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RESEARCH ARTICLE

Impact of Farm-Scale on Animal Management Practices in Pırlak Sheep Enterprises

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ABSTRACT

This research was carried out to investigate the effects of farm scale on animal management practices in Pırlak sheep farms in the Emirdağ District of Afyonkarahisar province. A total of 56 Pırlak farms determined by simple random sampling were divided into three scale groups small (<50 heads), medium (51-100 heads), and large (>101 heads) based on sheep and ram numbers. The data were collected through measurements, observations, and face-to-face interviews with the farmers. The farm-scale significantly affected the feed production capacity, barn size, window area, lamp number, herd dog number, litter and manure removal frequencies, lamb production, penning the ewes with their lambs, and marketing of dairy products. The pasture-based extensive sheep production system was widespread in Pırlak farms, and the air quality, litter management, and frequency of equipment cleaning and manure removal were poorer than expected in those typical local sheep barns. Moreover, the farm's records related to production performance, animal diseases, and treatments were not kept. It has been understood that grazing, milking, lamb care, reproduction, and shearing processes were carried out with traditional methods, mostly without machinery. Since the Pırlak sheep breed is a hardy domestic breed adapted to this region for decades, improving efforts for the Pırlak sheep can increase the breed's performance. In conclusion, it has been concluded that the farm management capacities of Pırlak Farms in the Emirdağ can be supported with more financial government aid and farmers' training in sheep breeding, animal health and welfare, and business economics.

Keywords: Animal management practices, Emirdağ district, Farm-scale, Pırlak sheep farms

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Pırlak Koyunculuk İşletmelerinde İşletme Büyüklüğünün Hayvan Yönetimi Uygulamalarına Etkisi

ÖZ

Bu araştırma Afyonkarahisar ili Emirdağ İlçesi'nde bulunan Pırlak koyunculuk işletmelerinde işletme büyüklüğünün hayvan yönetimi uygulamalarına etkisinin incelenmesi amacıyla yapılmıştır. Basit tesadüfi örnekleme ile belirlenen 56 adet Pırlak koyunculuk işletmesi koyun ve koç sayısına göre küçük (<50 baş), orta (51-100 baş) ve büyük (>101 baş) ölçekli olmak üzere 3 gruba bölünmüştür. Araştırmanın verileri işletmelerde yapılan ölçüm, gözlem ve çiftçiler ile yüz yüze görüşmeler yoluyla elde edilmiştir. İşletme büyüklüğünün yem bitkisi üretimi kapasitesi, ağıl büyüklüğü, pencere alanı, ağıl içi lamba sayısı, sürü köpeği sayısı, altlık ve gübre uzaklaştırma sıklığı, kuzu üretimi, koyunların kuzulu koyun bölmerinde barındırılması ve süt ürünlerinin satışı üzerine önemli derecede etki yaptığı tespit edilmiştir. Genel olarak, Pırlak işletmelerinde meraya dayalı ekstansif yetiştiricilik yapıldığı, yöreye özgü tipik koyun ağıllarında hava kalitesi, altlık yönetimi, ekipman temizliği ve gübre uzaklaştırma sıklığının beklenenden daha zayıf olduğu tespit edilmiştir. Ayrıca verim performansı, hayvan hastalıkları ve yapılan tedavilere ilişkin çiftlik kayıtların tutulmadığı görülmüştür. Otlatma, sağım, kuzu bakımı, sıfat ve kırkım işlemlerinin geleneksel yöntemlerle ve ağırlıkla makine kullanmadan yapıldığı anlaşılmıştır. Pırlak koyun ırkı onlarca yıldır bu bölgeye uyum sağlamış dayanıklı yerli bir ırk olduğu için yapılacak ıslah çalışmaları bu ırkın performansını artırabilecektir. Sonuç olarak, Emirdağ'da bulunan Pırlak koyunculuk işletmelerinin hayvan yönetimi kapasitelerinin kamu mali teşviklerinin arttırılması ve koyun yetiştiriciliği, hayvan sağlığı ve refahı ile işletme ekonomisi konularında çiftçilerin eğitimi ile desteklenebileceği kanaatine varılmıştır.

Anahtar Kelimeler: Emirdağ ilçesi, Hayvan yönetimi uygulamaları, İşletme büyüklüğü, Pırlak koyunculuk işletmeleri

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INTRODUCTION

Turkey is among the leading countries in sheep production in the world. The sheep population was 23.089.691 in 2010 Turkey, which increased to 31.507.934 in 2015 (TUIK 2019). There is a significant potential for small animal breeding with 778.120 sheep and 60.908 goats that can make the best use of pastures in Afyonkarahisar in 2015. Sheep breeding has been accomplished for generations in the Emirdağ District of Afyonkarahisar. The most typical features of traditional sheep breeding can also be seen in addition to modern livestock farms. Animal production efficiency depends on total animal numbers and the amounts of the product obtained per animal. The success of breeding efforts to increase the animal genetic capacity for yields is impressed by the conditions in which animals are raised. So, it is more than necessary to provide a proper environment, sufficient care, and feeding to obtain yields to the extent of the animal's genetic capacity.

Humans manage all procedures concerning sheep health and yields (Alcedo et al., 2015, Bokkers 2006, Bozkurt et al., 2013). For this reason, there is a need for a current situation analysis in sheep breeding to examine human-animal interactions, to increase the current animal health and welfare standards in sheep farms, and to increase the animal welfare knowledge and skills of those responsible for the care and management of sheep (Caroprese et al. 2016, Fedele et al. 1993, Fregonesi and Leaver 2001).

Animal management practices can affect human-animal interactions in traditional sheep farms (Le Neindre et al. 2004, Raina et al. 2017, Sejian et al. 2010, Sevi et al. 1999). Studies on the effects of farm scale on traditional sheep breeding are limited. This research aimed to determine the effects of farm scale on animal management practices in Pırlak sheep farms in the Emirdağ District of Afyonkarahisar.

MATERIAL AND METHOD

This research was carried out in the Emirdağ District of Afyonkarahisar in the Inner-West Anatolia Region. Considering the information obtained from the Afyonkarahisar Provincial Directorate of Agriculture and Forestry, the farms in which only Pırlak sheep are raised (594 farms) were specified in the Emirdağ district. Sampling was used due to constraints such as time, cost, and distance, and a simple random cluster sampling method was applied considering the geographical distribution of Pırlak Farms in the Emirdağ district (Ural and Kılıç 2013). The Yüreğil village was appropriate in terms of the implementation of the research survey (Latitude: 39°1'31.82"N; Longitude: 31°1'29.99" E). There were only Pırlak sheep farms in all three neighborhoods of the village. The formula suggested by Sekaran (2003), was used in determining the sample scale with 95% reliability and a 6% sampling error.

The formula is given below;
$n=N.P.Q.Z\alpha 2/((N-1).d2+P.Q.Z\alpha 2)$

From the parameters in the formula, N=594, P=50%, Q=50%, the theoretical value corresponding to the significance level of 0.05 $Z\alpha=1.96$, d=6% is taken, and the minimum sample scale was calculated as 72 farms. In this context, all 74 farms in Yüreğil Village were visited. Statistical analyses were made on the data collected from 56 farms that were active at the time of the visit and accepted to participate in the research and had a 20 sheep capacity or more. The farms were assigned to small (<50 heads), medium (51-100 heads), and large (>101 heads) enterprise scale groups taking into account the total number of sheep and rams in the farms. The research was conducted on 15, 20, and 21 farms in small, medium, and large-scale groups, respectively. A measurement, observation, and evaluation form were developed and used to collection research data related to agricultural activities, land characteristics, and animal existence of Pırlak sheep farms. Additionally, the practices related to sheep feeding, housing, health and welfare management, and managing pregnant animals and lambs were observed and examined on the farms. Also, information and data on animal management were obtained through face-to-face interviews with the farmers. Descriptive statistics such as frequency, percentage distribution, arithmetic mean, and standard error in the mean were assessed to analyze the collected data. In addition, the One-Way ANOVA test (P1) was applied in the quantitative data analysis to compare the farm-scale groups regarding the parameters examined. The Person Chi-Square test (P2) was performed for the qualitative data.

RESULTS

The feed crops (barley, wheat, oat, and alfalfa) were produced in 57.58% of the Pırlak farms, and the average arable land was 43 decades. The results of the agricultural assets owned and management of input and storage in Pırlak Farms are presented in Table 1. Small-scale enterprises were not landowners; as the farm scale increased, so did the land availability in the other two scale groups. The average number of ewes and rams (83.39 heads) raised in Pırlak farms during the last 12 months also increased significantly as the farm scale increased. There was a storage area in 69.09% of farms (average of 44.39 m^2) for feed, medicine, and equipment, but the storage area did not significantly increase with the farm scale. The struggle with rodents, especially in feed storerooms, was managed with cats and mousetraps. Rodenticide was used only in some large-scale (5%) enterprises. There was no manure depot in 83.93% of Pırlak farms, and the farm scale did not affect this parameter.

The results concerning sheep barns and housing management in Pırlak farms are given in Table 2. The sheep barns' dimensions (width, length, and total barn area) differed significantly ($p<0.05$, $p<0.01$) in the farm-scale groups. Barn heights were similar in all the groups. Although the share of covered area per animal was not statistically different between farm-scale groups, it was somewhat low, especially in small- and large-scale farms. The farm-scale affected the average number of windows ($p<0.01$) and the total window area of the barns ($p<0.01$), but it was not affected the numbers or dimensions of barn doors and the traits of chimneys and courtyards. As the farm-scale increased, the number of lamps used in the barn increased ($p<0.01$), but the farm scale did not affect the lamp type. The farm-scale did not affect the parameters such as barn type, barn construction and wall condition, shelter availability, and roofing materials. Only 16.07% of the farms had shelter. "I" type barns were observed in 96.43%, and all barn units were under a single roof in 87.50 % of the farms. The barn's wall construction was rubble stone masonry in 64.29%, and stone reinforced concreted in 3.56% (ashlar random masonry with bricket and stone), and a mixture of materials such as stone, wood, and adobe in 32.15% of farms. Barn walls were plastered in 30.36% of the farms. The ratios of Pırlak farms that used tile or wood for roofing sheep pens were calculated as 96.43% and 3.57%. The farm scale did not affect the parameters such as barn type, barn construction and wall condition, shelter availability, and roofing materials.

The results on the management of animal feeding and grazing in the Pırlak farms are given in the Table 3. Portable feeders and drinkers were used on all farms. In all of the Pırlak farms, it was observed that water was supplied from the city water network so that animals could reach clean water resources. It has been detected that automatic equipment was not used in all sheep farms, and there was no generator. As seen in Table 3, the average daily feed and water meals were 1.07 and 1.11, and these parameters were not affected by the farm scale. The animals grazed an average of 263.64 days per year (an average of 226.02 days at night and 37.63 days at daytime), and the effect of the farm scale was insignificant. In addition, it has been determined that there was no drinking water supply in the pasture. It was determined that the number of herd dogs performing in herd management and safeguarding was significant ($p<0.01$) affected by the farm scale, more dogs were employed in medium-scaled enterprises, and two out of three were male dogs ($p<0.05$). Additionally, the daily animal feed allocation was supplied with a thin box in 96.43% of the farms and with bales in 3.57%.

The results related to animal health and welfare management in Pırlak farms are shown in Table 4. The farm scale did not significantly affect the feeder and waterer cleaning frequencies, barns disinfection frequency, and barn floor conditions such as slope and drainage. The frequency of litter and manure removal from the barn was lower for large-scale farms ($p<0.05$). There were neither disinfection procedures for people and vehicle motions at entrances and exits, nor were dip baths for sheep during treatments against ectoparasites.
The results on the management of milking, shearing, and marketing in Pırlak farms are presented in Table 5. The Pırlak farms had no milking chamber or milk cooling system. Though the farm scale did not affect the daily milking frequency, milking time, and milk usage method, it was reported that the milk produced in the farms was used for family consumption (46.43%) or marketed as traditional dairy products (53.57%). Pırlak farms were shearing sheep mostly in June (94.64%), and the most preferred method was shearing manually with scissors (96.43%). The keeping conditions of shearing equipment were not appropriate(96.43%). Also, there was no particular shearing area, and the farmers said they sold the fleece. The farmers mentioned using the milk they produced to make traditional dairy products such as yogurt and local cheese. The effects of the farm scale were significant ($p<0.05$) for milk and milk product marketing but insignificant for manure dispose and marketing.

The findings related to the management of the care of pregnant and lactating ewes and lambs and breeding in the Pırlak farms are given in Table 6. The free mating method was practiced in all farms. The rams were always kept with sheep, including those pregnant in 85.70% of the farms. The farm-scale significantly affected the number of ewes that were lambing and the number of single or twin lambing ($p<0.01$). The farm-scale was not meaningful for the first colostrum intake time, weaning age, suckling frequency, weighting and fattening of the lambs, and the orphaned lamb feeding method. The farmers reported that the first colostrum meal time of the lambs was 11.21 hours after birth. Dry grass was given to the lambs after an average of 8.05 days; the average weaning age was 143.36 days. All of the Pırlak farms used the age criterion for weaning. All newborn lambs were identified by ear tags and were vaccinated against Sheep and Goat Plague, Foot and Mouth Disease, Brucella, and Enterotoxemia. In all farms, the lambs were not regularly weighed for growth checks. The farm scale's effect was insignificant regarding the availability of lamb pens, rams pens, and lambing pens in the barns. The farm-scale affected the housing of ewes with their lambs up to the weaning age ($p<0.05$). The farm's ratio of the farms penning lambs with ewes was higher (89.29%) than the farms penning lamb and ewes(10.71%) separately. The method used for feeding orphaned lambs were milk bottle suckling (1.79%) or cross-fostering of lambs to another lactating ewe voluntarily (12.50%) or involuntarily (85.71%). The farm-scale effect was insignificant for this parameter.

Table 1. The results regarding the agricultural assets owned, and the management of input and storage in the Pırlak farms

Parameters	Traits	Farm Scale			Total	P1	P2
		Small	Medium	Large			
Herd (head)	Rams +Ewes	34.20±1.51[c]	65.57 ±2.82[b]	141.10 ±8.36[a]	83.39±6.78	0.000	
Storage	Storage area (m^2)	36.30±4.23	47.38±6.52	47.20±6.21	44.39±3.50	0.395	
Storage availability (%)	Yes	71.43	61.90	75.00	69.09		0.647
	No	28.57	38.10	25.00	30.91		
Feed storage conditions (%)	Partially suitable	13.33	33.33	50.00	33.33		0.084
	Insufficient	86.67	66.67	50.00	66.67		
Rodent struggle method (%)	Cat	6.67	14.29	20.00	14.29		0.521
	Cat+ mousetrap	93.33	85.71	75.00	83.92		
	Cat+ mousetrap+ rodenticide	0.00	0.00	5.00	1.79		
Manure storage (%)	Yes	13.33	28.57	5.00	16.07		0.115
	No	86.67	71.43	95.00	83.93		
Forage crop production (%)	Yes	13.33	42.86	40.00	33.93		0.141
	No	86.67	57.14	60.00	66.07		

P1=One-Way ANOVA test was applied to analyse the quantitative data. P2=Person Chi-Square test was performed for the qualitative data.

Table 2. The results concerning sheep barns and the management of sheep housing in Pırlak farms

Parameters	Traits	Farm Scale			Total	P1	P2
		Small	Medium	Large			
Sheep barn	Width (m)	5.60±0.273 ^{b}	7.63±0.51 ^{ab}	11.47±2.09 ^{a}	8.43±0.83	0.012	
	Length (m)	12.40±1.47 ^{b}	13.55±1.43 ^{b}	19.40±2.30 ^{a}	15.36±1.13	0.021	
	Height (m)	2.56±0.18	2.67±0.17	2.20±0.25	2.46±0.12	0.253	
	Total barn area(m^2)	69.80±9.56 ^{b}	109.58±20.62 ^{b}	202.05±35.30 ^{a}	131.11±16.49	0.003	
Window	Number	1.86±0.25 ^{b}	2.00±0.21 ^{b}	3.70±0.31 ^{a}	2.58±0.19	0.001	
	Width (cm)	65.46±5.45	87.45±7.87	70.32±6.14	75.69±4.15	0.067	
	Length(cm)	72.38±5.31	87.75±3.99	86.79±4.88	83.56±2.80	0.152	
	Area (m^2)	0.85±0.15 ^{c}	1.65±0.29 ^{b}	2.44±0.30 ^{a}	1.72±0.18	0.001	
Chimney	Number	0.86±0.29	0.81±0.31	1.37±0.34	1.02±0.19	0.395	
	Width(cm)	26.67±2.11	27.50±1.64	27.38±3.87	27.26±1.93	0.987	
Barn door	Height (cm)	180.00±6.05	182.05±4.49	180.50±7.81	180.95±3.58	0.972	
	Width (cm)	165.50±8.43	193.00±12.96	192.58±11.95	186.24±7.07	0.262	
Courtyard (m)	Width (m)	8.27±1.03	9.52±0.79	12.15±1.41	10.13±0.67	0.057	
	Length(m)	17.67±5.97	16.81±1.14	21.20±1.75	18.61±1.75	0.541	
Lamp number	Number	2.13±0.19 ^{b}	2.62±0.20 ^{b}	3.35±0.21 ^{a}	2.75±0.13	0.001	
Lamp type (%)	Tungsten	100.00	90.48	90.00	92.86		0.454
	Fluorescent	0.00	9.52	10.00	7.14		
Courtyard fencing (%)	Stone	6.68	14.29	15.00	12.50		0.725
	Wire	93.32	85.71	85.00	87.50		
Shelter avaibility (%)	Yes	6.67	28.67	10.00	16.07		0.138
	No	93.22	71.43	90.00	83.93		
Barn type (%)	I type	100.00	100.00	90.00	96.43		0.155
	L type	0.00	0.00	10.00	3.57		
Barn construction (%)	Rubble stone masonry	66.67	61.90	65.00	64.29		0.937
	Stone reinforced concreted	0.00	4.76	5.00	3.56		
	Mix.(stone+wood+adobe)	33.33	33.34	30.00	32.15		
Barn wall condition (%)	Plastered	13.33	38.10	35.00	30.36		0.240
	Unplastered	86.67	61.90	65.00	69.64		
Barn units (%)	Single roof	100.00	85.71	80.00	87.50		0.199
	Seperate roofs	0.00	14.29	20.00	12.50		
Roofing material (%)	Tile	100.00	90.48	100.00	96.43		0.178
	Wooden	0.00	9.52	0.00	3.57		

P1=One-Way ANOVA test was applied to analyse the quantitative data. P2=Person Chi-Square test was performed for the qualitative data.

Table 3. The results on the management of animal feeding and grazing in Pırlak farms

Parameters	Traits	Farm Scale			Total	P1	P2
		Small	Medium	Large			
Daily frequency	Feeding (times)	1.00±0.00	1.24±0.12	1.05±0.05	1.11±0.05	0.106	
	Watering (times)	1.00±0.00	1.05±0.05	1.15±0.08	1.07±0.04	0.211	
Grazing	Nights **(**days**)**	226.27±5.82	221.24±10.5	230.85±5.64	226.02±4.66	0.685	
	Daytimes **(**days**)**	46.73±5.57	37.76±5.92	30.65±4.43	37.63±3.29	0.162	
	Total (days)	273.00±2.00	259.00±7.54	261.50±4.42	263.64±3.17	0.195	
Herd dogs(head)	Male dog	1.47±0.17 [b]	2.05±0.15 [a]	2.00±0.15 [a]	1.88±0.92	0.024	
	Female dog	0.80±0.14 [b]	0.71±0.17 [b]	1.20±0.16 [a]	0.91±0.09	0.007	
	Total	2.20±0.11 [c]	2.76±0.21 [b]	3.20±0.19 [a]	2.77±0.12	0.002	
Feed supply (%)	Purchase	93.34	71.43	70.00	76.79		0.206
	Produced +Purchase	6.66	28.57	30.00	23.21		
Feed supply type(%)	Thin box	100.00	100.00	90.00	96.43		0.155
	Bale	0.00	0.00	10.00	3.57		

P1=One-Way ANOVA test was applied to analyse the quantitative data. P2=Person Chi-Square test was performed for the qualitative data.

Table 4. The results on management of animal health and welfare in Pırlak farms

Parameters	Traits	Farm Scale			Total	P1	P2
		Small	Medium	Large			
Feeder cleaning frequency (times/month)		3.43±1.18	3.24±0.74	5.00±1.15	3.93±0.59	0.388	
Water cleaning frequency (times/year)		3.00±0.92	2.95±0.76	5.80±1.36	3.98±0.630	0.098	
Barn disinfection frequency(times/year)		1.00±0.00	1.10±0.07	1.15±0.08	1.09±0.04	0.315	
Frequency of litter and manure removal from the barn (times/year)		1.27±0.12 [a]	1.29±0.10 [a]	1.00 ±0.00 [b]	1.18±0.05	0.033	
Barn disinfection (%)	With slaked lime	93.33	90.48	100.00	94.64		0.386
	No	6.67	9.52	0.00	5.36		
Floor slope (%)	Yes	0.00	0.00	5.00	1.85		0.421
	No	100.00	100.00	95.00	98.15		
Barn floor drainage (%)	Sufficient	100.00	90.48	75.00	87.50		0.075
	Insufficient	0.00	9.52	25.00	12.50		
Farm records (%)	Recording	0.00	0.00	5.26	1.85		0.391
	No	100.00	100.00	94.74	98.15		

P1=One-Way ANOVA test was applied to analyse the quantitative data. P2=Person Chi-Square test was performed for the qualitative data.

Table 5. The obtained results on the management of milking, shearing, and marketing in Pırlak farms

Parameters	Traits	Farm Scale			Total	P1	P2
		Small	Medium	Large			
Milking	Daily milking frequency	1.00±0.00	1.10±0.07	1.00±0.00	1.04±0.03	0.169	
	Milking time (minutes)	30.42±0.42	41.67±5.63	43.18±8.32	38.78±3.36	0.280	
Product price	Cheese (kg/TL)	40.00±0.00	41.43±2.10	45.00±0.00	41.82±1.55	0.639	
	Yogurt (kg/TL)	4.00±0.00	4.17±0.17	4.17±0.17	4.14±0.10	0.856	
	Wool (kg/TL)	3.00±0.32	2.83±0.19	2.68±0.21	2.80±0.13	0.651	
Dairy product marketing(%)	Yes	20.00[b]	61.90[a]	70.00[a]	53.57		0.008
	No	80.00	38.10	30.00	46.43		
Milk product types (%)	Yogurt	40.00	23.81	15.00	25.00		0.346
	Cheese+Yogurt	60.00	76.19	80.00	73.21		
	Local cheese	0.00	0.00	5.00	1.79		
Shearing time (%)	June	93.33	95.24	95.00	94.64		0.965
	July	6.67	4.76	5.00	5.36		
Shearing method (%)	Shearing with scissor	100.00	95.24	95.00	96.43		0.684
	Shearing with machine	0.00	4.76	5.00	3.57		
Keeping condition of shearing equipment	Appropriate	0.00	9.52	0.00	3.57		0.178
	Not appropriate	100.00	90.48	100.00	96.43		
Manure disposing (%)	Marketing	13.33	0.00	0.00	3.57		0.056
	Fertilizing into own field	60.00	71.43	45.00	58.93		
	Throw away	26.67	28.57	55.00	37.50		

P1=One-Way ANOVA test was applied to analyse the quantitative data. P2=Person Chi-Square test was performed for the qualitative data.

Table 6. The results related to the management of breeding and care of pregnant and lactating ewes in Pırlak farms

Parameters	Traits	Farm Scale			Total	P1	P2
		Small	Medium	Large			
Number of lambing sheep (head)		31.13±1.66 [c]	60.80±3.99 [b]	135.25±7.93 [a]	79.78±6.74	0.000	
Number of single lambing sheep(head)		26.27±1.36 [c]	47.25±3.27 [b]	108.25±6.79 [a]	63.71±5.45	0.000	
Number of twin lambing sheep (head)		4.87±0.87 [c]	13.55±1.91 [b]	26.80±3.12 [a]	16.00±1.79	0.000	
First colostrum intake time (hours)		12.80±1.31	11.24±0.87	10.00±0.60	11.21±0.53	0.121	
Weaning age (days)		147.00±3.21	145.14±3.20	138.75±3.35	143.36±1.93	0.192	
Frequency of suckling (times/day)		1.00±0.00	1.19±0.09	1.10±0.07	1.11±0.04	0.196	
Availability of indoor pen (%)	Lamb pen	100.00	85.71	80.00	87.50		0.507
	Ram pen	0.00	9.52	15.00	8.93		
	Lambing pen	0.00	4.76	5.00	3.57		
Regular lamb weighing (%)	Yes	0.00	0.00	10.00	3.57		0.155
	No	100.00	100.00	90.00	96.43		
Lamb fattening (%)	Yes	6.66	14.29	5.00	8.93		0.545
	No	93.34	85.71	95.0	91.07		
Penning lambs with ewes (%)	Yes	100.00[a]	76.19[b]	95.00[a]	89.29		0.044
	No	0.00	23.81	5.00	10.71		
Orphaned lamb feeding method (%)	Suckling	0.00	0.00	5.00	1.79		0.198
	cross-fostering-volunteer	20.00	19.05	0.00	12.50		
	cros-fostering-unvolunteer	80.00	80.95	95.00	85.71		

P1=One-Way ANOVA test was applied to analyse the quantitative data. P2=Person Chi-Square test was performed for the qualitative data.

DISCUSSION

As the farm scale increased, the number of sheep and rams increased. It was observed that lambs were sold after weaning, especially in small-scale enterprises. This situation shows that lambs are sold to provide subsistence for the family and to purchase production inputs for farms, such as feed. It was detected that two-thirds of the enterprises still need to produce feed. These results generally agree with medium- and small-scale sheep farming (Mthi et al. 2017). These results show that the feed input of Pırlak enterprises in the Emirdağ district heavily depends on foreign sources. The scarcity of land to produce fodder crops makes it difficult to meet the cost of animal feed in these enterprises, which are already engaged in sheep breeding to ensure family livelihood. Fourie et al. (2018) also reported that insufficient land availability and inadequate agricultural equipment are the most critical problems in family sheep farms with a similar structure in their study in rural areas of South Africa**.** We observed storage rooms in two-thirds of the sheep farms, but the capacity of the storage rooms needed to be more proportional to the farm scale. This finding showed that the storage area needed to be improved, especially in large enterprises. However, it was evaluated that the storage room conditions (such as ventilation, storage, floor, and cleaning) were poor for small and medium- scaled enterprises. In feed storage rooms, it was seen that the struggle against rodents was done with cat and mouse traps, and rodenticide was used for this purpose in very few large-scale (5%) enterprises. Although the success of this traditional control method can be arguable in dealing with rodents, this method could reduce possible poisoning cases due to rodenticide consumption as well as sheep deaths. According to Tokur et al. (2021), insecticides and rodenticides constitute the most critical part of animal poisoning cases. The rodent problem is considered more prominent because of the cost, especially in small and medium-scale enterprises. Steen et al. (2005) reported a significant interaction between sheep density and rodent population, and the number of rodents decreases as the number of sheep decreases in the sheep housing areas.

As the number of animals on the farm increased, the area of the barn also increased. However, the barn's height did not change significantly, suggesting that the air and ground quality decreased with the increased number of animals in the barn. Moreover, in large-scale enterprises with the highest animal number, the problems related to ventilation and moisture management in these crowded barns were getting deeper. As the farm scale increased, the average number of barn windows (1.86-3.70) and total window area (0.85-2.44 m^2) increased. Although this situation provides an advantage for these naturally ventilated barns, the average chimney opening was low. This may have caused the barn's comfort and air quality levels unsuitable (Tuyttens 2005, Caroprese 2008, Stafford and Gregory 2008, Wadhwani et al. 2016). The total microorganism and coliform budget in the barns' air was reported to be significantly lower in barns with a 2 m^2/head living area compared to more crowded barns (1.5 or 1 m^2/head) ($P<0.05$) (Sevi et al. 1999).

In the study, the number of animals increased parallel with the farm's scale, but the barns' physical structure and the conditions affecting the animals were similar in all farm scale groups. On all farms, the barns were earthen-floored, the barn walls were constructed of rubble stone masonry and were unplastered, and all barn units were under one single roof. These local and traditional corrals were very restrictive for animals and needed more administrative flexibility (Sevi et al. 1999). On the other hand, it has been reported that socio-cultural and ecological risks that arise from animal farming are lower in this type of sheep breeding compared to large intensive farms (Middleton 2013, Babai and Molnár 2014).

It was detected that the feeders and drinkers were portable and suitable for group use, and ideal for sheep drinking. The animal feeding management, mainly based on pasture, was supplemented with roughage and concentrated feeding once a day in the barn. However, determining the animals' daily feed allowance was not considered to age, yield, or other physiological needs of the animals. The feed was poured into the group feeders with standard scales such as buckets or tins without considering the feed content. In addition, water was provided once or twice a day when the animals were in the yard or after their return from the pasture. These findings are interesting regarding the success of feeding management in enterprises. Because this feeding management can lead both obstruct the feed intake of recessive animals that were in the social order by superior animals, and the feed intake according to the needs of each animal could not be guaranteed. While this situation increases the heterogeneity in the flock in terms of live weight, it may also cause a decrease in meat yields for a fattening period or excessive weight loss (Phillips et al., 2014).In addition, it was thought that the knowledge and skills in animal feeding management and animal behaviours of the farmers might need to be improved because the farmers reported that they learned sheep breeding from their family elders and neighbour farmers (Phythian et al. 2014).

Sheep were grazed between spring and autumn if the pasture grass capacity was appropriate. After their return to the barns, animals were supplemented with concentrated feed. This feeding management is standard for extensive sheep breeding (Dwyer 2009). However, Spigarelli et al. (2020) report that grazing has several other benefits. With grazing, there is a chance of getting rid of unfavourable indoor housing conditions, the sheep reaching fresh roughage, and the hoof health is positively affected by exercise (Dwyer 2009, Liu et al. 2012). As a traditional model, this feeding management was similar for farm-scale groups. Expectedly, as the farm scale increased, the number of sheep and herding dogs increased (2.20-3.20 heads). This result shows that dogs have a dominant role in herd management. In almost every business, male and female dogs worked together for sheep flock management. Flock dogs protect the sheep from predators and help to prevent economic losses due to predator attacks. On the other hand, Goddard (2011) reported that sheep perceive shepherd dogs as predators and that the primary reaction of sheep against herding dogs is avoidance or distance. For this reason, the ability and skill of herding dogs to manage the herd are essential. Lawson (1989) reported that predator attacks cause significant economic losses due to lamb and sheep deaths and injuries.

There were no differences between farm scale groups for manure removal frequency. In general, the effect of farm scale on animal health and welfare management was insignificant. However, the frequency of manure removal was low in large-scale farms. Caroprese (2008) also reported that poor housing conditions harm udder health and increased mastitis risk, and there is a relationship between low yield and low milk quality. Phythian et al. (2014) reported that veterinarians could work with sheep farmers to increase production and operating profitability and help farmers develop and implement herd health programs.

Half of the farms (53.57%) produced local dairy products (yogurt and cheese) and marketed them to local bazaars. Similarly, fleece was sold al all farms. The ratio of the farms selling sheep manure was only 3.57%. These results showed that regardless of the scale of the farms, Pırlak farms did not have a professional management approach in product marketing, and they had traditional management suitable for local and regional conditions. It was argued that the difficulties in marketing raw milk and the high demand for local yogurt and cheese in local markets induced these results. However, it has been observed that there are no specific standards or favourable marketing channels for producing and marketing these products. It has been evaluated that the farmers need more marketing knowledge and skills. Indeed, Fourie et al. (2018) stated that poor marketing skills are among the limiting factors faced by small-scale farms.

Sheep and rams were housed in the same barns on the farms. Only 3.57% of the farms had lambing pens, and the newly giving birth ewes stayed with their lambs for a few days in these pens. In 87.50% of the farms, the weaned lambs or sheep were graze on the pasture, while the suckled lambs were kept in the lamb pens. The management processes for the ewes that gave birth or the care of the lambs were not different. These findings reveal concerns about the sensitive care and animal management requirements to be met in farms with more animals and lambs. As the scale of the farm increased, it was seen that the number of sheep that gave birth and that were reformed was also higher. Accordingly, it was thought that there is a higher risk in terms of pregnant sheep care, delivery management, and lamb care on large farms. Dwyer (2008) also reported that good care and management for pregnant animals improves the health and welfare of sheep, and lambs born in poor conditions may have increased stress reactivity later in life. Again, it showed that using methods such as artificial lamb feeding or involuntary breastfeeding to care for orphaned lambs in large-scale farms with multiple births can cause a conflict of rejection or acceptance between lamb and ewe. Dwyer (2008) reported that managerial actions such as painful procedures without analgesics or disruption of the sheep-lamb bond by permanent or temporary separation could be a source of poor welfare for the newborn lamb.

The results obtained in the study demonstrate that Pırlak farms are traditional operations with low income and low investment. These family-type farms can offer potential opportunities for regional rural development policies. Because the Pırlak sheep breed is a hardy domestic breed that has been adapted to this region for decades, it has the potential to provide high economic income under better care and management. It has been detected that no efforts have been carried out on animal improvement or farmer training in these Pırlak enterprises in Emirdağ. Indeed, in the Emirdağ district, within the scope of the "Community based animal improvement project of Ramlıç Sheep" conducted by the General Directorate of Agricultural Research and Policies, an important increase has been reached in fertility and litter size. Also, the livability, birth weight, weaning weight, and daily body weight gain of Ramlıç lambs were increased within this project's scope (Tekerli et al.2021). Similarly, if Pırlak sheep are included in the scope of the Community based animal improvement program, it is thought that significant increases in the yields of the Pırlak sheep breed can be achieved, and the quality of animal management can be improved.

CONCLUSION

As a result, the feed production capacity, barn size, window area, lamp number, herd dog number, litter and manure removal frequencies, lamb production, penning ewes with their lambs, and marketing of dairy products were significantly affected by the farm scale. However, the farm scale did not affect the other examined parameters regarding housing, feeding, breeding, animal care, and animal health and welfare. The results obtained in the study indicated that Pırlak farms in Emirdağ were traditional farms having low equity capital and income. These family-type farms offer potential opportunities for regional rural development policies and an animal-friendly or traditional food industry. Because the Pırlak sheep breed is a hardy domestic breed that has been adapted to this region for decades, the improvement efforts to be carried out on the Pırlak sheep can increase the performance of this breed. In conclusion, it has been concluded that the farm management capacities of Pırlak Farms in the Emirdağ should be supported with more public financial incentives and farmers' training in sheep breeding, animal health and welfare, and business economics.

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