

Beef Cattle Feeding Principles of Kars Province Enterprises During the Winter Period

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Abstract

This research was conducted as a survey to determine the feeding principles of beef cattle enterprises in Kars province during the winter period. For this purpose, face-to-face survey interviews were conducted with a total of 45 beef cattle enterprises, 10 of them were located in Kars city center, whereas 5 enterprises were from each of Susuz, Arpaçay, Akyaka, Selim, Sarıkamış, Kağızman and Digor town located in Kars. It was determined that the abundantly used forages were straw, dried grass hay, sainfoin, and beef cattle concentrate and crushed barley as concentrate feed. This study showed that roughage and concentrate feeds are given to animals after mixing. It was observed that most of the enterprises offers the feed and water 2 or 3 times a day to their animals and most of them were using salt blocks, but not vitamin-mineral licking blocks. Majority of the enterprises do not receive professional support from the veterinarians or zootechnician for feeding their animals. Frequency of digestive system disorders such as indigestion, diarrhea, and tympani was at rarely. It was determined that the most important problem for enterprises was high concentrate feed prices. It has been concluded that the beef cattle enterprises in Kars province maintain traditional feeding principles for feeding their animals, do not face serious health problems in their animals, there may have vitamin-mineral deficiencies in animals, which could be met by feeding adequate and balanced ration recommended by animal nutritionist.

Keywords: Kars State, beef cattle, winter feeding, feeding principles, roughage, concentrate

Kars İlindeki Besi Sığırı İşletmelerinin Kış Döneminde Beslenme Esasları

Öz

Bu çalışma, Kars ilindeki besi sığırı işletmelerinin hayvanlarını kış döneminde beslenme esaslarını belirlemek amacıyla anket çalışması olarak yapıldı. Bu amaçla, Kars il merkezindeki 10 ve Kars ilinin ilçeleri olan Susuz, Arpaçay, Akyaka, Selim, Sarıkamış, Kağızman ve Digor'daki, 5'er işletme olmak üzere toplam 45 besi sığırı işletmecisi ile yüz yüze anket görüşmesi yapıldı. Yaygın olarak kullanılan kaba yemlerin saman, çayır kuru otu ve korunga, konsantre yemlerin sığırı besi yemi ve arpa ezmesi olduğu tespit edildi. Kaba ve konsantre yemlerin karıştırıldıktan sonra verildiği belirlendi. İşletmelerin önemli bir kısmının hayvanlarını günde 2 ya da 3 öğün olarak beslediği ve suladığı, işletmelerin hemen hemen tümünün yalama bloğu şeklinde tuz kullandığı, ancak vitamin-mineral yalama bloğu kullanılmadığı belirlendi. Yetiştiricilerin hayvan besleme konusunda veteriner hekim ya da zootechnistlerden profesyonel destek almadıkları tespit edildi. Hazımsızlık, ishal ve timpani gibi sindirim sistemi bozukluklarının nadiren görüldüğü belirlendi. Yetiştiricilerin en önemli sorununun konsantre yem fiyatlarının pahalı olması olduğu tespit edildi. Sonuç olarak; Kars ili genelindeki besi sığırı işletmelerinin hayvanlarını geleneksel besleme ilkeleriyle beslediği, besleme konusunda ciddi problemlerle karşılaşmadıkları, hayvanlarda vitamin-mineral yetersizlikleri olabileceği, yetiştiricilerin bazı profesyonel önerilerle hayvanlarını yeterli ve dengeli besleyebilecekleri kanaatine ulaşıldı.

Anahtar Kelimeler: Kars ili, besi sığırı, kış beslemesi, besleme prensipleri, kaba yem, konsantre yem

Introduction

Kars is a province located in the northeast region of Turkey and has an average altitude of 1.785 m. The city has a harsh continental climate with cold and long winters, short, cool, rainy summers (Arslan and Tufan, 2011; Demir, 2016). The main source of income for peoples who are living in Kars is animal husbandry, which is extensively performed due to its geographical and climatic characteristics, and in particular beef cattle feeding is more popular (Ünal, 2003; 2004). Kars province surface area consists of 39.1% of natural grasslands and pastures (Arslan and Tufan, 2011). This situation enables animal owners to graze their animals on grasslands during the spring, summer, and autumn seasons when grassland conditions are more favorable. On the other hand, dried grass hay is obtained from the well-preserved pastures in Kars province, which are used as a source of roughage during the winter season.

According to the Turkish Statistical Institute 2019 data, there are 17 872 331 head cattle in Turkey. A total of 596 966 head of these is raised in Kars province, which is 3.34% of Turkey's large animal population (TUIK, 2020). In terms of the number of large animal, Kars is in fifth place in Turkey. The number of pure breeds, cultures, crossbreed, and local breed cattle in Kars is 147 388, 408 326, and 41 252, respectively (TUIK, 2020).

The principles of beef cattle feeding in the barn during the winter season varies enterprises to enterprises in Kars province. Aim of the study is to determine the feeding principles of beef cattle during the winter season in Kars province by conducting surveys.

Material and Method

This study was conducted between 01.04.2016 and 15.10.2016 as a survey. For this purpose, a total of 45 beef cattle enterprises owners, 10 of them in the city center of Kars and 5 operating in each of the following town of Kars' (Susuz, Arpaçay, Akyaka, Selim, Sarıkamış, Kağızman, Digor), were surveyed and face-to-face interviews were conducted. Questions for the survey were asked to the enterprises' owner and the answers were recorded. The results were evaluated by the Excel programmer, and the results are given as a percentage.

Results and Discussion

The numbers and ratio of beef cattle per enterprise in Kars province are given in Table 1. As shown in Table 1, the highest beef cattle number per enterprise were ranged from 15 to 20 animals (28%), followed by 11 to 15 animals (20%) and 21 to 25 animals (14%). The sum of the animals from first three enterprises with the highest number sums up to 62%, which indicates that the majority of the animal numbers in the enterprises varied between 11 and 25 head. Considering the number of large animal enterprises sizes could be evaluated within 5 categories (SERKA, 2011). These are as follows: 1. Lower than small-scale enterprises (1-4 animals), 2. Small scale enterprises (5 to 24 animals), 3. Medium scale enterprises (25 to 49 animals), 4. Large scale enterprises (50 to 300 animals), 5. Integrated enterprises (300 animals and above). According to this definition, Kars province falls within the "small scale" enterprises. Similarly, it was reported that the majority of dairy farms in Kars (Arslan and Tufan, 2018) and Sivas province (Hozman, 2014) are "small scale" enterprises. Also, Çiçek and Sakarya (2003) reported that several small- and medium scale dairy enterprises are higher than the large scale in Afyon province.

Table 1. The numbers and ratio of beef cattle per enterprise in Kars province

Beef cattle range, number	Rate (%)
6-10	10
11-15	20
15-20	28
21-25	14
26-30	12
31-35	4
36-40	6
55-60	4
100-105	2
Total	100

Genders and breeds ratios of the beef cattle raised by the enterprises in Kars province are given in Table 2. The proportion of enterprises keeping mixed-gender animals was 46%, it was followed by 30% male and 15% female enterprises. The proportionally highest ratio of mixed-gender feeding by enterprises in Kars province should be seen as a reality of the local livestock breeding. Since the sum of the total number of the crossbreed and local breeds cattle is higher than that of the pure breeds in Kars province. Due to the relatively low genetic capacity for production of crossbreed and local breed cattle both male and female animals being fattened by the enterprise. In addition, it is effective that the people of the region prefer female cattle in Feast of the Sacrifice because they are cheaper than males.

In this study, it was determined that the most common cattle breeds used for fattening were Brown Swiss crossbreed (46.74%) and Simmental crossbreed (35.87%) in Kars province (Table 2). These findings are in accordance with TUIK 2020 data for cattle breeds raised in Kars, which states that there are a total of 596 966 large animals and 408 326 of those are crossbreeds (TUIK, 2020). On the other hand, Brown Swiss and Simmental crossbreeds are preferred due to their combined breeds and better adaptation in climatic and geographic traits of Kars province (Aydın and Sakarya, 2012). Our results are in accordance with the results of previous studies conducted on beef cattle (Aydın and Sakarya, 2012) and dairy cows (Arslan and Tufan, 2018) in Kars province. Çiçek and Sakarya (2003) report that Holstein and Brown Swiss breeds and their crossbreeds are predominantly preferred as beef cattle in Afyon province, and Simmental breeds are getting popularity as well.

Table 2. Genders and breeds of beef cattle's of Kars province enterprises (%)

Gender	Rate (%)	Breed	Rate (%)
Male	30	Local breed	3.26
Female (Heifer)	24	Brown Swiss crossbreed	46.74
Mixed *	46	Simmental crossbreed	35.87
Total	100	Brown Swiss	6.52
		Simmental	7.61
		Total	100.00

*: Enterprises that breed mixed-sex (male + female (heifer)) cattle

In this result indicated that beef cattle were generally taken from grassland to barn at the beginning the October and it intensifies 21st to 30th October (Table 3). This fact is related to unfavorable climatic conditions such as heavy rain and snowfall. This finding is in accordance with the results of Arslan and Tufan (2018) for dairy cattle in Kars province.

In Kars province, beef cattle are intensively taken from barn to grassland between 11th April and 20th May (Table 3). The finding is in accordance with the results of Arslan

and Tufan (2018) for dairy cows. According to our observations, the animal owner takes their animals to graze earlier even the grassland grasses does not reach to the optimal height. In other words, early grazing is a common practice in Kars province. In this context, there is a need to educate the animal owners to avoid early grazing practice of grassland.

Table 3. Dates and ratio of beef cattle taken from grassland to barn and from the barn to grassland in Kars province (%)

Date of taking grassland to the barn	Rate (%)	Date of taking barns to grassland	Rate (%)
1-10 September	8	11-20 April	22
11-20 September	4	21-30 April	48
21-30 September	2	1-10 May	10
1-10 October	12	11-20 May	20
11-20 October	24		
21-30 October	50		
Total	100	Total	100

The cost of feed comprises the largest portion of fattening enterprise, which approximately ranges between 70 to 80% (Yaylak and Kaya, 2001; Ergün et al., 2017). Approximately 30 to 40% of the feeding cost is being spent on roughage and 60 to 70% on concentrates. One of the main objectives of this study is to determine what kind of roughages are given to beef cattle during the winter season in Kars province. As shown in Table 4, more than one roughage is being used for animals feeding. The most commonly used roughages are barley + wheat straw with a rate of 92%, followed by dried grass hay with a rate of 86%. Our results are close to the ratios determined by Arslan and Tufan (2018) for dairy cows (for barley + wheat straw: 98%; grassland hay: 82%). These roughages were followed by sainfoin (40%), oat + vetch dry grass (32%), sugar beet pulp (26%), corn silage (26%), alfalfa (6%), and vetch dry grass (4%). In Turkey, approximately 30 million tons of wheat and 16 million tons of barley straw have been produced annually (Alçiçek et al., 2010). Straw is inadequate in terms of energy and many nutrients but provides physical satiety, stimulates rumination and is a ballast material for ruminants. Straws are widely used as a main source of roughages for livestock feeding in Turkey. The results of this study shows that this fact is reflected in the Kars region. One of the common factors of straw usage in Kars province is related to the widespread cultivation of barley and wheat. Another factor is their easy supply and cheaper cost as compared with other roughages, such as alfalfa and vetch hay. Kars province is rich in terms of grassland and pastures, which constitutes 39.1% of the total area of Kars. This situation explains the use of dried grass hay in 86% of the enterprises. On the other hand, many previous studies have reported that the nutritional composition of pastures in Kars province is good quality (Arslan and Eşsiz, 2009a; Arslan and Eşsiz 2009b; Arslan and Tufan, 2011). In this study, widespread use of sainfoin hay (40%) by the enterprises attracted attention in Kars province. Sainfoin can easily adapt to cold climates and can be grown on poor-quality soil (Coşkun et al., 2000). Therefore, recently sainfoin cultivation is continuously raising in Kars province. Agricultural supports by the Ministry of Agriculture and Forestry for the cultivation of forage crops also has a positive effect on its increased cultivation. Another interesting point in this study was the widespread use of dried barley-oat hay binary mixtures (32%). This situation is attributed to the widespread cultivation of barley-oat mixture in Kars province. There is a sugar factory in Kars city center, its byproduct sugar beet pulp is also widely used as feedstuff in beef cattle enterprises. Corn silage usage has been increased in recent year as a result of the initiatives made by the private sector. Alfalfa is not widely cultivated in Kars province due to the climatic condition. Some

enterprises are buying alfalfa from other provinces of Turkey. However, it is not preferred by majority of the farmers due to its high price.

In this study, it was observed that the most commonly used concentrated feeds were "beef cattle concentrate" at a rate of 76%, which was followed by crushed barley with a rate of 70% (Table 4). The widespread use of beef cattle concentrates and crushed barley showed that the animal owners have known the positive effects of these feeds on the fattening of animals. The reasons why crushed barley is widely used as concentrate feed in Kars province can be associated with the fact that barley is one of the most widely cultivated forage crops in Kars being comparatively inexpensive and available anywhere throughout the year (TUIK, 2018). Furthermore, since barley is rich in crude fiber it does not cause digestive disorders such as indigestion and tympani it has positive affect on the growth performance of animals (Şekerden and Özkütük, 1995). The finding of the present study on beef cattle concentrate and crushed barley is in agreement with the results of other studies result (Çiçek and Sakarya, 2003; Çelik and Sarıözkan, 2017). It can be seen from Table 4 that other concentrate feeds are crushed wheat (12%), crushed oat (10%), crushed vetch (8%), and wheat bran (4%) respectively, in Kars province.

Table 4. Roughage and concentrates usage ratio during the winter season of Kars province enterprises (%)*

Roughages	Rate (%)	Concentrates	Rate (%)
Straw (Barley + Wheat)	92	Beef cattle concentrate	76
Grass hay	86	Crushed barley	70
Sainfoin hay	40	Crushed wheat	12
Oat - vetch hay	32	Crushed oat	10
Sugar beet pulp	26	Crushed vetch	8
Corn silage	26	Wheat bran	4
Alfalfa hay	6		
Vetch hay	4		

*More than one roughage or concentrated feed was used in one enterprise.

Our results indicated that 92% of the enterprises were giving concentrate feed to their animals, whereas only 8% were feeding only with roughages during winter in Kars province (Table 5). It can be understood from the high concentrate feed usage ratio (92%) that animal owners aim to high live weight gain from their beef cattle. Similarly, Arslan and Tufan (2018), and Aydın and Keskin (2019) results were very close to our results for dairy cattle (concentrate usage rates 100% and 98%, respectively).

Provision of mixed roughage and concentrate in ruminants feed helps to decrease feed selection, stimulates appetite, increases dry matter consumption, minimizes fluctuations in rumen pH, and positively affects digestion. Our results showed that 92% of the enterprise offered the roughage and concentrated after mixing to their animals, whereas 8% of them were offering them separately (Table 5). These results showed that most of the animal owners know the beneficial effects of mixed ration, and its application. Similarly, Arslan and Tufan (2018) reported that the mixed ration usage ratio is 98% in dairy cattle during the winter season in Kars province

Table 5. Concentrate usage status, and offering a form of concentrate and forage in Kars province enterprises (%)

Concentrate usage status of enterprises	Rate (%)
Using	92
Does not using	8
Total	100
Offering a form of concentrate and forage	
Mixed	92
Separately	8
Total	100

According to Table 6, 56, 36 and 8% of the enterprises fed their animals 3, 2 and 4 times a day. Increasing meals and even ad libitum offering of feeds in ruminants is a beneficial practice in terms of keeping the stability of the rumen ecosystem at optimal limits and for better digestion. Additionally, when the meal number increases, the opportunity for the observation of animals also increases. In a previous study conducted by Arslan and Tufan (2018) on dairy cows, it was reported that 48, 44 and 8% of enterprises in Kars province were feeding their animals 3, 2 and 4 times a day.

Beef cattle need sufficient, fresh, and clean water to perform optimal body functions (NRC, 2000; Hozman, 2014). This study showed that 68, 20 and 8% of the enterprises offered water to their animals twice, trice, once a day respectively, and 4% of them had automatic watering systems (Table 6). According to our observation, most of the beef cattle barns in Kars province are still performing traditional practices. Offering ad libitum water to the animals is beneficial for production performance, it will be advantageous to use automatic drinking systems on enterprises. Arslan and Tufan (2018) reported that 78% of dairy cattle enterprises in Kars province offered water twice a day, whereas 16% of them offered three times a day. Hozman and Akçay, (2016) reported that 91.7% of the enterprises had an automatic waterer system for dairy cattle in Sivas province.

Table 6. A number of meal and watering, and their ratio enterprises in Kars province (%)

Item					Total
Meal number, day	1	2	3	4	Total
Ratio, %	-	36	56	8	100
Item					Total
Watering number, day	1	2	3	Automatic waterer	Total
Ratio, %	8	68	20	4	100

This study showed that 94% of the enterprises used salt block, whereas 6% did not (Table 7). These results indicated that majority of the animal owner are aware of the necessity of using salt in beef feed. Salt block using ratios was 89.5% (Özder et al., 2008) and 100% (Arslan and Tufan, 2018) in dairy cattle enterprises.

Vitamins and minerals are very important nutrients for animal nutrition. Serious health problems and economic losses can occur (such as lower weight gain, decrease in milk yield, weakness of the immune system, low fertility, and metabolic diseases) as a result of mineral and vitamin deficiencies in farm animals (Ergün et al., 2016; Arslan and Tufan, 2018; Arslan and Tufan, 2019). Present study results showed that the usage of the vitamin-mineral block was very low (2%) in Kars province (Table 7). During interviews conducted with the animal owners, they stated that vitamin and mineral blocks are offered to pre-weaned calves but not to adult cattle (no requirement). However, our observations in Kars province show that hair loss, dull and mixed hair and the low body condition score in the beef cattle are seen from time to time in the winter season, which are common symptoms of vitamin and mineral deficiencies. The higher ratio of pica occurrence rarely

(70 %) in this study (Table 8) supports this thought. Therefore, animal owners should be informed about the importance of supplemental vitamin and mineral for better animal performance.

Table 7. Salt and vitamin-mineral licking block usage status and their ratio in Kars province enterprises (%)

Usage of salt	Rate, %	Usage of vitamin-mineral block	Rate, %
Using	94	Using	2
Does not using	6	Does not using	98
Total	100	Total	100

In the present study, the rate of pica occurrences was 70%, and the rate of hair loss and dull was 24% in the Kars province enterprises (Table 8). Pica is a nutritional disorder characterized by the eating and licking of non-feed substances that occur due to the deficiency of various minerals and vitamins, especially P deficiency. The rare high incidence of pica in this study (70%) suggests a possible vitamin and mineral deficiency in animals during the winter season.

In this study, it was determined that the rate of absence of digestive system disorders during the winter season was 54%, and occurrence was 46% in the enterprises in Kars province (Table 8). These rates are in accordance with Arslan and Tufan (2018) findings for dairy cows. Different factors such as the cold and long winter months, cold drinking water, and the insufficient barn conditions for the welfare of the animals are thought to cause rarely seen disturbances in the digestive system of beef cattle.

Taking professional support from the animal nutritionist, veterinarians and zootechnician leads to sufficient and balanced nutrition, prevention of animal diseases, preventive medicine and better herd health management and ration preparation. In this study, it was seen that 98% of the enterprises in Kars province did not receive technical support from professionals such as veterinarians and zootechnician for feeding their animals (Table 8). Similar result was also found by Arslan and Tufan (2018) for dairy cows in Kars province. Present findings showed that the animal owner thinks they have sufficient knowledge of animal nutrition and do not seeks technical support. Aydın and Sakarya (2012) reported that animal owners, who received technical support in Kars, gained improved performance and increased carcass weight. Hozman (2014) reported that 36% of total enterprises received technical support in Sivas province.

Table 8. The occurrence ratio of some nutritional diseases depends on some nutrients deficiencies and the technical support status of enterprises in Kars province (%)

Pica	Rate, %	Digestive disturbances	Rate, %
Seen frequently	-	Seen frequently	-
Seen rarely	70	Seen rarely	46
Unseen	30	Unseen	54
Total	100	Total	100
Hair loss and hair dull		Technical support status	
Seen	24	Support recipients	2
Unseen	76	Those who do not get support	98
Total	100	Total	100

One of the main aims of this study was to reveal the feeding problems faced by owners while feeding their animals. Our results showed that the first important problem was the high concentrate feed cost and the second was beef lower quality of cattle concentrate feed (Table 9). This study also revealed that 98% of the enterprise owners want to continue raising animal, while the latter 2% want to quit (Table 9). Reason behind

that results is the province is very suitable for animal husbandry, and less availability of alternative business options in Kars province. Another reason the cost of feed is more affordable depending on the large grassland and pasture areas. Finally, large animal husbandry is suitable for the socio-cultural characteristics of the region. Large animal husbandry is a reality of the socio-economic structure of Kars province.

Table 9. The most important feeding problems of enterprises and, animal owners' thoughts about whether or not to do farming in the future

Feeding problem	Rate, %
High cost of beef cattle concentrate	86
No standard in the quality of beef cattle concentrate	20
No feeding problems	4
Thought about whether to continue fattening or not	
Those who want to continue	98
Those who do not want to continue	2
Total	100

Conclusion

It can be concluded from this survey study, the feeding principles applied by the beef cattle enterprises determined during the winter season in Kars province are as follows.

1. Enterprises are widely using straw, dried grass hay and sainfoin as roughage, and beef cattle concentrate and crushed barley as a concentrate feed source.
2. Most of the enterprises provide concentrated feed to their animals.
3. Nearly all of the enterprises offers roughage and concentrate mix feed.
4. Most of the enterprises feeding and watering their animals at 2 or 3 times a day.
5. Most of the enterprises use salt blocks, but almost none of them did not use vitamin-mineral licking blocks.
6. Hardly none of the enterprises did receive technical support from animal nutritionists, veterinarians and zootechnicians.
7. The incidence of digestive system disorders such as diarrhea, tympani, and indigestion are moderate, pica (rarely) high, and hair problems low level.
8. The most important feeding problem for animal owner is the high concentrate price, however, nearly all of them want to continue this occupation.

As a result; it was showed that the enterprises still using the traditional animal feeding principles, do not encounter a significant feeding problem. Despite these, it has been concluded that there may be a possibility of vitamin and mineral deficiency in animals and, professional support should be taken for a more adequate and balanced fattening business.

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