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## GENERAL INFORMATION ON DAIRY CATTLE ENTERPRISE AND ANIMAL WELFARE IN EAST MEDITERRANEAN REGION

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### Abstract

The animal husbandry sector plays a significant role in agricultural development of nations not only in terms of its products but also because it creates added value and employment opportunities as much as other sub-sectors of agriculture. The animal husbandry sector maintains its production activities while it also steers and promotes the production of inputs like forage plant growing required for its own production. The study comprises general information and findings on dairy cattle rearing in agricultural enterprises in East Mediterranean Region cities (Adana, Osmaniye, Mersin, Hatay and Kahramanmaraş) set as the research area of the study, as well as animal welfare. The main resource of information for the study involves the primary data collected from 148 dairy cattle enterprises selected via random sampling in the region. The data was obtained through surveys. The general information regarding the dairy cattle in the enterprises involves the reasons why these enterprises deal with dairy cattle rearing and whether and how they produce silage. As for animal welfare, the vaccinations conducted by enterprises, the regular health checks as well as how often these enterprises resort to artificial insemination were studied. Food security and protection of animal welfare have been prominent issues recently. Veterinary officers pay visits to such enterprises as long as they are invited by the owner of the enterprise. It was found that the ratio of regular health checks increases as the enterprises expand.

All in all, it must be a requisite for the enterprises to attend training programs for purposes of extending the impact and popularity of preventive medicine and improving environmental conditions.

*Key words:* dairy cattle enterprise, silage, animal welfare, artificial insemination

### Introduction

Cattle breeding takes the leading role in the world and in Turkey as far as livestock breeding is considered. The great majority of milk production comes from cattle relative to other livestock animals. Among EU countries, France, Germany and England have the biggest numbers of cattle. Turkey ranks after France when compared to the EU countries (FAO, 2014). The average milk production figures per animal in these EU countries in 2012 are as follows: France – 6 583 kg, Germany

– 7 280 kg, England – 7 683 kg. Turkey's milk production per animal is 2 991 kg (FAO, 2014). Livestock rearing in Turkey has experienced major declines since 1970s. Insufficiency of quality animals and feed sources, constant epidemic illnesses, low quality of veterinary services, low level of education of the breeders, lack of regular organizations as well as transient and inadequate policies and regulations implemented in animal husbandry sector could be the reasons for the major decline in the sector.

Turkey is quite suited for animal husbandry with regard to natural resources and ecological circumstances. However, the inappropriate policies that have been implemented hampered the development of animal husbandry and the sector went through a major decline. After all, the number of animals declined while the prices went up. Consequently, people intended to consume less animal products.

Turkey's total milk production for the year 2013 is 18 223 712 tons. Cow's milk constitutes 16 655 009 tons (91.39%) of the total production. Sheep's milk production share is quite low although it owns a significant share among the total number of animals milked (TÜİK (Turkish Statistical Institute) 2014).

The improvements in animal husbandry sector have occupied the agenda of the Turkish economy in recent years. Agricultural policies as well as animal husbandry policies have been discussed seriously in many platforms. In this respect, the limited funds allocated for animal husbandry, a major driving force of agriculture, should be implemented in the most efficient areas and with the most effective policies for the future of the sector. Animal husbandry, especially dairy cattle rearing is a major sector in Turkey with regard to its social as well as economic implications. Besides, dairy cattle rearing is closely linked with meat cattle rearing and the improvements in dairy cattle rearing shall impact meat cattle rearing as well as meat production positively. Despite the decline in the number of animals, improving pace of subsidies towards animal husbandry as well as the increase in loan facilities might be regarded as quite positive for the sector. However, the structural, economic and technical challenges for animal husbandry in Turkey still persist. The studies and researches in the sector are to be shifted to various other regions due to the recent woes in animal husbandry and differing stockbreeding activities through regions.

Some of the studies that looked at dairy cattle raising from economic perspective are as follows: Yurdakul (1978), Binici (1990), Gül (1998), Şahin et al. (2001), Yılmaz (2010) in Adana; Fidan (1992), in Çorum; Bülbül and Fidan (1994), Gündüz and Dağdeviren (2011) in Samsun; Aksoyak (1995), Günlü (1997), in Konya; Erkuş et al. (1996), in Tekirdağ; Fidan (1996), in Kütahya; Tapkı (1996), Yılmaz et al. (2003), in Hatay; Sivashgil (1997), Öztürk and Karkacier (2008), Uzunöz and others (2008), in Tokat; Gül et al. (1998), in Mersin; Armağan (1999), in Aydın; Günlü et al. (2001), in Afyon; İçöz (2004), in Bursa; Koyubenbe (2005), Koyunbenbe and Candemir (2006) in İzmir; Topçu (2008), in Erzurum; Demir and Aral (2009), Demir et al. (2014), in Kars; Aktürk et al. (2010), in Çanakkale; Dano and Huba (1997), in Slovakia; Johansson (2005), in Sweden. Boz (2013) in his study aimed to identify the challenges of enterprises engaged in dairy cattle

rearing in East Mediterranean Region and to offer solutions to these challenges. The results of his study revealed that the major challenges that these enterprises faced were high feed prices and inadequate subsidies for animal husbandry.

Based on the issues raised above, our study has the objective to identify and analyse various practices of enterprises engaged in dairy cattle rearing in East Mediterranean Region.

## **Material and Method**

The main data of the study involves primary data collected from enterprises engaged in dairy cattle rearing in East Mediterranean Region. The data was obtained through surveys and face-to-face interview method.

The research area involves TR62 and TR63 level cities in Mediterranean Region based on Turkey Nomenclature of Units for Territorial Statistics (TÜİK (Turkish Statistical Institute) 2014). These cities are Adana, Mersin, Osmaniye, Hatay and Kahramanmaraş located in East Mediterranean Region.

Mediterranean Region constitutes 8.56% of total cattle inventory of Turkey. The cities in the research area of the study form 60.53% of the total cattle inventory in Mediterranean Region. The animal inventory in these cities is 3 615 048 heads with 747 321 heads of cattle forming 20.67% of this inventory (Table 1).

Mediterranean Region has 9.64% of the total milk production of Turkey. The cities in the research area of the study form 56.19% of the total milk production in the region. The total milk production of these provinces is 1 022 011 tons while 901 942 tons of the productions come from cows, which makes 88.25% (Table 2).

The study was conducted in cities of Adana, Osmaniye, Mersin, Hatay and Kahramanmaraş located in East Mediterranean Region. The enterprises engaged in dairy cattle rearing were involved in the study. The number of milked animals in the counties of these cities was obtained from the records of Directorate of Food, Agriculture and Livestock. Two counties from each city with the highest number of animals milked were determined via "Purposive Sampling Method". These counties are Sariçam and Ceyhan in Adana; Kadirli and Sumbas in Osmaniye; Tarsus and Mut in Mersin; Central Hatay and Kırıkhan in Hatay; Central Kahramanmaraş and Andırın in Kahramanmaraş. Based on the records of the District Directorate of Agriculture, the number of milked animals in the villages of each county was identified while two villages that shall be able to represent research area in each county were determined via "Purposive Sampling Method", also by taking the views of relevant institutions.

The enterprises in these counties were classified into 4 different groups based on the number of animals: 1-2 heads (1st group), 3-8 heads (2nd group), 9-28 heads (3rd group) and 29 and above (4th group) according to the records of TÜRK-VET (Turkey Veterinary Information System). The sample size was calculated using "Neyman Method", one of stratified sampling methods (Çiçek and Erkan, 1996). Based on this method, the sample size was found as 148 enterprises were within the boundaries of 5% error limit and 95% confidence limit. The data was obtained from enterprises engaged in dairy cattle rearing in the region via face-to-face interview method. Several practices of enterprises were analysed and interpreted in the tables.

## Results and Discussion

### General Information on Dairy Cattle Raising

The age and education level of executives of enterprises have significant impact on the management of the enterprises, hence on the achievement of the agricultural activities. The

age of the executives interviewed varies from 24 to 74 and the average age is 45.53. The average duration of the work experience of the dairy cattle business executives is 16.24 years while the experience in plant production is 18.03 years. The executives from the 1st group has the highest work experience (23.50 years) while the lowest was in group 4 (11.58 years).

The close and intimate relationship between the agricultural enterprise and the producer's family, in other words the fact that the main labour force in the agricultural enterprises is comprised by members of that family makes it necessary for the researchers to study the demographic characteristics of the enterprises (Esengün and Akay, 1998). Average family size in the enterprises was found to be 4.84 people. Among enterprise groups, average family size differs between 3.90 and 5.79. With regards to gender variety among enterprises, male population constitutes 54.13% while females constitute 45.87% of the family population in the enterprises. It was found that significant number of executives interviewed hold primary school education (58.78%).

**Table 1**  
**Animal inventory in cities in research area (2013)**

Cities	Cattle		Sheep		Goat		Other*		Total	
	Head	%	Head	%	Head	%	Head	%	Head	%
Adana	247.536	27.06	277.760	30.36	383.593	41.93	5.926	0.65	914.815	100.00
Mersin	127.740	10.77	413.403	34.86	640.302	54.00	4.314	0.36	1185.759	100.00
Hatay	141.736	29.55	198.667	41.42	133.309	27.80	5.883	1.23	479.595	100.00
Kahramanmaraş	143.282	20.44	339.245	48.40	208.850	29.79	9.593	1.37	700.970	100.00
Osmaniye	87.027	26.06	131.028	39.24	114.538	34.30	1.316	0.39	333.909	100.00
Total	747.321	20.67	1360.103	37.62	1480.592	40.96	27.032	0.75	3615.048	100.00

\*involves water buffalo, horses, donkeys, camels and pigs

Source: TÜİK (Turkish Statistical Institute) 2014

**Table 2**  
**Milk production of cities in research area (2013)**

Cities	Cow's milk		Sheep's milk		Goat's milk		Water buffalo's milk		Total	
	Ton	%	Ton	%	Ton	%	Ton	%	Ton	%
Adana	286.352	90.04	13.020	4.09	18.576	5.84	77	0.02	318.025	100.00
Mersin	178.611	78.25	17.147	7.51	32.482	14.23	29	0.01	228.269	100.00
Hatay	149.605	94.28	4.906	3.09	3.888	2.45	288	0.18	158.687	100.00
Kahramanmaraş	172.466	89.31	13.055	6.76	7.561	3.92	32	0.02	193.114	100.00
Osmaniye	114.908	92.73	5.319	4.29	3.541	2.86	148	0.12	123.916	100.00
Total	901.942	88.25	53.447	5.23	66.048	6.46	574	0.06	1022.011	100.00

Source: TÜİK (Turkish Statistical Institute) 2014

The ratio of those who cannot read and write is 3.38%. The earliest year when the enterprises launched their animal husbandry activities is 1952 and 2011 - the latest. 50% of enterprises stated that they maintain ancestral husbandry activities while 40.54% stated that they started business by purchasing and the rest with government subsidies. It was determined that 89.86% of the executives interviewed had never taken part in a training programme on husbandry.

As for the reasons for engaging in dairy cattle rearing, 78.38% of enterprises stated that it is to earn their living. Owning land and enjoying husbandry (5.41%), being a side income (5.41%), being a traditional family business (5.41%) and also working as veterinary officer (3.38%) could be named as other reason (Table 3).

**Table 3**  
The reasons why enterprises studied engage in dairy cattle rearing

	Frequency	%
To earn living	116	78.38
To own land and enjoy stockbreeding	8	5.41
As a side income	8	5.41
Traditional family business	6	4.05
Also working as veterinary officer	5	3.38
Government subsidies	2	1.35
Existence of grazing land in the village	2	1.35
To meet household needs only	1	0.68
Total	148	100.00

72.97% of the enterprises stated that they will consider maintaining husbandry in the future while 27.03% consider quitting it in the future. 41.67% of those who will pursue this business in the future are considering enlarging their capacity while the rest (58.33%) does not seek for any capacity enlargement. Those who are planning to enlarge their capacity aim at generating more income by boosting the sales. However, those who will maintain their husbandry activities but will not invest in capacity building stated that the lack of stable income is the main factor behind it.

The breeders were asked which productive activity they would choose if they were not engaged in dairy cattle raising. The answers are as follows: plant production (54.05%), workers (10.81%), trade (10.81%), driving (4.73%), sheep and goat

breeding (4.05%), veterinary officer (3.38%), village headmen (0.68%) and no other business or activity (11.49%).

About 53 enterprises out of 148 engage in grazing. 43 enterprises out of 53 graze their animals in harvest area; 9 enterprises in grazing land and 1 enterprise both in harvest area and grazing land.

About 51 enterprises out of 148 produce silage. The average land for silage production is 63.33 dca and nearly all enterprises make corn silage. Those which do not make silage were questioned about the reasons. 34.46% of enterprises stated that the inadequacy of irrigation is the most significant reason. Other reasons for not making silage are: lack of sufficient financial support (26.35%), lack of technical tools and equipment (23.65%), not knowing how to make it (13.51%), lack of suitable land (7.43%), outsourcing (4.73%) and low number of cattle (1.35%) (Table 4).

Approximately, 81.76% of the enterprises empty their animal manure in the fields, 4.73% in front of the stable; 2.70% outside the backyard and 0.68% in storage hole while 10.14% sell it. 73.65% of the enterprises bury their dead animals into the ground; 14.87% leave them out in an open area; 8.11% sell their animals before they die. 3.38% of enterprises have given no response.

**Table 4**  
The reasons why enterprises studied do not make silage

Reasons for not making silage	Frequency	%*
Irrigation inadequacy	51	34.46
Lack of sufficient financial support	39	26.35
Lack of technical tool and equipment	35	23.65
Not knowing how to make silage	20	13.51
Lack of suitable land	11	7.43
Outsourcing	7	4.73
Low number of cattle	2	1.35

\*more than one response was received

Adopting Agricultural Developments and Level of Implementation

About 27.70% of the enterprises stated that they hear about a new product used in husbandry on TV, radio and newspaper advertisements. Other ways of learning about new products are through agriculture organizations (18.24%), veterinary officers (18.24%), other breeders (17.57%), people from the

**Table 5**  
**Ways of hearing about a new product used in husbandry sector**

	Frequency	%*
TV/radio/newspaper ads	41	27.70
Agriculture organization	27	18.24
Veterinary officer	27	18.24
Other breeders	26	17.57
Notables of the village like headman, teacher, etc.	10	6.76
With his own means	6	4.05
Product dealers and sellers	3	2.03

\*more than one response was received

village like headman, teacher, etc. (6.76%), their own means (4.05%) and product dealers and sellers (2.03%) (Table 5).

The enterprises were asked if there is any area in husbandry where they feel incompetent. 35.81% of the enterprises have responded "yes". They stated that they feel incompetent in animal diseases and breeding. They (65.54%) also asked for more training on husbandry.

The enterprises were also asked if they immediately implemented recent developments they heard or learned. 43.24% of enterprises responded "always"; 25.00% "usually"; 16.22% "sometimes"; 8.11% "never" and 7.43% have given no response (Table 6).

About 45.27% of the enterprises interviewed stated that the breeders in the village expect most of other breeders to approve any recent agricultural investment, technology or technological products first; 38.51% will approve immedi-

**Table 6**  
**The frequency of applying new methods heard or learned**

	Frequency	%
Always	12	8.11
Usually	64	43.24
Sometimes	37	25.00
Rarely	24	16.22
Never	11	7.43
Total	148	100.00

ately and 16.22% will approve once all others have started making use of them.

### **Animal Welfare in Enterprises**

It was determined that animal vaccines were applied by all enterprises interviewed. 98.65% of enterprises purchase alum precipitated vaccine while 79.05% purchase Brucella vaccine. Alum precipitated and Brucella vaccines for female calves are conducted by Ministry of Food, Agriculture and Livestock. 9.46% of enterprises have Theileria, 7.43% Mastitis, 4.05% Septicemia, 2.70% Fungal, 1.35% Leptospirosis, 1.35% Enterotoxemia and 0.68% Pasteurella vaccines (Table 7)

**Table 7**  
**Vaccines used by enterprises studied**

Vaccines	N	%*
Alum precipitated vaccine	146	98.65
Brucella	117	79.05
Theileria	14	9.46
Mastitis	11	7.43
Septicemia	6	4.05
Fungal	4	2.70
Leptospirosis	2	1.35
Enterotoxemia	2	1.35
Pasteurella	1	0.68

\*more than one response was received

Veterinary officer visits largely take place upon invitation by the enterprises. About 43.92% of enterprises have regular health checks on their animals while 56.08% never resort to health checks. Considering the enterprise groups, regular health checks in group 1 and 2 are quite low, 20.00% and 25.00% respectively while group 3 enterprises have the ratio of 50.67% and group 4 enterprises have the highest ratio of regular health checks on their animals (73.68%) (Table 8).

The most critical challenges that these enterprises had to tackle during the past 5 years are progeny fertility, abortions, epidemics (foot-and-mouth disease, bovine ephemeral fever, etc.), low fertility and anomaly births. In very rare cases following birth diarrhea and brucella were encountered. 36.49% of the enterprises expressed that they never detected any disease on their animals during the past 5 years. Nearly all enterprises (97.30%) expressed that they consult veterinary doctors once they detect a disease in their herds.

Most, about 90.54%, of the enterprises stated that they use artificial insemination while 9.46% never had it. Those that did not use artificial insemination stated that the cost

**Table 8**  
**Regular health check on animals conducted by enterprises studied**

Enterprise groups	Regular health check on animals				Total	
	Yes		No		N	%
	N	%	N	%		
1	2	20.00	8	80.00	10	100.00
2	11	25.00	33	75.00	44	100.00
3	38	50.67	37	49.33	75	100.00
4	14	73.68	5	26.32	19	100.00
Average	65	43.92	83	56.08	148	100.00

of it was quite high. Average insemination per pregnancy is 1.84. Group 1 holds the highest ratio among enterprise groups (2.3). 23.65% of enterprises prefer 1 insemination per pregnancy; 54.73% prefer 2; 12.84% prefer 3; 1.35% prefer 4 and 1.35% prefer 5 while 6.08% gave no response. The insemination number per pregnancy is the required amount of insemination for each pregnancy in a herd and the ideal number is 1. However, it might not be possible to get this number. In natural inseminations for each pregnancy, 1.2-1.3 is found quite normal while in artificial inseminations, for each pregnancy max 2 inseminations are regarded normal (Uygur, 2004).

## Conclusion

It was determined that animal vaccines were used by all enterprises interviewed. The complete control over vaccines is not ensured due to frequent changes in number of the animals. As for animal welfare, the state-controlled vaccinations shall ensure the well-being of animals. Immunity duration of the vaccines is to be extended; new combination for vaccines are to be developed and subsidies are to be granted for vaccinations.

Food security and protection of animal welfare are prominent issues both in domestic markets and in EU harmonization process. Food security takes place at very beginning of the production. Thus, the welfare of animals is to be secured at very beginning of production processes.

Veterinary officer visits to enterprises take largely place upon invitation. Considering the enterprise groups, the ratio of enterprises having regular health check increases in accordance with their expanding. The most economical way of raising healthy animals lies in breeding in places where sanitary conditions are ensured. Besides the preventive medicine measures and the conditions should also be improved and relevant trainings on these issues are to be arranged.

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## References

- Aksoyak, Ş.,** 1995. Konya İlinde Kültür+Melez Süt Sığırcılığı İşletmeleri ile Yerli Irk Süt Sığırcılığı İşletmelerinin Ekonomik Yönden Karşılaştırılması. Selçuk Üniversitesi Fen Bilimleri Enstitüsü, Tarım Ekonomisi Anabilim Dalı, Yüksek Lisans Tezi Konya (Tr).
- Aktürk, D., Z. Bayramoğlu, F. Savran and F. F. Tatlıdıl,** 2010. The Factors Affecting Milk Production Cost: Çanakkale Case-Biga. *Journal of the Faculty of Veterinary Medicine, Kafkas University*, **16** (2): 329-335 (Tr).
- Armağan, G.,** 1999. Süt Sığırcılığı Yapan İşletmelerin Yapısal Özellikleri ve Planlanması Üzerine Bir Araştırma: Nazilli Örneği. Ege Üniversitesi, Fen Bilimleri Enstitüsü, Tarım Ekonomisi Anabilim Dalı, Doktora Tezi, İzmir (Tr).
- Binici, T.,** 1990. Aşağı Seyhan Ovasında Süt Sığırcılığına Yer Verilen İşletmelerde Yem Giderlerinin Minimasyonu. (Yüksek Lisans Tezi) Ç.Ü. Fen Bilimleri Enstitüsü, Tarım Ekonomisi Anabilim Dalı, Adana (Tr).
- Boz, İ.,** 2013. Doğu Akdeniz Bölgesi'nde Süt sığırcılığı Yapan İşletmelerin Yapısı, Sorunları ve Çözüm Önerileri. *Kahramanmaraş Sutcu Imam University Journal Of Natural Sciences*, **16** (1): 24-32(Tr).
- Bülbül, M. and H. Fidan,** 1994. Türk-Alman İşbirliği ile Uygulanan Samsun Sığırcılık Projesi İşletmelerinde İnek Sütü Maliyeti ve Üretim Fonksiyonel Analizi. *Kooperatifçilik Dergisi*, **105** (Tr).
- Dano, J. and J. Huba,** 1997. First Results of The Milk Production Costs Analysis of The Braunvieh Breed in Slovakia. *Zemelska-Ekonomika-UZPI*, Slovakia, **43** (7): 297-307.
- Demir, P. and S. Aral,** 2009. Kars İlinde Faaliyet Gösteren Süt Sığırcılık İşletmelerinin Karşılaştıkları Sorunlar ve Çözüm Önerileri. *Vet Hekim Der Derg.* **80** (3): 17-22 (Tr).

- Demir, P., Y. Aral and S. Sarözkan**, 2014. Kars İli Süt Sığırcılık İşletmelerinin Sosyo-Ekonomik Yapısı ve Üretim Maliyetleri. *YYU Veteriner Fakültesi Dergisi*, **25** (1): 1-6 (Tr).
- Erkuş, A., A. Turan, A. Eliçin, H. Tanrıvermiş, A. Özçelik and E. Gündoğmuş**, 1996. Tekirdağ İli Tarım İşletmelerinde İthal ve Kültür Melezi Süt Sığırları ile Üretim Yapan İşletmelerde Süt Sığırcılığı Faaliyetlerinin Karşılaştırmalı Ekonomik Analizi. Türk Ziraat Yüksek Mühendisleri Birliği ve Vakfı Yayınları, No: 14, Ankara (Tr).
- Esengün, K. and M. Akay**, 1998. Tokat İli Artova Bölgesi Tarım İşletmelerinin Yapısal Analizi ve Faaliyet Sonuçları. G.O.Ü. Ziraat Fakültesi Yayınları No: 24, Araştırma Serisi No: 4, Tokat (Tr).
- FAO**, 2014. Food and Agriculture Organization of the United Nations, Web Page (<http://www.fao.org>).
- Fidan, H.**, 1992. Çorum İlinde Sığır Yetiştiriciliği Yapan Tarım İşletmelerinin Ekonomik Analizi ve Hayvansal Ürünlerin Maliyet Unsurlarının Araştırılması. Ankara Üniversitesi, Fen Bilimleri Enstitüsü, Yüksek Lisans Tezi, Ankara (Tr).
- Fidan, H.**, 1996. Kütahya Merkez İlçede Bünyesinde Pazar Yönelik Süt Sığırcılığına Yer Veren Tarım İşletmelerinin Ekonomik Analizi ve Planlaması. *Ankara Üniversitesi Fen Bilimleri Enstitüsü Tarım Ekonomisi Anabilim Dalı*, Doktora Tezi, Ankara (Tr).
- Gül, A.**, 1998. Adana İlinde Projeli ve Projesiz Süt Sığırcılığı Üretim Faaliyetlerinin Ekonomik Yönden Karşılaştırılması. *Çukurova Üniversitesi Ziraat Fakültesi Dekanlığı*, Yayın No: 131, Adana (Tr).
- Gül, A., K. Şahin and B. Demirtaş**, 1998. Alata Bahçe Kültürleri Araştırma Enstitüsü'nde Sütçülük Üretim Dalının Ekonomik Analizi. *Çukurova Üniversitesi Ziraat Fakültesi Dergisi*, **13** (3): 65-74 (Tr).
- Gündüz, O. and M. Dağdeviren**, 2011. Bafra İlçesinde Süt Maliyetinin Belirlenmesi ve Üretimi Etkileyen Faktörlerin Fonksiyonel Analizi. *Yüzüncü Yıl Üniversitesi, Ziraat Fakültesi, Tarım Bilimleri Dergisi*, **21** (2): 104-111(Tr).
- Günlü, A.**, 1997. Konya İli Süt Sığırcılık İşletmelerinde Karlılık ve Verimlilik Analizleri İle İşletmelerin Üretim ve Pazarlama Sorunları. Ankara Üniversitesi, *Sağlık Bilimleri Enstitüsü, Hayvancılık İşletme Ekonomisi Doktora Tezi*, Ankara (Tr).
- Günlü, A., H. İmik and M. Tekerli**, 2001. Afyon İli Süt Sığırcılık İşletmelerinin Genel Özellikleri ile Karlılık ve Verimlilik Analizleri. *Lalahan Hayvancılık Araştırma Dergisi*, **41** (1): 1-12 (Tr).
- İçöz, Y.**, 2004. Bursa İlinde Süt Sığırcılığı Yapan İşletmelerin Karlılık ve Verimlilik Analizi. Tarımsal Ekonomi Araştırma Enstitüsü Yayınları, Yayın No: 116, Ankara(Tr).
- Johansson, H.**, 2005. Technical, Allocative and Economic Efficiency in Swedish Dairy Farms: The Data Envelopment Analysis versus the Stochastic Frontier Approach. *XI-th International Congress of the European Association of Agricultural Economists (EAAE)*, Copenhagen, Denmark.
- Koyunbenbe, N.**, 2005. İzmir İli Ödemiş İlçesinde Süt Sığırcılığının Geliştirilmesi Olanakları Üzerine Bir Araştırma. *Hayvansal Üretim*, **46** (1): 8-13 (Tr).
- Koyunbenbe, N. and M. Candemir**, 2006. Küçük Menderes Havzasında Ödemiş, Tire, Bayındır ve Torbalı İlçelerindeki Süt Sığırcılığı İşletmelerinin Teknik Etkinliklerinin Karşılaştırılması. *Hayvansal Üretim*, **47** (2): 9-20 (Tr).
- Öztürk, D. and O. Karkacier**, 2008. Süt Sığırcılığı Yapan İşletmelerin Ekonomik Analizi (Tokat İli Yeşilyurt İlçesi Örneği). *Gaziosmanpaşa Üniversitesi, Ziraat Fakültesi Dergisi*, **25** (1): 15-22 (Tr).
- Sivaslıgil, A. C.**, 1997. Tokat İlinde Hayvancılık Sektörünün Yapısı, Sorunları ve Gelişme Olanakları Üzerine Bir Araştırma. Süt Sığırcılığı, Atilla Yayıncılık Kitabevi, Ankara (Tr).
- Soyak, A., M. İ. Soysal and E. K. Gürçan**, 2007. Tekirdağ İlinde Süt Sığırcılığı İşletmelerinin Yapısal Özellikleri ve Bu İşletmelerdeki Siyah Alaca Süt Sığırlarının Çeşitli Morfolojik Özellikleri Üzerine Bir Araştırma. *Tekirdağ Üniversitesi Ziraat Fakültesi Dergisi*, **4** (3): 297-305 (Tr).
- Stokes, J. R., P. R. Tozer and J. Hyde**, 2007. Identifying Efficient Dairy Producers Using Data Envelopment Analysis. *Journal of Dairy Science*, **90**: 2555-2562.
- Şahin, K.**, 2001. Kayseri İlinde Süt Sığırcılığı Yapan İşletmelerin Yapısal Özellikleri ve Pazarlama Sorunları. *Yüzüncü Yıl Üniversitesi, Ziraat Fakültesi, Tarım Bilimleri Dergisi*, **11** (1): 79-86 (Tr).
- Şahin, K., A. Gül, B. Koç and E. Dağistan**, 2001. Adana İlinde Entansif Süt Sığırcılığı Üretim Ekonomisi. *Yüzüncü Yıl Üniversitesi, Ziraat Fakültesi, Tarım Bilimleri Dergisi*, **11** (2): 19-28 (Tr).
- Tapkı, İ.**, 1996. Hatay İli ve Çevresinde Süt Sığırcılığı ve Sığır Besiciliği Yapılan Tarım İşletmelerinin Teknik, Ekonomik ve Yapısal Özellikleri. (Yüksek Lisans Tezi), M.K.Ü. Fen Bilimleri Enstitüsü Zooteknik Anabilim Dalı, Hatay.
- Topçu, Y.**, 2008. Süt Sığırcılığı İşletmelerinde Başarıyı Etkileyen Faktörlerin Analizi: Erzurum İli Örneği. *OMÜ Üniversitesi, Ziraat Fakültesi Dergisi*, **23** (1): 17-24 (Tr).
- TÜİK**, 2014. Turkish Statistical Institute, Web Page (<http://www.tuik.gov.tr>)
- Uygur, A. M.**, 2004. Süt Sığırcılığı Sürü Yönetiminde Döl Verimliliği. *Hayvansal Üretim* **45** (2): 23-27 (Tr).
- Uzunöz, M., G. Altıntaş and Y. Akçay**, 2008. Cost of Milk and Marketing Margins in Dairy Farms of Turkey. *Journal of Applied Sciences*, **8** (7): 1329-1332.
- Yılmaz, İ., E. Dağistan, R. Özel and B. Koç**, 2000. Hatay İli Süt Sığırcılığı İşletmelerinin Ekonomik Analizi. Ç.Ü. Araştırma Fonu Projesi, Adana.
- Yılmaz, İ., E. Dağistan, B. Koç and R. Özel**, 2003. Hatay İlinde Projeli ve Projesiz Süt Sığırcılığı Yapan İşletmelerin Süt Sığırcılığı Üretim Faaliyetlerinin ve Faktör Verimliliklerinin Analizi. *Akdeniz Üniversitesi Ziraat Fakültesi Dergisi*, **16** (2): 169-178 (Tr).
- Yılmaz, H.**, 2010. Süt Sığırcılığında Kooperatifler Aracılığıyla Desteklemenin Ekonomik ve Sosyal Etkileri: Adana İli Örneği. Çukurova Üniversitesi, Fen Bilimleri Enstitüsü, Tarım Ekonomisi Anabilim Dalı, Doktora Tezi, Adana (Tr).
- Yurdakul, O.**, 1978. Adana Merkez İlçesi Tarım İşletmelerinde Süt Sığırcılığının Ekonomik Yapısı ve İlçede Süt Pazarlaması İle Tüketimi. (Doçentlik Tezi), Çukurova Üniversitesi, Ziraat Fakültesi, Adana (Tr).