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A Study on the Milking Practices and Some Structural Characteristics of the Cattle Enterprises Located in İspir County of Erzurum Province

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ABSTRACT: This study was carried out in İspir county of Erzurum Province to reveal the milking management practices in the cattle enterprises. For this purpose, data were obtained by conducting a face to face survey with 385 dairy farm owners in the county. Frequency analysis and Chi-square tests of the obtained data were performed in SPSS statistics program. According to the results obtained from this study, it was determined that more than half (53.5%) of the enterprises handed out concentrate feed to cattle during milking, and 33.0% of them prior to milking. Cows were milked by hand in the majority of the cattle enterprises (78.4%), and mobile milking machines were used for milking cows in 21.6% of the farms. Effect of education levels on the milking method was determined to be highly significant ($p<0.01$). Only 3.3% of the enterprises did not perform pre-milking udder cleaning. The most common problems encountered by the cattle breeders in the İspir county of Erzurum were found as diseases (99.2%), expensive feed prices (97.5%), difficult cattle care (97.0%), and market insufficiency (94.9%). Although the milking management of dairy cattle enterprises in the county is better than in some provinces of Turkey, there are still important problems and deficiencies. For improving the breeder's awareness and knowledge about milking management in the county, farmers need to be informed about pre-milking udder cleaning, milking methods, storing raw milk, keeping milk yield records as well as supports and incentives given by the Ministry of Agriculture and Forestry.

Keywords: Cattle enterprises, Erzurum province, Milking management, Milking practices, İspir County

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Erzurum İli İspir İlçesinde Bulunan Sığırcılık İşletmelerinin Sağım Uygulamaları ve Bazı Yapısal Özellikleri Üzerine Bir Araştırma

ÖZET: Bu çalışma, Erzurum ili İspir ilçesindeki sığırcılık işletmelerinde uygulanan sağım yönetimi uygulamalarını ortaya koymak amacıyla yapılmıştır. Bu amaçla ilçede bulunan 385 süt sığırcılığı işletme sahibi ile yüz yüze anket yapılarak veriler elde edilmiştir. Elde edilen verilerin frekans analizi ve Ki kare testleri SPSS istatistik programında yapılmıştır. Çalışmadan elde edilen sonuçlara göre, işletmelerin yarısından fazlasının (%53.5) büyükbaş hayvanlara sağım sırasında kesif yem verdiği, işletmelerin %33.0'ünün ise kesif yemi sağımdan önce verdiği tespit edilmiştir. İlçedeki sığırcılık işletmelerinin büyük çoğunluğunda (%78.4) inekler elle sağılırken, %21.6'sında sağım için seyyar sağım makineleri kullanılmıştır. Eğitim düzeyinin işletmede uygulanan sağım yöntemine etkisi çok önemli ($p<0.01$) bulunmuştur. İşletmelerin sadece %3.3'ünde sağım öncesi meme temizliği yapılmadığı belirlenmiştir. Erzurum ili İspir ilçesinde yetiştiricilerin en sık karşılaştıkları sorunların, hastalıklar (%99.2), yem fiyatlarının pahalı olması (%97.5), sığır bakımının zor olması (%97.0) ve pazar yetersizliği (%94.9) olduğu belirlenmiştir. İlçedeki süt sığırcılığı işletmelerinin sağım yönetimi konusunda Türkiye'nin bazı illerine göre daha iyi olmasına rağmen halen önemli sorunlar ve eksiklikler bulunmaktadır. İlçede sağım yönetimi konusunda yetiştiricinin bilinç ve bilgi düzeyinin artırılması için çiftçilerin sağım öncesi meme temizliği, sağım yöntemleri, çiğ sütün depolanması, süt verim kayıtlarının tutulması ve Tarım ve Orman Bakanlığı tarafından verilen destek ve teşvikler hakkında bilgilendirilmesi gerekmektedir.

Anahtar Kelimeler: Erzurum ili, İspir İlçesi, Sağım uygulamaları, Sağım yönetimi, Sığırcılık işletmeleri

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INTRODUCTION

İspir is a county located in the north of Erzurum in the Çoruh Valley and 141 km away from the city center. The average altitude of the county is 1050 m and its surface area is 2100 km^2. It is surrounded by Tortum and Yusufeli in the east, Pazaryolu in the west, Çamlıhemşin and İkizdere counties of Rize province in the north and Bayburt province in the south. The county, which is located in the transition region between Eastern Anatolia and Eastern Black Sea Regions, has both continental climate and Black Sea climate effects. The most precipitation falls in the spring months.

The arable lands of the county, which has a total surface area of 210000 hectares, constitute 4% of the total area with 9100 hectares. Grain and cereals are produced in 80% of the agricultural areas, vegetables in 2% and fruit in 2%. Small ruminant production is widely carried out in the county, goat breeding is the primary branch of livestock activities, moreover, cattle breeding is carried out in villages located in mountainous regions. Dairy cattle breeding is less preferred compared to other counties of Erzurum province. Native breeds constitute 8% of the total cattle presence, while the rest are crossbreds of continental breeds in İspir county (Anonymous, 2021).

In recent years, it has been observed that the research on the structural status of cattle breeding enterprises operating in different regions of the world and in Turkey and the characteristics of milking management have been intensified. In addition to determining the changes and new trends in the cattle breeding sector and creating solutions to existing problems, the survey studies is of particular importance in creating realistic plans and programs for the future (Bakır and Kibar, 2020, Özsağlıcak and Yanar, 2021).

According to TUIK 2020 data, the total number of cattle in İspir county is 24291 heads and livestock has a very important place for the development of the county. Although there are studies examining the structural characteristics and milking management of existing cattle farms in Hınıs (Koçyiğit et al., 2016) and Narman counties (Koçyiğit et al., 2017), no study has been conducted in İspir county, which is located in the north of the province. Therefore, it was aimed to determine the current situation and problems of milking management practices in the dairy cattle enterprises as well as to reveal any other commercial activities of the breeders excluding cattle breeding, reasons for breeders to raise cattle, satisfaction of the cattle breeders from rearing of cattle in İspir county of Erzurum province in this study.

MATERIAL and METHODS

The data obtained from face-to-face surveys conducted in 394 out of 2107 cattle farms in İspir county of Erzurum province consisted the material of the study. Since the variance is unknown as well as the population is limited and there are qualitative variables dependent on probability, the method (1) whose formula is given below was used to determine the sample size of the research (Arıkan, 2007).

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

n= Minimum number of necessary samples
N= Population size (N= 2107)
D= Acceptable or desired sampling error (0.05)
t= Table value (t=1.96, α=0.05)
p= The rate to be calculated (0.5)
q= 1-p

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

The minimum number of samples (n) was found to be 325, and the final sample size was determined as 394 by increasing the number of samples by 21.23% of the total population. The data collected from the questionnaires were transferred to the MS-Excel program and frequency analysis was performed, and the class ranges of some values were determined. Then, the data were summarized in tables and the % values of each subgroup were presented. Chi-Square analysis available in SPSS statistics program were utilized to determine the effects of the educational status of the owners of the enterprises (illiterate, literate, Primary School graduate, Secondary School graduate and High School graduate) and the number of cattle in the enterprises on some milking practices performed in the enterprises (SPSS, 2011).

RESULTS and DISCUSSION

Time for Feeding Milking Cows with Concentrate Feed

The findings and percentages of the enterprises regarding time for feeding the milking cows with concentrate feed in Erzurum province İspir county are presented in Figure 1. It was determined that more than half (53.5%) of the enterprises included in the study handed out concentrate feed to cattle during milking, and 33.0% of the enterprises prior to milking. In addition, while 4.6% of the farmers offered concentrate feed after milking, 8.9% of the cattle breeders stated that they did not give concentrate feed during the milking time. Similarly, Kaygısız et al. (2008) reported that 58.0% of the

farms in Kahramanmaraş offered feed to cattle during milking and this percentage was reported as 44.4% in Tokat province by Ildız (1999). Similar to the findings of the present study, it was reported that 28.0% of the farms in Hınıs county of Erzurum province (Koçyiğit et al., 2016) did not give feed to cattle during milking.

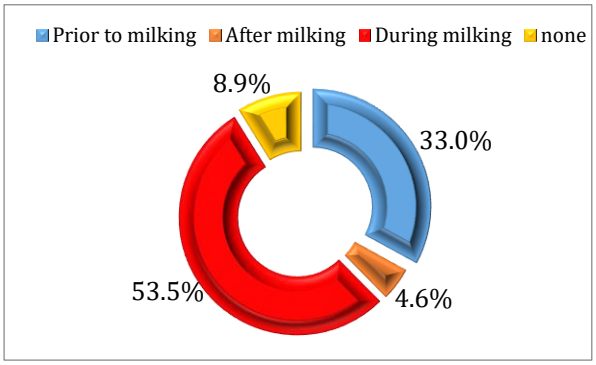

Figure1. Concentrate feeding applications prior to, after or during milking.

Şekil 1. *Sağım öncesi, sonrası veya sırasında konsantre yemleme uygulamaları*

Milking Methods

It was determined that cows are milked by hand in the majority of the cattle enterprises (78.4%) in İspir county, and mobile milking machines in 21.6% of them were used for this milking practice (Figure 2). Effect of education levels on the milking method was determined to be highly significant ($p<0.01$). All of the illiterate breeders preferred the hand-milking method to milk their cows. In similar studies on this subject, it was revealed that the hand-milking method is quite widespread in Turkey (Bakır, 2002; Demir et al., 2014; Aksoy et al., 2014; Pirinççi, 2015; Sarıalioğlu and Laçin, 2021). Moreover, in the studies conducted in the Eastern Anatolia Region, it was observed that the rate of enterprises that milk their cows by hand was considerably high as it was also confirmed by the present study. Bakan (2014) determined that 42.45% of the cattle enterprises in Ağrı province milked their cattle manually, while 57.55% used milking machine. On the other hand, it was reported that the rate of machine milking is more common in the middle and western regions of Turkey. The percentage of machine milking usage was reported as 93.0% in Tekirdağ (Soyak et al., 2007), 95.2% in Ankara, 94.4% in Aksaray (Tatar, 2007). Furthermore, Önal and Özder (2008) determined that all enterprises in Edirne province and Kaygısız and Özkan (2021) and Alapala Demirhan and Yenilmez (2019) reported that 69.0% and 88.0% of enterprises in Tekkeköy county of Samsun and Uşak province used machine milking method for milking their cows, respectively. Moreover, Bogdanovic et al. (2012) reported three milking systems were widespread in Serbia, milking in herringbone milking parlors, milking with the assistance of stable milkline and vacuum line and milking using milking machines in special bins. In a similar study conducted in the Rangpur region of Bangladesh, the percentage of enterprises that use hand milking method was reported to be 100% (Hossain et al., 2005).

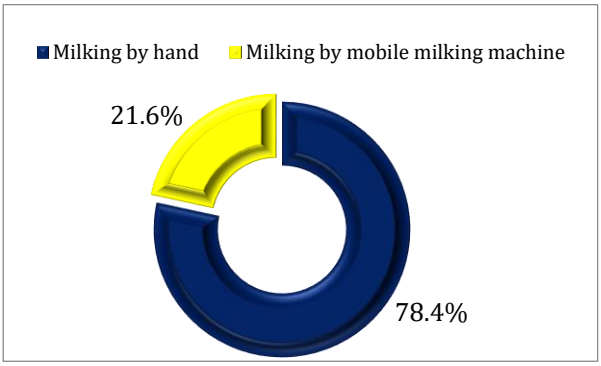

Figure 2. Milking methods used in the enterprises

Şekil 2. *İşletmelerde kullanılan sağım metotları*

Pre-milking Udder Cleaning

It was found out that only 3.3% of the enterprises did not perform pre-milking udder cleaning, while 96.7% of them cleaned cows' udders prior to milking (Figure 3). Of all the participants who used the machine milking method, only 23.3% stated that milking machines were cleaned after each milking in their enterprises. It is highly important that the applications such as pre-milking udder and milking machine cleaning, which are key for quality and healthy milk production, become widespread in dairy cattle enterprises, breeder's awareness and sensitiveness should be increased. A similar study conducted in Hınıs county of Erzurum province (Koçyiğit et al., 2016), revealed that pre-milking udder cleaning was performed in 85.0% of the farms. In addition, several other studies carried out in Turkey showed that the rate of enterprises that perform pre-milking udder cleaning was considerably high. Percentages of the enterprises that perform pre-milking udder cleaning reported as a results of similar studies in other regions of Turkey are as follows, 96% in Tekirdağ (Soyak, 2007), 98.4% and 96.5% in Aksaray and Ankara (Tatar, 2007), 78% in Kahramanmaraş (Kaygısız et al., 2008) and 95.7% in the enterprises established within the scope of DAP project in Erzurum (Eltas, 2018). The findings of present study are similar to the reports of Soyak (2007) and Tatar (2007).

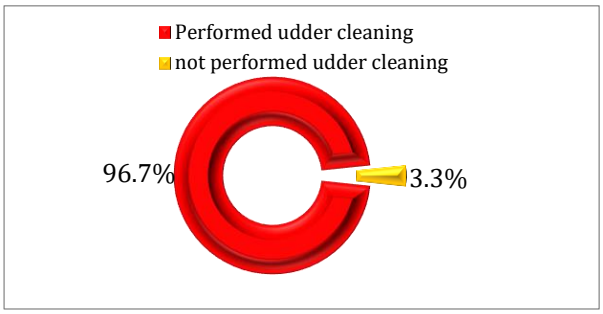

Figure 3. Performing udder cleaning prior to milking in the cattle enterprises

Şekil 3. *Sığırcılık işletmelerinde sağım öncesi meme temizliği yapılması*

Storage of Raw Milk

It was determined that all dairy cattle farms in the county kept their raw milk in plastic cans after milking. Koçyiğit et al. (2016) reported that most of the enterprises (73.0%) in Hınıs county stored milk in aluminum buckets. Moreover, Koçyiğit et al. (2017) indicated that 68.6% of the enterprises in Narman county stored the milk in aluminum buckets outside the barn after milking, while 30.9% stored it in the barn environment and only 0.5% stored it in the cooling tank. It was reported by Şahin et al. (2021) that almost half of the (48.2%) enterprises in Muş province kept the raw milk in the refrigerator at home after the cows are milked, while Kaygısız and Özkan (2021) reported that in Tekkeköy county of Samsun province, all the surveyed enterprises stored the milk in the refrigerator following the milking process. Furthermore, Millogo et al. (2008) reported that following the milking of cows, raw milk was stored in plastic rectangular containers farms and in aluminum churns in cattle farms of peri-urban areas of Burkina Faso.

Starting Season of Lactation

It was also determined that more than half (56.9%) of the dairy cattle farms in İspir county preferred their calves to be born in fall, 33.5% in spring, and the least preferred birth season was determined to be summer (6.9%) and winter (2.8%) (Figure 4). Similar to the findings of the present study, it was reported that the calving season preference of 68.0% of the enterprises in Hınıs county of Erzurum province was fall (Koçyiğit et al., 2016). Unlike these results, Çoban et al. (2013) reported that 83.9% of the breeders, in the center of Erzurum province, wanted the calving season to be in winter and spring. The reason for breeders to prefer autumn as the calving season might be due to their desire for calves to grow enough to go to pasture during the long winter season of Eastern Anatolia.

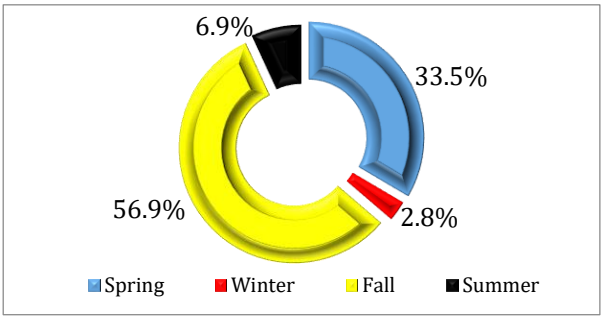

Figure 4. Calving seasons

Şekil 4. *Buzağılama mevsimleri*

Benefiting from the Milk Incentives of the Ministry of Agriculture and Forestry

Almost all of the respondents (99%) stated that they did not benefit from the milk production incentives given by the Ministry of Agriculture and Forestry. While only 4 enterprises benefited from the milk production incentives of the Ministry, the effect of cattle number in the enterprises on the incentive utilization was found to be significant ($p<0.05$). The low number of animals in the farms, hard-to-meet conditions to get the incentives, old age, and unawareness of the farm owners may be the reasons for the low rate of benefiting from the milk production incentives. Percentages of the enterprises benefited from the incentives of milk production were reported 9.0% and 21.6% in Hınıs and Narman counties of Erzurum, respectively (Koçyiğit et al., 2016; Koçyiğit et al., 2017). However, Özdemir et al. (2021) and Alapala Demirhan ve Yenilmez (2019) reported that benefit rates of the Government incentives were 85.5% in Gönen county of Balıkesir and 93.14% in Uşak province respectively.

Keeping Individual Milk Yield Records of Animals

It was determined that 99.0% of the farmers did not keep individual milk yield record of their animals in İspir county. It was observed that breeders were highly insensitive and unaware of the benefits of this application. In the western parts of Turkey farm size is larger and the level of education of enterprise owners is higher. Reports of the previous studies showed that the size of the farm and the education of the farmers significantly affects the record keeping status. It was reported that 96.0% of the enterprises kept records of their animals in Aydın province (Kaya Kuyululu et al., 2013). In similar studies conducted in Iğdır, Yozgat and Ağrı, percentages of enterprises that kept records of their animals were reported as 74.1% (Yılmaz et al., 2020), 71.8% (Ermetin, 2020) and 81.1% (Bakan and Aydın, 2016) respectively. Furthermore, Alapala Demirhan and

Yenilmez (2019), Kaygısız and Tümer (2008) and Akkuş (2009) reported that individual records of animals are kept regularly only in 33.7%, 37.0% and 32.7% of dairy cattle farms in Uşak, Kahramanmaraş and Konya provinces, respectively. In addition, it was reported that 77.9% (Rudstrom, 2001) and 46% (Costa et al., 2013) of dairy cattle enterprises kept production records.

Sources of Technical Information for Cattle Breeders

Almost all of the respondents (98.0%) stated that they received technical information support about cattle breeding from different sources. The percentages of the enterprise owners who received information support reported as 59.0% in Narman county of Erzurum (Diler et al., 2017) and 66.0% in Niğde province (Ünalan et al., 2013). While Alapala Demirhan and Yenilmez (2019) stated that 84.0% of the farm owners in Uşak province stated that they did not need information support. It was determined that the education level of the breeders had a significant ($p<0.01$) effect on the status of receiving information support in the county. It was found out that 98.9% of breeders who were primary school graduates and all of the secondary school graduate participants stated that they received information support, while 20% of illiterate participants were determined to be not receiving this kind of support. Directorates of Provincial Agriculture and Forestry (34.8%), veterinarian (33.8%) and other family members (27.2%) determined to be the primary information sources for the farmers of the county (Figure 5). Eryılmaz et al. (2020) determined that majority of the enterprises received technical information support concerning cattle breeding from the other family members (72.9%) and neighboring farm owners (67.1%) in Samsun province. In addition, Alapala Demirhan and Yenilmez (2019) stated that 24.0% of the breeders in Uşak province received this support from the Directorates of Provincial Agriculture and Forestry. In the Alberta region of the USA Veterinarians (81.1%), other dairy business owners (56.4%), feed sellers (51.9%), factories nutritionists (36.4%) were reported as the primary technical information sources for the breeders (Goonewardene et al., 1995).

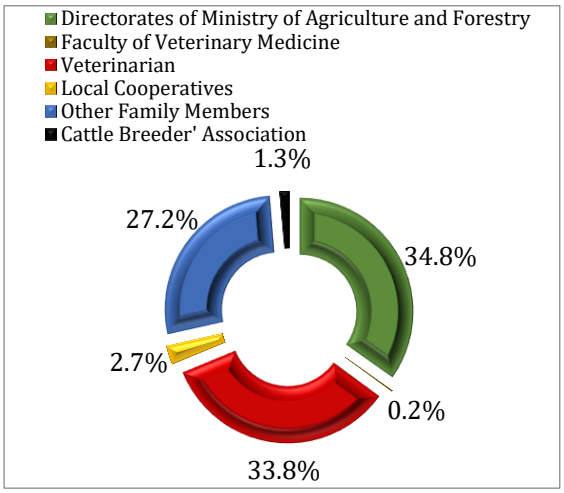

Figure 5. Sources of technical information for cattle breeders

Şekil 5. *Sığır yetiştiricileri için teknik bilgi kaynakları*

Satisfaction of Farmers from Cattle Breeding

Of all the respondents, 74.4% stated that they were satisfied with cattle breeding. It was also determined that number of cattle in the farm and education level of the farmers had a significant effect ($p<0.01$) on the satisfaction status (Figure 6). Almost all of the high school graduate participants (90.9%) were satisfied with this occupation, while 40% of illiterate breeders were unsatisfied. Farmers who had over 20 cattle in their enterprise were determined to be satisfied with this occupation. Different results on the satisfaction level of farmers were reported in similar studies. Percentages of the farmers who were satisfied with cattle breeding were reported as 88.9% in Tokat (Ildız, 1999), 79% in Tekirdağ (Soyak et al., 2007), 67% in Kahramanmaraş (Kaygısız et al., 2008), 96% in Giresun (Tugay and Bakır, 2009), 62.6% in Muş (Şeker et al., 2012), 41.3% in Ödemiş county of İzmir (Yaylak et al., 2013) and 59.4% in Muş province (Bakır and Kibar, 2019).

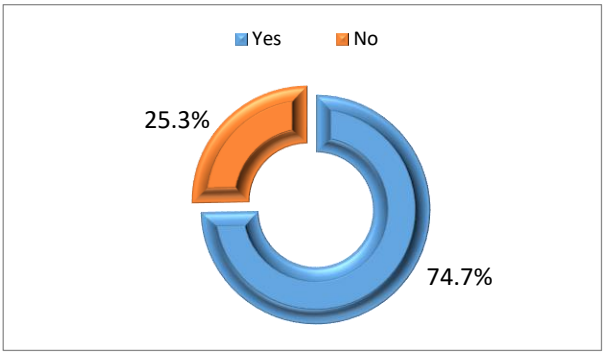

Figure 6. Satisfaction of farmers from cattle breeding

Şekil 6. *Çiftçilerin sığır yetiştiriciliğinden memnuniyeti*

Other Commercial Activities of the Breeders Excluding Cattle Breeding

It was determined that 40.4% of the breeders in İspir county of Erzurum engaged in another commercial activity (Figure 7). In addition, the education level of the farmers had a significant effect on engaging with an additional occupation ($p<0.05$). It was determined that high school (81.8%) and

secondary school (69.6%) graduates were proportionally more engaged in another commercial activity. However, illiterate and primary school graduates were determined to be less engaged in another occupation. Furthermore, 58.5% and 47.3% of the breeders who had been dealing with cattle breeding for 11-20 and 21-30 years respectively had another commercial occupation. The percentages of the breeders who were dealing with another commercial activity were reported as 52.0% in Muş (Şeker et al., 2012), 72.5% in Erzurum (Aksoy et al., 2014), 63.0% in Sivas (Hozman and Akçay, 2016), 91.9% in Rize province (Savaş and Yenice, 2016). Moreover, Duguma et al. (2012) reported that 25.9% of the enterprise owners were retired, 25.9% were civil servants, 20.4% were engaged in trade, 11.1% were housewives and only 16.7% were working full-time in the enterprise in Ethiopia. Similarly, the main activity of the breeders in Ağrı province was reported as agriculture and animal husbandry, 96.2% of the farmers were also dealing with another activity beside cattle breeding and 83.1% of these activities were related to other branches of agriculture, very few of the breeders were dealing with trade (8.8%) and only 4.8% were workers in the official offices (Bakan and Aydın, 2016).

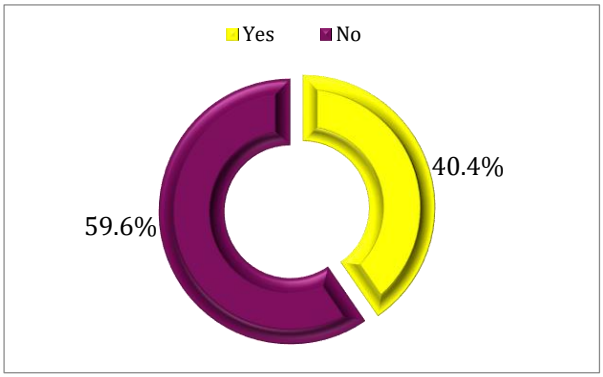

Figure 7. Any other commercial activities of the breeders excluding cattle breeding?

Şekil 7. *Yetiştiricilerin sığır yetiştiriciliği dışında başka ticari faaliyetleri var mı?*

Reasons for Cattle Breeders to Be Engaged in this Occupation

A big majority of the participants (90%) stated that their reasons to deal with cattle breeding were habit, contribution to the family budget and source of livelihood. Tugay and Bakır, (2009) reported that source of livelihood (73.7%), meeting household needs (14%), an additional contribution to livelihood (9.8%), habit (1.7%), and no other available source of income (0.8%) were the primary reasons for cattle breeders in Giresun to keep up this activity. In Muş province, 55.1% of the breeders expressed that they were dealing with cattle breeding for livelihood (Şeker et al., 2012). In a similar study conducted by Bakır and Kibar (2019), it was revealed that 64% of the enterprise owners were satisfied with cattle breeding. Almost half of the breeders who expressed their satisfaction (44.8%) stated that they had no other job to do other than animal husbandry, while 19.8% thought that their income from this occupation was enough for them and 18.5% of them thought that animal husbandry was profitable. In addition, Grobler et al. (2008) reported that animal husbandry was mostly carried out in South Africa to make profit (25.7%), and to meet the family's meat (21.6%) and milk (10.2%) needs.

The Most Common Problems in Dairy Cattle Enterprises

The most common problems encountered by the breeders in the İspir county of Erzurum were determined as diseases (99.2%), expensive feed prices (97.5%), difficult cattle care (97.0%), and market insufficiency (94.9%) (Figure 8). Özdemir et al. (2021) reported that the roughage supply was the most important challenge that breeders encountered in the milk production process, and this was followed by high feed prices, low animal product prices, and problems in veterinary and health services. In addition, Koçyiğit et al. (2016) determined that the most challenging problem seen in the enterprises is the insufficiency of the market (50.0%) and the

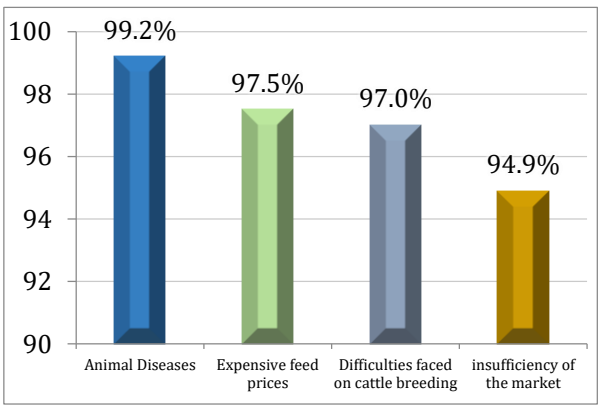

Figure 8. The most common problems in dairy cattle enterprises (%)

Şekil 8. *Süt sığırcılığı işletmelerinde en sık karşılaşılan sorunlar (%)*

second biggest problem was high feed prices in Hınıs county of Erzurum (32.0%). Oğuz and Yener (2017) reported that the main challenges of dairy cattle enterprises in Konya province were difficulties faced supplying roughage and concentrate feed as well as insufficiency in organization of the farmers.

Cattle Breeders' Expectations from the Ministry of Agriculture and Forestry

It was determined that in İspir county the primary expectations of the enterprise owners from the government were support for marketing their products (98.0%) and supply of cattle for breeding (97%). In addition, 80.0% of participants stated that they expected credit support, support for veterinary services and technical information from the government. Similarly, Şeker et al. (2012) reported that 42.7% of the breeders in Tokat province wished the government to support them with low-interest loan. It was reported by Koçyiğit et al. (2016) that in Hınıs county primary expectation of cattle breeders from the government was to provide credit support (82%).

CONCLUSION and SUGGESTIONS

In this study, milking management, record keeping, information support, breeder satisfaction and expectations in dairy cattle enterprises in İspir county of Erzurum province were determined. As a result of the information obtained, it was determined that in most of the enterprises cows are still milked manually. It should be highly required to inform of the breeders about the benefits of machine milking so as to increase the milk quality produced in the county and reduce the workforce. Awareness and sensitivity on the pre-milking udder cleaning was determined to be quite high among breeders. The most preferred calving season by the breeders was fall in the county. In dairy cattle husbandry, it is desired to have a constant flow of income to the enterprise. Achieving this is only possible with planning the births of the calves throughout the year. In the county, breeders are not able to benefit from agricultural credit supports and incentives adequately due to some restrictions, lack of information about the incentives and the challenging conditions for credit approval. The breeders at least should be well informed about the ways to benefit from these incentives and supports by the provincial and county directorates of agriculture and forestry. Animal husbandry is performed with traditional methods in family enterprises in the county. In order to fight animal diseases and increase productivity in production, application of modern livestock practices should be expanded. Migration of youngsters is one of the primary risks for the cattle breeding of the county since the local population is getting older. This situation has a negative impact on the county in terms of human resources, reducing the workforce and entrepreneurship. It was observed that only a small minority of breeders kept records of their animals regularly in the county. For a healthy herd management and profitable husbandry records are extremely important. It is highly required to increase the awareness about the benefits of the record keeping practice among the breeders.

Conflict of Interest

The authors declared no conflict of interest.

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