

General Structure and Economic Analysis of Fish Farms in Ordu Province - Turkey

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Summary

In this study, economic analyses and general structure of fish farms in 2009 Ordu, which has an important position in aquaculture sector in Turkey, researched. The data used in the study were obtained from face to face interviews, surveys and observations. In the study, the fish farms which were registered to the provincial directorate of agriculture in Ordu and make production actively were evaluated. The farms were analyzed under three groups having ≤ 10 , 11-30 and > 31 ton/year capacities considering their annual productions by 2009. General profiles of the producers were presented according to the groups. Production and economic structures of the fish farms were researched and the differences between the fish farms were tried to be revealed. The solution offers were also tried to be presented to solve the problems by determining the faults seen at the production structure of the farms.

Keywords: Economic analysis, Ordu province, Fish farms

Ordu İlindeki Su Ürünleri Yetiştiricilik İşletmelerinin Genel Yapısı ve Ekonomik Analizi

Özet

Bu çalışmada, Türkiye'de su ürünleri yetiştiriciliği sektöründe önemli bir konumda bulunan Ordu ilindeki su ürünleri yetiştiriciliği yapan işletmelerin 2009 yılı içindeki ekonomik analizleri ve genel yapıları incelenmiştir. Araştırmada kullanılan veriler, yüz yüze görüşmelerle, anket ve gözlem yoluyla elde edilmiştir. Çalışmada Ordu ilinde Tarım İl Müdürlüğü'ne kayıtlı bulunan ve aktif olarak üretim yapan işletmeler değerlendirilmeye alınmıştır. İşletmeler, 2009 yılı itibarıyla, yıllık üretimleri göz önünde bulundurularak, kapasiteleri ≤ 10 , 11-30 ve > 31 ton/yıl olmak üzere üç grup altında incelenmiştir. Üreticilerin genel profili gruplara göre değerlendirilmiştir. İşletmelerin üretim ve ekonomik yapıları temel alınarak işletme grupları arasında farklılıklar ortaya konulmuştur. Ayrıca işletmelerin sorunları tespit edilerek çözüm önerileri sunulmuştur.

Anahtar sözcükler: Ekonomik analiz, Ordu ili, Yetiştiricilik işletmeleri

INTRODUCTION

Fishery authorities agree concerning the idea that recently catching has reached it's maximum level with 100 million tons over the world. Thereby, protection of existing stocks becomes much more important for providing higher fertility, instead of increasing the catching in sea and inland waters ¹.

In parallel with population growth fishery requirement has been increasing as well. The aim is to enhance

aquaculture. Promotion of aquaculture largely depends upon evaluation of existing water sources to optimum level. Establishment of fish farms expedient to present water and enlarging the scope of old fish farms in order to benefit from the existing water source is the most important point ².

In Turkey, approximately 74% of fishery production is done through capture fisheries. Even though fish culture



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is rapidly increasing, still stays about 26%. In addition, it is seen that increasing aquaculture through capture fisheries is impossible. Therefore, aquaculture has great significance on supplying the increasing demand³.

In Turkey, aquaculture shows steady increase. Hence, fish farms are provided product, fingerling and organization supports within the scope of fish farms supports. In addition, fish farms, agricultural insurance premium support are also provided. Furthermore, farmers are able to use low interest investment and establishment credits. These kinds of supports enable fish farms to enlarge and farmers to establish new ones. Ordu has an essential role in terms of aquaculture. The amount of fingerling support by Provincial Directorate of Agriculture is the proof of it. In 2008, (only for fingerling) 399.608 €, support was provided to Ordu Province⁴.

Rainbow trout culture has been extended almost all regions in the country and this is essential not only for employment but for also improvement of underdeveloped areas. Concordantly, it is necessary to make constitutional and bio-technical analysis of trout farmers and reveal the problems and their solutions⁵. Especially fish farms should be monitored and their data should be updated firstly about production amount, technical installation, pest control and struggling with diseases and then about other constitutional features for actual and effective projection of planners or units related to subject⁶.

The purpose of this study is to explore general structure, economic analysis and annual performances (in 2009) of fish farms produced in Ordu.

MATERIAL and METHODS

The material of this study was primary data obtained from fish farms in inland and marine through observation and survey. In survey, farms were to respond questions about general structure, physical and technical features and economic structure of their businesses.

In the study, complete inventory method was applied as a sampling method. Three farms in research area did not want to conduct the survey. Also farms which do not make aquaculture are out of evaluation. Herewith, of 42 licensed 23 farms (Fig. 1) were applied survey and their aquaculture activities were evaluated.

Farms were categorized into three as; farms with ≤ 10 tons yearly production, between 11-30 tons yearly production and more than 31 tons yearly rearing. Surveys were applied to owners of farms or administrators of those in order to evaluate 2009 year activities. Capital structure of them was designated through classification in terms of capital functions.

As a business, analysis method standard process was conducted. In this context, operation cost and rearing expenses were determined and then gross profit, net profit, expenses cost, production expenses, margin, capital asset interest, and profitability rate were confirmed. For the confirmation of these rates and amounts; *Gross Production Value (output value)* is defined as gross profit obtained from whole business or one part of business activities (fish sale, fingerling, food and etc.)⁷. *Expenses cost* is the total of standby and variable expenses of business⁷.

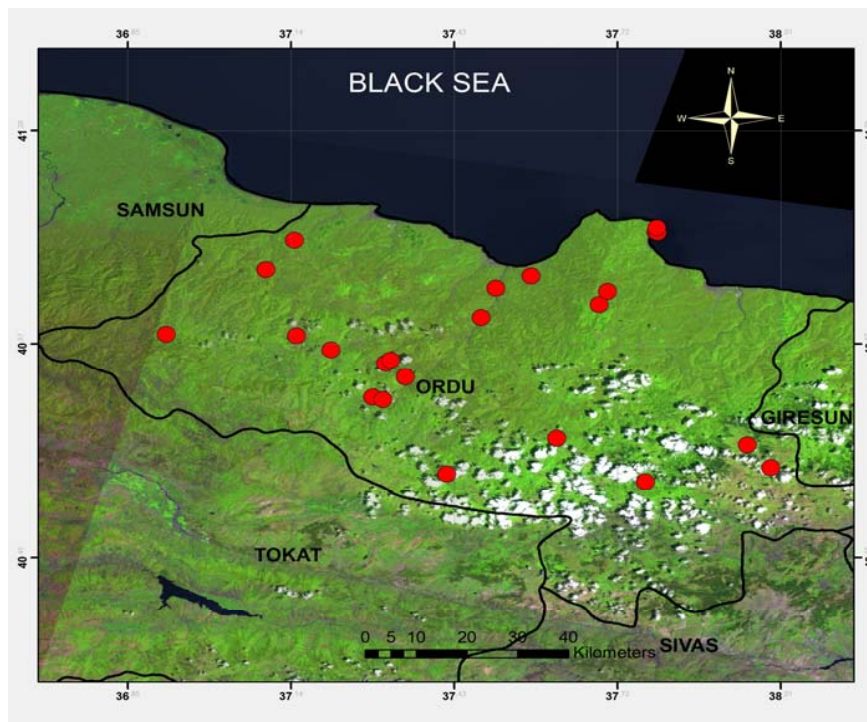


Fig 1. Map showing the investigated fish farms are located in the area

Şekil 1. Çalışmada incelenen işletmelerin buldukları noktalar

Rearing cost is assessed through adding actual capital interest value to expenses cost value ⁸. *Gross Product* is assessed through subtracting variable expenses from sales of reared fish. *Net profit* is assessed through subtracting expenses cost from gross products. *Amortizations* (annual depreciation share) is assessed by direct line method. The value of stock is estimated to its estimated economic life ^{7,9}. The calculation of depreciation share is as following: $AP:S/n$ (AP: Annual depreciation share, S: stock value). *Standby capital Interest* is obtained by multiplying annual interest rate to half of machine or homestead value. Annual interest rate is 10% in this calculation. *Profitability* is defined as the rate of expenses profit to actual capital rate. This is a criterion used in evaluation of yearly activities and comparing with each other ^{7,10}. For the calculation of profitability rate ^{7,9,10} are used. Profitability rate which conveys the relationship of total investment capital and its income is calculated by adding debts to net profit and rating it to total capital ^{7,9}. *Rate of Return on Investment*: $[(Net\ profit + debt\ interests) / (Investment\ capital)] * 100$ The height of the rate shows business is profitable or efficient economically ^{7,9}. *Capital Turnover Rate*: It is the rate of gross rearing value means annual endorsement to investment capital. For the calculation: $Capital\ Turnover\ Rate: (Gross\ production\ value / Investment\ capital) * 100$ ^{7,9}. When lowness of capital turnover is compared with farmer's gross rearing rate, it is clear that farmer has relatively more investments. He should either reduce investment capital or increase gross rearing value. For the analysis of the data SPSS and Excel programs are used.

RESULTS

There was 42 licensed fish farms in Ordu. Two of them which were in marine have restrictive injunction. On the one hand, eight farms were broken down actual aquaculture. There were also 6 farms which were preauthorized but not started actual aquaculture yet.

The oldest fish farms in Ordu were founded in 18 years ago while new one were established 5 years ago.

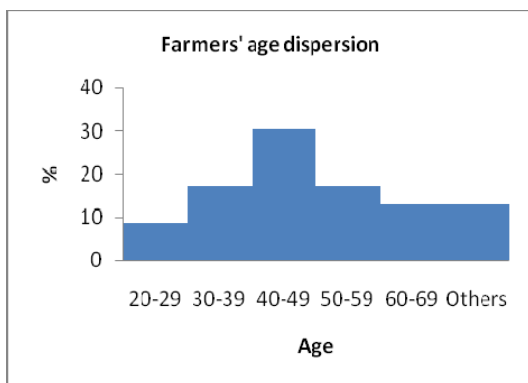


Fig 2. Farmers' age dispersion
Şekil 2. İşletme sahiplerinin yaş dağılımı

In research field, all of the farms in freshwater the rearing were done in concrete ponds; in sea it was in offshore cage. Ages of fish farmers were mainly between 40 and 49 means midlife (Fig. 2). It was found that fish farmers were generally primary school graduated (44.0%) (Fig. 3).

Almost half of (52%) of farmers had alternative income source beyond aquaculture. Crop and livestock rearing (50%) were mostly preferred. Besides this, it was possible to see other occupational groups (Marine fish farmers proclaimed that they had no alternative occupation but except fish culture). While marine fish farms used their all actual capacity, fresh water farms used 76.0% of their capacity. 75% of fresh water farms did not intend to enlarge their capacity. 90.0% of those farms give the reason as lack of water source, 5.0% point out lack of finance and 5.0% inconvenience land structure. Briefly, it was clear that the reason was lack of water source. On the contrary, 67.0% of marine fish farms were positive approach to capacity development.

Moreover, 52.0% of the fish farms had hatchery for the aquaculture. 85.0% of those determine their fingerling was sufficient for further rearing unlike. Those farms also purchase fish from outside. 15.0% of the farms sell their product. On the other hand, 48.0% of the fish farms had not got hatchery. It signifies that these farms were foreign-dependant. Fingerling provided from other provinces or other farms carry diseases risks and it may cause big losses in the future. In addition, 55.0% fresh water fish farms had hatchery in their body.

It is specified that none of the farms in research had agricultural insurance against risks. This is a proof of the farms were unaware of future risks afterwards there can be great loss in the region due to diseases, turbidity, chemical wastes, flood and etc.

Fish farmers were asked that how long they can continue their operations in any kinds of economic recession. Farms make rearing in inland water and sea fish cage responded as 1 and 1.5 years respectively.

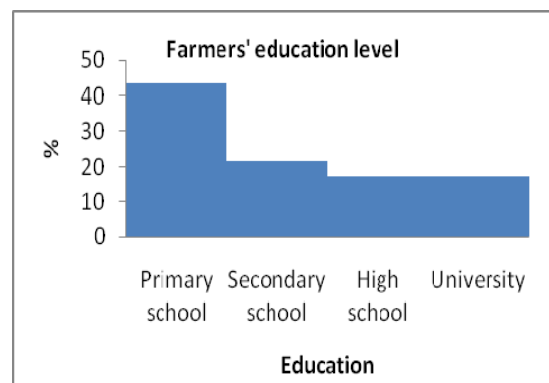


Fig 3. Farmers' education level
Şekil 3. İşletme sahiplerinin eğitim düzeyi

Farmers were questioned that how they evaluate their income obtained from aquaculture. Marine sea cage farms answered that they have no investment since they are small whereas 67.0% maritime farms try to develop their capacity by using their income.

Of farms on inland water 75.0% have no marketing problem in order for their aquaculture amount is limited and for the consumption they use restaurant like fish farms. Unlike the inland water fish farms, coastal side farms have marketing difficulties due to long distance to central settlements and heavy road conditions. Indeed, all of the marine aquaculture encounters marketing problems.

Active capital in farms involves land, building, pond or cage, brood stock, machine and equipment, fish and money capital whereas debit capital includes debts and stocks. *Table 1* shows active and debit capital of farms in terms of amount and rate. Among farms with in active capital the biggest margin belongs to fish capital in 16.0%, 29.0%, 67.0% respectively.

Own capital is calculated by subtracting debts from active capital. Even as the margin of debit capital in capital stock is 94.0%, 94.0% and 100%, debts comprise lower percentage of liabilities assets. *Table 2* gives values and rates of expenses and production costs. As seen in *Table 2* expenses costs are 16.144 €, 25.789 € and 222.323 €. The total fixed cost, part of expenses costs, is 8.285 €, 12.818 € and 28.623 €. Nevertheless, variable costs have the

highest amount among expenses and production costs. Variable costs are ranked as 7.859 €, 12.971 € and 193.700 €. Food cost is the most important outcome component in expenses and production outcomes with 23.1%, 24.5% and 59.1% respectively.

Farms' incomes and rates are shown in *Table 3*. The biggest income source is shown in the table fish sales. Farms in coastal sites prefer and focus on trout rearing while farms which make rearing in sea cages would prefer sea bass and trout rearing. It is clear from the table that fish species for income source are limited fish eggs and fingerling sales are not income source for those farms. It is a big handicap for them.

Margin, net profit, investment capital profitability ratio, debt interest and standby capital interest of company groups are seen in (*Table 4*). In fact, margin has great importance in terms of monitoring the activities in company analysis ^{7,10}. As seen in the table the farms in I. group has quite lower margin; yet, differences are occurred in other two groups. Farms' gross margin is calculated as 12.666 €, 47.341 € and 431.300 €; net profit is calculated respectively as 4.381 €, 34.523 € and 402.677 € (*Table 4*). It is found that capital turnover rates are 42.0%, 37.0% and 72.0% ranking from smaller to bigger fish farms.

The profitability rates specifying the relationship between total investment capital and net profit are 14.0%, 12.0% and 22.0% for first, second and third group farms respectively.

Table 1. Capital structure of the investigated farms (€)

Tablo 1. İşletmelerde sermaye yapısı (€)

A. ACTIVE CAPITAL	I. GROUP	%	II. GROUP	%	III. GROUP	%
I. LANDLORD'S ASSETS FARM						
Land	14843	33.3	52500	43.6	0	0
Building	8937	20.0	33125	27.5	0	0
Pond or cage	20750	46.7	34750	28.9	164000	100
TOTAL LANDLORD'S ASSETS	44531	100	120375	100.00	164000	100
II. TENANT'S ASSETS						
Machine and equipment	15	0.1	0	0	23750	3.4
Brood stock	1316	10.7	625	1.1	18000	2.6
Fish	9344	75.7	51250	95.0	575000	82.9
Cash	1563	12.7	813	1.6	76900	11.1
Material capital	94	0.8	1250	2.3	0	0
TOTAL TENANT'S ASSETS	12331	100	53938	100	693650	100
B. LIABILITIES ASSETS						
Debts	3188	5.3	10813	5.8	0	0
Own capital	53675	94.7	163500	94.2	857650	100
TOTAL LIABILITIES ASSETS	56863	100	171313	100	857650	100
TOTAL ACTIVE CAPITAL	56863	100	174313	100	857650	100

Table 2. Expenses and production costs of farms (€)**Tablo 2.** İşletmelerde işletme ve üretim masrafları (€)

VARIABLE COSTS	I. Group	%	II. Group	%	III. Group	%
Procurement of fingerling	1434	18.3	3167	24.4	55000	28.4
Food	3719	47.3	6313	48.7	131250	67.8
Temporary labor	475	6.0	1359	10.5	0	0
Veterinary and medicine	94	1.2	125	1.0	2500	1.3
Food	1672	21.3	1438	11.1	3125	1.6
Electricity	402	5.1	569	4.3	625	0.3
Marketing	63	0.8	0	0	1200	0.6
TOTAL VARIABLE COSTS	7859	100	12971	100	193700	100
FIXED COSTS						
Permanent labor	313	3.8	3125	24.4	10125	35.4
Family labor	4375	52.8	2013	15.7	0	0
Debt interest	478	5.8	156	1.2	0	0
Land rent	243	2.9	47	0.4	0	0
Water rent	176	2.1	234	1.8	5125	17.9
Maintenance	546	6.6	1000	7.8	3750	13.1
Amortizations	2101	25.4	6091	47.5	9388	32.8
Standby capital interest	53	0.6	152	1.2	235	0.8
TOTAL FIXED COSTS	8285	100	12818	100	28623	100
TOTAL EXPENSES COSTS	16144	100	25789	100	222323	100

Table 3. Gross production value (GPV) and income source out of aquaculture of the investigated farms (€)**Tablo 3.** İncelenen işletmelerin yetiştiricilik dışı gelir kaynakları ve toplam üretim değeri (€)

AQUACULTURE INCOME	I. Group	%	II. Group	%	III. Group	%
Trout	20400	99.4	56250	93.3	250000	40
Sea bass	0	0	0	0	375000	60
Sea bream	0	0	0	0	0	0
Fingerling	125	0.6	4062	6.7	0	0
Fish eggs	0	0	0	0	0	0
TOTAL	20525	100	60312	100	625000	100
INCOME SOURCE OUT OF AQUACULTURE						
Retirement	866	22.3	0	0	0	0
Crop	1759	45.3	5000	100	0	0
Livestock	281	7.2	0	0	0	0
Tradesman	156	4.0	0	0	0	0
Hotel, guest house or else	0	0	0	0	0	0
Interest income	0	0	0	0	0	0
Others	825	21.2	0	0	0	0
TOTAL	3887	100	5000	100	0	0
TOTAL FAMILY INCOME	24413	100	65313	100	625000	100

DISCUSSION

Compared with farmers in other provinces, the dispersion of farmers' ages has similarities. In the study done in Trabzon, the ages of farmers are between 40 and

49¹¹. In Tokat it is between 28 and 57¹² in Samsun for sea cage farmers it is between 42 and 49, coast business it is 47-50¹³. In Sivas it is between 25 and 57¹⁴.

When credit use concern is considered, it is seen that 52.0% of fish farmers' used credit in setting up process.

Table 4. Gross margin, net profit, rate of return on investment and standby capital interest rates of farms**Tablo 4.** İşletmelerin brüt kar, net kar, yatırım sermayesi ve sabit sermaye faiz oranları

	I. Group	II. Group	III. Group
Gross Margin (€)	12666	47341	431300
Net profit (€)	4381	34523	402677
Rate of return on investment (%)	8.2	20.4	47.0
Debt interest (€)	319	1081	0
Standby capital interest (€)	1484	6788	16400

Another study done in trout farms in Erzurum has proved 5 of the farms used credit in setting up or culture process¹⁵. Nevertheless, in Sivas, shows that 14.3% of farms were set up by using Source Use Support Fund (SUSF) and 85.7% from own capital¹⁴. Concerning studies done in Tokat, Samsun, Sivas and Erzurum, it is stated that the problems of obtaining loan such as high loan rate, low loan amount, difficulty in collateral surety and reimbursement in short time are common problems of business managers in Ordu.

When the education level of fish farmers are taken into consideration, it is obvious aquaculture has similarities in the country. The research in Sivas shows that 36.9% of owners are graduated from primary school and the education level is low¹². In Samsun they are mostly graduated from primary school and high school¹³. It is reported that 53.8% of rainbow trout farmer owners in Black Sea Region are graduated from primary school¹⁶. In another research in Mediterranean Region 39.92% of farmers are graduated from primary school. Emre et al.⁶ and Karatas et al.¹⁵ signify in their studies, a considerable part of entrepreneurs have formation about aquaculture and most of them have insufficient experiences in fish rearing. Therefore, some troubles may occur in those businesses. In their study¹⁴, it is stated that 42.9% of farmer owners are primary school graduated and their education level is low.

According to, Adigüzel and Akay¹² it is indicated in their study, apart from fish culture 52.6% of company managers have different occupations as public staff, other agricultural activities and works of tradesman. In another study¹³ it is claimed that 54.2% of sea cage farms and 60% of coastal fish farms have different occupations beside aquaculture. Dogan and Yıldız¹⁷ confirmed in their study that 33.3% of farmers they studied on have income from aquaculture only; 33.3% of deal with commerce in different fields; 21.6% do farming. Karatas et al.¹⁵ proclaimed that 42.8% of fish farmers have no adding income source but in aquaculture area; 57.2% have income source from agriculture and commerce aboard aquaculture income. Thereunto, the majority of coastal trout farmers in Ordu serve their products in their own restaurants to their customers. Similarly, in other study done by Dogan and Yıldız¹⁷ it is seen that many farmers have considerably high income in same way.

21.1% of farms in Tokat implied that for why there is lack of water source, they have difficulty in aquaculture rearing and hence, they are not able to develop their capacity¹² 57.1% of sea cage fish farms and 25.0% of inland aquaculture farms in Samsun indicated that they would like to reduplicate their capacity¹³.

For a successful aquaculture proper hatchery planning is a necessity¹⁸. Adigüzel and Akay¹² suggest that 63.1% of the farms have a separate hatchery structure and 10.5% of them use their ground floor as hatchery. Karatas et al.¹⁵ emphasize that 9 of the farms they work on are able to produce fish eggs and fingerling for their own needs. They predicate 64.3% of the farms have separate hatchery and 35.7% have hatchery at their ground floor.

None of the farms in research have food unit. Moreover, they consume convenience food (for adult fish pellet, for fingerling granule). Most of the farms claim that the main problem in food procurement is high cost of food. According to research, dry food is utilized similarly^{12-16,19}.

Meanwhile, fish farmers had not organized as a farmer's union yet in Ordu. It seems that they were unaware of this issue. Farmers investigated had no membership to such unions and others; however, most of them have willingness to be united^{12,14,16,19}.

Under any kinds of troubles (diseases and etc.) during rearing period, Provincial or District Directorate of Agriculture is the first address for the farmers. Other organizations are second steps. Trabzon Central Fisheries Research Institute and Universities plays an information desk role. In Trabzon farmers follow the same ways for their problems²⁰.

Concerning the similar research, marketing seems one of the main problems and according to farms, high demand and lower supply and lower fish sales prices lead to marketing problem²⁰. The most important ones can be supposed as high food prices, diseases (fungal or parasite and etc.), turbidity and flood, marketing problems, obtaining loan problems and so on.

According to Adigüzel and Akay¹² research, the biggest capital in Tokat was building and pond capital (40.9%). Unlike this, fish capital stands at 26.0%. In accordance with

research done in Kırklareli, farms sort into three groups and biggest capital is again fish capital (31.0%, 26.0% and 26.0% respectively) ¹⁹.

According to Adıgüzel and Akay ¹² food cost is 28.0% of expenses costs. Cetin and Bilgüven ²¹ suggest that food cost is the highest outcome component in trout farms with 61.5. For Yavuz et al. ²² it is 63.4% and for Aydın and Sayılı ²³ it is 50.9%. When the general results are taken into consideration, farms in Turkey have almost the same structure at all.

In research done in Kırklareli similar results are estimated as 21.0%, 29.3% and 14.2% ²⁴. Provincial profitability rate of trout culture fish farms in South Marmara Region is 64.0% ²¹. In Tokat the concerned rate is calculated as 37.9% ⁸. Though, throughout Turkey the rate is found as 28.8% ²⁵. Farms under research have rather low profitability rate; thereby, it is possible to indicate those farms concerned are unprofitable.

This is a proof that farms turnover rates are notably in good position. The lowness of capital turnover rate predicates company owner transfers income obtained from the facility to other fields. In South Marmara this rate is 48.9% and it is 59.0% in Thracian Region ^{21,24}.

According to research in Yene River in Kırklareli done margin in three facility groups is estimated as 24.973 €, 42.073 € and 32.373 €; net profit as 16.213 €, 31.132 € and 20.996 € respectively. Taking into account that I. and II. Group fish farms show similarities to farms in Kırklareli, but gross margin and net profit values are different ¹⁹.

Ordu has pretty convenient structure for aquaculture. It is necessary to protect existing water source and utilize the water consciously in order to improve rearing. It is highly essential to promote fishery to farmers and provide adequate support policies for the improvement of aquaculture.

For the year 2030, aquaculture production estimated lower limit and upper limit respectively as, between 189.222 and 380.842 ton ²⁶. Such a scenario would have important functions fish farms in Ordu.

In research, it is pointed out that most of the farms are family business farms. It conveys a great importance to employee fishery technician/engineer or fishery technology engineer in the company for the sustainability and rapid improvement of aquaculture so then under any diseases problem quick and deliberate solution can be achieved. More often monitoring and high quality product serving should be supported. Owing to Black Sea Region climatic conditions, water discharge and quality can show differences time to time (water used in fish farms). Necessary structural measurements should be taken against potential flood and overflow. Against turbidity resulting from excessive precipitation settling tank and

system should be installed. Agricultural Insurance against risks and formulation of farmer's union within Ordu is very significance for the sustainability of the fish farms.

It is indicated that farms rentability is not high; thence, different methods to improve efficiency would be necessary. One of the ways is to reduce food outcomes, part of variable costs. In other words, decrease in feed conversion ratio and decrease in consumption will increase the efficiency. In accordance with the results, supports for fingerling and fish sales can bring farms to a certain level.

The other way to improve efficiency is to establish hatchery and sell fish eggs and fingerling. Thus, gross production value would be extended as well. In line with it, farms will be provided sufficient conditions to work efficiently. Fish farmers have great effort not to contract debt or loan credit from any organizations or institutions. However, it means they take any risks for new investments.

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