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RESEARCH ARTICLE

The Comparison of Structure of Existing Stable with Standards of Stable Requested in IPARD Program in Erzurum Central Districts, Turkey

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ABSTRACT

Erzurum is one of the provinces in Turkey where the Instrument for Pre-Accession Assistance Rural Development (IPARD) program will be implemented in the first stage. In this study, we determined the status of the existing enterprises in Erzurum and measured their capacity to comply with the IPARD program in relation to the "Investments for Restructuring Agricultural Enterprises and Reaching Community Standards" measure. This was conducted in 33 barns in 11 villages in the central districts of Erzurum Province. The current situation of animal shelters in central districts of Erzurum province was compared with European Union (EU) standards required in animal shelters. In addition, rural development and the basis on which documents give directions in Turkey, IPARD, and IPARD measures related to the subject of study are given general information. It has been concluded that the existing animal shelters in Erzurum are generally far from the EU standards required within the scope of the IPARD program, and it is challenging for existing animal shelters to meet EU standards by modernizing them. Therefore, in Erzurum province, it will be appropriate for the livestock enterprises that want to take advantage of the IPARD program's "Investments for the Restructuring of Agricultural Enterprises and Reaching Community Standards" measure, instead of modernizing their existing shelters, which the Program allows, by building new animal shelters. In addition, the Agriculture and Rural Development Support Institution, which is the implementer of the IPARD program, should inform the enterprises wishing to benefit from the program to build new animal shelters.

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Introduction

Farming has an important place and potential in Turkey's agricultural sector. Carrying out animal production activities causes positive effects such as the evaluation of some herbal and by-products, increasing labor productivity and operating profit, reducing the risk factor arising from natural and economic conditions withal it is important in terms of balanced nutrition and public health (Vural & Fidan, 2007).

There are two available ways to increase animal productions. The first is to increase the number of animals. However, this situation will reveal the need for new shelter and area which requires high costs due to the increasing number of animals. The second and recommended way is to ensure that animal shelters have suitable environmental conditions for animals (Kayar, 2011).

Environmental conditions in traditional barns are primitive and unhealthy in terms of animal welfare. Small and medium businesses have handicaps in securing the necessary financing for the modernization of shelter, feeding, parlor equipment, and cooling facilities due to difficulties in obtaining commercial loans (Ekmekyapar, 1991).

Turkish agriculture is faced to a serious competition problem against both EU and world markets, so it has to carry out especially the institutional structuring and programming

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that will use in the most effective way the EU resources to improve the rural and agricultural infrastructure and agricultural business structures (Akyüz, 1998). It is a misunderstanding that the IPARD program will be the solution to all the problems of the agricultural sector and rural living areas in Turkey. However, if the needs analysis is done correctly and realistically, the institution that will operate the implementation mechanism is created on a careful and appropriate basis, and the planning is prepared in accordance with the needs with wide participation, this financial support, which can be considered in significant amounts for Turkey's agriculture and rural areas will be used appropriately and effectively (Can, 2007).

IPARD provides support to small and medium-sized enterprises to improve their production techniques and operations in order to ensure their economic efficiency and long-term sustainability, and continuity of their existence. In terms of opening Turkish agriculture to the EU Common Market, it will also help agricultural businesses meet community standards for quality management, hygiene, food safety, animal welfare, environmental protection, and occupational safety (Anonymous, 2008).

The Instrument for Pre-Accession Assistance (IPA) was established by the EU to support Candidate and potential candidate countries within the framework of Council Regulation No 1085/2006. IPA support includes five components. Since Turkey is in the status of candidate country in Annex 1 of the IPA regulation, it can benefit from all components. IPARD (IPA's Rural Development component) supports the preparations for harmonization and policy development for the implementation and management of the EU's Common Agricultural Policy, Rural Development Policy, and related policies. IPARD support within the scope of this study was implemented in 2007-2013. The IPARD program has been designed considering the country's priorities and needs in the pre-accession period in the context of rural development. The program included a seven-year period between 2007-2013 (Anonymous, 2008).

Materials and Methods

Erzurum Province is located between 39.10°- 40.57° north latitudes and 40.15°- 42.35° east longitudes. Erzurum constitutes the western half of the Erzurum-Kars section, which is located in the northeastern part of the Eastern Anatolia Region. The total land size of the province, which is located in the starting area of the Çoruh, Fırat, and Aras basins, is 25,330.9 km^2. Erzurum, which has 966 villages, has a total of 35 municipalities. There are 20 districts in Erzurum, 3 of which are the Central District (Anonymous, 2011).

This research was carried out in 33 barns in 11 villages of 3 Central Districts (Palandoken, Yakutiye, and Aziziye) in Erzurum Province, Turkey. The villages that are the subject of the research and some of their characteristics are shown in Table 1.

Table 1. Some characteristics of the researched villages

Number	District Name	Village Name	Distance to District Center (km)	Number of Households of the Village	The Population of the Village	Altitude	Lowest and Highest Temperatures (°C)	
							Lowest	Highest
1	Aziziye	Pasayurdu	7	59	330	1850	-30	30
2	Aziziye	Gelinkaya	18	110	355	1855	-31	30
3	Aziziye	Kabaktepe	80	33	178	1910	-32	29
4	Aziziye	Sirli	69	28	113	1910	-32	29
5	Yakutiye	Gungormez	35	22	53	2000	-34	30
6	Yakutiye	Akdag	25	50	297	2000	-34	30
7	Yakutiye	Guzelyayla	35	50	168	2000	-34	30
8	Yakutiye	Karagobek	32	50	179	2000	-34	30
9	Yakutiye	Koşk	30	60	345	2000	-34	30
10	Palandoken	Derebogazi	25	200	967	1953	-28	34.1
11	Palandoken	Guzelyurt	27	65	294	1953	-28	34.1

Erzurum province has hot and dry summers and cold and snowy winters. The average number of days with snowfall is 51.8, and the average number of days covered with snow is 112.3. The average annual precipitation of Erzurum Province is 33.96 kg/m^2, and the highest precipitation is in May with an average of 68.1 kg/m^2, and the least precipitation is in August with 17 kg/m^2 (Anonymous, 2012).

The area of Erzurum is 2,533,090 ha. 64% of its total land is meadow and pasture land, and it constitutes 13% of the existing pastures in Turkey. Total agricultural land is 460,252 ha, 305,636 ha of which are suitable for irrigation; however, the irrigated area is only 15,672 ha (Anonymous, 2011).

Animal production, which constitutes 64% of Erzurum's agricultural economy, is one of the main livelihoods. However, since the province's rural areas are not developed enough, the animals have not reached adequate care, feeding, and welfare conditions. The number of the total cattle stock of the province is 538,000 as of 2010. The number of animals in the researched villages is shown in Table 2 in detail (Anonymous, 2011).

Table 2. Animal assets of the research subject villages (Anonymous, 2011)

Number	District Name	Village Name	Cattle Presence									Number of Businesses
			Culture Breed				Hybrid Breed				Native Breed	
			Cow >24 month	Heifer 12-24 month	Calf 6-12 month	Calf 0-6 month	Cow >24 month	Heifer 12-24 month	Calf 6-12 month	Calf 0-6 month	Cow >24 month	
1	Aziziye	Pasayurdu	56	7	5	30	170	65	42	76	59	54
2	Aziziye	Gelinkaya	24	4	-	46	252	113	6	108	134	105
3	Aziziye	Kabaktepe	59	11	-	69	257	5	8	94	137	65
4	Aziziye	Sirli	61	8	-	30	161	64	8	142	189	61
5	Yakutiye	Gungormez	30	30	15	25	289	55	45	30	-	22
6	Yakutiye	Akdag	72	27	30	45	626	160	29	47	95	80
7	Yakutiye	Guzelyayla	72	39	10	111	508	84	117	25	-	47
8	Yakutiye	Karagobek	63	30	8	70	320	95	5	202	52	68
9	Yakutiye	Koşk	90	120	35	80	620	140	35	90	110	86
10	Palandoken	Derebogazi	56	7	5	30	170	65	42	76	59	54
11	Palandoken	Guzelyurt	24	4	-	46	252	113	6	108	134	105

According to the IPARD Program, within the scope of the Investments for Restructuring of Agricultural Enterprises and Reaching Community Standards (Measure Code: 101), the agricultural enterprises that will benefit from this measure must be located in the rural area of the province where the investment will be implemented. For this reason, settlements that were previously in village status but are now in neighborhood status are not included in the scope of the study because they are outside the IPARD program.

In this context, the lists of animal assets of all enterprises in these villages were obtained from the Provincial Directorate of Agriculture through TÜRKVET (Veterinary Information System). Then, the animal assets of the agricultural enterprises in the villages included in the IPARD program in the central districts of Erzurum were examined.

Agricultural Enterprises Producing Milk and Meat are supported separately within the scope of the Investments for Restructuring of Agricultural Enterprises and Reaching Community Standards (Measure Code: 101).

The specific eligibility criteria of these sub-measures were examined. According to this dairy-producing enterprises must have at least 10 and no more than 100 animals, and those producing meat must have at least 30 and no more than 250 animals. For this reason, in order for the enterprises to benefit from the IPARD program, it was selected enterprises which have at least 30 and at most 100 animals in the villages subject to the research.

In this context, a total of 11 villages were determined 3 from Palandöken district (Derebogazi, Guzelyurt), 5 from Yakutiye district (Gungormez, Akdag, Guzelyayla, Karagobek, Koşk) and 4 from Aziziye district (Pasayurdu, Gelinkaya, Kabaktepe, Sirli). Then, 3 barns that could represent each village were selected and a total of 33 barns were studied.

The research was carried out in January, February, and March of 2011. During the period of the research, 33 barns were visited every month. In January, the locations and altitudes of the barns were determined with a hand-held GPS device. In February, the physical properties of the barns were measured with a laser meter. In January, February, and March, temperature, light, and humidity measurements of the barns were made.

Then, the values measured during the study with the EU standard values required by the IPARD program were separately compared, and similar and different points were determined.

Finally, the facilities and problems that will arise in the implementation of the IPARD support program in the region have been determined based on these differences and similarities.

Results and Discussion

It has been observed that closed type and tied-stall systems are applied in all of the barns. The measurements made in the barns were prepared in the form of general tables in order to see the current situation quickly and effectively. The tables prepared for the measured values are given in Tables 3, 4, and 5.

Table 3. The physical properties of the research barns

Number	Barn Dimensions			Feeder Dimensions				Wall Thickness (cm)	Roof Style (cm)	Free stall Dimensions	
	Width (cm)	Length (cm)	Height (cm)	Width (cm)	Depth (cm)	Height from Ground (cm)	Height of Feeder (cm)			Range (cm)	Number
1	625	935	360	32	26	67	41	60 Stone	Wooden Triangle without Slab	103	17
2	600	1140	330	26	26	74	48	25 Briquette		90	18
3	810	2130	335	37	30	70	40	50 Stone	Triangle with Concrete Slab	100	42
4	612	904	350	43	20	54	34	60 Stone	Wooden Triangle without Slab	100	16
5	623	1027	385	34	20	60	40	60 Stone	Wooden Pentagon without Slab	100	20
6	680	709	300	46	23	61	42	50 Stone	Wooden Porch without Slab	100	13
7	1260	2020	372	165	30	50	20	60 Stone	Under the House	125	64
8	530	800	375	32	22	68	48	60 Stone	Wooden Triangle without Slab	100	14
9	615	1280	373	44	31	77	46	60 Stone		105	24
10	774	1355	360	45	28	76	48	60 Stone		95	28
11	844	1865	400	47	34	47	13	25 Briquette		65	30
12	742	1113	345	47	24	80	56	60 Stone		125	18
13	640	1178	309	41	30	69	39	70 Stone		120	18
14	650	1620	370	41	29	70	41	80 Stone		100	30
15	635	2285	404	40	31	55	24	70 Stone	Triangle with Concrete Slab	110	41
16	640	720	348	34	29	79	50	70 Stone	Wooden Triangle without Slab	115	11
17	715	1480	395	37	30	47	17	60 Stone		120	24
18	840	1640	340	40	27	63	36	70 Stone	Triangle with Concrete Slab	110	27
19	600	1500	340	44	32	65	33	50 Stone	Wooden Triangle without Slab	105	35
20	418	645	327	42	28	68	40	60 Stone		120	9
21	720	950	363	44	44	55	11	60 Stone		95	19
22	630	1430	300	33	25	67	42	70 Stone	Triangle with Concrete Slab	82	32
23	940	2260	310	43	32	62	30	60 Stone	Wooden Triangle without Slab	88	50
24	880	1900	300	44	30	59	29	70 Stone	Triangle with Concrete Slab	90	47
25	740	1050	335	46	27	65	38	70 Stone	Wooden Triangle without Slab	105	20
26	785	836	334	43	35	55	20	70 Stone		76	22
27	-	-	-	-	-	-	-	-	-	-	-
28	617	1200	370	57	23	63	40	60 Stone	Wooden Triangle without Slab	100	21
29	790	2620	480	40	30	50	20	30 Briquette		180	25
30	755	1540	410	31	20	51	31	40 Brick		110	26
31	600	1200	400	34	27	69	42	60 Stone		110	21
32	550	1110	350	36	30	68	38	60 Stone		110	16
33	654	1695	400	37	26	64	38	60 Stone		110	29

Table 4. Door, window, chimney dimensions, waterer, and lighting conditions of barns

Number	Door		Window			Flue			Waterer/ Lighting	
	Width (cm)	Height (cm)	Width (cm)	Height (cm)	Number	Width (cm)	Height (cm)	Number	Number	Number
1	100	180	59	97	2	50	40	2	1 F	2 B
2	100	172	68	144	1	-	-	-	1 F	1 B
3	120	190	80	90	7	40	30	3	1 F	2 B
4	120	180	50	50	1	50	50	1	1 F	1 B
5	114	180	70	100	3	50	70	1	-	1 B
6	100	163	100	50	2	-	-	-	-	1 B
7	322	210	110	90	10	25	25	4	33 W	9 B
8	90	185	50	80	1	50	80	3	-	1 B
9	87	175	100	100	1	60	60	1	-	1 B
10	100	200	100	100	4	120	100	1	1 F	1 B
11	130	220	77	190	6	40	40	3	1 F	3 B
12	120	195	100	100	1	-	-	-	1 F	1 B
13	100	180	70	90	3	80	50	1	1 F	2 B
14	120	190	80	100	3	-	-	-	1 F	2 B
15	110	180	130	120	6	30	30	3	1 F	5 B
16	110	170	60	70	1	20	20	1	1 F	1 B
17	120	170	-	-	-	130	70	2	1 F	2 Fl
18	100	190	70	100	2	60	70	1	1 F	2 Fl
19	110	180	100	50	3	100	40	2	1 F	3 B
20	100	170	80	80	1	-	-	-	1 F	1 B
21	100	170	50	120	1	80	100	1	1 F	2 B
22	130	190	80	90	1	-	-	-	1 F	2 B
23	120	250	80	100	4	70	70	1	1 F	2 B
						50	70	2		
24	155	195	80	90	3	50	50	2	1 F	2 B
25	100	180	50	70	2	50	60	1	1 F	1 B
26	100	200	70	40	2	-40	40	1	1 F	1 B
27	-	-	-	-	-	-	-	-	-	-
28	120	190	50	80	2	70	80	1	1 F	1 B
29	170	200	90	170	7	100	170	3	25 W	3 B
30	110	190	100	100	2	50	50	1	1 F	1 B
31	110	180	100	90	2	100	60	1	1 F	2 B
32	100	180	100	50	2	50	50	1	1 F	1 B
33	110	190	90	110	3	100	100	1	1 F	1 B

F: Faucet, W: Waterer, B: Bulb (100W), Fl: Florasan

Table 5. Temperature, light, and humidity measurements inside the barn

No	Date			Indoor humidity %			Outdoor humidity %			Indoor Temperature (°C)			Outdoor Temperature (°C)			Indoor Light (Lux)			Outdoor Temperature (x100 Lux)		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1	22.01	23.02	25.03	75	78	58	39	52	49	17.9	18.8	16.9	2.3	6	1	187.5	150	250	226	190	250
2	22.01	23.02	25.03	87	90	100	39	50	52	17	20.2	17.7	2	6	1	75	54	68	225	185	260
3	22.01	23:02	25.03	85	85	89	42	50	50	15.7	18	15.2	2.3	5.2	1.5	37	20	23	265	177	230
4	22.01	23.02	25.03	87.5	94	99	39.2	49	50	17.9	17.4	16	2.6	4.7	1	54	10	30	230	120	200
5	22,01	23.02	25.03	78	99	94	37.5	55	49	19.3	21	17.5	2	5	1	25	15	18	225	125	180
6	22.01	23.02	25.03	82	83	82	42	52	51	17.2	17.2	17	1.5	4.8	1.2	19	10	13	160	80	100
7	23.01	24.02	26:03	87.5	97	55	52	58	42	13	16.4	21	0.5	3	6	126	45	138	680	120	750
8	23.01	24.02	26.03	71.5	77.5	58.5	43	50	38	18.1	17	18.5	1	2.8	5.7	5	1	4	650	125	620
9	23.01	24.02	26.03	70.5	84	66	40	53	41	17	18	14	1	3	5.5	55	1	50	670	90	650
10	23.01	24.02	26.03	82.5	96.5	81.5	30	53	42	19.8	19	18.8	1	5	5	105	90	100	700	600	680
11	23.01	24.02	26.03	82.5	95.5	81.5	27	51	42	14.4	16.2	16.5	1.5	3	4.5	230	205	190	710	650	570
12	23.01	24.02	26.03	75.5	89	95	29	47	43	17.6	19.1	16.2	1.5	3.3	5	9	1	5	685	500	580
13	23.01	24.02	26.03	70	98	85	38.5	68	56	17.6	16	17	0	1	2	13	10	15	500	465	750
14	23.01	24.02	26.03	98	95	95	37	65	52	16	18.5	18	-1	1	2	5	7	10	350	450	720
15	23.01	24.02	26.03	72.5	82	89	39	62	50	11.1	14.2	15.7	-1	1	2.5	43	40	51	300	420	700
16	24.01	24.02	26.03	67.5	98	70.5	49	60	56	18.6	15	13	1	1.5	2	7	15	20	325	430	685
17	24.01	24.02	26.03	70.5	83	71.5	45	65	55	11.6	13.3	14	1	1	2	2	1	4	300	420	620
18	24.01	24.02	26.03	72	82	61	48	62	55	12.5	14.5	16	0	1	2	8	12	15	320	450	580
19	24.01	24.02	26.03	75	73	75	46	57	49	18.8	19.2	18.1	1	1	2.5	10	8	15	200	405	690
20	24.01	24.02	26.03	95	72	75	45	58	43	17	18.4	17	1	1	2.5	1	5	8	230	450	700
21	24.01	24.02	26.03	85	85	84	45	51	50	20	20.6	19.3	1	1	3	5	15	25	240	445	745
22	25.01	25.02	27.03	65.5	87	83	48	48	40	16.2	19.1	17.4	1	3	5.5	10	35	50	360	900	1100
23	25.01	25.02	27.03	79.5	84	82.5	48	49	41	12.4	17	16.2	1	3	5.5	15	30	40	350	950	1120
24	25.01	25.02	27.03	78.5	81.5	66.3	49	48	43	15.6	19.5	16.5	1.5	3	6	3	25	35	340	930	1200
25	25.01	25.02	27.03	75.5	87	65	49	47	45	13.6	16.1	17.1	1.5	3.5	5.5	7	17	29	290	920	1100
26	25.01	25.02	27.03	84	92	70	50	49	43	17.7	16.5	20.1	1.5	4	5.5	20	30	45	300	950	1150
27	25.01	25.02	27.03	65.5	--	75	50	--	45	13.6	--	18	2	--	5	11	--	20	240	--	1000
28	25.01	25.02	27.03	74	94	65	50	48	45	17.3	18.2	17.2	2	2	6	2	6	30	100	170	1110
29	25.01	25.02	27.03	97.5	99	83	47	48	47	15.8	19.5	18.5	2	2.5	6.5	30	90	200	110	160	1125
30	25.01	25.02	27.03	76.5	95	68	49	47	46	14.5	18.5	18.1	1.5	2	6.5	1	5	25	90	170	1150
31	25.01	25.02	27.03	68.5	79	52	45	41	42	19.3	18.6	21	0	-1.5	5	0	1	15	10	35	1000
32	25.01	25.02	27.03	67.5	89.5	82	44	44	44	15	16	16.5	0	-1.5	5	0	0	35	8	40	1010
33	25.01	25.02	27.03	85	88	75	46	44	43	16.8	18.5	17.7	-1	-1	4.5	1	6	70	5	50	980

General Condition of the Barns

All but one of the shelters in the cattle farms that are the subject of the research were built as a single storey. Since the settlement in the research area is a collective settlement, the shelters are generally built close to the houses where the households live or adjacent to the dwelling and mostly in the same courtyard. 22% of the barns have ceilings, and the rest are built without ceilings. Roofs were constructed in single, double, and sloping in more than two directions shapes.

Comparison of Barn Features with EU Standards Required in IPARD Program

Flue of natural ventilation

It has been determined that 84% of the barns were less than 0.01 m^2 ventilation shaft opening for a unit m^2 barn floor area, which was not in accordance with EU standards, while 16% of the barns have complied with the EU standards. Furthermore, it has been observed that the natural ventilation chimneys in most of the barns were not opened before the spring months by closing during the winter (Table 6).

Table 6. Comparison of EU standards with barn features

Number	Barn Floor Area m^2	Barn Flue Area m^2	Flue Area per m^2	EU Standards (m^2)
1	58.4	0.4	0.007	
2	68.4	0	0.000	
3	172.5	0.36	0.002	
4	55.3	0.25	0.005	
5	63.9	0.35	0.005	
6	48.2	0	0.000	
7	254.5	0.25	0.001	
8	42.4	1.2	0.028	
9	78.7	0.36	0.005	
10	104.8	1.2	0.011	
11	157.4	0.48	0.003	
12	82.5	0	0.000	
13	75.3	0.4	0.005	
14	105.3	0	0.000	
15	145	0.27	0.002	
16	46	0.04	0.001	
17	105.8	1.82	0.017	**0.01**
18	137.7	0.42	0.003	
19	90	0.8	0.009	
20	26.9	0	0.000	
21	68.4	0.8	0.012	
22	90	0	0.000	
23	212.4	1.19	0.006	
24	167.2	0.5	0.003	
25	77.7	0.3	0.004	
26	65.6	0.16	0.002	
27	-	-	-	
28	74	0.56	0.008	
29	206.9	5.1	0.025	
30	116.2	0.25	0.002	
31	72	0.6	0.008	
32	61	0.25	0.004	
33	110.8	1	0.009	

Window area

It was observed that the windows were positioned on the long side in 31% of the shelters, on the short side in 28%, and on both sides in 25%. In addition, 13% of the shelters have windows located on the roof; however, 3% of shelters do not have windows.

It has been determined that 87.5% of the barns did not meet the EU standards on a window area of 1/20 of the barn floor area for cold regions.Only 12.5% of the barns have complied with the EU standards. In addition, it was observed that there were barns with high light ratio since they have large chimney openings, although the window area was small (Table 7).

Table 7. Comparison of EU standards with barn window areas

Number	Barn Floor Area (m^2)	Barn Window Area (m^2)	Ratio of Floor Area to Window Area	EU Standards (m^2)
1	58.4	1.2	1/49	
2	68.4	2.4	1/29	
3	172.5	5.0	1/35	
4	55.3	0.3	1/184	
5	63.9	2.1	1/30	
6	48.2	1.0	1/48	
7	254.5	13.2	1/19	
8	42.4	0.4	1/106	
9	78.7	1.4	1/56	
10	104.8	4.0	1/26	
11	157.4	8.8	1/18	
12	82.5	1.0	1/83	
13	75.3	1.9	1/40	
14	105.3	2.4	1/44	
15	145	9.4	1/15	
16	46	0.4	1/115	
17	105.8	0.0	0	**1/20**
18	137.7	2.6	1/53	
19	90	1.5	1/60	
20	26.9	0.6	1/45	
21	68.4	0.6	1/114	
22	90	2.0	1/45	
23	212.4	3.4	1/62	
24	167.2	2.3	1/73	
25	77.7	0.7	1/111	
26	65.6	0.6	1/109	
27	-	0.0	0	
28	74	0.8	1/93	
29	206.9	10.7	1/19	
30	116.2	2.0	1/58	
31	72	1.8	1/40	
32	61	1.0	1/61	
33	110.8	3.5	1/32	

Door dimensions

It has been determined that the door sizes of all the researched barns were not in accordance with the standards of the EU.

Barn dimensions

In all the barns, the animals are tied to the feeders with chains from their necks. Free stalls were built in any of the barns, and dividing irons separating the free stalls from each other were not found in the existing free stalls.

When the widths of the free stalls in the barns are examined, it has been determined that 19% of the barns existing free stalls widths were in accordance with the relevant EU standards; however, 81% of the barns were not in accordance with these standards (Table 8).

Table 8. Comparison of EU standards with some dimensions of barn

Number	Animal Compartment (m^3)	EU Standards (m^3)	Free stall Width (cm)	EU Standards (cm)	Barn Height (m)	EU Standards (m)
1	12		103		3.6	
2	13		90		3.3	
3	14		100		3.35	
4	12		100		3.5	
5	12		100		3.85	
6	11		100		3	
7	15		125		3.72	
8	11		100		3.75	
9	12		105		3.73	
10	13		95		3.6	
11	10		65		4	
12	16		125		3.45	
13	13		120		3.09	
14	13		100		3.7	
15	14		110		4.04	
16	15		115		3.48	
17	17	**18 m^3**	120	**120 cm**	3.95	**3m**
18	17		110		3.4	
19	9		105		3.4	
20	10		120		3.27	
21	13		95		3.63	
22	8		82		3	
23	13		88		3.1	
24	11		90		3	
25	13		105		3.35	
26	10		76		3.34	
27	-		-		-	
28	13		100		3.7	
29	40		180		4.8	
30	18		110		4.1	
31	14		110		4	
32	13		110		3.5	
33	15		110		4	

According to EU standards, the minimum animal section in the barns should be 18 m^3. In this study, 6% of the barns have complied with EU standards; however, 94% were below these standards. The heights of the barns have complied with EU standards.

Feeder dimensions

Most of the barns' (62.5%) feeder building materials were used wood, while 37.5% of the barns were concrete. Although it causes many problems in feeding and cleaning processes, 85% of the barns' feeders were built adjacent to the walls (Table 9).

Table 9. Comparison of EU standards with feeder dimensions of barn

Number	Height from Ground (cm)	EU Standards (cm)	Feeder Length (cm)	EU Standards (cm)	Feeder Width (cm)	EU Standards (cm)
1	67		103		32	
2	74		90		26	
3	70		100		37	
4	54		100		43	
5	60		100		34	
6	61		100		46	
7	50		125		165	
8	68		100		32	
9	77		105		44	
10	76		95		45	
11	47		65		47	
12	80		125		47	
13	69		120		41	
14	70		100		41	
15	55		110		40	
16	79		115		34	
17	47	**20-50 cm**	120	**60-120 cm**	37	**55 cm**
18	63		110		40	
19	65		105		44	
20	68		120		42	
21	55		95		44	
22	67		82		33	
23	62		88		43	
24	59		90		44	
25	65		105		46	
26	55		76		43	
27	-		-		-	
28	63		100		57	
29	50		180		40	
30	51		110		31	
31	69		110		34	
32	68		110		36	
33	64		110		37	

The height of the feeder should be between 20-50 cm according to EU standards. It has been found that only 10% of the barns have complied with these standards. The feeders in all barns have complied with the feeder lengths specified in EU standards in terms of feeder length. Only 6% of the barns have the width of the feeder in accordance with the relevant EU standards.

Temperature, light, and humidity values

It has been determined that there was no homogeneous light distribution in large part of the barns that were the subject of the research. Therefore, light measurements were made three times in the barns in January, February, and March. Measurements were made in at least three different parts of the barns, and the average of these measurements was taken. The proportional results obtained from the measurements are shown in Table 10.

Table 10. Comparison of EU standards with measured light values

	January (%)	February (%)	March (%)
Ratio of barn remaining between EU standard range	24	29	45
Ratio of barn remaining under EU standard range	67	65	43
Ratio of barn remaining above EU standard range	9	6	12

It was observed that the light intensity in the barns increased as the summer months approached due to the increase in light intensity.

Measured temperatures inside the barn during the research have been found to be in the range of the highest and lowest critical temperature levels specified in the EU standards in all of the barns.

Humidity measurements in barns varied. In January, it was determined that only 15% of the barns were in the ideal relative humidity range specified in EU standards, while other barns were above the highest value specified in the relevant standards. Furthermore, it was observed that the humidity values measured in February were not in accordance with the relevant EU standards in all of the barns. In March, it was determined that 27% of the barns were in the ideal relative humidity range specified in EU standards.

When the measurements were made, the humidity and temperature values in the external environment were also recorded since it is thought that outside humidity and temperature will affect indoor humidity and temperature.

Conclusion

It is clear that the current situation of animal husbandry in Turkey is far from competing with the EU.

It can be foreseen that there will be a great development in animal husbandry and other branches of agriculture in the country, and its ability to compete will increase by dint of implementation at the desired level in Turkey's IPARD program, which supports the compliance preparations for the implementation and management of the EU's Common Agricultural Policy, Rural Development Policy and related policies, and policy development in this context.

Table 11. Compliance rates of research barns to EU standards

Number	Comparing EU Standards	Compliance Rate of Existing Barns with EU Standards (%)		
1	Natural Ventilation Flue	16		
2	Window Area	12.5		
3	Door Width	0		
4	Door Hight	0		
5	Least Animal Compartment in Barns	6		
6	Barn Hight	100		
7	Free stall Width	19		
8	Feeder Lenth	100		
9	Feeder Width	4		
10	Feeder Hight from Ground	10		
11	Light Intensity Range for Cows	**January**	**February**	**March**
		24	29	45
12	Ideal Humidity Range in Barns	**January**	**February**	**March**
		15	0	27
13	Lowest and highest critical temperature levels in Barns	**January**	**February**	**March**
		100	100	100

As shown in Table 11,almost all structural features of the existing barns need to be changed in order to adapt them to EU standards. It would be wrong to choose modernizing the barns to raise the agricultural structures in this region to EU standards because there is not enough space for the expansion of the barns since the existing barns are built within the settlement. In this case, modernizing these barns will not be cost-effective. On the other hand, If ARDSI directs rebuilding instead of modernizing those willing to invest, it will be effective in cost and time savings.

Conflict of Interest

The authors declare that they have no conflict of interest.

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