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## **PRODUCTION AND PROCESSING EFFICIENCY OF COMMODITY FISH FARMING PRODUCTS**

### **Abstract**

The article discusses the issues of efficiency of production of fish farming industries, the challenges facing the fishing industry, shows the country's fish resources. The authors consider the issues of regulating the development of fish farming and fishing. In general, Kazakhstan has certain conditions for their intensive development. The article describes the characteristics and features of these two industries. The consumption of fish products in Kazakhstan is at a very low level. The increase in the share of imported products in the country's domestic market has a negative impact on local fish production. As part of the provision of state support measures for the development of commercial fish farming, subsidies are provided for expenditures on investment in the purchase of machinery and equipment for fish farms. As part of the adjustment of the state program of the agro-industrial complex, proposals have been prepared to expand state support measures by subsidizing the costs of fish planting material. The article considers the volume of production and their implementation in the context of specific farms, estimates subsidies and shows the profitability of production, taking into account state support. The directions of commercial fisheries and their characteristics: lake-commercial – the most promising, allowing in a short time and at low cost to dramatically increase production of marketable fish; pond and industrial that need to be developed through the implementation of effective and scientifically based technologies; industrial fisheries; river basin technology. Proposals for the development of fish farming have been developed.

Key words: commercial fish farming, production, processing of products, fish resources, preferential taxation, small business, medium business.

Kazakhstan has a rather rich fish farming water fund and satisfactory conditions for the intensive development of fish farming and fishing. One way to solve the problem of supplying the population with high-grade food products, rich in protein is fishery products supply, i.e. development of commercial fish farming.

The development of fish farming in Kazakhstan is one of the priorities of the domestic agro-industrial complex. The State program on AIC development foresees the increased volume of commercial fish farming from 1.6 thous. to 5 thous. tons by 2021, which will increase the load on processing capacities.

Fish and seafood products are very healthy and nutritious products that make up a significant part of the diet of the population in different countries of the world. In Kazakhstan, their consumption increases and averages 7 kg of fish per 1 person per year, for comparison – the world level is 19 kg per year per person, and in Europe – 24 kg.

In Kazakhstan the consumption of fish products is at a very low level. In the diet of Kazakhstan, fish products are not at the first place, and they mainly consist of sea fish: herring, mackerel, sprats, seasonal pollock fish, and freshwater fish: carcass fillet which is fished within the country. There is also imported aquaculture: salmon, sea bass, dorado, pangasius, some of them are presented in the “luxury” segment (luxury item).

Therefore, the fishing industry of the Republic of Kazakhstan is faced with the task of preserving natural resources and wider development of aquaculture, which will fully supply the domestic market with seafood, reduce production costs, solve social problems – create more new jobs [1].

Kazakhstan has a lot of water resources for the development of fish farming industry – the Caspian and Aral seas, Alakol, Balkhash and Zaysan lakes. The country has registered 293 fishing and aquaculture enterprises and more than 70 enterprises for conservation and processing of fish, shellfish and crustaceans. 1800 tons are grown in aquaculture and 41 thous. tons of fish are caught in natural reservoirs.

According to the AIC development program for the period up to 2021, it is planned to achieve fish products production volumes in aquaculture up to 5000 tons / year.

The public support system for fish farming industry provides at the legislative level investment subsidizing of entrepreneurial initiatives aimed at the development of fish farms. Budgetary funds and private investments will be used to modernize existing fish enterprises and open new farms with a full production cycle, subsidize feed costs, and provide farmers with fish stock. At the same time, some tasks are already being solved – a number of investment projects aimed at fish breeding in artificial ponds are being implemented. In Kazakhstan, there are more than 180 fish farms that grow trout, carp, herbivorous and sturgeon fish.

In Kazakhstan, processing enterprises are aimed at processing fish which is caught from the natural environment. Imported fish are processed to a lesser extent and, to a very small extent – the fish grown in aquaculture.

The main countries – importers of fish and fish products for Kazakhstan are Norway, Iceland, Estonia. For example, Norway imports to Kazakhstan more than 19.7 thous. tons of fish, Iceland and Estonia each account for 2 thous. tons.

However, the constant increase in the share of imported products on domestic market negatively affects local fish production. A limiting factor is the saturation of local market with imported products, since imported fish is often sold at a price lower than that produced in Kazakhstan, as a result of which demand is higher.

Available fish processing facilities are used at 50% of the possible. The local market is provided with fish products, however, a significant part is fish that have little nutrition value (bream, crucian carp, roach, etc). Therefore, the lack of valuable fish products, such as pike perch, salmon, whitefish, sea fish, is compensated by imports.

The main problem in Kazakhstan is the high cost of fish growing and keeping, and fish feeds are also imported. It is unprofitable for entrepreneurs to grow or breed fish, as it pays off partially. In addition, there are high water and electricity costs, which deteriorate the situation.

At the same time, the intensive economic use of water resources creates a high anthropogenic load on the ecosystem of water reservoirs. In addition, most of the river basins of the republic are transboundary and are used jointly with neighboring countries, which are located along the river above the territory of Kazakhstan.

The development of fish farming sector includes: cooperation between government bodies and fisheries (co-management), public support for fish farming, public-private partnerships, staff and scientific support [2].

Key industry development priorities:

- ◆ sustainable use and conservation of fish resources;
- ◆ increased production of aquaculture products;
- ◆ expansion of scientific and human potential for sustainable fisheries development;
- ◆ improvement of fish processing and marketing;
- ◆ providing government support for diversification of fish farming production.

In Kazakhstan, there are three sources of fish resources: fishing in natural reservoirs, aquaculture (fish farming, artificial breeding and cultivation of aquatic organisms) and import from other countries.

The fish farming industry is one of the structural units of national economy, including fishing and conservation of aquatic biological resources, aquaculture, production and sales of fish and other products from aquatic biological resources. At the same time, fishing is a branch of industry and is related to the extraction of renewable natural resources, and aquaculture is aimed at fish breeding and growing, improvement and increasing of fish stocks in water reservoirs and relates to agriculture.

Naturally, fish farming should be considered in terms of the development of its sub-sector. Unlike fishing, where the final product (fresh fish) is obtained annually, in fish farming it takes 2–3 years to obtain the final product (commercial fish). There are the following areas of commodity fish farming – lake-commodity, basin and industrial, which must be developed through the introduction of effective and scientifically based technologies.

Lake-commodity fish farming is the most promising development direction, which enhances sharp increase of commodity fish production in a short time, and at low cost. According to estimates,

there are 694 405 ha of suitable reservoirs in the republic where 30–50 thous tons of fish per year can be produced, while at the present stage, only 3.7 thous tons of fish is catch. The reason is the use of reservoirs as fishing, and not in the aquaculture mode [3].

Pond fish farming. A significant part of pond farms stopped their activities: Almaty, Tasotkol, Sarykol, Kazalinsk. Also, Chilik, Kyzylorda, Shymkent, Ust-Kamenogorsk pond farms are operating at partial capacity, which production potential is estimated at 2150 tons of commodity fish.

Industrial fish farming, which differs by work method.

Cage cultivation is limited by such climatic factor as wind. Promising objects of cultivation in cages using waste warm waters are carp, white and motley silver carp, Nile and other types of tilapia, canal and clarium catfish. The most promising locations for cage farms and complexes for growing these objects are cooling ponds of Ekibastuz GRES–1 and GRES–2, and Karaganda GRES–2. The total capacity of these cage farms should be 618.3 tons of marketable food products, including 412.2 tons of carp and 206.1 tons of white carp. The potential for commercial fish production in cages on the Bugun reservoir is 300 tons; promising objects are sturgeon hybrids.

Basin technology. The basis of basin fish farming in Kazakhstan is the use of rivers and artesian springs located in Almaty, Zhambyl, Turkestan and Kyzylorda regions for fish farming. The best way to use the basin fish farms is to grow trout, sturgeons and their hybrids, canal and clari catfish, and various types of tilapia. According to preliminary estimates, the potential for commercial fish farming in case of basin growing can be 3000 tons per year.

Fish growing in closed water supply facilities. In the current economic conditions of Kazakhstan, its cultivation in modules with re-circulating water supply (ultrasonic complexes) is becoming cost-effective while ensuring high added value. In our case, this is the cultivation of commercial products of sturgeon fish, their hybrids and other high-value aquaculture objects.

The potential capacity of the existing ultrasonic complexes in Kazakhstan is more than 500 tons of fish, while theoretically the potential of this technology is not limited, as it is not limited by natural conditions. However, taking into account the economic feasibility, limited domestic demand for expensive products and the existing great competition on foreign market, primarily from the PRC, the potential of ultrasonic complexes in our country can be about 3–5 thous tons of fish per year.

The capacity of the existing 72 fish processing enterprises in Kazakhstan is 87 thous tons per year, but their congestion does not exceed 43%. The placement of fish processing facilities is traditionally tied to large fishing ponds. At the same time, the main processing volume falls on the regions – Atyrau, Almaty, East Kazakhstan and Kyzylorda.

323 fishing companies are registered in Kazakhstan, of which: large enterprises (more than 250 people) – 1; average (from 101 to 250 people) – 2; small (from 5 to 100 people) – 320, i.e. over 99%.

In the Republic of Kazakhstan, 184 fish farms are engaged in the cultivation of marketable fish, of which 10 cage, 99 LCFF, 55 pond and 20 Ultra sonic and basin farms.

In 2019, 5 653 tons of commercial fish were grown, of which 3 972 tons of fish were sold (2 700 tons were grown in 2017, 1 400 tons in 2016). They mainly grow carp (31.9%), common carp (17.4%), sturgeon (9.8%), and trout (9.5%), for which there are proven biotechnologies for growing.

Objects of fish farming are sturgeon, salmon (salmon, trout), cyprinids, whitefish and herbivorous fish species. Compared to 2016, the production volume increased by 18.7% in fishing and in aquaculture – almost twice – 90.7%. In fishing, these are Kyzylorda, Atyrau, East Kazakhstan, Turkestan and Mangystau regions, in aquaculture – Turkestan, Atyrau and Almaty regions.

The dynamics of fish and other animals catching shows that in Kazakhstan more than 50 species of fish are caught on average, in 2019 – 37 283 tons of fish. Basically it is fresh-water bream – 11 580 tons, pike perch – 5 131, crucian carp – 2 170, roach – 2 150, roach – 2 139, common carp – 1 646, catfish – 1 013 tons and other types of fish. The main specific weight is noted in the Atyrau region – 9 128 tons, Kyzylorda – 6 520 tons, East Kazakhstan – 6 722 tons.

It should be noted that the maximum allowable catch recommended by science and agreed with the State environmental review is more than 66 thous tons. As for the aquaculture production volume, it amounted to only 5.6 thous. tons, while in order to achieve the rate of consumption per capita which is justified by the Institute of Nutrition – 14 kg per year, more than 250 thous. tons of fish and fish products are needed.

In 2019, commercial fish and other aquatic animals were grown in the amount of 5363 tons, carp – 1802 tons, common carp – 982, sturgeon – 555, silver carp – 334, trout – 538 tons, etc., by regions: Turkestan – 3533 tons, Almaty – 451, North Kazakhstan – 348 and East Kazakhstan – 370 tons. In total, there are 20 water reservoirs of international and republican significance in the republic.

In recent years, Kazakhstan has increased exports and reduced imports of fish products. For example, Kazakhstani fish products are exported to more than 10 countries: Austria, Germany, Georgia, Canada, Kyrgyzstan, Lithuania, the Netherlands, Poland, Russia, Romania, Tajikistan, Uzbekistan, Ukraine, the Czech Republic.

With a population of more than 18 mln people in the republic, the demand for fish products according to national standards is 257 540 tons (14 kg per person). Per capita consumption is 13.2 kg, domestic consumption is 51700 tons. Thus, the share of imported products in domestic fish consumption is 66%.

The decrease in product imports should be noted, for example, in 2015 – 47.6 tons of fish products were imported to Kazakhstan, whereas in 2019 – 24.6 tons, which lower at 27.9%.

Thus, among AIC products, in terms of export volume, fish products (56.5 mln USD) are at the second place after cereals, while much higher than beef exports (25 mln USD) and poultry (13 mln USD) in whole. In general, in 2019 – 36.4 thous tons of fish were caught in Kazakhstan.

Proposals on fish farming development [4, 5]:

- ◆ saturation of local market with imported products;
- ◆ subsidizing of investment investments in the amount of 20% for the creation of fish farming facilities with closed water supply (CWF) and cages;
- ◆ soft loans to reduce working capital costs;
- ◆ reimbursement of 30% of the feed costs when growing sturgeon, salmon and carp fish species;
- ◆ it is necessary to differentiate traditional fish farming by grown fish: trout – in small “trout” ponds and pools; salmon – in large “marine” cages; sturgeon – pools and ultrasound, etc.;
- ◆ small and medium-sized businesses should change their approach to the cultivation of various types of fish. In cages and CWF, fish species are predominantly expensive (with high added value) (sturgeon mainly in CWF, salmon in cages and direct-flow basins), and less expensive to grow in ponds and lakes (LCFF) [6];
- ◆ improvement of legislation is required – adoption of the Law “On Aquaculture” and model provisions for all types of fish farms;
- ◆ improvement of sanitary-veterinary and breeding control in fish farming;
- ◆ development of the effective mechanism for providing preferential taxation for small and medium-sized businesses for fish cultivation and feed production.

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#### Аңдатпа

Мақалада балық шаруашылығы салаларының өндіріс тиімділігі, балық саласының алдында тұрған міндеттер, елдің балық ресурстары келтірілген. Авторлармен балық шаруашылығы мен балық аулауды дамытуды реттеу мәселелері қарастырылған. Жалпы алғанда осы саланың дамуы үшін Қазақстанда қолайлы жағдайлар бар. Мақалада осы екі саланың сипаттамалары мен ерекшеліктері берілген. Қазақстанда балық



өнімдерін тұтыну өте төмен деңгейде. Елдің ішкі нарығындағы импорттық өнім үлесінің өсуі жергілікті балық өндірісіне кері әсер етеді. Тауарлы балық шаруашылығын дамыту үшін мемлекеттік қолдау шараларын іске асыру шегінде балық шаруашылықтарының техникасы мен жабдықтарын сағып алуға инвестициялық салымдар кезінде шығындарды субсидиялау қарастырылған. АӨК мемлекеттік бағдарламаларын өңдеу шегінде балықты орналастыру материалына шығындарды субсидиялау жолымен мемлекеттік қолдау шараларын кеңейту бойынша ұсыныстар жасалды. Мақалада нақты шаруашылықтар аясында өндіріс көлемдері мен оларды өткізілуі қарастырылған. Субсидиялауға баға беріліп, мемлекеттік қолдауды ескере отырып, өндірістің рентабельділігі берліген. Тауарлық балық шаруашылығының бағыттары ұсынылған және олардың сипаттамасы берілген: көл тауарлы – ең перспективалы, қысқа мерзім ішінде және аз шығынмен тауарлық балық өндірісін күрт ұлғайтуға мүмкіндік береді; тоған және өнеркәсіптік, оларды тиімді және ғылыми негізделген технологияларды енгізу жолымен дамыту қажет; өнеркәсіптік балық өсіру; бассейндік технологиялар. Балық шаруашылығын дамыту үшін ұсыныстар әзірленді.

Тірек сөздер: тауарлы балық шаруашылығы, өндіріс, өнімді өңдеу, балық ресурстары, салық салу жеңілдіктері, шағын бизнес, орта бизнес.

#### **Аннотация**

В статье рассмотрены вопросы эффективности производства продукции отраслей рыбного хозяйства, задачи, стоящие перед рыбной отраслью, показаны рыбные ресурсы страны. Авторами рассмотрены вопросы по регулированию развития рыбного хозяйства и рыболовства. В целом Казахстан обладает определенными условиями для интенсивного их развития. В статье дана характеристика и особенности двух этих отраслей. Потребление рыбной продукции в Казахстане находится на очень низком уровне. Увеличение доли импортной продукции на внутреннем рынке страны отрицательно сказывается на местном производстве рыбы. В рамках оказания мер государственной поддержки для развития товарного рыбного хозяйства предусмотрено субсидирование расходов при инвестиционных вложениях на приобретение техники и оборудования для рыбных хозяйств. В рамках корректировки госпрограммы АПК подготовлены предложения по расширению мер господдержки путем субсидирования расходов на рыбопосадочный материал. В статье в разрезе конкретных хозяйств рассмотрены объемы производства и их реализация, дана оценка субсидирования и показана рентабельность производства с учетом господдержки. Представлены направления товарного рыбного хозяйства и дана их характеристика: озерно-товарное – наиболее перспективное, позволяющее в короткие сроки и при небольших затратах резко увеличить производство товарной рыбы; прудовое и промышленное, которые необходимо развивать путем внедрения эффективных и научно обоснованных технологий; промышленное рыбное хозяйство; бассейновые технологии. Разработаны предложения для развития рыбного хозяйства.

Ключевые слова: товарное рыбное хозяйство, производство, переработка продукции, рыбные ресурсы, льготное налогообложение, малый бизнес, средний бизнес.