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SOCIO-ECONOMIC STRUCTURE OF CATTLE ENTERPRISES IN NORTHEAST ANATOLIA REGION: AN EXAMPLE OF İSPİR COUNTY OF ERZURUM PROVINCE

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Abstract: This study was carried out to reveal the current situation regarding the socio-economic characteristics of cattle enterprises in İspir county of Erzurum province. For this purpose, a face-to-face survey was conducted with 394 cattle farm owners determined using the random sampling method. The data obtained were interpreted using frequency analysis. The enterprises were mostly small-scale family types that had less than 20 (69.3%) animals. The number of cattle in the enterprises was classified as less than 11, 11-20, 21-30, 31-40, and more than 40 heads. Additionally, educational status of the owner of the enterprises were grouped as illiterate, literate, Primary School graduate, Secondary School graduate and High School graduate. The average age of the breeders was determined to be 55.2 years, with the majority between 50-70 years. The level of education of the breeders was low and the majority of them were primary school graduates (68.8%). More than half of the enterprise owners (58.4%) had more than 30 years of experience in cattle breeding. Apart from the owner, the number of people who cared for the animals was usually 2 people (43.7%) or 3 people (33.5%), and the person who cared for the animals was generally a family member. Only 27.9% of the enterprises were members of a union and 49.3% of the member enterprises preferred the Agricultural Credit Cooperative. As a result; the high average age of the population engaged in animal husbandry in the county makes it necessary to clear the way for young entrepreneurs with various supports and to prevent migration to the cities. In addition, carrying out various training and incentive activities to eliminate the disadvantages such as the low level of education of the breeders and membership of a union will make important contributions to the development of the Country's livestock sector.

Keywords: Cattle breeders, Farmers' experience, İspir, Socio-economic structure

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1. Introduction

The livestock sector has a very important and strategic place in the economy of the countries in terms of animal products, the added value and employment it creates. Livestock activities are a continuous production branch that can be performed throughout the year (Koçyiğit et al., 2022). Despite the arithmetic increase in food production in the world in recent years, the world population rised geometrically. This situation makes it difficult for people in many countries to meet their nutritional needs, especially protein, and causes malnutrition problems (Özsağlıcak and Yanar, 2021).

Animal husbandry is the most significant source of livelihood for the rural population in the Northeast Anatolian Region. Today, Erzurum and its counties maintain their feature of being one of the most important centers of Turkey in the development of animal husbandry with its large meadow and pasture areas. Rural areas have preceded as the centers of agricultural production for many years, and solutions for rural development problems in these places have been tried to be solved. However, with the mechanization in agriculture and the industrialization in urban areas unemployment rate has increased in rural areas, and migration from these areas to the cities has started (Yalçın and Kara, 2016). With the migration, young population decreased and a demographic structure with elderly people was remained in rural areas. As a result of this cycle, a significant part of the enterprises in rural areas continued their animal husbandry activities with traditional methods, remained in the small family enterprise model, and sustained animal production far from today's economic principles and requirements. In

such rural areas, the provision of public services has become difficult, structural problems and low productivity have continued in livestock enterprises, and inadequacies in organization and product marketing have been emerged. Rural areas, where public services cannot be provided adequately, have lost their attractiveness and therefore the interest of new entrepreneurs in rural areas has decreased (Şahin, 2015). This situation has become an important obstacle for agriculture and livestock sector in sustainable and balanced development. Although Turkey's geographical and socio-economic characteristics have an important potential for animal product production, animal husbandry could not reach the desired level in the country due to the reasons stated above. While, the share of animal husbandry in agricultural production in developed countries is over 50%, this rate has remained around 25-30% in Turkey (Tapkı et al., 2018).

Although Erzurum is in the Eastern Anatolia Region, İspir county is in the Black Sea Region. The county is located at the intersection of North East Anatolia and East Black Sea Region. The county is in a transition place between continental and maritime climates, and mainly continental climate characteristics are observed in the region. This characteristic of the climate leads to the formation of different climates in terms of geographical conditions in the north and south of the county. Compared to other counties of Erzurum, the winter months are milder in İspir county (Anonymous, 2021). These climatic conditions have direct or indirect effects on the socio-economic structure of the county.

The population of İspir county is 14 955 as of 2021, 49.6% of the total population is men and 50.4% are women. According to TUIK data; The ratio of the population in the 15-64 age group, which is called the working age, is 59.4% (30.3% Male, 29.1% Female), the population ratio in the 0-14 age group, which is defined as the child age group, is 14.6% and the population ratio of those who are 65 years old and older is 25.9% (Figure 1).

The population of working age in the county has decreased numerically by 10.7% in the last 10 years (Anonymous, 2022a). In recent years, the demographic structure has changed dramatically in the county where the young population has decreased and the elderly population constitutes the majority (Figure 1).

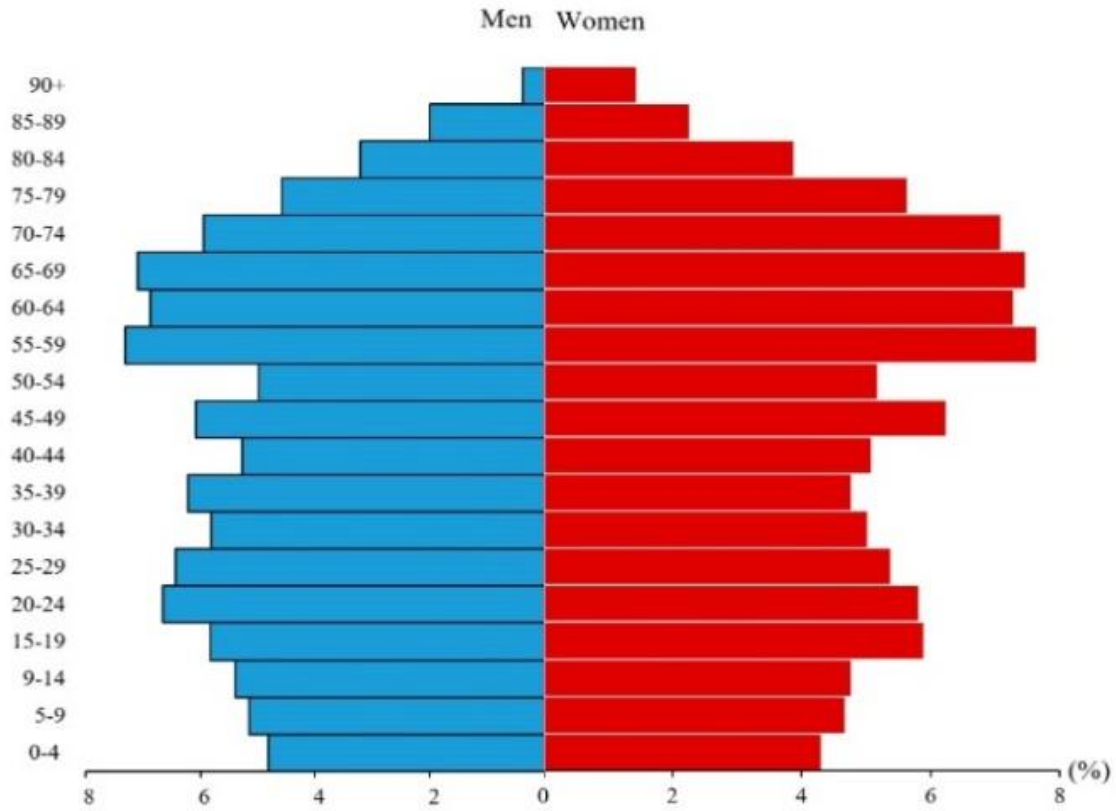

Figure 1. 2021 population pyramid of İspir county (Anonymous, 2022a).

According to 2021 TUIK data, there are 23102 cattle in the county. The cattle presence constitutes 2.7% of the total cattle population in Erzurum province. There was a 7.3% decrease in the number of cattle in 2021 compared to the previous year. High-yielding European breeds constitute 19.4% of the total cattle presence of the county, while crossbreds 77.3% and indigenous breeds 3.4% (Anonymous, 2022b). The number of lactating cows constitutes 37.7% of the total cattle population of the county. Annual milk yield per milked cow was 3.7 tons/head in high-yielding European breeds, 2.9 tons/head in crossbreds and 1.3 tons/head in domestic breeds. The annual milk yield per cow is close to the Turkey averages (Anonymous, 2022c). However,

although the annual milk yield has increased over the years both in Turkey and in the county, the annual milk yield per cow is quite low when compared to EU countries with an annual milk yield of over 6.0 tons/head.

Cattle enterprises in the county are generally small-scale family-type. Providing support to small-scale enterprises is highly important for the development of the agricultural economy, as well as sustainable development policies. In order to ensure the development of the agricultural sector, in addition to other structural problems, economic and social issues in enterprises should also be taken into consideration. Socio-economic problems such as low agricultural income, poverty risk, low market power, weak market integration, quality of education and health services and other cultural issues are among the most important problems for enterprises. Therefore, improvements in these areas seem to be of great importance. Ensuring a balance in terms of economic and social situation in enterprises will enable them to adapt to future changes and continue their activities in the long run. This study was carried out to determine the socio-economic profile of cattle farms in İspir county of Erzurum province, to reveal the existing problems related to animal husbandry and to offer solutions for the realization of sustainable activities.

2. Material and Methods

2.1. Animal Materials

The study was carried out on the owners of randomly selected dairy cattle enterprises located in İspir county of Erzurum province. A face-to-face survey was conducted on 394 individuals, and data obtained from the questionnaire comprised the material of the present study. The enterprises were visited and the current situation was tried to be revealed through 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 in equation 1 was utilized for the determination of the sample size of the research (Arıkan 2007).

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

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 α= 0.05), *p*= the rate to be calculated (0.5) and *q*=1-*p*.

With the formula given above, the estimated sample size was calculated to be as approximately 325 (equation 2).

$$n = \frac{2107.(1.96)^2.0.5.(1-0.5)}{(2107-1).(0.05)^2 + (1.96)^2.0.5.(1-0.5)} = 325 \quad (2)$$

After obtaining the number of samples, the number of surveys was increased by 21.23%. The final number of surveys to be carried out in the villages of the İspir county of Erzurum province was determined as 394.

2.2. Statistical Analysis

The data obtained from the survey work were transferred to Excel 2010 computer program before statistical analysis was performed. The number of cattle in the enterprises was classified as less than 11, 11-20, 21-30, 31-40, and more than 40 heads. Additionally, educational status of the owner of the enterprises were grouped as illiterate, literate, Primary School graduate, Secondary School graduate and High School graduate. Chi-square analysis available in SPSS statistics program was used to determine the effects of the number of cattle and the educational status of the owners of the enterprises in the enterprises on the structural characteristics of cattle barns in the enterprises (SPSS 2011).

3. Results and Discussion

The distribution of the enterprises according to the number of animals in the county are presented in Figure 2. Cattle enterprises in İspir county are generally small-scale. In these enterprises, the percentage of holdings with 0-10 animals is the highest (39.6%), followed by enterprises with 11-20 and 21-30 animals (29.7% and 14.2%, respectively). Enterprises with less than 20 animals in the county constitute 69.3% of all cattle enterprises. Similar results were reported in various studies conducted in Turkey (Özder and Özder, 2008; Şeker et al., 2012; Savaş and Yenice, 2016; Şahin and Karadağ Gürsoy, 2016).

Similarly, Ayenew et al. (2011) reported the average number of cattle in farms in Ethiopia as 21.8 heads in urban (Urban) regions and 8.1 heads in rural (Peri-urban) regions. The number of milking cows in the enterprises were reported as 2 heads in 52.5% of the enterprises in Tanzania (Mzingula, 2019), 1-5 heads in %37.6 of the enterprises in West Kenya (Amimo et al., 2011), 6.7 heads in average in Bangladesh (Datta et al., 2019), and 10-50 heads in more than half (50.7%) of the enterprises in Nigeria (Saleh, 2018). On the other hand, in a study conducted in Cameroon, it was reported that 37.4% of the enterprises had 50-100 cattle (Mingoas Kilekoung et al., 2014). In another study conducted in the Northern Benin province of West Africa, it was determined that the average herd size was 45 heads, but the number of cattle in 41.0% of the enterprises was less than 25 heads (Houessou et al., 2019).

The average age of dairy cattle breeders in İspir county of Erzurum was determined as 55.2 years old and the majority of breeders in the county were between the ages of 51-70 (Figure 3). While the age group of 50-60 years was in the first place with a share of 27.2%, it was followed by the groups of 61-70, 41-50, 31-40, >70, <30, respectively. While the average age of enterprise owners having 0-10 animals was 62.5 years, the average age of the breeders having 41 heads and above animals was 49.2 years.

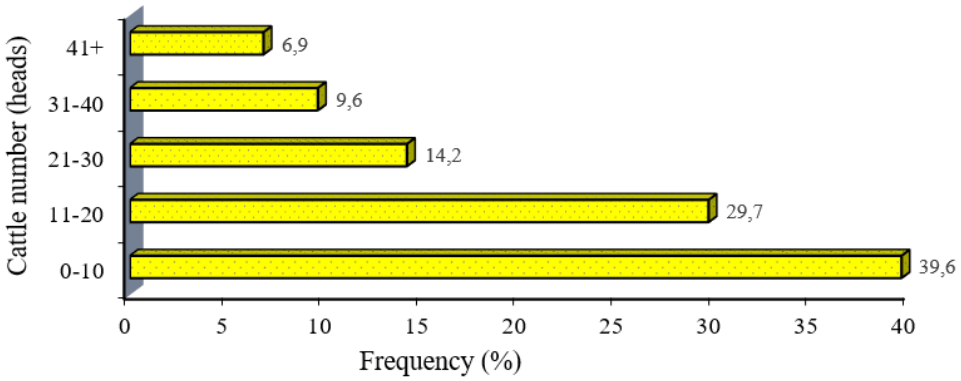

Figure 2. Distribution of the enterprises according to the number of cattle.

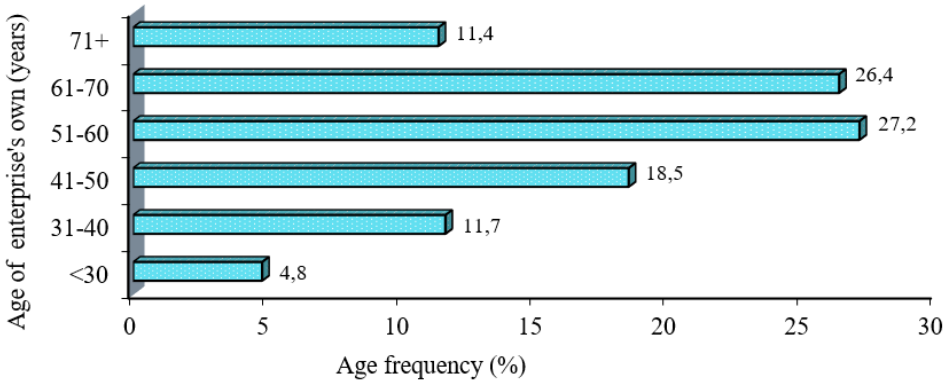

Figure 3. Age groups of cattle breeders in İspir county.

Similarly to the findings of the present study, it was reported that the average age of breeders in Tanzania was 52 years, and the majority (43.3%) of the enterprise owners were between the ages of 40-59 (Mzingula, 2019), while in Western Kenya, the majority of the respondents (38.8%) were between 46-60 years of age (Amimo et al., 2011). In studies conducted in South Africa, Grobler et al. (2008) reported that 60% of the breeders were in the 50-70 age group, while Van den Berg (2013) reported that the majority of the breeders were older than 61 years. On the other hand, the average age of cattle breeders in Azerbaijan and Georgia was reported to be 33.4 and 41.3 years, respectively (Neudert et al., 2020). The average age of breeders was 48 years in Nigeria (Saleh, 2018), 47 years in Finland (Sahlström et al., 2014), while the majority of the cattle breeders (59.1%) in Cameroon was between 26-45 years old (Mingoas Kilekoung et al., 2014). In different studies conducted in Turkey, it was reported that the age of breeders was between 41-47 years (Demir et al., 2014; Bakan and Aydın, 2016; Şahin and Karadağ Gürsoy, 2016; Tapkı et al. al., 2018; Mat and Cevger, 2020; Paksoy and Bulut, 2020). Considering these data, it can be said that the dairy cattle breeding sector in İspir county have an older population structure.

There is a strong relationship between the level of education and the yield obtained in livestock enterprises. It can be said that the level of education is generally high in enterprises where farming is carried out more consciously (Şahin and Karadağ Gürsoy, 2016). The education level of dairy cattle enterprise owners in İspir county was considerably low (Figure 4). Among cattle breeders in the county, primary school graduates represent the highest population with 68.8%, followed by literate 17.3%, secondary school graduates (5.8%), high school graduates (5.6%) and illiterate 2.5%. In addition, there were no breeders with a university or college degree in the county.

Similarly, it was reported that the majority of the breeders were primary school graduates (51.7%), while the percentage of high school and university graduates were 5.9% and 0.8%, respectively, in the Çatak, Erciş and Özalp countries of Van province, (Terin and Ateş, 2010). Furthermore, a big majority of the breeders (75.4%) in Edirne province were primary school graduates, while 21% were secondary school graduates, 3.5% were high school graduates, and there was no breeder with a college degree (Özder and Özder, 2008). In Giresun province, the percentage of primary school graduates was 54.2%, high school graduates was 9.1%, and the percentage of the breeders without any education was 19.3% (Tugay and Bakır, 2009). On the other hand, the percentage of high school and university graduate breeders was reported as 15.0% and 14.0% in Tekirdağ province (Soyak et al., 2007), 21.0% and 1.0% in Kahramanmaraş province (Kaygısız et al., 2010), 18.4% and 2.4% in Muş province (Şeker et al., 2012), 17.7% and 3.4% in Kars province (Tilki et al., 2013), and 20.8% and

1.0% in Çayırlı county of Erzincan province (Özyürek et al., 2014).

Similar results were reported in studies conducted abroad, Amimo et al. (2011) determined that 36.1% of breeders in western Kenya did not receive formal education, while 23% were primary school graduates and 26% were secondary school graduates. The proportion of farmers who graduated from primary school was reported to be the majority in Tanzania (83.3%) (Mzingula, 2019) and almost half in Cameroon (42.7%) (Mingoas Kilekoung et al., 2014). Furthermore, Ayenew et al. (2011) reported that 27.7% of cattle farm owners in Ethiopia were illiterate, 25.5% could read and write, and 19.6% had higher education. In the northern Benin province of West Africa, the majority of the farm owners were reported to be illiterate (Houessou et al., 2019). However, the graduation rates of at least one school and college graduates in Azerbaijan and Georgia were reported to be 73.4%-18.3% and 47.7%-43.2%, respectively (Neudert et al., 2020). On the other hand, the percentages of breeders who were graduated from at least one official school and college graduates in Azerbaijan and Georgia were reported as 73.4%-18.3% and 47.7%-43.2%, respectively (Neudert et al., 2020). Duguma et al. (2012) stated that 35.2% of farmers in Ethiopia had a college degree, while Saleh (2018) stated that 75.6% of them had a university degree in Nigeria.

Advanced age and lower education level of cattle enterprise owners are the main reasons for not be able to following and adopting new technological developments as well as not spending enough time and energy to improve their own or employees' skills and to eliminate the lack of knowledge. This situation can create a significant obstacle to the success of agricultural activities and the development of the livestock sector.

The breeders with an experience of 31-40 years in cattle farming represented the highest share in the county (40.4%) (Figure 5). This group was followed by the farmers with an experience of 21-30 years (27.9%), 41 years and more (18.0%), 11-20 years (10.4%) and 0-10 (3.3%).

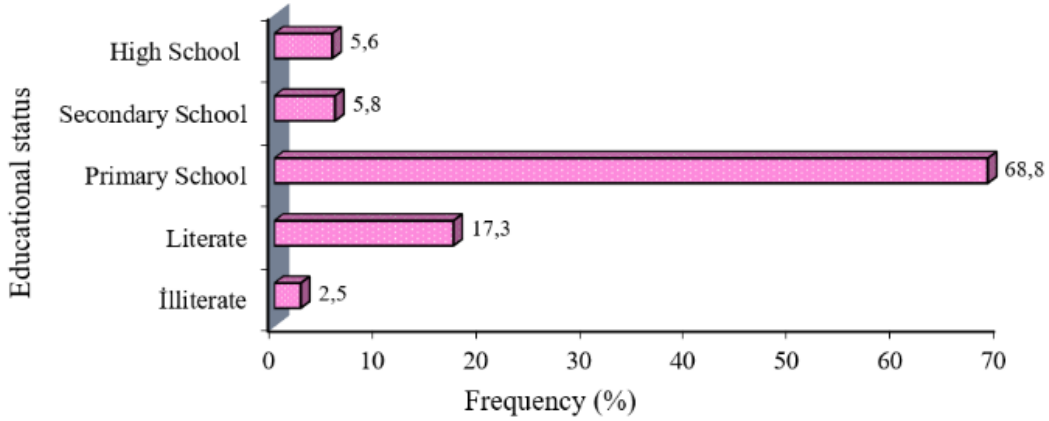

Figure 4. Educational status of cattle breeders.

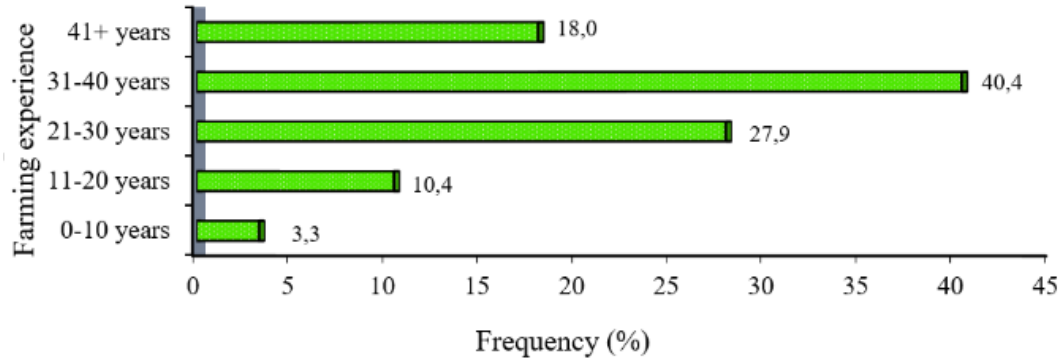

Figure 5. Experience of cattle breeders.

In similar studies, the duration of experience of cattle breeders were reported as 16-30 years (63.0%) by Tugay and Bakır (2006), >21 years (71.2%) by Terin and Ateş (2010), and 14-36 years (47.0%) by Kılıç and Aydın Eryılmaz (2020). Average experience duration on the other hand was reported as 30.2% by Tilki et al. (2013), 15.2% by Kutlar et al. (2013), 24.3 years by Bakan and Aydın (2016), and 16.2 years in Eastern Mediterranean by Yılmaz et al. (2020).

The average duration of experience was reported between 16-35 years in Bangladesh (Datta et al., 2019), 22 years in Finland (Sahlström et al., 2014), and 8 years

in Uganda (Ahikiriza et al., 2021). Majority of the breeders (50.0%) had over 15 years of cattle breeding experience in Ethiopia (Duguma et al., 2012). Furthermore, 41.4% of cattle breeders have more than 21 years of experience (Van den Berg, 2013). Cattle breeders in Thailand were reported to have 10.57-14.23 years of experience in average (Rhone et al., 2008). In Nigeria, on the other hand, 62% of cattle farmers had 1-10 years of cattle breeding experience.

The duration of experience of cattle breeders was higher in İspir county compared to the results of similar studies. However, although this situation may seem advantageous, since majority of the farm owners in the county are elderly and have low education levels, this situation disadvantageous in terms of the sustainability of cattle breeding activity in the county.

The distribution of the surveyed enterprises having another economic activity other than cattle breeding and the branch of their activity was presented in Figure 6. It was determined that 41.6% of the breeders had another occupation in addition to cattle farming. Majority of the respondents worked in other businesses (57.0%), while others were occupied in the private sector (24.2%) or in a public institution (18.8%) apart from cattle breeding.

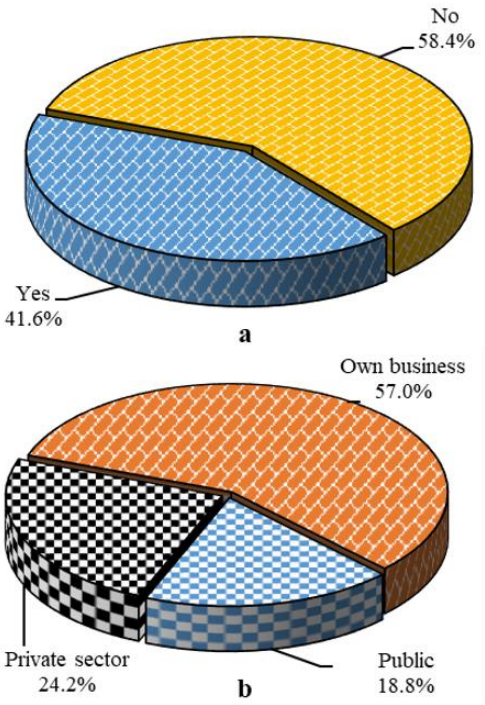

Figure 6. The status of the breeders to have another occupation (a) and the sector they work in (b).

The cattle breeders having another occupation other than cattle breeding was reported as 48.0%, 37.0%, and 29.8% in Muş province (Şeker et al., 2012), Sivas province (Hozman and Akçay, 2016) and Narman county of Erzurum province (Koçyiğit et al., 2018), respectively. On the other hand, Koçyiğit et al. (2016) reported that the percentage of cattle breeders having additional economic activity in Hınıs county of Erzurum province was considerably low (17.0%). Also, Duguma et al. (2012) reported that 25.9% of cattle farmers in Ethiopia were at the same time government workers, 25.9% were retired, 20.4% were traders, 11.1% were housewives and only 16.7% were full-time farmers.

Most of the enterprises that carry out dairy cattle breeding in Turkey also perform other agriculture and livestock activities (Bakan and Aydın, 2016; Hozman and Akçay, 2016; Savaş and Yenice, 2016). In the present study, it was determined that the percentages of enterprise owners having additional occupation was higher than other studies.

The average family population in the enterprises in the county was determined as 4.6 people. The average family size varies between 3.9 and 5.4 people by enterprise groups. It was observed that as the number of animals in the farms increases, the average number of individuals in the family increases in as well. The total number of family members in the enterprises mostly consists of 3 (30.7%), 4 (21.6%) or 5 people (22.2%) (Figure 7).

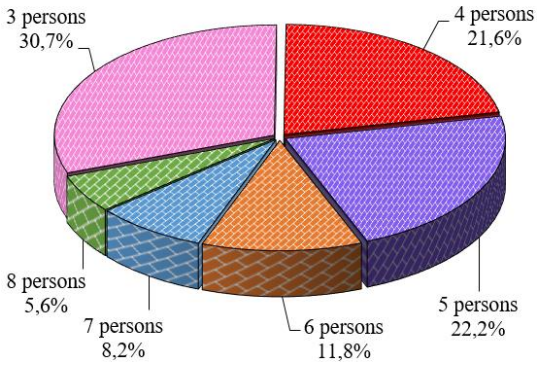

Figure 7. The number of family members in the enterprises.

The average number of family members in the cattle enterprises were reported as 4.84, 4.8, between 3-5 people, 3.8 people and 3-5 people by Yılmaz et al. (2020), Yılmaz et al. (2014), Tugay and Bakır (2009), Kutlar et al. (2013) and Kaygısız et al. (2010) respectively. Results of these study were in accordance with the present study's findings. On the other hand, in many studies, the average number of family members was reported to be higher than in this study. Güler et al. (2016), Ünalan et al. (2013), Tilki et al. (2013), Terin and Ateş (2010), Öztürk and Karkacıer (2008), Gürel and Akay (2008) and Şahin et al. (2001) reported that the average number of family members in cattle enterprises in their studies was 6.0, 5.2, 7.2, 9.0, 6.2, 5.3, and 6.1 people, respectively.

Similarly to the research findings, the average number of family members in cattle enterprises in Azerbaijan and Georgia was reported to be 4.8 and 3.6, respectively (Neudert et al., 2020). On the other hand, the average number of family members in enterprises in Ethiopia was 6.0 people in urban (Urban) regions and 7.1 people in rural (peri-urban) regions (Ayenew et al., 2011). Moreover, the same number was reported as 8 people in

West Kenya (Amimo et al., 2011), and 8.7 people in Uganda (Ahikiriza et al., 2021). Mzingula (2019) reported that 64.1% of the families of cattle enterprises in Tanzania had 5-8 members, while Saleh (2018) reported that 60% of the families in Nigeria had 1 to 20 members.

The distribution of the number of people working on the cattle farms in the İspir county is presented in Figure 8. It was determined that mostly 2 (43.7%) or 3 people (33.5%) worked in cattle enterprises in the county. Similarly, Güler et al. (2016) reported that mostly 2 or 3 people were working in cattle enterprises in Hınıs county. In another study, Daş et al. (2014) reported that the number of employees in cattle enterprises was between 3-5 people. In another study conducted in the United States, it was reported that at least two people worked full-time in enterprises, and, in addition, one or two people per enterprise worked part-time (Dou et al., 2001).

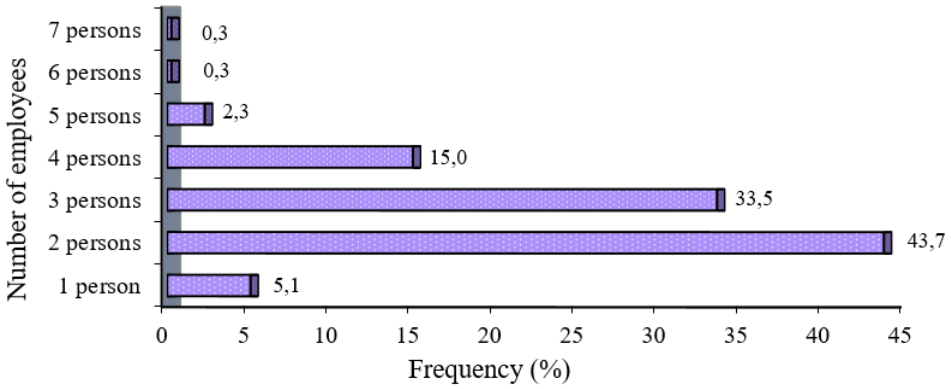

Figure 8. Number of employees working in the cattle enterprises.

Dairy cattle farming is one of the agricultural activities that requires a high level of labour and care. Asked to the breeders, "Is there anyone else who takes care of the animals?" and the majority of the breeders answered yes (97.7%) to the question. It was stated that the person taking care of the animals was a member of the family in 96.6% of the enterprises. The percentages of those employing workers for this job was found to be considerably low (0.5%) (Figure 9).

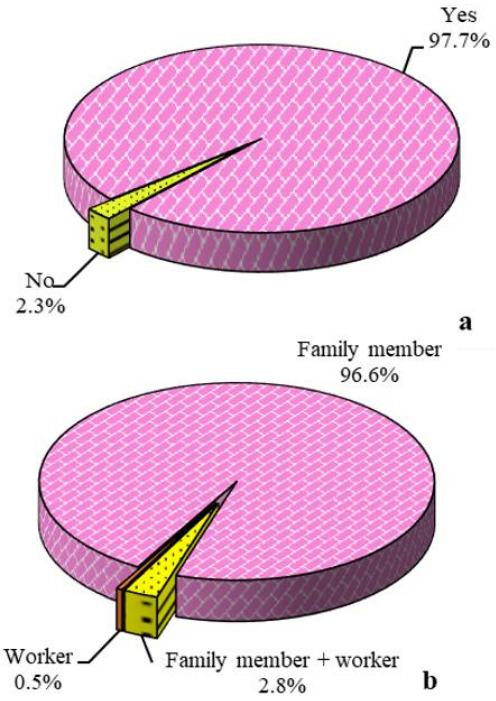

Figure 9. Is there anyone else who takes care of the animals, (a) is this person family member or (b) worker?

In the similar conducted on the subject, the people who take care of the animals in the enterprises were generally family members as in this study (Gürel and Akay, 2008; Ünalan et al., 2013; Güler et al., 2016).

In a study conducted by Demir et al. (2014), it was reported that in 23.5% of the enterprises in Kars province an average of 1.6 (min.1; max.4) workers/shepherds were hired, while the remaining enterprises use only family labour. On the other hand, in another study conducted in Uganda, it was determined that the average number of people hired permanently in the cattle enterprises was 1.4 people in small-scale enterprises, and 3.8 people in large enterprises (Ahikiriza et al., 2021). Furthermore, Goonewardene et al. (1995) reported that the number of workers who are members of the family for cattle enterprises in Alberta was 1 person at 43%, 2 persons at 28%, and 3 persons at 13% of the enterprises.

Of all the surveyed enterprise owners, 72.1% were not member of any organization related to agriculture. It was determined that 49.3% of the enterprises that were members of a union (27.9%) were members of the Agricultural Credit Cooperative, 27.4% of them were members of the Village Cooperative, and 7.5% were members of the Cattle Breeders' Central Association (Figure 10).

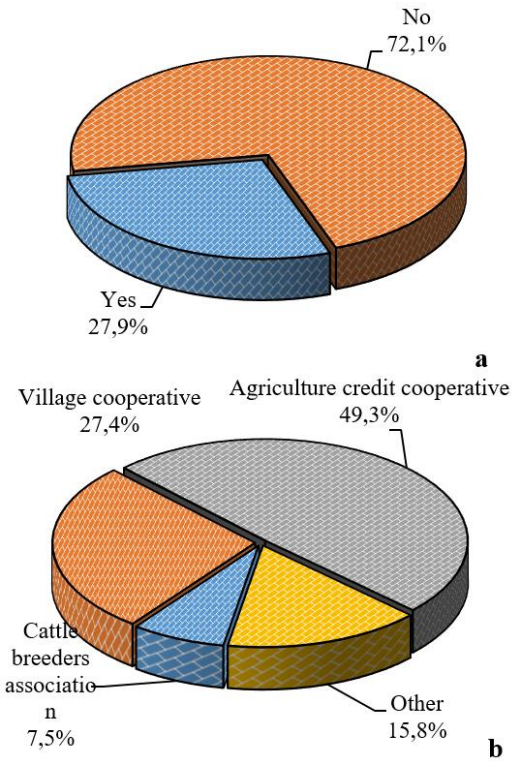

Figure 10. The status of the breeders being a member of a union (a) and the proportions of the unions they are members of (b).

Livestock organizations were important for providing services to farmers and producers in every field they need, facilitate their access to markets and enable small enterprises to contact with each other. In particular, the organization of small enterprises provides many opportunities in the development and implementation of new projects, as well as helping enterprises strengthen their own position. However, the percentage of enterprises that are a member of an organization or a union is considerably low in Turkey (Tilki et al., 2013; Bakan and Aydın, 2016; Savaş and Yenice, 2016; Şahin and Karadağ Gürsoy, 2016). Similarly, Neves et al. (2021) stated that only 11.4% of farmers in Brazil were associated with a cooperative. On the other hand, the proportion of being a member of a cooperative in Russia was reported to be between 29% and 56% (Yanbykh et al., 2019).

4. Conclusion

In this study, the socio-economic characteristics of the cattle farms in the İspir county of Erzurum province were examined. It was determined that the majority of the breeders in the county were in the age range of 50-70 years, and the average age was 55.2 years, enterprises in the county were mostly small-scale family enterprises. The education level of the breeders was low and most (68.8%) were primary school graduates. In addition, more than half of the enterprises had more than 30 years of experience in cattle breeding. However, although the high experience appears to be an advantage, considering the age and level of education of the farm owners, this situation becomes a disadvantage in terms of the sustainability of the cattle farms in the county. For this reason, the active participation of young and educated entrepreneurs in agricultural activities is vitally important both for the future of agriculture and for sustainable animal husbandry.

In the county, 72.1% of the enterprises were determined not to be members of any agricultural organization, and farmers cannot receive adequate services in other areas they need, especially in veterinary services, feed and material supply, and marketing issues. In addition, the insufficient number of members of the existing unions also causes the union activities to not be carried out effectively. In order to overcome these deficiencies, unions should work more actively and farmers' interest in unions, cooperatives, or associations should be increased. Demand for animal products due to growth and urbanization of the human population will continue to provide a key opportunity for economic growth in small-scale enterprises in this sector. In the next century, small enterprises will be critical for food production and food security. Small-scale enterprises in the region should be informed and encouraged to take advantage of these opportunities. As a result; developments in the livestock sector should be well evaluated, young entrepreneurs should be left the field open, and migration should be prevented. Government institutions, civil societies and organizations should make serious supports and investments so that the farmers can take advantage of these opportunities and get the maximum benefit.

Author Contributions

All authors have equal contribution and the authors reviewed and approved the manuscript.

Conflict of Interest

The authors declared that there is no conflict of interest.

Ethical Approval

The authors confirm that the ethical policies of the journal, as noted on the journal's author guidelines page, have been adhered to. The study has been approved by Atatürk University Faculty of Agriculture Ethics Committee Chairmanship that ensuring compliance with EC Directive 86/609/EEC for animal experiments (Approve number: E-38813508-000-2200006932).

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