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Calf Rearing Practices in the Northeast Anatolian Region of Türkiye: A Case of Horasan County of Erzurum Province

Musa BASTEM[1], Mete YANAR*[1]

[1]Atatürk University, Agriculture Faculty, Animal Science Department, 25240, Erzurum, Türkiye

Musa BASTEM, ORCID No: 0009-0001-3584-0275, Mete YANAR, ORCID No: 0000-0002-5311-5675

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*** Corresponding Author**

mtyanar@gmail.com

ABSTRACT

The aim of this study was to assess calf rearing methods applied in 500 cattle farms in the Horasan district of Erzurum province. Data used in this study were obtained through face-to-face interviews with cattle breeders. In 69.5% of the enterprises operating within Horasan county, the exact quantity of milk consumed by calves could not be determined due to the fact that they are fed by nursing from their mothers. On the other hand, the proportions of farms feeding calves 1, 2, 3, 4, 5 and 6 liters of milk per day were determined as 0.4%, 0.6%, 5.7%, 3.6%, 8.9%, and 11.3%, respectively. In 38.4% of cattle enterprises in the county, calves were fed with milk while their mothers were being milked, whereas in 27.6% of cattle farms, calves were weaned at 4 months of age, and in 24.3% at 5 months. Furthermore, it was also observed that the most of breeders (72.7%) considered the birth weight of calves as a criterion to decide on the quantity of milk to be provided to them. On these farms, the methods of feeding colostrum to calves were by sucking their mothers with a percentage of 54.3%, followed by bottle feeding with a percentage of 45.5% and the bucket method with a very low percentage of 0.2%. Furthermore, calves in Horasan County usually begin to be given calf starter feed either at the age of 2 weeks (28.3%) or 3 weeks (28.1%), while dry hay is generally introduced to the most of calves (42.0%) at the age of 2 weeks. In conclusion, some inaccuracies in calf rearing practices were identified in Horasan county of Erzurum province and solutions were proposed to address these problems.

Türkiye'nin Kuzeydoğu Anadolu Bölgesinde Buzağı Yetiştirme Uygulamaları: Erzurum İli Horasan İlçesi Örneği

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ÖZ

Bu çalışmanın amacı, Erzurum ilinin Horasan ilçesinde faaliyet gösteren 500 sığırcılık işletmesinde uygulanan buzağı yetiştirme yöntemlerini değerlendirmektir. Çalışmada kullanılan veriler, sığır yetiştiricileri ile yüz yüze yapılan anketler yoluyla elde edilmiştir. Horasan ilçesinde faaliyet gösteren işletmelerin %69,5'inde buzağılar annelerinden süt emerek beslendikleri için buzağıların tükettikleri süt miktarı net olarak tespit edilememiştir. Öte yandan, buzağıları günde 1,

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Anahtar Kelimeler

Buzağılar
Sütten kesim
Kolostrum
Buzağı başlatma yemi
Erzurum

*** Sorumlu Yazar**

mtyanar@gmail.com

2, 3, 4, 5 ve 6 litre sütle besleyen işletmelerin oranları sırasıyla %0,4, %0,6, %5,7, %3,6, %8,9 ve %11,3 olarak belirlenmiştir. İlçedeki sığırcılık işletmelerinin %38,4'ünde buzağılar anneleri sağıldığı süreçte sütle beslenirken, sığırcılık işletmelerinin %27,6'sında buzağılar 4 aylıkken, %24,3'ünde ise 5 aylıkken sütten kesilmektedir. Ayrıca, yetiştiricilerin çoğunluğunun (%72,7) buzağılara verilecek süt miktarına karar vermek için buzağıların doğum ağırlığını bir kriter olarak kabul ettiği de gözlemlenmiştir. Bu çiftliklerde buzağılara kolostrum verme yöntemi olarak %54,3'lük bir oranla annelerini emme yöntemi kullanılırken, bunu %45,5'lik bir oranla biberonla besleme ve %0,2'lik çok düşük bir oranla kova yöntemi takip etmiştir. Ayrıca, Horasan ilçesindeki buzağılara genellikle 2 haftalık (%28,3) veya 3 haftalık (%28,1) yaşta buzağı başlangıç yemi verilmeye başlanırken, kuru saman buzağıların çoğuna (%42,0) genellikle 2 haftalık yaşta verilmektedir. Sonuç olarak, Erzurum ili Horasan ilçesinde buzağı yetiştirme uygulamalarında yapılan yanlışlıklar belirlenmiş ve bu sorunların giderilmesi için çözüm önerileri sunulmuştur.

Introduction

Cattle play a major role in the worldwide production of meat and milk, including in Turkey. According to the latest FAO data, the global number of cattle has exceeded 1.529 billion in 2021, making them one of the most commonly reared types of livestock worldwide (Anonymous, 2023).

The hilly terrain, high altitude, and plentiful pastures and meadows, along with unsuitable climatic conditions for cultivating industrial and horticultural crops, have made animal husbandry, primarily cattle rearing, a crucial economic activity in Erzurum province. According to the latest livestock statistics, the province has reared 800,002 head of cattle in the year 2022. In the province, 19.05% of the cattle were continental breeds, while crossbreeds made up 76.63% and indigenous breeds 4.32% (Anonymous, 2023). Furthermore, Horasan county contributed 8.52% of the total number of cows in Erzurum province.

Calf rearing is a vital factor in ensuring the sustainability of cattle enterprises, and it is an area of cattle rearing that demands the utmost attention (Kaygısız et al., 2023). Obtaining one calf annually from each cow is crucial for profitability in dairy cattle breeding (Özhan et al., 2015). The continuity of the herd depends on a successful and healthy calf breeding programme. Therefore, it is imperative to minimize calf losses, particularly during the neonatal period. Raising healthy calves is very important in order to replace the cows that are culled from the herd every year for various reasons with new breeding cows (Tüzemen and Yanar, 2013). In calf rearing systems, factors that negatively affect calf health include inadequate and poor calf feeding, insufficient and poor quality colostrum intake, poor housing conditions and inadequate health protection programs. Furthermore, high calf mortality rates around the world are also considered to be the most important parameters indicating poor animal welfare and herd management (Kaygısız et al., 2022).

When conducting surveys to identify the current situation and problems in livestock enterprises, it is important to collect information on recent production, farm management and enterprise practices (Costa et al., 2013). This information can also be crucial for designing livestock policies for a region or even an entire country (Koçyiğit et al., 2023). Although numerous survey studies have been conducted on calf rearing techniques, problems and

proposed solutions in different regions of Turkey (Oğuz et al., 2013; Koçyiğit et al., 2015; Yener and Yaylak, 2015; Diler et al., 2017; Kaylan et al., 2019; Karaca, 2020; Kurt 2020; Sezer, 2020; Özsağlıcak and Yanar, 2021; Ermetin and Erkan Can, 2023), there is no study conducted in Horasan county of Erzurum province. Therefore, the aim of this research is to evaluate the current management approaches of calf rearing in cattle farms in Horasan county, highlight the existing problems and provide recommendations for these problems.

Material and Method

The study was approved by Atatürk University Faculty of Agriculture Ethics Committee Chairmanship (Protocol Number: 2023/11). Data used in this study were obtained by conducting a face-to-face survey of cattle farms located in 77 villages in the county of Horasan in the province of Erzurum. For the purpose, 500 farm owners selected from 4565 farms in the county were interviewed. In the determination of the random sample size (number of enterprises) in this research, a method whose formula is given below, was used. This formula is for cases where the variance is unknown, the population is limited and there are qualitative variables dependent on probability (Arıkan, 2007).

$$n= (N.\ Z^2_{\alpha/2}.\ p.\ q)/[(N-1).\ D^2]+(\ Z^2_{\alpha/2}.\ p.\ q)$$

In this formula;
n=Number of samples,
N=Population size,
D=Margin of error (5%),
$Z_{\alpha/2}$= Table value (1.96) for α= 0.05,
p=The rate to be calculated (0.5),
q=1-p.

$$n = \frac{4565*1.96^2* 0.5*0.5}{(4564*0.05^2)+(1.96^2*0.5*0.5)} =354.6$$

The study initially established a minimum of 355 surveys, which was later increased by 41.0%. A survey was then conducted with 500 owners of enterprises in Horasan county. The data collected from the survey was transferred to Excel 2016 and analyzed using the SPSS statistical software package (SPSS, 2013) through frequency analyses.

Results and Discussion

Daily amount of milk given to the calves

The results concerning the daily amount of milk given to the calf and the age at weaning are presented in Figure 1. In response to the question of the amount of milk given to the calf daily, 69.5% of the farmers preferred the option as much as the calf suckled. This was followed by 4 liters with 11.3%, 5 liters with 8.9%, 3 liters with 5.7%, 2 liters with 3.6%, 6 liters with 0.6% and 1 liters with 0.4%. Among the results of studies conducted in other regions of Turkey, Kaygısız et al. (2023) showed that 66% of cattle breeders in Torul county of Gümüşhane province gave more than 5 kg of milk to calves in the first 30 days, while 76% gave less than 5 kg of milk in 31-60 days. Similarly, Koçyiğit et al. (2021) reported that the majority (44.2%)

of cattle enterprises in the central county of Ağrı province offered 5 litres of milk per day to calves, while in 34.0%, 11.3%, 8.3% and 2.0% of cattle farmers gave daily 4 litres, 6 litres or more, 3 litres and 2 litres of milk to calves, respectively. However, Tatar and Esenbuğa (2022) stated that 70% of cattle farmers in Ödemiş county of İzmir province gave 1-3 litres of milk and 27.1% gave 4-5 litres of milk to calves in the first weeks.

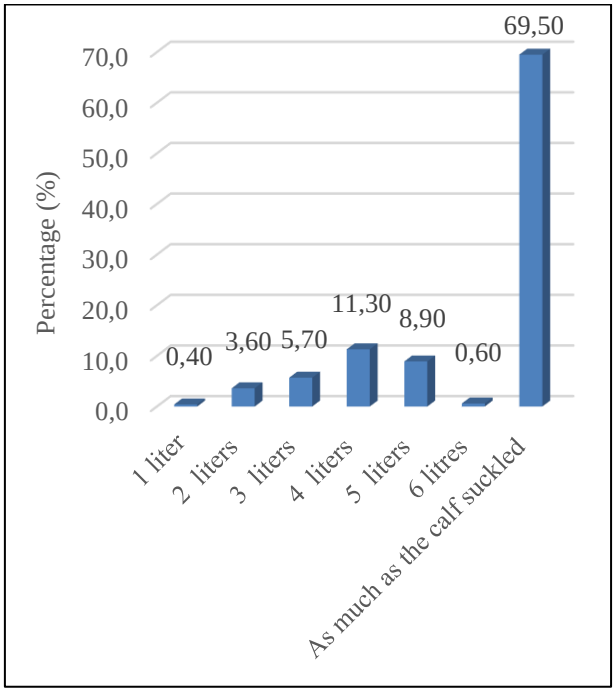

Figure 1. Daily amount of milk given to the calves (kg)
Şekil 1. Buzağılara günlük verilen süt miktarı (kg)

Weaning age of the calves

Calf weaning is a critical and challenging procedure in livestock breeding that significantly influences calf welfare, development, and growth. In dairy cow production systems across USA and Canada, economic considerations have caused the pre-weaning period to be shortened to 6-8 weeks of age. Although the age of calf differs significantly between cattle farms in Turkey, Erez and Göncü (2012) report that it is later than in the USA and European countries. In terms of the age at which calves were weaned in Horasan county of Erzurum province, 38.4% of owners of enterprises responded that calves were suckled for as long as their mothers were milked. This was followed by 4 months with 27.6%, 5 months with 24.3%, 6 months with 4.7%, 3 months with 2.8%, 7 months with 1.4%, 2 months with 0.6% and 1 months with 0.2% (Figure 2). Thus, the average weaning age of the calves reared in Horasan county of Erzurum province was found to be between 3 and 4 months of age. Similarly, Kaygısız et al. (2008) reported that 56.0% of the cattle farms in Kahramanmaraş province weaned their calves at 3-4 months, while Öztürk (2009) found that calves in Mardin province were fed milk for more than 3 months. Furthermore, Özsağlıcak and Yanar (2021) reported that the majority (79.7%) of calves reared in the central county of Erzincan province were weaned at the age of 3-4 months, while Yeşil (2015) found that 61.5% of calves were weaned at the age of 3-4 months and 39.5% at the age of 5 months in Iğdır province. Furthermore, Koçyiğit et al. (2021) also stated that the majority (58.0%) of cattle breeders in Ağrı province weaned their calves at

6 months of age. In contrast to the results of the above studies, Akkuş (2009) found that the average weaning age of calves reared in Konya province was 68.3 days.

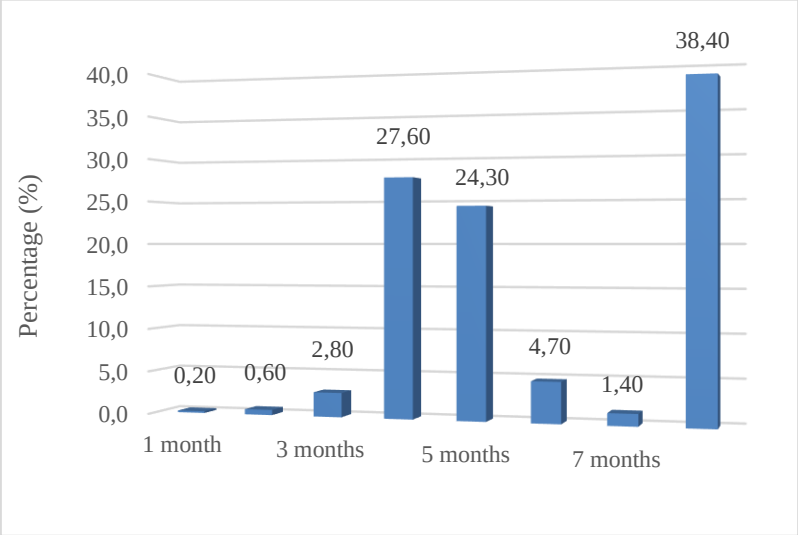

Figure 2. Weaning age of the calves
Şekil 2. Buzağıların sütten kesim yaşları

Criteria used to determine the amount of milk to be given to calves

The results of the criteria considered by the cattle breeders in Horasan to determine the amount of milk to be given to the calves are presented in Figure 3. Although the majority of farmers (72.7%) used birth weight as a criterion to determine the amount of milk to be given to the calf, 18.4% reported that they adjusted the amount of milk according to the age of the calf and 3.2% according to live weight. A further 5.7% of breeders reported that the amount of milk to be given to the calf was determined randomly and no criteria were taken into account. Contrary to the findings obtained in the present study, Koçyiğit et al. (2021) reported that the majority (86.8%) of cattle breeders in the province of Ağrı Province determined the amount of milk to be given to their calves randomly and roughly without considering any criteria.

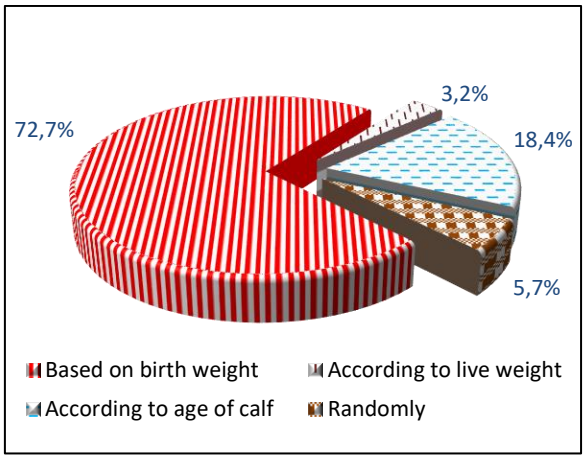

Figure 3. Criteria used for determining the amount of milk to be given to calves
Şekil 3. Buzağılara verilecek süt miktarını tespit etmek için kullanılan kriterler

Colostrum feeding methods and umbilical cord care for newborn calves

The results of the methods of feeding colostrum to calves reared on cattle farms in Horasan County are presented in Figure 4. In these farms, the methods of feeding colostrum to calves were by suckling their mothers with a percentage of 54.3%, followed by calf feeding bottle with a percentage of 45.5% and the bucket method with a very low percentage of 0.2%. Similarly, Koçyiğit et al. (2015) reported that calves took colostrum by sucking their mothers in the majority (82.0%) of cattle enterprises in Hınıs county of Erzurum province, while a calf feeding bottle was used in 10%, a bucket in 7.0% and a bucket with nipple in 1.0% of these farms. In another study carried out by Diler et al. (2017) in the Narman county of Erzurum province, it was found that calves were not given colostrum in 47.0% of the farms, and in the farms where colostrum was given, calves received colostrum by sucking their mothers (40.0%) or by calf feeding bottle (57.0%). Furthermore, 84.0% of the breeders stated feeding colostrum for less than 3 days and the duration of milk feeding for the calves was mostly 4-5 months (51.0%). in Finland, Hanninen et al. (2007) reported that 51.3% of the farms offered colostrum by calf feeding bottle and 36.5% by bucket, while Heinrichs et al. (1987) stated that 57.8% of the colostrum was given by suckling from mother, and the rest was given by buckets with pacifier in USA. However, Vasseur et al. (2010) reported that 92.0% of the farms included in their research gave milk to calves in buckets and 17.7% gave milk in bottles with pacifier in Canada.

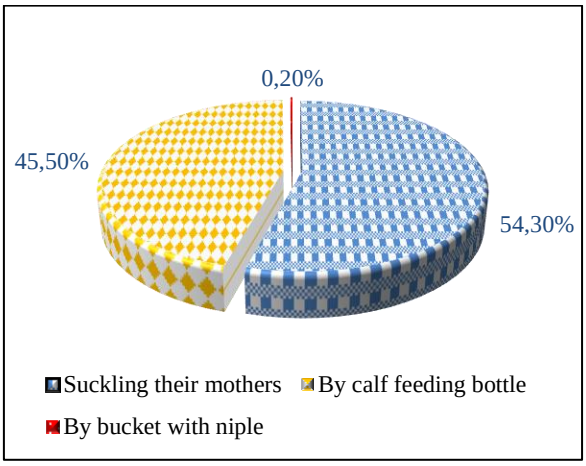

Figure 4. Colostrum feeding methods
Şekil 4. Kolostrumla besleme metotları

When the umbilical cord care of the calves in Horasan county was evaluated, it was found that most of the owners of the enterprise (85.6%) did not perform umbilical cord care of the newborn calves and only 14.4% of them did (Figure 5). This result is in accord with the results of Koçyiğit et al. (2018) and Kaylan et al. (2019) who reported that 73.4% and 85.8% of breeders in Narman county of Erzurum province and Iğdır province did not provide umbilical cord care to newborn calves. On the other hand, Kaygısız et al. (2023) and Koçyiğit et al. (2016) stated that in Torul county of Gümüşhane province (53.0%) and Hınıs county of Erzurum province (45.0%), unlike Horasan county, the percentages of farms that provided umbilical cord care to calves were higher. Ünalan et al. (2013), Kaygısız et al. (2022) and Karaca (2020)

reported similar results in studies conducted in Niğde (72.9%), Andırın county of Kahramanmaraş (96.0%) and Hendek county of Sakarya province (71.3%), respectively.

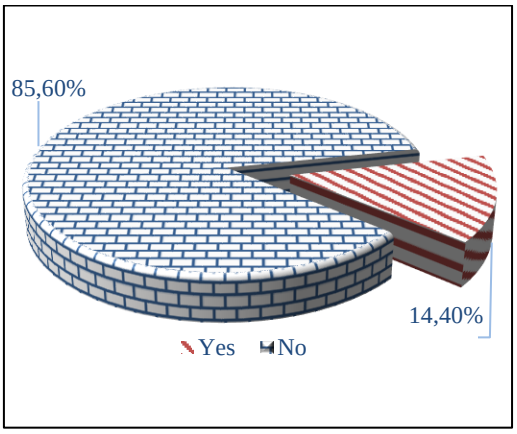

Figure 5. Umbilical cord care for newborn calves
Şekil 5. Yenidoğan buzağılar için göbek kordonu bakımı

Time to initiate feeding hay and concentrate feeds to calves

When calves are born, their rumen is underdeveloped. The rumen must develop before it can digest solid feeds. Dry feed intake are the most significant factors for rumen development in newborn calves. For example, calves fed concentrates in addition to milk will have significantly more papilla development and a much thicker, darker and more vascularised rumen wall. In addition, newborn calves with access to roughage will have positive effects on increasing rumen size and rumen motility, stimulation of rumination and the salivary flow to the forestomach (Gümüş ve Küçükeraslan, 2018). Therefore, it is recommended that dairy calves are started on dry hay at 1-2 weeks of age and calf starter at around 10 days of age (Tüzemen and Yanar, 2013). In Horasan County of Erzurum province, the most of the calves (42.0%) began receiving dry hay for the first time when they reached 2 weeks of age. It was also observed that 32.5% of the cattle enterprises started feeding dry hay when the calves were 3 weeks old. Additionally, 14.7% of cattle farms began feeding dry hay for the first time when the calves were 4 weeks old (Figure 6.). Regarding the timing of the first feeding of concentrates to calves, young animals are generally started on calf starter at the age of 2 weeks (28.3%) or 3 weeks (28.1%) in Horasan County. On the other hand, 14.4%, 7.6%, 6.8% and 7.6% of breeders start feeding concentrates to calves for the first time at 4, 5, 6 and 7 weeks of age respectively (Figure 7.).

In studies conducted in other regions of Turkey, 98.5% of cattle farms in Sivas province started giving calf starter to calves from 6-7 days of age, as reported by Hozman and Akçay (2016), while calves reared in Burdur province received it on average from the ninth day (Oğuz et al., 2013). Çapadağ (2016) found that calves in Yakutiye County of Erzurum Province were given roughage and concentrate feed for the first time at an average age of 24.5±14.6 days. Diler et al. (2016) also stated that the majority (52.0%) of the cattle producers surveyed started giving dry hay and calf starter when their calves were 4 weeks old and 30.0% of them started giving dry hay and calf starter after 4 weeks of age. Furthermore, Kum (2006) indicated that the most of the farms (39.4%) in the central Antalya region started feeding calf starters to calves from the fourth week. It was also reported that 27.5% of the farms in this region started

to give calf starter from the 2nd week. On the other hand, the number of enterprises in Burdur province that started feeding dry feed to calves in the first, second, third, fourth and fifth weeks was 283 (41.8%), 146 (21.6%), 109 (16.1%), 82 (12.1%) and 57 (8.4%), respectively (Elmaz et al. 2010). In a study carried out in Canada (Vasseur, et al. 2010), it was reported that calves had access to the calf starter from the seventh day of life and dry hay from the third day of life. In addition, Heinrichs et al. (1987) reported that 97.9% of cattle producers in Pennsylvania, USA, started feeding with calf starters to new-born calves within the first week of life and 78.7% of breeders began feeding dry hay to calves at 2 weeks of age. In another study carried out in the USA, the average age of access to starter feed for calves was 8.5 days, but access to dry hay was 24.5 days of age (USDA, 2008).

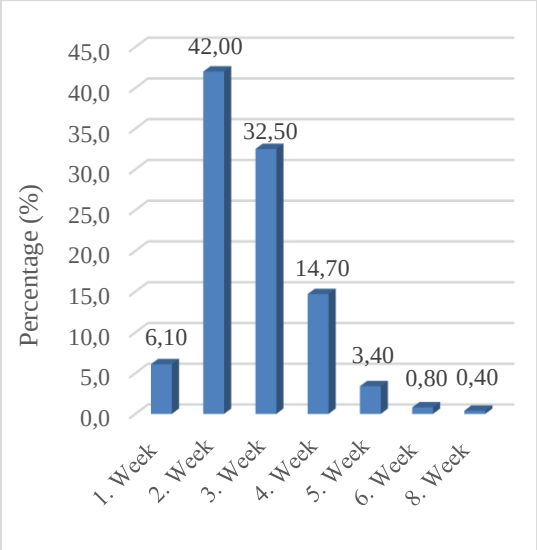

Figure 6. Time to start feeding calves with hay
Şekil 6. Buzağıları kuru otla beslemeye başlama zamanı

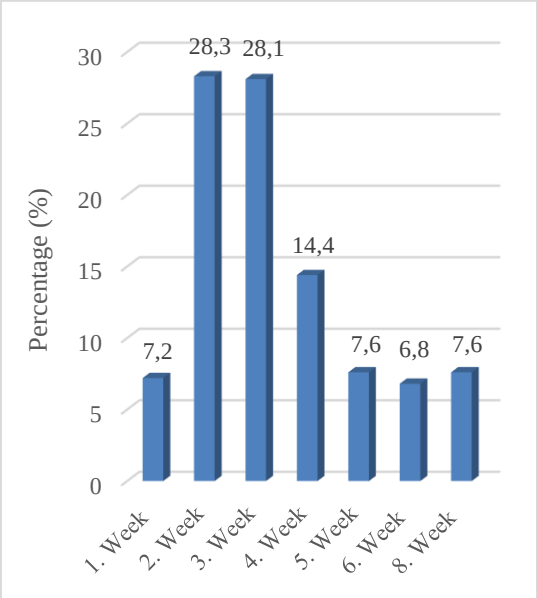

Figure 7. Time to start feeding concentrates to calves
Şekil 7. Buzağılara konsantre yemi vermeye başlama zamanı

Age of calves at water access

Providing calves with free access to water from their first days of life is a straightforward and cost-effective method of enhancing rumen development, average daily weight gain, and preparing them for a seamless transition to weaning (Jones and Heinrichs, 2007). When examining the age at which calves were given free access to water for the first time after birth, it was found that approximately half of the cattle farms (52.3%) surveyed in Horasan county began providing water to calves between 1 and 10 days of age, while approximately one third of the farms offered water to calves between 11 and 20 days of age. Furthermore, 12.3% and 0.6% of farms started watering calves between 21 and 30 days of age and 31 days and later, respectively (Figure 8). A similar result was also reported by Çapadağ (2016), who found that 44.2% of cattle farms in Yakutiye county of Erzurum province gave water to calves for the first time between the first and tenth day after birth, and 21.3% between the eleventh and twentieth day. Furthermore, Özsağlıcak and Yanar (2021) also found that 58.6% of the enterprises surveyed in the central county of Erzincan province had access to water in the first 21 days after birth. On the other hand, Tatar (2007) found that 61.7% of cattle farms located in Ankara and 73.2% in Aksaray started watering calves in the first week of life.

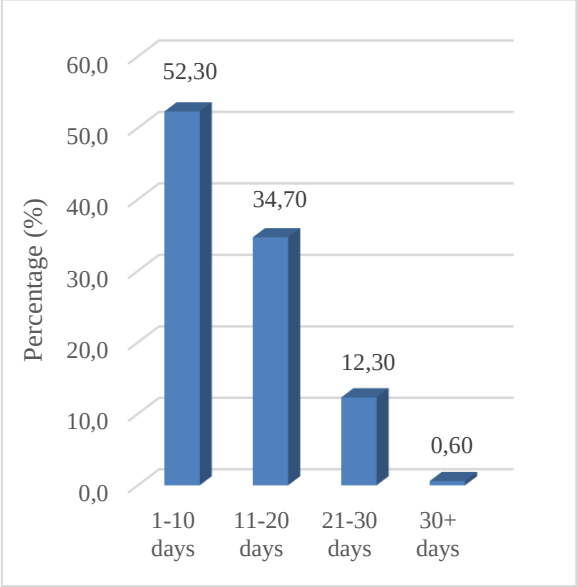

Figure 8. Time to start watering calves

Şekil 8. Buzağıları sulamaya başlama zamanı

In a study carried out by Çapadağ (2016) in cattle farms in Yakutiye county of Erzurum province, it was reported that calves were given water for the first time at an average age of 19.5 days. The same study also reported that 44.2% of the farms allow the water access to the calves for the first time in the period between 1-10 days after birth. Furthermore, the percentages of the cattle farms that started watering their calves in the period between 11 and 20 days and 21-30 days were noted as 21.3% and 27.2% respectively. Furthermore, Diler et al. (2018) reported that 48.1% of the owners of enterprise in Narman county in the same province started watering their calves between 1 and 3 days after birth, 44.7% between 4 and 7 days of age, and 7.2% after one week of age. Similarly, Vasseur et al. (2010) reported that 9.6% of cattle farms in the province of Quebec, Canada, did not allow unweaned calves access to water, although 91.4% of farms allowed calves access to water from an average age of 2.5 days. However, in

the United States, it was indicated that calves are allowed to drink water from an average age of 15.3 days (USDA, 2008). Additionally, Diler et al. (2016) also found that cattle breeders in Hınıs county of Erzurum province generally began watering their calves at 1-2 weeks of age (77.0%). On the other hand, Aydın et al. (2022) reported that 98.7% of cattle farmers in İspir county of the same province did not give water to calves before the age of 3 weeks. The results obtained in Horasan county are quite parallel to the results of the studies mentioned above. It could be said that due to the lack of individual calf pens in cattle farms in Horasan county in general and the housing of calves of different age groups together, the time to start watering calves may be more intensive in the first weeks of life.

Conclusion

In Horasan county, Erzurum province, some incorrect practices were observed during calf breeding in this study. A significant issue is that in a majority of farms (69.5%), daily milk consumption of the calves remains unknown as they receive uncontrolled milk by sucking their mothers. Therefore, it was noted that calves raised in the cattle farms of the county were being given milk in quantities greater or less than required. However, as the milk feeding period is a very critical period for the growth and development of calves as well as for their health, it is imperative that calves are fed milk in the quantities they need during this period. For this reason, it has been recommended that calves in the Horasan county should be given 10% of their birth weight or 4 litres of milk daily by a calf feeding bottle at 2 meals, morning and evening.

Another problem with calf rearing in the county is that calves are usually weaned at a very advanced age. It was found that the highest proportion (38.4%) of farms continue to feed milk during the period when the cows are milked. It has been noted that this situation is due to the difficulties in marketing milk as a result of the widespread use of grazing in the county. For this reason, it was proposed that the Ministry of Agriculture has to provide financial and training support to establish a cold chain for milk transport and deliver milk to dairies by refrigerated vehicles, and to develop awareness among farmers to act collectively in marketing milk.

It was found that 51.8% of the calf breeders in Horasan County started feeding dry hay to calves for the first time in the third or later weeks of life. On the other hand, 64.5% of the farms started feeding concentrates to calves in the same period. Therefore, instead of these erroneous applications, it was recommended to the farmers to start with dry hay for dairy calves at the age of 1-2 weeks and for calf starters at about 10 days. Another important issue in calf rearing was the high rate of neglect of umbilical cord care in newborn calves, which is one of the factors that can lead to calf losses in the neonatal period in Horasan county. The importance of umbilical cord care, which is a simple but effective means of protection against infectious diseases, needs to be recognised by farmers and livestock rearing training for farmers in the county should be intensified to effectively disseminate this care practice.

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