare, is a necessity in our country as well in terms of providing breeders with technical support with respect to land and farm management.

With the project "Building Knowledge Bridges on Dairy Farm Management for Future", it is aimed to lay the foundations of a farm advisory centre in the province of Aydın. It is intended to carry out a study in Aydın, which will bring awareness regarding EU standards, and legislation that the sector will face in the future as well as preparing the sector for competition with the EU and the world. To that end, it is planned to establish a "farm advisory centre" within the body of Cattle Breeders' Association of Aydın (CBAA) to train farm advisors specialized in cattle breeding, who will assist in the member herds of CBAA and Milk Producers' Association of Aydın (MPAA) to carry out quality production, taking into account topics such as productivity, feeding, genetic improvement, environment, animal health and welfare, and infuse farm management and sustainable production practices to them. Farm Advisory Centre of Aydın that will train such advisors will be put into the service of breeders within the scope of the project.

One of the main elements that will contribute to ensuring a swift transition from the existing structure to a more efficient one is organization, and another is the inclusion of knowledge into the production process. One of the most appropriate ways of including knowledge into the production process is to supply producers, association personnel and field professionals with advanced publication systems, proper sources of knowledge and training support.

Herd and farm management have an important place among the issues that interest cattle breeders. However, the efforts in this respect in our country are insufficient. Although it is obvious that training and consultancy activities constitute the basis of animal production, in particular for sustainable production and its improvement, efforts in this regard have not been able to reach a desired and sufficient level yet.

From this viewpoint, it is an essential step for the breeders to receive a better and more accurate training by enabling practices regarding farm management and sustainable

production, and address the issue in a wider platform where the relevant organizations and various experts express their opinions.

For this purpose, "International Farm Advisory Systems and Dairy Farm Management Congress" held by the Cattle Breeders' Association of Aydın, on March 15-16, 2012, has attracted great attention. In the Congress conducted with the participation of approximately 350 people from various organizations and sector representatives, many local/foreign experts and scientists have made presentations; moreover, a platform for discussion has also been established. Thus, it was aimed to provide the participants with awareness regarding dairy farm management and advisory services. Measures that may be taken for compliance with the EU legislation and standards as well as practices concerning the advisory systems, dairy cattle breeding and farm management in various countries were significantly emphasized.

Papers presented by the experts and scientists over the course of the Congress are brought together in the book "Advisory Systems in the EU and Turkey, and Management of Dairy Cattle Farms, Volume II". We believe that the book will assist in the comprehension of the farm management and advisory systems in the world and contribute substantially to the enhancement of the welfare and awareness of breeders.

We would like to express our deepest gratitude to the European Union which financed this project and this publication, Prof.Dr. Numan AKMAN who have edited the book and to everyone who contributed to the preparation of the book.

CBAA thanks

Regards,

Mehmet Sedat GÜNGÖR
President of the Board
Cattle Breeders' Association of Aydın

Contents

1. Dairy Cattle Farming in Aydın	1
2. Results of CBAA Dairy Cattle Breeder's Survey and Sector Stakeholders SWOT Analysis	11
3. Agricultural Extension in the World and Turkey	31
4. Agricultural Advisory Services in the EU	43
5. Agricultural Extension and Advisory System in Turkey	55
6. Organisation of Practical Breeding Services for Dairy Farms	69
7. Dairy Farm Advisory Services in Germany and Other Countries	75
8. Cattle Breeding in Turkey	85
9. Italian Breeder Association: 60 Years of Activity towards Farmers and Breeding	91
10. Cattle Breeding in France	99
11. Management Problems in Dairy Cattle Enterprises	103
12. International Committee for Animal Recording: Mission, Activities and Services	109
13. EU Record Keeping, Data Verification and Reliability, Equipment and Machinery Used, Cattle Sector in Developing Countries	111
14. Herdbook Activities in Turkey	117
15. Developments in the Mechanization of Dairy Farming	127
16. Dairy Cow Welfare: Some Aspects	137

1

CHAPTER

Dairy Cattle Farming in Aydın

Emine Seda PAYIK*

Record keeping efforts that can contribute to the herdbook in Turkey, began with the projects executed in collaboration with Italian and German governments. Turkish-ANAFI Project for Improving Dairy Cattle Farming, supported by the Italian government, was executed in 9 provinces (Aydın, Balıkesir, Burdur, Isparta, İzmir, Denizli, Manisa, Muğla and Uşak) between 1989 and 1994. Cattle Breeding Information System Project, initiated in 1995 and executed in collaboration with the German government, was carried out in 7 provinces (Bursa, Edirne, Kırklareli, Konya and Samsun) and finalized in 2000.

Objective of both of the projects was to establish a registration system for cattle in Turkey and ensure the foundation of associations that would execute this registry system. Breeders were encouraged to get organized by these projects, and Cattle Breeders Associations began to be established as from 1995.

Cattle Breeders Association of Aydın (CBAA) was established by 11 founding members and began to function officially with the permission letter of TUGEM (General Directorate for Agricultural Production and Development) dated 20.10.1995 and numbered 8217.

The Association carries out its activities with 49 personnel and 28 vehicles (2012).

Table 1 CBAA Personnel

Veterinarian	Manager	Agricultural Engineer	Technician	Office personnel	Total
4	4	16	23	2	49

These activities are supported by the Project Coordinator of the Provincial Directorate for Food, Agriculture and Livestock.

* Cattle Breeders' Association of Aydın, Aydın

Activities of the CBAA

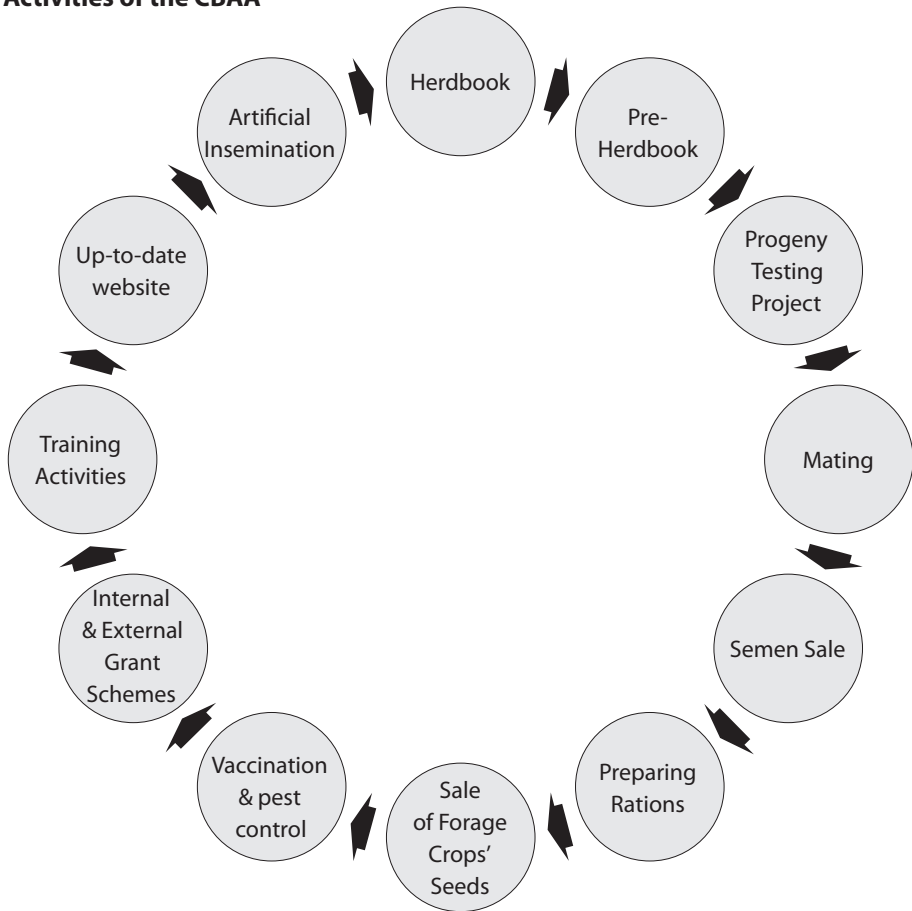


Figure 1 Activities of the Cattle Breeders' Association of Aydin (CBAA)

Herdbook: It is the registry system established for animals bearing the qualities of the breed they belong to in holdings where breed and performance records are maintained. Farms are visited regularly each month to receive data records and register them in the e-improvement system.

Pre-herdbook: It is a provisional registry system for animals bearing the qualities of the breed they belong to, whose dam and sires are known but are not registered in performing recordings. The pre-herdbook registry system, ear tagging and registry procedures within the province have been carried out since 2006 within the framework of the pre-herdbook protocol signed with the Provincial Directorate for Food, Agriculture and Livestock. Since 2011, pre-herdbook holdings are being inspected once in 20 days to tag and register the newborn calves.

Artificial insemination: In response to a demand from the members in 2010, a protocol was concluded with Aydin Chamber of Veterinarians to work with 124 freelance veterinarians.

In 2011, the number of freelance veterinarians had increased to 132. These veterinarians use the semen supplied by the Association to perform artificial insemination in member holdings.

Progeny Testing Project: It is a project executed in cooperation with the Cattle Breeders' Association of Turkey and the Ministry of Food, Agriculture and Livestock.

Mating studies and semen sales: Mating studies are continuing without interruption in line with the interests of the members. Mating studies allow you to determine with which bull your cows will be mated to have calves with better genetics in the following generation.

Up to the present, 21,000 animals were mated in 821 holdings to ensure insemination with the appropriate sire.

Vaccination and Control: In consequence of widespread anomalous calf births in our province in 2010, CBAA began to collaborate with Adnan Menderes University Faculty of Veterinary Sciences and the Provincial Directorate for Food, Agriculture and Livestock to prevent viral diseases that were transmitted by insects and brought serious economic losses, and carry out preventive insecticide applications in farms where the bovine animals were exposed to the risk of diseases transmitted by Culicoides. In response to the demand from the members, CBAA have continued to apply preventive practices in 2011 as well.

Preparation of rations: In order to meet the needs and expectations of the members, more attention is paid to ration preparation services aiming to minimize the feeding costs, which are the major item of the operating expenses, and to ensure the implementation of the correct nutrition methods.

Sale of forage crop seeds: In order to meet the needs and expectations of the members in time and ensure them to obtain their roughage requirements in an economical and quality manner, seeds of various forage crops (corn, annual ryegrass, canola, clover, rutabaga/turnip, etc.) are supplied.

Local and foreign grant projects: Within the framework of the "Active Labour Market Measures Grant Scheme Civil Society Dialogue II – Fisheries and Agricultural Grant Scheme", the project titled "Building Knowledge Bridges on Dairy Farm Management for Future" was put into effect under the leadership of Cattle Breeders Association of Aydın in 2010. Other stakeholders of the mentioned project are Dairy Producers' Association of Aydın, International Committee for Animal Recording (ICAR) and German Holstein Association (DHV).

Training: Silage day, trainings and night meetings are conducted to make the members aware of any innovation practically in order to continuously develop quality and keep the members and personnel trained and motivated.

Website www.adsyb.org: Current news could be found at the website of CBAA.

In the e-improvement system in Turkey, the number of cattle which are recorded in either the herdbook or pre-herdbook records in 2011 was 3,520,556, in which 327,601 heads are (in 38,574 holdings) in the province of Aydın. Cattle population of the province of Aydın is approximately 10% of that of Turkey.

Table 2 Number of CBAA members and total number of cattle

Years	Number of member farms	Number of recorded cattle (heads)	Herd size (heads cattle/herd)
2002	750	13.939	18,6
2003	933	21.917	23,5
2004	1165	30.677	26,3
2005	1756	49.806	28,4
2006	2405	64.460	26,8
2007	3200	84.429	26,4
2008	3425	94.710	27,7
2009	3703	104.215	28,1
2010	4371	124.618	28,5
2011	5064	157.789	31,2

In 2002, CBAA had 750 registered members, whereas this figure was 5064 in 2011 that means the number of its members increased 7 times in 9 years.

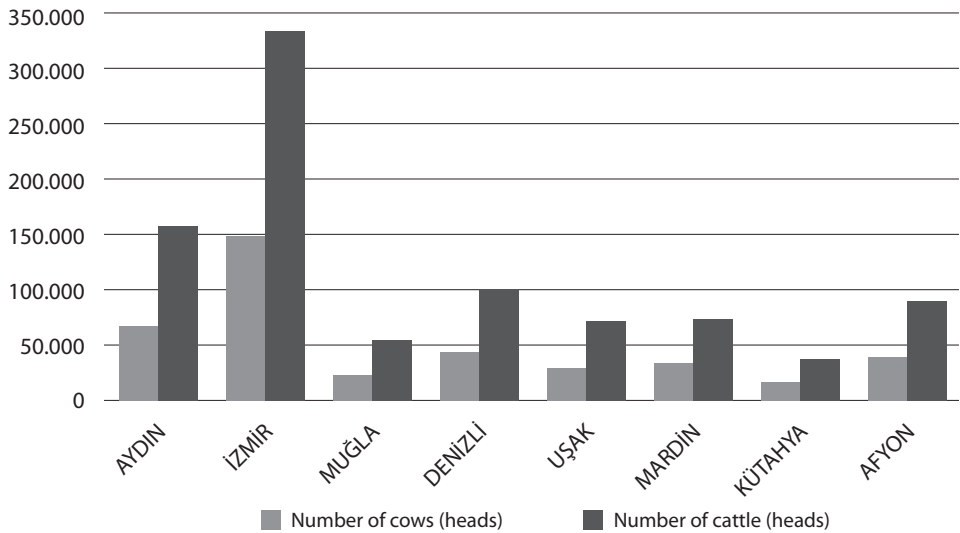


Figure 2 Total number of cattle and milk cows registered in the Herdbook Records of the Aegean region

The number of cattle registered in the herdbook records of the Aegean Region is 917.552 heads. The number of milking cows registered in the herdbook system of the region is 392.722 heads. 37% of the milking cows in the Aegean Region are found in İzmir whereas 17% is in Aydın.

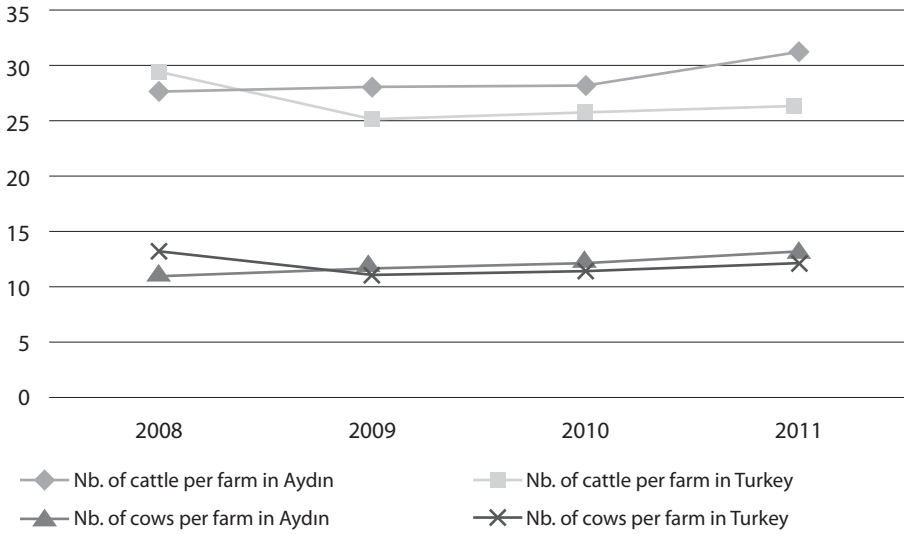


Figure 3 Average number of cattle and milking cows per farm registered in the Herdbook system in Turkey and Aydın

In 2008, the average number of cattle and milking cows per farm in Aydın were 27.7 and 11 heads, respectively. Increases in herd size were 4% in 2009, 3.25% in 2010 and 4.5% in 2011.

Total number of members whose herdbook records are maintained in Aydın Association was 5064 in 2011. There are five member companies, 35 member cooperatives and 5024 member individuals whose herdbook records are maintained. Average number of milking cows per herd in member companies and member cooperatives are 217 and 192, respectively.

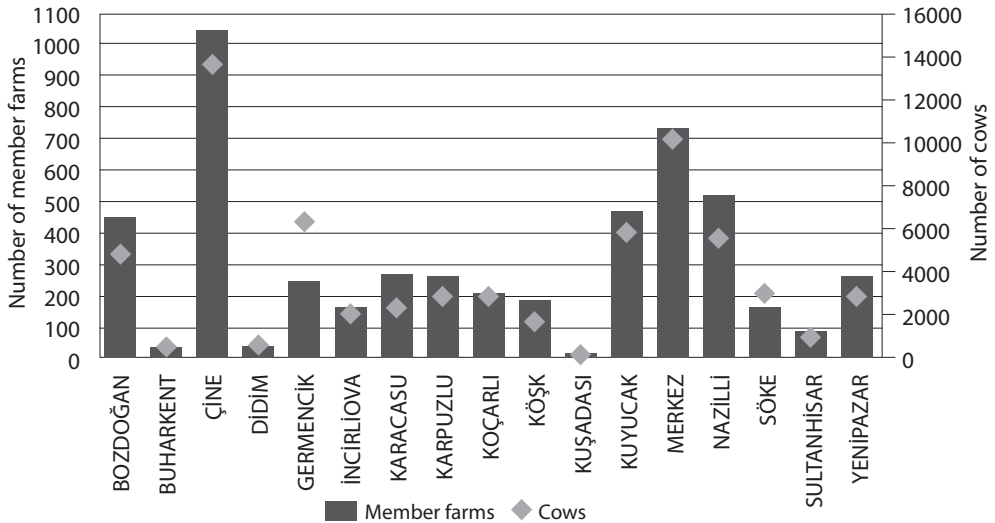


Figure 4 Distribution of CBAA members by district

If we have a look at the number of members and cattle in the districts of Aydın, it could be seen that Çine has the highest number of members. It is followed by the central district. Although the number of members is low in some districts, the total number of cattle is high. This is because those members have bigger herds. One of the largest dairy cattle holdings in Turkey is located in Germencik district.

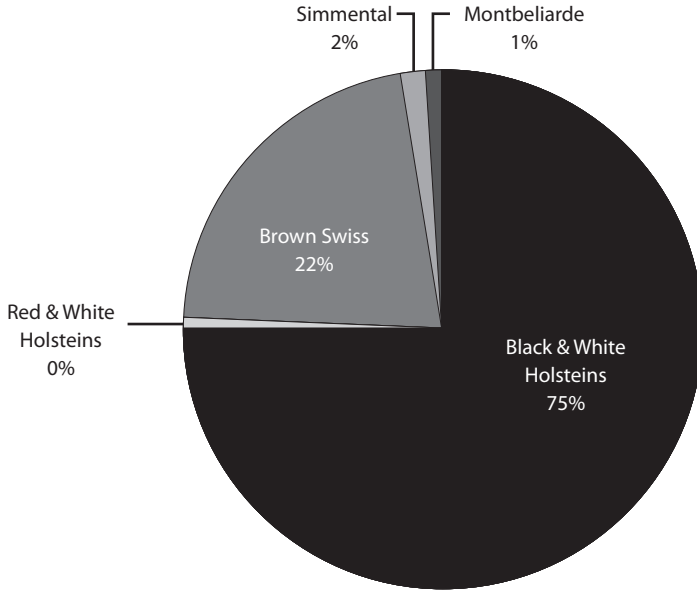


Figure 5 Share of different breeds in Aydın according to the Herdbook and Pre-Herdbook Records

Among the culture breeds, Black and White Holstein is the most widespread breed in the province of Aydın. Montbeliarde can be found in the member holdings in Kuyucak, and Red and White Holsteins can be found in the member holdings in Kuşadası. Brown Swiss is mostly raised in highlands both for dairy and meat production purposes.

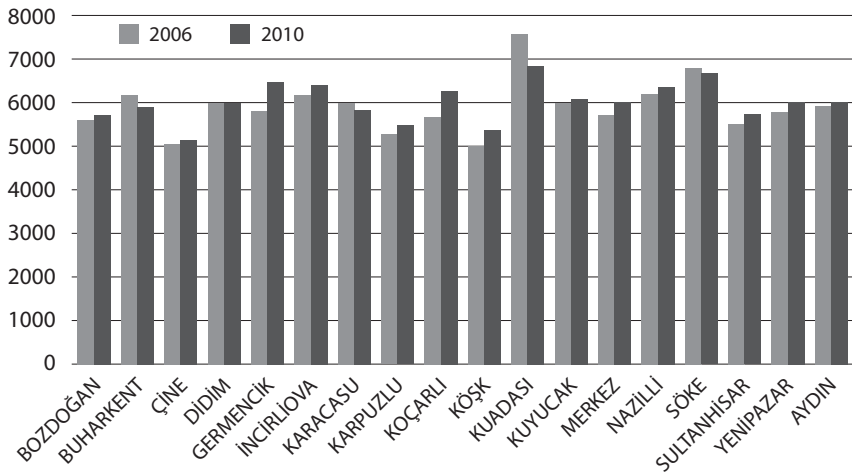


Figure 6 Average milk yield (305 days) in districts by years

Average milk yield (305 days) of cows registered in the herdbook system in Aydın increased in parallel to the number of registered milking cows each year. The increase in the 305-day milk yield in the district of Germencik in 2008 and 2009 can be attributed to Söktaş livestock folding located in that district. Although the number of members and milking cows are high in the district of Çine, its 305-day average milk yield is low compared to other districts.

ARTIFICIAL INSEMINATION

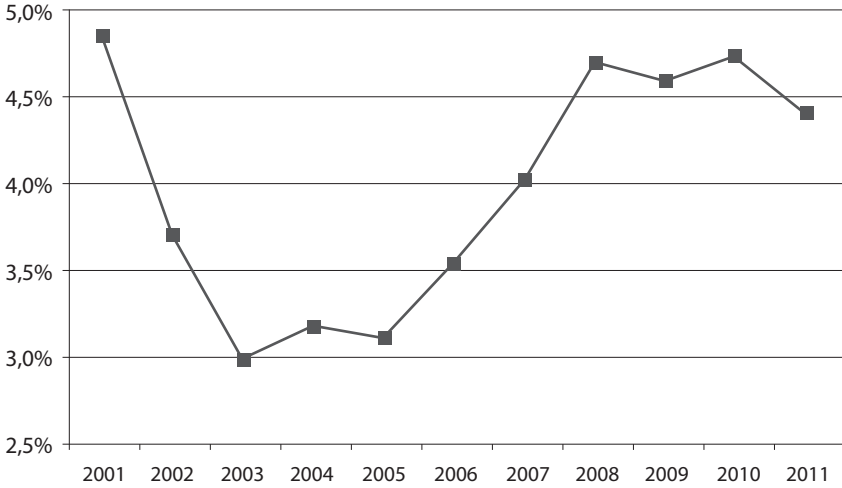


Figure 7 Number of registered artificial inseminations according to the E-Improvement System

With the establishment of associations throughout Turkey, artificial insemination applications have increased both in member and non-member livestock holdings. A rapid increase was noted in 2005 due to the incentives granted to freelance veterinarians. As from 2006, CBAA has ensured the freelance veterinarians contracted throughout the province to register the artificial inseminations they performed in the holdings of breeders, thereby ensuring the parentage information of newborn calves to be registered properly.

PROGENY TESTING PROJECT

Owing to the herdbook studies, Turkish sires are tested within the scope of the progeny testing project. In this scope, high quality semen is used on cows selected from model holdings for the selection of new bull candidates.

In consequence of the studies,

- 1 head in the 2nd cycle,
- 10 heads in the 4th cycle,
- 6 heads in the 5th cycle
- 4 heads in the 6th cycle,

which amount up to 21 bulls, were selected and sent to MenemenAI station. Eight of these bulls were raised to obtain quality semen. These semen were sold later.

Table 3 Bulls selected from Aydın for the Progeny Testing Project

	Bull no	Name	Cycle	Date of Birth
1	TR0922696	AYDINLI	2	09.07.2001
2	TR09172790	BASKAYA	4	18.06.2003
3	TR0998823	SEYMEN	4	06.05.2003
4	TR09100646	YÖRE	4	28.04.2003
5	TR09208118	ADALILAR	5	01.02.2004
6	TR09209060	ERTÜRK	5	06.03.2004
7	TR09209212	YÖRÜK	5	23.03.2004
8	TR09333940	YENİCELİ	6	07.07.2005

Table 4 Daughters of the sires originating from Aydınin the progeny testing project

SireEartag No	Sire name	Cycle	Cow	Heifer	Others (young heifers and calves+ males)	Total
TR0922696	AYDINLI	2	144	16	339	499
TR09172790	BAŞKAYA	4		20	203	223
TR09100646	YÖRE	4	36	215	384	635
TR09208118	ADALILAR	5	-	47	213	260
TR09209060	ERTÜRK	5	-	2		2
TR09209212	YÖRÜK	5		21	-	201
TR09333940	YENİCELİ	6	-	8	13	21

Source: E-improvement system

For milk control analysis throughout Turkey, milk samples are taken once every two months from the daughters of the sires used in the progeny testing project. Among these bulls, average lactation milk yield of the daughters of the sire named Aydınli is the highest. It is also reported that average number of somatic cells of this bull is below 400,000/litre.

Table 5 Average lactation milk yield of daughters of tested sires and milk control results

Sire Eartag No	Average lactation milk yield of daughters (lt)	Ave. Milk fat ratio (%)	Ave. Protein ratio (%)	Ave. Number of somatic cells (1000/lt)	Ave. Age of first calving (months)	Ave. Calving interval (days)
TR0922696 AYDINLI	7207	3,6	3,2	135	28	387
TR09172790 BAŞKAYA	7135	3,6	3,2	149	27	385
TR0998823 SEYMEN	5665	3,9	3,1	100	28	385
TR09100646 YÖRE	7048	3,1	2,9	118	26	399

FARM INFORMATION SYSTEM (CIBIS)

CIBIS renders information display and reporting services related to the livestock of member holdings. According to the data of December 2011, there are 131 member holdings in the province of Aydın and 2276 member holdings throughout Turkey. CIBIS allows member holdings to see and monitor the livestock movements related to their holdings, registered data (insemination, calf records, new animal records, subsidy information) and livestock reports.

As a result, the province of Aydın has a great potential in terms of agriculture and cattle breeding. Record keeping and performance evaluation required for genetic improvement studies, which are the basis of cattle breeding, are carried out by the Association. The existing records are assessed to contribute to the development of cattle breeding in the province.

2.

CHAPTER

Results of CBAA Dairy Cattle Breeder's Survey and Sector Stakeholders SWOT Analysis

*Dr. Çağla Yüksel KAYA KUYULULU**

1. Introduction

It was accepted that the Project with reference number **TR0703.01-02/178** titled **“Building Knowledge Bridges on Dairy Farm Management for Future”** would be financed by Central Finance & Contracts Unit (CFCU) under the Civil Society Dialogue-II: Agriculture and Fisheries Grant Scheme Programme (CSD-II/FA), and the Grant Agreement was signed on April 21, 2011. Upon the signing of the agreement, the preparatory stage began with the establishment of the project's timetable and action plan. After the project team was organized, project office and website were also properly prepared. As mentioned in the grant application programme, other main activities of the preparatory stage are the preparation of the book titled “Dairy Cattle Farm Management and Agricultural Advisory Services in the EU and Turkey”, conducting of a survey study among members of Cattle Breeders Association of Aydın (CBAA) and Milk Producers Association of Aydın (MPAA), and organization of a project onset workshop with the stakeholders of the milk sector in Aydın. It was decided that the survey study would be conducted among the herdbook and pre-herdbook cattle holdings in Aydın prior to the preparation of the book in order to ensure that the said book on the dairy cattle farm management and agricultural advisory services meet the needs of the milk sector in Aydın in terms of farm management and EU practices. This article intends to give information on the survey method, sampling, survey questions and results.

Survey questionnaire was prepared between July 22 and September 6, 2011, and the questions were tested in 8 different holdings, which have different herd sizes between September 7, and 10, 2011. After necessary arrangements and changes were made, the questionnaire began to be conducted by six interviewers in 16 districts of Aydın out of 17 in total on September 14 and ended on October 19.

Apart from the survey study, a stakeholder's workshop was held on December 24, 2011 and the SWOT analysis was conducted for the dairy cattle-breeding sector in Aydın within the scope of the project.

2. Material and Methodology

The data used for sampling in the dairy holdings in Aydın and for a general assessment of the sector are predominantly about cattle-breeding at herd and district level and were taken from the Herdbook and Pre-Herdbook Systems jointly executed by the Cattle Breeders Association of Turkey (CBAT) and the Ministry of Food, Agriculture and Livestock (MoFAL).

*Cattle Breeders' Association of Aydın, Aydın

The survey questionnaire was prepared with the support of Prof. SalahattinKUMLU and Prof. NumanAKMAN, and is essentially based on the “Dairy Farm Sustainability Check sheet” prepared by Appropriate Technology Transfer for Rural Areas (ATTRA) (Anonymous, 2001).

The questionnaire form consisting of 63 questions were applied to the sample population by private surveyors. Each part in the questionnaire comprises five or six questions to assess the knowledge of breeders concerning certain subject matters and thus reveal the level of knowledge and advisory needs of the breeders in Aydin.

Sample population consists of the dairy farm holdings located in Aydin and registered in the herdbook and pre-herdbook systems as of July 8, 2011. The list of the population was taken from E-Improvement database. Following the sample study, 516 herds were designated in total, 89.92% of which is from Herdbook farms and 10.08% from Pre-Herdbook farms (Table 1).

Table1 Distribution of the registered holdings in Aydin and those that are in the sample

	Number of holdings	Surveyed holdings	Percentage
Herdbook	4762	464	9,7
Pre-Herdbook	4584	52	1,1
Total	9346	516	5,5

Following the sampling process, data collection began on the field and the questionnaire was conducted as planned in 97.1% of the selected holdings. 501 breeders answered the questions of the survey and 15 breeders in total either refused to take part in the study or could not be found during the data collection process. Moreover, at the time of survey, 19 of the farms sampled as Herdbook farm became Pre-Herdbook farms, and four farms sampled as Pre-Herdbook farms were included in the Herdbook system.

Breeders were asked questions regarding employment and family labour in their holdings in order to determine the labour used for milk production in the farm. To that end, it was deemed necessary to calculate the labour unit, as there were workers of different age groups and genders working in the farm. Coefficients developed by Açı̇l and Demirci (1984) were used in the calculation of the labour used for cattle breeding and milk production activities in the surveyed farms (Table 2).

Table 2 Labour Force Unit (LFU) Coefficients for man and woman by age groups (Açı̇l, et al., 1984)

Age	Male	Female
7-14	0,50	0,50
15-49	1,00	0,75
50 +	0,75	0,50

SWOT Analysis was conducted with the determination of Strengths and Weaknesses of, and Opportunities and Threats for the dairy cattle sector in Aydın. A moderator accompanied the stakeholders who participated to the workshop, and they were asked to rank the responses according to their importance.

3. Findings

3.1 Demographic and general information on the holdings

One of the most significant data for the comparison of cattle herds is the herd size. Total number of female cattle per herd, which is the sum of the heifers (over 1 year old) and cows in the farm, is used as the herd size indicator in this study. Table 3 shows the distribution of the farms in the population and sample by herd size classes. As clearly seen from the data, dairy cattle farms in Aydın mostly have 10-19 head female cattle (45.7%). Since it took approximately 1.5 month to carry out the survey study after downloading the farm data from the database, there are some farms in the survey that have less than 3 female cattle in the sample.

Table 3 Distribution of population and sample farms by herd size classes (female cattle/ herd)

Herd size (female cattle/herd)	Population, %	Sample, %
Total number of farms	9346	501
< 3	0,0	1,0
3-9	34,3	22,0
10-19	45,7	43,3
20-49	16,9	28,3
50-99	2,3	4,0
>=100	0,7	1,4

This part of the questionnaire consists of questions that intend to collect information on the breeder and asset structure, number of cattle, machinery and basic income activity of the holding. Owners of the surveyed holdings are mostly men (92.2%) of 31-49 age group (51.4%) and only 4.8% of the holdings are owned by women of 31-49 age group (66.7%). Young (18-30) and old (over 65 years old) breeders have the same percentage in the total population, whereas there is not any woman breeder over 65 years old (Table 4).

Table4 Age group and gender distribution of the breeders

Breeders	18-30 years old, %	31-49 years old, %	50-65 years old, %	Over 65 years old, %	Total, %	Total number of breeders	Total ratio of breeders, %
Man	5,5	51,4	37,9	5,2	100,0	477	95,2
Woman	4,1	66,7	29,2	0,0	100,0	24	4,8
Total	5,4	52,1	37,5	5,0	100,0	501	100

If gender, age group and educational background are compared at the same time, it is seen that majority of the breeders are primary school graduate men of 31-49 age group (36.0%). If merely woman breeders are considered, it is seen that more than 80% of them are primary school graduates as well (Table 5). Having a relatively younger breeder population (57.5%), Aydın has a higher level of education (high school or higher) in the Herdbook System (14%) when compared to the Pre-Herdbook System (5.5%).

Table5 Distribution of breeders by their level of education, gender and age group

		Level of Education					
		Primary		Elementary		High School or Higher	
Gender	Age Group	Total share, %	Share in gender, %	Total share, %	Share in gender, %	Total share, %	Share in gender, %
Men	18-30	2,2	2,3	1,6	1,7	1,0	1,1
	31-49	36,0	37,8	5,1	5,3	8,1	8,5
	50-65	30,8	32,3	1,8	1,9	3,6	3,8
	≥ 65	5,0	5,3	0,0	0,0	0,0	0,0
	Sub-total	74,0	77,7	8,5	8,9	12,7	13,4
Women	18-30	0,2	4,1	0,0	0,0	0,0	0,0
	31-49	2,6	54,1	0,2	4,2	0,4	8,3
	50-65	1,2	25,0	0,2	4,2	0,0	0,0
	≥ 65	0,0	0,0	0,0	0,0	0,0	0,0
	Sub-total	4,0	83,2	0,4	8,4	0,4	8,4
TOTAL		78,0	-	8,9	-	13,1	-
Total number of breeders who answered the questions		388		44		65	

There are seven different breeds of dairy cattle in Aydın whereas Black and White Holstein cattle are the dominant breed. Only 3% of the surveyed farms do not have Black and White Holstein cattle, in other words 486 farms out of 501 declared that they owned B&W Holsteins in their farms. One of the farms, which were surveyed, did not have any cattle left while 26 of the farms have 3 different breeds in their farms. There are only cattle of the same breed in 358 holdings whereas 116 of the farms have cattle of two different breeds. There are 3 Brown Swiss, 1 Red and White Holstein and 6 Montbeliarde herds in which the average herd size is 18 heads.

Table6 Distribution of the cattle population in the sample herds by breeds and herd size (head female cattle/herd)

Breeds	Total cattle, %	Total farms, %	Average Heads of Cattle/Herd
Black and White Holstein Friesian	91,4	97,0	28,92
Brown Swiss	2,7	5,8	9,69
Red and White Holstein Friesian	2,6	9,6	8,27
Montbeliarde	1,8	11,4	7,39
Simmental	0,6	3,2	4,00
Jersey	0,4	4,8	3,79
Native	0,4	1,6	8,25
TOTAL	100	133*	-

To understand the labour structure of the dairy cattle farms in Aydın, breeders were asked about the family and hired labour, used for milk production and cattle breeding. More than half of the farms, both in Herdbook and Pre-Herdbook Systems have two or more family members working for the milk production and cattle breeding. While 31% of all the farms have at least one family member working at the holding for the aforementioned activities, in 11% of them the family members are not sharing the work done at the farm for milk production and cattle breeding. Nonetheless, hired labour is not very common among Aydın's dairy cattle herds since only 53 farms out of 501 (11%) hired one (40 farms) or more (13 farms) workers to take care of the cattle (Table 7).

Table7 Labour Force Unit (LFU) of family and hired labour for milk production and cattle breeding by herd size (head female cattle/herd)

Total N, %		Herd Size Class (head female cattle)						TOTAL	
		< 3	3-9	10-19	20-49	50-99	>=100	Total, %	Number of farms
Labour (MLU, family)	0	%0,0	%1,4	%2,8	%3,8	%2,2	%1,0	%11,2	56
	<= 1	%0,8	%7,4	%13,0	%9,2	%0,4	%0,2	%30,9	155
	1-1,5	%0,2	%4,4	%10,4	%2,4	%0,6	%0,0	%18,0	90
	> 1,5	%0,0	%8,8	%17,2	%13,0	%0,8	%0,2	%39,9	200
	Toplam	%1,0	%22,0	%43,3	%28,3	%4,0	%1,4	%100,0	501
Labour (MLU, hired)	0	%1,0	%21,8	%41,5	%23,8	%1,4	%0,0	%89,4	448
	<= 1	%0,0	%0,2	%1,4	%3,8	%2,0	%0,6	%8,0	40
	1-1,5	%0,0	%0,0	%0,2	%0,0	%0,0	%0,2	%0,4	2
	> 1,5	%0,0	%0,0	%0,2	%0,8	%0,6	%0,6	%2,2	11
	Total	%1,0	%22,0	%43,3	%28,3	%4,0	%1,4	%100,0	501

The size of the arable land used for agricultural production by the surveyed farms varies among different size classes. However, there are a small number of farms (4.8%) which do not own or use any arable land for crop production or grazing of the livestock. When it comes to the land ownership, the survey results show that 77% of the holdings in the sampled population own some amount of arable land, whether it is irrigated or not. The breeders, who have responded as not being the owner of the land, use the land owned by their parents in more than one third of the cases.

Table8 Number of holdings, land used by each holding and number of cows according to the land size

Land Size Class (da)	Owned land (da)	Family property (da)	Land tenancy (da)	Utilized Agricultural Area (da)		Herd Size (head female cattle)
	Total, %	Total, %	Total, %	Number of farms, %	Mean	Mean
Holdings without land	0,0	0,0	0,0	4,6	0,0	14
< 5	0,0	0,0	0,0	0,8	3,5	10
5-9	0,3	0,3	0,3	5,6	7,0	11
10-49	6,2	12,5	12,6	38,9	27,0	15
50-99	9,8	27,3	21,4	27,1	68,1	21
100-499	42,2	46,9	50,1	21,6	169	30
>= 500	41,4	12,9	15,5	1,4	3110	67
Total	100,0	100,0	100,0	100	109	20

Majority of the cattle farms in Aydın has a Utilized Agricultural Area (UAA) between 10-49 da with an average of 27 da and 15 head female cattle. Furthermore, there are significant amount of holdings with more than 50 da UAA (50%) including 7 farms with more than 500 da (Table 8).

When it comes to machinery used in the holding it is obvious that there is a tractor in many of the holdings with an average age of 17 years. As expected, most of the tractors are found in holdings with a land size between 10-49 da. The machinery solely used for milk production in the holdings such as milking machine and bucket are present in most of the holdings (485 and 240, respectively). On the contrary, cooling tank is found just in 9% of all the surveyed farms (Table 9)

Table9 Share of holdings with feed and milk machinery by herd size, and average age (years) and capacity (tons) of the machinery

Herd Size Class (head female cattle)	Share of holdings with machinery by herd size, %					Cooling tank capacity (tons)
	Forage harvester	Milking Machine	Milk bucket	Feed mixer	Cooling tank	
< 3	%1,2	%0,8	%0,4	%0,0	%0,0	-
3-9	%4,7	%21,2	%19,2	%4,3	%4,3	1,5
10-19	%29,4	%44,0	%44,2	%8,7	%13,0	1,4
20-49	%50,6	%28,5	%31,2	%47,8	%45,7	1,1
50-99	%12,9	%4,1	%4,6	%17,4	%26,1	1,6
>=100	%1,2	%1,4	%0,4	%21,8	%10,9	2,9
Total, %	%100	%100	%100	%100	%100	1,5
Total, number of holdings	85	485	240	23	46	-
Average age of machinery (years)	7	5	2	2	3	-

87% of all the surveyed farms answered that milk production was their main source of income, while cattle breeding (sale of breeding cattle) and crop production were the main sources of income in 4% of the farms, separately. Furthermore, 91% of all farms have forage production.

3.2 Record keeping

In order to understand the managerial skills of the breeders, the record keeping habits were questioned, and a significant number of breeders (96%) declared that they were keeping records on their own; in which 95% of them keep these records on a notebook. The main data kept at farm level are, as expected, the Herdbook (85%) and insemination (84%) data, whereas only 7% of the farms declared that, they maintained accounting records.

As mentioned above, 91% of all surveyed farms have forage production. Table 10 shows the main forage crops produced in the province of Aydın for dairy cattle feeding. Maize production for silage covers 35%, vetch covers 29% and alfalfa covers 9.4% of the total land used for forage production in the surveyed farms. In other words, maize for silage is produced in 74%, vetch is produced in 55% and alfalfais produced in 34% of the farms with a forage production. With such a high rate of forage production, it is quite natural that farm manure is mainly used as fertilizer in agricultural lands. Of all the farms surveyed (501 farms), 96% use farm manure for production in their own land, while only 2% sell it and 0.6% use it for heating.

Table10 Number and share of farms producing main forage crops, and total and average (per farm) cultivated land used for main forage crops

Forage production	Total number of farms	Share in total farms (%)	Total land (da)	Average land (da)
Maize silage	338	%74	9729	29
Vetch	250	%55	8283	33
Alfalfa	153	%34	2655	17
Rutabaga	52	%11	420	8
Other total	41	%9	920	22
Ryegrass	8	%2	95	12
Total forage production	456	%100	28148	56

3.3 Housing systems

To be able to understand the housing facilities and characteristics of the dairy cattle farms in Aydın, the questionnaire also included questions on housing of the adult and young cattle in the holdings. The housing of dairy cattle in Turkey and in particular Aydın region could be grouped as enclosed or roofed-open; loose, free or tied stall housing systems. Even though the use of different groups could vary according to the region, tradition and climate the survey results show that more than 70% of the dairy cattle in Aydın are kept in a roofed-open, loose/free stall housing system (Table 11).

Table 11 Distribution of different housing systems in the surveyed farms by districts

Districts	Barn types for milking cows				
	Roofed-open, loose/free-stall housing system	Roofed-open, tied-stall housing system	Enclosed, tied-stall housing system	Enclosed, free-stall housing system	Total
Bozdoğan	%87,8	%6,1	%6,1	%0,0	%100
Çine	%53,6	%11,3	%32,0	%3,1	%100
Didim	%75,0	%0,0	%25,0	%0,0	%100
Germencik	%66,7	%9,5	%23,8	%0,0	%100
İncirliova	%58,3	%25,0	%16,7	%0,0	%100
Karacasu	%80,0	%4,0	%16,0	%0,0	%100
Karpuzlu	%43,3	%33,3	%20,0	%3,3	%100
Koçarlı	%71,0	%9,7	%19,4	%0,0	%100
Köşk	%95,2	%4,8	%0,0	%0,0	%100
Kuyucak	%88,9	%2,8	%8,3	%0,0	%100
Merkez	%85,5	%3,9	%9,2	%1,3	%100
Nazilli	%81,0	%5,2	%10,3	%3,4	%100
Söke	%62,5	%18,8	%18,8	%0,0	%100
Sultanhisar	%83,3	%0,0	%16,7	%0,0	%100
Yenipazar	%88,9	%0,0	%11,1	%0,0	%100
Total	%73,8	%8,8	%16,0	%1,4	%100

When it comes to housing, one of the most important topics is the bedding material for the comfort of the cows, which contributes to udder health. Unfortunately, 95% of farms that answered the question declared that there was no special bedding material in the barn. Only 4% of these farms use sand, while 1% of them use either hay or straw.

Having clean drinking water available for the adult and young cattle in the barn or in the pasture is another very important topic since water is the most essential of all nutrients required by dairy cattle (Linn, 2010). The results of this survey show that 95% of the dairy

cattle in the barns have unlimited access to drinking water, while this ratio falls to 73% when they are at pasture. The main source of drinking water in the farms is city water supply system (~60%). In some of the farms, there is an automated drinking bowl (11%); however, 82% of all farms mostly use a watering trough.

3.4 Milking

Milking of cows is the most important activity in the farm particularly in terms of profitability because it is directly linked with the well-being of the cows. Therefore, utmost attention should be paid to the milking equipment, technique, training of the personnel milking the cows and the milking centre/place (Anonymous, 2010a; 2010b). The survey clearly shows that 97.6% of the cattle breeders use milking machine, while only 2.4% still milk the animals manually. Most of the milking machines used are portable/mobile (87%) machines generally preferred by small and medium sized farms (88.4% in farms with 3-19 head cows).

3.5 Herd health management

The frequency of scheduled veterinarian visits is variable and somewhat dependent on herd size (Anonymous, 2011a). The frequency of veterinarian visits in the surveyed farms shows that most of the farms do not have planned, scheduled veterinary services, but rather the veterinarian visits the farm on call (39%). Moreover, small and medium sized farms (3-19 head female cattle) receive veterinary services with a frequency of weekly to monthly (56% and 44% for 3-9 and 10-19 head female cattle herds, respectively) while relatively higher herds receive such services more frequently.

When analysed according to the overall response counts, the three main reasons for calling a veterinarian in the surveyed farms resulted as artificial insemination (46%), treatment (33%) and calving difficulty (8%). As a result, it could be said that even in one of the most developed milk production regions in Turkey, veterinary services are not considered as a part of the herd health management and planning. Instead, their service is still required for artificial insemination, which in fact is not the veterinarians' main field of activity anymore in most of the developed countries. In most of the cases, after a couple of weeks training the breeders usually receive a certificate that enables them to inseminate their own animals. This result also shows that preventive medicine and herd health management still do not get the attention they should get in Turkey where there are still serious epidemic diseases present in the cattle population, such as blue tongue, bovine tuberculosis, brucellosis, Foot and Mouth Disease (FMD) and anthrax (Anonymous, 2011b). This becomes clear with 80% of the farms declaring that they do not have a vaccination program for their herd. Another reason for not having a herd level vaccination program could be the vaccination program currently being carried out by the Ministry of Food, Agriculture and Livestock for certain diseases.

The result of this survey is an important proof that most of the time breeders do not realize that their cows have mastitis. According to the survey results, 62% of the herds in Aydın do not have mastitis, only 38% of the breeders declared that there was mastitis in their

herd with an average of 3 head cows per year. Linked with this question, the breeders were also asked whether they knew the bacteria count in their milk or not. The bacteria count of the milk is not known by 98% of the breeders. Nevertheless, they made estimation when they were asked to do so, and the average bacteria count they estimated varies from 30 thousand to 300 thousand per ml.

The cow's health is very much linked to a healthy use of its feet and legs. Feet and leg problems could occur very frequently and easily due to improper housing, bedding and hygienic conditions (Anonymous, 2010e). In 78% of the surveyed farms, breeders stated that there were no feet and leg problems in their herds.

3.6 Feeding management

In order to understand the feeding management basics of the surveyed farms, the breeders were asked about their feeding practices during dry period of dairy cows. Nearly half of the breeders decrease the amount of roughage and concentrate feed when the cows are in dry period. However, there are still a significant number of breeders who do not change the amount of feed given during dry and milking periods of lactation (89) and a small number of breeders who increase the amount of roughage while increasing concentrate feed (51) (Table 12).

Table 12 Feeding practices applied by surveyed breeders during dry period of dairy cows

		Concentrate feed use in dry cows			
		No change	Increases	Decreases	Total
Roughage feeding in dry cows	No change	%17,8	%0,4	%19,0	%37,2
	Increases	%0,8	%0,6	%10,2	%11,6
	Decreases	%1,0	%1,0	%49,2	%51,2
	Total, %	%19,6	%2,0	%78,4	%100
Total number of breeders		500			

The survey results show that dairy cattle farms in Aydın feed their cows twice a day (99%). Only 1% of the surveyed farms feed the cows 3 times a day.

Another important factor in feeding management is the decision of balances of rations for the cows. 95% of the respondents decide by their own on how the daily ration should be. Consulting to an expert is an option for only 4.3% of the respondents.

3.7 Genetic improvement activities

Dairy cattle breeding goals consist of functional traits as well as milk production traits (Buch, 2010); however, it has shown a significant change over the years. Dairy cattle breeders

still have an indisputable impact on genetic improvement and the structure of animal breeding programs (Van Der Werf, 1999), specifically in countries like Turkey where Artificial Insemination is considered as the main breeding activity and yet so far, the most common technology.

If the role of breeders in genetic improvement is to be assessed for Aydın region, the outcome of the survey concerning the attitude of breeders towards their herds' actual situation could give a clear idea. The results show that more than half of the breeders do not consider that the cows in the farm have any characteristics or traits that are inadequate or not improved sufficiently. In spite of this response, fortunately the other half (45%) is aware of the inadequacies in the herd such as repeat breeding (22%), low milk yield (14%) and small body size (3%).

Sire selection is equally important for an animal breeding program. AI technicians have the biggest influence not only on the sire selection itself (73%) but also on the selection of the sire origin (whether it is an imported or local sire) (60%), while the sire catalogues are in the second place (19%). The influence of semen companies for selection of appropriate sire at the farm level is as low as 1%. However, the origin of the AI bull, in other words, whether the semen is imported or obtained from local production, is a decision that 41% of the breeders prefer to make themselves. Imported frozen, tested bull semen is more preferred (37%) than the local ones (4%).

3.8 Expectations and targets of the holdings

Breeders who participated in the survey were asked in which cases they would consider their holdings successful, and the answers given to this open-ended question were grouped. The fact that 37% of the breeders consider the increase in milk prices as a success criterion, which suggests that their success depends on the milk prices developing under the conditions of Turkey rather than proper farm or herd management and planning, can only be accounted for by the widespread use of the system of pricing according to quality in this region. Another explanation is that majority of the breeders already have confidence in the business they own and that they believe the milk price to be obtained above the costs will be the most significant factor that contributes to their success. Increasing the milk yield and production is regarded as a success criterion by 22% of the breeders. The main point to be noted here is the low percentage of farmers who consider themselves successful with good herd management, healthy herd and improvement activities (3.3%, 1.9%, and 0.8%).

When the answers given to the question on the investment priority of the holding are examined, it is seen that the size of the holding is influential on the answers given. While livestock purchase is the priority in the holdings with a herd size of 1-9 head cattle, those with a herd size of 10-49 and above 100 head cattle consider the expansion of the barn a priority. Selection of land purchase by relatively large holdings (>50 head cattle) may be accepted as the reflection of the desire of the holdings to produce their own roughages. This is also supported by the answer given to the question asking the expectancies of the farmers in 5 years, with an expectancy of enlargement of the herds in 5 years by 54%.

Among answers given to the question, asking the three primary problems of cattle-breeding, breeders pointed out to marketing with a ratio of 69% and animal diseases with a ratio of 21%. Other answers given to this open-ended question are genetic material, insufficient subsidies, feed quality and insufficient pastures, holding management, housing, milk quality and keeper. A small number of breeders (0.6%) think that there is not any problem.

3.9 EU Membership and Practices, and Advisory Services

In this part, breeders were questioned with respect to their knowledge and opinions on the EU and were asked to compare themselves with the breeders in the EU. They were also asked in which fields they would want to benefit from advisory services.

Those who think that the EU breeders have an edge over them constitute 79% of the respondents, and 38% of them believe that this advantage of EU breeders stems from the subsidies and long-term policies in the EU. Additionally, marketing opportunities and price stability (15%) provide the EU breeders with significant advantages according to the respondents. They stated that the most prominent difference of cattle breeding in the EU from that in Turkey was the possession of modern and technological holdings (61%). Those who believe that better business management (9%) and more healthy animals (0.4%) make this difference, are quite low. Despite all these advantages and infrastructural differences, 63% of the breeders in Aydın believe that they can compete with the European breeders if Turkey becomes a member of the EU.

The most striking point regarding the answers given in the questionnaire was the level of knowledge of the breeders in Aydın on the rules of milk production and animal welfare in the EU. When the answers given to the questions are examined, it is seen that 71% of the respondents correctly answered the question concerning the rules of milk production and 81% correctly answered the question concerning the rules of animal welfare. This indicates that breeders in Aydın have a higher level of knowledge than expected.

3.10 SWOT Analysis Results

The SWOT Analysis study conducted with the participation of relevant stakeholders from the dairy cattle sector in Aydın and surrounding provinces was attended by 37 people from professional chambers, faculties, cooperatives, producer associations and private sector representatives (related to the sale of semen, barn materials, etc.) With this study carried out under the supervision of a moderator, strong and weak aspects as well as future opportunities and threats involved in dairy cattle breeding in Aydın were determined, and then the participants were asked to rank those items in order of importance. The five most important answers that came up in consequence of this analysis are summarized in Table 13.

The results obtained are parallel to the answers given by breeders, particularly in the weaknesses and threats parts. Strengths determined in the analysis are roughage production and fertile lands, high ratio of high-yielded breeds, proper keeping of the records related to the activities of CBAA and thus maximum capability to benefit from subsidies and growing

herd sizes. On the other hand, notable weaknesses are marketing, pricing policy and price instability, widespread presence of small-scale holdings and their undesired influences on negotiations for milk prices, and widespread animal diseases.

Establishment of new modern holdings, increase in the demand for animal products and the accompanying increased awareness of the strategic importance of the food sector, thus the increase in knowledge of breeders, and plans to establish a milk and dairy market organisation within the scope of the EU harmonization activities as a solution for marketing problems can be described as the future opportunities of the sector virtually in national terms. As in all of the opportunities and most of the weak aspects, answers received for threats are also linked to national problems, from which it is possible to infer that regional advantages will not turn into significant opportunities in the long-run unless both the existing and future sectoral problems are resolved in national terms.

Table 13 Results of the sector stakeholders SWOT Analysis study

STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
Forage production potential	Instability of milk prices and the fact that the contract is not awarded in Aydin	Establishment of new and modern milk processing facilities	Spreading cattle diseases and failure to control them
High ratio of culture breeds	High number of small holdings	Growing demand for animal products	Continuation of instability in the milk market and slaughter of quality cattle
Proper keeping of herdbook and pre-herdbook records; Growing herd size; Fertile lands	Widespread animal diseases and lack of policies to fight against them	Growing strategic importance of the food sector	Continuing wrong agricultural policies
Maximum capability to benefit from livestock subsidies	Unstable milk market and crises	Growing fund of knowledge	Unconscious use of loans
Growing herd size	No pricing according to quality	Plans to establish the market	Continuing livestock imports and uncontrolled imports

4. Conclusions and Recommendations

Aydin is located in the Aegean Region (1st among 12 NUTS 2 regions), which is one of the most important milk production regions in Turkey, and solely Aydin province produces 3% of the total milk production in Turkey (Anonymous, 2012). The presence of a powerful

Cattle Breeders Association, which has a widespread service network and trained technical personnel, and of an Agricultural Development Cooperative named Ör-Koop, which has a deep-rooted history have no doubt contributed greatly to the attainment of a high level of knowledge and awareness by breeders engaged in dairy cattle breeding. On the other hand, survey results indicate that holdings need to enhance their knowledge on feed, calves, young animals, reproduction and herd health management and improve their managerial skills. Above all, they should be more aware of the improvement activities and practices going on in their own farms. Record keeping, particularly maintenance of accounting records will undisputedly increase the productivity and profitability of the farm.

For 38% of the surveyed farms, the most significant source of information is veterinarians. Other breeders and personnel of the Association were other answers given by more than 20% of the respondents (Table 14).

Table 14 First 3 sources of information of the dairy cattle farms in Aydın

First 3 Sources of information	Responses	
	Number of farms	Percent of Cases
Veterinarians	444	%90,6
Other breeders	249	%50,8
Personnel of the Association/Cooperative	245	%50,0
Publications (written and visual)	56	%11,4
Other	55	%11,2
Feed vendors	42	%8,6
Internet	27	%5,5
Private advisor	24	%4,9
Health personnel of the Ministry	18	%3,7
Public Technician/Agronomist	10	%2,0
Dairy plants	8	%1,6
Advisors of the Ministry	2	%0,4
None	1	%0,2
Total number of farms	490	%100

Sooner or later Cattle Breeders' Associations need to, as a part of their primary duty, develop a dairy cattle advisory system by being inspired from international associations that have been operating successfully for long years, and by taking their cue from their efforts. Among basic topics demanded by breeders, product quality ranks the first with 26%, feeding the second with 25% and preventive medicine and animal diseases with 20%. Accounting records and business economics have such a low demand as 1%. In fact, these results clearly demonstrate that breeders are aware of the shortcomings in their farms and desire to carry out market-oriented production or at least enhance their competitive power in the market.

Table15 First 3 topics requested from CBAA's advisory centre by dairy cattle farms in Aydın

Topics of advisory services	Responses	
	Number of farms	Percent of Cases
Product quality and hygiene	218	49.1%
Feeding management	215	48.4%
Animal diseases and preventive medicine	172	38.7%
Improvement activities	77	17.3%
Heat detection	65	14.6%
Record keeping	45	10.1%
EU milk production rules	25	5.6%
None	12	2.7%
Bookkeeping and farm economics	9	2.0%
Other	8	1.8%
Animal welfare and practices	5	1.1%
Total	444	100%

In addition to all, dairy cattle breeding in Turkey have some structural problems, which cause distress for the farms of the breeders in their long-term plans. It is essential that political approaches that have, to date, always worked against producers under "free market conditions" give way to national cattle policies that have rational, long-term and export-oriented targets. The failure of Turkey, which has approached the 100th anniversary of the foundation of the republic, to resolve problems related to animal diseases and its becoming

a net importer of animal products is a situation that should not be accepted, considering the richness of Anatolian lands and the position of Turkey in the global economy.

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3.

CHAPTER

Agricultural Extension in the World and Turkey

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1. Concept of Agricultural Extension and the Transformation Process

Although “agricultural extension” can have different meanings for different individual under different conditions, it can be defined as an approach that assist in farmers to increase their income and production efficiency with any resource aid, or in other words, to adopt developing technologies and change their living standards (Perumal, 2001).

Shekara (2001) defined agricultural extension as providing knowledge transfer that will contribute to individual improvement, whereas Kumuk and Akgungor (1995) define it as an unofficial education service for rural people. Agricultural extension is a service in which executives (agricultural researchers, political authority, farmer organizations, non-governmental organizations, farmer training centres, media organizations, etc.) who are responsible for activities such as research, knowledge transfer and training, and are influential on the decisions of farmers take part (Satpathy and Mangaraj, 2001). While this service is performed by the state in underdeveloped and developing countries, it is carried out by non-governmental organizations and farmer organizations in most of the developed countries (Kumuk and Akgungor, 1995).

Today globalization, liberalization and developments in the world agricultural sector have intensified the responsibilities of extension personnel for fulfilling the changing needs of farmers (Chandrakandan and Karthikayan, 2001). Besides, fiscal deficits that have risen in most of the developing countries have increased the pursuit of extension services that are cost-effective and directly compatible with the farmers’ needs. This has also brought into the agenda the necessity to reform the extension services carried out by the public in many countries where the ineffectiveness and insufficiency of extension services to fulfil the needs of farmers are criticized (Hanchinal et al., 2001). Disagreements on this matter and disputes on the redefinition of extension services carried out by the public emerged in 1980s (Coutts, 2006). Today the tendency is to decrease the functionality of extension activities carried out by the public in the agricultural extension services and increase that of the extension activities carried out by the private sector including advisory companies, contracted companies, non-governmental organizations and producer associations (Prasad, 2001).

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Areas of extension activities carried out by the public sector (Saravanan, 2001)

1. Providing Self-sufficiency in production
2. Providing knowledge transfer to rural areas
3. Focusing on environmental problems
4. Sustainable agriculture
5. Protecting land and water resources
6. Pest control
7. Human resources development in agriculture

Areas of extension activities carried out by the private sector (Saravanan, 2001)

1. Advisory services for profit maximization
2. Timely supply of inputs for better production
3. Supplying the demands of the market
4. Product development
5. Marketing the products
6. Loans for farmers

2. Examples from the World

Table 1 Basic characteristics of the agricultural extension services in various countries

COUNTRY	LEVEL OF STRUCTURING	MAJOR ACTORS	FINANCING
GERMANY	State		Mixed (Public, Farmer)
DENMARK	National	Producer Organizations	Farmer
BRAZIL	State	Public	Public
SOUTH AFRICA	Province	Mixed (Public, Farmer Organizations, Non-governmental Organizations)	Mixed (Public, Farmer)
KAZAKHSTAN	Province	Public	Public
NEW ZEALAND	National	Private Sector	Farmer
ISRAEL	Regional	Public	Public
EGYPT	Province/ Sub-province	Public	Public

As expressed in Table 1, there are different forms of structuring observed in different countries of the world in terms of agricultural extension service. An important point that needs to be underlined at this stage is that it would be fallacious to claim that such forms of structuring will maintain their existence in the same structure in the forthcoming years. This is because some characteristics specific to the countries that direct the organization and financing of the agricultural extension service may differ over time.

For instance, a dual structure is observed in the agriculture of the South Africa in terms of the size of enterprises. On one side, there are very large-scale enterprises, and on the other, there are numerous small enterprises that are engaged in subsistence farming. Approximately 60,000 commercial enterprises cultivate 85% of the total arable land and produce 95% of the products put into the market. Approximately 3 million small enterprises use 13% of the total arable land. In the South Africa Republic, the contribution of the agricultural sector to the national economy is around 2%. Due to the predominance of the traditional use of land, insufficiency of the physical infrastructure, inadequate credit facilities, insufficient conditions to access the market and inputs, and intense immigration to urban areas, these enterprises engaged only in subsistence farming.

In such a dual structure, the public has to reach the lowest administrative units and provide this service free of charge so that the needs of approximately 3 million small enterprises for knowledge are fulfilled. Non-governmental organizations or farmer organizations are predominantly organizations established by the owners of approximately 60,000 large enterprises that cultivate 85% of the whole arable land in the country. It is quite natural that such enterprises, which can also be named as giant plantation enterprises, are ready to pay for specialized knowledge and purchase such services through their organizations.

New Zealand has been known as an agricultural country since the 19th century. Particularly with the development of cold chain transportation, exportation of agricultural products such as meat, butter etc. from New Zealand to the UK became easier. Over the 20th century, exportation of agricultural products took an important place in the country's economy and constituted half of the export revenues. Owing to the improvement of mechanization and developments in other sectors, population ratio in the agricultural sector, which was 37%, fell to 9.4% in 1999.

New Zealand Ministry of Agriculture was established in 1892. The most important objective of establishment of the Ministry is described as providing farmers with technical advisory services. Significant changes were made in the structure of the Ministry following this date. In the next periods, it rather focused on formulating more policies, regulation and control functions. Service functions such as agricultural extension were detached from the main unit of the Ministry and were assigned to the Agriculture New Zealand (ANZ) in 1995. Initially ANZ was a public organization, but later it was privatized. Thus, agricultural extension service became fully privatized in the country.

3. Agricultural Extension and Advisory Services in Turkey

Organizations that provide agricultural extension and advisory services in Turkey can be classified as given below. No doubt, the number of the beneficiaries of the services provided by these organizations as well as the financing of the services and areas of profession may differ between such organizations.

- Ministry of Food, Agriculture and Livestock (Public organization responsible for direct extension)
- Organizations that are not directly responsible for extension but are engaged in extension activities
- Research Institutes, Extension and Economy Departments subordinate to the Ministry of Food, Agriculture and Livestock
- Non-profit organizations (Foundations)
- University Extension Research Application Centres
- Chamber of Agriculture
- Other Producer Organizations (Ozcatalbas et al., 2010).

Ministry of Food, Agriculture and Livestock

Organization of the Ministry was re-regulated with the “Statutory Decree on the Organization and Duties of the Ministry of Food, Agriculture and Livestock” no. 639, dated 03.06.2011 (published on 08.06.2011). With the said decree, the name of the Ministry was changed to the Ministry of Food, Agriculture and Livestock.

Duties of the “Training, Extension and Publications Department” serving within the body of the Ministry are as follows:

- a) Carrying out or causing to carry out the printing and publication of visual, audial and written documents that fall into the jurisdiction of the Ministry.
- b) Collecting, reviewing, publishing any information and document related to the jurisdiction of the Ministry for training purposes, preparing or causing to prepare films, slideshows, photographs and other similar documents, and carrying out archive, documentation and library services regarding these matters.
- c) Performing or causing to perform any training/education activity that falls into the jurisdiction of the Ministry.
- d) Cooperating with public and private organizations with respect to publications to be made in areas that fall into the jurisdiction of the Ministry.
- e) Carrying out farmer training, agricultural extension and advisory services.
- f) Fulfilling other similar duties assigned by the Minister (published on 27.08.2011)

With this regulation, the departments that had previously served at provincial level under the name of “Farmer Training and Extension Department” became “Coordination and Agricultural Data Department”, and apart from farmer training and extension services, many additional duties were assigned to this department.

Public Project for the Development of Agricultural Extension (TAR-GEL)

TAR-GEL Project was initiated on January 01, 2007 following the termination of KOYMER project.

When the transition from KOYMER to TAR-GEL is examined, it is seen that the only difference between these projects is to transform agricultural advisors serving within the scope of KOYMER (approximately 1000 people) to civil servants. Agricultural advisors included in the scope of TAR-GEL stayed in their original assigned positions and began to fulfil the same duties as civil servants.

Table 2 Number of personnel serving under the status of 4/B within the scope of Tar-Gel project (2011)

REGION	ENGINEER	VETERINARY	TOTAL
Mediterranean	537	180	717
Eastern Anatolia	623	401	1.024
Aegean	696	228	924
South-eastern Anatolia	697	288	985
Central Anatolia	1.116	503	1.619
Black Sea	848	435	1.283
Marmara	539	221	760
TOTAL	5.056	2.256	7.312

Source: Anonymous 2012/a

It is planned to recruit 2,500 more personnel in 2012.

Non-Public Advisory Services (Free Agricultural Consultancy)

The first legal framework that regulated the free agricultural advisory services in Turkey was the "Regulations on the Arrangement of Agricultural Extension and Advisory Services" which went in effect on 08.09.2006. Although article 16 of the Bylaws on the Duties and Powers of Agricultural Engineers published in the Official Gazette in 1992 empowers the agricultural engineers to serve as freelance advisors, these regulations filled many gaps regarding free agricultural consultancy (Ates and Sayin, 2008).

These Regulations allowed the non-governmental organizations, chambers of agriculture, agricultural advisory companies and farmer organizations to provide agricultural advisory services (article 4/k). Article 21 of the Regulations list the persons and organizations that can render agricultural advisory services:

- a) Producer organizations and chambers of agriculture, which employ advisors,

- b) Agricultural advisory associations/foundations,
- c) Agricultural advisory companies,
- d) Freelance agricultural advisors.

Article 4/r of the Regulations states that persons certified in accordance with the provisions of the Regulations and serving for extension services in the central organization of the Ministry, subordinate organizations and provincial organizations are called as "Agricultural Extension Officers".

Duties of agricultural extension officers/advisors are listed in article 19 of the Regulations:

- a) Assisting in the owners of agricultural enterprises or other served units to acquire necessary knowledge and skills on relevant topics at any stage of production, and carrying out agricultural applications in compliance with the relevant legislation when required,
- b) Ensuring that any information and new technologies related to sustainable production techniques for plant and animal production are put into the use of the target group,
- c) Informing the owners of agricultural enterprises and target group for the protection of environment, natural resources and biological diversity,
- d) Contributing to the achievement of a more competitive structure in agricultural enterprises and to their orientation to the goods and services market more efficiently,
- e) Serving as business economics extension officer/advisor and giving necessary recommendations,
- f) Performing extension/advisory services on economic analyses, development plans, improvement of business and capital efficiency for enterprises and on problems specific to family business, domestic economy and mechanization for family enterprises,
- g) Providing personal development and entrepreneurship trainings so that agricultural personnel can practise their profession better,
- h) Attending trainings held on topics, for which they are responsible,
- i) Making use of printed, auidial and visual means of mass media in extension/advisory activities, and preparing or contributing to the preparation of them,
- j) Collecting and recording data related to agricultural extension and advisory activities,
- k) Ensuring the drawing up of documents that will contribute to the recording and control of agricultural production,
- l) Making efforts concerning producer organization.

Although the Regulations had required participation in a 120-hour Certificate Program so as to be a Freelance Agricultural Advisor or Agricultural Extension Officer, this requirement was later abolished, and instead the Ministry holds examinations twice a year, in which successful people are entitled to be an advisor or extension officer.

The legal framework for the supporting of Agricultural Extension and Advisory Services is the "Communiqué on the Payment of Subsidies for Agricultural Extension and Advisory Services" dated 21.05.2009. Pursuant to this Communiqué, a subsidy payment of TL225 was made to each farmer/enterprise who/which purchased agricultural advisory service in 2009. The subsidy payment for 2011 was TL500 (published on 21.05.2009).

To benefit from the subsidy, farmers/enterprises have to fulfil some minimum conditions. These conditions are as follows:

- a) Being registered in the farmer registration system and/or animal registration system and/or greenhouse registration system and/or aquaculture registration system and/or apiculture registration system and/or sheep-goat registration system,
- b) Meeting at least one of the criteria below:
 - 1) Having at least 3 decares in greenhouse production,
 - 2) Having at least 10 decares in fruit cultivation,
 - 3) Having at least 100 decares for enterprises engaged in dry farming and 50 decares for enterprises engaged in irrigated farming,
 - 4) Having at least 20 heads for dairy cattle-breeding enterprises, at least 50 heads for beef cattle production, and at least 100 heads for ovine animal breeders,
 - 5) Having at least 50 bee colonies,
 - 6) Having aquaculture production facilities.

Distribution by provinces of those who were certified to serve as Freelance Agricultural Advisors in Turkey in compliance with the provisions of the Regulations on the Arrangement of Agricultural Extension and Advisory Services and of enterprises which benefit from the Agricultural Extension and Advisory Services Subsidy is given in the table below (2011):

Table 3 Number of freelance agricultural advisors in the provinces of Turkey (2011)

Provinces	Number of advisors	Provinces	Number of advisors
01 Adana	7	36 Kars	22
02 Adıyaman	4	39 Kırklareli	2
05 Amasya	11	42 Konya	20
06 Ankara	13	43 Kütahya	11
07 Antalya	13	44 Malatya	20
09 Aydın	8	45 Manisa	15
10 Balıkesir	11	46 K.Maraş	18
12 Bingöl	8	47 Mardin	26
15 Burdur	8	48 Muğla	6

Provinces	Number of advisors	Provinces	Number of advisors
16 Bursa	12	50 Nevşehir	1
17 Çanakkale	3	51 Niğde	1
18 Çankırı	8	52 Ordu	67
19 Çorum	9	53 Rize	3
20 Denizli	10	54 Sakarya	19
21 Diyarbakır	59	55 Samsun	47
22 Edirne	11	56 Siirt	7
24 Erzincan	12	58 Sivas	23
25 Erzurum	5	59 Tekirdağ	26
26 Eskişehir	8	60 Tokat	4
27 Gaziantep	21	63 Şanlıurfa	11
28 Giresun	24	67 Zonguldak	4
29 Gümüşhane	1	68 Aksaray	5
30 Hakkâri	3	69 Bayburt	3
31 Hatay	5	70 Karaman	1
32 Isparta	19	72 Batman	8
33 İçel (Mersin)	24	74 Bartın	1
34 İstanbul	2	77 Yalova	4
35 İzmir	41	81 Düzce	10
TOTAL		745	

Source: Anonymous 2012/b

Table 4 Number of enterprises benefiting from agricultural extension and advisory subsidy in Turkey (2011)

Provinces	Number of Enterprises	Provinces	Number of Enterprises
01 Adana	296	36 Kars	311
02 Adıyaman	199	39 Kırklareli	63
05 Amasya	443	42 Konya	801

Provinces	Number of Enterprises	Provinces	Number of Enterprises
06 Ankara	411	43 Kütahya	438
07 Antalya	254	44 Malatya	540
09 Aydın	284	45 Manisa	658
10 Balıkesir	440	46 K.Maraş	831
12 Bingöl	400	47 Mardin	1.187
15 Burdur	507	48 Muğla	183
16 Bursa	579	50 Nevşehir	7
17 Çanakkale	62	51 Niğde	37
18 Çankırı	429	52 Ordu	3.267
19 Çorum	460	53 Rize	150
20 Denizli	366	54 Sakarya	606
21 Diyarbakır	3.742	55 Samsun	2.205
22 Edirne	559	56 Siirt	338
24 Erzincan	437	58 Sivas	1.120
25 Erzurum	188	59 Tekirdağ	1.383
26 Eskişehir	287	60 Tokat	197
27 Gaziantep	975	63 Şanlıurfa	598
28 Giresun	994	67 Zonguldak	200
29 Gümüşhane	36	68 Aksaray	191
30 Hakkâri	189	69 Bayburt	119
31 Hatay	209	70 Karaman	49
32 Isparta	788	72 Batman	399
33 İçel (Mersin)	1.393	74 Bartın	60
34 İstanbul	73	77 Yalova	181
35 İzmir	1.823	81 Düzce	317
TOTAL		33.258	

Source: Anonymous 2012/b

When the both tables given above are considered together, it may be said that the speed of development of the Freelance Agricultural Consultancy is quite low. When the total number of agricultural enterprises in the provinces and of the companies that enter into consultancy contracts are compared, it is clear that the number of companies that enter into consultancy contracts is very low. This may have several causes:

- a) Low number of advisors (service supply)
- b) Low demand for advisory services despite the granted subsidies

Considering that Freelance Agricultural Consultancy is a novel practice, the number of Freelance Agricultural Advisors is expected to increase over time. However, the expectation for the demand for this service to increase at the same rate is not realistic because the number of civil servants employed within the scope of TAR-GEL project is quite high and they render similar services with Freelance Agricultural Advisors at the rural level. On the other hand, Freelance Agricultural Advisors should be paid for their services. The option of receiving similar services free of charge will naturally always be more attractive for farmers.

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4

Agricultural Advisory Services in the EU

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1 Introduction

Agricultural advisory (extension) services are a vital element of the array of market and non-market entities and agents that provide critical flows of information that can improve farmers' and other rural peoples' welfare. The services provided by agricultural extension have significant public-good attributes. From a development-policy perspective, the investment in extension services or the facilitation of non-government extension, are potentially important tools for improving agricultural productivity and increasing farmers' incomes. Apart from the "classical" objective of agricultural advisory services to improve agricultural productivity, advisory services can also play an important role to meet the new challenges agriculture is confronted with: changes in the global food and agricultural system, including the rise of supermarkets and the growing importance of standards and labels; growth in non-farm rural employment and agribusiness; and the deterioration of the natural resource base and the emerging need to cope with climate change.

Extension also has an important role to play in helping the research establishment tailor technology to the agro-ecological and resource circumstances of farmers. Extension thus has a dual function in bridging blocked channels between scientists and farmers: it facilitates both the adoption of technology and the adaptation of technology to local conditions. The first involves translating information from the store of knowledge and from new research to farmers, and the second by helping to articulate for research systems the problems and constraints faced by farmers. Moreover, it has increasingly been recognized in recent years that important innovations, for example, those relevant in natural resource management, are developed by farmers themselves rather than from agricultural research stations. Agricultural advisory services can play an important role in promoting the spread of farmer-based innovations. These several interactions among research, extension, education and farmers are well articulated in a world view described as agricultural knowledge and information systems (AKIS), which can serve as a useful organizing principle for discussions of policy relevant to agricultural advisory services (Anderson, 2008; FAO/WB 2000).

Adoption of innovations by farmers is inevitably affected by many factors. In general, farmers will adopt a particular technology if it usefully suits their socioeconomic and agro ecological circumstances. The availability of improved technology, access to "modern" inputs

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and resources, and profitability at an acceptable level of risk are among the critical factors in the adoption process. Adoption can be influenced by educating farmers about improved varieties, cropping techniques, optimal input use, prices and market conditions, more efficient methods of production management, storage, nutrition, etc. To do so, extension agents must be capable of more than just communicating messages to farmers. They must be able to comprehend an often-complex situation, have the technical ability to spot and possibly diagnose problems, and possess insightful economic-management skills in order to advise on more efficient use of resources.

2 Agricultural Advisory Services in the EU

The Farm Advisory System (FAS) in EU aims at helping farmers to better understand and meet the EU rules for environment, public and animal health, animal welfare and the good agricultural and environmental condition. The FAS is a system-advising farmers on land and farm management. The setting-up of the FAS is an important element of the 2003 Common Agricultural Policy (CAP) reform. The advisory activity has to cover at least the statutory management requirements (SMR) and the good agricultural and environmental conditions (GAEC) included under the scope of Cross-Compliance that farmers benefiting from CAP payments have to respect. The FAS has been introduced in order to help farmers to “meet the standards of modern, high-quality agriculture”. Therefore, MS have to establish a comprehensive system offering advice to commercial farms. Regulation (EC) No 1782/2003 specifies that *“The Farm Advisory System should help farmers to become more aware of material flows and on-farm processes relating to the environment, food safety, animal and plant health and animal welfare, as well as the requirement of maintaining land in good agricultural and environmental conditions (GAEC)”*. The FAS aims helping farmers face their Cross-Compliance obligations and avoid financial reductions under cross compliance.

The Farm Advisory System covers the overall organization and the various public and/or private operators that deliver farm advisory services to a farmer in a Member State (see Article 12 of the Council Regulation 73/2009). A farm advisory service assesses the specific situation of the farmer and gives appropriate advice. The Farm Advisory System (FAS) in EU has been gradually introduced since 2005 and Member States were obliged to introduce it from January 2007. Possible support from the European Agricultural Fund for Rural Development (EAFRD) for the use by farmers and forest holders of management and advisory services is foreseen under Regulation (EC) No 1698/2005.

Two measures are available for the MS to be possibly included in national/regional RDP:

- measure 114 supporting the use of advisory services by farmers and forest holders (art. 24) and
- measure 115 supporting the setting-up of farm management, farm relief and farm advisory services for farmers and of FoAS for forest holders (art.25).

Following recitals 18 and 19 of Reg. 1698/2005, the objective of these measures is to help farm and forest holders to improve the sustainable management and overall performance of their holdings. The two measures are part of a number of Axis 1 measures, dealing with competitiveness of the agricultural and forestry sector. They aim, together with other measures, more specifically **promoting knowledge and the improving human potential**. In particular, activities carried out in the context of *measure 111* (vocational training and information action) could cover issues also targeted by advisory activities.

At Member State level, the advisory system and the services provided are interwoven with pre-existing agricultural extension services, certification systems, other business advisory services, information channels, and so forth. Advising farmers in relation to the Common Agricultural Policy is thus ultimately a combination of these three levels: pillar one referring to FAS, pillar two and the existing MS extension services.

In this context, when considering the setting-up and implementing FAS, the following key elements have to be considered:

- The field of the FAS-advice is at least “the whole” cross-compliance requirements at farm level.
- If EARFD funds are mobilised under pillar two, in addition to the scope of cross-compliance, occupational safety standards based on Community legislation have also to be covered as a minimum requirement.
- FAS can be operated by one or more designated authorities or by private bodies and therefore is defined as a system rather than specific services.
- MS have the possibility to enlarge their FAS framework to other standards, such as other good farming practices (even larger than GAEC) and standards relating to agrochemicals, or any other Community or national relevant standards.
- Advice and compliance control must remain separate, the farmer bearing the ultimate responsibility for his actions in relation to cross-compliance, as indicated in Table 1.

Table 1 Advisory system and the services provided by Member States

Advisor	Farmer	Controller	Member States
Helps farmer with advice	Responsible for his actions has to understand the requirements	Controls can lead to sanctions	Have to inform farmers about the requirements included in the scope of cross-compliance

In fact, the FAS is designed to help not only farmers who receive CAP payments but all farmers in the EU. The main issues and suggestions provided by the Commission report are:

- An effective FAS is based on a trustful relationship between the farmer and the advisor and therefore the use of the FAS shall remain voluntary for farmers;
- Cross compliance should be kept as the core minimum scope of the FAS, but as expectations from advisory services have risen since 2003, especially for new challenges of the CAP, the FAS should therefore pro-actively develop and encompass also issues that go beyond legal requirements under cross compliance;
- A clear separation between advice and farm inspections is necessary as the trust between the farmer and the adviser is a key in the success of the system (i.e. obliging non-compliant farmers to take advice may enhance the perception that the advisor is closely in relation with the inspectors);
- Non-disclosure of individual information from farmers shall be respected, but the use of aggregated data from farm inspections could be helpful in targeting the advice (e.g. information on frequently found non-compliances);
- One-to-one advice has proved to be particularly effective as it addresses the specific situation of the farm and the farmer: the advisor should act as a 'general practitioner', interlinking all different aspects of farming with a holistic approach and explain to farmers not only the EU's requirements but also their objectives and the underlying policies, directing farmers, if necessary, to specialist advisors;
- Advisors should be suitably qualified and regularly trained, and training sessions should be organised by the FAS coordinating bodies;
- Commission intends to promote the FAS by introducing flexibility in the content and in the frequency of uptake of the advisory measure in the Rural Development Programme;
- Even if farmer request of advice could be specific for particular issues, FAS coordinating bodies and advisors should keep giving the necessary attention to all core obligations under the FAS,
- The FAS should better be promoted for instance by enclosing a list of advisory bodies when sending application forms to farmers, or by arranging for farm inspectors to give that list to the farmer if any infringement is detected;
- Knowledge sharing between actors (e.g. farmers and researchers) should be improved. FAS coordinating bodies should enhance the synergies between various instruments such as advice, training, information, extension services and research;
- FAS coordinating bodies should organise basic and regular follow-up training for advisors covering both farmers' actual obligations and new actions to deal with, for instance, climate change;

- As the advisor should act as a 'general practitioner' (e.g. directing farmers if necessary to specialist advisors), FAS coordinating bodies should help the advisors to network (e.g. by providing the contact details of specialist advisors or researchers).

Agricultural advisory services can also be considered as a component of an "Agricultural Innovation System" (AIS). AIS is based on the "National System of Innovation" (NIS) concept, which is widely used to guide science and technology policy in OECD countries. The NIS concept was first developed in evolutionary economics and emphasizes the role of a wide range of factors that influence innovative activity and innovative performance in an economy. Next to investments in research, such factors include, for example, human resources development and the climate for entrepreneurial behaviour. Applications of the NIS concept to the agricultural sector in developing countries emphasize the role of partnerships among a wide range of stakeholders beyond agricultural research, agricultural advisory services and agricultural education. Other partners in an AIS include, for example, input suppliers, processors, export companies, non-governmental organizations and the media, which may all be involved in the development of innovations in the agricultural and food system. Due to changes in the global agricultural and food system caused by factors such as the increasing demand for high-value products and the rise of supermarkets, the role of agribusiness enterprises and other private sector actors in the agricultural innovation system deserves special attention.

2.1 Farm Advisory System in AUSTRIA

Agricultural Advisory Service in Austria is driven by Chambers of agriculture. The chambers of agriculture have two major functions:

- (i) lobbying to represent and defend their members' interests and
- (ii) provision of specialised services to the farmers, which include advisory services and facilitating the preparation of farmers' request for RDP subsidies and their subsequent handling.

Farmers receive general advice free of charge (directly subsidised by the Government). Specialised advice is personalised and is available at full cost to the farmers. The Chamber of agriculture is structured around one federal chamber, 9 Länder chambers and 80 local chambers, mobilising a total of \pm 2000 persons. They are also in charge of lifelong learning programmes and basic farming education.

2.2 The DANISH Agricultural Advisory Service - Farmers are both owners and users

The advisory system has a long history in Denmark. The Danish Agricultural Advisory Service (DAAS) is a partnership made up of 60 local advisory centres and a national centre. The unique two-level advisory system is both owned and used by Danish farmers. The partnership

employs app. 3,400 professionals. Today, DAAS is one of the leading Agricultural Advisory Services in Europe. They employ a staff of app. 500 who are organized into departments according to professional expertise.

2.3 Farm Advisory System in ESTONIA

The Ministry of Agricultural certified 15 county advisory centres in 2005. Most of these centres are related to producers' and farmers' unions. The basic duty of an advisory centre is to advise on cross-compliance and on other agricultural problems, to offer broader information and trainings, to help finding the necessary information and to "read" legal acts, introduce and distribute printed material and organise information events.

2.4 Farm Advisory System in FRANCE – Local and regional networks

The pre-existing system is based on very specialised (i.e. crops, cattle, environment, accountancy) bodies, whereas most of farms need more global advice (on cross-compliance, management-strategies...). Local organisations have been asked to pool their competences into networks called "réseaux de competences". There are from 0 to 12 accredited "network" per region; they have to provide in-house all competence to address all on cross-compliance issues (and of all agricultural production on the concerned area) and ensure appropriate coordination between network members. Agricultural Advising in France is handled by agricultural chambers, which supervise the activities of various advising agencies. Although advisory activities are co-ordinated by the state, its role in financing these activities is minimal. Tasks undertaken by ADASEA include the following:

- Advising through information, training, news articles,
- Personal advising in such areas as starting and modernizing a farm,
- Assistance in preparing documentations needed for the realization of CAP,
- Introducing advisory programs related to environmental protection,
- Diversification of agricultural activities including rural tourism etc.

Financing for advisory services is mainly sourced from membership fees and from direct payments for advices given. In observing experiences of France's institutional systems that support agricultural and rural development a tight co-existence between agricultural advisory institutions, CAP implementing institutions and banks can be noticed (Miś, 2007).

2.5 Farm Advisory System in GERMANY

Agricultural Advisory Services in Germany is the pre-occupation of several institutions and organizations, both public and private (Miś, 2007). These include advisory agencies, agricultural chambers, advisory societies, agricultural unions, producers' co-operatives and private firms. Authorities of various regions are responsible for the proper functioning of Advisory Services while the Federal Ministry of Agriculture co-ordinates and supervises their services. Patterns of advisory services however differ in the 16 regions (lands):

- State-run–public advisory organizations administered by advisory agencies subservient to the Federal Ministry of Agriculture dominate the area. Basic advisory and consultative services are free of charge. The increasing role of farmers’ financed advisory services is however being preferred for example in Baden-Württemberg, Bavaria, Hessisch, Rhineland and Saxony.
- Local Authorities – created by farmers and under the supervision of agricultural chambers. 10 to 50% of finances for chambers of agriculture are from the Lands’ budgets while the rest is made up membership fees and direct payments for advisory services as can be observed in Bremen, South Saxony, Hamburg, Rhine area – Westphalia, Schleswig-Holsteins.
- Private (Commercial) – It is based partly on financial assistance from governments of federated lands but substantially from payments by farmers for advisory services. Private advisory agencies take benefit of funds from the Lands only for the realization of specific tasks. Private advising is undertaken by trade unions, limited liability companies, industrial and commercial enterprises etc in areas as Berlin, Mecklenburg, Brandenburg, Saxony Anhalt, Thüringen.

2.6 Farm Advisory System in HUNGARY

Technical Advice Centres (TAC) makes advisory service contracts with farmers and completes the service via registered advisors. There is no geographical limit; they can undertake assignments at any part of Hungary. They have to coordinate a network of (on average 12) contracted individual advisers, from anywhere in Hungary as long as they are registered with MARD. Each adviser can work for one or more TACs. Each year, there are random on sight evaluations and approximately 25 per cent of the TACs are yearly checked.

2.7 Farm Advisory System in IRELAND

Worthy of attention also is the Irish advisory system managed by TEAGASC, a national institute directly supervised by the Department of Food and Agriculture. TEAGASC is not only involved in advisory activities but also in research activities and in managing schools of agriculture. Private consultancy firms, mainly involved in technological advising and assistance in drawing up business plans also provide advisory services besides TEAGASC. Advisory services offered by TEAGASC like other institutions are payable and its main tasks include the following:

- Agricultural development through the application of new technologies as well as increasing their competitiveness,
- Supporting rural development, including the diversification of agricultural production,
- Development of a balanced agriculture,
- Dissemination of information and training in quality standards, etc.

2.8 Farm Advisory System in the NETHERLANDS - From associative to public and back to private

The decision in 1986 to separate policy formulation and implementation resulted in reorganisation of the public extension service. In the second half of the 1990s, the Minister of Agriculture introduced the principles of demand driven extension and user payment. The user-pays principle implied that end-users are responsible for obtaining technical and social-economic advice concerning their enterprises. At present, the extension system is part of a wider Dutch Agricultural Knowledge Information System (AKIS) composed of the following major actors:

- A series of external services or facilities such as a general agri-window and specialised thematic websites.
- Privately owned and operated advice providers, of which the most important is the privatised and restructured DLV, composed of five Business Units
- Wageningen University (Wageningen UR) jointly managed with the research division, privatised as "Stichting DLO".
- Two specialised environmental related Information and Knowledge Centres (IKC).

2.9 Farm Advisory System in POLAND

The advisory system in place in Poland embodies 2 structural organizations with the first, the Centre for Agricultural Advising in Brwinów together with its branches in Kraków, Poznan and Radom controlled by the Minister of Agriculture and Rural Development. The other supervised by the Voivodship are the Provincial Centres for Agricultural Advising. There is also the Social Board of Agricultural Advising that is a consultative and advisory body. Polish advisory organs support the attainment of goals in agriculture and rural areas such as:

- Assisting farmers and rural dwellers in their attempts to secure financial assistance within the EU CAP and structural policies framework,
- Improving the quality of agro-food products,
- Promoting regional and local products,
- Analysing markets for agro-food products and production inputs,
- Protecting the natural environment and production of healthy food,
- Activating non-agricultural developmental activities of rural areas, etc.

The main function of advisory institutions in the future would be assisting rural dwellers in their effective utilization of EU funds.

2.10 Farm Advisory System in the Republic of SLOVENIA

The Agricultural extension and advisory service (AES) has a long tradition in Slovenia. The AES has regional offices throughout the country, which are incorporated in the Regional Agricultural and Veterinary Institutions. Altogether, the AES employs a total of around 300

agricultural experts of which 180 are active in the fieldwork, around 80 are specialists and 50 household and social advisors, with the remainder employed in the administration. There is approximately one adviser per 300 farms and 1,500 hectares of the UAA. Field advisors provide general advice and if necessary, involve specialists from the regional office. Specialist teams are structured according to the prevailing regional production patterns. There is usually one specialist in farm economics and management. The range of activities of the AES includes:

- training of farmers and their family members through lectures, courses, direct personal advice or through publications and mass media,
- organisation of professional events, such as exhibitions, presentations, demonstrations and field trips,
- design of development and investment programmes based on new farm management methods, introduction of supplementary activities on farms and development of programmes for organic farming,
- promotion of producers associations,
- advisory activities concerning data collection required for the Farm Accountancy Data Network (FADN),
- educational training within the Slovenian Agricultural and Environmental Programme, implementing EU standards and cross compliance,
- provision of help with recording data for applications concerning direct payments,
- advisory assistance and providing aid with measures of the CAP.

The main tasks of Agricultural Advisory Service are:

- consulting in the fields of technological, economic and environmental aspects of agriculture,
- consulting and help with the development of farm developments plans (investments, business plans for RDP funds and/or bank loans, working in the regional developments programs ...),
- supporting the introduction of agricultural policy,
- consulting and helping the organisation and work of breeders' organisations, producers' organisations as well as other forms of organisations of farmers,
- performing programs of national importance based on special agreements.

In some new EU member countries such as Lithuania and Latvia, there exists a semi-autonomic agricultural advisory system. The primary organization responsible for advisory in Lithuania is the Lithuania Agricultural Advisory Services (LAAS); a state owned company that was commercialized in 1998 and payment for specialized services were introduced. In Latvia, on the other hand there exists the Latvian Centre for Agricultural Advising (LAAC), which was in 1997 transformed into a non-profit state owned commercial company. Its major partnerships are the Ministry of Agriculture and the Federation of Latvian Farmers. Farmers

have since 1993 been paying for advisory services with those connected with obtaining loans, tax issues, and computer services being the most expensive. Besides, in other new EU member countries like Slovakia, Hungary and the Czech Republic there exists systems of agricultural advisory services run by state parastatals that charge farmers and other clients full or part payment for certain services rendered. These notwithstanding, an increasing number of private consultancy companies have started offering payable advisory services (Miš, 2007).

3 Information and Advisory Services for Organic Farming in Europe

Organic farming is increasingly recognised in the European Union (EU), by consumers, farmers, environmentalists and policy-makers alike, as a possible model for environmental, social and financial sustainability in agriculture. A review of the situation in the EU (and three non-EU countries) in 1997 showed that information and advice is provided by a variety of governmental and private organisations. The organisational structure ranges from full integration into the mainstream agricultural extension institutions to total separation, and from publicly funded provision of information and on-farm advice free to organic or interested conventional producers, over self-help groups of farmers to fully commercialised expert consultancy services. Information and advice is funded by either public support, producer levies and fees, private sponsorship or a combination. In some mainly southern European countries, the organised advisory provision is still very limited. In most countries organic producer associations, important actors in the general development of the organic sector, also provide information to producers. Their technical services range from publications (magazines, technical notes), over farm walks and open days to the employment of specialist advisors for farm visits, the later generally restricted to members only. In some countries, the organic inspectors hold a large amount of the available knowledge, but its use is hampered by the current practice of a clear separation between inspection and advice. In a number of countries (e.g. France, Scandinavia and German speaking), the general agricultural extension services are increasingly involved in information and advice on organic farming. Few countries give public support to regional and discussion groups of organic producers or networks of demonstration farms. In countries with a larger number of specialist organic advisors networks have developed, but rarely are the bodies well enough funded to ensure a good range of back-up services for the growing number of organic advisors (Padel, 2001).

4 CECRA (Certificate for European Consultants in Rural Areas)

CECRA is a Europe-wide standardized training for competence development addressed to agricultural advisors, home economics and rural development actors as well as other regional actors and trainers. It is developed by IALB- Internationale Akademie land- und hauswirtschaftlicher Beraterinnen und Berater- in different German speaking countries. Participants can benefit in acquiring knowledge and skills, developing the planning, implementing and evaluating advisory and extension work and establishing a transnational network. The approach focuses on personality advisory profile development as well as

improvement of communications and relations with customers. The certificate is given after fulfilling of different conditions such as attending two compulsory and three elective modules, two years of professional experience, participation in two seminars abroad, visit in an advisory service outside the country of origin, developing a final case-study.

5 Conclusions

- FAS is strategic for the success of the CAP and its role should be increased;
- FAS is for every farmer and it would be important to create the conditions to make it accessible for every farmer;
- FAS should not be restricted to cross-compliance, but should be extended to other topics like climate change, biodiversity, protection of water, innovation, economic profitability, protection of natural resources etc.;
- FAS should be made more flexible in terms of funding rules and contents (MS should be given the freedom to increase the limit of 80% support);
- The role of advisers is strategic for knowledge transfer between researchers and farmers;
- The link among control and advice was one of the problem for the uptake of advisory services by farmers and the distinction should be made clear by MS with farmers (as it is already in the legislation);
- There is a need of exchange of technical information also with platforms like the one in the ENDURE project;
- There is a need of exchange of information about curricula and training of advisors (like in CECRA);
- There is an interest for the development of a common web space for the exchange of information on FAS among Member States experts;
- The role of coordinating bodies is important in order to promote meeting among different bodies in charge of cross-compliance;
- Synergies among different tools like one-to-one advice, group advice and training are important and should be developed in the next rural development programming period.

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5.

CHAPTER

Agricultural Extension and Advisory System in Turkey

*Selman EREN**

Considering the historical development process of the Agricultural Extension Services in Turkey, public extension at central level was carried out by the General Directorate of Agricultural Affairs, and it rendered beneficial services in line with the existing agricultural policies at province/sub-province and partially village level with its sub-organizations before 1984. In this period, testing and production stations were established and seed cleaning activities were carried out. Training activities with costless input subsidies enabled the intensive use of inputs to be adopted by farmers. Projects to develop production on the basis of products were implemented in this period as well. However, significant problems emerged in public extension in the late 1970s, which diminished the efficiency of the public extension. In the course of time, public extension was intervened in to eliminate the hitches.

With the Agricultural Extension and Applied Research Project (AEARP), which was one of the most notable interventions and was implemented in 1984, Training and Visit Approach was experienced. AEARP was important in terms of quality human resources, transportation, equipment support, mobilization of extension personnel and strengthening of the links between research, extension personnel and farmers. This project substantially influenced the agricultural extension studies in Turkey.

Around the same date, the Ministry was reorganized and Extension Department consisting of three branches was established within the body of the General Directorate of Organization and Support (GDOS). Among the duties of the said Department were the adoption of new knowledge and techniques related to agriculture and cooperative system by farmers, preparation of extension programs, cooperation with bodies within and outside of the Ministry and with universities so as to ensure the performance of extension services, supplying of written and visual means of extension, and arrangement of programs with a view to ameliorate the living conditions of farmers.

With the awareness of the role and importance of women in agricultural activities, Department of Women in Rural Development was established to carry out training and extension activities for women farmers, but its name was later changed to Female Farmers Department. Extension and Female Farmers Departments were responsible for extension services. Farmer Training and Extension Branch Offices within the body of the Provincial Directorates in provinces and by District Directorates in sub-provinces executed Farmer training and agricultural extension services.

* Ministry of Food, Agriculture and Livestock Farmer Training and Extensions Department, Ankara

Agricultural Extension and Applied Research Project (AEARP) was implemented until the late 1990s. Between 1990 and 1997, extension services were carried out in approximately half of the provinces in the country within the scope of AEARP.

Considering the developments and changes in agricultural extension, our Ministry adopted participatory (problem solving) approaches as from 2003 and this approach began to be used in the planning of extension activities.

With the statutory decree no. 639 on the organization and duties of our Ministry, published in the Official Gazette no. 27958 dated 08.06.2011 and amended statutory decree no. 651, published in the Official Gazette no. 28038 dated 27.08.2011, **Training, Extension and Publications Department**, a self-contained department, was established to execute training and extension services exclusively, more efficiently and effectively. This Department consists of Farmer Training and Extension Department, Visual and Periodical Publications Department and In-Service Training and Coordination Department.

Execution of farmer training and agricultural extension and advisory services is among the duties of the Farmer Training and Extension Department.

1. Village-Based Agricultural Production Support Project (VBAPSP-KÖYMER):

Between 01.01.2004 and 31.12.2006, our Ministry implemented the Village-Based Agricultural Production Support Project, which was also known as “1000 Agricultural Volunteers for 1000 Villages”. This project intended to meet on-site the farmers’ need for knowledge in 1000 villages. Services were received from engineers (agriculture, fisheries) and veterinaries each of whom took part in the project in a village.

VBAPSP is important in terms of putting the “Agricultural Advisory Services” into the agenda of our country and its contribution to implementation of the Agricultural Advisory System established in our country. VBAPSP, a pilot project, ended on December 31, 2006.

2. Agricultural Extension Development Project (AEDP-TARGEL):

Based on the Article 15 in the Agricultural Law no. 5488 dated 18.04.2006, which regulates rural development, Agricultural Extension Development Project (AEDP) was carried into effect by our Ministry in an attempt to enhance the contribution of rural areas to the economy of the country and improve the quality of life of the rural communities. Experiences gained in VBAPSP as well as the public and farmer satisfaction that was revealed in consequence of questionnaire surveys were influential in the implementation of the AEDP. The project intended to provide farmers and agricultural enterprises with knowledge on-site, meet the need for knowledge on time and sufficiently and thus increase the income level.

As per article 4-B of the Civil Servant Law no. 657, the AEDP personnel were employed in the “Operation Regions” consisting of villages and towns. For the first time, our Ministry adopted a performance-based salary system, which enabled the personnel to render services more efficiently. Provincial Directorates taking into account the predominant agricultural structure of each region determined “Operation Regions”, and the title and qualifications of

the personnel to be employed. To that end, 2,500 “Operation Regions” were formed in 2007. As of 2011, the number of regions rose to 7,501. In 7,501 “Operation Regions”, approximately 28,000 villages receive services. It is planned to increase the number of “Operation Regions” to 10,000 and offer services in 32,000 villages in 2012.

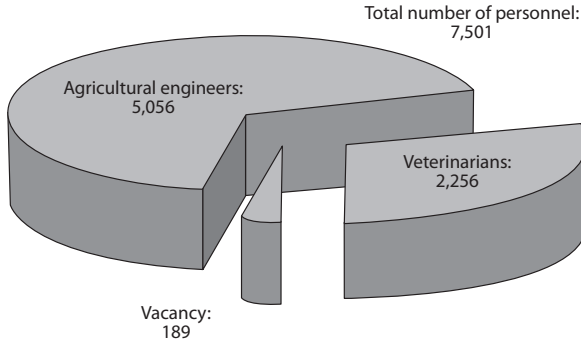
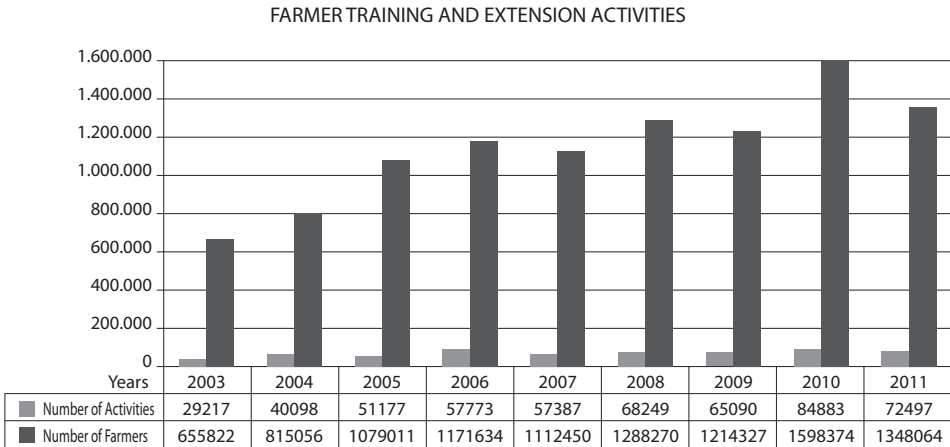


Figure 1 Advisors employed under AEDP by profession

3. Farmer Training and Extension Activities:

One of the primary duties of our Ministry is training and extension activities for farmers. Farmer training and extension services are carried out in order to increase the living standards of our people in rural areas, enhance the contribution of the agricultural sector to economy and ensure incorporation of modern technology into the agricultural production process. Our technical personnel serving in agricultural organizations that have currently spread to 81 provinces and numerous sub-provinces carry on their extension activities so as to provide our farmers with agricultural knowledge.



Grand Total : Number of Activities : 526.371
 Number of Farmers : 10.283.008

Figure 2 Farmer training and extension activities

In this period, particular attention was paid to farmer training and extension activities.

In this context, agricultural training was provided to approximately 656 thousand farmers in 29 thousand training activities in 2003, to 1,6 million farmers in 85 thousand training activities in 2010, and to 1,3 million farmers in 72 thousand training activities in 2011. In the period between 2003 and 2011, approximately 10 million 280 thousand farmers in total received training on various agricultural topics. Yearly average number of farmers who benefited from the training activities were 1 million 140 thousand.

4. Training and Extension Activities for Women Farmers:

Training of our women, who play an active role in any part of agriculture, on agricultural subjects by appropriate extension methods, is important in terms of increasing agricultural production.



Grand Total : Number of Activities : 134.961
Number of Farmers : 1.613.697

Figure 3 Women farmers’ training and extension activities

In the said training activities, women farmers were paid a particular attention with the awareness of the role and significance of women in agricultural activities. 1,6 million of the trained farmers were women farmers.

5. Quiz and Project Contest: “Women Farmers are Competing”:

In order to see the outcomes of the training and extension efforts made in rural areas for women farmers, assess their performance in agricultural matters, increase their self-confidence, develop awareness on healthy nutrition and production of quality products, integrate them with each other and instil the spirit of entrepreneurship among them, the quiz contest named “Women Farmers are Competing”, the first of which was organized in

2004, is held each year. In 2011, the project's format was altered and its name was changed to "Women Farmers are Competing" Quiz and Project Contest.

6. Women in Rural Areas Workshop:

Objective of the Women in Rural Areas Workshop organized by our Ministry and held for the first time in our country on October 15-17, 2008 in Ankara was to:

- Bring together the stakeholders working on the subject of "Women in Rural Areas",
- Develop solutions according to the existing condition of women in rural areas,
- Identify strategic targets in line with the specified solutions,
- Decide on actions to be taken by the government, regional development organizations, non-governmental organizations and international financial organizations.

Reports written up jointly with experiences, opinions and suggestions of participants during the workshop were brought together to prepare an outcome book. It was agreed to conduct "Women in Rural Areas Regional Workshops" in order to review problems and solutions offered at regional level and offer solutions in line with the outcomes of the national workshop.

Between 2009 and 2011, "Women in Rural Areas Regional Workshops" were conducted in nine agricultural regions of our country. With the "Women in Rural Areas" to be conducted in 2012, it is aimed to:

- Reveal the outcomes of the regional workshops,
- Establish a national databank for women,
- Concretize the "Action Plan for the Improvement of the Position and Enhancement of the Capacity of Women in Rural Areas",
- Begin to take the actions within the scope of the Action Plan.

Then action plan to be implemented following the workshops will be important in terms of supporting the women in rural areas and increasing employment, and they will be backed up with the projects to be implemented.

7. Project for Sustainable Rural Development through the Supporting of the Training of Women Living in Rural Areas in Socioeconomic Terms:

The project titled "Sustainable Rural Development through the Supporting of the Training of Women Living in Rural Areas in Socioeconomic Terms" is executed jointly with Azerbaijan within the scope of the FAO-Turkey Partnership Program. Pilot provinces selected for the project are Kars, Antalya and Düzce. It is planned to train 120 women farmers in Turkey. It is the only project of FAO, whose subject matter is women. Its budget is \$250,000.

8. Strengthening the Link between Research, Extension and Farmer:

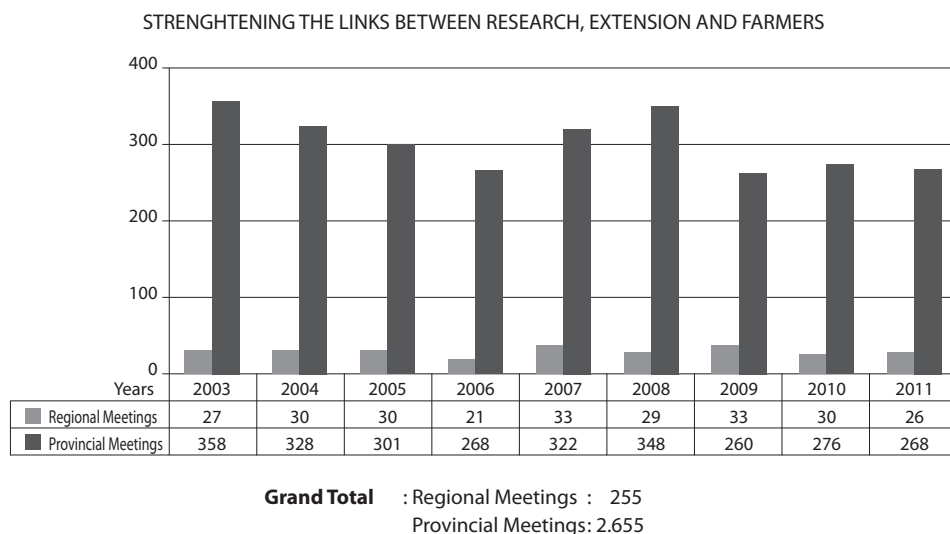


Figure 4 Strengthening the links between research, extension and farmers

With the efforts to strengthen the links between research, extension and farmers, it is aimed to:

- Render the agricultural extension activities more effective and efficient,
- Make developed agricultural innovations available for farmers,
- Convey the agricultural problems of our farmers to institutes, and the solutions to our farmers in a rapid and effective manner.

Within the framework of the annual plan, meetings are held once in 3 months in our Provincial Directorates, and once in 6 months in our Coordinator Research Institutes.

9. Project for Spreading Agricultural Innovations:

The objective of the **Project for Spreading Agricultural Innovations** is to make the innovations developed by Research Institutes available for our farmers. With this sub-project, 90 types of 27 different products will be spread, made available for and known by farmers, and they will have the opportunity to see on-site the works performed in some of the institutes. 13 coordinator institutes and 45 provincial directorates as from 2012 will execute the project. The budget for 2012 is TL606,200.

Table 1 Targets of spreading agricultural innovations Project for 2012

Year	Number of provinces where the project will be executed	Number of projects
2012	45	14

10. Young Farmers Training Project:

In order for our country to be able to compete and increase its share from developed global markets with well-trained and well-equipped farmers, it is essential to train today's young farmers in agricultural matters on a continuous basis and bring them to the level of the farmers in developed countries in terms of knowledge and skills.

There is a considerable population of young farmers aged between 15 and 30 years, who live in rural areas, are engaged in agricultural activities and waiting to be trained on agricultural matters. Venturesome, enterprising, open-minded and curious characteristics of young people as well as their willingness to take risk, make sacrifices, and high-energy potential make them a significant social capital for the agricultural sector. In order to enhance the quality of this capital and create a synergy, young farmers in rural areas should be trained on contemporary agricultural knowledge and techniques. Considering this matter, our Department designed the **YOUNG FARMERS TRAINING** Project. The State Planning Organization as a sub-project of the Project accepted this project for Supporting Agricultural Extension Services.

Objective of the project is to acquaint young farmers with agricultural production techniques, equip them with skills and knowledge related to agricultural extension and rural development leadership, make them volunteer implementers of the agricultural extension system in the environment they live in, establish a wide extension network consisting of young, dynamic and open-minded farmers, and contribute to the development of agricultural production by bringing the farmers under one roof regarding agricultural production, processing, marketing, agricultural industry, rural ecotourism, etc. under the leadership of young farmers and by virtue of the rural area leadership and knowledge of development.

Table 2 Young farmers training project

Years	Regions	Place of Training	Term of Training	Number of Farmers
2008	Eastern and South-eastern Anatolia Regions	3 Training Centres (UTEM, Adana, Aydın/Söke TAYEM)	6 Weeks	80
2009	Central Anatolia and Mediterranean Regions	3 Training Centres (UTEM, Adana, Aydın/Söke TAYEM)	6 Weeks	103
2010	Black Sea, Marmara and Aegean Regions	3 Training Centres (UTEM, Adana, Aydın/Söke TAYEM)	8 Weeks	132
2011	All regions	(UTEM, Ankara, Aydın/Söke TAYEM)	8 Weeks	144
2012*	All regions	3 Training Centres (UTEM, Adana, Aydın/Söke TAYEM) and the provinces of Ordu, Muş and Şanlıurfa	8 Weeks	84
TOTAL			-	543

11. Agricultural Advisory Services

In order to meet our farmers' need for knowledge in parallel to rapid developments and changes experienced in agriculture as well as ensuring reliable supply of food from the field to the table, Certificated Agricultural Advisory Services were initiated. "Regulations on the Arrangement of Agricultural Extension and Advisory Services" took effect on September 8, 2006. These Regulations were prepared to identify the procedures and principles related to the meeting of needs of agricultural enterprise owners with respect to knowledge, techniques and methods on time and sufficiently. In addition to the public efforts, a "Pluralist Agricultural Extension and Advisory System" was established, which consists of Producer Associations, Chambers of Agriculture, Agricultural Consultancy Companies, Farmer Associations and Freelance Agricultural Advisors, among others.

This system aims to give new service providers an active role, activate agricultural extension services and enhance efficiency and quality in agricultural production.

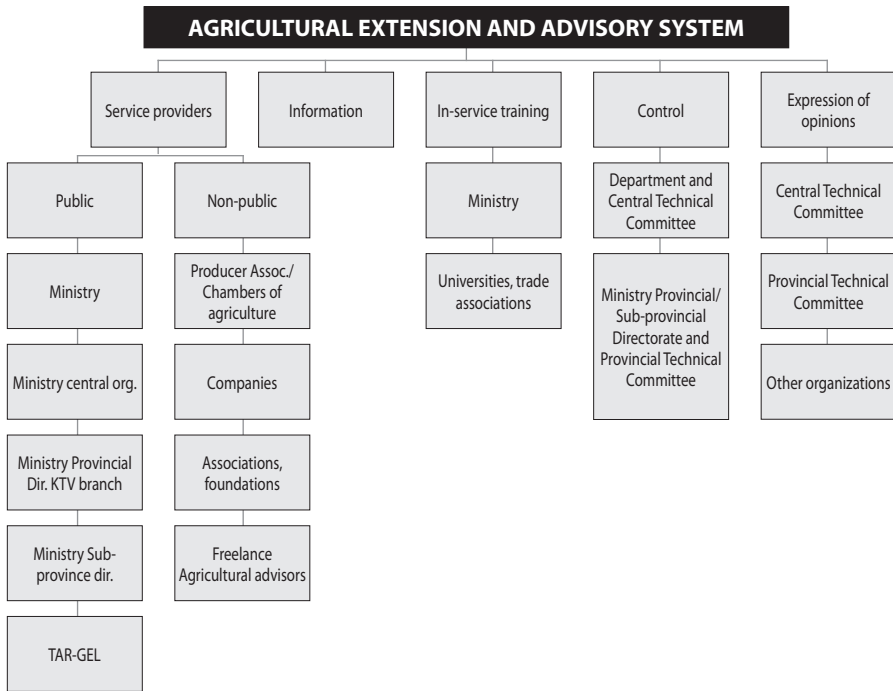


Figure 5 Organisational chart of agricultural extension and advisory system

BENEFITS OF THE SYSTEM

- Execution of agricultural extension and advisory services within a legal framework,
- Execution of agricultural extension and advisory services by persons and organizations certified by the Ministry,
- Supporting of the receivers and providers of advisory services.

EXPECTATIONS FROM THE SYSTEM

- Recording of each stage of production and information,
- Providing reliable supply of food from the field to the table,
- Increasing employment,
- Enhancing product range and quality,
- Establishment of agricultural companies that will be able to compete in world markets,
- Rural development.

Agricultural Extension and Advisory Services Subsidy:

In 2009, subsidy payment was made to agricultural extension and advisory services. “Communiqué on Subsidy for Agricultural Extension and Advisory Services” goes in effect each year after being published in the Official Gazette. The table below shows the total amount of subsidy payments made since 2009 and the number of enterprises subsidized.

Table 3 Agricultural extension and advisory services subsidy

YEARS	Amount of Payment per Enterprise (TL)	Number of Agricultural Enterprises	Total Subsidy Payment (TL)
2009	225	3.145	707.625,00
2010	500	21.777	10.888.500,00
2011	500	33.481	16.740.500,00

ENTERPRISE CRITERIA

Agricultural enterprises that can purchase advisory services within the scope of the Subsidy Payment to Agricultural Extension and Advisory Services need to be registered to one of the following according to their production pattern: Farmer Register System, Animal Register System, Greenhouse Register System, Aquaculture Register System or Apiculture Register System.

According to the production pattern, the following minimum conditions are necessary:

- Having 3 decares in greenhouse production,
- Having 10 decares in fruit cultivation,
- Having 20 heads for dairy cattle-breeding enterprises, 50 heads for enterprises breeding cattle for slaughter, and 100 heads for ovine animal breeders,
- Having 100 decares for enterprises engaged in dry farming and 50 decares for enterprises engaged in irrigated farming,
- 50 bee colonies,
- Having one of the aquaculture production facilities and being engaged in agricultural production.

Table 4 Maximum number of enterprises and the frequency of controls

Type of Cultivation/ Breeding	Minimum size of enterprise	Maximum number of enterprises	Frequency of control
Greenhouse cultivation	3 da	50	Once a week
Horticultural crops	10 da	50	24 times a year
Field Farming (irrigated)	50 da	50	15 times a year
Field Farming (dry)	100 da	70	12 times a year
Cattle-breeding (dairy)	20 heads	40	Once a week
Cattle-breeding (slaughter)	50 heads	80	24 times a year
Ovine animals breeding	100 heads	80	24 times a year
Aquaculture	Any facility	10	Once a week
Apiculture	50 colonies	50	24 times a year
Mixed enterprises		60	

Certified / Authorized Persons and Organizations:

Regulations on the Arrangement of Agricultural Extension and Advisory Services were prepared based on the Agricultural Law no. 5488 and went in effect after being published in the Official Gazette no. 26283, dated September 8, 2006. These regulations have been a new initiative for farmer training and extension efforts.

For the meeting of the needs of agricultural enterprises with respect to agricultural knowledge, techniques and methods on time and sufficiently, these regulations set out rules and methods related to:

- **Public Extension Services,**
- **Non-public Extension Services,**
- **Agricultural Advisory Services**

Persons and Organizations Authorized to Provide Agricultural Advisory Services

- Producer Associations/Chambers of Agriculture
- Agricultural Advisory Companies
- Freelance Agricultural Advisors
- Agricultural Advisory Associations/Foundations

Regulations Amending the Regulations on the Arrangement of Agricultural Extension and Advisory Services were published in the Official Gazette no. 27538, dated March 31, 2010. With this amendment, agricultural extension and advisory trainings were abolished. Instead, those who pass the central examination are entitled to receive Agricultural Extension Personnel / Agricultural Advisor certificate.

Table 5 Number of agricultural extension personnel and advisors

Number of Agricultural Extension Personnel and Advisors	
Agricultural Extension Personnel Certificate	2,980
Agricultural Advisor Certificate	6,370

Table 6 Certificate of authority for agricultural advisory services

Certificate of Authority for Agricultural Advisory Services	
Producer Organization	242
Chamber of Agriculture	104
Association	10
Company	60
Freelance Agricultural Advisor	195
TOTAL	611

Table 7 Number of certified agricultural advisors by regions

REGION	Number of Agricultural Advisors
Mediterranean	1.605
Eastern Anatolia	242
Aegean	1.346
South-eastern Anatolia	595
Central Anatolia	1.148
Black Sea	634
Marmara	800
TOTAL	6.370

Table 8 Number of certified agricultural advisors by profession

Profession	Number of Agricultural Advisors
Engineer	4.644
Veterinary	708
Technical Personnel	898
Technician	120
TOTAL	6.370

Table 9 Number of agricultural advisors by type of certificate

Title	Number of Agricultural Advisors
Agricultural Advisor	5.211
Specialist Agricultural Advisor	141
Technical Agricultural Advisor	898
Technician Agricultural Advisor	120
TOTAL	6.370

Table 10 Number of actually serving agricultural advisors by regions

REGION	Number of Agricultural Advisors
Mediterranean	96
Eastern Anatolia	70
Aegean	91
South-eastern Anatolia	136
Central Anatolia	84
Black Sea	203
Marmara	71
TOTAL	751

Agricultural Extension and Advisory Services Workshop:

On February 13-17, 2012, agricultural extension and advisory services workshop was conducted to assess the current status of the agricultural extension and advisory system and execution of extension services after the reorganization, to present problems and solutions offered for them, and to identify objectives, policies and strategies for the future.

In the workshop, the current state of the agricultural extension and advisory system was assessed, problems and solutions offered were examined and objectives, policies and strategies for the future were identified.

All stakeholders including central and provincial units of our Ministry, public organizations, universities, non-governmental organizations, trade associations, leading farmer associations, farmers and young farmers, attended the workshop held at national level. The workshop was held in eight working groups under four main titles. 267 participants attended it.

NEWS AND PRINTED PUBLICATIONS

- Our Ministry carried into effect the Web Agriculture TV project on October 22, 2010. Having been launched with the slogan "We are on air for the agriculture of our country", Agriculture TV started a new period for the training of farmers in a very short time.
- Being followed from 19 countries and having broadcast data equal to 22,265 CDs (1CD=700 MB) to date, Agriculture TV takes on the task of "databank" in agricultural sector. Producers and other stakeholders of the sector can watch the training films prepared on subject matters they would like to obtain information about on Agriculture TV.
- Particularly in the Agricultural Agenda Program broadcast, live in the mornings on Agricultural TV, agricultural matters are closely followed, turned into news and the written and visual news are broadcast.
- Within this framework, 1700 news videos have been prepared and broadcast to date.
- Research files, interviews and news prepared for notifying the public of the activities of our Ministry and agricultural policies are broadcast.
- Activities carried out with a view to announce the projects of our Ministry and news prepared by Web Agriculture TV News Centre are sent to media organizations and news agencies.
- Thematic agricultural channels are supported with video news.

AGRICULTURAL BULLETIN

Agricultural Bulletin published monthly within the body of the Ministry of Food, Agriculture and Livestock, which generally includes information on the activities of our Ministry is printed with 150 thousand copies annually and distributed in all provinces.

TÜRK TARIM

Having been published in 1986 for the first time, Türk Tarım Journal covers various agricultural topics and is published once in two months. It is printed with thirty thousand copies annually and distributed in all provinces. In March 2012, its 204th issue was published.

- Farmer Training Series is a publication activity for the information of producers in all agricultural topics. This series, prepared specifically for small and medium scale producers, is prepared in an attempt to give printed publication support to agricultural extension activities of our Ministry.
- Within this framework, 30 thousand sets each consisting of 20 different books (600 books in total) were printed under the sponsorship of Türk Traktör and distributed to farmers.
- 3500 training sets consisting of 100 different books (350 thousand books in total) were printed under the sponsorship of Denizbank and distributed to producers and technical personnel.

In order to meet the needs of producers for knowledge, the agricultural extension and advisory system, which brings together agricultural advisors and producers, raises awareness in producers and in which the public as well as private sector and non-governmental organizations take part as service providers continues to spread throughout our country.

In the pluralist extension and advisory system, Special Extension / Certified Agricultural Advisory Services will continue to wend its way in agriculture by virtue of the great interest show by farmer organizations, agricultural advisory companies and freelance agricultural advisors as well as with the acceleration brought by the Advisory Services Subsidies. The public will be the most important actor in extension services as well as being in a position that formulates policies, directs other actors, organizes and controls actions.

6.

CHAPTER

Organisation of Practical Breeding Services for Dairy Farms

Klemens OECHTERING*

1. Introduction

Rinder-Union West eG (RUW) is a forward-looking and leading agricultural company of cattle breeding, insemination and cattle marketing in Germany. It was established from 15 formerly independent organizations (6 insemination cooperatives, 4 marketing cooperatives and 5 breeding organizations) in 1993. With our headquarters in Münster and the two regional centres in Krefeld and Fließem near Bitburg, we are represented in North Rhine-Westphalia, Rhineland-Palatinate and Saarland. RUW is the only cooperative in the area of cattle breeding, which is operating across three federal states. RUW is one of the largest cattle breeding organizations in Germany. Currently RUW takes care of approximately 9,900 member farms. For this purpose, RUW has more than 220 employees in the office and in the field.

2. Dairy farming in Germany

Dairy farming in Germany is influenced by a variety of factors, which are covered by different external consulting companies. The activities of RUW are focusing on the sector of cattle breeding (artificial insemination, herd book and marketing).

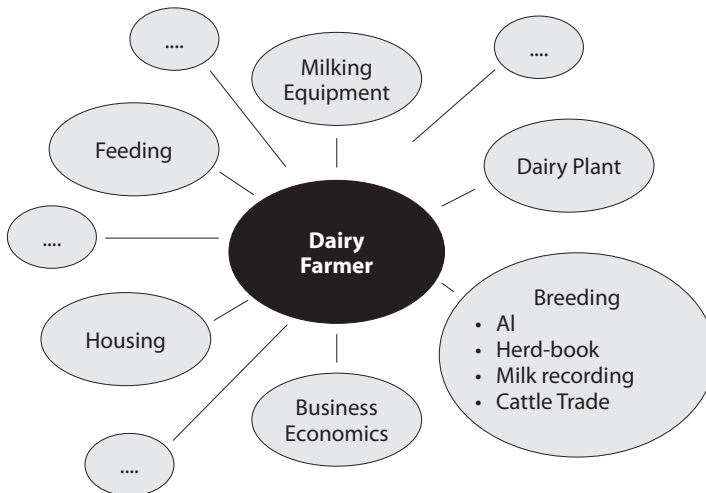


Figure 1 Factors influencing the dairy farming

* Rinder-Union West eG Marketing Department, GERMANY

Data from cattle breeding are stored in a central database at “VIT” in Verden. The data are collected from different organizations and added to the central database after corresponding validation. This allows an optimal support of the members in all aspects from artificial insemination via cattle breeding up to marketing.

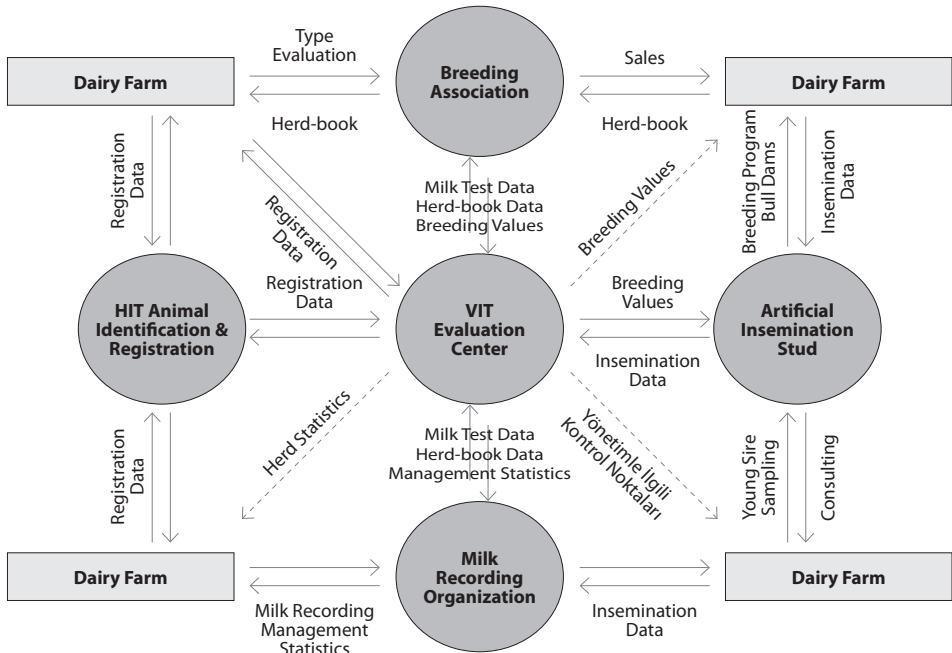


Figure 2 Consolidated data from different origins (source: VIT)

3. Requirements of the members

Dairy farmers in Germany are well trained and work professional. The economic conditions and the rapidly growing herds require a market-oriented focus. Cattle breeding is an important component of the success of a member farm.

The requested products have to be highly competitive. They have to promise an added value to the dairy farmers and have to be offered at a fair market price.

4. Services and products of RUW

Regardless of each department of RUW, the services and products have to be flexible, customer focused and reasonably priced. They must be adapted to different herd sizes and to the expectations of the breeders. The systematic use of modern communication enables increasing efficiency and timesaving.

4.1. Artificial insemination

In the last year, 426,447 first inseminations and 764,869 total inseminations were made on behalf of RUW. 64.2% inseminations were made by RUW-technicians, 17.04% by professional

veterinarians specialized on insemination and 18.4% by Do-it-yourself-inseminators. 100 technicians and 95 freelance AI veterinarians are working for this in the area of RUW. In addition, 317,482 doses of semen from own bulls were sold to non-members. 84 bulls (50 Holsteins and 34 Red Holsteins) from our own breeding programme were selected for the use at our semen collection centres in the last year. Currently RUW holds almost 580 AI-bulls. The two following listings give an overview on the products and services offered by our AI-department.

Range of products

- Semen from proven Holstein bulls from RUW-breeding programme
- Holstein semen from other suppliers worldwide
- Semen from many other races
- Sale of semen containers, nitrogen and technical equipment (pipettes, gloves, etc.)
- Sale of technical systems for heat detection

Range of Services

- AI-services by professional technicians and veterinarians
- Training courses with practical exercises for DIY-inseminators
- Regular supply of DIY-inseminators
- Pregnancy control
- Herd monitoring and fertility checks with ultrasonic devices
- Embryo transfer
- etc.

The main objective of the AI-department is the professional execution of all activities associated with reproduction. Good results of the AI-technicians combined with the production and use of semen from competitive bulls at adjusted marketable prices are important pillars for economic milk production in the member farms. Therefore, only trained specialists, who can rely on modern technology to do their tasks, work for us.

4.2. Breeding department

Currently in the RUW-herd book are about 285,000 pedigree cows registered. The data provider "VIT" does the necessary data storage and processing. The RUW staff has an internet-based access to the pedigree and performance information of each animal. This database is a fundamental requirement for other services of RUW such as artificial insemination, cattle marketing, fertility monitoring, mating programs, etc.

The RUW-breeding programme tests about 100 young bulls based on their descendants per year. For this purpose, about 100 daughters per bull are needed. The progeny test is preceded by a consequent selection of potential test candidates based on genomically supported breeding values. For this purpose, more than 1,400 bull calves are investigated

using SNP genotyping. In many cases, these calves are the result of selective mating between interesting sires and nationally and internationally approved cow families, which is mostly regulated by mating contracts.

As part of the breeding activities, 47,556 cows were classified last year. Thus, RUW is the organization with the most classifications in Germany. The number of 23,801 linearly described daughters of young bulls from the progeny test offers RUW-members a high level of certainty regarding external breeding values. A minimum of 70 daughters per bull are described linearly. All staff members, who are carrying out classifications, have to be licensed by the German Holstein Association (DHV), the neutral authority for these activities, and have to prove their skills regularly.

RUW has an efficient internet supported mating program to select a suitable bull for each cow in the herd, namely the so-called "BAP"-programme. Selection criteria can be set individually, so each herd manager can choose his own priorities in relation to the use of bulls. The basic principle of BAP is the identification of three major weak points of a cow and to mate it with a selection of suitable bulls to reduce them. Thereby the avoidance of inbreeding and hereditary defects is an integral part.

The main aim is to breed viable, long-lasting cows with a functional conformation, good fertility and calving ease, lots of milk combined with good udder health and milkability to ensure the economic success of our members.

4.3. Cattle marketing

Another activity is the marketing of each kind of pedigree and commercial cattle. With a broad variety of marketing possibilities RUW, offers customized options to sell various livestock categories and qualities for their members.

In the last business year, the highest number of sold pedigree animals, 24,533 heads, was achieved since the foundation of the organization regarding livestock marketing. The great majority of traded animals are pregnant or milking heifers. The rest is allotted to bulls, cows and calves. With 10,561 animals the largest number of them is placed in the area of domestic farm-to-farm sales, 6,824 animals were sold through auctions and 7,148 animals have been exported to a variety of countries from North Africa, through South and Eastern Europe up to Kuwait. Since last autumn export to Turkey is possible and becomes increasingly important.

In commercial livestock marketing a total of 22,588 animals were traded. The majority are bull calves that are sold to specialized calf fattening farms. Besides this, cattle for normal fattening use and slaughter cows are traded. Last year 3,849 animals were sold on the livestock auctions and 18,739 were bought directly on the member farms.

The cattle market is focused on the continuous sale of all animals that are not needed for replacements in the dairy herd or for fattening use in the member farms at competitive

market prices. Due to the big extension of the working area and due to good sales figures RUW is an interesting and efficient partner for national and international clients.

5. Communications and training

Professional services in cattle breeding can only be realized with specialized and motivated staff. For this purpose, RUW conducts its own training programmes, maintains close contacts to schools and universities and recruits new staff according to their own quality criteria. For each individual department RUW relies on properly trained staff and thus has employees who are able to take care for the members for their optimum. Communication is a key factor for success. Both the communication with members, buyers and breeders as well as the communication with field staff and the data service provider "VIT" is crucial for a smooth process and the on-going development of the offer.

6. Conclusions

- Breeding organizations have to reconsider their structure and to improve continuously in order to achieve benefits for their members.
- Central databases are a key factor for the support of members and have to be kept up to date.
- Product development must be focused regarding the needs of members.
- Pillars of a modern service provider are the skills and qualifications of the staff combined with a flexible and customer orientated focus.
- Communication at all levels of the organization and with all partners and customers is a key to quick solutions and better products.

7

CHAPTER

Dairy Farm Advisory Services in Germany and Other Countries

*Ekkehard SCHRÖDER**

1. Introduction

Since many years, agricultural advisory work is known as an important force for the modernization of farms. In some countries, systematic farm advisory activities started already more than one hundred years ago. Farm advisory work encompasses a diverse range of activities, which seek to enlarge and improve the abilities of farmers to adopt more appropriate and often new practices and to adjust them to changing conditions and societal needs. Important general tasks of farm advisory services can be summarised as follows:

- to disseminate useful and practical information to farmers;
- to promote the adoption of best economically viable farming practices;
- to encourage and help farmers to make effective decisions;
- to bring together the expertise of farmers and the best available scientific knowledge and
- to serve farms with specific expert know-how.

Agricultural advisory services act also as an intermediary in the information flow between agricultural development institutions, such as research, and farmers. In this way, research results are made available to the farmers in such a way, that they can be understood and applied. Research results have to be checked, whether they fit to local conditions and especially whether new technologies are profitable to local farms. Conversely, the needs for local solutions to practical agricultural problems have to be reported back to the research institutions.

This paper presents an overview about advisory services for dairy farms. Specific focus lies on dairy farm advisory services established in Western European countries.

2. Supply of and demand for farm advisory services

In the early years of farm advisory support in Western Europe, advisory work was organized particularly by public agricultural administrations and research centres (central/regional/local), by agricultural colleges and experimental stations, by farmers' organizations (e.g. cattle breeders' associations, milk recording associations, agricultural societies, cooperatives, farmers' unions, or chambers of agriculture) or combinations of these parent

* ADT Projekt GmbH, GERMANY

bodies. Even up to some decades ago the herd size of cattle oriented family farms was on average small, the cattle rearing system relatively labour-intensive but capital-extensive and the farming approach mostly traditional.

Advisory support provided by the different above-mentioned organisations was previously predominantly supply oriented and to a large extent financed or co-financed by public funds. Typically, the support was based on strategic governmental plans with the key objectives to increase agricultural production output, to insure food quality in accordance with national legislation and to increase the income of family farms. Agricultural fairs, exhibitions, cattle shows and other breeders' events as well as the dynamic development and dissemination of agricultural magazines and specific journals for milk producers and cattle breeders' played and are still playing an important role to exchange experience on best practices and to introduce new technologies or genetics.

In the less developed countries located in the South, with deficit in food supply and multitudes of small, resource-poor cattle farmers, the main focus of advisory work remains to increase animal production and health by better production technology, animal health and breeding programmes. Specific advisory approaches and systems have been developed for the conditions and structures of less developed countries such as the "training and visit system".

In several Western European countries where - due to high labour opportunity costs - more capital-intensive production methods are nowadays widely applied and high yields per dairy cow achieved, many issues and challenges regarding environmental deterioration and animal welfare have also arisen to dairy farms. Particularly dairy farmers in the European Union Member States have to face with very high standards and requirements on food hygiene/safety, animal welfare and environmental protection issues. In addition, the dairy industry requires milk with excellent standards of quality. High investments in cow barns, manure storage, milking and feeding technologies and animal genetics are demanding excellent dairy farm management and cost-effective milk production systems.

Therefore, professional advisory services with well-trained advisory staff are necessary for dairy farms to tackle the complexity of the modern dairy farm business. In many countries, agricultural advisory work has now become recognised as an essential mechanism for delivering information and advice as an "input" into modern dairy farming. Since new technologies as well as structural and socio-economic changes over the last decades resulted in many Western European countries into medium or large-size family farm businesses, entrepreneurial oriented farmers can derive strong financial benefits from professional advisory services. Consequently, many entrepreneurial oriented medium or large-size dairy farmers are now in the position and willing to pay for good advisory services. In several Western European countries semi-public, private or farmers' organisations are providing today advisory services for dairy farms on a voluntary basis and farms have to cover partly or fully the costs for the demanded and used advisory packages.

¹ The training and visit system was developed about 30 years ago and has a simple organization and infrastructure with defined objectives. It is based on regular visits to the farmers and periodical trainings to the advisory workers. It has wide popularity because it provides problem-oriented guidance, flexible management and continuous feedback from the farmers.

3. Organisations of advisory services for dairy farms – example Germany

The Member States of the EU have today little differences in the organisation structures of their advisory services for dairy farms. The differences are particularly influenced by the average size of farm holdings, the overall agricultural structure, historical developments and existing bodies in the agricultural advisory system. In countries or regions with mostly small dairy farms public or semi-public advisory services are usually prevailing although private services became more significant in the further development process taking into consideration also the prospective limitations of many public budgets. As an example, the following table 1 presents important service providers for dairy farms in Germany and the specific advisory activities offered by them.

Table 1 Important service organisations for dairy farms in Germany

Organisation	Typical business areas and service	Specific areas of advisory support for individual or groups of farmers
Cattle breeders' associations	<ul style="list-style-type: none"> • Artificial insemination service, semen sales, embryo transfer • Marketing of breeding and commercial cattle • Herdbook-keeping • Breeding programme formulation and extension 	<ul style="list-style-type: none"> • Selection of breeding bulls • Selection of breeding cows • Planning mating of cows and heifers • Cattle classification • Reproduction management
Milk recording associations	<ul style="list-style-type: none"> • Milk recording (individual cows for breeding and management) • Milk quality monitoring (herd milk for food safety, quality assurance and milk payment) • Operation of cattle identification & registration • Dairy farm audits 	<ul style="list-style-type: none"> • Milk hygiene and udder health • Quality assurance and herd management • Milk content and payment • Animal identification & registration • Milking, cleaning, storage and cooling equipment and management
Animal health & veterinary services	<ul style="list-style-type: none"> • Daily veterinary and animal health services • Laboratory analysis and prophylaxis related to animal health and animal welfare issues • Regular checking & monitoring of animal health • Hoof trimming and other services 	<ul style="list-style-type: none"> • Provision of information and advice related to animal health and hygiene • Herd management and reproduction management

Organisation	Typical business areas and service	Specific areas of advisory support for individual or groups of farmers
<p>Regional or local farm advisory service, e.g. provided by advisory units of agric. administrations (public), chambers of agriculture (semi-public) or private organisations</p>	<ul style="list-style-type: none"> • Farming technologies, fodder production, pasture management, fodder conservation, farm business development, investment planning and farm management • Preparation of practical guides, brochures and other information materials related to best dairy farming practices and technologies • Assessment and independent evaluation of new technologies and techniques for dairy farms • Interface between innovation-research and farmers (end-users) 	<ul style="list-style-type: none"> • Advice to assist farmers in applications for public support programmes • Advice related to the implementation of legal standards on food safety, animal welfare and environment protection • Provision of expertise on farm business & investment planning, farm financing & credit, new technologies, farm management, diversification • Organisation and management of economic dairy farm comparison
<p>Agriculture training and information centres (national or regional)</p>	<ul style="list-style-type: none"> • Vocational training for dairy farmers and agricultural advisors • Practical farm demonstrations and experimental trials • Information on best practices and new technologies • Interface between innovation-research and farmers (end-users) 	<ul style="list-style-type: none"> • Vocational training • Information about new technologies applied under local conditions • Practical demonstration of new technologies
<p>Agricultural media, fairs and other events</p>	<ul style="list-style-type: none"> • Information, general orientation and contacts to suppliers of new farm technologies and production means 	<ul style="list-style-type: none"> • Information on new technologies and production means
<p>Agricultural Universities, Colleges and Research Centres</p>	<ul style="list-style-type: none"> • Innovation-research • Education • Capacity building in the Agriculture Knowledge and Information System (AKIS) 	<ul style="list-style-type: none"> • Identification of status quo, potentials, development trends and innovations • Dissemination of information about improved approaches, potentials and technologies

Organisation	Typical business areas and service	Specific areas of advisory support for individual or groups of farmers
Equipment and other input providers	<ul style="list-style-type: none"> • Stables and other buildings for cattle, manure and fodder storage • Equipment and production means for dairy farms and other services • Spare parts and maintenance • Other services 	<ul style="list-style-type: none"> • Advisory support in cattle feeding and management (product oriented) • Product information • Practical concepts for implementation of advanced technologies (product oriented)
Milk or meat processors	<ul style="list-style-type: none"> • Collection, transport, processing and marketing of milk 	<ul style="list-style-type: none"> • Advisory support related to raw milk and meat quality
Other	<ul style="list-style-type: none"> • Accounting and book-keeping • Legal advice, financing and credit, taxation 	<ul style="list-style-type: none"> • Advisory support in specific areas

4. Changes in practical advisory work

The continuing rapid development of telecommunication and computer-based information technology is an important factor for change in advisory work during the last 20 years in Western Europe. There are many possibilities for the potential applications of the technology in agricultural advisory work and related software available, e.g. for planning and controlling of feeding, for mating of cows, for production cost analysis and farm business and investment planning. Farm advisors are usually equipped with portable computers, which can be directly used during farm visits and first results, and recommendations are rapidly available for the dairy farmer to make decisions. However, computers will not make advisory staff redundant. Rather they will be able to concentrate on tasks and services where human interaction is essential - in helping farmers individually and in small groups to diagnose problems, to interpret data and to apply their meaning.

In addition, rapid developments in milk and feed laboratory diagnostics and technologies as well as on data information systems have an impact on advisory work for dairy farms. Linkages and interactions of different service providers for dairy farms become more and more important to serve the dairy sector professionally. For example, the results from milk recording or from the laboratory in charge of fodder analysis can be transmitted immediately to the farm adviser by e-mail to have latest information available during the farm visit. The future will call for good cooperation, linkages and interactions of different information and advisory service providers for dairy farms to utilize the potential of new information and diagnostic technologies.

The following figure 1 illustrates important elements of successful advisory work.

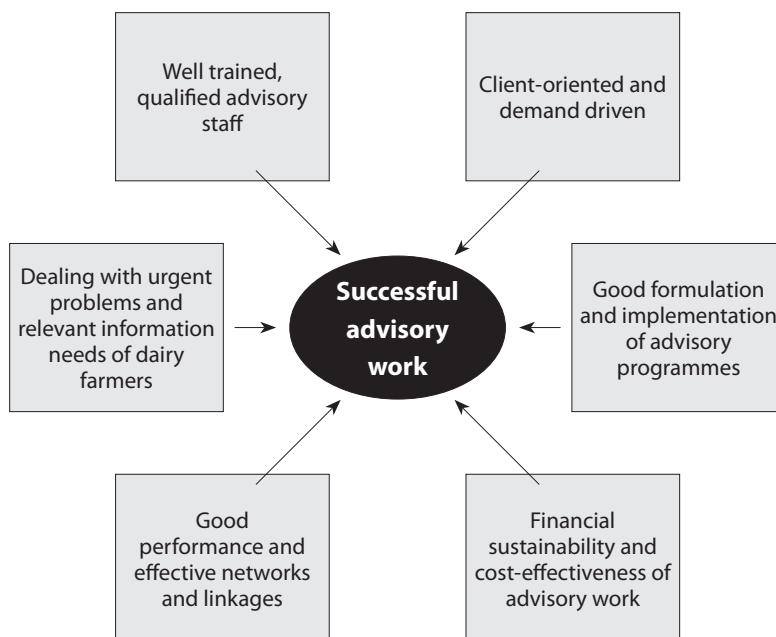


Figure 1 Important elements of successful advisory work

5. Economic dairy farm comparison

Many advanced dairy farmers are nowadays very interested to know from their advisers how the level of their milk production costs and other economic parameters compares with other dairy farms in the region or in other countries with similar farming conditions. Some advisory services are therefore providing analytical tools and services for dairy farms for continuous cost controlling based on standardised procedures and real and up-to-date figures and production parameters of individual dairy farms. Micro-economic results on production costs per kg milk, returns per kg milk, profitability and productivities of a dairy farm are important figures to compare with colleagues. The purpose is to identify further potentials to improve the dairy farm business by annual comparison of the economic figures of an individual farm with the average of the whole or selected group of other participating dairy farms.

This service requires a well-defined methodology for data collection, data management, a profound data analysis system and in particular the willingness of dairy farmers to provide necessary information and financial resources for the service. It is also important to achieve a minimum number of participating dairy farmers to generate significant findings and results from the comparison.

Several specialised advisory services for medium or large size dairy farms that are offering advisory packages on dairy farm economics, farming technologies and farm management

are supporting their clients with such farm comparison services. With this tool, technological recommendations and key factors for successful dairy farm practices can be identified and justified by economic results. Economic dairy farm comparison is an excellent advisory tool for fine-tuning of a dairy farm business, to establish the benchmark and to sensitize dairy farmers on economics.

However, continuous data collection, processing and data analysis is time consuming for farmers and the involved farm advisers. High motivation of the participating dairy farmers is required to achieve a reliable annual analytical report, which is a very useful tool for the farm advisor and the participating dairy farmers. The results should be published only anonymously. Mostly advanced dairy farmers are demanding this farm comparison service.

6. Knowledge and skills of farm advisors

Farm advisory work is nowadays a challenging task where sound knowledge as well as practical experience and skills are required. Beside technical knowledge on dairy farm management also soft skills such as diagnostic ability, active listening and communication skills are important. The following figure 2 illustrates key areas of knowledge and skills of dairy farm advisors. All this topics cannot usually be covered by just one farm advisor.

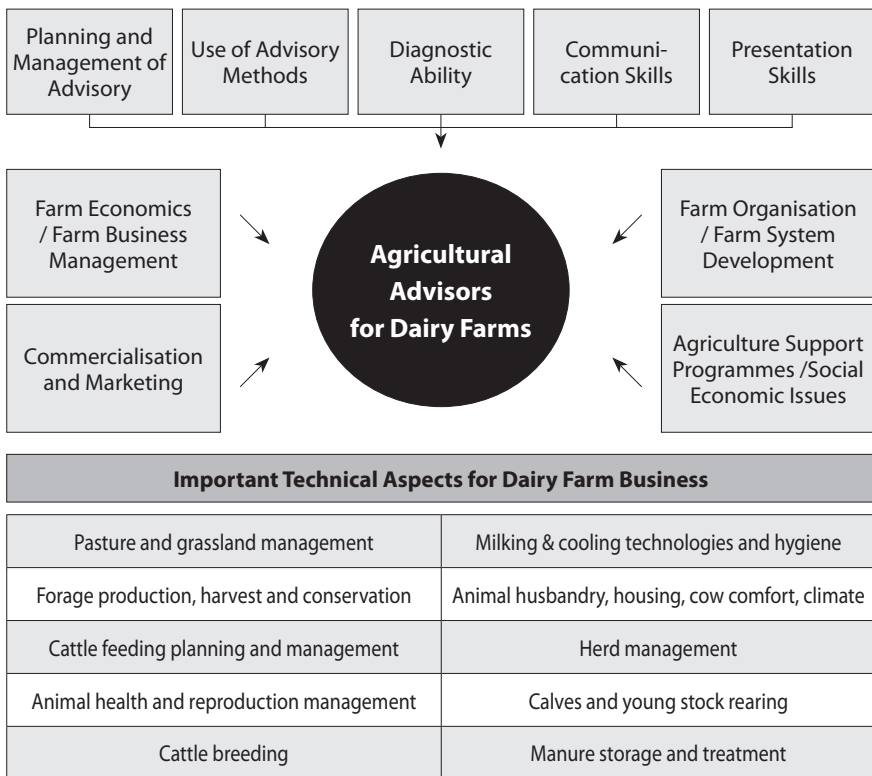


Figure 2 Knowledge and skills of dairy farm advisors

The basic education of a professional dairy farm advisor is usually a master or bachelor degree in agriculture sciences with specialisation in animal production, farm economics or farm advisory methodology or a degree in veterinary medicine. After specific post-graduate courses in agricultural advisory methodology, further training on the job is usually required to become a professional farm advisor who can provide measurable value to their farm clients. To maintain a high standard and continually increase the advisory competence regular participation in trainings for advanced farm advisers is required.

7. Practical advisory packages for dairy farms

The following table 2 illustrates exemplary three advisory packages for dairy farms in detail. Further packages can be easily defined for example on (4) Cattle breeding; (5) Animal health and veterinary aspects; (6) Herd management and daily farm work organisation; (7) Farm economics and investment planning; (8) Farm mechanisation, stable construction and technologies.

Several of these packages can be very effective for the development of dairy farms in a region, particularly if the activities are provided and used by farmers pro-actively in advance and not only when significant problems are already occurring on a farm.

Table 2 Example of specific advisory packages for dairy farms

No	Advisory packages	Specific advisory activities
(1)	Forage production, pasture management, forage harvesting and conservation	<ul style="list-style-type: none"> • Calculation of the annual fodder demand for all cattle on the farm and the optimal composition of different fodder crops in accordance with the requirements and economic aspects • Proposing maize varieties, leguminous varieties and production techniques to achieve good fodder quality • Pasture, meadows and grassland management • Harvest of forage and post-harvest storage • Forage conservation techniques, management and cleanness of silage • Advice on the improvement of silage or hay (time of harvest, silage technology, silage additives etc.) • Information and training • Comparison of different varieties and technologies under local conditions and exchange results with local dairy farmers (clients)

No	Advisory packages	Specific advisory activities
(2)	Fodder and feed analysis, ration formulation, feeding management and control	<ul style="list-style-type: none"> • Forage quality analysis and interpretation of results (annual farm comparison) • Checking body condition of individual cows and groups of cows • Feed-ration calculations for milking and dry cows and other groups of cattle on the farm • Determination of supplements, concentrate feed and minerals in accordance with the specific requirements and economic aspects • Assessment of roughage structure in the rations and final formulation of diets and rations • Advice on feedstuff supply management, feeding frequency etc. • Support control of feeding management (feed intake; body condition; milk components (fat, protein, urea etc.)) • Regular analysis of performance of cows, lactation curves and specific herd situation related to dairy cow diseases which might be caused by sub-optimal feeding management • Information and training • Comparison of different feeding results under local conditions
(3)	Milking and milk hygiene management, udder health	<ul style="list-style-type: none"> • Milk hygiene and daily milking technique • Regular analysis of Total Bacteria Count /ml • Regular analysis of Somatic Cell Counts /ml • Regular inspection of cleaning procedures and management • Advice on milk quality and udder health • Advice on new installations of milking and cooling equipment • Technical auditing of milking equipment • Analysis of milk quality problems which might be caused by milking and hygienic aspects • Information and training about rules and regulations related to milk quality and milking, cleaning and cooling techniques available • Individual advice on milk quality and udder health aspects

8.

CHAPTER

Cattle Breeding in Turkey

*Dr. Hüseyin VELİOĞLU**

When the current conditions of the world countries, EU-27 member states and Turkey are compared using the data obtained from the United Nations Food and Agriculture Organization, we see that;

- Turkey ranks 24th in the world and 1st among the European Union countries with an agricultural population of 14,994,000 people, and that
- Turkey ranks 21st in the world and 3rd in the European Union with its cattle population of 10,859,942 heads. Turkey also ranks 10th and 15th in the world and 2nd and 1st in Europe, respectively, with its sheep and goat population of approximately 30 million heads.

According to the data on current milk and beef production obtained from the FAO, Turkey ranks:

- 57th in the world and 27th in Europe with a milk yield of 2803 kg per cow,
- 10th in the world and 5th in Europe with a milk production of approximately 12 million tons.

If the structure of agricultural holdings, on which the production statistics given above are based, is examined, we see that both crop and animal production are carried out in 67.4% of totally 3,000,000 agricultural holdings, while only animal production is carried out in 2.4% of them, and only crop production is carried out in 30.2% of them. As of 2010, the statistics indicate that the number of holdings engaged in animal production have increased, owing to the livestock investments made in the recent years. It is necessary to underline that average land possessed by holdings engaged in crop production is 61 decares.

Statistics indicate that our large ruminant population tend to decline over the years and the most prominent decrease is in small ruminant population (Table 1).

* Cattle Breeders' Association of Turkey, Ankara

Table 1 Livestock population by species and years

Years	Cattle	Sheep	Goat	Buffalo
1990	11 377	40 553	10 977	371
1995	11 789	33 791	9 111	255
2000	10 761	28 492	7 201	146
2005	10 526	25 304	6 517	105
2009	10 724	21 750	5 128	87
2010	11 433	23 090	6 293	86

Source: TURKSTAT, 2011

If small ruminant and cattle are examined separately, we see that sheep and goat population decreased steadily and tended to increase after 2009, whereas cattle population tended to decline until 2009 and had a rapid increase afterwards (Table 2).

Table 2 Livestock populations by years with 1990 taken as 100

Years	Cattle	Sheep	Goat	Buffalo
1990	100	100	100	100
1995	104	83	83	69
2000	95	70	66	39
2005	93	62	59	28
2009	94	54	47	24
2010	100	57	57	23

Source: TURKSTAT, 2011

36.9% of our current cattle population is high yielded exotic breeds, 41.4% is crossbreeds and 21.7% is domestic cattle breeds. The number of milking cows is 4,384,000 heads. We see that the shares of exotic breeds and crossbreeds among the total number increased over the years (Table 3).

Table 3 Shares of different genotypes in the total cattle population by years

Years	Number of cattle (1000 heads)	Shares of genotypes, %			Number of milk cows (1000 heads)
		Exotic	Crossbreed	Domestic	
1990	11 377	8,9	32,3	58,8	5 893
1995	11 789	14,4	40,5	45,1	5 886
2000	10 761	16,8	44,0	39,2	5 280
2005	10 526	22,4	43,1	34,5	3 998
2009	10 724	34,7	41,1	24,2	4 133
2010	11 433	36,9	41,4	21,7	4 384

Source: TURKSTAT, 2011

If the milk production data for 2010 are examined, we see that 92% of the total milk production of 13 million 605 thousand is obtained from cattle, 6% from sheep, 2% from goat and less than 1% from buffalo.

As for the meat production in the same year, cattle breeding has the largest share (79%) in the total red meat production of 780 thousand tons.

If the share of cattle in total production in other countries and the European Union countries are compared, we see that:

- It has a share of 83% in the world's total milk production and 97% in EU-27,
- It has a share of 79% in the world's total meat production excluding pork and 89% in EU-27 (Table 4).

Table 4 Share of cattle in milk and meat production (%)

	Milk	Total meat	Red meat production	Red meat production excluding pork
World	83	22	33	79
EU-27	97	18	26	89
Turkey	92	17	52	52

Source: www.fao.org

When the herd size in terms of average number of cows are examined, it is seen that majority of holdings have 1-9 cows in average. According to 2011 data of TURKSTAT, the percentage of holdings that have 1 to 9 bovine animals is 81.1%. It is followed by holdings with 10 to 19 bovine animals with a share of 12.8% (Table 5).

Table 5 Share of herd size groups (%)

	Bovine (cattle and buffalo) herd size groups (heads)					
	01-09	10-19	20-49	50-149	150-299	300 +
Turkey, %	81,1	12,8	5,4	0,7	0,0	0,0

Source: TURKSTAT, 2011

When the subsidies given for bovine production in 2011 are examined, it would be right to say that subsidies for calves born from cows, which are registered to the herdbook system and inseminated artificially, are insufficient.

When the breeding animals imported by years are examined, we see that totally 46,545 female breeding cattle were imported predominantly from the US, Austria, Uruguay and Australia.

Examining the trend for importation by country for each year, we see that the price of raw milk, which was 33.83 Eurocent/lit in 2010, fell to 25.17 Eurocent/lit in 2011 (Figure 1).

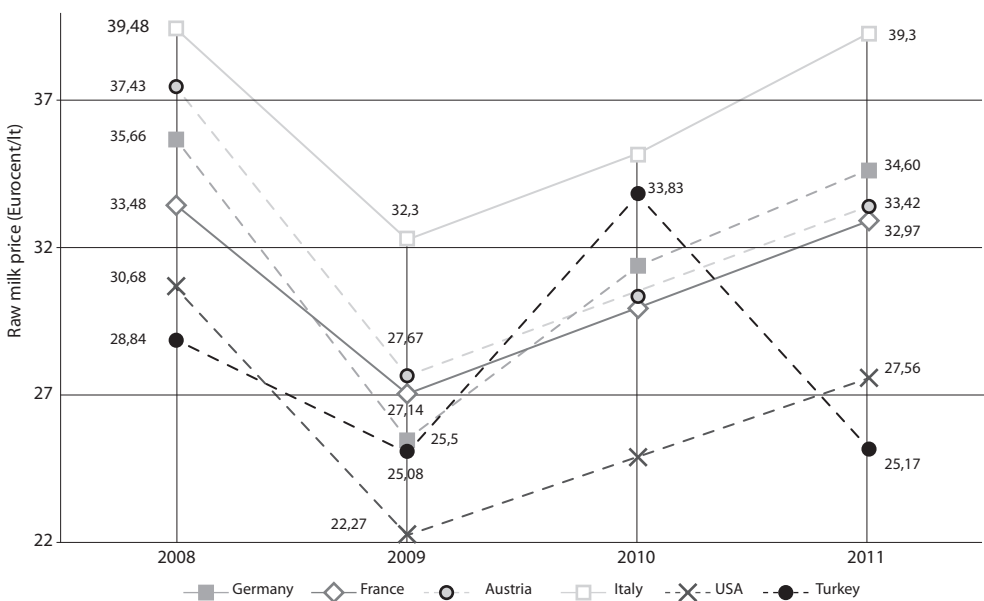


Figure 1 Raw milk prices of countries by years (Eurocent/lit)

Source: http://www.clal.it/en/index.php?section=latte_europa and e-improvement database

When the mixed feed and raw milk prices are examined together, it is seen that the milk production is far from being economical in cases where the parity falls below 1.5 (Figure 2).

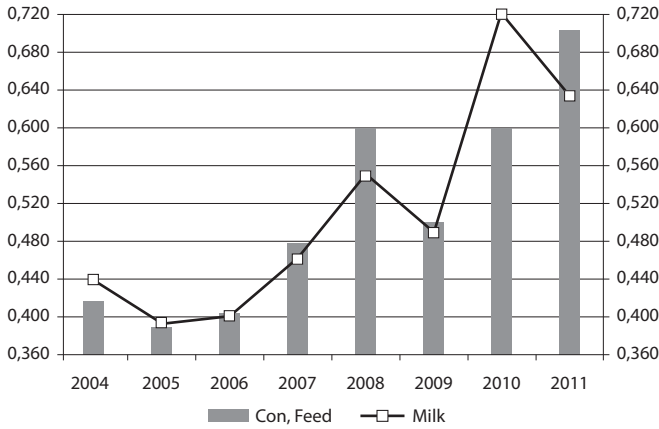


Figure 2 Raw milk prices (TL/lt) and concentrate feed prices (TL/kg) by years

Source: Feed industry and e-improvement database for 2011

It is known that the change in the meat prices in the last years along with the low prices of milk led to the slaughter of breeding animals.

If we examine the changes in raw milk and red meat prices in the same table, we see that they move in a parallel manner, considering the importation of cattle for slaughter as well (Figure 3).

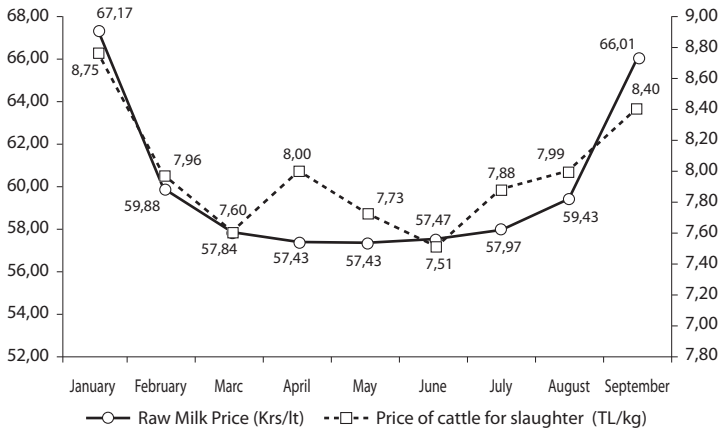


Figure 3 Raw milk and red meat prices by the months of 2011

Source: http://borsa.tobb.org.tr/fiyat_sorgu1.php?ana_kod=13&alt_kod=202 and e-improvement database

Recommendations

- Raw milk and red meat markets should be retrieved from free market approach; these products should be declared as strategic products, and minimum of a 5-year policy should be formulated concerning ruminant breeding.

- It should be ensured that the producing, processing and consuming parties take part equally and play active roles in the Market Regulatory Board that will be established.
- Genetic improvement in cattle should be accelerated.
- Slaughter of breeding cattle should be prevented by increasing the subsidies granted for mature cattle, calves born from artificial insemination, sheep and milk.
- Use of approved semen, breeding ram and goat should be encouraged and organizations engaged in such activities should be promoted.
- Improvement targets should be set for sheep and goat species, and pressure on cattle in terms of red meat production should be mitigated.
- Sufficient budget should be allocated and a compensation fund should be established for fight against zoonosis and epidemics.
- VAT applied to the retail prices of livestock, red meat and milk should be provisionally reduced from 8% to 1%.
- Vulnerabilities of the local producers and the market should be taken into account while making decisions regarding the import of livestock, red meat and milk products (milk powder, butter, etc.).
- Necessary measures should be taken to protect the producers against the high costs of inputs (electricity, fuel, feed, fertilizer, medicine).
- Quality forage crop production should be increased, efforts to protect and rehabilitate meadows should be accelerated, and organizations should be established for meadow management,
- Tax rates applied to imported feed raw materials should be reduced in certain periods,
- Development of the breeders should be aimed in credit facilities, and measures should be taken accordingly.

Objectives

The objectives of Turkey shall at least be set as given in Table 6.

Table 6 Objectives of Turkey for 2023 for animal production and consumption

	2010	2023
Total milk production (million tons)	13,6	25
Total red meat production (thousand tons)	780,7	1 500
Registered milk production (%)	54	85
Milk and milk products consumption per capita (kg/year)	174	350
Meat consumption per capita (kg/year)	6	18,5
Roughage production (million tons)	42,2	100

9

CHAPTER

Italian Breeder Association: 60 Years of Activity towards Farmers and Breeding

Dr. Riccardo NEGRINI*

The Italian Breeder Association (AIA) was founded in 1944 with the mission to support farmers in their day-to-day activity, and enhance their sustainability and competitiveness.

In about 60 years, the Italian Breeder Association grows up and now it covers with its technicians all parts of Italy still pursuing its mission.

The present structure comprises 72 provincial nodes and 17 regional nodes. About 31 specific Breed Associations refer to Italian Breed Association for their activity.

Italian Breeder Association accomplish its mission through more than 1100 technicians expert in dairy and beef recording, 150 technicians qualified in dairy system assistance, 700 technicians qualified for extension services and to provide technical advice to farmers.

These expertise are integrated by more than 500 active external collaborators comprising veterinarians, nutritionists, geneticists, animal scientists, experts in animal productions, animal welfare etc.

The last years, the technicians of the Italian Breeder Association spent together more than 254.700 day/control in the farms.

In table 1 are reported, per species, the number of farm and head controlled by the Italian Breeder Association. From the table, it is clear that the main activity of AIA is related to dairy cow; however, efforts are spent also for beef recording and towards minor species as sheep and goats, or rabbit.

Table 1 Species, number of farm number and number of animals controlled by Italian Breeder Association

Species	Number of farms	Number of animals (heads)	Species	Number of farms	Number of animals (heads)
Dairy Cattle	20.590	1.390.058	Bufalo	288	48.539
Beef Cattle	11.474	301.617	Swine	400	25.080
Sheep	5.647	601.305	Equine	7.269	14.697
Goat	1.004	72.749	Rabbits	419	19.398
TOTAL			47,091		

* Italian Breeder Association, ITALY

Concerning dairy cow, AIA records the production of about 62% of cow in Italy, representing more than the 81% of the overall milk production in Italy. From a different point of view, more than 50% of dairy cattle farms are subscribed up to now, and benefit to the services provided by AIA (Figure 1).

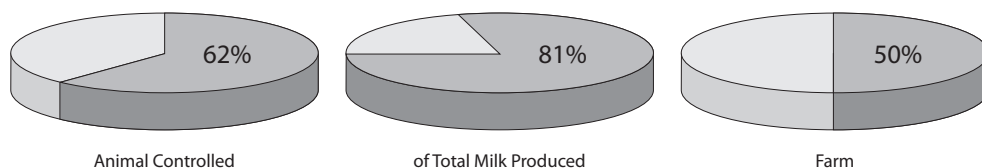


Figure 1 Share of dairy cows, controlled milk and farms subscribed to the Association in 2011

Regarding the beef production, the table 1 shows that AIA is actually recording the performances (life-weight and reproductive events) of more than 300,000 beef cattle located in more than 11,000 farms. In Figure 2, the situation is showed in more detail: the left pie shows that 48% of suckler cows are controlled by AIA while the right pie shows that the 74% of slaughtered animals born outside Italy are under AIA supervision.

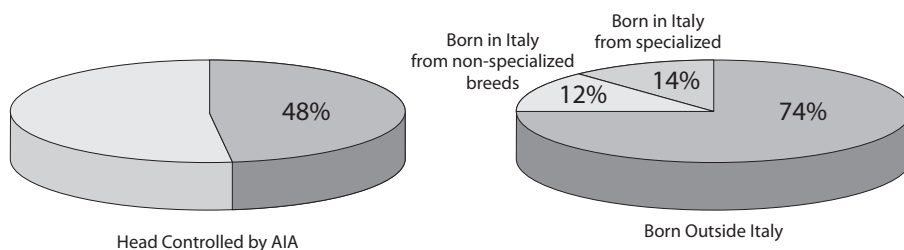


Figure 2 Share of suckler cow and controlled slaughtered animals by AIA

AIA also records milk production of small ruminants, considering the importance that goat and sheep breeding assume in the rural economy of marginal areas and that several Italian products labeled as PGI (Protected Geographical indication) or PDO (Protected Denomination of Origin) are linked to a specific sheep or goats native breeds. As showed in the figure 3, in spite of the effort spent, up to now only the 6% of goats and the 8% of sheep respectively are controlled by the Italian Breeder Association, and the picture in terms of farms is even worst (3% and 5% of farms in goats and sheep respectively).

Increase the number of farms and of the animal controlled is the challenge that AIA is facing also to enlarge the genetic basis for the genetic improvement and as a toll to improve the quality and quantity of the milk produced.

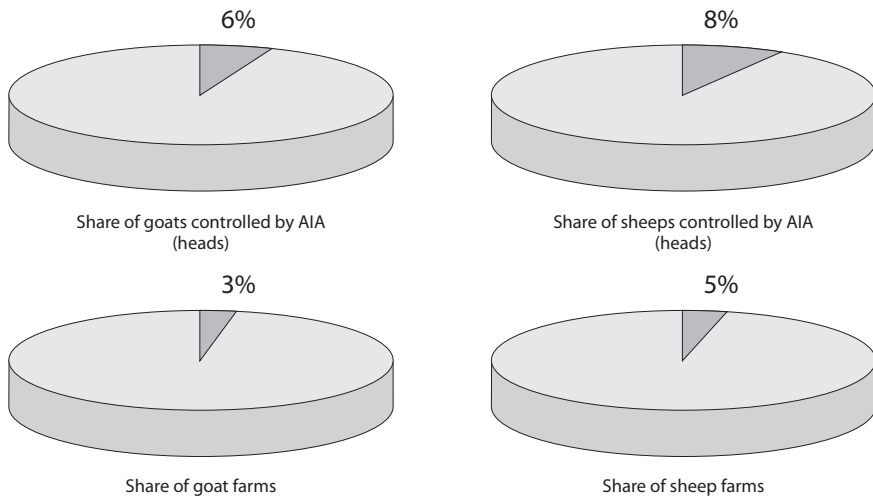


Figure 3 Share of controlled goats and sheeps by AIA, goat and sheep farms (%)

Buffalo milk production recording experiences the same situation. The request of mozzarella cheese made by buffalo milk is increasing exponentially boosting the increase of Mediterranean buffalo population in Italy and the related production. However, the number of buffalo cow and farm controlled is still quite low (Figure 4).

In this specific case, increase the number of farms and animals controlled by the Association technicians means also increase the disease preventions since the brucellosis is somewhere still a problem to solve.

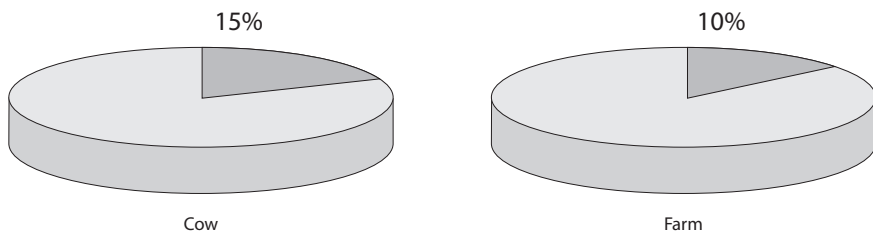


Figure 4 Percentage of Mediterranean buffalo cow and farm controlled by AIA

However, the benefits of being subscribed to the breeder Association and to the related heard-book are clear, looking for example at the trends of milk productions of the animals subscribed to the functional control of milking are increasing, as showed in Figure 5.

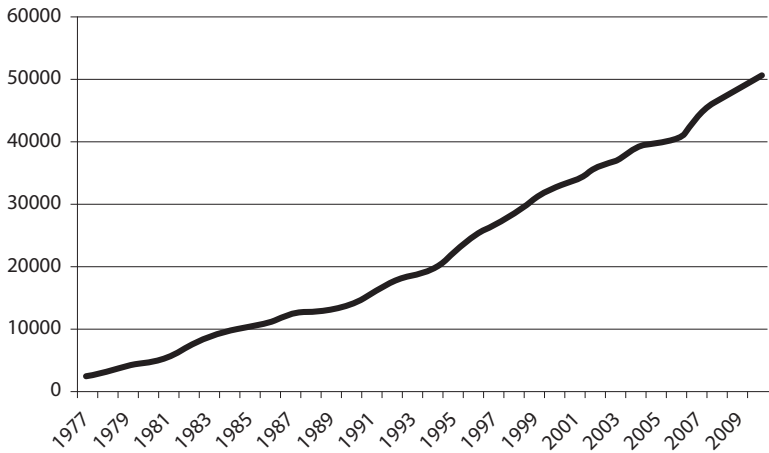


Figure 5 Number of Mediterranean buffalo cow under milk recording.

For these animal and farms, the possibility to access to the heard book and to exploit the breeding selections activity of the Italian Buffalo Association (ANASB) produced also a sensitive benefit in terms of milk yield and fat and protein content (Figure 6).

This again confirms the usefulness of the activity of the Italian Breeder Association together with the Activity of the Breeder Association in charge of the selection scheme.

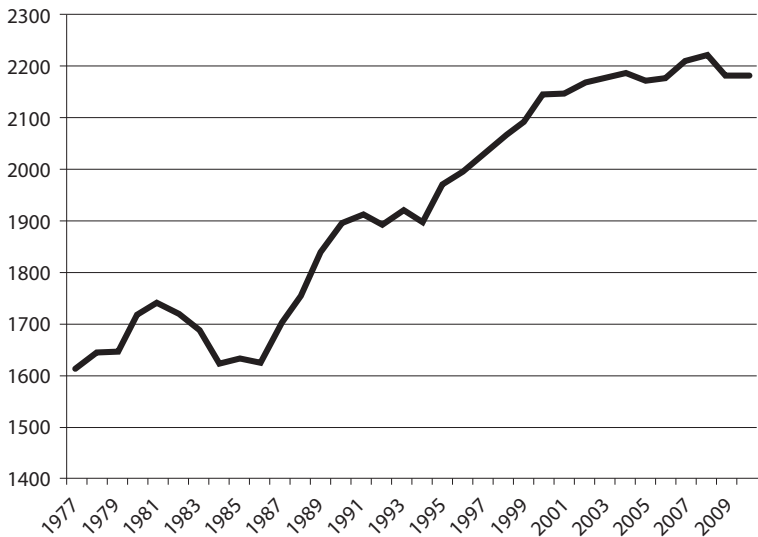


Figure 6 Milk yield (kg) trend in the last 30 years

Fortunately, these results boosted the farms subscription to the Association as showed in figure 7. However, the present day situation is far from being satisfactory form the AIA point of views and further effort will be spent to recover the gap between the farms subscribed and those outside the network.

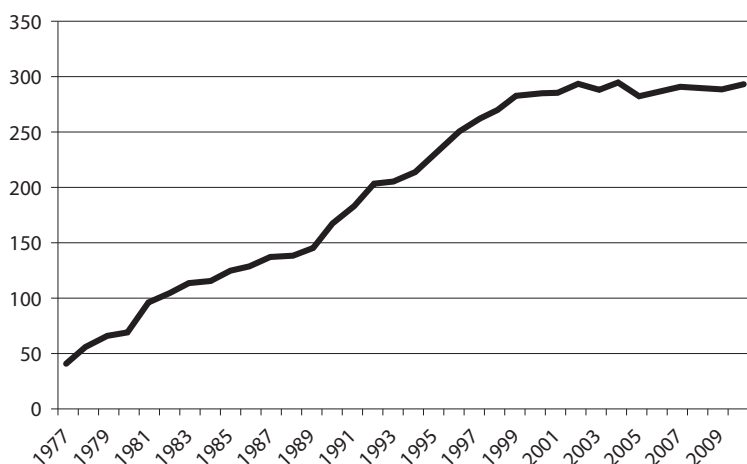


Figure 7 Number of farms subscribing to the milk recording service

The Certification of Quality obtained by ICAR, grants the excellence of AIA activity in recording productions of dairy cattle, buffalo, dairy goat and sheep and beef cattle, and the reliability of the animal identification it performs.

In table 2, is reported the recording methods used in Italy in the last decades. From 2009, almost the totality of the control executed is classified as AT4: the technicians visit each farm every 4 weeks, controlling the production and collecting the samples of the morning or of the evening milking sessions. The table also shows the positive trends of animals controlled, which increased of about 200,000 units in the last decades and the decline of the number of farms that in the same period decreased of about 6,000 productive units.

Table 2 Recording methods in use in Italy since 1998, number farms and number of dairy cow controlled.

Recording method	1998	2002	2006	2008	2009	2010
A 4	48,0	44,0	55,4	36,5	4,0	2,8
A 6	30,0	26,0	6,8	22,6	0,5	0,2
AT4	22,0	30,0	37,8	40,9	95,5	97,0
Farm	26.141	24.429	22.011	20.970	20.606	20.208
Dairy cow	1.199.114	1.340.508	1340.569	1.337.872	1.344.733	1.363.556

The milk samples collected by technicians during the milk recording are sent to one of the 25 laboratories composing the AIA laboratory Network to be analyzed. The logistic

of the laboratory locations allows the sampling delivery within 24h from the collections, to guarantee the respect of the analysis timeframe for the reliability of the results and facilitate the maintenance of the freezing chain.

The network is coordinated by the Laboratorio Standard Latte, located nearby Rome, that provides standard samples for the instrument calibrations, protocols for the analysis and organizes a periodic ring test among all the 25 laboratories. In 2011, more than 12,000,000 milk analysis has been carried out and the results stored in the central database and released to farmer by SMS (within 3 working days from the sampling in farm).

Italian breeder association also in active in parentage testing, offering this and many other services through its “Laboratorio Genetica e Servizi” located in Cremona (Northern Italy).

Last year the Laboratorio Genetica e Servizi performed more than 50,000 parentage analysis based on DNA molecular markers.

The laboratory has been recently equipped by the Illumina genomic platform that allows the high throughput genotyping necessary to implement “Genomic Selection “ (Figure 8).



Figure 8 Illumina HiScan SQ at Laboratorio Genetica e Servizi.

Explanation: The black towers in front of the picture are parts of the automated loader that allows the machine to work without assistance 24h a day.

All the data of milk and beef recording are stored and managed through a centralized database that provides also several facilities via web services. The Si.All. (Sistema Informativo Allevatori) system is presently composed of 10 servers with 500GB RAM and 24 TB of storage capacity. The system architecture is highly redundant and protected to preserve the integrity of the data Stored.

In table 3 are reported some statistics about the database. Italian breeder Association offers more than 400 services in Web services to more than 1000 clients. Last year, Si.All. handled more than 12 million and 21 millions of reproductive and productive data respectively. About 500 million of records are stored and organized and more than 20 million of subject registered.

The system last year managed more than 1 million of accesses for data input or/and output.

Table 3 Statistics on the activity of SiAll.

475	Available functions
1.123	Clients
20.364.087	Subject identified in the system
	1,116,016 new pedigree record in 2011
210.853	Dairy recording controls in 2011
	2,957 Buffalo 205,764 Dairy cattle 2,132 Beef cattle
537.458.525	Production and reproduction records stored
	12,229,670 Reproductive records 2011 21,629,065 Productive records 2011
1.274.380	Request batch (input-output) 2011

Italian Breeder Association is also dynamic in research and development. Together with several partners, it is developing some proprietary devices to help the technicians in their daily activity, to enhance the automation of data recording, and to increase the product quality.

Among these, presently is under ICAR evaluation a system for the remote estimation of animal life-weight using a camera and software for image elaboration under patenting. The systems will allow the technicians to safely operate in the fields, minimizing the stress for the animals. Furthermore, AIA has been developed NIR (Near Infrared Reflection) curves to estimate several parameters correlated to meat tenderness as peak force, humidity, etc. The idea is to measure these parameters directly in the slaughterhouse to collect data potentially useful to set up a genetic index for tenderness and valorize the national meat productions

Finally, to give a contribution to solve the problem of animal and samples identification in the parlor, The Italian Breeder Association is developing a low cost animal identification system based on a patented flexible antenna that is able to communicate to the major devices for electronic milk recording and milk sampling. Of course, electronic ear tags should mark animals.

AIA is presently collaborating with several International and National Associations or Organizations active in the world of animal productions: EAAP, ICAR, Interbull; Universities, Research Centers, other breeder Associations and many others. Nevertheless, AIA is always open to further new collaborations being persuaded that working in team and sharing information is the overall right strategy to face and solve the complex problems of milk and meat productions toward farms sustainability and competitiveness.

10.

CHAPTER

Cattle Breeding in France

*Pierre-Louis GASTINEL**

1. Introduction

Cattle breeding in France takes roots in the weeding of genetics and territories, and I invite you, if you don't know, to visit France to discover cheese, wine, castles, but also cheese, cattle, dairy breeds and beef breeds.

We can shortly describe cattle breeding in France through 7 main points:

1. Biodiversity
2. A professional network : France Génétique Elevage
3. Reliability of top genetics
4. Development of Genomic Selection
5. International partnerships
6. Breeding goals for sustainable animal production
7. Biosecurity

2. Biodiversity

France got the 1st cattle herd in EU, and the second dairy herd. It's the first beef herd, with 4,1 million of cows.

Our geographic conditions are multifaceted: river basins, plateaux, high mountains, lower old mountains, foothills ...

The climate are also very various, and the impacts of climate changes are sensible on oceanic climate as on Mediterranean one.

The French genetics is a wide range of cattle breeds, goat breeds as sheep breeds.

Among dairy cattle, the main breeds are Holstein, Montbéliarde, and Normande, these 3 breeds make up 90% of dairy cattle; but 10% are split between 4 others local or international breeds (Simmental, Brown Swiss, Tarentaise, Abundance), more some native rare breeds with preservation program.

* France Genetique Elevage, FRANCE

3. The professional network

France Génétique Elevage, umbrella organisation for genetics of ruminants, gathers the bodies in charge of:

- Identification and parentage registration
- Performance recording
- AI and breeding companies
- Breed societies
- National data base
- Genetic evaluation

A Quality Management System, recognized by the Certificate of Quality of ICAR, manages this professional network.

4. The reliability of genetics

It is based on a large recorded population (70 % of the 3,8 millions of dairy cows are recorded with pedigrees).

5. Development of Genomic Selection

The genomic is the technology with the largest impact on dairy genetics since the introduction of insemination. Now, the estimating breeding value is possible since the birth (or embryo!), whatever the heritability of the traits, and with the same reliability for male and female.

In France, this technology is widely used, since 2008. It is the result of a successful joint venture between public research (INRA) and farmers' organisations. However, it is also the result of an international collaboration.

6. International partnership :

For the French farmers' organisations, international partnership is crucial:

- French farmers' organisations built Euro Genomics, with German, Dutch, and Nordic organisations, and today with Spain. With this partnership, European breeding companies built a reference population of 22 000 Holstein bulls.
- They participated to several international consortiums for the building of crucial tools as HD or LD chips.
- France Génétique Elevage members are very active inside international bodies as ICAR, because we think it is an excellent opportunity of exchange of experiences and the condition for a good transparency of genetic and breeding information worldwide.

7. Breeding goals for sustainable animal production

The genetic selection is an opportunity for increasing the yearly genetic gain; do we need more genetic gain on production or the same genetic gain on production and more genetic gain on functional traits?

The choice of French farmers' organisation is to increase the weight of fertility, longevity and udder health.

8. Biosecurity

The top genetics has no value if a sanitary problem happens.

So the vet system, in French insemination centres, is based on European directive, with regular controls, working with the Quality Management Requirements.

Threes levels of controls:

- Controls in Farms for the candidates
- controls in Quarantine Station
- Yearly controls in Semen Collection Centre

A national laboratory (LNCR) is the Referent Laboratory, with a National Data basis for health tests and 240 000 analyses / year. Therefore, there is, in this lab, a strong expertise for national and international authorities on health requirement.

11

CHAPTER

Management Problems in Dairy Cattle Enterprises

*Prof. Dr. Salahattin KUMLU**

1. Introduction

Holding is defined as “the economic unit engaged in activities to produce and/or market goods and services needed, thus providing benefits and consequently making profits by meeting the existing demand”. As can be understood from this definition, first there should be a demand for the goods or services that will be produced or marketed by the holding so as to establish and maintain the holding. Another prerequisite is that the production should be economic.

Natural resources, capital and labour, which are all together called “factors of production” are made use of to produce goods or services that are economically valuable. Entrepreneur that properly brings together these three factors and engages in production is considered as the fourth factor. Entrepreneur and holding can be used interchangeably due to the sameness of the function.

Cattle breeding is an economic activity. Holdings engaged in activities in this area make use of natural resources, capital and labour to make production. Among products produced milk, meat, breeding cattle and cattle for slaughter are the most significant ones in economic terms.

Recently, there has been a considerable increase in the number of cattle-breeding holdings that utilize modern technologies. In order for these holdings, which are established with huge costs to carry out profitable breeding and maintain their existence, it is required to first set short-term and long-term targets, and then prepare strategic plans that encompass the activities to be performed so as to attain those targets.

It is essential to consider the holding as a whole while both planning and implementing those plans. Cattle-breeding holdings should take into account not only the issues of cattle-raising, housing, genetic improvement, feeding but also the efficient use of lands, production of forage crops, waste treatment and recycling, input supply and product marketing. Attainment of desired levels in all of these sub-activities to contribute to the success of the holding is only possible with a successful management.

Like the holdings in other sectors, cattle-breeding holdings face various obstacles in successful management. The purpose of this paper is to draw attention to managerial

* Retired Academic Member

problems encountered in cattle-breeding holdings and present some recommendations towards enhancing success.

2. Business opportunities

Facilities of cattle-breeding holdings, such as the number of animals raised, lands, machinery, labour and capital determine, to a considerable extent, the managerial problems to be encountered by the holding. Decisions made in small holdings are both simple and easy. However, decisions to be made in large holdings established with high costs require the taking into account of more factors, and thus employment of more experienced and specialized staff.

Management will be easier in cases where merely dairy cattle-breeding is carried out and no animals are raised for other purposes or no crop production is performed. Conversely, management will be more challenging and, apart from specialization and experience, modern technologies may be necessary as well in the case that various crops are produced on owned or rented lands, and cattle fattening, sheep, goat, etc. raising are performed along with cattle-breeding.

Another key point is the levels of productivity of the livestock raised in the holding. When a higher level of productivity is desired, it will be essential to work far more precisely and establish a management and control mechanism to minimize the faults and mistakes. It also applies to crop production and other sub-activities.

3. Expectations and targets of the holding owner

Expectation and targets of the holding owner may differentiate the problems to be encountered. The holding owner who is in pursuit of increasing the productivity and profits has to take risks, keep himself up-to-date with the latest developments and make more efforts. Therefore, the holding manager will attempt to make decisions that will meet the expectations of the holding owner and minimize the risks.

The way of reducing the risks is to prepare at least a 5-year activity plan. This plan, which should be prepared, reviewed, and revised for changing conditions at least once a year by experts with the participation of the holding owner, should include some points listed below:

- What are the strengths and weaknesses of the holding?
- What are the short and long-term targets of the holding?
- What is the position/level desired to be reached in the following 5 years?
- What will be the direction and extent of change in the animal capacity of the holding?
- What will be done in the case that the prices of products and inputs change significantly?
- What are the criteria for success in production?

- What is the current and expected level of production costs?
- What are the revenue and expense levels in the holding and how is the expected course in the following 5 years?

Manager is responsible for exploring the ways of increasing the profit level in production in line with the targets of the holding and finding proper solutions. To that end, she/he should review and develop on a continuous basis the procurement and production processes as well as marketing program of the holding.

4. Bookkeeping and management

One of the indispensable elements in holding management is regular bookkeeping. The records to be maintained should be of sufficient quality and quantity to produce tangible and accurate information related to any activity of the holding. For instance, a manager should be able to be informed regarding the genetic levels of the breeding material raised in the holding by making use of such records, but at the same time find out the cost of a kg of milk, daily cost of different rations, daily, monthly and annual production quantities, expenses, share of revenue and expense items, reasons for changes throughout the year, etc. In the case that the records kept are not used in a manner to derive benefits, there is no point in keeping these records.

Quantity and diversity of records maintained in small-scale holdings are low. However, it is a key activity for large-scale holdings engaged in various productions. Therefore, specialized staff and infrastructure are needed to collect record and analyse data in order to precisely assess the current situation and make accurate decisions.

The expressions stated above should not be inferred as implying that small-scale holdings do not need to maintain records. On the contrary, it should definitely be ensured that all holdings keep records to a certain extent. In order for cattle-breeding holdings to keep herdbook, insemination and productivity records, they should be a member of the Cattle Breeders' Association, and for the keeping of economic records, it is beneficial to be partner of a cooperative.

5. Planning

One of the questions required to be taken into account by the managers of the holdings is whether there are any different ways to increase the profit. For instance, it should be considered in a holding where dairy cattle are raised whether or not cattle fattening and even sheep and/or goat raising can increase the profit. Similarly, the benefits of allocating the lands of the holding to the production of forage crops or using them as pasture should be considered.

Another point to be considered is the option of providing the roughages and concentrate feed from the lands and facilities of the holding. If the holding does not have sufficiently large and quality land for this purpose, possible advantages of the option of renting land

should be considered. Even the possibility of providing the roughages and concentrate feed by contractual production instead of renting land should be taken into consideration as well.

If the holding has its own lands, it should plan the use of manure in order to both preserve and enrich the soil and utilize the wastes produced in the holding. What should be done prior to this is to conduct soil analysis at three-year intervals at most. Depending on the analysis results and requirements of the crops to be sown, the amount and time of manure to be used in the field should be determined.

Legume forages can be sown with a view to decrease the use of livestock manure. Legume cultivation should be considered when there is a risk of groundwater pollution.

One of the frequently encountered problems in agricultural holdings is the presence of redundant machinery and equipment. This problem is the result of poor planning. Which machinery and equipment are needed when and for how long should be reckoned well in order to avoid this problem. The next step is to check whether it is more appropriate to purchase, hire or use that machinery commonly with other holdings. The option of using common machinery of a cooperative can be considered.

Another consideration required to be checked in dairy cattle holdings is the enhancement of profits by decreasing the input requirement owing to changes to be made in the use of land and manner of breeding. For instance, this question should be mindfully investigated and answered: "In the case that a holding with appropriate land focuses its attention on grazing, the need to use machinery and equipment will be reduced; would this increase the profit?"

Manager should carefully calculate the annual input requirements and ensure their provision while the prices are at minimum level so as to increase the profit of the holding. For instance, a holding that is unable to produce sufficient amounts of alfalfa should purchase it in July and August. Commercial links should be established and contracts should be concluded several months before the purchase. Otherwise, the manager may be forced into purchasing the forages with 2-3 times higher prices.

A similar planning should be applied to other inputs as well. Additionally, it is quite essential to plan and establish connections prior to marketing the products.

6. Herd health and reproduction management

Animal health and comfort are very important for holdings whose main activity is raising dairy cattle. It is not possible to obtain desired amounts of milk from cattle raised under unhealthy and stressful conditions. Thus, housing of the animals, their resting and walking facilities and access to water and feed should be planned and presented in a manner to meet their needs.

Primary requirement for high yields and thus profitable raising of animals is the healthiness of animals. Support of a veterinary surgeon and a health protection program are needed for maintaining the health of animals. The program should include a vaccine

program, fight with internal and external parasites, housing disinfection and measures to be taken against other diseases.

No doubt, udder inflammation (mastitis) is one of the most significant problems in dairy cattle holdings. The most effective measure against mastitis is to employ a qualified milker. Mastitis cases can be minimized by various measures such as having the milking system regularly maintained and cleaned, disinfecting the udder before and after milking, and managing the milking process well. Having the somatic cell counted at certain intervals allows the manager to be informed of the udder health levels of both individual cows and the herd, and take necessary measures.

Health problems encountered in the cattle of the holding and their frequency sheds light on how the health protection program will be prepared and to what extent other activities are carried out properly. For instance, problems such as acidosis and ketosis may point out that the feeding program is improper, whereas feet and hoof problems may point out there are errors in both feeding and housing conditions. Therefore, health problems should be carefully recorded and used for increasing the health level of the herd.

7. Improvement and breeding activities

In a successful dairy cattle holding, improvement targets should definitely be defined. For this purpose, traits that are important for the holding and their weights should be determined, and a road map should be formulated to achieve those targets. In order to make the desired genotype widespread in the holding with the lowest cost, lowest risk and in the quickest manner, selection of female breeding cattle should be regularly made, bulls previously tested in other improvement programs should be selected, matings should be planned and implemented, and the results should be followed up and assessed.

Selection of breed should also be considered in the improvement efforts. The cattle breed can completely be replaced with breeding cattle of the desired breed if its performance is not appreciated and does not respond to the improvement goals of the holding.

Breeding cattle should be raised under proper conditions and raising losses should be reduced so as to increase the profitability of the holding. To that end, success criteria should be determined and it should be checked whether the overall raising activities meet such criteria. Some of those criteria may be as follows: calving ration, pregnancy rate in the first insemination, first calving age, reproductive life, mortality in calves and other age groups, herd replacement ratio, ratio of and reasons for culling from the herd.

8. Labour resources

One of the most significant problems in large-scale modern holdings is the provision of trained and experienced labour force. With the recent growth in the number of large-scale holdings, this problem has become more of an issue. Holding owners and managers have serious difficulties in finding sufficient number of labourers and technicians or health personnel who have the desired qualifications.

A reason for such difficulties in finding workers is that Turkey lacks an education policy regarding this matter. The attempts to fulfil this need with the unqualified labour force that live in rural areas and somehow previously engaged in husbandry lead to significant setbacks and problems in the holdings. Thus, holdings face serious losses.

Another important reason is the avoidance of holding owners and managers from paying decent wages to experienced-trained labour force. They usually tend to employ workers who are willing to work in return for minimum wage, which drives away qualified labour force from the sector.

There are also similar problems in finding and employing qualified technicians and animal health personnel. Poor wage policy and toughness of working conditions result in the avoidance of the qualified labour force from the sector. Besides, it seems that the number of people who have the desired qualifications is low. More precisely, despite the presence of many faculty and college graduates, difficulties are encountered in finding experienced and zealous personnel.

9. Holding owners' lack of experience

Majority of holding owners in cattle-breeding sector either have a poor educational background or do not have much experience in husbandry. Bookkeeping and utilization of records are hardly observed in small-scale holdings. In addition, the lack of husbandry experience of the wealthy investors who have invested in the sector in the recent years, and their attempts to carry out business with their experiences in other sectors lead to serious problems. Those investors who do not sufficiently consult with experts are very likely to take wrong decisions and thus incur great losses.

10. Conclusions and recommendations

Future of cattle-breeding holdings depends on the holding owners and managers realizing the problems and making planned efforts together to resolve those problems. No doubt, Cattle Breeders' Association and other breeder organizations and public organizations should undertake responsibility on this matter.

The short-term project implemented by the Cattle Breeders' Association of Aydın with respect to developing and improving advisory services has fulfilled a very important function. At least, it has shed light on the advisory needs of holding owners and played a role in raising awareness. Such efforts should be maintained, increased and made widespread in other provinces as well.

12

CHAPTER

International Committee for Animal Recording: Mission, Activities and Services

*Uffe LAURITSEN**

1. Introduction

ICAR (International Committee for Animal Recording) is the worldwide organization for the standardization of animal identification, recording and genetic evaluation. The first dairy performance recordings started in USA in 1883 while early attempt to internationally standardize milk recording in Europe goes back to 1923. The key event in the international standardization of recording was the foundation of the European Milk/Butter Recording Committee in 1951 as an association of European ministries of agriculture and producers' organizations. The introduction of computerized system in '60s and the establishment of Interbull in 1988 marked new qualitative changes in recording and evaluation first of dairy cattle and in early nineties of other farm animal species and other traits of economic importance. Application of genomic data in breeding and selection that started in the last decades of the past century has already become a routine practice in evaluation of dairy cattle and in parentage recording in a number of ICAR member Organizations.

2. Mission

ICAR provides information and services to help its Member Organizations to develop, operate and manage their business. It promotes benefits of identification, recording and evaluation of farm animals. As a global organization, it provides a platform to its Member Organizations to work together and achieve shared objectives. ICAR standards, rules guidelines represent Minimum Requirements to ensure a satisfactory degree of uniformity of recording and evaluation and a maximum flexibility in the choice of methods. ICAR Members are free to determine their particular methodology. ICAR today has 97 Member Organizations from 53 Countries

3. Activities

ICAR carries out activities in fields of farm animal identification, performance recording (quantity and quality) and genetic evaluation. Presently it covers cattle (dairy and beef), sheep, goats (dairy and meat), buffalo and alpaca (fiber). About 100 Technicians work voluntarily in four Sub-Committees and twelve Working Groups to fulfil ICAR missions. They give international standard of identification system and devices, test and approve recording

* International Committee for Animal Recording, ITALY

devices and ensure international genetic evaluation of dairy (Sub-Committee INTERBULL in cooperation with Uppsala centre in Sweden) and beef cattle, and improve efficiency of milk testing laboratories. They also produce guidelines for field technicians on how to measure and record productive and morphology traits, how to assess conformation of farm animals, how to control parentage and how to calculate lactations. ICAR working groups produce guidelines for a variety of operations vital for farm management and genetic evaluation, such as keeping and processing of animal data, recording animal health and functional traits, beef recording, milk recording in buffalo, sheep and goats, recording of data on artificial insemination. Working Group Developing Countries promotes animal identification, recording and evaluation in low to medium input production systems and encourages development of identification and recording methods and technologies applicable in these systems.

ICAR organizes technical workshops, through its web site and Newsletter provides for exchange of information, and assists its Members to keep up with technical developments also by publishing books and technical series. ICAR carries out important activities in the field of international representation and lobbying activities.

4. Services

ICAR provides standards for animal industry in fields of animal identification and recording of traits of economic interest. It carries out international genetic evaluation of dairy and beef cattle, disseminates information and publishes books and professional and research papers. It also provides benchmarking service, which helps ICAR members to measure and compare their efficiency and economy. ICAR Certificate of Quality is accorded to Members on the basis of peer auditing and thus stimulates improvements in services they provide to animal industry. Patenting Sentinel and Action Service keeps Members informed on patenting in fields of ICAR mandate and expertise.

5. Future challenges

In the near future, ICAR will enlarge its mandate and activities so as to pay more attention to new and emerging requirements of animal industry and the public, such as health and welfare traits, genomic application and new species and productions. Improvements in efficiency and quality of ICAR activities will include also developments in animal data exchange and the use of data for commercial purposes by breeding industry.

13.

CHAPTER

EU Record Keeping, Data Verification and Reliability, Equipment and Machinery Used, Cattle Sector in Developing Countries

*Dr. Milan ZJALIC**

The modern system of animal identification was introduced in 1997 after the BSE crisis and applied also in Turkey. It stems from methods used in herdbook keeping that started in England in 18th century.

Animal identification is the basic pre-requisite a for

- herd and farm management,
- animal recording,
- animal breeding,
- animal health management,
- trade in animals,
- labelling and traceability of animal products,
- control of subsidies.
 - The recorded animal identity must be the animal's official identity in the related country and must be unique to that animal.
 - The animal s identity must be visible.
 - The animal s identity should be unique and never be re-used.

The animal s identification device/method, must comply with legislative requirements.

Collection of data on milk production with a view to selecting best cows for reproduction started at the end of 19th century in USA (1893), Denmark (1895), Germany (1897), (Hungary (1897), Finland, Norway and Sweden (1898) and Netherlands (1899). Between 1910 and 1925, Milk Recording spread to many countries. Data recorded included quantity and fat content of milk. Each country and region used to apply its own methods and systems. In this situation, data recorded were hardly comparable. The growing international trade in breeding material, and later in bull semen, created the need for the standardization of recording. The first steps towards standardization were undertaken as early as in 1923. However, the systematic international work on standardization started only in the period after the World War II, precisely in 1951 when the European Milk Butter Recording Committee a predecessor of the present day ICAR was established upon the initiative by FAO and EAAP by ministries of agriculture and breeders organizations from Austria, Denmark, France, Germany, Italy,

* International Committee for Animal Recording, ITALY

Luxembourg, Norway, Scotland, and Spain. ICAR and its 80 Members monitor developments in the social and economic environment, market, science and technology and establish standards and guidelines for animal identification and recording and genetic evaluation of traits of economic importance.

The principal goal of ICAR and its Member Organization is to provide technically sound, science based and efficient services to livestock producers in support of viability of both traditional and high-tech production systems. Standardization of recording greatly contributed to the international trade in genetic material and to the genetic improvement as a key factor in meeting growing global demand for animal products. ICAR carries out testing of identification, recording and analytical devices and issues approvals for their use for the purpose of genetic evaluation and farm management in accordance with ICAR standards. ICAR guidelines for animal identification, recording and analysis of animal primary products are used by the staff of ICAR members in their work on farms, in laboratories and in evaluation. The growing number of farmers is carrying out recording on their farms and they also apply ICAR principles under the guidance and advice of ICAR Member organizations.

Selection on the basis of pedigree that takes into account traits and performance of ancestors was applied first in England in the second half of 18th century. It soon spread to many European and non-European countries.

First attempts to select best animals on the basis of progeny testing (comparison of milk production of daughters with the milk production of mothers in their first lactation – Denmark 1912 – and comparison of milk production of daughters of selected bulls with the production of other cows in the first lactation – Sweden 1913) did not have a substantial impact on genetic improvement due to the small number of tested animals (Johanson in Mitic et al, 1987). The introduction of artificial insemination on the large scale in almost all European countries made it possible to apply principles of population genetics. Utilization of progeny tested bulls with the estimated breeding value was the key factor in attaining the spectacular increase in milk production in the second half of the last century. For example, in the European Union, in the forty year period 1961-2000 the number of dairy cows declined from 43 million to 28 million heads or 35%, while the total milk production increased from 117 to 150 million tons or by 28%. The milk yield increased from 2.728 kg to 5.419 kg (FAOSTAT 2012).

Parallel with genetic improvement, the animal industry strongly relied on new technologies developed in the field of animal nutrition and management on the basis of sound scientific evidence and as a result of scientific research. Although these new technologies were more widely applied in mono-gastric animals, they also contributed to increased efficiency of the dairy sector. In addition, developments in crop production and an increase in cereal and forage yields provided solid base for nutrition of farm animals including dairy cows.

Milk production in the European Union was strongly supported by policy measures, including premiums and regulations. Thus Commission's Decision of 20 June 2006 obliges the competent authorities of the Member States are to approve the bodies responsible for setting the rules for performance recording and assessing the genetic value and for publication of the evaluation results of pure-bred breeding animals of the bovine species. It lays down that milk recording data must comply with the principles agreed by competent international bodies (for example, the International Committee for Animal Recording (ICAR)). It also establishes principles of recording of functional – secondary – traits and conformity. In accordance with the Decision, genetic evaluation of breeding animals must be carried out under the responsibility of the approved body and must include the following performance traits according to the selection objectives.

Furthermore, it is recommended that the genetic evaluation also include the traits of reproductive performance and of morphology for breeds in which recording of these traits is being practiced.

The breeding value of an animal is calculated on the basis of the results of the performance of the individual and/or of its relatives.

The statistical methods applied in genetic evaluation must comply with the principles agreed by competent international bodies (for example, the ICAR) and guarantee a genetic evaluation unbiased from the influences of the main environmental factors and data structure.

The reliability of the genetic evaluation must be measured as the coefficient of determination in accordance with principles agreed by competent international bodies (for example, the ICAR).

In the genetic evaluation of dairy traits of artificial insemination bulls for milk production, the milk yield and content (butterfat and protein percentage) as well as other available and relevant data for the genetic aptitude for dairy traits must be included.

The minimum reliability of the genetic evaluation of AI bulls of the dairy breeds must be at least 0,5 for the main production traits according to ICAR principles taking into account all information from relatives.

Like in many countries of the world, parents of future generations of dairy cows in Europe are selected in accordance with their estimated breeding values (EBV) (Spehar et al, 2011). The estimated breeding value is expressed in total merit index based on estimated values for production, longevity, conformation, udder health and reproduction traits. Genetic evaluation of dairy bulls is based on recorded data related to production and functional traits of their offsprings (progeny testing). Genetic evaluation is carried out on local level by national and local evaluation organizations. ICAR Sub-Committee INTERBULL evaluates dairy bulls at global – international level. International cooperation in genetic evaluation of dairy bull through ICAR – INTERBULL contributed to dissemination of improved genetics worldwide and to the more appropriate use of genetic improvement in different production systems

and social and physical environments. International Genetic Evaluations are across-country measures of genetic merit of dairy for individual traits. In 2011, the International Genetic Evaluation Service provided by Interbull evaluated a range of 34 traits of 6 breeds expressed in 30 national scales that are used extensively worldwide in semen marketing.

Interbull uses a scientifically advanced method known as Multiple Across Country Evaluation (MACE) to calculate International Genetic Evaluations. MACE uses of all known relationships between animals and combines information from each country using all known relationships between animals, both within and across populations. MACE accounts for the possibility of animals re-ranking between certain countries. This occurs when animals perform better in certain environments than they do in others or when genetic evaluation methods differ between countries.

The rapid improvements in genotyping technologies have recently opened the possibility of using genomic information in livestock selection. Genomic information obtained by the analysis of single nucleotide polymorphism (SNP) may reduce costs and accelerate genetic gain by reducing genetic interval. The high throughput molecular technologies can trace the inheritance of markers through generations. Genetic evaluation starts with the establishment of reference – training - population, which has been phenotyped and genotyped. The resulting data serve as a reference to develop a statistical model estimating the effect of each SNP with the trait or traits of interest. The result is a predictive equation to calculate a genomic estimated breeding value – GEBV. The accuracy of GEBV depends on the size of the population and the heritability of the trait to be considered.

The reliability of genomically evaluated breeding values for production traits for the Holstein breed varies around 70% compared with 85% reliability of EBV from progeny testing. Already some 30 000 bulls are evaluated by the use of genomic analysis. Genomic selection builds on existing breeding programs in which the collection of pedigree information together with phenotypic data is already a routine. It provides a new level of information that can be integrated into decision-making process to identify and select the most promising animals. (Scheifers and Weigel 2012)

The genomic approach will improve the rate of genetic progress in comparison with traditional selection schemes. Many breeders are already applying genomic selection both when purchasing semen and when deciding the animals in the herd on which to use reproductive technologies. AI companies to select young bulls and to decide which animals can make positive genetic contributions to the next generation use genomic testing. (Bagnato and Rosati, 2012)

It is expected that the genomic revolution could help in meeting the growing demand of an increased number of human population and contribute to alleviating poverty and hunger affecting several hundred million people.

At the dawn of agriculture, about 8000 B.C., the population of the world was approximately 5 million. Over the 8,000-year period, it grew to 200 million, with a growth rate of under 0.05%

per year. A tremendous change occurred with the industrial revolution: whereas it had taken all of human history until around 1800 for world population to reach one billion, the second billion was achieved in only 130 years (1930), the third billion in less than 30 years (1959), the fourth billion in 15 years (1974), and the fifth billion in only 13 years (1987). During the 20th century alone, the population in the world has grown from 1.65 billion to 6 billion. World population will continue to grow in the 21st century, but at a slower rate compared to the recent past. World population has doubled (100% increase) in 40 years from 1959 (3 billion) to 1999 (6 billion). It is now estimated that it will take a further 42 years to increase by another 50%, to become 9 billion by 2042.

However, the volume of agricultural production grew faster than the number of humans living on the Earth. For example, in 1961, the global average yield of cereals was a little less than 1.5 tons per hectare. It rose above 3.0 tons at the end of the twentieth century. Close to 90% of total crop production increase is the result of productivity increase as opposed to area expansion.

Livestock production grew faster than the population numbers and it met both increase in demand and changes in nutritional habits caused by industrialization and urbanization: increase in consumption of animal products. Productivity increases in livestock have been brought about by the broad application of science and advanced technology in feeding and nutrition, genetics and reproduction, and animal health control as well as general improvements in animal husbandry. Majority of developing countries experienced substantive growth in animal production, particularly in production of meat of monogastric animals – poultry and pigs. In the period, 1960-2010 global milk production grew from 313 to 599 million tons or by 91%. The largest increase was in Asia – from 21 to 158 million tons or 7,5 times, while milk production in Africa grew from 7,8 to 31 million tons or 4 times.

It is estimated that in 2030 global consumption of meat would be 68% and of milk 57% higher than in the year 2000. While production and consumption of milk and milk products in developed countries would remain at the level attained in the beginning of the current century, the bulk of increase would take place in developing countries. Demand for animal products in developing countries is based both on population growth and on the growth of per capita income of some population strata.

In developing countries parallel with traditional low input livestock production systems based mostly on the use of pastures and local breeds, there is a growing industrial sector, particularly in poultry meat and egg production.

Dairy sector in recent decades has undergone a number of important changes. Traditionally, dairy sector was based on the use of local breeds and technologies. Although the use of exotic – imported breeds was common throughout the history, developing countries significantly increased the import of high productive breeds during the last century. These are used both for crossbreeding with local breeds and for stocking new small to medium size farms with high input technology that often includes dependence not only on imported

genetics but also on partly or completely imported feed. While in many tropical regions crosses of local cattle breeds with highly productive ones did not meet expectations with regard to productivity and adaptability, in a number of countries careful selection based on animal recording and evaluation resulted in creation of new highly productive breeds well adapted to the local environment.

Based on developments in some regions such as China where in the last 50 years number of cows doubled, the total milk production increased by six times; production per cow increased from 1 200 kg to 2.880 kg, significant increase in demand for milk in developing countries in coming decades will require both an increase in the number of dairy cows and an increase in milk yield per cow. Both mean an increased pressure on environment (N pollution and GHG) and land resources. These two factors, together with the threat of global warming represent new challenge for whole complex of life sciences. Research agenda of animal science should, inter alia, include also the use of genomic tools in providing dairy cows with high adaptability to various climatic conditions, better use of roughages and other feed, reduced N and GHG emissions.

14.

CHAPTER

Herdbook Activities in Turkey

*Dr. Onur ŞAHİN**

The first initiatives on genetic improvement in Turkey began when Karacabey farm was turned into a state production farm in 1925 and Brown Swiss cows and sires were imported from Austria to this farm. Herdbook record keeping activities by the state began in the same period. In the following years, grey cattle raised around Karacabey were artificially inseminated with the imported Brown Swiss semen to achieve crossbreeding. In consequence of these efforts, a cattle breed was created, which is currently known as Karacabey Brown and has high adaptability to regional conditions .

Efforts were put to constitute the legal infrastructure of improvement activities and Animal Improvement Law no. 904 was enacted in 1926. In the same year, artificial insemination, an important application in terms of genetic improvement, began to be applied. In 1973, genetic improvement activities in cattle gained momentum with the introduction of the frozen bovine semen.

Record keeping activities that would contribute to the herdbook in Turkey began with the projects jointly executed by Italian and German governments. Turkish ANAFI-Project for Improving Dairy Cattle Breeding, supported by the Italian government, was executed in 9 provinces (Aydın, Balıkesir, Burdur, Isparta, İzmir, Denizli, Manisa, Muğla and Uşak) between 1989 and 1994. Cattle Breeding Information System Project (GTZ), executed in collaboration with the German government, was executed in 7 provinces (Bursa, Edirne, Kırklareli, Konya, Sakarya, Samsun and Tekirdağ) in 1995, and finally ended in 2000. Objective of both of the projects was to establish a registry system in Turkey and ensure the foundation of associations that would execute this registry system. Breeders were encouraged to get organized by these projects, and provincial Cattle Breeders' Associations began to be established as from 1995. The established 16 provincial associations came together in 1998 and founded the Cattle Breeders' Association of Turkey. Having initiated herdbook registry system efforts jointly with the Ministry, Cattle Breeders' Association of Turkey presented the Progeny Testing Project to the Ministry in 1999 and began to be engaged in such activities. In consequence of the efforts to constitute an up-to-date legal infrastructure of genetic improvement and organizing

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¹ GÖKÇEN, H., 2000. Türkiye'de Hayvan Islahının Dünü, Bugünü ve Geleceği.
<http://www.hazimgokcen.com/hzm/index.php?showtopic=138>

of breeders, Animal Improvement Law no. 4631 was published in 2001. The database infrastructure, which has been used since 1994, operated independently in each province, and required delivery of the data to the centre through discs and CDs. This initial software was changed with a superior central database that operates online in 2005. Activities regarding herdbook and organizing of breeders' are carried out by the Cattle Breeders' Association that is now working under the legal framework of the Veterinary Services, Plant Health, Food and Feed Law no. 5996, which was enacted in 2010 and had repealed the Animal Improvement Law no. 4631. The following national regulations on organizations, improvement and herdbook activities were put into force under the scope of the aforementioned law.

- Regulations on the Identification, Registration and Monitoring of Cattle (2011),
- Regulations on Guidelines for Herdbook and Pre-Herdbook Activities (2012),
- Regulations on the Foundation and Services of Animal Breeders' Associations for Improvement Purposes (2011).

The regulations and directives published before are given as following:

- Directive on Herdbook in Dairy Cattle (2000),
- Directive on Guidelines for Progeny Testing (2009),
- Directive on Milk Measurement Controls (2009),
- Breeding Cow Competitions (2009),
- Directive on the Collection and Analysis of Milk Samples (2010).

Organizational structure of Cattle Breeders' Associations is as follows:

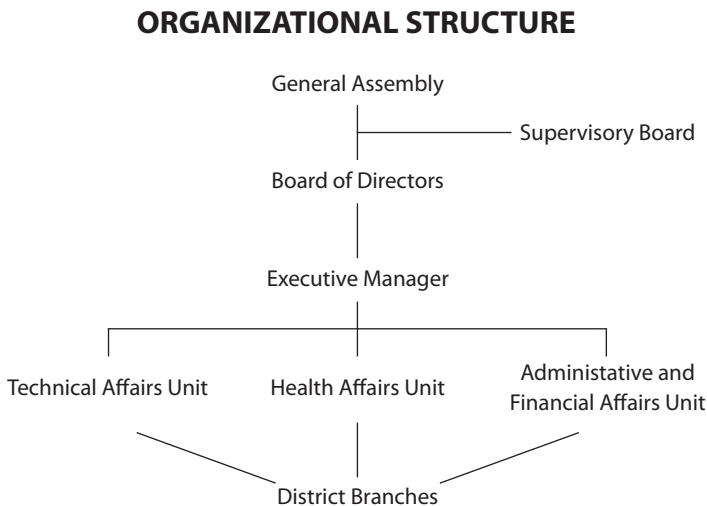


Figure 1 Organizational structure of breeders' associations

At the top of the organizational structure of breeders' associations is the General Assembly, which is the most authorized. All members of the Association are represented in this Assembly. Board of Directors and Supervisory Board, which are elected by and are responsible for executing activities on behalf of the General Assembly operate in subordination to the same. Executive Manager, to whom the Administrative and Financial Affairs, Technical Affairs and Health Affairs Units are subordinate, is responsible for executing activities on behalf of the Board of Directors. District branches are at the bottom of the organizational structure. These branches are directly responsible for carrying out herdbook and progeny testing activities related to member holdings.

Activities carried out by the Cattle Breeders' Associations within the scope of the herdbook project are:

- Ear-tagging and holding licensing
- Calving records
- Milk yield records
- Artificial insemination records
- Milk control analysis
- Animal movements
- Classification
- Issuing of pedigree
- Inspection
- Estimation of breeding value
- Cow competition
- Input provision
- Marketing
- Training and advisory services

The herdbook registry system (e-improvement) executed for genetic improvement operates centrally and online. Through this system, holdings with internet connection can enter their own data, directly access to information and reports concerning herd management. The technical personnel of the Cattle Breeders' Association carry out new registration and update processes for holdings without internet connection on field. The mobile system put into implementation in 2010 has allowed proper and rapid collection of data directly from the farms. Besides, it is ensured that each member breeder can access information and reports related to its own farm and herd through the internet using the Farm Information System (Cibis) that was put into service in 2007. E-improvement database that came into service in 2005 completed its online integration with National Cattle Identification Database (Turkvat), Agricultural Insurances Database (Tarsim) and Farmer Registry System (ÇKS) as from 2007. Current situation of the herdbook activities carried out in Turkey can be summarized with the data given in Table 1 below.

Table 1 Current situation of the herdbook registry system

Number of provinces	80
Number of districts	150
Number of vehicles	544
Number of personnel	1.050
Number of holdings	126.820
Number of cows (Heads)	1.668.000
Total number of females (Heads)	2.841.000
Total number of cattle (Heads)	3.649.000
Number of Inseminated Cattle (Heads)*	1.485.000
Number of artificial inseminations (doses)*	2.073.000
Number of calves born (Heads)*	1.061.000
Number of cows monitored for milk yield (Heads)*	1.192.000

*: As of the end of 2011

Herd size of 126,820 holdings where the herdbook registry system is executed are given in

Table 2 Cattle capacities by types of holdings

Type of holding	Number of holdings	Average number of cows (heads)	Average number of cattle (heads)
Individual	125.118	11,2	24,6
Cooperative	577	3,6	7,3
Company	1.125	111,9	259,5
Total	126.820	10,7	23,7

Average herd size by cow and cattle of individual farms, which are member of the Association and constitute the majority, are 11.2 and 24.6 heads, respectively. For all of the holdings within the scope of the herdbook registry system, these figures are 10.7 and 23.7.

Herd size by cattle increased approximately by 1 head in the period between 2009 and 2011. Distribution of female cattle raised in these holdings by breeds is given in Table 3.

Table 3 Distribution of female cattle by breeds

Breed Name	Number of Cattle (Heads)	Share in Total Number of Cattle (%)
Holstein	1.950.994	67,9
Holstein Crossbreed	153.612	5,3
Red Holstein	3.763	0,1
Red Holstein Crossbreed	3.363	0,1
Brown Swiss	203.915	7,1
Brown Swiss Crossbreed	194.443	6,8
Simmental	187.929	6,5
Simmental Crossbreed	127.478	4,4
Jersey	4.331	0,2
Jersey Crossbreed	3.046	0,1
Other Culture Breeds	13.760	0,5
Other Culture Crossbreeds	2.416	0,1
Local Breeds	22.339	0,8
Local Crossbreeds	3.487	0,1

In the last two years, the number of female Holstein cattle has decreased and fallen to 67.9%. On the other hand, the number of female Brown Swiss and Simmental cattle has increased and their share in the total number of cattle has risen to 7.1% and 6.5%, respectively.

In the last eleven-year period, the numbers of registered breeders and female cattle have increased rapidly thanks to the subsidies granted by the government for the herdbook system. Change in the number of registered breeders and female cattle are given in Figure 2.

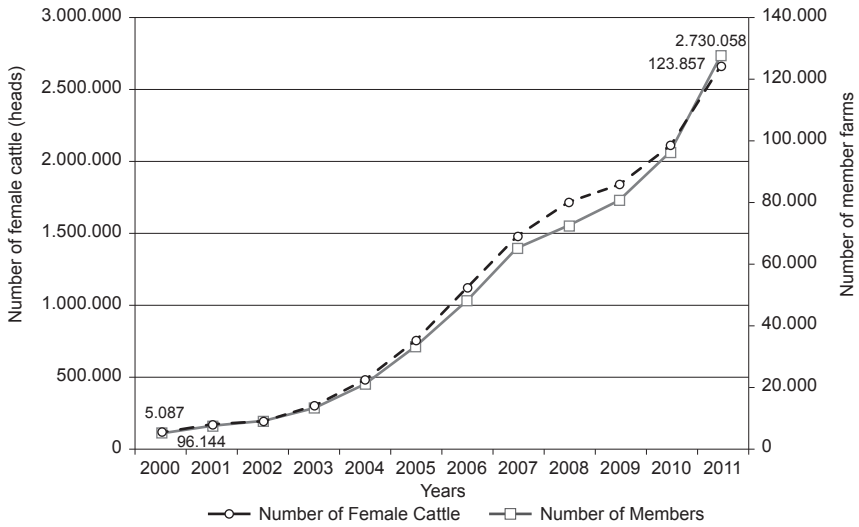


Figure 2 Change in the number of member holdings and total number of female cattle by years

In parallel to the increase in the number of member farms and female cattle, there has been an increase in the number of artificial inseminations and registered calves as well. The change in the number of artificial inseminations and registered calves is given in Figure 3.

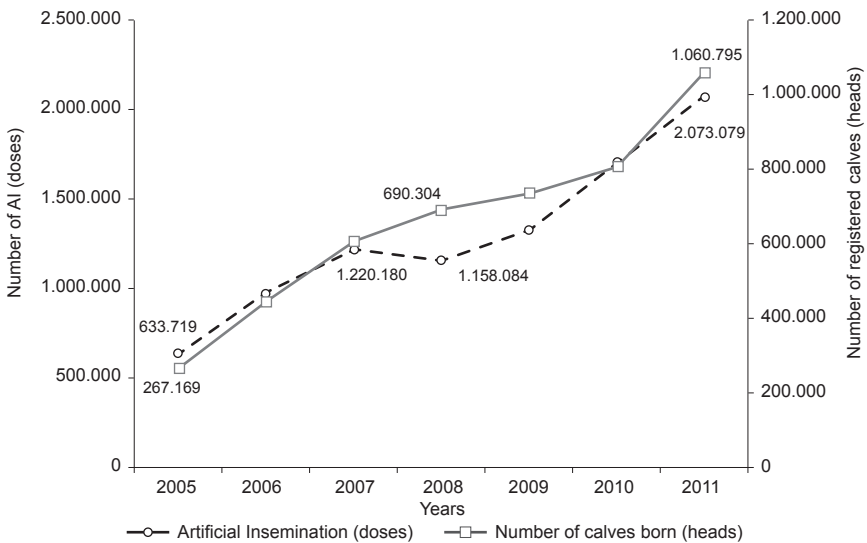


Figure 3 Change in the number of artificial inseminations and registered calves by years

The change by years in the milk yield of the first three breeds registered in the herdbook system is given below.

Table 4 Milk yield of Black and White Holstein, Brown Swiss and Simmental cattle (2000-2010)

Date of Calving	B&W Holstein		Brown Swiss		Simmental	
	Number of Lactations	Milk Yield (litres)	Number of Lactations	Milk Yield (litres)	Number of Lactations	Milk Yield (litres)
2000	14740	6079	1570	5501	282	4782
2001	23818	5986	1887	5176	582	4828
2002	33717	5820	2438	4959	942	4610
2003	55191	5790	3054	4860	1217	4272
2004	83601	5784	3397	4897	1840	4328
2005	119142	5817	4656	4687	2581	4578
2006	192005	5873	7649	4678	4416	4787
2007	263732	5839	10536	4624	7202	4769
2008	293443	5870	11971	4657	8461	4787
2009	290822	6071	12297	4780	9282	4838
2010	249080	5994	11786	4559	10064	4693

Source: E-improvement Database, 2012

Although the milk yield of Holstein cattle tends to mildly fluctuate over the years, it reached around 6,000 litres in 2009. With fluctuations of the milk yield of Brown Swiss cattle over the years, it decreased to 4,559 litres. Milk yield of the Simmental breed increased as from 2005 and reached 4,800 litres in 2009. It is observed that a decline occurred in the milk yield again in 2010.

Reproduction statistics for all cattle and particularly for Holstein, Brown Swiss and Simmental breeds in the herdbook registry system are given in Table 5.

Table 5 Reproduction statistics by breeds

Breed	Age of first calving		Service Period		Calving Interval		Number of inseminations per pregnancy	
	Number of cattle (heads)	Average (months)	Number of cattle (heads)	Average (months)	Number of cattle (heads)	Average (months)	Number of cattle (heads)	Average (months)
Holstein Friesian	1.119.118	28,0	662.052	135,3	646.321	435,1	612.342	2,02
Brown Swiss	73.129	29,7	54.033	123,9	45.719	423,4	48.949	1,76
Simmental	71.036	29,5	48.720	120,9	35.109	423,5	40.751	1,78

Source: E-improvement Database, 2012

Currently ages of first calving for Holstein, Brown Swiss and Simmental breeds are 28.0, 29.7 and 29.5 months, respectively, whereas it is 28.3 months in average for all cattle. Service periods for the same breeds are 135.3, 123.9 and 120.9 days, respectively, whereas it is 132.5 days in average for all cattle. Calving intervals for the same breeds are 435.1, 423.4 and 423.5 days, respectively, whereas it is 432.5 days in average for all cattle. Inseminations per pregnancy for the breeds in question are 2.02, 1.76 and 1.78 doses, respectively, whereas it is 1.94 doses in average for all cattle.

Within the scope of the herdbook project, data on the amount of milk produced are collected according to B4 system, which can be defined as a system requiring declaration once in four weeks. Accuracy of the monthly milk yield data obtained within the framework of this system is ensured by way of milking controls performed in 5% of the member farms monthly. Besides, animal assets of holdings are checked and information on animal movements is updated. Within the scope of the raw milk analyses, the accuracy of the analysis results for the samples is tested through control analyses of replicate samples. Mobile e-improvement project was initiated in order to ensure more proper and efficient collection of information on farms and cattle without being influenced by the human factor. Within the scope of the "Regulations on the Identification, Registration and Monitoring of Cattle" issued by the Ministry of Food, Agriculture and Livestock, it is expected that holdings will be licensed with a barcode system as from June 2012 and the improvement in the technological infrastructure of the ear tag application for new-born calves will enhance the speed and accuracy of data collection.

Within the scope of the Progeny Testing, which is the ultimate objective of herdbook activities, the first test insemination efforts began in 2001 following the signing of the Progeny Testing project protocol between the Ministry of Food, Agriculture and Livestock and Cattle Breeders' Association of Turkey. To date, 136 candidate bulls were taken into Menemen Artificial Insemination Laboratory, which is located in Izmir. 93 of these bulls were used in

semen production, 87 of which are Holstein, 5 of which are Brown Swiss and 1 of which is Simmental. Young bulls are obtained from mating of selected sires and dams based on their breeding values. Semen production and test inseminations are also carried out at the same time. Breeding values of the daughters of 52 bulls among the 87 were estimated according to their milk yields. Sire catalogues containing the breeding values, type values, fat ratios, protein ratios and somatic cell counts are updated annually and put into the use of breeders and artificial insemination practitioners.

15.

CHAPTER

Developments in the Mechanization of Dairy Farming

*Prof. Dr. Hamdi BİLGEN**

1. Introduction

As in any other business, the main purpose in dairy cattle-breeding is to obtain the highest yields and revenues in return for certain expenses, and thus attain the highest level in profitability. It is only possible if the production activities are well planned and implemented properly. Success in planning and implementation depends on the establishment of in-housing equipment and environmental conditions at the most appropriate level possible.

Specific characteristics of animal production entail the planning and implementation of new techniques in the beginning of the investment, since the investment is planned for a long-term agricultural production. Among appropriate solution methods, mechanization has very firm ties with the fixed facilities for animal production. Depending on main functions such as the types of animals, feeds, feed preparation methods, feeding, excrement-manure management, milking and milk cooling, particularly "Breeding-Housing-Mechanization Relation" should be planned and implemented in the most proper manner.

It is only possible with the implementation of proper mechanization methods to keep the labour requirement at the lowest level, facilitate business, ensure animal comfort, improve product quality and increase productivity and yields.

It is useful to deal with the mechanization applications in dairy farming with the main topics listed below:

- Feed preparation and feeding,
- Manure management,
- Milking and milk conservation,
- Computer-aided herd management practices

2. Mechanization in Feed Preparation and Feeding

Tendency towards preparing quality roughages increasingly rises, and studies and developments are observed in this particular matter.

In addition to pasturing and directly providing the cattle with harvested forages in their barns, there are also other methods of roughage feeding such as extra drying and

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conservation in the form of silage. With proper mechanization methods employed at the right time, it is possible to reduce losses and maintain the quality in the beginning of the harvest.

Mechanization in the preparation of green feed or fodder primarily refers to the use of machinery in harvest and post-harvest phase. These machines include reaping machines, hay rakes and baling machines. It is observed that as the technical characteristics of this machinery are developed, their capability and performance increase as well.

There are on-going developments towards enhancing the quality and quantity of the method of feed conservation in the form of silage, which is of particular importance in the feeding of dairy cattle with water-rich roughages. Withered fodder silage and fodder bale silage are preferred in countries, regions, enterprises and seasons where fodder preparation conditions are not suitable. Methods in which more appropriate harvesting and post-harvest operations are preferred gain importance in the processing of plants that are suitable for silage owing to relatively higher dry matter and nutrient content as well as aerobic resistance.

Regarding the feed trade in Turkey, which is primarily based on dried alfalfa and maize silage, the guidelines given below should be followed:

- The share of production of plants with increased qualities and quantities should be raised in the production of roughages for livestock feeding.
- Enterprises in roughage production business should be specialized.
- Specialized machinery use models should be employed (common acquisition and/or use of machinery in this scope).

In the provision of concentrate feed, the mixed concentrate feed produced by specialized companies are preferred, but some enterprises prepare concentrate feed mixtures by their own. There are on-going efforts to attain higher amounts of products with higher quality by the use of machines that shear and mix feeds, consuming less power.

Mechanization tools have been utilized to a greater extent in the recent years in the presentation of feeds to the animals. In addition to fix feeding tools, devices that are tied to a tractor or self-propelled mobile vehicles are made use of as well. The growth in the use of roughage-concentrate feed mixing and distributing wagons is noteworthy.

Significant developments are going on in individual concentrate feed stations with the preference for data recording and controller options. Practices of feeding with roughages and concentrate feed with the opportunity of controlling with the same data records are expected to increase in the individual feeding of cattle.

It is also possible to mention an expectation of increase in the adoption of more ergonomic and hygienic practices in livestock watering pots as well as the use of controllers with water consumption data records.

3. Mechanization in Manure Management

Utilization of mechanization is indispensably increasing with a view to better make use of farm manure and establish environment-friendly manure management systems.

Rather than mobile scrapers, fixed manure scraping devices are preferred in the removal and transmission of manure from the housing structures of animals. Even the use of manure scraping robots, which are unmanned mobile mechanization devices, may be increased if appropriate structural arrangements are done.

The increase in drip-proof manure storage areas or liquid manure pools is important in terms of environmental protection. Reduction of manure losses and better use of manure thanks to ripening processes are also important, considering the plant production cycle. Encouragement of the practices of alternative energy generation through biogas production is pleasing development. At this point, however, it should be emphasized that it would be appropriate to avoid from using the nutritional material of humans and animals as an input in the generation of alternative energy, particularly under conditions where the deficits pose significant problems. It should also be emphasized that it would be more efficient to co-invest in biogas facilities instead of individual solutions in energy generation.

Widespread use of manure separators as solid-liquid phase separator as required by ecological conditions in Turkey is interesting.

The increase in the use of manure applicators to apply liquid and solid manure onto the field is noteworthy, and the use of machines with increasingly expanding carrying capacities is an important indicator of the increasing level of mechanization.

4. Mechanization in Milking and Milk Conservation

As in any other agricultural activity, harvesting is essentially important. Milking machine has a functional significance as a harvesting machine in dairy farms. Therefore, milking techniques through the use of machines are dealt with in more detail in this paper.

If a combine harvester does not have right functional characteristics or is not used properly during harvesting cereals, it is easy to determine the losses. However, if a milking machine does not have right technical characteristics or is not used properly, it may lead to reduced milk yield that cannot be detected immediately as well as losses in udder health and raw milk quality. It is not possible to easily detect such losses. Undesired impacts can only be noticed after a long time. Milking machine is a special machine that directly affects living organisms and is used every day of the year and even for a number of times in a day. Milk cooling tanks used cool and conserve the milk in terms of raw milk quality are supplementary means of milking technique.

4.1 Milking parlours and systems

The prerequisites for the success of a milking system are the milking system and personal characteristics of the enterprise manager and milking personnel. In the enterprise plans,

definition of framework conditions regarding the development of the enterprise and herd (herd projection), number of milkers and duration of milking should definitely be taken into account. Fishbone milking parlours have long been preferred. Milking parlours with milking stalls that are parallel to each other and are vertical to the axis of the milker's pit are correct choices for large enterprises. Fishbone milking parlours (with milking stalls that are 50 - 55° to the axis of the milker's pit) are offered as a transformation solution at the first stage for small autotandem milking parlours (with milking stalls that are parallel to the axis of the milker's pit, where the animals can individually enter and exit). Large enterprises have to make a selection between rapid exit group-stall milking parlours and carousel milking parlours.

Swing-over milking parlours exhibit a different characteristic. A milking unit can be used between two opposite milking stalls. This system is applied in group-stall milking parlours. In order to carry out efficient milking, this system should have at least 12 milking units. In fact, 16 milking clusters are recommended. This means there should be more than 24 milking stalls in two rows. Success of swing-over systems also includes the obligatory change of a consistent milking routine and a disciplined management of milking processes.

In addition to the selection of the right system, structure of the milking parlour building (beam-column structure) is important as well. The shaping of roof in the most appropriate manner for the needs of humans and livestock without using any column ensures that the animals remain calm and move safely without any obstacles.

Full automatic milking machines (robots) have regained prominence recently. Companies manufacturing milking robots are improving their technologies and enhancing their optimization. At the centre of the developments are solutions for increasing the milking work performance (number of animals milked in a unit time) and guaranteeing the raw milk quality and udder health. Transition to a milking system where milking robots are used may be a reasonable decision for any family enterprise. Multi-stall milking robot systems can provide more optimal solutions for relatively larger herds in terms of work performance.

In order to attain optimum milking work performance in all systems, one should pay strict attention to arrangements such as the waiting stall for animals waiting to be milked, entry into and exit from the milking parlour or separation door. Generally, cattle-driving equipment in the waiting section for animals is useful. Relatively large enterprises have more requirements with regard to herd management. It should be accepted that as the enterprises grow larger, they are more likely to abandon lockable feeders. Cows are directed to the intervention section through the use of separation doors after exiting the milking parlour. This is necessary for hoof care, insemination, treatment and taking blood sample. Owing to separation doors, animals with a health problem can be directly driven into the intervention room.

One should pay strict attention to the arrangement of separation doors and partitions as well as to jamming points. A considerable amount of labour is saved thanks to the use of separation system for insemination, pregnancy examination and treatment interventions.

Separation equipment should be suitable for directing the cattle after leaving the milking parlour and in accordance with the herd management systems.

Standard system in dairy cattle-breeding is free barns with lie down stalls. Such housings should generally be structured along a long axis. The selection of the location of the milking parlour should not constitute an impediment for the expansion of the housing building.

High temperatures in barns during summers lead to acute temperature stress for high-yielding cows. It leads to rising body temperature, increased pulse rate, reduced activity, reduced consumption of feed and consequently reduced milk yield. Considering the reduced fertility and serious increase in the risk of udder infections, immediate treatment should be applied. Thus, it is recommended that air circulations systems with low-flow fans be placed to suitable points in the barns.

4.2 Optimization of milking parlours

A good milking technique should be used in a proper working environment. Most enterprises spend long times in milking, leading to bodily strain in the milking personnel. Such strains may be avoided through ergonomic improvements. A proper lighting and improvement of the climatic environmental conditions can enhance concentrating on milking. Lighting in the milking parlour should primarily optimize at the working area under the cattle. Some companies offer supplementary technical solutions regarding this matter.

Milking parlours that are on the same level with milk rooms provide better working conditions and ensure that milking materials are easily carried to the milking parlour thanks to the direct connection. Besides, colostrum milked into different pots can easily and simply be carried to outside. A milking pit formed below the stall ground in large milking parlours provides great advantages. Thus, many technical equipment (milk and washing tubes, milk meters, pulse devices and vacuum tubes) can be put in a safe and clean area in the milking place. Milking pit ground furnished with water-permeable plates improves the comfort of the ground where the milkers stand on and the hygiene of the milking parlour. Mechanical and hydraulic height adjustment systems can be used for milkers of different height.

The continuation of the increase in the number of common milking centres for small enterprises is a significant expectation.

4.3 Technical characteristics of milking facilities

ISO 5707 standard contains minimum technical characteristics required to be possessed by milking facilities. Many companies guarantee in their products that they meet the necessary conditions for milking facilities. It is recommended that the sizing of the main vacuum air duct, milk duct and foremilk collection pot should be done in the first plan, considering the increasing biological yield of dairy cattle. Therefore, it is of great importance to evaluate the product offers not only for their price but also technically. Independent official consultants should be consulted with for meticulous evaluation of offers. Taking into account the possible

expansions in the future, sufficient flexibility should be ensured for development stages. However, high costs of investment, energy and cleaning restrict the sizing of milking facilities.

4.4 Energy saving in vacuum units

Vacuum pumps with frequency converter ensure adaptation to the changing capacity requirement during milking and generation of vacuum power. Such new technologies combined with cleaning-in-place systems in compliance with the studies conducted in the industrial field prove that energy consumption can be saved up to 50%. First of all, vacuum pumps with frequency converter are of great importance in milking robots where the pump operates continuously almost like a clock. A significant advantage of these pumps is that the noise is reduced. In contrast to the vacuum units where the exceeding vacuum capacity is adjusted through a regulator, flow rate is reduced through a frequency converter depending on the required capacity in vacuum pumps. By virtue of the reduction in the number of revolutions in the pump, they ensure a considerable reduction in the noise caused by the regulator in the facility and application of safe pressure. Additionally, it also improves the working conditions in the milking parlour during long hours of milking.

Due to the fact that a high vacuum pump capacity is required during the washing of traditional milking facilities by cleaning systems and the increasingly growing milk lines need to be cleaned safely, the use of a second vacuum pump that steps in during cleaning and has an equal capacity is recommended as a way of saving energy.

In milking facilities with classical type vacuum pump and unit, fixed operating vacuum pressure is secured by means of a regulator. A servo regulator achieves this. What causes the increased noise in high capacity vacuum pumps is the rising free flow rate of air. Use of a noise attenuator or other noise-reducing measures can remedy the discomfort caused by the noise in the milking parlour.

4.5 Pulse and impulse action

Manufacturers apply variable and simultaneous pulse action. Today most manufacturers use different pulse rates as the ratio of the milk intake – massage phase. It is recommended that the pulse rate be between 60:40 and 67:33, and the number of pulses in a minute be set between 52 and 62. In addition to the fixed pulse application that does not change during milking, there is also a pulse application that perceives the momentary milking flow rate and acts accordingly. A new development in the pulse technique is the application of a different pulse action on udder lobes. Technical settings should only be changed by certified service personnel from independent institutions in accordance with proper test results.

Impulse may be needed to enhance the milkability of dairy livestock. Mechanical impulse assistance equipment that is linked to a proper milking routine is recommended. There are different impulse applications that are dependent on time and milking flow rate. Scientific studies indicate that impulse assistance applications that are dependent on time are more effective.

4.6 Milking clusters and nipple rubbers

In the design works of milking clusters, milking technique companies mostly use different points of view. They rely on the experiences of applicators for different breeds and milking techniques in the world. It depends on general physical arrangements of the milking facilities whether light milking clusters with rigid plastic teat or heavy milking clusters with stainless steel teat will be used. General tendency is the use of anatomically adapted milking clusters, which can operate without any problem in very high flow rates. New arrangements of milk entry and exit on milking claws should ensure proper milk transmission in maximum flow rates as well as convenient use of milking clusters. Internal volume of the milking claw should be 250 - 350 mL.

Despite some advantages, silicone nipple rubbers have not had any prominent success in the market up to the present. Favourable features such as compatibility with food, long-lastingness and good adaptation to nipple forms do not suffice for most of the breeders to buy them, since they have high prices. Standard nipples made of neoprene rubber, which have a softer rubber and more affordable price, are preferred in the market. No doubt, frequency of replacing the nipple rubbers and all rubbers in a set should be taken seriously. Nipple rubbers are the components that link the animal to the machine. Optimal characteristics and quality of nipple rubbers entail proper contraction and dilation movement, which is stimulated by the pulse device, felt by the animal and transmitted to the nipples. Nipple rubbers that are not changed regularly or faulty/inferior nipple rubbers will not produce pleasing results expected from heavy investments made in the milking technique. Considering that the improvement of milking conditions depends on the replacement of nipple rubbers, it should definitely be ensured that the replacement is never delayed.

Replacement interval for nipple rubbers should be done in accordance with the directives of the manufacturer company. As a general rule, manufacturers recommend a replacement interval of 750 operation hours or 2500-3000 milking sessions for black nipple rubbers. According to the directives of companies, silicone nipple rubbers can be used up to 5000 milking sessions (1500 hours). Reuse of nipple rubbers after being cleaned in boiling water or in oven should definitely be avoided. Such a method is a waste of time and will not produce successful results in the long run. No doubt, among nipple rubbers that have abundant varieties in the market, those that are not known and recognized should not be used. Manufacturers' recommendations and directives on the usage characteristics should be observed.

Minimum technical characteristics required to be possessed by milk and vacuum hoses are specified in the standards. Owing to their low weight, lightweight silicone milk hoses with 16 mm diameter provide advantage in terms of the proper position of the milking cluster.

4.7 Cluster fitting support and service arms

Simple cluster positioners and service arms have gained prominence as advanced development products. Companies offer various solutions in this field. Modern service

arm equipment ensures further automation of milking processes. Service arms facilitate the obtainment of the best fitting position as well as the fitting of the cluster. In addition, automatic mechanical final milking application is undertaken as well prior to removing the cluster. Mechanical final milking systems bring the advantage of preventing excessive (blind) milking and shortening the milking duration through optimal arrangements in large milking facilities. This practice is carried out based on the milking flow rate measurements. Milkability of the animals is adjusted and the final milking system steps in within the milking flow rate range of 600 – 1000 mL/min. This range entails a specific adjustment by the enterprise.

The use of cluster removing equipment is compulsory in all milking parlours with a view to prevent blind milking and enhance milking performance. New sensors secure compliance with the times set and correct and reliable flow rate values desired. For automatic cluster removal, milking flow rate values are usually set to 250 - 300 mL/min. They should be adjusted in a manner conforming to the conditions in the enterprise, just like the case in the final milking systems of the machines. Acceptable values taken from certain sources can only provide a general definition. Enterprises that conduct more than two milking sessions should set the flow rate value to 50 - 100 mL/min.

Service arms reasonably developed for the milking cluster to function properly even on nipples that deviate from normal nipples in form offer technical solutions in terms of bearing the weight. There are on-going developments that enable the reduction of milking duration for interim washing and interim disinfection on the service arms in carousel-type milking facilities.

Developments in “farm-type” milk cooling tanks are towards the attainment of the most appropriate milk cooling method and energy saving while fulfilling this function. The obligation to use an environment-friendly cooling fluid material is generally complied with.

4.8 Washing/Cleaning technology for milking facilities and cooling tanks

Although new developments emerge on a continuous basis for saving energy, water and chemicals used in the washing technologies for milking facilities and cooling tanks, boiling water circulation washing systems are a widely recognized and approved technique. Selection of one of these techniques depends on the hardness of water used in the enterprise as well as on the power voltage value. As a general approach, recommendations of companies should be followed regarding this matter. Particularly, low energy and water consuming systems should be preferred, provided that they offer reliable washing and disinfection. As for electronic control systems, modern automatic washing mechanisms have certain superiority when using hazard analysis critical control points (HAACP) technique for biosecurity purposes.

5. Computer-Aided Herd Management

Electronic management system equipment are widely used in large enterprises. It should be checked which recording system and technique are suitable and necessary for the milking

parlours of enterprises. System developers should aim for the most appropriate learning, installation and simple use. A good management program should fulfil the following criteria:

- . Simple use,
- . Easy reception of notices,
- . Highly successful automatic data recording,
- . Simple control functions for milking, feeding and washing technique,
- . Control of animal productivity and behaviours,
- . Properly executed selection,
- . Good harmony of feeding, milking parlour and separation doors with each other.

A good management requires notices based on necessary data records obtained from sensors. Udder health notices can be provided through milk amount measurement data and counting of cells, which has been recently introduced.

Demand for the automation systems called “smart herd management systems” is growing in herd management in increasingly growing enterprises. Many herd management programs and systems are offered to the use of breeders. In order to reduce errors, it is aimed to conclude results through the analysis of numerous data. This is achieved by automatic data reception in many systems. Smart management systems encompass standard information records such as herdbook and yield as well as the detection of oestrus, udder diseases and anabolic problems. Formation or change of clinical symptoms can be determined through appropriate routine processes. It should not be forgotten that early measures and processes mean ready money earned.

In addition to the use of analyses such as CMT (California Mastitis Test) in securing udder health, new hand devices are also offered, which enables accurate counting of living cells qualitatively in a very short time. Sensors that recognize the changing structure of milk (fat, protein, lactose, chemical residues such as antibiotics, etc.) in milk transmission systems are at market testing stage. In addition to the use of the method of monitoring settled activity for fertility control, new devices are also offered, which detect progesterone hormone in milk. Automatic systems for the detection of foot and claw disorders are also introduced in addition to activity measurements. A new alternative is offered regarding this matter through a special passing scale installed at the exit of the milking parlour. By virtue of a weighing platform established longitudinally, the distribution of the force of gravity transmitted from the feet of the animal is determined.

Expectations for the inclusion, by this application, of new information and data such as animal identification, position and duration, body size, body condition and rumination activity of animals are growing.

6. Conclusion

Mechanization systems developed so far have various machines and sub-systems. Like enterprises with different sizes have different demands, solutions offered by companies

for these enterprises vary as well. A meticulous planning is essential for determining sizes of and technical equipment for mechanization systems while establishing new in-housing applications or modifying the existing ones. Before making decisions, different systems and mechanization tools in the market should be compared with each other. For system and equipment offers to be received from companies, public advisors can be consulted with, and impartial solution offers may be made use of. However, final decision regarding the equipment, size and system of mechanization should be made specifically for each enterprise.

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16.

CHAPTER

Dairy Cow Welfare: Some Aspects

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Abstract

In society, an increasing concern has emerged about the way dairy cows are used and treated and the consequences for their welfare. As a result of this awareness a lot of research has been done on welfare of dairy cows and legislation has been developed. In this paper, we will deal with several aspects of dairy cow welfare. First, the development in dairy farming will be discussed and the consequences for the welfare of the animals and the development of legislation. Second, a short summarizing of the EFSA report on 'effects of farming systems on dairy cow welfare and disease' will be given. Third, we will elaborate on the concept of animal welfare and will further focus on two specific welfare issues concerning dairy cattle, foot disorders and sick animals unfit for transport.

1. Introduction

In many countries, agriculture has developed into an industrialized production system. With this development, societal concern has emerged about the treatment of animals in those new agricultural systems. The focus of concern is no longer only on animal cruelty but focuses on the use and treatment of animals in general that might have a negative impact on the welfare of the animals (Rollin, 2004). In 1965, the Brambell Commission stated that any agricultural system should meet the needs and natures of the animals involved. The Brambell Commission formulated the 'five freedoms' to be adopted in agricultural systems in order to safeguard the welfare of the animals used. Those freedoms are still widely used as a guidance for agricultural systems and form the bases of for example the Animal Act in the Netherlands that will be implemented. The concern about animal welfare has resulted in the implementation of a wide variety of legislation in the EU on e.g. transport, slaughter and rejection of the use of bovine somatotropin.

Why is there an increasing concern in society about animal welfare? For centuries, more than half of the Western population was engaged in agriculture. However, nowadays more people keep pets for company or backyard animals for hobby than people that are involved in agriculture. In Western societies most people that keep pets view them as 'members of the

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family'. With this development, views on animals have changed in society. Philosophers and scientists have shown fundamentals to raise the moral status of animals. Research shows that animals can have both positive and negative experiences resulting in a positive and negative impact on their welfare (Spruijt et al., 2001). Another reason for the increased concern is the changes in the nature of animal use. In traditional agriculture, the system and treatment are adopted to the needs of the animals. Farmers were only able to keep a limited number of animals, where individual animals represented a considerable value to the farmer. In that, system productivity was directly linked to the welfare of the animals. During the last century, the demand for cheap food of a constant quality increased considerably. Agriculture and science responded by introducing new technologies that made the development of industrial agriculture possible. In industrial agriculture, the connection between productivity and welfare does not automatically hold anymore.

2. Developments

2.1 Dairy farming

With the introduction of e.g. mechanisation, breeding techniques and the use of hormones, vaccines and antibiotics, the production of animals has increased and become more efficient as more animals can be kept on a farm by one person. As a consequence less attention will be paid to individual animals and the environment in which animals are kept changed not necessarily in a way to meet the needs and nature of the animals. An example of these developments in housing systems is the introduction of cubicle housing systems, where the flooring consists of concrete. As a result of these developments new types of animal health and welfare issues came to the fore. (i) Production diseases arise like the fatty liver syndrome and leg and claw disorders. (ii) The individual animal will not automatically receive the attention and treatment needed due to the small profit margin per animal, the limited number of workmen on a farm and restrictions set to the treatment of animals for food safety reasons. (iii) Constant indoor keeping and overcrowding might induce psychological stress to the animals involved.

Two developments in particular had a major impact on the development of dairy farming in Europe. First, from the late seventies onwards traditional farm systems, like the tied stall system the feeding of hay in winter time and access of cows to pasture, have been replaced by cubicle housing systems, the feeding of silage in wintertime and zero-grazing. Second, in 1984 a milk quota system has been introduced in Europe. As a result e.g. in the Netherlands (fig 1) the number of farms decreased from 65.000 to 22.000, the number of cows per farm increased from 35 to 60, the total number of cows decreased from 2.5 million to 1.4 million cows and the production per cow increased from 5.210 kg milk to 7.950 kg milk per year (LEI-rapport, 2009).

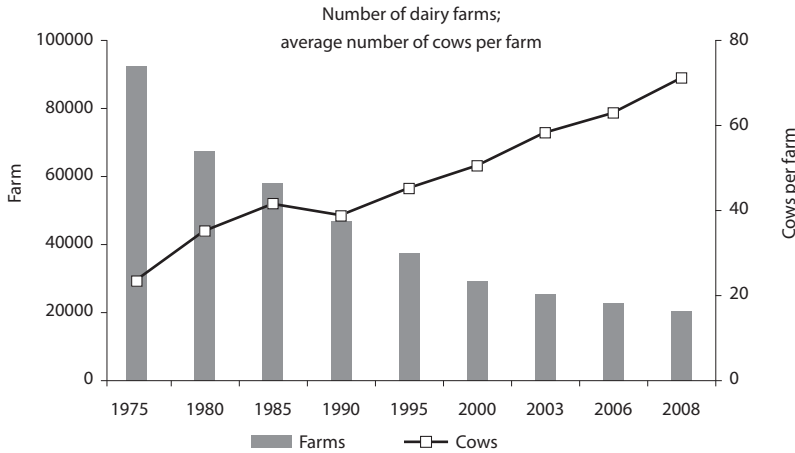


Figure 1 Development in the number of dairy farms and the average number of cows per farm from 1975 through 2008 in the Netherlands (LEI-rapport, 2009)

Free trade agreements will stimulate the production of dairy products to continue to increase in Europe, New Zealand and the US. However, it is questionable whether or not the production of biological dairy products will be stimulated by these agreements as well.

2.2 Society

Although the vast majority of people in Europe are in favour of the use of animals and ask for cheap and plentiful available food, they also want the animals to live lives that respect their natures and needs, and thus prevent them from health and welfare problems. The question could be raised “why do people find it important to respect the nature and the needs of a dairy cow?”. Research shows that a majority of people consider humans to be superior to animals. However nearly all people in society hold the conviction that animals have value, that people should do good to all animals and that all animals have a right to life. These convictions are based on a number of arguments, such as animals are living beings, animals have the ability to feel pain and emotions (sentience) and people recognise the importance of animals for the ecosystem (Cohen et al, 2012).

2.3 Legislation

In 1998, Council Directive 98/58/EC concerning the protection of animals kept for farming purposes formulated recommendations for the protection of animals bred or kept for farming purposes, including dairy cattle, although no specific rules are laid down at Community level for dairy cows. They reflect the so-called ‘Five Freedoms’. If countries sign up, they have to incorporate the provision in their national legislation. There are no mechanisms to verify this.

The recommendations state that:

... ‘Aware that the basic requirements for the health and welfare of livestock consist of good stockman ship, husbandry systems appropriate to the physiological and behavioural needs of the

animals, and suitable environmental factors, so that the conditions under which cattle are kept fulfil the need for appropriate nutrition and methods of feeding, freedom of movement, physical comfort, drinking, defecating and urinating, adequate social contact and the need for protection against adverse climatic conditions, injury, infestation and disease or behavioural disorder, as well as other essential needs as may be identified by established experience or scientific knowledge;'

'Concerned with the possibility that the results of certain developments in biotechnology may add to welfare problems of cattle, and aware of the need to ensure that such developments do not diminish their health and welfare;'

In one of the articles of the recommendations it has been stated for example that the number of cubicles in a cubicle housing system should be at least the number of cows housed in that barn.

Some requirements affecting dairy cattle can be found in other (welfare) legislations such as in:

- Council Regulation (EC) No 1/2005 on the protection of animals during transport, e.g. prohibit the transport of sick and injured animals;
- Council Regulation (EC) No 1099/2009 on the protection of animals at the time of killing, e.g. lactating cattle should be given priority during slaughter;
- Council Regulation (EC) No 834/2007 and 889/2008 on organic production and labelling of organic products, e.g. lactating females should be milked at intervals no longer than 12 hours;
- Council Regulation (EC) No 853/854/2004 on the hygiene of food of animal origin for food business operators.

Most health rules in the regulations have been formulated to reduce trade barriers for the products concerned, contributing to the creation of the internal market while ensuring a high level of protection of public health.

At present new prevention and control, strategies for contagious animal diseases are being developed which aim to better reflect the views in society about justifiable culling of animals during an epidemic of a notifiable disease like Foot and Mouth Disease, Swine Fever or Avian Influenza. Also a lot of research is going on to improve the methods of killing of animals during an outbreak in order to prevent unnecessary suffering of animals in the event.

2.4 EFSA report

In response to the request from the European Commission, EFSA has recently issued a scientific opinion and report on the welfare of dairy cows, titled: "Effects of farming systems on dairy cow welfare and disease" (EFSA Journal 2009, 1143, 8-284). This opinion considers whether current farming and husbandry systems comply with the requirements of the well-being of dairy cows from a pathological, zootechnical, physiological and behavioural point of view. Due to the great diversity of topics and the huge amount of scientific data,

four different subjects have been assessed: i) metabolic and reproductive disorders, ii) udder disorders, iii) leg and locomotion problems and iiiii) behaviour, fear and pain. The range of factors which have important consequences for dairy cow welfare are discussed. They include cow genetics, housing (e.g. space and pen design, flooring and bedding material), feeding (e.g. concentrates and roughage), management (e.g. grouping, weaning) and human-animal relations. The measures used to assess welfare include behavioural and physiological measures, pathophysiological measures and clinical signs, as well as production measures.

In the report, it has been stated that lameness is generally recognised to be the most severe welfare problem facing the dairy cow and the European dairy industry. Over the years, a considerable investment of time and money in research, technology and information transfer has been put in the prevention and control of lameness. However, these efforts have not led to a reduction in the prevalence of lameness in dairy cows in the last 20 years. Bell et al. (2009) suggest that this has been mainly due to failure to implement the agreed procedures. Therefore, it seems that the solution to the major welfare problem of lameness in dairy cattle lies more in socio-economics than in science. We will elaborate in the next paragraph on the impact of the various foot disorders on the welfare of dairy cows and economic consequences for the farmer.

In the report, one section deals with the care and procedures for stunning and killing of individual sick or injured animals on the farm. In the report, it has been stated that on farm killing of these animals is often the only practical way to relief uncontrollable suffering and preventing additional stress and suffering during transport. We will elaborate more deeply on this welfare issue as well.

3. Two welfare issues

In this paper we like to specifically focus on two welfare issues concerning dairy cattle as those issues are generally considered to be severe welfare problems of dairy cattle. Before we are able to deal with these issues, it is of importance to elaborate on the concept of animal welfare.

3.1 Perceptions of animal welfare

Many concepts of animal welfare have been defined, we adopted the one by Fraser et al. (1997). In this view, three different aspects of animal welfare are combined: biological functioning (e.g., health and growth); feelings of the animal (e.g., affective state and minimize suffering); natural living (through the development and use of natural adaptations). Especially farmers tend to interpret animal welfare on the basis of biological functioning and are confident that providing care and assuring health leads to good animal welfare (De Greef et al., 2006). Over the years, particularly in Western societies, increasingly more value has been given to the feelings of the animal, for example in relation to the ability to cope with the environment or the effect on the affective state of the animal, i.e. the positive (pleasure, feeling well) and negative (stress and suffering) experiences of the animal. The

aspect of feeling is often addressed by animal scientists, e.g. by research on behaviour and physiology. The third aspect of animal welfare, natural living, has gained importance. Natural living relates to how well the animal is able to perform species-specific behaviours and fulfil species-specific needs. The three aforementioned aspects of animal welfare, which do relate and overlap, are valued differently by different groups in society (Fraser, 2008). We assume that these aspects together cover what determines animal welfare.

3.2 Foot disorders in dairy cattle

Foot disorders, which are the main cause of dairy cow lameness, are considered to have a considerable impact on the welfare of dairy cattle (e.g., Bruijnis et al., 2012 in press), and cause economic losses for the dairy farmer (Bruijnis et al., 2010). These consequences are mainly caused by the pain of the foot disorders, which likely affects the locomotion of the cow (Flower and Weary, 2009). Pain also has a direct negative effect on the affective state of the cow and causes indirect negative effects by obstructing the performance of cow-specific behaviour and to fulfil their needs (EFSA Journal 2009, 1143, 8-284). Dairy cows may be reluctant to show pain because of their stoic nature as a prey animal (O'Callaghan et al., 2003). A dairy cow has a wide range of cow specific needs of which some are specifically influenced by the presence of foot disorders, like the ability to rest, to exercise and move freely, to feed and drink. This results in impaired functioning like a lower milk production (Onyiro et al., 2008) or a reduced fertility (Bicalho et al., 2007).

Eighty percent of the dairy cows has one or more foot disorders (Somers et al., 2003) and about a third of these cows is visibly lame (Frankena et al., 2009). Preventive strategies and therapeutic treatments are available, but dairy farmers may not put these measures into action (Bell et al., 2009) as they tend to underestimate the problem (Leach et al., 2010).

3.3 Economic consequences

In a dairy farming system with cubicle housing, concrete flooring, pasturing during summer and two foot trimming interventions per year, foot disorders cost €53 per average cow in the herd (Bruijnis et al., 2010). Milk production losses, premature culling and prolonged calving interval are the most important cost factors. Subclinical cases of foot disorders make up 32% of the total costs due to foot disorders. The different foot disorders vary in their impact on the costs. Digital dermatitis (DD), a foot disorder with a relatively high clinical incidence with a long duration, causes one third of all costs. Sole haemorrhage (SoH) and interdigital dermatitis/heel erosion (IDHE), which have a high subclinical prevalence, have a substantial impact on costs due to foot disorders as well (20% and 17% respectively). Interdigital phlegmon (IP), the foot disorder that is assessed to be the most painful foot disorder during its presence, but with low incidence and short duration only accounts for 10% of total costs.

3.4 Welfare consequences

The impact on dairy cow welfare depends on the severity, duration and incidence of the foot disorders and these characteristics are specific for each foot disorder. Some foot

disorders, like IDHE, occur mainly subclinical. Often such foot disorders are not diagnosed and treated and, consequently, develop in a long lasting and clinical foot disorder. In contrast, IP is very acute and painful. Typically, this foot disorder is treated accurately with antibiotics as it is easy to diagnose and the farmer is aware of the negative consequences (arthritis) when IP is not treated. Differences in welfare impact can be revealed by using different ways of welfare assessment, like welfare assessment on individual cow level or on herd level.

Subclinical foot disorders have a relatively high impact on welfare. This is caused by the fact that subclinical foot disorders can be present for a long time (e.g. IDHE) or have a high incidence (e.g. SoH). On average, the welfare impact of subclinical foot disorders is comparable to the welfare impact of clinical foot disorders. Likely, farmers are unaware of these subclinical foot disorders, which (partly) explains why dairy farmers underestimate the occurrence of foot disorders, as found by Leach et al. (2010), and the associated impact on dairy cow welfare. The impact of subclinical foot disorders might be underestimated even more, because often these foot disorders occur bilaterally. In such cases, a cow is less able to alleviate the pain because both sides are painful. Detection is more difficult because the cows then ‘paddle’ with their hind legs, which is likely to worsen the underestimation by farmers. The welfare impact for different foot disorders was calculated by including the pain caused by the foot disorder, the average duration of each case and the incidence (Bruijnjs et al., 2012 in press). On average, the negative impact of foot disorders on welfare is all cows having severe pain for 3 months. Again, DD has the highest impact on dairy cow welfare, followed by SoH and IDHE. The welfare impact of IP is negligible particularly on herd level as the incidence and duration are relatively short.

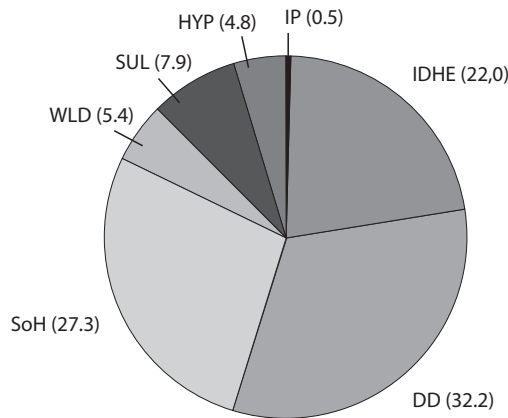


Figure 2 Relative welfare impact (%) for the different foot disorders (including clinical and subclinical state) at herd level.

IP = Interdigital Phlegmon, **IDHE** = Interdigital Dermatitis and Heel Erosion, **DD** = Digital Dermatitis, **SoH** = Sole Hemorrhage, **WLD** = White Line Disease, **SUL** = Sole Ulcer, **HYP** = Interdigital Hyperplasia.

At cow level, i.e. when excluding the effects of foot disorder incidences, clinical foot disorders have a relatively higher impact. The assessment on individual level stresses the

importance of suffering due to intense pain. The development in husbandry of increasing farm scale size, where attention for the individual cow becomes less likely, stimulates the use of welfare assessment protocols on herd level. Such approaches may underestimate the welfare reduction for individual cows suffering from a very painful foot disorder.

3.5 Dairy cows unfit for transport and slaughter

Before 2007 on a regular base media attention has been paid to the transport of dairy cows and other animals like horses that were considered unfit for transportation and that suffered uncontrollable due to transport to markets or slaughter places. In 2007, the Council Regulation (EC) No 1/2005 on the protection of animals during transport has been implemented. Regulations on transport and on slaughtering prohibit the transport of sick and injured animals such as animals with a broken leg, severe trauma, fever, illness or an inability to stand or walk. One of the aims of these regulations was to improve the welfare of animals during transport when culled from the farm. A consequence of these implementations is that a farmer who likes to cull a sick or injured cow is now obliged to keep the animal at the farm because the animal is considered unfit for transport. These animals are then treated at the farm and recover or are killed or die. Deciding for and performing on-farm killing is often done without prior consultation of a veterinarian. Some countries like the Netherlands impose the presence of a veterinarian for on-farm killing. Research among farmers and veterinarians in the Netherlands gave insight in the way dairy cows are treated on the farm when unfit for transportation (Remijn and Stassen, 2010). The results indicate that, after the implementation of the transport regulation (EC 1/2005), on a yearly base twice as much dairy cows are euthanized on the farm than before the implementation. Three times as much animals are being killed on a daily base on Tuesday, Wednesday and Thursday than on Saturday and Sunday. On Sunday and Monday twice as much animals die by themselves than on the other days of the week. These results indicate that many farmers tend to wait to call the veterinarian in order to euthanize the sick cow because of economic reasons, as a consult is more expensive in the weekend. More than 20% of the euthanized cows were more than 2 weeks ill up to several months. The survey indicated that mortality was mainly (45%) due to foot and leg disorders. In a Danish survey foot and leg disorders were also registered as the most important cause of mortality. The Dutch farmers indicated that they recognised the negative impact on animal welfare when the killing of the animals was delayed or not executed. However, often economics and the farmers' aversion to kill the animal on the farm have been the main reasons to delay or refuse to kill severely sick or injured animals. Refusing or delaying killing severely sick, debilitating or injured animals may lead to unnecessary suffering. The EFSA report states that delaying farm killing of animals in critical and irreversible pain and distress may happen because of negligence or for economic or other reasons and should be avoided at all costs. However, euthanasia should not be considered as the "easy way out" for poor managers, as a high mortality rate due to on-farm killing may be an indication of poor management, poor stall and cubicle design and no access to pasture during summer.

4. Conclusions

- Awareness about welfare of dairy cattle in society, among scientists and among farmers is increasing.
- Legislation in the EU has predominantly been formulated to reduce trade barriers and to protect public health, although some paragraphs have paid exclusively attention to (cow) welfare.
- Different farming and husbandry systems might have various consequences for dairy cow welfare.
- Foot disorders are generally recognized to be the most severe welfare problem for the dairy cow.
- Refusing or delaying killing severely sick, debilitating or injured dairy cows may lead to unnecessary suffering. More attention should be paid to on farm treatment and killing of sick and injured dairy cows.

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Notes

