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Research Article
(Araştırma Makalesi)

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Structural Characteristics of Dairy Cattle Enterprises in Central County of Ağrı Province: Milking Management Practices

Ağrı İli Süt Sığırcılığı İşletmelerinin Yapısal Özellikleri: Sağım Yönetimi Uygulamaları

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ABSTRACT

Objective: In this study, it was aimed to determine the current situation of milking management practices of the dairy cattle enterprises in the central county of Ağrı province and to propose some solutions in consideration of the revealed problems.

Material and Method: Survey data obtained from 400 dairy cattle enterprises in the central county of Ağrı province constituted the material of the study.

Results: It was determined that in 25.2% of the surveyed enterprises udder cleaning is not performed, and in 93.5% of them the milking is done by hand. The average milk yield of 85.0% of dairy cattle enterprises was between 6-10 liters per animal and only 17.5% of the produced milk was sold. A significant proportion of this milk (95.7%) was marketed as raw milk, and milk in 4.3% of the enterprises was sold after processing into different products such as cheese, yogurt and butter. It was also found out that milk produced in 1.8% of the dairy cattle farms was stored in the cooling tank after milking. 13.6% of the farm owners fed their animals after milking, while 86.3% of them fed them prior to milking. It was also revealed that the calving occurs usually in the winter season and the lactation period of the cows varies between 5-6 months in 57.5% of the enterprises.

Conclusion: In order to produce high quality and clean milk in the dairy cattle farms in the central county of Ağrı province, udder cleaning has to be performed properly as well as machine milking should be made widespread. It is necessary to increase the genetic capacity of cows and improve the milking practices of the dairy farms located in the central county of Ağrı province.

ÖZ

Amaç: Bu çalışmada, Ağrı ili merkez ilçede bulunan süt sığırcılığı işletmelerin de sağım yönetimi uygulamaları bakımından mevcut durumun belirlenmesi ve ortaya konulan sorunlara yönelik çözüm önerileri sunulması amaçlanmıştır.

Materyal ve Metot: Araştırmanın materyalini Ağrı ili merkez ilçede bulunan 400 süt sığırcılığı işletmesinden elde edilen anket verileri oluşturmuştur.

Bulgular: Araştırma konusu işletmelerin % 25.2'sinin meme temizliği yapmadığı, % 93.5'lik kısmın sağımı elle yaptığı belirlenmiştir. İşletmelerin % 85.0'inin ortalama süt verimlerinin 6-10 litre arasında olduğu ve üretilen sütün sadece % 17.5'inin satıldığı tespit edilmiştir. Bu sütün önemli bir kısmı (% 95.7) çiğ süt olarak satılmakta, işletmelerin % 4.3'ünde ise süt; peynir, yoğurt ve tereyağı gibi ürünlere işlendikten sonra pazarlanmaktadır. Yetiştiricilerin % 1.8 lik kısmının sütü sağım sonrası soğutma tankında depoladıkları belirlenmiştir. Ağrı ilindeki işletmecilerin % 13.6'sı sağım sonrasında hayvanlara yem verirken, % 86.3'ü ise sağım öncesinde yem verdiklerini ifade etmişlerdir. İl genelinde ineklerin genel olarak kış mevsiminde yoğun olarak buzağıladığı ve işletmelerin % 57.5'inde ineklerin laktasyon sürelerinin 5-6 ay arasında değiştiği tespit edilmiştir.

Sonuç: Ağrı ili merkez ve ilçelerindeki süt sığırcılığı işletmelerinde kaliteli ve temiz süt üretmek için meme temizliğinin uygun şekilde yapılması, makineli sağımın yaygınlaştırılması ve elde edilen sütün soğuk zincir kurallarına göre depolanması gereklidir. İlçede bulunan süt çiftliklerinde, ineklerin genetik kapasitelerinin artırılması ve sağım uygulamalarının iyileştirilmesi gerekmektedir.

INTRODUCTION

There are two basic sources of income on dairy cattle enterprises. The first is the calf, and the second is milk. In order to initiate lactation, which is called the milk yield (secreting) period, cows need to give birth to a calf. According to the data of TUIK 2019, the total number of cattle in Türkiye is 17872331 head. The number of cows that are milked is 6580753 head, which is 36.8% of the total number of cattle in Türkiye.

Ağrı is a province located in the Eastern Region of Türkiye. There are Iran in the east of the province, Kars in the north, Erzurum in the northwest, Muş and Bitlis in the southwest, Van in the south and Iğdır in the northeast. The population of the province is 535,435, of which 59.72% lives in cities. The acreage of the province is 11,099 km² and the altitude of the city center is 1630 m (Anonymous, 2021a).

Considering meadow and pasture areas, Ağrı has significant potential for livestock production (Anonymous, 2021b). There are 139317 dairy cows in the province and this number accounts for 2.1% of the dairy cow population in Türkiye. About 64.7% of the cows raised in the province are crossbreds (between European and local breeds), 4.9% of them are continental (high yielding European) breeds and 30.4% of them are indigenous (local) breeds (TÜİK, 2019).

In this study, it was aimed to determine the current situation of milking management practices of the dairy cattle enterprises in the central county of Ağrı province and to propose solutions in consideration of the revealed problems.

MATERIAL and METHOD

The surveys conducted face-to-face on 400 dairy cattle enterprise owners in the central county of Ağrı province constituted the material of the study. Survey questions were prepared to reveal the milking management practices applied in the enterprises. Dairy cattle farms were visited and the current situation was tried to be revealed by means of observation together with survey questions.

In the determination of the random sample size (number of farms) 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).

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

n= Number of samples

N= Finite population size

D= Acceptable or desired sampling error

t= Table value

p= The rate to be calculated

q= 1-p

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

With the formula written above, the estimated sample volume was calculated to be approximately 361. According to this result, the number of surveys was increased by 10.8% (39 pieces) and the number of surveys to be conducted in the villages of the central district of Ağrı province was determined as 400. The data obtained from survey work were entered to MS-Excel 2010 computer program. For statistical analysis the SPSS statistical software (procedure of descriptive-frequency analysis) was used (SPSS, 2004). Graphs were created by using the proportional values and the results were interpreted.

RESULTS and DISCUSSION

It was determined that pre-milking udder cleaning was performed in 75.8% of the enterprises surveyed in the central county of Ağrı province, while it was not performed in 24.2% of them (Figure 1). In this regard, in a study conducted in Hınıs County of Erzurum Province (Koçyiğit et al., 2016), it was reported that pre-milking udder cleaning was performed in 85.0% of the cattle farms. In similar studies conducted in Türkiye, the percentage of the enterprises that cleaned the udder before milking was reported as 96.0% in Tekirdağ (Soyak, 2007); 98.4% and 96.5% in Ankara and Aksaray, respectively (Tatar, 2007); 78.0% in Kahramanmaraş (Kaygısız et al., 2008) and 93.3% in Çayırlı County of Erzincan Province (Özyürek et al., 2014). When the pre-milking udder cleaning practicing rate of the cattle enterprises in the central county of Ağrı province is compared with the above-mentioned findings, in other studies, it is seen that the results are significantly lower than in other provinces and counties of Türkiye. In order to spread hygienic practices such as pre-milking udder cleaning in the county, the old traditional habits of breeders must change and more emphasis should be placed on pre-milking udder cleaning and training courses should be provided for this purpose.

In this study, it was determined that cows in the 93.5% of the enterprises are milked by hand and in only 4.5 % of the enterprises by mobile milking machines. The percentage of farms which has a milking parlor was 2.0% (Figure 2). In similar other research conducted in other regions of Türkiye, it was reported that the percentage of enterprises which used hand milking method was 96.5% in Van province (Bakır, 2002),

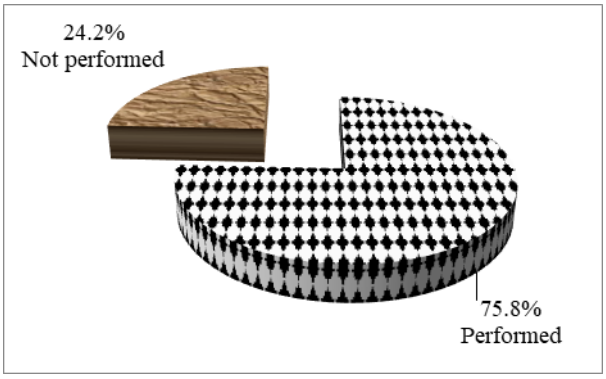

Figure 1. Pre-milking udder cleaning status

***Şekil 1**. Sağımdan önce meme temizliği yapma durumu*

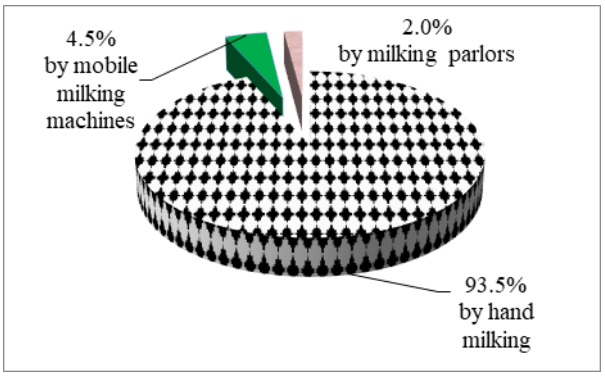

***Figure 2.** Milking Methods*

***Şekil 2**. Sağım Metodu*

81.0% in Çayırlı county of Erzincan province (Özyürek et al., 2014), 78.4% in Kars province (Demir et al., 2014), 89.2% in Hınıs county of Erzurum province (Koçyiğit et al., 2016), 71.5% in Muş province, and 62.5% in Erzurum central cattle farms (Sarıalioğlu and Laçin, 2021). It can be deduced that hand milking method is more common in the Eastern part of Türkiye. On the other hand, the percentage of using milking machine in Tekirdağ province (North west part of Türkiye) was reported to be 76.0% by Akman and Özder (1992) and 93.0% by Soyak et al. (2007). In Ankara and Aksaray (Central part of Türkiye), it was reported by Tatar (2007) as 95.2% and 94.4% respectively. In addition, Önal and Özder (2008) indicated that all enterprises in Edirne province used machine milking, while Kaygısız and Özkan (2021) stated that the machine milking was used by 69.0% of the enterprises in Samsun province (Black Sea Region).

Findings of the present study demonstrated that pre-milking udder cleaning has to be done properly and this should be made widespread among the breeders in central county of Ağrı. Additionally, it is necessary to work towards increasing the use of the machine milking method instead of hand milking, and breeders should be encouraged on this way.

The information about the feeding time of lactating cows is presented in Figure 3. As could be seen in Figure 3, 13.6% of the owners of cattle farms fed their animals after milking while 86.4% of them fed them prior to milking. Percentage of enterprises fed cows before milking was reported as 28.0% in Hınıs County of Erzurum Province (Koçyiğit et al., 2016). In other studies conducted in Kahramanmaraş and Tokat provinces, the percentages of the enterprises fed cows during milking were reported respectively as 58.0% (Kaygısız et al., 2008) and 44.4% (Ildiz, 1999).

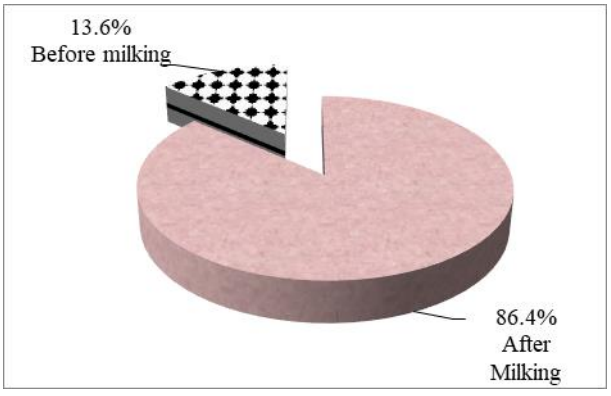

Figure 3. Feeding time of cows

***Şekil 3.** İneklerin beslenme zamanı*

According to modern dairy cattle breeding practices, the newborn calf should be separated from its dam in fourth days postpartum. In the current study, it was determined that the calves stayed together with the cows and were raised by their mothers in most of the enterprises (71.3%) in the central county of Ağrı province (Figure 4).

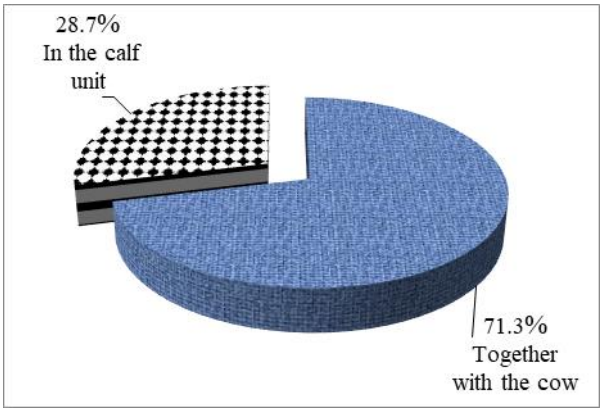

Figure 4. The place where the calf is held during milking

***Şekil 4.** Sağım esnasında buzağıların tutulduğu yer*

The average daily milk yield was determined as 6-10 liters in 85.0%, less than 5 liters in 9.0% and 11-20 liters in 6.0% of the enterprises which were included in the present study (Figure 5). By other similar studies the average daily milk yield were reported as 7.04 kg in Muş province (Şahin et al., 2021) and 11.2 liters in Bolu province (Şahin, 2000). In Giresun province, it was reported that 49.3% of the dairy cattle farms had 4.5 kg or less average milk yield per cow, and 50.7% of them had 5 kg or higher milk yield per cow (Tugay and Bakır, 2009). The average milk yield obtained in this study is in accordance with the results of the other studies mentioned above. Findings of the present study demonstrated that lactation period of cows in the central county of Ağrı province is shorter than the recommended lactation length, which may lead to lower milk production and reduce the income of the enterprises. For this reason, there is a need to increase the genetic milk yield capacity of the animals and to improve the husbandry practices on the farms in this region.

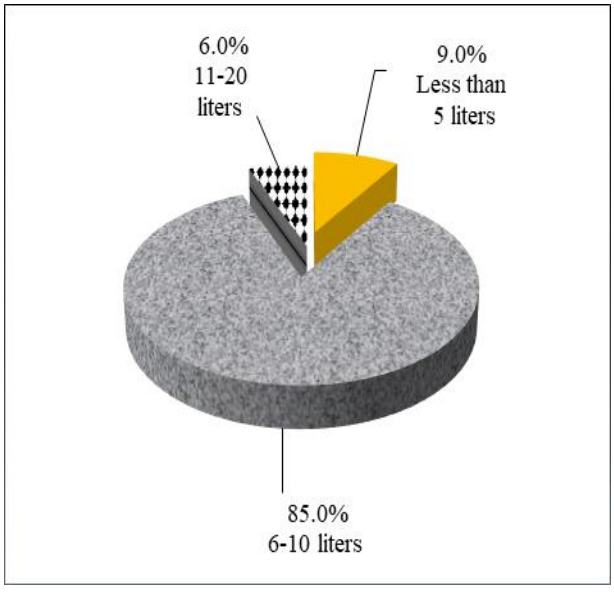

Figure 5. Daily milk yield

Şekil 5. *Günlük süt verimi*

In the present study, it was determined that 81.0% of dairy cattle enterprises in Ağrı stored their milk after milking in plastic containers, 17.3% in aluminum containers and 1.8% in cooling tanks (individual + collective).In similar studies, Koçyiğit et al. (2016) reported that most of the enterprises (73.0%) in Hınıs county, involved in the study, stored their milk in aluminum buckets. In another study Koçyiğit et al. (2017) revealed that 68.6% of the enterprises in Narman county of Erzurum province, involved in the study, stored their milk after milking in aluminum containers outside the barn, 30.9% in the barn and 0.5% in the cooling tank. Şahin et al. (2021) reported that in 48.2% of the enterprises, involved in the study in Muş province, raw milk was stored in the refrigerator at home after the cows were milked. In addition, Kaygısız and Özkan (2021) indicated that all of the enterprises, involved in the study in the Tekkeköy county of Samsun Province kept their milk in the refrigerator after milking. Results of the current study revealed that a cold chain for preservation of raw milk in central county of Ağrı province has to be established, and the milk must be stored after milking under healthy and hygienic conditions and the cattle farmers should be trained about this topic.

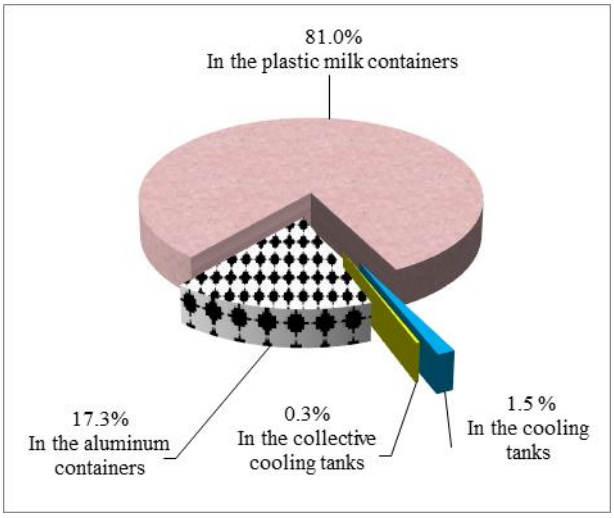

Figure 6. Used milk storing equipment after milking

Şekil 6. *Sağımdan sonra sütün muhafaza edildiği ekipman*

The type of utilization of milk produced in the enterprises are presented in Figure 7. 82.5% of the surveyed enterprises stated that they use the milk for their home's needs. In other similar studies Koçyiğit et al. (2017) revealed that 65.4% of the surveyed enterprises in Hınıs County of Erzurum province sold their milk to milk traders, 19.7% used it for their own consumption, 13.9% gave it to milk processing factories or dairies, and 1.0% gave it to milk producer associations. Demir et al. (2014) conducted a survey study in 162 enterprises of Kars Province and found that 56.8% of dairy cattle enterprises marketed their milk to the dairy, 21.0% of them marketed the milk by themselves, and 14.2% of them sold it to the dairy factories. Şahin (2001) reported that some of the dairy farms in Kayseri province sold their milk to local retailers, which sold the milk in the city center of Kayseri province.

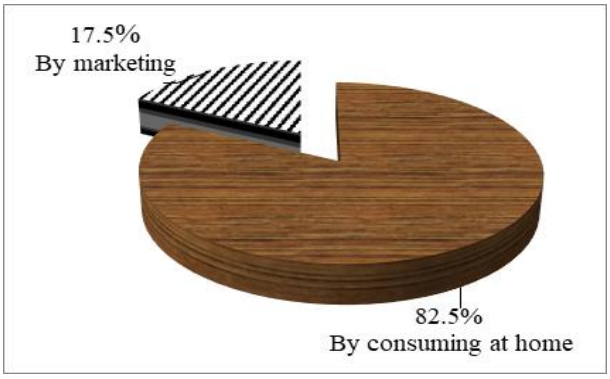

Figure 7. Utilization types of milk

Şekil 7. *Sütün değerlendirilme şekilleri*

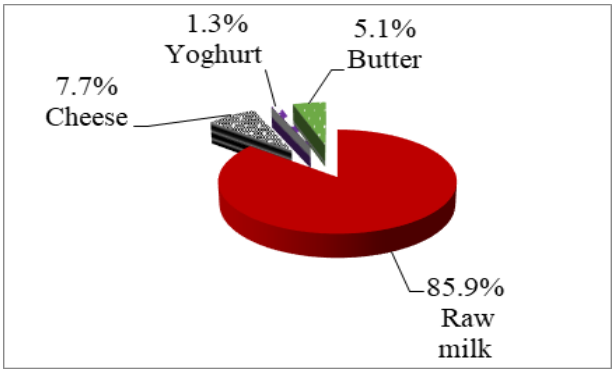

Figure 8. Products in which the milk produced is processed

Şekil 8. *Üretilen sütün işlendiği ürünler*

Share of products in which the milk produced is processed is given in Figure 8. When the results presented in Figure 8 were taken into consideration, it was found out that the majority of the enterprises (85.9%) marketed the milk as raw milk. In the rest of the enterprises (13.1%), the milk was processed and sold as dairy products such as cheese, yogurt or butter. In similar studies, Şahin et al. (2021) reported that 59.12% of dairy cattle enterprises in Muş province sold their milk after processing it into different dairy products (cheese, butter, yogurt, cream, etc.). In another study conducted in Kahramanmaraş province, it was reported that the percent of the enterprises processing their milk produced to yogurt, white cheese, local finger cheese, ayran, kashar cheese, butter and knitted cheese were 100%, 50%, 40%, 30%, 20%, 20% and 10% respectively (Bars and Akbay, 2013). In the current study, it was found that the percentage of enterprises which processed their milk into different dairy products was lower compared to the findings of the Bars and Akbay (2013) and Şahin et al. (2021).

In central county of Ağrı Province, in 58.6% of the cattle farms the calving season was in winter, in 27.8% in spring and in 13.5% in summer (Figure 9). Similarly, in a survey study conducted by Çoban et al. (2013), 83.9% of breeders expressed that they prefer winter or spring as calving season.

Distribution of the average length of the lactation periods (months) in dairy farms in the central county of Ağrı province are given in Figure 10.

In contrast to these results, in a study conducted by Koçyiğit et al. (2016) in Hınıs county of Erzurum province, it was reported that autumn season was preferred as calving season by 68.0% of the farm owners.

In order to achieve a regular income on the dairy cattle enterprises throughout a year, it is recommended that the births of the cows should be spread over the year equally rather than giving birth on specific months or seasons, and that the dairy cattle farms in the Ağrı Province should make a projection in this regard.

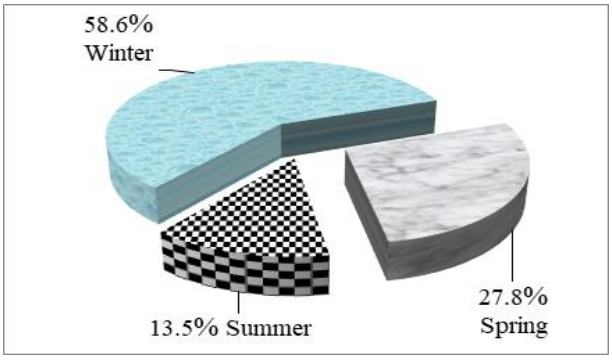

Figure 9. Birth seasons of the cows

Şekil 9. *İneklerin doğum mevsimleri*

It was determined that 57.5% of the farms milked their cows between 5 and 6 months. The percentages of farms which milked their cows between 7-8 months and 2-4 months were 3.25% and 39.25%, respectively. Optimum lactation period is accepted as 10 months in dairy cattle production and then the cows should have a dry period over 2 months before giving birth. However, in this study it was found out that the longest milking period was 7-8 months in the surveyed farms. In another survey study, the average lactation period of the cows in Kars province was determined as 6 months (Demir and Aral 2009). Average milking periods of Muş and Bolu provinces were reported to be 6.13 months (Şahin et al., 2021) and 242.3 days (Şahin, 2000) respectively. Koçyiğit et al. (2017) stated that milking period was 10 months in 24.5% of the surveyed enterprises in Narman county of Erzurum province. Şeker et al. (2012) reported that in 46.0% of the surveyed enterprises in Muş province the cows are milked until they go dry period by themselves and in 38.7%, breeders dried their cows off 2 months before their expected calving

date. In another study conducted in Giresun province, researchers reported that in 82.8% of the surveyed enterprises the cows are milked until 2 months before calving, and in 17.2% of them they are milked until they go dry or give birth (Tugay ve Bakır, 2009). According to lactation length, the values obtained in this study were found to be lower than values reported in previous studies mentioned above.

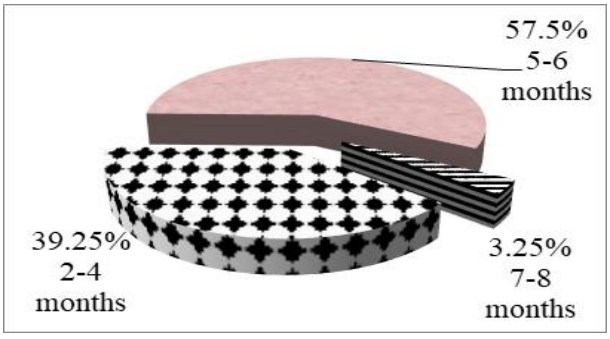

Figure 10. Average length of the lactation

Şekil 10. *Ortalama laktasyon süresi*

CONCLUSION

This study was conducted to reveal the current situation of dairy cattle enterprises in the central county of Ağrı province in terms of milking management practices. The results of the current study demonstrated that 25.2% of the enterprises did not make udder cleaning at milking time and in most of the farms (93.5%) milking of the cows was done by hand. It was also revealed that the average milk yield of cows was between 6-10 liters in majority of the surveyed enterprises (85.0%) and only 17.5% of the enterprises could sold their milk and the whole sold milk was sent to the market as raw milk. Therefore, it was suggested to improve the milking practices and to increase the genetic capacity of cows of the dairy farms located in the central county of Ağrı province.

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