



## A Study on Cattle Feeding Practices and Habits of Cattle Enterprises in Central County of Ağrı Province

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### ABSTRACT

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This study was carried out in the central county of Ağrı Province in order to reveal the cattle feeding habits of cattle breeders. For this purpose, data were obtained by conducting a face-to-face survey with 400 dairy cattle owners of the enterprises in the county. According to the results obtained from this study, it was determined that 91.5% of the breeders produced their forage crops. It was also found out that barley, alfalfa, and sainfoin were the most produced plants in these enterprises. However, the production of the corn silage, which is an important source of roughage for dairy cattle, was performed at a very low level (1.2%). Dry hay (93.5%) took first place among the roughage sources used in these enterprises, and it was followed by alfalfa hay (61.5%) and wheat-barley straw (28.0%). Corn silage was used at a low level (7.8%) in the cattle enterprises. It was determined that cattle breeders in the central county of Ağrı province were deficient in terms of some information about cattle feeding practices. It was also demonstrated that it was necessary to increase the usage and production of corn silage as forage crops and to implement rational animal feeding practices in place of the old traditional animal feeding habits. Therefore, cattle breeders in the central county of Ağrı province should be involved in technical training programs about the cattle feeding and forage planting. As result of the courses given to the cattle breeders, their technical information about cattle nutrition and preparation of ration would be updated. For this purpose, it is also recommended that agricultural extension service should be boosted to increase the education level and awareness of the cattle breeders in the rural areas.

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## Introduction

The basic foodstuffs needed by the increasing population of the world must be met at a sufficient level. However, the limited world agricultural lands and the low livestock presence or productivity result in difficulties in meeting the increasing demand. Therefore, in order to meet the need, it is necessary to utilize from the existing agricultural areas and animal existence at a maximum level and in a sustainable way.

Ensuring the desired level of productivity and profitability in animal breeding largely depends on the production of quality roughage and concentrate feed, besides the important factors such as quality stud animal, adequate environmental conditions, product evaluation, and marketing. In order to achieve the desired yield level, rational feeding practices should be carried out regularly. One of the requirements of the rational feeding practices for productive animal husbandry is the use of quality

roughage and concentrate feed sources (Tugay ve Bakır 2008). Especially, the improvement of enterprises producing milk, which is one of the basic foodstuffs for human nutrition, at the desired level depends largely on sufficient grazing areas and the production of quality roughage (Diler et al., 2016).

The use of quality forage crops reduces the use of costly concentrate feed in the cattle enterprises and increases economic profit. The ability of cattle to utilize from cellulose-rich feed has increased the importance of forage crops culture that provides quality and cheap roughage. For this reason, it is essential for breeders to produce the roughage they will use in their own enterprises for profitable husbandry, especially in dairy cattle enterprises (Diler ve ark., 2018).

According to the Turkish Statistical Institute data, the Northeast Anatolia region, which includes the province of

Ağrı, has a 5.3% share in crops and other plant products. The share of Ağrı Province in the Northeast Anatolia region is 22.8% (Anonymous, 2021). This data show that Ağrı is insufficient in terms of plant production and forage crop production is not widespread in the province. The majority of the cattle farms are in small scale and the main feed source of the enterprises is natural meadows and pasture areas. Thus pasture-based cattle farming is performed commonly in the Northeast Anatolia region. Pastures-based animal husbandry, overgrazing, the lack of pasture care and management programs led to decrease of the quality of the plants in the meadow and pastures of this area. The impoverishment of meadows and pastures over the years and the lack of forage crop production in the region result in also a failure in the implementation of rational and economical feeding program. Thus, desired yield level of the animal products could not be achieved in the enterprises.

This study was carried out to determine the common animal feeding habits in cattle enterprises located in the central county of Ağrı province, to reveal the existing problems and to suggest solutions. Furthermore, results of the study will make important contributions to the literature about the feeding practices of the cattle farms in this region.

## Material and Method

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 questionnaire constituted the material of the study. Dairy cattle farms were visited and the current situation was tried to be revealed by means of 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).

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

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.

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

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 10.8% and the number of surveys to be conducted in the villages of the central county of Ağrı province was determined as 400. The data obtained from survey work were transferred to Excel 2010 computer program. The percentage values were obtained by using frequency analysis in descriptive statistical method available in SPSS statistics program

(SPSS, 2004). Graphs were created by using the proportional values and the results were interpreted. The data obtained were analyzed in the SPSS (20.0) package program by dividing enterprises into 5 different groups (10-20, 21-40, 41-60, 61-80, and 81+ cattle) according to their animal presence that affect the structural status of the enterprises. The Chi-square independence test was applied to determine the relationships between the variables (Yıldız and Bircan, 2006).

## Results and Discussion

### Forage Crop Production

Results of the current study revealed that 91.5% of the enterprises in central county of Ağrı Province produced forage crops on their own fields (Figure 1a). Similarly, percentages of cattle farms produced their own forage crops in Kars Province, in Muş Province, Narman county, in Tekirdağ and Kırklareli provinces were reported as 87.8%, 80.8%, 88.7%, 91.6% and 81.8% respectively by Demir et al., (2013), Bakır and Kibar, (2018), Diler et al., (2018) and Öztürk et al., (2019). On the contrary of results of the present study, findings of other studies conducted in Turkey revealed lower percentages of enterprises produced their own forage crops in Konya (47.2%) as well as and in Ergani (9.0%), in Yalova (61.2%), in Erzurum (16%) (Uzal and Uğurlu 2006; Bakır and Han 2009; Demir and Han, 2014 and Diler et al. 2016). It was also determined that there was a significant ( $P < 0.01$ ) relationship between forage crop production and the size of the enterprises. As the number of animals in the enterprises increased, the number of dairy farms produced their own forage crops increased at a similar percentage.

In the present study, percentages of the enterprises which produced barley, alfalfa, sainfoin, vetch, corn silage and rye were determined as 37.4%, 28.7%, 20.2%, 12.3%, 1.2%, 0.2% respectively. (Figure 1b). The percentage of the enterprises in which another forage crop was produced along with barley was 78.7%, while the percentage of the enterprises which produced another forage crop along with alfalfa was 60.4%. In a study, Öztürk et al. (2019) reported that the commonly produced forage crops in Tekirdağ and Kırklareli provinces were barley, corn for silage production, and alfalfa. In other study carried out by Bakır and Kibar (2018), the most produced forage crop in Muş Province reported as alfalfa (33.8%). Diler et al. (2018) noted that the percentages of the forage crops produced in the cattle enterprises in Narman county were 61.5% alfalfa, 60.1% barley, 45.7% vetch, and 37.5% sainfoin, while Tugay and Bakır (2008) found out that the percentages of produced forage crops in cattle enterprises of Giresun province were 73.2% corn, 20.6% alfalfa, 20.4% barley, 17.7% vetch, 4.6% sainfoin, as well as 2.1% rye.

The high level of forage crops production (91.5%) in the central county of Ağrı province is important for increasing profitability of the cattle enterprises. However, the low production level of corn silage (1.2%), which plays an important role in increasing milk yield, has to be increased as well. The climatic and geographic conditions of Ağrı Province, which has a high altitude, low temperature especially during winter and fall, and short vegetation period allow silage corn harvest only once a year. In order to increase silage corn production, high yielding and early varieties suitable for the region should be developed and their cultivation should be increased.

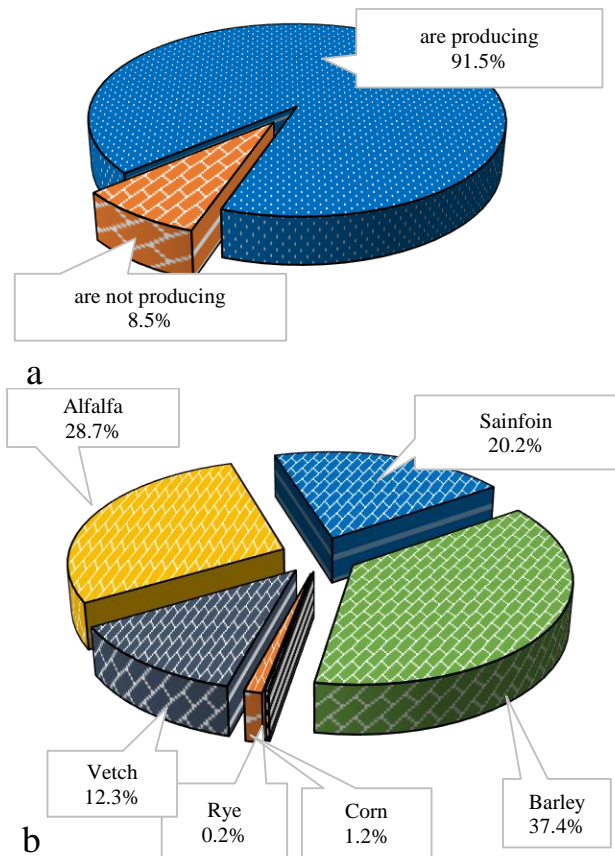


Figure 1. Forage crops production (a) and percentages of forage crops varieties (b) produced and cultivated in enterprises (%)

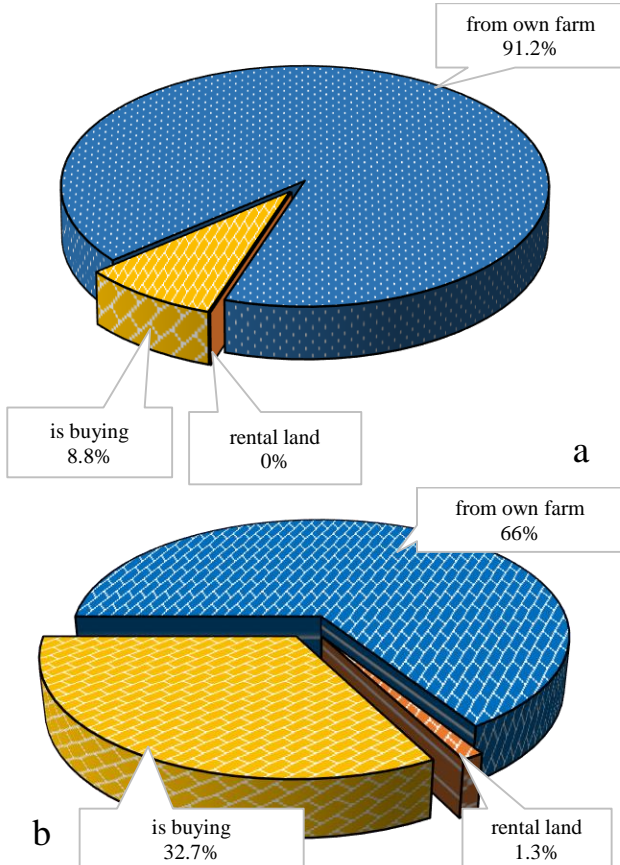


Figure 2. The percentages of the roughage (a) and concentrate feed (b) supply (%)

**Sources of Roughage and Concentrate Feed Supply**

While the majority of the enterprises produce their own roughage (91.2%), the percentage of farmers who prefer to buy was determined as 8.8% (Figure 2a). Similarly, it was reported by several researchers that cattle enterprises in the Narman county of Erzurum (Diler et al., 2018), in Muş province (Bakır and Kibar, 2018), in Kars Province (Demir et al., 2013), in Serbia (Bogdanović et al., 2012) and in the USA (Dou et al., 2001) produced mostly their own roughage. In contrast, percents of the enterprises purchased roughage from other farms in Hınıs county of Erzurum Province, in Bingöl, in Kahramanmaraş were 63.0% (Diler et al. (2016), 88.7% (Daş et al., 2014) and 61.0% (Kaygısız and Tümer, 2009). In addition, Kurt et al. (2020) reported that in the majority of the enterprises (50.7%) both methods were preferred in Muş Province. The type of roughage supply in the present study was significantly ( $P < 0.01$ ) affected by the number of animals in the enterprises. It was also revealed that there was an increase in the percent of those who produced the roughage in their own enterprises as long as the number of animals increased in their enterprises.

Concentrate feed used for the feeding of the animals was mostly produced in the enterprises (66.0%) (Figure 2b). The rate of enterprises that purchased concentrate feed was 32.7%, while the percentage of the enterprises which used rental lands for production was 1.3% (Figure 2b). Similarly, Dou et al. (2001), Önal and Özder (2008), Bogdanović et al. (2012), and Tilki et al. (2013) stated that concentrate feed was mostly produced in the enterprises. On the other hand, Kılıç and Eryılmaz (2020), Bakır and Kibar (2018), Diler et al. (2016), Daş et al. (2014) and Kaygısız and Tümer (2009) reported that concentrated feed used in the cattle farms was mostly purchased from out of the enterprises. The percentages of the enterprises that preferred to buy concentrate feed from the feed companies was reported as 83.4% and 64.0% by Tugay and Bakır (2008) and Diler et al. (2016) respectively. On the other hand, the preference percentage of the feed dealers for concentrate feed supply was reported as 65.7% by Kılıç ve Eryılmaz (2020) and 65.0% by Soyak ve ark. (2007). Furthermore, Demir et al. (2013) revealed that 42.5% of the enterprises preferred agricultural cooperatives to purchase concentrate feed.

Dry hay (93.5%) took first place among the sources of roughage in the central county of Ağrı Province. This was followed by alfalfa (61.5%), wheat or barley straw (28.0%), dry sainfoin (80%), silage (7.8%), and other forage legumes (3.5%). The percentage of the enterprises that use silage as roughage, which has an important place in the ration of dairy cattle, remained at a very low level with 7.8% in this province (Figure 3).

In other studies, conducted in Turkey, it was reported that the use of straw was common and generally takes the first place (Özyürek et al., 2014; Budağ and Keçeci, 2013; Bakır and Demirel, 2001). On the contrary, Bogdanovic et al. (2012) revealed that dairy cattle enterprises in Serbia preferred mostly dry hay, dried alfalfa, and corn silage as roughage. The results obtained in the present study for the percentage of straw usage in the cattle enterprises were found to be lower than findings of the other studies.

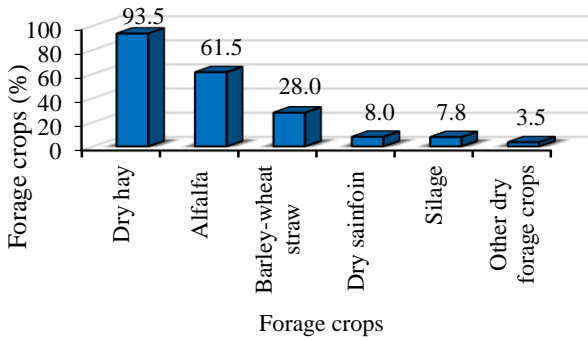


Figure 3. The percentages of the different roughage sources used in the enterprises (%)

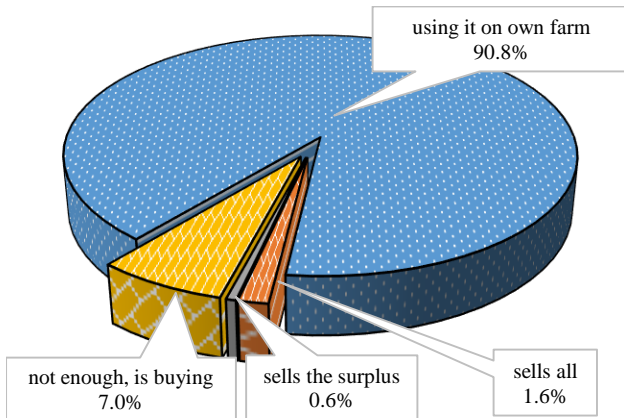


Figure 4. Evaluation types of the dry hay in the enterprises which produce dry hay (%)

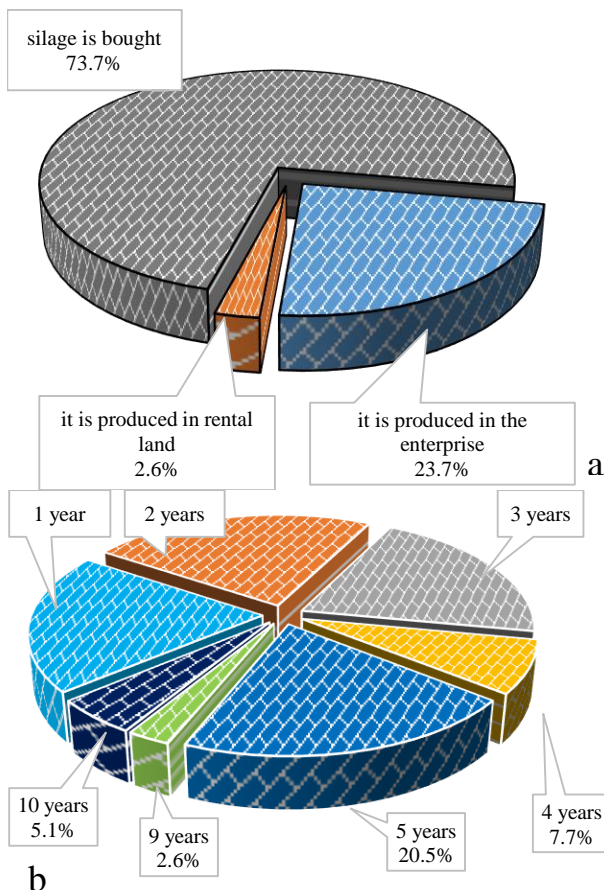


Figure 5. Types of silage supply (a) and duration of silage usage (b) (%)

As could be seen in Figure 4, owners of the 90.0% of the enterprises used the hay which they produced in their own farms for their cattle feeding. However, 7% of them stated that their hay production was not enough to fulfill the need of their animals. On the other hand, owners of the farms noted that the entire of the dry hay produced in 1,6% of the enterprises was sold and 0,6% of them noted that they sold only their surplus hay. Similarly, Diler et al. (2016; 2018) reported the percentages of the enterprises which used their own dry hay in the cattle farms in Hınıs and Narman counties as 66.0% and 60.0% respectively. Additionally, in their reports, the percents of the enterprises that sold surplus hay were indicated as 21.0%, 28.0% respectively. Percentages of the cattle farms which sold all of the hay produced in their own fields (13.0%, 12.0% respectively) were found to be higher than result of the current study.

Corn silage, which is a source of roughage and has an important place in dairy cattle breeding, was used in 7.8% of the cattle enterprises located in the central county of Ağrı province. Percentage of utilization from silage was already reported at a similar level by Diler et al. (2018). In the other similar studies, Diler et al. (2016) revealed extremely low level of silage usage (0.25%), while Kurt et al. (2020), Aydın and Keskin (2019), Özyürek et al. (2014), Bakır and Han (2014), Özdemir and Karaman (2008) and Önal and Özder (2008) reported the percentages of the silage using enterprises as 18.8%, 30.0%, 13.0%, 21.4%, 30.0%, and 96.5% respectively. Silage supply in the enterprises was mostly made by purchasing (73.7%). The percentage of the owners who produce silage in their own enterprises was determined as 23.7%, and the percentage of those who produce corn for silage on the rented lands was determined as 2.6% (Figure 5a). It has also been found out that silage was used in the enterprises for 1 to 5 years (Figure 5b).

#### Cattle Feeding Methods

In the majority of the enterprises in central county of Ağrı province (84.8%), the mixed feeding method (roughage and concentrate together) was used. The percentages of those who fed mixed feeds before and after milking were determined as 9.5% and 2.0%, respectively. 15% of the enterprises offered roughage first and then concentrate feed to animals, and the percentage of those which offer concentrate first and then roughage was 2.3% (Figure 6). Although the milk yields of the cattle were different, the percentage of the enterprises that feed all the animals at the same amount of the ration was determined as 91.5%. Likewise, Tugay and Bakır (2008) and Önal and Özder (2008) stated that the breeders do not take the yield levels of the animals into consideration while they fed them.

Majority of the breeders (96.5%) in central county of Ağrı province stated that they fed their animals based upon their own knowledge and experiences. Percents of the enterprises demanded technical information about cattle feeding from veterinarians, agricultural engineers (animal scientists), animal breeding associations and cooperatives as well as feed companies were 10.5%, 1%, 0.3% and 0.3% respectively.

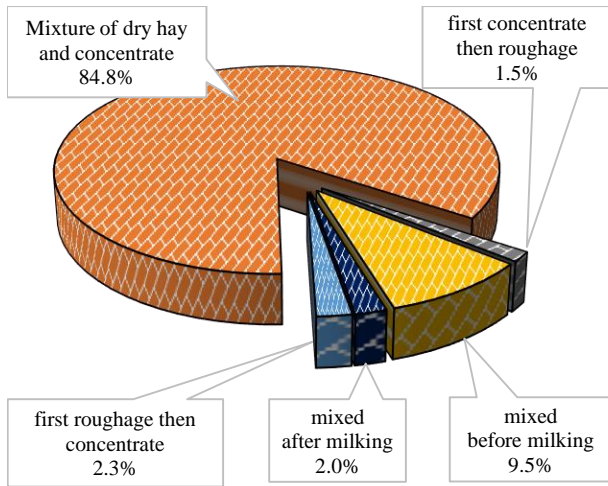


Figure 6. Feeding methods of the cattle in the enterprises (%)

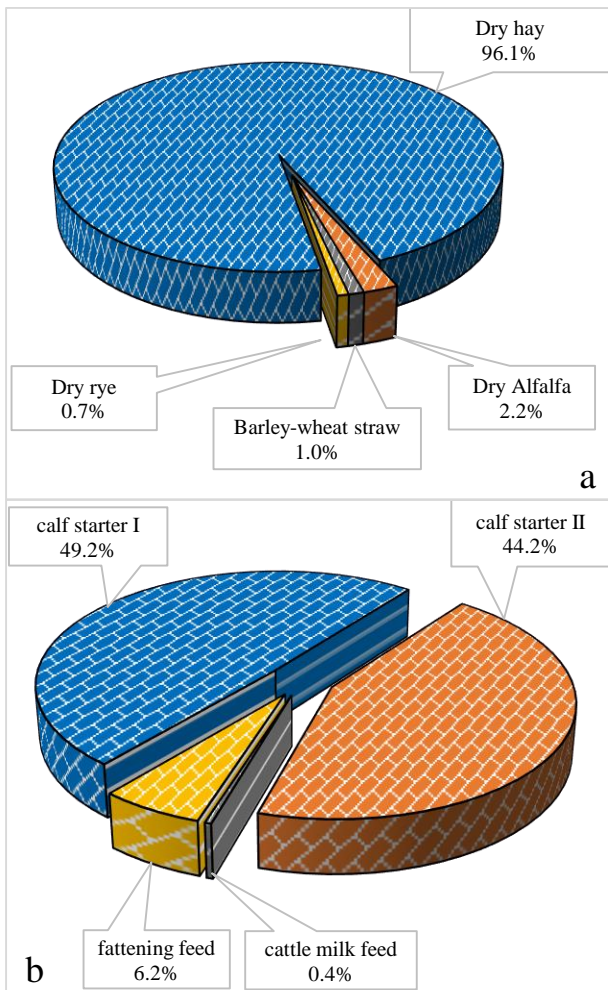


Figure 7. Types of the forage (a) and concentrate (b) feed offered to calves (%)

### Calf Feeding

The types of roughage and concentrate used in calf feeding are illustrated in Figure 7. Dry hay was offered to the calves as roughage in 96.1% of the surveyed enterprises. It was also revealed that the use of concentrate feed in calf feeding was 64.3%. In 49.2% of the enterprise's calf starter feed, in 44.2% of them calf growth feed, and in the remaining enterprises cattle fattening feed (6.2%) or dairy cattle feed (0.4%) were utilized for calves' nutrition as concentrate feed. Contrary to the findings of

the current study, Tugay and Bakır (2008) and Diler et al. (2016) reported that 98.9% and 60.0% of the enterprises respectively did not offer concentrate feed to the calves.

In the present study, it was found out that in 7.5% of the enterprise's breeders started to offer roughage to the calves at the 1st week of age, 23.3% at the 2nd week, 33.3% at the 3rd week, and 36.0% after the 4th week in the central county of Ağrı Province. On the other hand, in 7.5% of the enterprises concentrate feed was initiated for offering to the calves at 1-3 weeks of postpartum, in 25.5% of them at 4th week and in 24.0% of them at week 5-7 and in 43.0% of them at 8th week. It was also determined that 56.3% of the owners of the enterprises started to give drinking water to their calves between 1-10 days of postpartum, 20.8% of them between 11-20 days, and 23.0% of them 20 days after birth. Diler et al. (2016) reported that breeders generally began to offer roughage and concentrate feed at 4th weeks of postpartum (52.0%) or after at 4th week (30.0%) after birth, and water at 1-2 weeks of age (77.0%). In the studies conducted in other countries, Vasseur et al. (2010) indicated that concentrate feed was offered to the calves at an average age of 7 days of postpartum and dry hay at 3 days after birth, and drinking water at 2.5 days of age. Heinrichs et al. (1987) reported that concentrate feed (97.9%) was initiated for feeding of calves in the 1st week of age, while roughage (78.7%) and drinking water (75.1%) was given in the 2nd week.

Good quality concentrate and roughage given to calves in the early period of their lives supports rumen development and ensures more economical weight gain. Ideally, calves should be offered concentrate feed (calf starters) about 10 days after birth and good quality roughage at 1-2 weeks of age. Although they can meet their water needs with liquid feeds, they should still be offered clean water continuously starting from the 1st or 2nd week. It was seen that the majority of the breeders do not comply with the recommended criteria except for the use of water in calf feeding.

### Conclusion and Suggestions

It was determined that a higher percentage (91.5%) of forage crops is produced in the central county of Ağrı province compared to other provinces of Turkey. On the other hand, usage of the corn silage in cattle farms in the central county of Ağrı province remained at a very low level (7.8%). High productivity from dairy cattle enterprises can only be achieved with proper animal care and feeding practices. In these conditions, quality silage may play an important role for increasing of the milk yield. Therefore, more silage has to be included in the feeding practices in dairy cattle farms and the use of silage should be popularized in central county of Ağrı province.

The majority of the breeders (96.5%) fed their animals based upon their traditional knowledge, and as a result, the animals suffer from malnutrition which results in low milk yield. The cattle breeders should receive the necessary technical information support from the relevant authorities about the feeding, and ration preparation that meet the needs of the animals in various physiological periods.

In conclusion, the awareness of the owners of the enterprises for forage crops and especially for silage corn

production in the central county of Ağrı Province has to be increased and the incentives and financial supports should be raised. Training courses and projects should be developed to increase the knowledge, awareness, skills, and education levels of the breeders, and at the same time, agricultural extension service delivery should be boosted in rural areas.

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