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Barn and Environmental Characteristics of Cattle Enterprises in Central County of Ağrı Province

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ABSTRACT

In this study, a survey was conducted with 400 enterprise owners to determine the current situation and problems related to the structural characteristics of the barns in cattle enterprises located in the central county of Ağrı province. The data obtained were transferred into Microsoft Excel program. Frequency analysis was performed in SPSS statistical program. Findings were evaluated through graphs obtained from proportional values. It was determined that 66% of the enterprises had free-stall closed barns, the barns in 48.5% of the enterprises were used for less than 10 years and the barns were generally detached (98.5%). The building material for the walls of the barns was mostly stone (72.8%), and sheet metal (72.8%) was the most preferred material for the construction of the roof, and the floors were generally made of concrete (88.8%). The feed alley (15%) and automatic waterers (2.8%) are available in a small percentage of the barns. It was determined that 88% of the cattle farms have individual calf units, and calves in most enterprises are housed in separate group sections (87.5%) in the same barn. Only 15% of the enterprises used bedding and 85% did not have bedding material. The majority of the enterprises watered the animals with buckets (51.5%) and the village's fountain or trough (43.8%). It also found out that 62.3% of the enterprises implemented general cleaning and 99.3% cleaned the manure with human resources. Furthermore, 94.5% of the enterprises stored the manure near the barn without any cover. In addition, 72.5% of the cattle farms utilized manure for heating purposes, and 51% used it as fertilizer in their field. As a result of the findings, it was concluded that the information support and investment incentives to be given to the enterprises and the training of breeders could be helpful to ensure profitable livestock production in the region.

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Ağrı İli Merkez İlçesi Sığırcılık İşletmelerinin Barınak ve Çevre Özellikleri

ÖZET

Bu çalışmada Ağrı ili merkez ilçesinde bulunan büyükbaş hayvancılık işletmelerinde barınakların yapısal özellikleri ile ilgili mevcut durum ve sorunları belirlemek amacıyla 400 işletme sahibiyle anket yapılmış olup elde edilen veriler Microsoft Excel programına girilerek SPSS istatistik programında frekans analizine tabi tutulmuştur. Bulgular oransal değerlerden oluşturulan grafikler üzerinden değerlendirilmiştir. İşletmelerin %66'sının bağlı duraksız kapalı ahırlardan oluştuğu, %48.5'inin ahırlarını 10 yıldan daha az kullandıkları ve ahırların genellikle müstakil (%98.5) olduğu belirlenmiştir. Kullanılan ahırların duvarlarında yapı malzemesinin genellikle taş (%72.8) olduğu, çatısında çoğunlukla sac (%72.8) kullanıldığı ve ahırlarının tabanlarının "beton" (%88.8) olduğu tespit edilmiştir. Ahırlarda yemlik yolu (%15) ve otomatik sulukların

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Gübre

(%2.8) çok az işletmede mevcut olduğu tespit edilmiştir. İşletmelerin %88'inde ayrı buzağı bölmesi bulunduğu, çoğunluğunun aynı ahırda ayrı grup bölmesinde (%87.5) barındırıldığı tespit edilmiştir. İşletmelerin sadece %15'inin yataklık kullandığı, %85'inde yataklık materyal bulunmadığı saptanmıştır. İşletmelerin çoğunluğu hayvanların su ihtiyaçlarını kova ile (%51.5) ve köy çeşmesi-yalak (43.8%) ile sağladığı tespit edilmiştir. İşletmelerin %62.3'ünde genel temizlik yapıldığı, %99.3'ünün gübreyi insan gücü ile temizlediği, %94.5'inin gübreyi ahır yakınında biriktirdiği, %72.5'inin ise gübreyi yakarak ve %51'inin tarlada gübre olarak değerlendirdiği belirlenmiştir. Elde edilen bulgular neticesinde bölgedeki işletmelere verilecek bilgi desteği ve yatırım teşvikleri ile ayrıca yetiştirici eğitimleri yapılarak işletmelerin karlı bir hayvancılık yapabilmelerine olanak sağlanabileceği sonucuna varılmıştır.

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INTRODUCTION

Ağrı is one of the provinces in the TRA-2 Region. The ecological conditions and natural structure of TRA-2 Region (Ağrı, Kars, Iğdır, and Ardahan) is quite suitable for animal husbandry. Livestock production has strategic importance for the region, because it provides materials to many sectors and prevents migration from rural areas to big cities. TRA-2 region has an important place in Turkey in terms of cattle presence, the number of continental cattle breeds, and milk production (Yılmaz et al. 2014). The information obtained from the studies conducted in the province of Ağrı indicated that the economy and industry of the province of Ağrı depended largely on agriculture and livestock production (Çimen et al. 2006; Arıöz and Güner 2007; Erhan 2019).

There are 34301 livestock enterprises in the province of Ağrı, including 22915 cattle, 11122 sheep and goat, and 264 beekeeping enterprises. Regarding cattle number, Ağrı province ranks 3rd in its region and 11th in Turkey with 411183 head cattle. Approximately 2.26% of the cattle population in Turkey is reared in Ağrı province and 66.6% of the cattle presence in the province consists of pure continental breeds and their crossbreds (Anonim 2020).

The enterprises in which cattle breeding is performed in Turkey differ among regions and provinces, and counties in terms of structural characteristics.

Survey studies were conducted to examine the current structural characteristics of cattle farms to provide important information about Turkey's livestock production. For this purpose, various studies have been carried out to determine the status and problems of cattle enterprises located in different regions of Turkey (Kaygısız et al. 2008; Kaygısız and Tümer 2009; Han and Bakır 2010; Şeker et al. 2012; Tilki et al. 2013; Koçyiğit et al. 2015; Güler et al. 2017; Kılıç and Eryılmaz 2020; Kaygısız and Özkan 2021) and other countries (Dou et al. 2001; Millogo et al. 2008; Vasseur et al. 2010; Sheppard et al. 2011; Costa et al. 2013; Klein-Jöbstl et al. 2015; Moges 2015).

In the studies conducted to determine the current situation of cattle farms and related problems in Turkey, it was demonstrated that the breeders were old, their level of education and knowledge about animal husbandry were low, their forage production was insufficient to meet the roughage needs of the animals in the enterprises. Furthermore, it was also revealed that the farmers were unconscious about care, feeding and housing of the animals. They did not pay attention to the hygiene rules in milking and milk storage, and they were insufficient in organization and marketing (Şahin et al. 2001; Koyubenbe 2005; Yılmaz 2005; Boz 2013).

This study was carried out to determine the current situation of the cattle enterprises regarding the structural characteristics, types of equipment used in the barn, and environment in the central county of Ağrı and reveal the problems related to them.

MATERIAL and METHODS

The survey study was carried out on the owners of randomly selected dairy cattle enterprises in the central county of Ağrı province, and the data obtained from the questionnaire constituted the material of the study. The enterprises were visited and the current situation was revealed through observation and survey questions.

Mathematical expressions can have many distinct aspects that must be evaluated by different solution

strategies (Hosseinpour et al. 2018). Since the variance is unknown as well as the population is limited and there are qualitative variables dependent on probability, the method whose formula is given below was utilized for the determination of the sample size of the research (Arıkan 2007).

$$n = \frac{N.t^2.p.q}{(N-1).D^2 + t^2.p.q}$$

In this formula;

n=Minimum number of necessary samples, N=Population size, D=Acceptable or desired sampling error (5%), t=Table value (t=1.96 for α= 0.05), p=The rate to be calculated (0.5), q=1-p.

$$n = \frac{5852.(1.96)^2.0.5.(1-0.5)}{(5852-1).(0.05)^2 + (1.96)^2.0.5.(1-0.5)} = 360.55$$

With the formula written above, the estimated sample size was calculated to be approximately 361. According to this result, the number of surveys was increased by 10.9% and the number of surveys to be conducted in the villages of the central county of Ağrı province was determined as 400. The survey was conducted using simple random sampling method. The data obtained from survey work were transferred to Excel 2010 computer program. The percentage values were obtained using frequency analysis in a descriptive statistical method available in the SPSS statistics program (SPSS 2004). Graphs were produced by using the proportional values and the results were interpreted.

RESULTS and DISCUSSION

Closed barns, which are quite common in the Eastern Anatolia region can be tie-stall or free-stall. In this study, it was determined that 66% of the barns in the central county of Ağrı province consist of free-stall barns and 32.8% of them are tie-stall barns, there is no free system barn in the county and the share of semi-open free-stall barns (1.3%) is quite low.

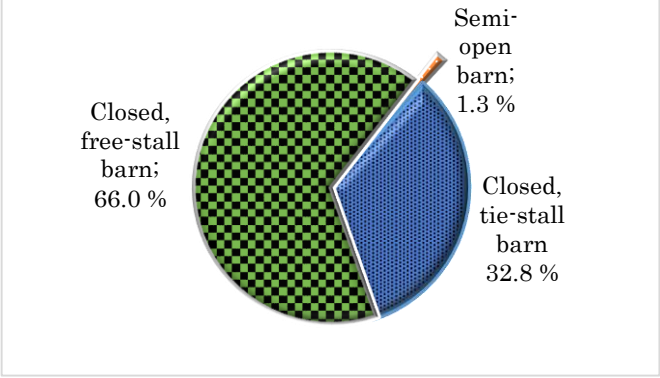


Figure 1. Type of barn
Şekil 1. Ahır tipi

In many studies carried out in Turkey, it was reported that the percentage of free-stall barns is higher than findings of the present study (Kaygısız and Tümer 2009; Uğurlu and Şahin 2010; Şeker et al. 2012; Tilki et al. 2013; Şahanoğlu and Koçak 2014). The percentage of tie-stalls barns in this study (32.8%) is similar to the studies conducted in other regions of Turkey (Yenice and Savaş 2016; Can and Boğa 2019; Demirhan and Yenilmez 2019). On the other hand, Dou et al. (2001) reported that 68.0% of the cattle enterprises in the Pennsylvania State have tie-stall barns. Sheppard et al. (2011) stated that less than 31% of the barns in Western Canada and 80% of the barns in St. Lawrence Plains are the tie-stall types. Working in this type of barn has some inadequacies that cause tedious problems in important routine works such as feeding, manure cleaning, milking, and watering the animals. Thus, it has been reported that the younger generations, especially women, did not want to perform the hard daily work in such enterprises and there was a lack of welfare for animals (Anonim 2018). In addition, Valde et al. (1997) pointed out that tie-stall barns had higher rates of clinical mastitis and suggested that free-stall barns should be preferred over tie-stall types for lower disease incidence and higher fertility. It was also reported that free-stall barns are the most commonly used housing system in dairy cattle breeding, but they were economical in enterprises with 60 or more dairy cattle (Gökalp 2019).

Responses given by the participants to the questionnaire revealed that 72.5% of them were satisfied with their barns, and that 27.5% of the participants stated that their barn was insufficient to meet their needs because it was small (67.6%) or old (32.4%) in the central county of Ağrı province (Figure 2a and b).

The question related to the effect of the barns on the health of humans and animals demonstrated that respectively 96.5%, %81.3, and %90.3 of the respondents did not accept adverse influences of the barns on the health of humans, animals as well as the milk yield of the cattle (Figure 3a, b, c). On the other hand, different results were reported in the studies conducted on other provinces or counties of Turkey. Tilki et al. (2013) reported that in Kars province structure of the barns had a negative impact on the health of enterprise owners (48.79%), the milk yield of the animals (60.92%), and the development of the animals (57.04%). Similarly, Aydın et al. (2016) reported that the structure of the barn in Hınıs county of Erzurum province adversely affected the health of 88.8% of the enterprise owners as well as milk yield and development of the animals in 88.6% and 81.0% of the enterprises, respectively. The differences between the results of these studies and the present study could be attributed to the local enterprise owners' lower sensitivity and awareness level on the subject.

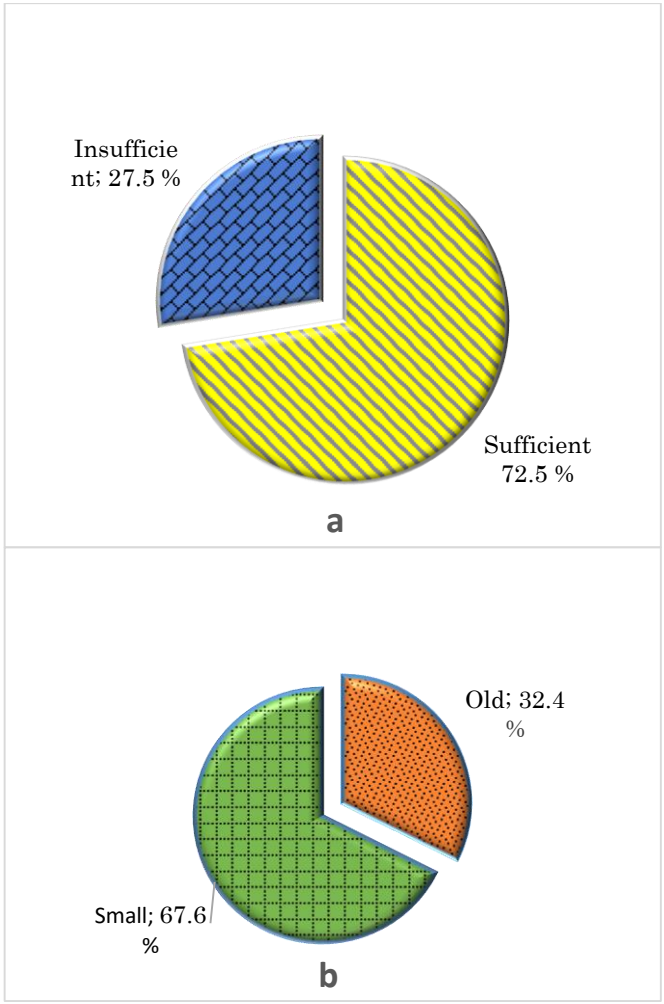
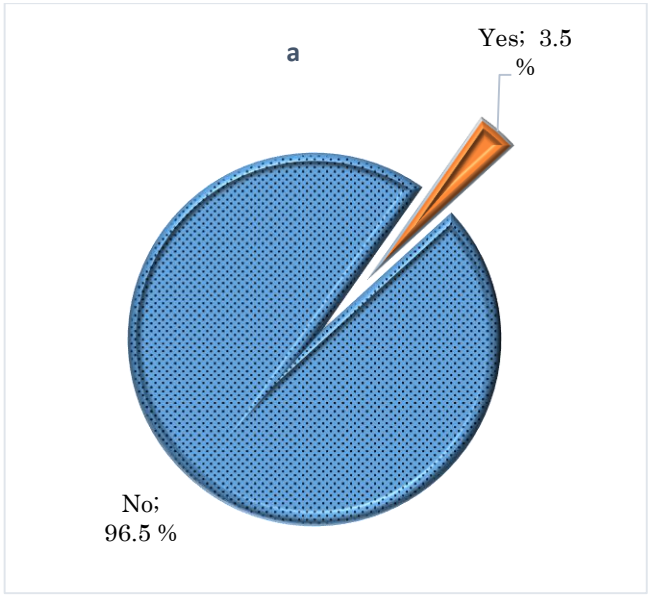


Figure 2. The status of the barn buildings sufficiency (a) the reasons for insufficiency

Şekil 2. Ahırın yeterlilik durumu (a) ve yetersizlik nedeni (b).



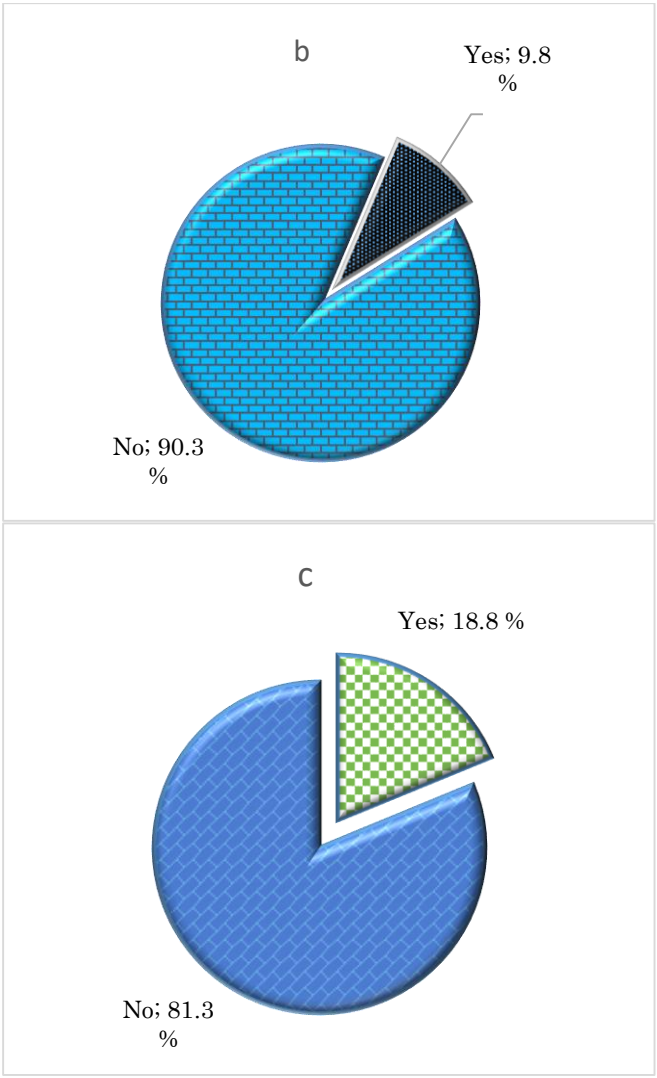


Figure 3. Does the Barn have adverse effect on the health of the enterprise's owner (a), development of animals (b) and milk yield of the cows?

Şekil 3. Ahır işletme sahibinin sağlığını (a), hayvanların gelişimini (b) ve hayvanların süt verimini (c) olumsuz etkiliyor mu?

While 48.5% of the enterprise owners who participated in the survey study indicated that they used their barns for less than 10 years, 35.3% stated that they used the barn for 11-20 years, 13.0% for 21-30 years, and 3.3% for more than 31 years (Figure 4). A large majority of the barns were detached (98.5%) in the central county of Ağrı Province. The percentage of the barn buildings younger than 10 years were reported as 19.6% in Hınıs county of Erzurum province by Aydın et al. (2016). The findings of Güler et al. (2017) were similar to the present study with a 40% barn percentage used less than 10 years. However, the share of detached barns (75%) was higher.

The share of detached barns in previous studies are higher than in present study with the percentages

reported as 63.0% in Kahramanmaraş (Kaygısız and Tümer 2009), 77.0% in Muş (Şeker et al. 2012), and 70.7% in Hınıs county of Erzurum province (Aydın et al. 2016). However, Han and Bakır (2010) in Ergani county of Diyarbakır province, Köseman ve Şeker (2016) in Malatya, Güler et al. (2017) in Narman county of Erzurum province, and Bakır and Kibar (2020) in Muş province reported similar findings for the percentages of detached barns (90.4%, 91.9%, 85.8%, and 75% respectively). An increase in the number of detached barns over the years is desirable in terms of animal health, welfare, and milk yield traits.

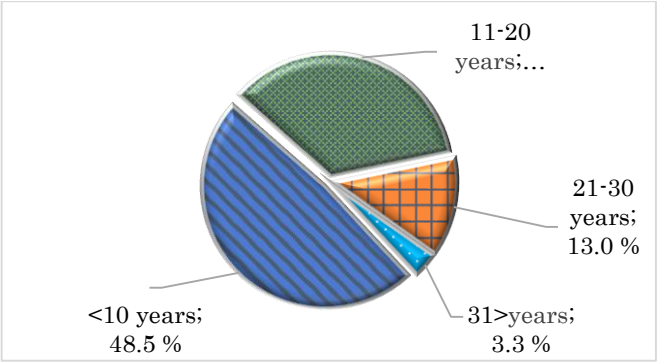


Figure 4. Usage time of the barns
Şekil 4. Ahırı kullanma süresi.

Stone (72.8%) and briquette (24.3%) were mostly used as building materials on the walls of the barns (Figure 5). The use of stone as a wall building material in the central county of Ağrı province is quite common because it is supplied easily and economically in the region. Many researchers reported that the stone material was widely used in the construction of animal barns, especially in foundations and walls (Tugay and Bakır 2006; Han and Bakır 2010; Şeker et al. 2012; Tilki et al. 2013; Daş et al. 2014; Özyürek et al. 2014).

It was determined that the roof of the barns in the county was mostly made of sheet metal (72.8%) and some of them had no roof and were made of soil (mud) (22.8%) (Figure 6). Özyürek et al. (2014), Bardakcıoğlu et al. (2004) and Güler et al. (2017) reported the percentages of sheet metal usage as a roofing material as % 64.7, % 56.5, and %48.1 in Çayırlı county, Aydın province, and Narman county, respectively. It was reported by Bakır and Kibar (2020) that the percentages of the gable, mudbrick, and concrete as the roof material of the barns in Muş province were 61.6%, 30.8%, and 7.6% respectively. In addition, researchers stated that the differences among barns were related to whether the barn was under the house or detached, and there was a positive relationship between the rate of barns under the house and the mud rooftop.

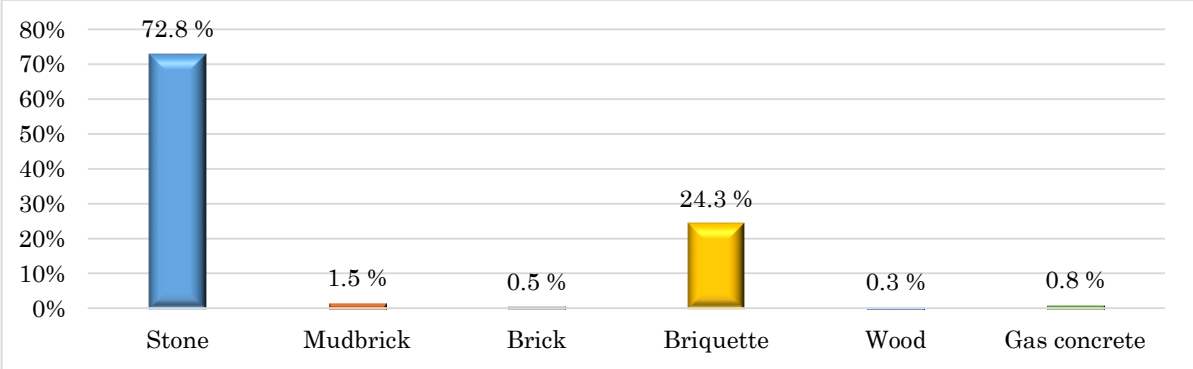


Figure 5. Building materials used for the construction of barn walls
Şekil 5. Ahır duvarlarında kullanılan yapı malzemeleri

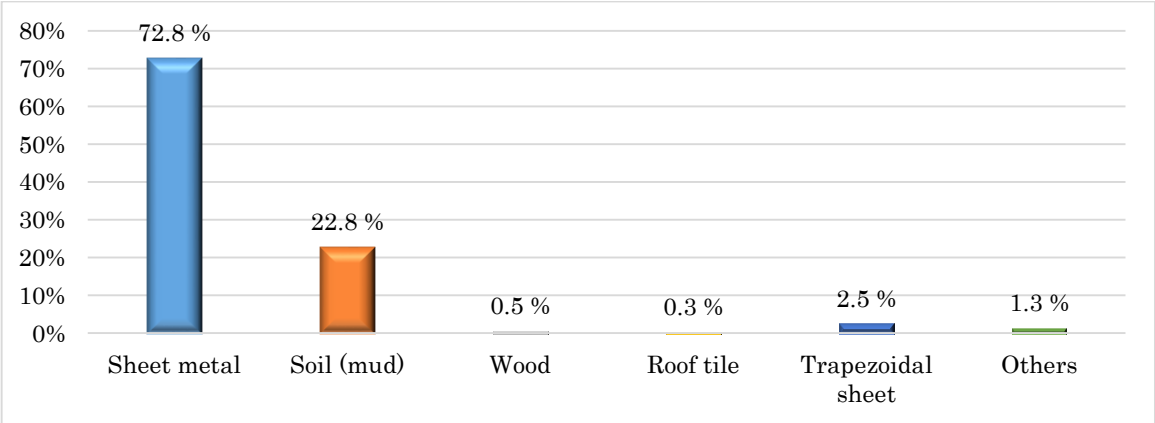


Figure 6. Building materials used for the construction of the barn roof
Şekil 6. Ahır çatısında kullanılan yapı malzemeleri

The materials used in the building of the barn floor were concrete in 88.8% of the enterprises (Figure 7). It was determined that in 10.0% of the enterprises the barn floor was made of stone and the material of the barn floor was soil only in 1.0% of the enterprises. It is suggested that the floor of the animal barns should be stable, impermeable, resistant to chemicals and urine, and easy to clean (Özhan et al. 2009; Yıldız 2013).

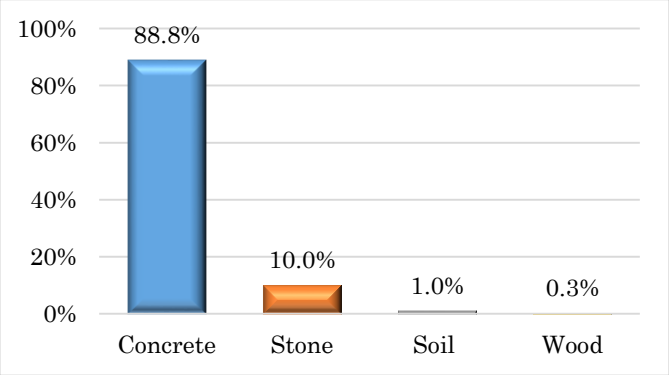


Figure 7. Building materials used in the construction of barn floor.
Şekil 7. Ahır tabanında kullanılan yapı malzemeleri.

In many studies conducted in different provinces and counties of Turkey, it was reported that the use of concrete as a building material in the floors of the barns was quite common (Yener et al. 2013; Özyürek et al. 2014; Mundan et al. 2018; Demirhan and Yenilmez 2019; Bakır and Kibar 2020). Şahanoğlu and Koçak (2014) stated that the barn floor material was concrete in all farms in Afyonkarahisar province, and plain concrete (without notches) floor material negatively affects animal welfare due to the lower usage of stalls and beddings. The rest and the level of welfare of animals increases in enterprises that use stalls and beddings (Haley et al. 2000; Ondarza 2000). The concrete (74.4%) was also reported to be the most commonly preferred floor material for cattle barns in the state of Pennsylvania, USA (Vasseur et al. 2010).

Figure 8 illustrates the structural elements used in the barns of the cattle enterprises in the central county of Ağrı province. It was revealed that there were generally standard structural elements in the barns, only a minority of the enterprises had feed alley (15%) and automatic waterers (2.8%) that would make the daily work easier.

The number of enterprises having feed alleys and automatic waterers in their barns was low in other studies, as well. It was found out that only 6.3% of the cattle farms in Narman county have a feed alley and 6.7% have automatic waterers, percentages of the enterprises having other structural elements (feeder, window, urine drainage channel, chimney, vents) were reported to be at similar levels with the present study (Güler et al. 2017). It was reported that 78.1% of the enterprises in Niğde province do not have ventilation chimneys in their barns (Ünalan et al. 2013).

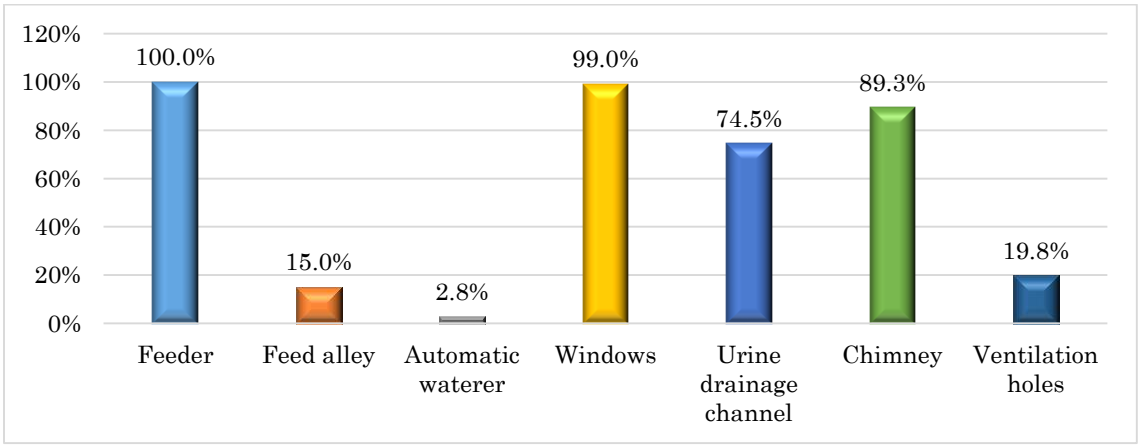


Figure 8. Structural elements found in the barn.
Şekil 8. Ahırda bulunan yapılar

If the number and size of windows are sufficient in closed barns, there is no need for electrical lighting. The windows are important in the planning of barns in terms of ventilation and lighting. Window area should be 1/15 - 1/20 of the barn floor area to provide enough light (Özhan et al. 2009). In response to the question asking how they illuminate the barn during the day, %39.3, 37.3%, 23.5% of the farmers respectively replied that they illuminate the barn by both electricity and windows, by windows, and by electricity (Figure 9). Similar results concerning the lighting of the barns (63.5% natural, 36.5% electricity) were reported by Aydın et al (2016) in Hınıs county of Erzurum province. It was also reported by Daş et al. (2014) that almost all of the barns in Bingöl province were illuminated by electricity and the number of enterprises that provide

natural illumination was very few. The percentage of barns illuminated by electricity was relatively low in the central county of Ağrı province. However, this type of lighting decreases income since it is an important expense for cattle enterprises. Thus, the use of natural lighting in the daytime through windows should be more widespread among breeders since it is more economical.

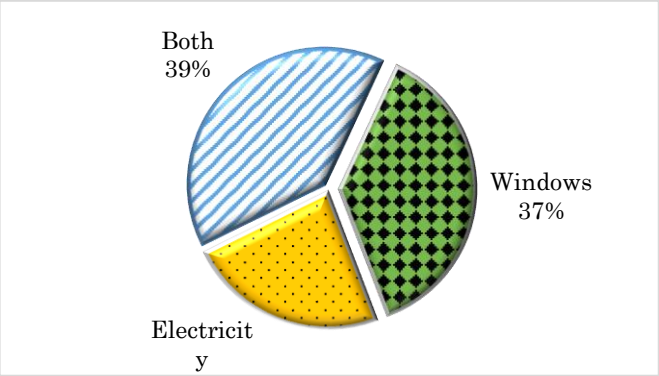


Figure 9. The methods of lighting the barn in the day time
Şekil 9. Ahırları Gündüz Aydınlatma Yöntemi

The number of windows in the barns is important in terms of lighting and this number may vary according to the size of the barn. As shown in Figure 10, the percentage of enterprises with 3-6 windows in the barn was considerably high (75.1%). Similarly, Aydın et al. (2016) indicated that the barns with 3 (36.3%) and 4 (40.0%) windows were quite common in the enterprises in Hınıs county of Erzurum province. Güler et al. (2017) reported that the percentage of the barns with 2 windows (47.5%) were widespread in Narman county and this was followed by the barns with 4-5 windows.

The number of ventilation chimneys in the barn is important for removing the hot and dirty air, excessive humidity, bad odor, and gases. The number of chimneys differs among enterprises just as the number of windows. It could be seen in Figure 11 that the percentage of enterprises with 2-4 chimneys was quite high in the central county of Ağrı province. Similarly, Aydın et al. (2016) reported that most enterprises in Hınıs county of Erzurum province have 2, 3, and 4 chimneys in their barns. In Narman county of Erzurum province, it was revealed that the majority of the enterprises have 1 or 2 (45.7% and 40.0%) chimneys in the barns (Güler et al. 2017). Tilki et al. (2013) determined that there were no ventilation chimneys in 6.3% of the enterprises in Kars province, while there was only 1 ventilation chimney in 3.6% of the surveyed enterprises.

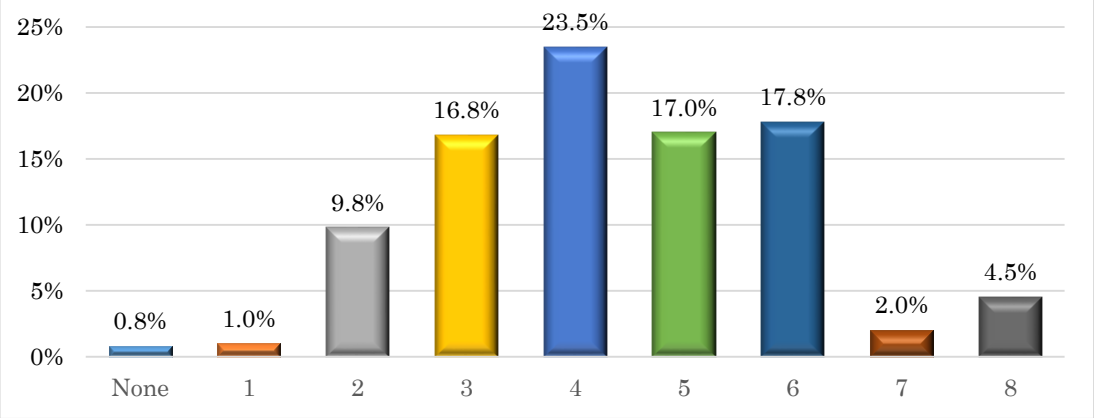


Figure 10. Number of windows available in the barn.
Şekil 10. Ahırda bulunan pencere sayısı

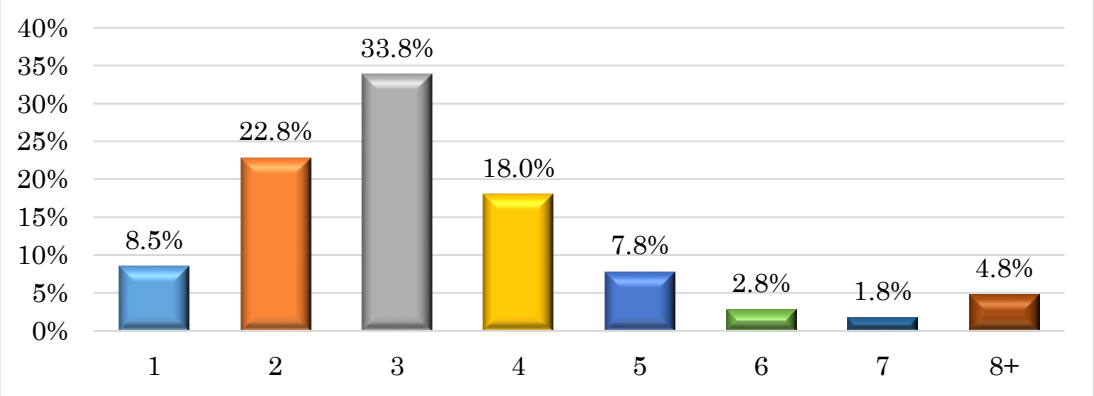


Figure 11. Number of chimneys in the barn
Şekil 11. Ahırda bulunan baca sayısı

Of the survey participants, 91.5% indicated no separate pens or sections for sick animals and cows to give birth in the barn. However, only 8% of them stated that there was a separate section in their barns. The breeders should be taught that keeping sick animals in a separate place is highly beneficial for preventing the spread of diseases. Similar to the findings of the current study, Şahanoğlu and Koçak (2014) reported that the presence of maternity wards (2.0%), sick animal pens (1.0%) and manure storage (8.9%) in farms in Afyonkarahisar province was quite low and this could adversely affect the welfare of animals.

It is known that raising the calves separately in the barn or keeping them in a separate place called the calf unit is favorable for the health of the calves. In the present study, it was revealed that 88% of the enterprises had separate calf units (Figure 12a). It was also found out that the calves in the majority of the enterprises (87.5%) were housed in the separate group sections in the same barn, and the calves in a small percentage of the enterprises (12.3%) were kept in the same barn with their dams (Figure 12b). There was no enterprise having individual calf units in their barns in the central county of Ağrı province. In the studies conducted in Turkey, it was reported that keeping calves in separate group sections in the same barn is common. The percentages of the enterprises having separate group sections for calves in their barns were reported as 93.9% in Aydın province (Bardakcıoğlu et al. 2004), %76.6 in Kars province (Tilki et al. 2013) and %64.4 in Narman county of Erzurum province (Güler et al. 2017). It was also reported that 72.3% of the enterprises in Niğde province have calf units in the barns (Ünalan et al. 2013).

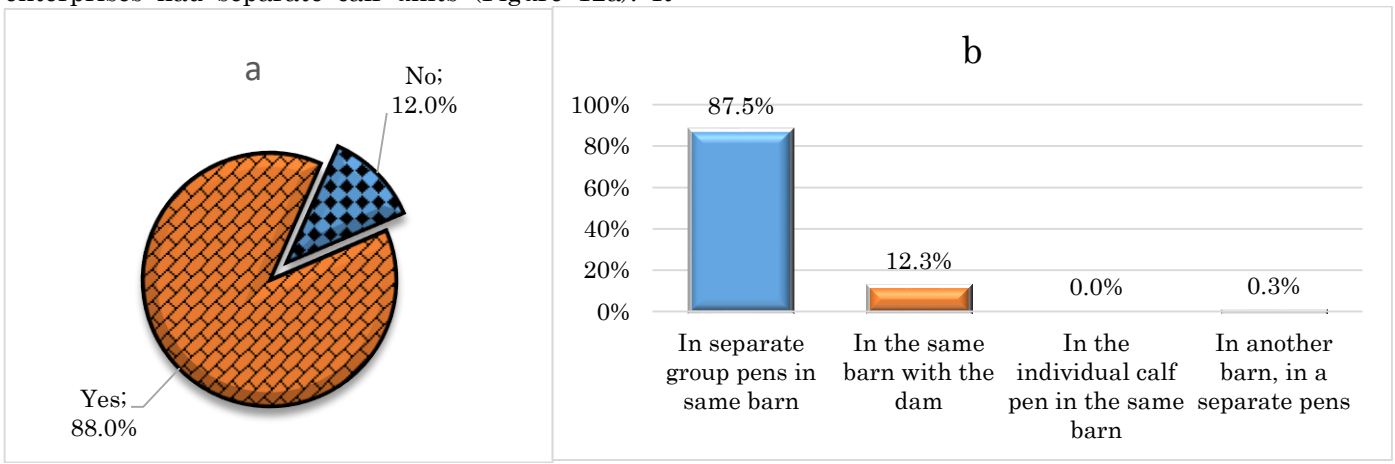


Figure 12. Status of having separate compartment for calves in the barn (a) and housing type of the calves (b)
Şekil 12. Ahırda buzağılara ait ayrı bir bölme bulunma durumu (a) ve barındırma şekli (b)

The percentage of the cattle farms raising the calves in separate units before weaning is lower than the percentages reported as % 87.9 in Canada and % 67.0 in the USA by Vasseur et al. (2010). This difference may be due to the fact that the cattle farms in Canada and the USA are generally large and intensive enterprises.

It was also determined that in the majority of the farms, heifers, calves, and dry cows are raised together (97.5%); only in 2.5% of them they are raised separately. These findings agree with the finding of Aydın et al. (2016) and Güler et al. (2017).

The percentage of respondents that use bedding was found to be very low in the current study. Only 15% of the surveyed enterprises used bedding for cattle and 85% of them did not have bedding material in their barns (Figure 13a). Similarly, it was reported that 93.4% of the enterprises in Diyarbakır (Han and Bakır 2010), 55.9% of the enterprises in Muş (Şeker et al. 2012), 79.7% of the enterprises in Niğde (Ünalan et al. 2013), 81.0% of the enterprises in Hınıs county of Erzurum province (Aydın et al. 2016) and 65% of the dairy cattle enterprises in Uşak (Demirhan and Yenilmez 2019) did not use bedding materials in the cattle barns. It was also found out that stems of different grains (54.4%) and dry manure (35.1%) were widely used as bedding materials in the enterprises in the central county of Ağrı province (Figure 13b). Likewise, dry manure was reported to be a common bedding material in Aksaray (Tatar 2007), Hınıs county (Aydın et al. 2016), Narman county (Güler et al. 2017), and dairy farms in Uşak (Demirhan and Yenilmez 2019). It was reported by Heinrichs et al. (1987) and Vasseur et al. (2010) that the use of straw and stem of different grains as bedding material was much higher in developed countries. Additionally, it was also revealed that 60% of the cattle barns in Kahramanmaraş used wheat straw as bedding material (Kaygısız and Tümer 2009).

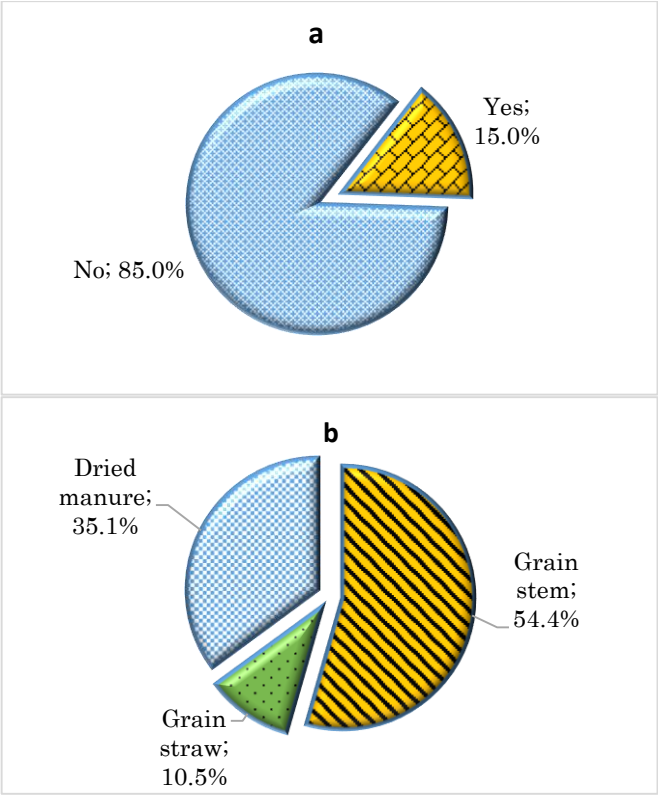


Figure 13. Status of bedding usage in the barn (a) and the type of bedding used (b).

Şekil 13. Yataklık kullanma durumu (a) ve Kullanılan yataklık türleri (b).

In reply to the question of which methods were used to meet the need of animals for drinking water, 51.5% of the respondents stated that the majority of the enterprises provided the water needs of the animals with buckets (51.5%) and the village fountain or trough (43.8%), a small percentage of the animals were watered by automatic waterers (3.0%) or by filling the feeders with water (1.8%) (Figure 14).

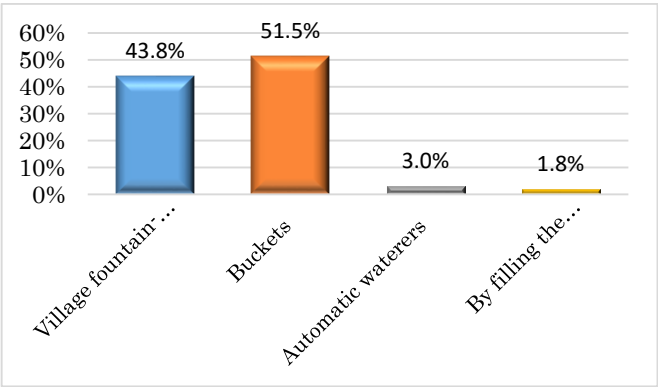


Figure 14. The methods used by the enterprises for meeting the water needs of animals.

Şekil 14. İşletmelerde hayvanların su ihtiyaçlarını karşılamak için kullanılan metotlar.

The village fountain or outside watering method was reported in 85.0%, and 69.0% of the cattle farms in Çukurova region as well as in Van province by Yıldız (1988) and Bakır (2002) respectively. Additionally, a higher percentage (% 100.0) of trough usage was also reported in Bingöl province by Daş et al. (2014).

As in the central county of Ağrı province (3.0%), other studies carried out in Turkey confirmed that automatic watering systems are not commonly used in cattle barns. In various regions of Turkey, percentages of enterprises using automated watering systems were reported as 9.0% in Van (Bakır 2001), 18.0% in Ankara and 10.6% in Aksaray (Tatar 2007), 22.4% in Hınıs county (Aydın et al 2016) and 6.7% in Narman county (Güler et al. 2017). The percentage of automatic watering systems in dairy cattle farms in Afyonkarahisar province was stated as 18.8%, and most of the enterprises (81.20%) used buckets, wheelbarrows, and feeders as waterer (Şahanoğlu and Koçak 2014). In addition, animals in Afyonkarahisar were watered after feeding, and it was pointed out that this practice led to a welfare problem since the water intake of animals was restricted.

Answers given by the owners of the enterprises to the questionnaire demonstrated that the animals are watered 3 times a day in 87.0% of the cattle farms in the cenral county of Ağrı Province. Similarly, it was reported by several researchers that watering of the animals 3 times a day in cattle enterprises was also widespread practice in other regions of Turkey (Akman and Özder 1992; Aydın et al. 2016; Güler et al. 2017).

The status of practicing general cleaning (including disinfection, dye, and whitewashing) in the barns of the enterprises and the frequency of general cleaning during the year are presented in Figures 15a and b. General cleaning of the barns was done in 62.3% of the enterprises while it was not done in 37.8% of them. Although the percentage of enterprises that general cleaning is performed seems to be high, the share of those in which general cleaning is not practiced is worrying. It was determined that 72.9% of enterprise owners who do general cleaning in the barns clean once a year, and 19.1% clean twice. The percentage of the enterprises that the barn was cleaned 3-4 times a year was less. In some studies, conducted in Turkey, it was reported that general cleaning was carried out 2 times or more, at least once a year (Ünalan et al. 2013; Aydın et al. 2016; Güler et al. 2017).

The manure almost in all of the enterprises was cleaned by human power (99.3%) and the manure was stored without any cover near the barn in 63% of the enterprises in the central county of Ağrı province. The result was in agreement with findings of (Tilki et al. 2013; Şahanoğlu and Koçak 2014; Aydın et al. 2016; Demirhan and Yenilmez 2019; Bakır and Kibar 2020).

The dirtiness of the animals in the enterprises paves the way for the formation of udder diseases, thus reducing the welfare level of the animals (Ellis et al. 2006; De Wolf 2009). In Canada, percentages of the enterprises that use lined or cement pits, lagoons or dugouts and above-ground tanks for manure storage were 53.0% 39.0% and 10%, respectively (Sheppard et al. 2011). Meyer et al. (1997) reported that 95.9% of the surveyed enterprises had storage or treatment ponds for manure storage in California state of the USA.

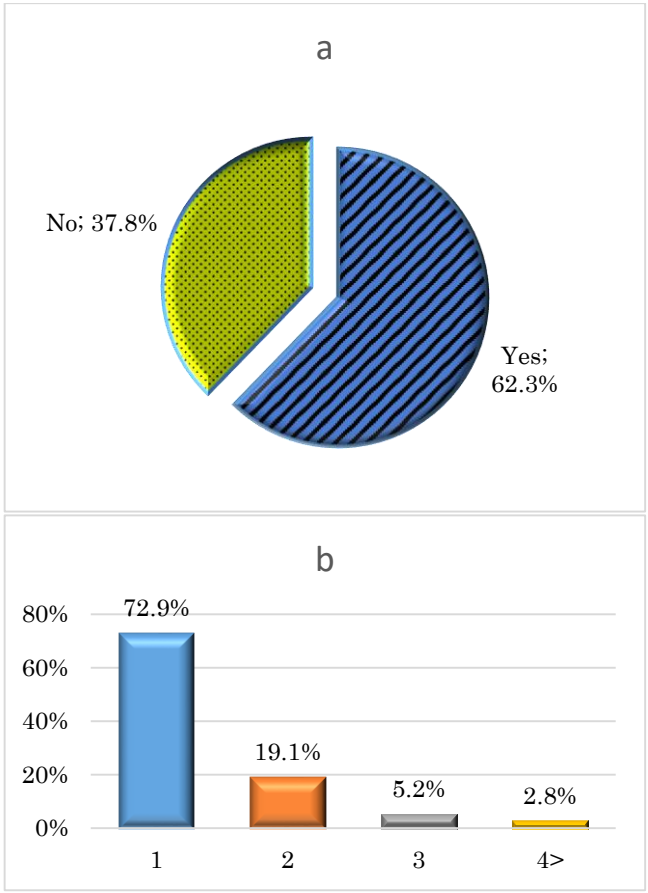


Figure 15. Status of general cleaning (dye-whitewash and disinfection) practice in the barns of the enterprises (a) and the frequency of general cleaning per year (b).

Şekil 15. İşletmelerin ahırlarında genel temizlik (Boya-badana, ilaçlama ve dezenfeksiyon) yapma durumu (a) ve yılda genel temizlik yapma sıklığı (b).

The utilization of manure is classified and presented in Figure 16. In the Eastern Anatolia Region, manure is still used for heating purpose in rural areas during winter season. The enterprises that use manure for heating were close to half of the farms (48%). While 51.0% of the enterprises in total used manure as fertilizer in their fields, the percentage of those who used it only as fertilizer was 26.8%, and the share of those who used it both for heating and as fertilizer in the field was 24.3%.

Özen and Oluğ (1997), Kaygısız and Tümer (2009), Boz (2013), Aydın et al. (2016) and Güler et al. (2017) stated that the percentage of the enterprises that utilized the manure as fertilizer in the field was high in their studies. Unlike Turkey, Dou et al. (2001) reported that 67.0% - 82.0% of the enterprises in Pennsylvania store the manure in solid or packaged form, while Sheppard et al. (2011) reported that the enterprises in Canada used almost all of the enterprises for plant production as fertilizer. The findings of the present study in terms of using manure as a source of heating in the central county of Ağrı was similar to the findings of Han and Bakır (2010) and Bakır and Kibar (2020).

CONCLUSION and SUGGESTIONS

The determinations and suggestions made considering the data obtained as a result of the survey conducted on the barn and environmental characteristics of the enterprises in the central county of Ağrı province can be summarized as follows;

It is necessary to provide technical information and financial support by the relevant official institutions to immediately improve the unfavorable barn conditions in the central county of Ağrı province. In this context, the barn walls must be made of briquettes instead of stones to be earthquake resistant and healthier. The use of natural lighting in the barns from the windows should be widespread. Furthermore, in order to reduce humidity, odor, and temperature, the barns must be furnished with an appropriate number of chimneys and existing chimneys must be kept open.

It is highly required to increase the use of bedding in the enterprises to reduce knee and other injuries, mastitis incidence and ensure hygienic milk production in the enterprises. It would be appropriate to use automatic waterers or install a watering system inside the barn in order to provide the animals with a constant water supply. It was also determined that there are no maternity wards for pregnant cows in the region's enterprises, and it would be beneficial for enterprises to keep a maternity ward in order to decrease calf mortality and to raise healthy calves. It is suggested that cooperation of the relevant institutions for technical information support, and investment incentives, and training programs for the farmers are highly required for profitable cattle husbandry in the county.

Statement of Conflict of Interest

Authors have declared no conflict of interest.

Author's Contributions

Authors declares the contribution of the authors is equal.

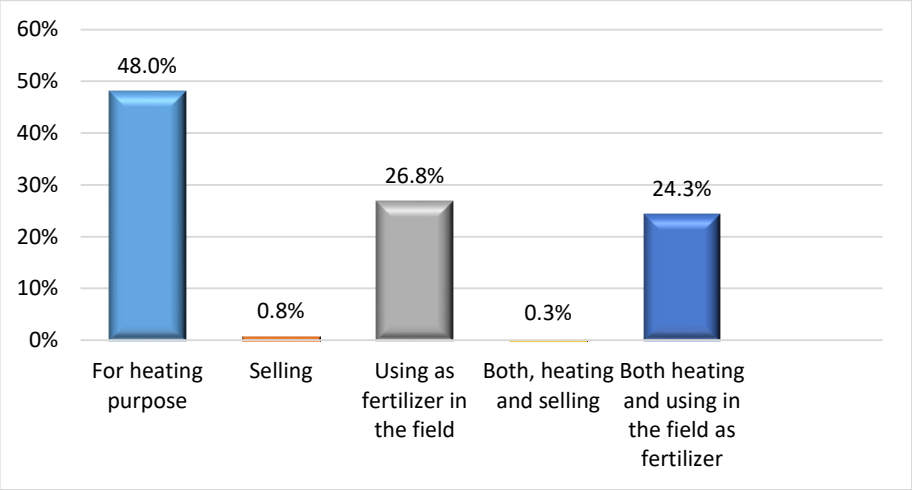


Figure 16. Manure utilization methods
Şekil 16. Gübreyi değerlendirme yöntemleri

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