



Breeding practices regarding the barn characteristics in the cattle enterprises in İspir district of Erzurum province of Turkey

Erzurum ili İspir ilçesindeki sığırcılık işletmelerinin barınak özellikleri ile ilgili yetiştirme uygulamaları

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Ö Z E T / A B S T R A C T

Aims: This study was carried out in order to determine the current situation and problems in the cattle breeding practices related to shelter characteristics in İspir district of Erzurum province and to provide solutions.

Methods and Results: In this research, a face-to-face survey was conducted with 394 business owners selected by a random sampling method among cattle farms in İspir district of Erzurum province. Chi-square and frequency analyzes were performed in the statistical evaluation of the obtained data. It was determined that 97.2% of the surveyed enterprises did not have separate maternity wards in their barns. While the majority of the enterprises housed heifers, young cattle and dry cows together (90.4%), only 9.6% of them housed them separately. It was also determined that the percentages of enterprises providing bedding for cattle in the district were considerably low (12.4%). Grain straw (6.6%) and sawdust (3.3%) were the most popular bedding materials. The enterprises watered their animals through village fountains (90.1%), troughs (70.6%) or carrying the water by the bucket (33.5%). Of all the surveyed enterprises, 54.8% performed general cleaning once a year, while 33.0% twice and 12.2% three times. In 62.9% of the enterprises, manure was used as fertilizer in the fields, and a significant part of the enterprises preferred to utilize manure as fuel (34%). Most of the participants stated that they believed that the cattle would be uncomfortable and that their productivity would decrease at 10-15 °C, which is the optimal temperature for the cattle.

Conclusions: The findings of the study demonstrated that there were some improper and deficient practices in the district in terms of breeding practices related to barn characteristics and a large educational campaign on this subject was required for cattle breeders.

Significance and Impact of the Study: There are some structural and nonstructural elements in the barn that help the cattle to perform their natural behaviours indirectly increase productivity and ease the work in the enterprises. With this study, the status of cattle enterprises in İspir district in terms of breeding practices related to barn characteristics was determined and some suggestions were made regarding current problems.

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INTRODUCTION

The main purpose of cattle breeding is to obtain the highest possible yield at the minimum cost. This can only be possible if the animals on the farm are fed adequately and have the appropriate genetic structure. Another requirement for profitable cattle farming is to provide appropriate environmental conditions in the barn. The terms environmental conditions cover all factors that affect the growth, development, and production of animals. The welfare of the cattle in the enterprise is very important for profitable farming. Providing better welfare is only possible by taking the needs of the cattle into consideration while building the barn and taking care of the animal. There are some structural and nonstructural elements in the barn that help the cattle to perform their natural behaviours so that indirectly increase the productivity and ease the work in the enterprises.

Erzurum is one of the leading provinces in Turkey in terms of cattle breeding. There were 827806 heads of cattle and 315594 dairy cows in the İspir district in 2019 (TUIK, 2021). The district is located 143 km northwest of Erzurum city center at the intersection of North East Anatolia and the Eastern Black Sea Region and is surrounded by high mountains. Its altitude from sea level is 1180 m. The area of the district is 2244 km². There are many mountains, large and small, between 2400 and 3900 meters in height within the district borders. The Çoruh River, one of the fastest flowing rivers in the world, passes through the İspir district. The climate prevailing in İspir is a transitional climate between continental climate and marine climate. This climate feature leads to the formation of different climates in the district at the same time. Compared to other counties of Erzurum, the climate of İspir is milder in winters. The average temperature for the year in İspir is 10°C. The warmest month is July with an average temperature of 21.7°C while the coolest month is January with an average temperature of -2.2°C. The average amount of precipitation for the year in İspir is 475 mm. The month with the most precipitation is May with 63.5 mm of precipitation and the month with the least precipitation is August with an average of 20.3 mm. According to actual data, there were 21924 cattle and 8263 dairy cattle in 2019 in the district, the total milk production was 24483 tons (TUIK, 2021).

Many researchers conducted studies to determine the barn characteristics and reveal the different breeding practices in cattle enterprises in different regions of Turkey (Aydın et al., 2016; Güler et al., 2017; Mundan et al., 2018; Tapkı et al., 2018a; Tapkı et al., 2018b; Ünlü,

2018; Alkan and Güney, 2019; Bakır and Kibar, 2019; Bakır and Kibar, 2020; Kılıç et al., 2020; Öcal 2020; Tapkı et al., 2020; Yılmaz et al., 2020; Kaygısız and Özkan, 2021). Although studies were conducted to determine the structural characteristics of barns in cattle enterprises in some counties of Erzurum province (Çapadağ, 2016; Diler et al., 2016; Diler et al., 2018), no study has been carried out in terms of breeding practices regarding the barn characteristics in İspir district. This research was carried out in this district that is distinctive for its climatic conditions in Erzurum province, to reveal the deficiencies in terms of cattle breeding practices with respect to barn characteristics in cattle enterprises in the İspir district of Erzurum province.

MATERIALS and METHODS

The study has been approved by Atatürk University Faculty of Agriculture Ethics Committee (Approval Number:E-75366018-000-2100363356) Chairmanship and then was conducted on the owners of randomly selected dairy cattle enterprises in İspir district of Erzurum province. A survey was conducted face-to-face with 394 owners of cattle enterprises in the İspir district of Erzurum province, and the data obtained from the questionnaire comprised the material of the present study. The enterprises were visited and the current situation was tried to be revealed by observation together with survey questions. 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).

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

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 $\alpha=0.05$), p=The rate to be calculated (0.5), q=1-p.

$$n = \frac{2107 \cdot (1.96)^2 \cdot 0.5 \cdot (1 - 0.5)}{(2107 - 1) \cdot (0.05)^2 + (1.96)^2 \cdot 0.5 \cdot (1 - 0.5)} = 325$$

The estimated sample size was calculated to be as approximately 325 with the formula given above. The number of surveys increased by 21.23% and the final number of surveys to be carried out in the villages of the

İspir district of Erzurum province was determined as 394. The number of cattle in the enterprises was classified as less than 11, 11-20, 21-30, 31-40, and more than 40 heads. Additionally, educational status of the owners of the enterprises were grouped as illiterate, literate, Primary School graduate, Secondary School graduate and High School graduate. Chi-Square analysis available in the SPSS statistics program was used to determine effects of the number of cattle and the educational status of the owners of the enterprises in the enterprises on the structural characteristics of cattle barns in the enterprises (SPSS, 2011).

RESULTS and DISCUSSION

Calving paddocks are important for the calves to be born in a hygienic environment. Otherwise, calf losses can

occur due to microbial infections. They are also crucial in establishing the organic bond between mother and calf and in preventing calves from being harmed by other animals. It was determined that 97.2% of the surveyed enterprises did not have a separate calving paddocks maternity wards (Figure 1). Similarly to the study findings, Çapadağ (2016) reported that 88% of the enterprises in Yakutiye district did not have any separate calving paddock. Şahanoğlu and Koçak (2014) reported that the presence of paddocks (2.0%), infirmary section (1.0%) and manure storage (8.9%) in farms in Afyonkarahisar province was quite low and can negatively affect the welfare of animals.

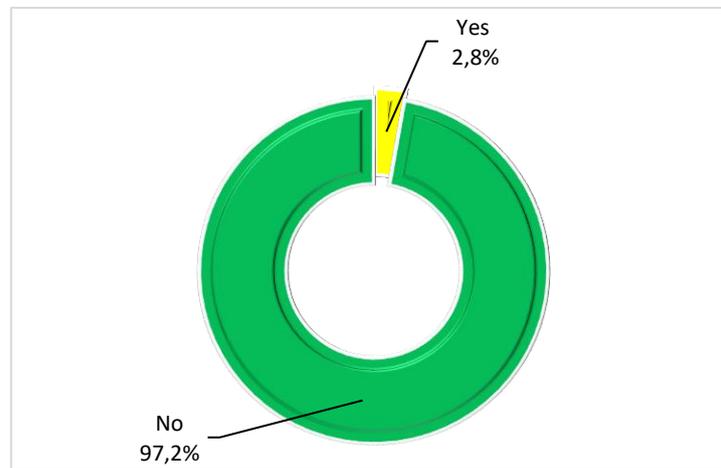


Figure 1. Do you have a calving paddock for pregnant cows?

It is important that the health, control and management of the calves are housed separately in the barn or in calf units independent of the barn (Tüzemen and Yanar, 2013). It was determined that the majority of the enterprises in the district housed their calves (93.9%) in the same barn but in separate calf group pens, and a very low (2.3%) percentage of them kept the calves together

with their dams in the same barn. The number of enterprises that had individual calf pens in their barns was considerably low (Figure 2). It was determined that the care, feeding and housing practices of young animals in separate calf pens were significantly affected by the size of the enterprise ($P<0.01$) and the education level of the owners ($P<0.01$).

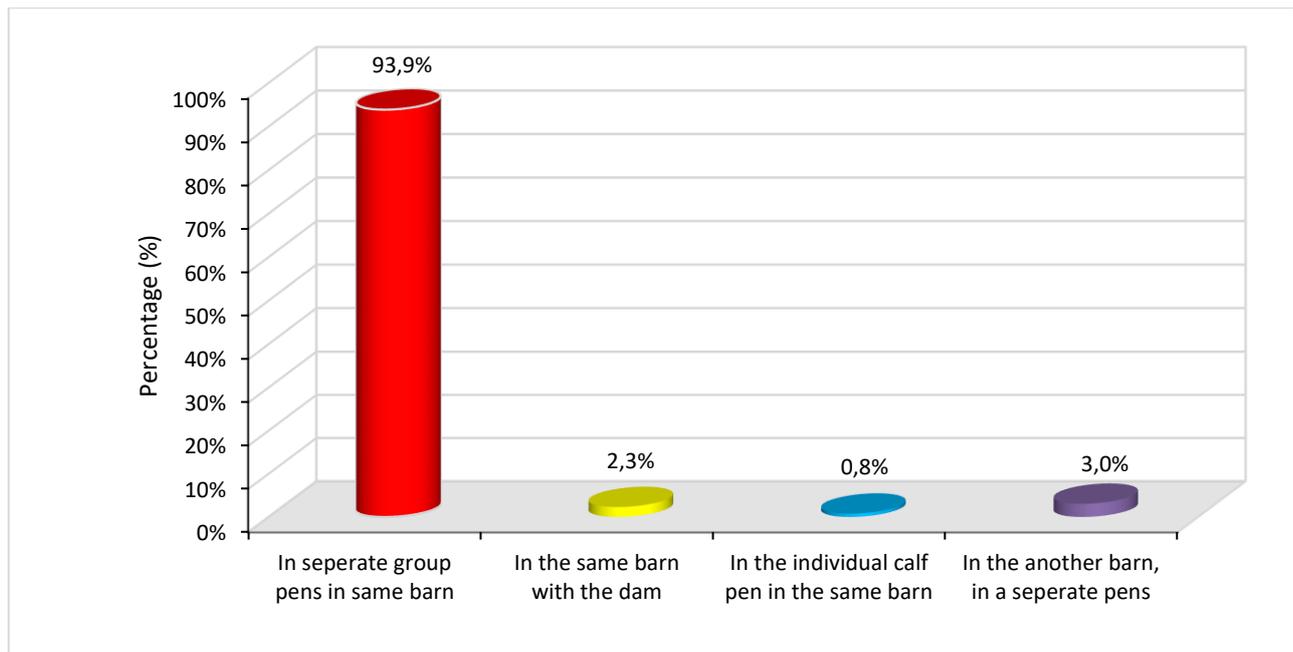


Figure 2. How do you house your calves?

The practice of housing calves in separate calf pens in the same barn is quite common in Turkey. The percentages of enterprises performing this practice in their barns were reported as 93.9%, 76.6%, 100.0%, and 64.4%, in Aydın province (Bardakçioğlu et al., 2004), Kars province (Tilki et al., 2013), Ağrı province (Bakan, 2014) and Narman district of Erzurum province (Güler et al., 2017), respectively. On the other hand, in Niğde province 72.3% of cattle farms were reported to keep their calves in calf group pens under the same barn roof (Ünalın et al., 2013). The percentages of enterprises that house calves before weaning in separate calf barns in individual pens were quite low in the district. (3.0%), Vasseur et al. (2010) reported that 87.9% and 67.0% of cattle enterprises in Canada and the USA had separate calf

barns in their enterprises. The reason for his significant difference may be the fact that in countries such as Canada and the United States, the enterprises are generally large and intensive.

It was determined that the majority of the enterprises housed heifers, young cattle and dry cows together (90.4%), and only 9.6% of them housed them separately (Figure 3). The findings were found to agree with the findings of Aydın et al. (2016) and Güler et al. (2017). It was also determined that the choices of housing of heifers, calves, and dry cows together in the same barn were significantly ($P<0.01$) affected by the size of the farm and the education level of the farm owners in İspir district.

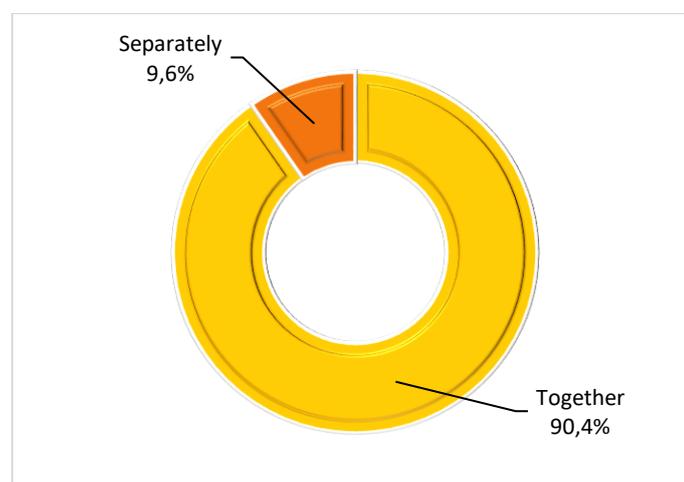


Figure 3. The status of housing heifers, young cattle and dry cows together or separately

The percentages of enterprises providing bedding for cattle in the district were determined to be considerably low (12.4%). (Figure 4). Similarly, it was reported that among cattle enterprises 93.4% in Diyarbakır (Han and Bakır, 2010), 55.9% in Muş (Şeker et al., 2012), 79.7% in Niğde (Ünalın et al., 2013), 81.0% in Erzurum (Hınıs district) (Aydın et al., 2016), 77.3% Malatya provinces (Köseman and Şeker, 2016) and 65.0% in Uşak province

(Demirhan and Yenilmez, 2019) did not use bedding material. As it can be seen from the literature reports and the results of the current study, the choice of bedding usage was considerably low in Turkey. On the other hand, bedding relationship between bedding use and the educational status of the operators was significant ($P < 0.05$).

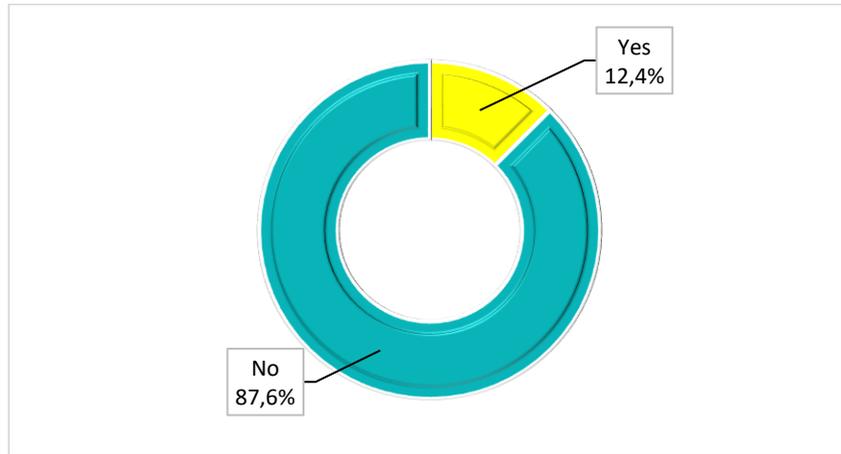


Figure 4. Do you provide bedding for cattle in the barn?

It was determined that grain straw (6.6%) and sawdust (3.3%) were widely used as bedding material in the cattle enterprises (Figure 5). Heinrichs et al. (1987) and Vasseur et al. (2010) reported that the use of straw and stem of different grains as bedding material was much higher in developed countries. On the other hand, 60% of the enterprises were reported to use wheat straw as bedding material in Kahramanmaraş (Kaygısız and Tümer, 2009).

In similar studies, the use of dry manure as bedding material was reported to be more common in Aksaray

(Tatar, 2007), Malatya (Köseman ve Şeker, 2016), Hınıs (Aydın et al., 2016) and Narman (Güler et al., 2017) districts of Erzurum and dairy cattle enterprises in Uşak (Demirhan and Yenilmez, 2019) compared to İspir district. It is known that not providing bedding to cattle on dairy cattle farms has a negative impact on yield. However, it is recommended not to use materials that contain pathogenic microorganisms, such as manure. The use of dry manure as bedding material in the district is quite low, but it is still one of the important misapplications.

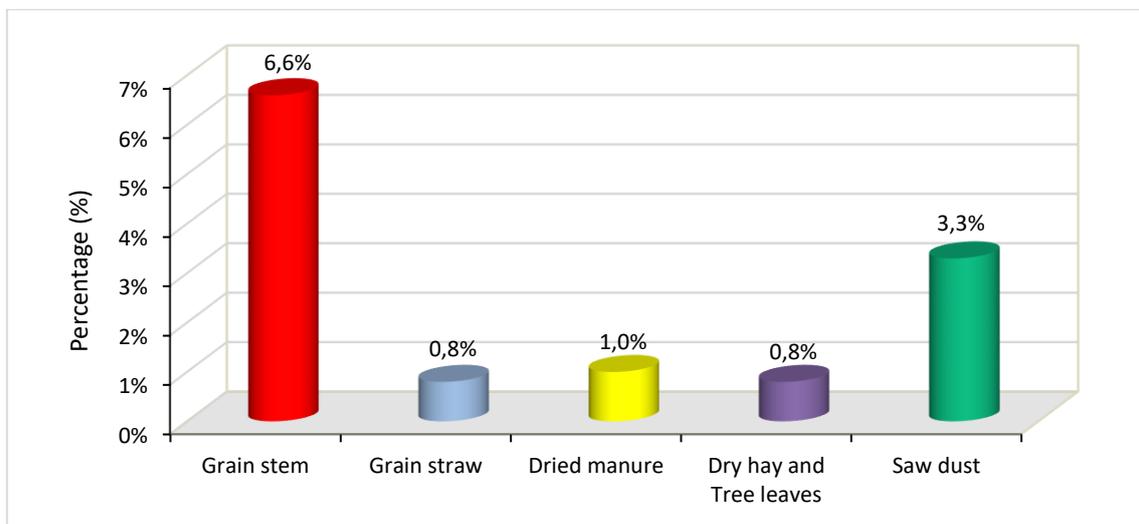


Figure 5. Bedding types

In Figure 6, the methods are presented to meet the water needs of the cattle. Enterprises generally watered their animals through a village fountain (90.1%), a trough (70.6%), or carrying the water through a bucket (33.5%). The percentage of participants who had automatic watering in their barns and those who stated that they watered their cattle by filling the feeders with water was considerably low (1.8% and 3.8, respectively) in İspir district.

Similarly, the percentages of the enterprises that watered their cattle outside of the barn or in the village fountain were reported as 85.0% and 69.0% in Çukurova district of Adana province and Van Province by Yıldız (1988) and Bakır (2002), respectively. On the other hand, Bakan (2014) and Daş et al., (2014) reported that in Ağrı Province (94.3%) and Bingöl Province (100.0%), the use of troughs to water cattle was quite common.

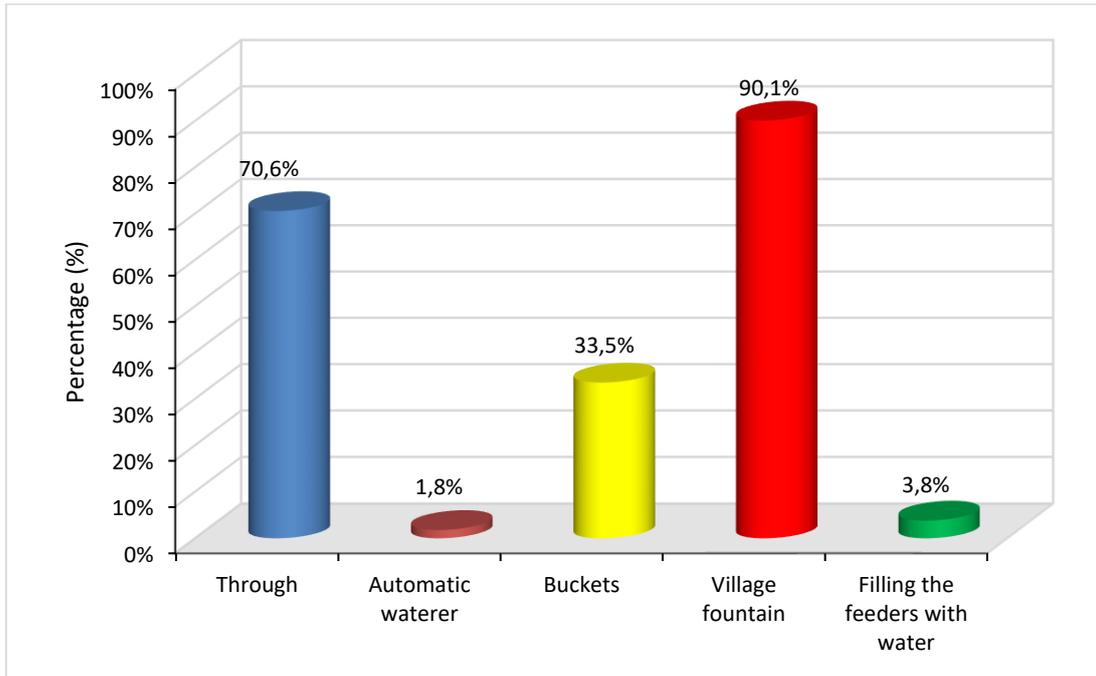


Figure 6. The method of meeting the water needs of the animals

In many studies it was reported that the use of automatic water trough was considerably low as it is in İspir district. The percentages of the enterprises that had automatic water troughs were reported as 9.0% in private enterprises in Van province (Bakır, 2001), 18.0% in Ankara and 10.6% in Aksaray (Tatar, 2007), 22.4% in Hınıs district (Aydın et al., 2016), 6.7% in Narman district (Güler et al., 2017). Şahanoğlu and Koçak (2014) reported that the proportion of the enterprises who used automatic waterers (18.8%) was low in dairy cattle farms in Afyonkarahisar, and most of the businesses (81.20%) used buckets, wheelbarrows or feeders as drinkers, and watering was performed after feeding. They also stated that this practice can cause animals to consume a limited amount of water or become dehydrated, and this may create an important problem

of animal welfare in cattle enterprises.

In cattle farming, it is quite important to meet the water needs of cattle in line with their feed consumption. The most adequate watering method is to use an automatic water trough, where animals have free access to water. It was determined that the animals were watered twice a day (94.9%) in the farms in İspir district (Figure 7). This application is insufficient to meet the daily water needs of the animals. It was also determined that there was a statistically significant ($P < 0.01$) relationship between the frequency of watering and the level of the education and the size of the farm. Köseman and Şeker (2016) reported that cattle farms in Malatya watering were practiced twice a day in 50.2% of the cattle farms and in 43.6% of the enterprises cattle had free access to water.

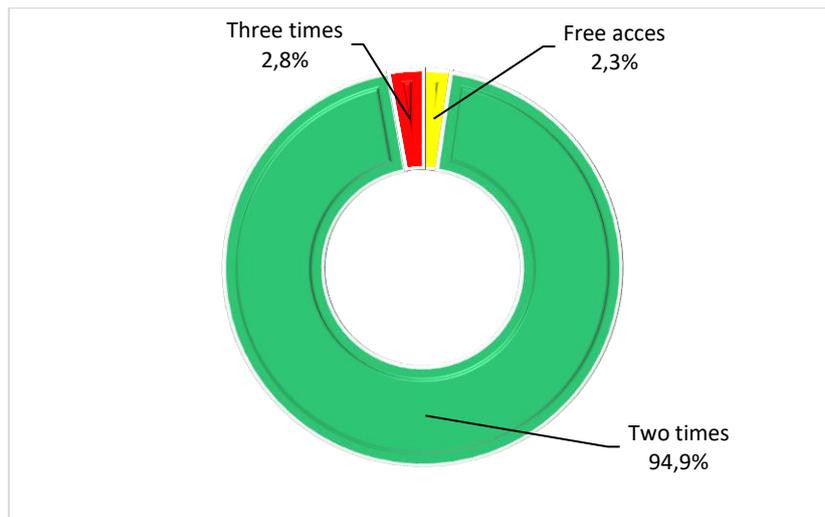


Figure 7. How many times do you water your animals in a day?

Contrary to the practices in Ispir district, Akman and Özder (1992), Aydın et al. (2016), Güler et al. (2017) and Denli et al. (2021) reported that the application of watering 3 times a day was more common in Tekirdağ, Hınıs and Narman counties Erzurum province and Diyarbakır province.

The general cleaning status in the barns of the enterprises (a) and the use of chemicals such as disinfectant and lime (b) are given in Figure 8. It is extremely important to carry out regular annual general cleaning practices in the barns in terms of providing hygienic conditions for the cattle. It was determined that annual general cleaning was carried out in all of the

surveyed enterprises in the district, 54.8% of the enterprises performed general cleaning once a year, 33.0% twice and 12.2% three times. Of all the participants 77.4% of them stated that they used chemical disinfectants during general cleaning. The size of the enterprise had a significant effect ($P < 0.01$) on the general cleanliness status of the barns of the enterprises. In similar studies conducted in Turkey, it was reported that general cleaning practice was carried out in the cattle enterprises at least once, twice or more in a year (Ünalın et al., 2013; Aydın et al., 2016; Güler et al., 2017).

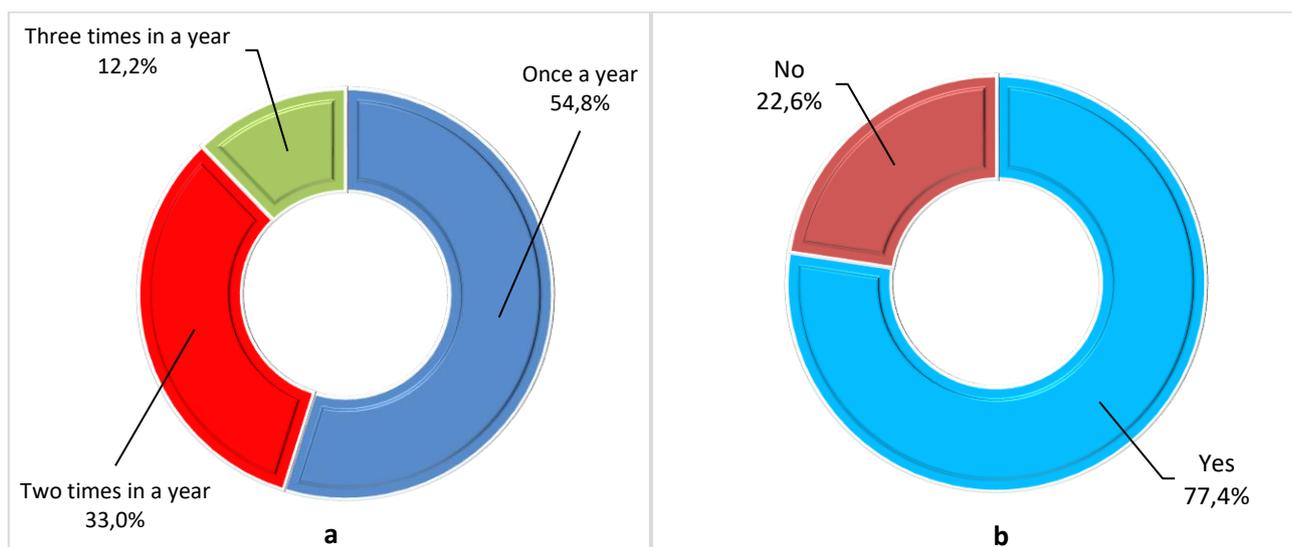


Figure 8. General cleanliness in the barns of the enterprises (a) and the use of disinfectants, lime, etc. (b)

It was determined that all of the enterprises cleaned the manure by manpower (100%) and all of the enterprises stored the manure in an open area near the barn in the district. Similar results were reported in studies

conducted in other regions of Turkey (Tilki et al., 2013; Şahanoğlu and Koçak, 2014; Aydın et al., 2016; Demirhan and Yenilmez, 2019; Bakır and Kibar, 2020).

The findings on the types of manure usage are presented in Figure 9. In the Eastern Anatolia Region, animal manure is still used as fuel in winter by turning it into dung. In 62.9% of the surveyed, the manure of the enterprises was used as fertilizer in the fields. On the other hand, a significant part of the enterprises preferred to utilize manure as fuel (34%), and 7.6% of them preferred to sell it. In addition, 37.1% of the enterprises stated that they use all three utilization methods. Özen and Oluğ (1997), Kaygısız and Tümer (2009), Boz (2013), Aydın et al. (2016) and Güler et al. (2017) reported that the proportion of enterprises that used animal manure in plant production was

considerably high in their studies. Dou et al. (2001) determined that 67.0%-82.0% of enterprises in Pennsylvania stored manure in solid or packaged forms, moreover Sheppard et al. (2011) reported that almost all of the manure in cattle enterprises were used in plant production in Canada. Han and Bakır (2010) reported that 52.1% of the enterprises in Ergani district used manure burning for heating purposes and 35.3% used it as fertilizer in the field. Bakır and Kibar (2020), on the other hand, reported that the obtained manure was utilized by burning for heating (48.7%), as fertilized in the field (19.0%) or by selling (5.0%).

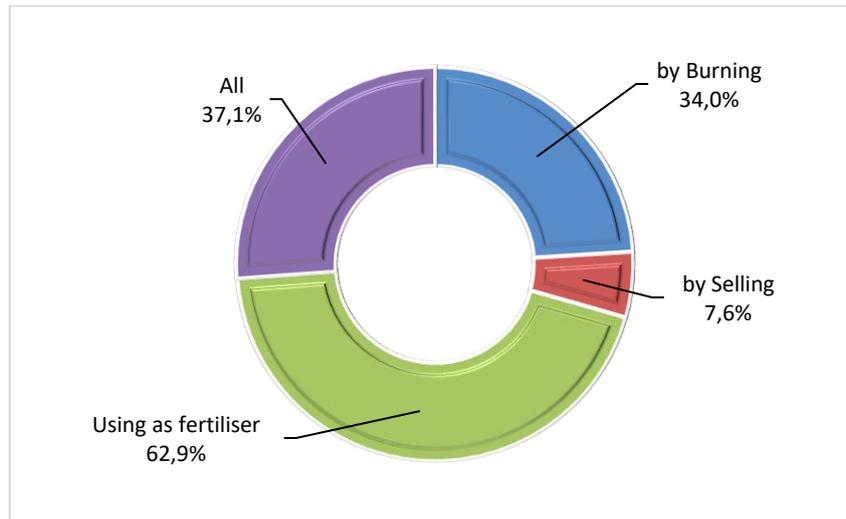


Figure 9. Manure utilizing methods

As high temperature causes stress in cattle, it leads to decreases in fertility and milk production. Temperatures between 10-15 ° C are reported to be suitable for dairy cattle, and it is highly recommended to practice cooling practice when the ambient temperature exceeds 24 ° C (Peypazar, 2019). The cattle barns in İspir district of Erzurum province were determined to be mostly hot or

warm, especially during the winter season. It was determined that the majority of the enterprises did not have a thermometer and most of the participants stated that they believed that the cattle would be uncomfortable and their productivity would decrease at 10-15°C which is optimal temperature for cattle (Figure 10).

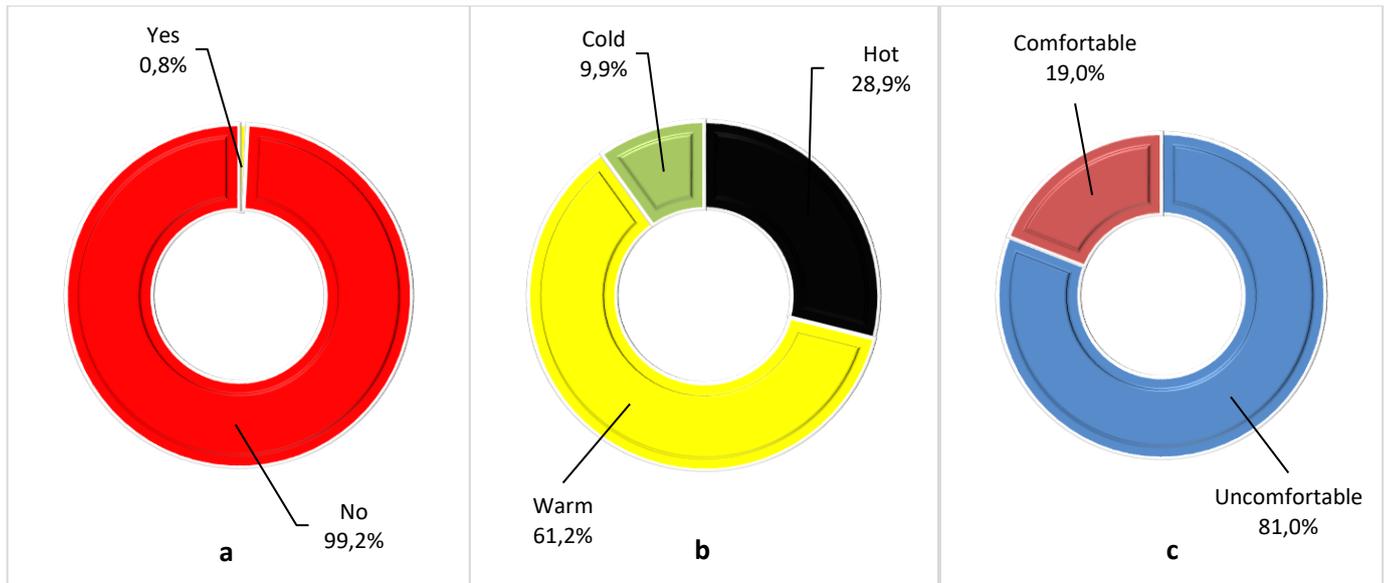


Figure 10. The condition of having a thermometer in the barn (a), the interior temperature of the barn in winter (b) and the condition of the animals that are affected if the interior temperature of the barn is warm (10-15 °C) (c)

In conclusion, this study was carried out to determine the current situation and the problems in the cattle breeding practices related to the characteristics of the barn in İspir district of Erzurum province. It was found that a very small part of the surveyed enterprises had a separate maternity ward for pregnant cattle in the district. Since newborn calves are extremely vulnerable, clean and quiet maternity wards are extremely necessary for a clean and stress-free birth, as well as for the health of the calf and cow. The keeping of calves together with other animals is not recommended, as this practice causes the spread of diseases. Even though the calves were kept in the same barn as other cattle, it is promising for the district that almost all breeders (93.9%) housed their calves in separate sections of the barn in İspir district. A very small percentage of the enterprises provided bedding for their cattle in the barn (12.4%). Practice of not using bedding is inappropriate for the health, productivity, and welfare of the cattle in the barn. Anything that keeps the ground comfortable, clean, and dry can be a bedding material. The most popular bedding materials in the district were grain straw (6.6%) and sawdust (3.3%). These are easy to access materials. Breeders should be informed about the benefits of bedding, and bedding usage should be spread throughout the district. A big majority of the enterprises watered their animals through village fountains (90.1%), trough (70.6%), or carrying the water by a bucket (33.5%). Continuous water for dairy cattle is proven to have positive effects on milk production, health, and well-being of cattle. Farmers should also be informed about the benefits of continuous water supply to cattle.

Almost all of the enterprises performed general cleaning in the barn at least once a year. This is extremely important for the sanitation and disinfection of the barn and hereby the welfare of the cattle. The ideal temperature range for cattle is between 10-15°C; however, most breeders believed that their cattle would be uncomfortable and productivity would decrease at this temperature. This demonstrates that a large educational campaign is required for cattle breeders for cattle farming in the district. University and provincial or district directorates of agriculture and forestry should collaborate to overcome and correct these deficiencies in İspir district. Additionally, the state should provide financial support as well as training for the construction of barns in order to accelerate the transition of breeders from fully closed to semi-open barns

ÖZET

Amaç: Erzurum ili İspir ilçesinde barınak özellikleri ile ilgili sığır yetiştiriciliği uygulamalarına ilişkin mevcut durumu ve sorunları belirlemek ve çözüm önerileri sunmak amacıyla bu çalışma yapılmıştır.

Yöntem ve Bulgular: Bu çalışmada Erzurum ili İspir ilçesinde, sığırçılık işletmeleri arasından tesadüfi örnekleme yöntemi ile seçilen 394 işletme sahibi ile yüz yüze anket yapılmıştır. Elde edilen verilerin istatistiksel değerlendirmesinde ki-kare ve frekans analizleri kullanılmıştır. Ankete katılan işletmelerin %97,2'sinin ahırlarında ayrı bir doğum bölümünün olmadığı belirlenmiştir. İşletmelerin büyük çoğunluğu düve, dana ve kuru inekleri birlikte (%90,4) barındırırken, sadece

%9,6'sı ayrı barındırmaktadır. Ayrıca ilçede işletmesinde sığırlar için altlık bulunan işletmelerin yüzdelerinin oldukça düşük olduğu (%12,4) tespit edilmiştir. İlçede en çok tercih edilen altlık materyallerinin tahıl samanı (%6,6) ve talaş (%3,3) olduğu belirlenmiştir. İşletmelerdeki hayvanlarının su ihtiyaçlarını köy çeşmesi (%90,1), yalak (%70,6) veya kovayla (%33,5) su taşıyarak sağlamaktadırlar. Ankete katılan işletmelerin %54,8'i yılda bir kez genel temizlik yaparken, %33,0'ı iki kez ve %12,2'si 3 kez genel temizlik yaptıklarını belirtmiştir. İşletmelerin %62,9'unda gübre tarlalarda kullanılırken, işletmelerin önemli bir kısmı gübreyi yakıt olarak kullanmayı tercih etmektedir (%34). Katılımcıların büyük bir çoğunluğu, sığırlar için optimum sıcaklık olan 10-15°C'de sığırların rahatsız olacağını ve verimlerinin azalacağını düşündüklerini belirtmişlerdir.

Genel Yorum: Araştırmadan elde edilen bulgular, ilçede sığır yetiştiriciliği konusunda bazı yanlış ve eksik uygulamaların olduğunu ve ilçede sığır yetiştiriciliğine yönelik geniş bir eğitim kampanyasına ihtiyaç olduğunu göstermiştir.

Çalışmanın Önemi ve Etkisi: Ahırlarda sığırların doğal davranışlarını gerçekleştirmelerine yardımcı olan ve dolaylı olarak işletmelerde verimliliği artıran ve iş gücünü kolaylaştıran yapısal ve yapısal olmayan bazı unsurlar bulunmaktadır. Bu çalışma ile, İspir ilçesindeki sığır yetiştiricilik işletmelerinin ahır özellikleri ile ilgili yetiştirme uygulamaları açısından durumların ortaya konmuş ve problemlerin çözümüne yönelik öneriler sunulmuştur.

Anahtar Kelimeler: Ahır, Sığır, yetiştirme uygulamaları, İspir ilçesi, sığır yetiştiricilik işletmeleri.

CONFLICT OF INTEREST

The authors declare no conflict of interest for this study.

AUTHOR'S CONTRIBUTIONS

The contribution of the authors is equal.

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