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RESEARCH PAPER

Socio-economic analysis of trout pond culture operating managers in Malatya province (Turkey)

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Abstract

This study was conducted to determine the socio-economic features of inland aquaculture managers in Malatya Province (Turkey) and includes the research results of 32 inland trout farmers that were registered in Directorate of Food, Agriculture and Animal Husbandry of Malatya Province in 2016.

Total number of registered facilities (cages + ponds) was 77 in Malatya. Aquaculture production was 3520 metric tonnes per year and 450 metric tonnes of them (12.78%) was cultured in ponds and raceways according to the statistical data of 2015. Although managers stated that they were pleased to deal with aquaculture, support should be given to fish feed instead of production. The vast majority of managers were members of the aquaculture association. The water used for aquaculture was obtained from river and spring water. Managers said that trouts were mostly sold to local restaurants and fewer amounts were sold as retail.

It has been seen that the age of the managers varied between 40-66 and all of them were married males. When the educational status was examined it was seen that 45% of them were high school graduates. It was stated that 50% of them were tradesman, 35% of them were farmers, 5% of them were fisherman and all of them had social security. All managers lived in their own home and 95% of them had a car or van. It was also observed that 85% of managers were educated about aquaculture.

Introduction

As a result of the fact that the aquaculture sector has an important position in the Turkey's economy, the rapid increase in the number of facilities in aquaculture reveals the necessity of conducting social, cultural and economic studies in this field in recent years (Sarıtaş, 2010). According to the statistical data of 2015, 101,455 metric tonnes (42.2%) of Turkey's aquaculture production, which was 240,334 metric tonnes, was realized in inland waters and 138,879 metric tonnes (57.8%) in marine waters (TUİK, 2015). Trout production was 3520 metric tonnes in Malatya in 2015. 450 metric tonnes (12,78%) of this amount were reared in ponds. Malatya province, which is rich in natural water

resources, is located in the southwestern part of the Upper Euphrates basin of the Eastern Anatolia region and ranks 9th in terms of trout farming in Turkey.

Achieving sustainable aquaculture in Turkey is possible by improving the socio-economic conditions of fishermen. In many studies conducted in Turkey, some data on the demography of employees in trout facilities have been published by various researches. (Soylu, 1989; Zengin and Tabak, 1997; Üstündağ et al., 2000; Adıgüzel and Akay, 2005; Emre et al., 2007; Aydın and Sayılı, 2009). However, the number of studies conducted to reveal the social status of fishermen in Turkey is quite low (Yücel, 2006; Dartay et al., 2009; Doğan and Gönülal, 2011, Aksoy and Koç, 2012).

Malatya province, located in the Euphrates basin, has a great potential in terms of aquaculture production. With this study, it was aimed to determine the social and economic conditions of the facility managers who reared trout in ponds in Malatya province.

Materials and Methods

The research was carried out in a total of 20 trout facilities operating on rivers and spring waters raising trout in ponds in the province of Malatya. The data obtained in the surveys belong to the production period of 2016.

32 pond facilities were identified in Malatya and 20 of them were actively operating according to the records of Directorate of Food, Agriculture and Animal Husbandry of Malatya Province. The surveys were conducted by face-to-face interviews with the managers. The total population sampling method was used to collect the data that were evaluated by using MS Excel program.

Results

Trout pond culture facilities in Malatya province

There were 77 trout farms in total in Malatya as of 2016. While 32 trout facilities were operated in ponds, the rest were operated in cages. The total trout production capacity in the ponds was 777 metric tonnes per year and the actual production was 450 metric tonnes per year. The rate of pond production is 12,78% in the total trout production of Malatya. The majority of the aquaculture pond facilities are located on Doğanşehir Sürgü Stream and Darende Ayvalı Tohma Stream.

Establishment years of facilities

Trout farming and production in Malatya province started as a family business in earthen and concrete ducts in Sürgü town of Doğanşehir district in 1974, and then trout production continued in ponds with a project in 1986. The distribution of the trout farms established between 1986 and 2010 is given in Figure 1 in 5-year periods.

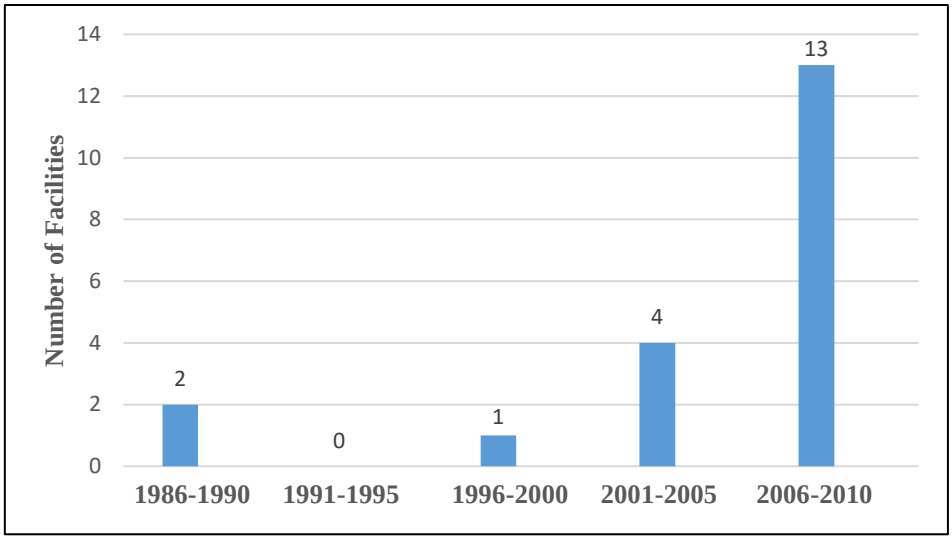

Figure 1. Distribution of trout pond culture facilities according to their founding year in Malatya Province

Age distribution, education and marital status of the managers

Ages of managers engaged in trout farming in ponds in Malatya province were between 40 and 66, and the ratio of managers in the 40-49 age group was 55% (11 people). The percentage of managers in the 50-59 age group was 30% (6 people), while that of the managers in the 60-66 age group was 15% (3 people).

30% of the managers were primary school (6 persons), 10% secondary school (2 persons), 45% high school (9 persons) and 15% higher school (3 persons) graduates.

All of the managers were registered to Malatya population and all of them were married. The rate of those who have 1-3 children was 45% (9 people), the rate of those who have 4-6 children was 40% (8 people), and the rate of those who have 7-10 children was 15% (3 people). It has been determined that 65% of the high school and college/university graduates have children between 1 and 4, and 35% of the managers who were primary and secondary school graduates have 6-10 children. It has been observed that the number of children of managers increases as the education level decreases.

Social security of the managers, NGO membership and their main occupations

It has been determined that all of the managers have social security. It has been observed that 60% (12 people) of these managers are covered by SGK, 25% (5 people) are under Bağ-kur social security, and 15% (3 people) are retired.

Owners of low-income aquaculture farms in the region stated that they became members of the Agricultural Credit Cooperative or Aquaculture Association because they bought trout feed from them by forward purchase. The ratio of these managers is 60%. On the other hand, 40% stated that they are not members of any non-governmental organization or union and that they take trout feed in advance.

When we evaluated the managers in terms of their main occupation, 50% of them stated that they have their own restaurant and that their main occupation was tradesmen, and that they did aquaculture in order to sell them in their own restaurants. The fact that the district of Darende is a city of culture and tourism and the crossing of intercity roads in the town of Sürgü have been effective in the adoption of the fishing profession by the tradesmen of the region. The rate of families who are engaged in farming was 35% (7 people) who state that they do this job in order to increase their income level and for their children to learn the fishing profession for the future. There were 2 people who were retired and

fishermen in various organizations, and one person whose main occupation was fishing.

Structural and economic characteristics of trout pond facilities in Malatya province

Status of trout pond culture facilities

In Malatya province, 42% of the facilities did aquaculture in ponds (32 units) and 58% in net cages (45 units). The capacity of the facilities engaged in aquaculture in ponds constituted 5.5% of the total capacity and 12.57% of the total production. The pond status of the facilities is given in Table 1. The total land assets of the managers was 172503 m^2. The managers produced trout on an average area of 33904 m^2 as a pond area from this land. Nursery, on-growing, growth, stocking and broodstock ponds were used for production. The managers generally used concrete as the building material in the ponds. Only one manager used earthen ponds as well as concrete ponds.

Table 1. Pond status in facilities.

Pond type	Building material	Area (m^2)
Nursery	Concrete	1340
On-growing	Concrete	4740
Growth	Concrete / Earthen	18499 / 480
Stocking	Concrete	6217
Broodstock	Concrete	2628
Σ	**Concrete / Earthen**	**33904**

Maintenance of ponds and analysis of water

The control of the water inlet and outlet to the ponds and the collection of dead fish were done daily. 5% of the facilities declared that they do the general maintenance and cleaning of the ponds monthly, 5% bimonthly, 45% quarterly, 5% semi-annually, 40% once a year. In addition, the managers stated that after each fish harvest, they clean the ponds with a brush and use white lime. While 20% of the managers stated that they had water analysis done by the Ministry of Environment every six months, 20% of them stated that they made water analysis once a year by their own means. 60% of facilities did not perform water analysis.

Capacities of facilities

The project capacity of the managers of the facilities engaged in trout pond farming in Malatya was 777 tons/year in 2016, and the realized production amount was 440 tons/year (Table 2). The project capacity of only one facility was 12.5 million fry/year and the production amount realized was 25 million fry/year.

Table 2. Actual and project capacity of facilities.

Facility	Actual capacity (metric tonnes/year)	Project capacity (metric tonnes/year)
1. Facility	25	65
2. Facility	5	5
3. Facility	25	29
4. Facility	10	25
5. Facility	10	25
6. Facility	5	15
7. Facility	3	5
8. Facility	5	10
9. Facility	57	80
10. Facility	40	65
11. Facility	85	134
12. Facility	15	20
13. Facility	10	20
14. Facility	5	10
15. Facility	10	15
16. Facility	20	40
17. Facility	20	29
18. Facility	75	160
19. Facility	25 million fry	12,5 million fry
20. Facility	15	25
Σ	**440**	**777**

Land and legal status of facilities

10 of the trout farming facilities (50%) were in open land, 8 (40%) between valleys and 2 (10%) in the foothills. When we examined the facilities in terms of property status, 25% of the facilities were on rental land, 55% are on private property, and 20% are on rent + private property. According to their legal status, 5% of the facilities are cooperatives, 15% are companies and 80% are private organizations. Aquaculture facilities work in areas that are not suitable for agriculture.

Water resources

Facilities continue their aquaculture activities by using stream-river water or spring water. These waters are brought to the ponds by concrete channels or PVC pipes. The percentage of facilities using spring water was 65%, and those using stream-river water was 35%. It has been observed that the concrete canals are open, the creek-river waters are cloudy at the end of the rains, the facilities that do not have a settling pond have problems with the water they use. 30% of the facilities use PVC pipes and 70% use concrete channels or ducts to deliver spring water and stream-river water to trout ponds.

Hatchery status of facilities

Most of the facilities did not have registered hatcheries, and they produced the fry necessary for them in their own hatching cabinets. Some producers, on the other hand, were purchasing trout fry from outside. 40% of the facilities produced approximately 32 420 000 fry per year. Only one manager produced fry with project capacity and the annual production of fry was 25 million. On the other hand, 55% of the managers purchased trout eggs or fry from the surrounding provinces for production.

The number of personnel and their education level

Considering that a total of 74 people work in the facilities, it turns out that approximately 4 people are employed per facility. It has been determined that 11 university / college, 27 high school and 36 secondary school graduates were employed

in these facilities. It was observed that 63 of these personnel employed in the facilities are male and 11 are female. In addition, the owners of the facilities declared that they employ temporary workers who are primary school graduates in periods when production is intense.

Immovable assets owned by facilities, equipment-machinery conditions

Most of the facilities had an operation building, feed warehouse and sales location (Table 3). In addition, there were 9 restaurants in the study area. The total number of vehicles owned by the managers was 25. It has been determined that some managers used pickup trucks for the transportation of fish. A manager did not own any vehicle. In addition, most of the pond facilities had hand tools such as scoops, scales and cleaning materials.

Table 3. Distribution of immovable properties, machinery, equipment and vehicles of facilities.

Facility	IMMOVABLE ASSETS					MACHINERY AND DEVICES						VEHICLES	
	Business building	Feed warehouse	Restaurant	Outlet	Pond	Grading machine	İce machine	Generator	Feeding machine	İncubator box	Water measurement device	Passenger car	Pickup
1.	X	X	X	X	X	X				X		X	X
2.	X	X	X	X	X							X	
3.	X	X	X	X	X			X		X	X	X	X
4.	X	X		X	X							X	
5.	X	X	X	X	X							X	
6.	X	X	X	X	X							X	
7.	X	X			X								
8.	X	X			X								X
9.	X	X	X	X	X			X		X	X	X	X
10.	X	X	X	X	X	X				X		X	X
11.	X	X		X	X	X	X	X		X	X	X	X
12.	X	X		X	X					X		X	
13.		X			X							X	
14.	X	X	X	X	X							X	
15.	X	X	X	X	X							X	X
16.		X			X								X
17.		X		X	X					X			X
18.	X	X		X	X		X			X			X
19.	X	X			X					X			X
20.	X	X			X							X	
Σ	**17**	**20**	**9**	**14**	**20**	**3**	**2**	**3**		**9**	**3**	**14**	**11**
%	**85**	**100**	**45**	**70**	**100**	**15**	**10**	**15**	**0**	**45**	**15**	**70**	**55**

These assets owned by the facilities vary depending on the shape, size, capacity of the ponds, the year of construction, the characteristics of the environment and the infrastructure.

Feed supply and payment method of facilities

The managers used pellets and extruded feed for the trout. In addition, breeders who produced in their own incubator cabinets declared that they use wet bait (fish byproducts, liver, egg yolk, etc.) 5-6 times a day during the on-growing and growth period. In the rearing period for the feeding of the trout, they stated that trouts were feeding between 2-5% of the body weight,

2-3 times per day. 70% of the facilities (14 people) purchased their fish feeds from the Agricultural Credit Cooperative with a term of 3-8%. The managers who purchased feed on a deferred basis have declared that the feed is expensive and that's why they make their payments after the fish harvest. Some managers (6 people) obtain their feed supply using cash, from the feed factories in Kayseri and Denizli provinces.

Maintenance and repair expenses of facilities

Managers have to carry out the maintenance and repair of their immovable assets and machinery-equipment annually in order to maintain the health of trout farming in the ponds. This evaluation is given as an estimate in Table 4.

Table 4. Distribution of maintenance and repair costs of facilities for 2016.

Facility	Fixed Annual Expenditures (Building +Pond)	Tool-Machine maintenance and repair	Land arrangement expenses	Water usage expenses (Monthly)	Total expense
1.	2000	2000	15000	250	19250
2.	2000	2000	-	-	4000
3.	1000	1500	3000	320	5820
4.	5000	2000	7000	250	14250
5.	1500	-	10000	250	11750
6.	800	200	15000	350	16350
7.	1500	500	5000	-	7000
8.	500	200	-	-	700
9.	7000	8000	2000	450	17450
10.	3000	-	-	360	3360
11.	3000	200	-	450	3650
12.	5000	200	1000	450	6650
13.	500	100	-	360	960
14.	1500	-	-	400	1900
15.	1500	500	-	-	2000
16.	2000	500	-	400	2900
17.	1500	1000	5000	400	7900
18.	15000	7000	-	200	24000
19.	2000	1000	-	-	3000
20.	1000	500	-	-	1500
Σ	**57300**	**27400**	**63000**	**6690**	**154390**

These costs vary according to the capacity of the ponds and the land structure of the facility. Managers declared that they pay different amounts of annual water usage fees to local administrations.

Marketing status

Since 50% of the aquaculture managers in the region were tradesmen and they offered the fish they produced in places such as restaurants belonging to the facility, they did not have problems with marketing. In addition, the managers sold their products, weighing 250-350 gr on average, fresh in the region (retail) to wholesalers and neighboring provinces. In addition to the growing ponds, the 19th establishment, which has a hatchery with a project, sold juvenile fish.

General opinions of the managers about aquaculture

50% of the managers emphasized that the supports were insufficient and demanded that the support given per kilo should be increased and the fry support be given again. Some managers, on the other hand, state that the supports provide a virtual growth, that the support is unfair considering the fact that the trout raised in the ponds are raised in a longer time than in the cages, and that the support given to the

facilities engaged in aquaculture in the ponds should be increased. All of the managers complained about the high feed prices (Table 5) and they stated that the support for trout feed should be given.

In Malatya province, water resources used for aquaculture are also used as drinking water and irrigation water for agricultural purposes. Although the managers paid an annual water fee of 3000-3500 TL for the water they used for aquaculture, the negative attitude of the local people towards trout farming was seen as an important problem. In addition, facilities located on the Stream-water experience the problems of turbid water flow as a result of the decrease of water in the summer and the increase in precipitation in the spring season.

11 facilities engaged in aquaculture in ponds complained that they cannot find qualified personnel. In addition, the fact that taxpayers are asked to be from Bağkur and employees from SGK as social security increases the costs of the operators.

Facility	Problems Encountered in Trout Culture in Ponds									Is it economically satisfying?		Have you received training on fish culture?		Do you do any other job?	
	Water problem	Supply of fry	Expensive feed	Feed support	Qualified personnel	Social security issue	Insufficient support	Bureaucracy problem	Marketing problem	Yes	No	Yes	No	Yes	No
1.			X	X	X	X	X			X		X		X	
2.	X		X	X	X	X				X		X		X	
3.			X	X				X		X			X		X
4.	X	X	X	X	X	X				X		X		X	
5.			X	X		X				X			X	X	
6.	X	X	X	X		X	X			X		X			X
7.	X	X	X	X	X	X		X	X		X	X		X	
8.	X	X	X	X	X	X	X		X		X	X		X	
9.			X	X	X			X		X		X			X
10.			X	X		X	X				X	X			X
11.			X	X	X					X		X		X	
12.			X	X		X				X		X			X
13.	X	X	X	X	X	X	X				X		X	X	
14.		X	X	X		X	X			X		X			X
15.		X	X	X		X	X			X		X		X	
16.			X	X	X	X	X			X		X			X
17.			X	X	X	X	X	X	X	X		X			X
18.			X	X	X			X		X		X			X
19.			X	X		X	X			X		X			X
20.		X	X	X		X					X	X			X
Σ	**6**	**8**	**20**	**20**	**11**	**16**	**10**	**5**	**3**	**15**	**5**	**17**	**3**	**9**	**11**
%	**30**	**40**	**100**	**100**	**55**	**80**	**50**	**25**	**15**	**75**	**25**	**85**	**15**	**45**	**55**

5 of the surveyed managers reported that they were not satisfied with the bureaucracy. The fact that the facilities were dealing with many official institutions, starting from the establishment stage and continuing, during and after the culture process, hinders their work and brings extra costs to the producers. This situation reduces the interest of managers in trout farming in ponds.

Discussion

The average age of the managers engaged in aquaculture in ponds in Malatya was 50, between 40-66 years. The number of managers in the 40-49 age group in the region was higher than the operators in the other age groups. While Adıgüzel and Akay (2005) stated the average age of the manager as 45 in their study, Aydın and Sayılı (2009) stated that the average age of the owners of the facilities engaged in trout farming on land was 47.5 years. Birici et al. (2016) have reported that the ages of the managers engaged in rainbow trout farming in the province of Elazığ varied between 18-65 years. According to these data, it is seen that the managers in Malatya are generally over 40 years old and close to the Turkey average.

When the education levels of the managers are examined, it is noted that the education level is generally low and it shows similarities with the results of other studies conducted in different provinces (Adıgüzel and Akay, 2005; Emre et al., 2007; Birici et al., 2016). However, it was determined that 85% of business owners received training in aquaculture.

It is noted that all business owners in Malatya are married and most of them have many children. When we compare the number of children of the managers with their education levels, it has been determined that 65% of the high school and college graduates have children between 1 and 4, and 35% of the managers who are primary and secondary school graduates have 6-10 children. It has been observed that the number of children of business owners increases as the education level decreases. On the other hand, Doğan and Yıldız (2008) report that those working in rainbow trout farms in the Marmara Region have a nuclear family structure and the number of children is not high. This difference between the two regions can be attributed to the different socio-cultural structures.

60% of the operators stated that they are members of organizations because they purchase trout feed from the Agricultural Credit Cooperative or Aquaculture Association. It has been determined that all of the managers have social security. Birici et al. (2016) reported that 98.2% of the aquaculture managers in the province of Elazığ, and Dartay and Canpolat (2017) reported that 86.5% of the fishermen who are partners in the Keban Dam Lake aquaculture cooperative have social security.

Majority of the managers in Malatya stated that they do this job in order to benefit from the supports, increase their income levels, and help their children to have a job and a profession. While the share of fishermen with the main occupation is 5% among the managers engaged in trout pond farming in Malatya, it has been observed that the main occupation of the majority of them is farming and tradesmanship. Demirol and Yüksel (2013) and Dartay and Canpolat (2017) reported the percentages of fishermen as 46% and 91%, respectively, in their studies. The rate in Malatya is far behind the results of the relevant literature.

Due to the high potential of Malatya in terms of spring water, 65% of the trout farming facilities established on land use spring water. In facilites that do not use spring water, negative effects may be experienced regarding the quality and quantity of water due to factors such as: the concrete canals are open, stream-river waters are turbid after precipitation, and the absence of a settling pond. In the study conducted in Samsun province, the rate of

use of spring water is given as 20% (Aydın and Sayılı, 2009).

It has been determined that pond cleaning is carried out infrequently in facilities. While 45% of the facilities clean the pools quarterly, 40% clean them once a year. Pond cleaning is done preferably after the fish is harvested. In a study conducted in the province of Sivas (Karataş et al., 2008), it is reported that 50% of the facilites do the general maintenance and cleaning of the ponds on a weekly basis. It has been observed that the managers in Malatya are quite deficient in this regard.

In Malatya province, 60% of the facilities that produce trout on land do not have any water analysis done, while 20% stated that they have have a water analysis by the Ministry of Environment done every six months, and 20% stated that they have the water analyzed once a year by their own means. However, the managers who did not have the water analyzed stated that there was a risk of disease in the ponds and decrease in production as a result of excessive stocking density and overfeeding during the periods when the water temperature increased.

It has been observed that 10% of the land where the facilities are established is on the foothills, 40% between the valley and 50% in the open field. 20% of these facilities are on rent + private property, 25% are on rental land, and 55% are on private property. According to their legal status, 5% of the facilities are cooperatives, 15% are companies, and 80% are private organizations. Looking at these rates, we see that the private sector's interest in aquaculture in ponds continues. In addition, the fact that these facilities operate on lands that are not suitable for agriculture is important in terms of bringing these areas to the economy and sustainable aquaculture activities. On the other hand, in the province of Sivas, 14.29% of the trout farms are on the mountain slopes, 35.71% in open land and 50% in valleys. When the ownership status of the lands where the facilities are established is examined; 21.43% is rental land, 71.43% is privately owned land and 7.14% is forest land for rent. 85.72% of the facilities are individuals, 7.14% are ordinary partnerships and 7.14% are public institutions (Karataş et al., 2008). It is reported that 78.26% of the facilities in Tunceli province are sole proprietorships, and 21.74% are companies operating within the company (Güçer, 2014).

Only one of the managers has a hatchery with a project of 12.5 million per year and it has been determined that he produces fry twice a year. It has been determined that the hatcheries of other facilities are not registered and they produce fry production in their own incubation cabinets. 55% of the facilities buy trout eggs or fry from the surrounding provinces. Malatya Food, Agriculture and Livestock Provincial Directorate records confirm this situation.

Considering the number of personnel and their education level, a total of 74 personnel work in these facilities and it is seen that their education level is at medium levels. Some facilities contribute to production by employing temporary workers in addition to family members during periods of intense production. In general, an average of 4 people are employed per facility, which contributes to the increase in the employment rate in the region. In a study conducted in Tunceli province, it is reported that unskilled and temporary workers are employed in most of the aquaculture farms (Güçer, 2014). It is stated that the education level of the majority of the employees in the trout farms in Antalya is low (Gümüş et al., 2013).

The owners of the facilities in Malatya state that they use pellets and extruded feeds for the feeding of the trout, and these feeds are provided by the Agricultural Credit Cooperative at a rate of 3-8%. On the other hand, some managers pay for feed supply in cash at feed factories in Kayseri and Denizli provinces. Managers who purchase feed on a deferred basis make their payments after the fish harvest.

In the studies conducted in the provinces of Tokat and Sivas, it is stated that the majority of the facilities make their trout sales in cash, and the rest are mixed (cash + deferred). It has been noted that the companies that make forward sales collect the product price within 1-2 months at the most (Adıgüzel and Akay, 2005; Karataş et al., 2008). In the province of Malatya, the managers sell their products weighing 250-350 gr on average, retail in the region, to wholesalers and neighboring provinces. In addition, business owners, 50% of whom are tradesmen, market the fish they produce by offering them for consumption both in retail and in their own restaurants. 8 managers produce fry in their own incubation cabinets and sell the fry to the surrounding companies.

As a result, although the gradual cost increase in production inputs in aquaculture causes problems in terms of marketing and price, most of the facilities in Malatya state that they do not face market problems. The fact that the facilities are close to the settlements and that they cook the fish they produce in their own restaurants and picnic areas and offer them for consumption do not pose a problem in marketing. However, the continuous increase in input prices (especially feed) prevented producers from working at full capacity. In order to solve the problem, it is hoped that supporting the cost of fry and feed will contribute to the development of the sector. Despite various negativities, trout farming in ponds is seen as an alternative source of livelihood by the people of the region.

The use of the water used in aquaculture in the region as drinking water and irrigation water at the same time causes problems between the operators and the local people. It is seen that local governments have some duties regarding the common use of water.

70% of the business owners stated that the cooperative did not provide them any benefit and that the interests of the members were not protected. It is thought that such a structure can provide great advantages to the producers by constructing cold storage and processing facilities, as well as the sale of feed by the cooperatives, and evaluating the products in every season.

One of the biggest problems of companies is the lack of qualified personnel. In order to solve this problem, training programs on aquaculture should be organized in cooperation with the private sector, public institutions and organizations. Such a cooperation will contribute to the training of personnel for facilities and the development of the sector.

Conclusions

Despite many difficulties, urban tourism and intercity roads passing through this region have a great impact on the development of trout farming in ponds in Malatya province. Consumption of the cultured trouts in the restaurants in the region has enabled the fishing profession to be adopted by the local people and to obtain additional income. In addition, the support provided by the Ministry of Agriculture and Forestry was also effective in the increase in the number of facilities.

Ethical approval

The authors declares that this study complies with research and publication ethics.

Data availability statement

The authors declare that data are available from authors upon reasonable request.

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