

**O 147. THE CHARACTERISTICS OF THE DAIRY FARMS WITH FREESTALL HOUSES
SUPPORTED BY IPARD IN KONYA REGION AND THE THEIR EFFECTS ON
ENVIRONMENTAL POLLUTION#**

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ABSTRACT: International Phonetic Alphabet Rural Development (IPARD) was established by the European Union (EU) in order to improve the performance of agricultural farms in the candidate and potential candidate countries, to protect the environment and to comply with the relevant EU standards on animal welfare issues. Konya region ranks first in our country in terms of production quantity and number of animals in dairy cattle breeding. Particular, Konya region the dairy farms with freestall housing are constructed by the support of IPARD. The aim of this study is to investigate the characteristics of the dairy farms with freestall housing supported by IPARD in Konya region and to determine their effects on environmental pollution. It was investigated representative twenty dairy farms with different animal capacities by using purposeful sampling method in this region. Examined dairy farms were evaluated at 5 different groups according to their animal capacities with <50 head, 50-99 head, 100-149 head, 150-199 head and 200 head and over. In this study, the number of dairy cows 35-225, the total animal capacities 71-453, 48-332 BBHB and 62.5-398.8 LU, the production of feed 327-2509 ton, the annual total milk production 235000-1750000 L and daily milk production 18.26-22.86 L per cow and year were determined. In addition, a large number of units such as the milking shed, the milk cooling and storage tank, the pressure washer system for cleaning milking parlours and the monitoring systems as well as manure conveyors, manure mixer research, fertilizer pump and fertilizer warehouses are available in all the farms investigated. As a result, it can be said that IPARD supported projects are environmentally friendly projects which take environmental pollution into consideration and try to solve the waste pollution.

Keywords: Dairy farm, environmental pollution, freestall houses, IPARD

1. INTRODUCTION

Milk has an indispensable importance for human health. Consumption of drinking milk per person is estimated in Turkey 40 kg, 100 kg on the countries of Northern Europe, the European Union average of 60 kg, 71 kg in Canada, the United States 69 kg (National Milk Council, 2019).

Increasing the quantity and quality of milk will be possible by raising the dairy cattle in farms built for the welfare of the dairy cattle.

Animal farms are structures designed to protect animals from adverse climatic conditions and provide a comfortable farm and production area for animals (Uzal, 2008). Stress factors should be eliminated in farm designs to provide a comfortable environment for animals. Sources of these stress factors in animals; climatic, structural, social and other factors (Uğurlu and Uzal, 2004).

The aim of livestock raising is to obtain the highest economic and yield. The selection of the facilities in livestock raising is of various sizes and types according to the production type and purpose. Planned farm type; settlement and orientation, regulation of environmental conditions, sizing, selection of building materials, use of equipment and internal details are important for animal production economics. In addition, the characteristics and needs of animals are important in farm planning. Animal farms should be planned suitable for purpose, economical, convenient, effective, practical useful and according to animal behavior characteristics (Olgun and Çelik, 1997).

Freestall housing system and loose housing system dairy farms are widely used in dairy cattle breeding in the European Union and America (Bravo-Ureta ve ark. 1990; de Boer, 2003; Haskell ve ark. 2006). These farm systems have been applied intensively in milk production in Konya region since the beginning of 2000 and an important part of the milk production in Konya was realized in the farm with this farm system. The reason for this is the planning of freestall housing system and loose housing system

dairy farms by considering issues such as animal welfare, production quantity and quality and environmental pollution (Uzal, 2013).

The purpose of the freestall housing is to create clean soft mini-resting areas where cow can be used to lay and rest without harming themselves and other cow. In freestall designs; sufficient and appropriate space should be provided for easy entry-exit and recumbent-up actions without causing injury to dairy cattle (Nordlund ve Cook, 2003).

IPARD (International Phonetic Alphabet Rural Development), was established by the European Union (EU) to improve the performance of agricultural enterprise in candidate and potential candidate countries, to protect the environment and to comply with relevant EU standards on animal welfare. IPARD supports are implemented by the Agriculture and Rural Development Support Institution (TKDK). The purpose of supporting dairy farms under the IPARD program is to improve the performance of dairy farms, protect the environment and ensure animal welfare.

IPARD program is implemented in 42 provinces across Turkey (Afyon, Ağrı, Aksaray, Amasya, Ankara, Ardahan, Aydın, Balıkesir, Burdur, Bursa, Çanakkale, Çankırı, Çorum, Denizli, Diyarbakır, Elazığ, Erzincan, Erzurum, Giresun, Hatay, Isparta, Kahramanmaraş, Karaman, Kars, Kastamonu, Konya, Kütahya, Malatya, Manisa, Mardin, Mersin, Muş, Nevşehir, Ordu, Samsun, Şanlıurfa, Sivas, Tokat, Trabzon, Uşak, Van, Yozgat). It contributes to the establishment of agricultural enterprises producing 1107 milk, 382 red meat and 731 poultry meat in accordance with European Union standards with grant support up to 70% (Anonymous, 2019). The majority of IPARD support consists of the purchase of agricultural structures and machinery equipment.

Efekan (2013) compared the current status of animal farms in the central districts of Erzurum with the EU standards. With the IPARD program, it will be more effective in terms of time and cost by rebuilding existing animal farms instead of modernizing them.

Turkmen (2018) examined the compulsory farm criteria and their effects in two freestall dairy cattle farms supported by IPARD in Şahinköy, Bursa.

Şerefoğlu (2008) refers in his work in the IPARD program in order to represent the heavily applied in Turkey, select a province from each of the measures to be taken regarding feedlots and agricultural building design significance.

Bilici (2010) states that monitoring and evaluations during and after the implementation of the IPARD program and during the implementation of the project are inadequate and unsuccessful.

In a study by Çukur et al. (2009) the changes in the last 20 years in Turkey's dairy cattle were evaluated taking into account the EU harmonization process.

In recent years, the number of research on (Şerefoğlu, 2008; Çukur vd. 2009; Bilici, 2010; Efekan, 2013; Türkmen, 2018) cow farm supported by IPARD has increased. Research conducted so far is usually in the form of economic analysis and examination of the structural features of farms in compliance with EU standards. However, animal welfare and environmental protection is another issue supported by IPARD and animal farms need to be examined in this respect.

The aim of this study is to investigate the properties of dairy cow farms with freestall houses supported by IPARD in Konya Region and to determine the effects of animal welfare and environment.

2. MATERIAL METHOD

Konya is geographically located between 36 ° 41' and 39 ° 16' north latitudes and 30 ° 14' and 34 ° 26' east longitudes in the south of Central Anatolia. The average height of the sea is 1016 m. The province is adjacent to Ankara in the north, Niğde and Aksaray in the east, İçel, Karaman and Antalya in the south and Isparta, Afyonkarahisar and Eskişehir in the west. In addition, the province consists of 31 districts, including 3 centers and 28 connected districts. The region has a typical continental climate (Anonymous, 2019).

Konya is in the first place in our country in terms of production quantity and number of animals in dairy cattle breeding. Large pasture and crop production areas contribute to the development of animal farm in Konya. Konya, with approximately 14% of dairy cattle has part of Turkey (Table 1). With this ratio, it is also ahead of the leading cities of Erzurum and Izmir.

Tablo 1. Dairy Cattle Stock in Turkey and Konya (head)

	TÜRKİYE	KONYA	%
2014	5.664.131	255.891	11,98%
2015	5.598.773	264.653	12,36%
2016	5.495.044	274.248	12,86%
2017	6.038.545	331.964	13,46%
2018	6.413.789	352.051	13,90%

Milk production amounts of the last 5 years are shown in Table 2.

Table 2. Türkiye and Konya Milk Production Amount (ton)

	TÜRKİYE			KONYA		
	CATTLE	SHEEP	GOAT	CATTLE	SHEEP	GOAT
2014	17.053.653	1.113.937	463.270	898.662	75.902	9.561
2015	16.996.281	1.177.228	481.174	930.703	77.852	10.362
2016	16.849.348	1.160.413	479.401	971.569	76.859	11.069
2017	18.831.720	1.344.779	523.395	1.200.488	79.320	10.395
2018	20.112.619	1.446.271	561.826	1.280.196	86.095	11.196

In Turkey, according to TÜİK statistics animal production cattle in 2018 (20.112.619 tons), sheep (1.446.271 tons), goats (561.826 tons) of the total amount of milk production is 22.120.716 tons. In Konya, the total production amount of cattle (1280196 tons), sheep (86095 tons) and goats (11196 tons) is 1377487 tons.

Changes according to the year of the existence of animals in Turkey and Konya are given in Table 3. There is an increase in cattle assets compared to 2014. Turkey appears to be a decline in sheep and goats in existence in 2017. In Konya, there is a decrease in the presence of sheep in 2015 and 2016, goats in 2017.

Table 3. Turkey and Konya Animal Stocks (head)

	TÜRKİYE			KONYA		
	CATTLE	SHEEP	GOAT	CATTLE	SHEEP	GOAT
2014	14.415.257	29.284.247	9.225.548	727.560	1.895.986	231.451
2015	14.223.109	31.140.244	10.344.936	740.148	1.862.022	255.168
2016	13.994.071	31.507.934	10.416.166	752.533	1.826.773	261.681
2017	14.080.155	30.983.933	10.345.299	868.551	1.894.530	240.367
2018	17.220.903	35.194.972	10.922.427	921.572	2.001.010	251.451

In the Konya Region, especially dairy cattle farms with freestall housing are planned in order to increase the production quality and quantity together with animal welfare and the important part is being built with the support of IPARD. It was conducted in 2017-2018 in order to examine the characteristics of the dairy cattle farms with freestall housing supported by IPARD in the region and to determine their environmental impact It was investigated representative twenty dairy farms with different animal capacities by using purposeful sampling method in this region. In terms of production type and animal

capacity in which the breeding is carried out continuously and commercially, the enterprises that are suitable for the purpose of research and representing the region have been selected as material. The data obtained from the surveyed farms were obtained by conducting a face-to-face survey with the owner. In addition, measurements, sketches, observations and photographs were taken in order to better define the structures within the farm. Examined dairy farms were evaluated at 5 different groups according to their animal capacities with <50 head, 50-99 head, 100-149 head, 150-199 head and 200 head and over. Purposeful sampling method was used in determining the farm.

Yüksek (2003) and Armağan (2004) reported the presence of animals in the grouping of farms according to their size as bovine unit (BBHB). In the calculation of BBHB value, 1 constant coefficients are used for cows, 0.6 for calves and heifers and 1.2 for bulls.

Costanheira et al. (2010) reported in their study that in the LU (Livestock Unit) calculation, they use 0.6 coefficient for animals less than 9 months and 1.0 coefficient for animals older than 9 months, ignoring calves less than 1 month.

3. RESEARCH RESULTS AND DISCUSSION

The farms examined in the study and their characteristics are given in Table 4. In this research, 20 units with different capacities were examined under 5 different groups as <50 heads, 50-99 heads, 100-149 heads, 150-199 heads and 200 heads and above.

The investigated farms are located of 10 in Sarayönü, 3 in Meram, 2 in Kadınhanı, 2 in Karatay, 2 in Karapınar and 1 in İçeri Çumra. Group capacities were determined based on the number of dairy cattle.

Table 4. Distribution Investigated Farms According to Dairy Cow Capacity

GROUP NUMBER	FARM NUMBER	DAIRY FARMS	LOCATION	DAIRY COW (HEAD)	TOTAL ANIMAL (HEAD)
1. GROUP	1	Senanmuz Süt Üretim Çiftliği	Sarayönü	30	62
	2	İnovaya Süt Üretim Çiftliği	Kadınhanı	30	70
	3	Eren Süt Hayvancılık Tarım	Karatay	41	78
	4	Elit Süt Düve ve Süt Üretimi	İçeriçumra	40	73
2. GROUP	5	Kuter Süt Üretim Çiftliği	Sarayönü	50	122
	6	Öcal Süt Üretim Çiftliği	Sarayönü	50	94
	7	Burak Atay Süt Çiftliği	Sarayönü	80	192
	8	Guycuoğlu Süt Çiftliği	Meram	80	198
3. GROUP	9	Ulusoy Süt Üretim Çiftliği	Sarayönü	100	230
	10	Lordlar Süt Üretim Çiftliği	Meram	100	270
	11	Agrobey Süt Üretim Çiftliği	Kadınhanı	120	270
	12	Erdoğan Süt Üretim Çiftliği	Sarayönü	120	275
4. GROUP	13	Durmuş Karabıyık Süt İşletmesi	Meram	150	329
	14	Ocakbey Tarım ve Hayvancılık	Sarayönü	150	328
	15	Erdem Süt Hayvancılık Tarım	Sarayönü	180	399
	16	Bilgi Süt Çiftliği	Karapınar	180	370
5. GROUP	17	Kefe Süt A.Ş.	Sarayönü	200	349
	18	CHS Süt Çiftliği	Karatay	200	363
	19	Projinal Tarım ve Hayvancılık	Sarayönü	250	547
	20	Karadağ Süt Üretimi	Karapınar	250	553

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The average number of dairy cow, total number of animals, BBHB, LU, feed production, annual total milk production and daily milk production values are given in Table 5. The difference between farm characteristics and groups was found to be significant ($P < 0,01$).

Table 5. Properties of Enterprises

	I. Grup (<50 baş)	II. Grup (50–99 baş)	III. Grup (100–149 baş)	IV. Grup (150-199)	V. Grup (200< baş)	F	P
Number of Dairy Cow	35,25 ± 3,04 ^d	65,00 ± 8,66 ^d	110,00 ± 5,77 ^e	165,00 ± 8,66 ^b	225,00 ± 14,4 ^a	72,8	0
Total Number of Animal	70,75 ± 3,35 ^d	151,5 ± 25,8 ^{cd}	261,3 ± 10,5 ^{bc}	356,5 ± 17,2 ^{ab}	453,0 ± 56,1 ^a	27,8	0
BBHB	48,25 ± 2,75 ^d	97,3 ± 15,0 ^d	170,5 ± 8,54 ^e	252,3 ± 12,7 ^b	332,0 ± 29,5 ^a	49,3	0
LU	62,5 ± 2,90 ^d	133,3 ± 22,6 ^{cd}	230,0 ± 9,38 ^{bc}	314,0 ± 15,0 ^b	398,8 ± 49,3 ^a	27,9	0
Feed Production	327 ± 116 ^e	1010 ± 134 ^{bc}	1173 ± 436 ^{bc}	2003 ± 121 ^{ab}	2509 ± 294 ^a	12,9	0
L/dairy cow.year	18,415 ± 0,931 ^b	22,035 ± 0,388 ^a	22,855 ± 0,133 ^a	18,260 ± 0,723 ^b	21,335 ± 0,455 ^a	12,7	0
Total Milk Production(L)	235000 ± 15679 ^e	521250 ± 66156 ^e	918250 ± 51118 ^b	1100000 ± 73598 ^b	1750000 ± 106066 ^a	70,52	0

a, b, c, d, Differences between data with different letters on the same line are statistically significant.

The difference between the groups in terms of total number of animals, BBHB and LU, feed production, annual total milk production and daily milk production (L / milking cow.year) was found to be significant ($P < 0.01$).

Daily milk production is the highest III. group (100-149 head) with 22,855±0,133 L per cow, II. group (50-99 head) with 22,035±0,388 L per cow and V. group (200<head) with 21,335±0,455 L per cow. Daily milk production is the lowest IV. group (150-199 head) with 18,260±0,723 L per cow and I. group (<50 head) with 18,415±0,931 L per cow. This difference in daily milk production is due to the difference in farm management.

The highest milk production was in V. group (200<head) with 1750000±106066 L and the lowest was in I. group (<50 head) with 235000±15679 L and II. group (50-99 head) with 521250±66156 L. Milk production increases in proportion to the number of animals.

The highest feed production is 2509 ± 294 tons with the highest animal capacity is in V. group (200 <head). I. group (<50 heads) with the lowest animal capacity with the lowest feed production is 327 ± 116 tons. Feed production increases in proportion to the number of animals.

Türkmen (2018) stated in his study that dairy cattle farms in terms of economic and sustainability of their own forage crops to be added to the IPARD program, and that the fertilizer produced in these areas can contribute to both the environment and feed production.

Since dairy cattle farms are supported by the IPARD program, the conditions in the investments are compulsory. Therefore, there is no significant difference between the structural features of enterprises ($P > 0,01$). Within the scope of IPARD support, under the laws of TKDK, min. structural features are described as follows.

- For cattle from 6 months to 12 months; stall widths should be at least 0.7-0.8 m and total stall lengths should be at least 1,2-1,3 m. At stall, a total area of at least 4-5 m² including the fertilizer path, should be provided. Outside the barn, at least 4-5 m² of courtyard areas should be provided.
- For cattle from 12 months to 12 months; stall widths should be at least 0.9-1.0 m and total stall lengths should be at least 1,4-1,5 m. At stall, a total area of at least 6-7 m² including the fertilizer path, should be provided. Outside the barn, at least 6-7 m² of courtyard areas should be provided.
- For cattle over 18 months; stall widths must be at least 1.1-1.2 m, stall lengths should be at least 1.8-1.9 m. At stall, a total area of at least 7-8 m² including the fertilizer path, should be provided. Outside the barn, at least 7-8 m² of courtyard areas should be provided.
- At least 1.8 m² of space should be provided for group calves (2-6 months) both for the barn (as a housing area) and outside the barn (as a navigation area) per calf.
- Shelter height of minimum 3 m and maximum 5 m shall be provided.
- A window area etc. of at least 1/20 of the floor area should be planned.
- At least 1/100 of the barn floor area, ventilation chimneys, cavities, etc. It should be planned.
- The birth compartment should be planned so that at least 15.75 m² area will fall per 25 dairy cattle in farm.
- An infirmary should be planned with a minimum area of 15.75 m² per 50 animals.

Fertilizer management is important in terms of environment, animal health and health of farm workers. Lack of fertilizer storage structure in traditional agriculture causes great harm to the environment and the farm. With fertilizer management, laws and standard criteria are introduced to ensure that the productivity of enterprises is not negatively affected, that environmental problems do not occur and that there is no unhealthy life (Süslü ve Uzal Seyfi, 2016).

IPARD attaches importance to fertilizer management which is the biggest environmental problem in the farms. IPARD has introduced criteria for storage and management of fertilizers within the scope of the support. If the farm is carried out with cattle for milk production, there should be a fertilizer store according to weekly fertilizer quantity (m³) and operation capacity. The fertilizer tank must be sealed. With the fertilizer scrapers, fertilizer mixer, fertilizer pump and fertilizer depots, IPARD is one of the most environmentally friendly projects that take into consideration the environmental pollution and tries to solve the waste pollution.

Örs (2018) reported that the regulations in the EU legislation on animal welfare, environmental protection, general hygiene, milk quantity and quality are compulsory in the farms.

As stated in the literature, it was determined that dairy farms with freestall houses in Konya region benefited from IPARD program successfully in terms of animal welfare and fertilizer management.

Considering that an important part (78%) of greenhouse gases originating from agricultural production originates from animal production, it is an important issue that must be studied meticulously on fertilizer management and environmental impacts of fertilizer.

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