Development of fisheries in Uzbekistan and activities to conserve biodiversity and improve its feed base: review

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Abstract. In Uzbekistan, efforts are being made to further develop fisheries based on the study of world experience. In 2024, it is planned to increase the volume of fish production to 900,000 tons, and with the development of fisheries, improving its feed base is becoming one of the main tasks. Taking into account that mainly herbivorous fish are raised in Uzbekistan, it is planned to feed them with green grass. For this purpose, a device that chops green grass was developed. Taking into account that the chopped feed in this device contains feed of different sizes, this device has been improved by installing a sieve device that separates these feeds into 2-3 fractions depending on their size. In the improved device with a sieve separation device, green grass with a moisture content of 70-80% is chopped and divided into fractions. The amount of nutrients that differ in size is not more than 5%; the indestructibility of chopped and unchopped feeds should be no more than 2%. Currently, an experimental sample of the device has been made, and now its experimental tests are being conducted to determine the optimal parameters and operating modes that satisfy the above requirements.

1 Introduction

Today, improving the environment and biodiversity, increasing population employment is one of the most urgent problems worldwide. In Uzbekistan, great attention is being paid to the development of family farms in order to ensure the employment of the population, to increase the production of food products, including meat products [1-5]. For this purpose, the decision of the President of the Republic of Uzbekistan "On additional measures to develop family entrepreneurship and expand the source of income of the population" was adopted. According to the decision, it was proposed to give loans for a period of up to 3 years with a preferential period of 3 to 6 months to residents and business entities who expressed a desire to engage in certain labor activities aimed at earning income and to expand the type of activity. In accordance with the President's decision, from January 1, 2024, unsecured loans of up to 50 million soums will be allocated to residents and entrepreneurs for the

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implementation of fish farming projects within the framework of the "Every family is an entrepreneur" program.

According to the document, it is planned to increase the volume of fish production to 900,000 tons in 2024. The number of households engaged in fish farming has reached 9,000, and it is planned to intensively grow up to 10,900 tons of fish.

With the development of fisheries in Uzbekistan, the organization of its feed base is becoming one of the main tasks.

Natural feed, balanced feed and additional feed are used in feeding fish.

Natural nutrients - these are the nutrient resources in the pond, namely phytoplankton, zooplankton, algae and algae, and their nutrient coefficient is 8-10.

Additional nutrients include forage plants, animal waste, and food waste. The nutrient coefficient of this type of feed is 5-6.

Balanced feeds are specially formulated feeds that are highly nutritious and are prepared industrially.

Among the food of fishes, additional food made from nutritious herbs is also important. A device was developed to cut and chop alfalfa, legumes and other nutritious grasses for the fish. Although this device performs the specified technological work process, but the fractional composition of grassy foods chopped by it causes some inconveniences in their use. In particular, fractions of 20 mm and larger in the content of crushed feed remain unconsumed and cause pollution of water bodies. Based on this, it is relevant to develop a chopping device that ensures the separation of chopped herbs into small, medium and large fractions in this device [6-9].

2 Materials and methods

The analysis of the state of fisheries in Uzbekistan was carried out based on the study of internet data and decisions and decrees related to fisheries. In doing so, the presidential decrees and decisions on the development of fisheries, raising the sector to a new level, as well as the decisions of the Cabinet of Ministers, as well as the information of the "Uzbekfish Industry" association, the recommendations and methodical manuals on fisheries developed by the Research Institute of Fisheries, were used.

In order to improve the design of the device for chopping blue grass and feeding it to fish, it is necessary to analyze the structure and technological work process of the existing device and other devices, as well as the equipment used for separating and sorting the materials. For this purpose, we studied the structure and technological work process of the device developed by K.Astanakulov and A.Borotov, as well as other chopping devices and equipment for separation and sorting of chopped products [4, 6, 8]. The analysis of chopping and sorting devices was carried out using the methods of analysis and synthesis based on the information obtained from the literature sources and electronic resources on the Internet, as well as the information obtained from the journals and collections in the Scopus database.

After analyzing the techniques used in practice for chopping greens and separating the products to be chopped or separated from each other, the initial requirements and specifications for the improved chopper device were developed using this information. In the preliminary requirements and specifications developed for an improved device for chopping and sorting greens according to their size, the technical description of this device, the quality of work and reliability indicators in the execution of the technological process were determined.

Preparation of the experimental sample of the device, which chops green grass and then sorts them according to size, was carried out based on the developed preliminary requirements, specifications and construction schemes [9-17].
In order to carry out experimental testing of the improved device, the factors affecting its technological work process and their change intervals, as well as the criteria for evaluating the device's work quality were determined.

3 Results and discussion

3.1 Current status of fisheries in Uzbekistan

Today, there are 5,775 fisheries in Uzbekistan, of which 5,600 are located in artificial water bodies (63,000 hectares) and 175 are located in natural water bodies (537,000 hectares). It was emphasized that in recent years, a number of important decisions regulating the further development of the fishing sector in Uzbekistan have been adopted, and the representatives of the sector are being supported in every way. In particular, Russia, China, Vietnam, Iran, Hungary, Turkey and other countries are giving incentives and introducing innovative and intensive technologies.

The number of farms growing cold water fish species (salmon, bream, salmon) has reached 24. In this regard, 5 projects were implemented and 1.2 thousand tons of new production capacity was commissioned. Last year, the total number of incubation workshops in this field reached 113. Breeding ponds were launched on 270 hectares. The volume of fish cultivation on the basis of intensive technologies per hectare has increased 3-4 times (more than 8,000 hectares of land have been activated in total) [18, 19].

Special attention is paid to the development of science in the field. In particular, "Ichthiopathology" laboratories for the analysis of fish diseases and the biochemical composition of water were opened at the Research Institute of Fisheries and Namangan State University. Modern laboratory equipment was brought from Hungary and the Netherlands.

In addition, in 2023-2024, a list of reservoirs planned for animal husbandry and fishing, as well as coastal tourism, was compiled. About 40 tourist services have been organized for residents of Uzbekistan and foreigners near reservoirs, rivers and other types of water bodies. Also, 186 out of 264 natural reservoirs with low breeding value and no permanent ichthyofauna in the republic were transferred to the Ministry of Ecology, Environmental Protection and Climate Change for effective use.

In 2024, it is planned to pay special attention to the following main issues among the priority tasks aimed at the development of the fishing network:

- scientific approach in the field of breeding new species of fish;
- attraction of investments in the industry;
- introduction of innovative technologies and digitization of the industry.

In particular, according to the contract concluded with the Hungarian fisheries research center, it is planned to establish a "Breeding Center" at the Fisheries Research Institute of Uzbekistan. The project aims to acclimatize Hungarian carp to the conditions of Uzbekistan. In addition, within the framework of the project, more than 10 species of carp, which are currently being maintained in the breeding center of the Hungarian Gene Fund, will be gradually brought. From this breed, it is planned to select species highly adaptable to natural and climatic conditions and carry out breeding work.

3.2 Preparation of green grass feed for fish

The device that chops the green grass and prepares food for fish was developed by K. Astanakulov and A. Borotov. When the composition of chopped alfalfa was studied in this device, it was found that fractions up to 1 cm in size are around 50-60 percent, fractions
between 1-2 cm are around 30-35 percent, and fractions larger than 2 cm are 5-10 percent [4, 6, 8].

When these foods are given to small fish, it has been found that the fish will eat food up to 1 cm in size, while food larger than that will remain in the pond and die, polluting the pond after a certain period of time.

Based on this, the device developed for the preparation of feed for fish and poultry by chopping green grass was improved by adding a chopping device that separates the chopped feed into fractions according to size (Figure 1, a and b).

![Developed chopping device](image)

**Fig. 1.** Developed chopping device.

Now, experimental samples of this device are conducted, its optimal parameters and operating modes are studied.
Through experimental research of the device, its work quality indicators that satisfy the specified requirements are determined.

The quality indicators of this work are presented in the table below.

**Table 1.** The main indicators of the quality of the technological process.

<table>
<thead>
<tr>
<th>Naming of work quality indicators</th>
<th>Values of indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Moisture content of green grass under favorable conditions, %</td>
<td>70-80</td>
</tr>
<tr>
<td>2. The amount of fractions up to 10 mm in the content of chopped stalks, at least, %</td>
<td>50</td>
</tr>
<tr>
<td>3. The amount of fractions larger than 10 mm and up to 20 mm in the composition of chopped stalks, at least, %</td>
<td>40</td>
</tr>
<tr>
<td>4. The amount of fractions larger than 20 mm in the composition of chopped stalks, at most, %</td>
<td>10</td>
</tr>
<tr>
<td>5. The amount of nutrients different from the specified size in the composition of the fractions, at most, %</td>
<td>5</td>
</tr>
<tr>
<td>6. Chopped grass contains:</td>
<td></td>
</tr>
<tr>
<td>- completeness of separation of small fractions, at least, %</td>
<td>95</td>
</tr>
<tr>
<td>- completeness of separation of medium-sized fractions, at least %</td>
<td>98</td>
</tr>
<tr>
<td>7. Chopped and unchopped feed indestructibility, at most, %</td>
<td>2</td>
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According to the specified requirements, when chopping green grass with a moisture content of 70-80% in an improved chopper device with a sieve separation device, the performance indicators should be as follows:

- the amount of fractions up to 10 mm in the chopped feed - at least 50%;
- the amount of fractions from 10 mm to 20 mm in the content of chopped feed - at least 40%;
- the amount of fractions larger than 20 mm in the content of chopped feed - no more than 10%;
- the amount of nutrients different from the specified size in each fraction - no more than 5%;
- completeness of separation of small fractions in the chopped feed - at least 95%;
- completeness of separation of medium-sized fractions in chopped feed - at least 98%;
- non-perishability of chopped and unchopped feed - no more than 2%.

Preparations are currently being made for experimental testing of this device. As a result of these studies, optimal parameters and operating modes of the device that chops the green grass for fish and poultry and separates it into fractions are determined.

**4 Conclusion**

Today, Uzbekistan is paying great attention to the development of fisheries, and as a result, about 5,800 fish farms have been established, and more than 60 percent of them are raising herbivorous fish. Now, in these farms, new technologies are being tested, which include feeding green grass in feeding fish. To implement this technology, a device that chops the green grass was developed. Taking into account the presence of fractions of different sizes in the chopped feed, this device was improved by placing a rotary device that separates these fractions into 2-3 groups depending on their size.
Currently, an experimental sample of the improved chopping device has been made. Now experimental work is being carried out to determine its optimal parameters and operating modes that provide the specified work quality indicators.

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