

CONSIDERATIONS REGARDING THE ESTABLISHMENT OF A STURGEON MICROFARM

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RESEARCH ARTICLE

Sturgeons are one of the most valuable fish in the Lower Danube. Until the 19th century, they migrated up the Danube to Germany and, for many fishing communities, represented an important source of income. Sturgeons have long been extremely important to the economy of Romania and Bulgaria, so the decline of sturgeon populations in recent decades has become a concern not only for commercial fishermen and scientists, but also for the State and its agencies.

The market demand for fish meat and especially for caviar has increased a lot in recent years. This growing demand could initially be satisfied due to the increase in fishing effort and sturgeon catches in the Black Sea and Caspian Sea basins, which led to the decrease, to the point of near extinction, of the natural populations.

Migratory sturgeons are indicator species of the quality of the environment in the region where they live due to the multitude of habitats they use during migration, the growth of young in the river and adults in the sea.

Due to the quality of the sturgeon meat, the roe produced by them, as well as the massive pressure exerted on the natural sturgeon stocks, in recent years in Europe, important steps have been taken in their growth in a super-intensive system.

In these relatively new systems for our country - fish breeding is carried out in strictly controlled environmental conditions, at a very high density resulting in productions of over 200 kg fish/m³ of water. The principle of super-intensive systems is to make the best use of the biological potential of a species, in order to obtain a maximum production of fish/m³ of water. A small number of employed personnel can ensure the smooth operation of such a farm. There are cases when only 2 employees are enough to operate such a farm that can produce over 200 tons of fish annually.

Keywords : needs, accommodation units, agritourism, tourists satisfaction

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INTRODUCTION

S.C DINOZAUURII APELOR S.R.L has as its main activity CAEN code 032 - this group includes "Aquaculture" respectively the production process involving the growth of aquatic organisms in fish farms by using techniques aimed at increasing the production of these organisms beyond the natural capacity of the environment. This company has the legal form of limited liability with its main office in Răbăgani town, Bihor county.

Răbăgani commune is located in northwest Romania, the center of Bihor county, in the Beiușului Depression, 15 km away from Beiuș Municipality and 45 km away from Oradea Municipality. The total area of the commune is 3,540 ha, of which 320 ha are located in the urban area.



Figure 1 Administrative map of Răbăgani commune

The present study refers to the construction of a 10 ha microfarm, located on land where the soil structure does not allow water loss through infiltration, where there is a permanent and quality water supply source, with flows corresponding to ensuring optimal conditions environment, in which to grow *Polyodon spathulla* together with other species, until the age of 3 years, when the fish can be marketed. In this sense, the microfarm can be considered a

module of fish production capacity which, if there are conditions and investment resources, can be multiplied, as many times as the investor wants.

Keeping the principles of construction, operation and exploitation valid for the micro-farm, there is the possibility that, later, the development will be extended to a much larger area, reaching an average-sized farm of several hundred hectares, in which, in addition to heleştee to also include a few ponds.

The present study considers the construction of a micro-farm, composed of 3 fish ponds of different surfaces, for the growth of polyodon in the 1st, 2nd and 3rd summers, together with other valuable species, as well as the necessary or optional annexes of production activity: service room, feed and materials warehouse

In essence, we are considering the production of sturgeon meat and other valuable species in a semi-intensive growing system, which requires:

- the construction of three basins of different sizes to ensure optimal environmental conditions for a good growth of fish material corresponding to each technological phase;

- the supply system is made through specific installations (monk), sized in such a way as to ensure adequate flows throughout the year;

- the exhaust system is similar from a constructive point of view to the supply one and has a double role: to maintain the water at the desired level, as well as the role of emptying the pool for fishing and various technological interventions (sanitization, administration of organic fertilizers, repairs etc.);

- the dykes should be well compacted, and their crowning should allow the access of the means of transport necessary for carrying out the specific activities.

MATERIAL AND METHOD

The methods used in this study were different: the historical method, the comparative method, the sociological method, the logical method and the analytical one, their aim was the systematic analysis of the information selected from the sources studied in order to develop personal points of view and conclusions about the stated objectives.

RESULTS AND DISCUSSIONS

Description of growth technology

Over the course of a year, the following works are carried out in a systematic fish farm:

- preparing basins for flooding;
- administration of organic fertilizers and amendments;
- flooding of basins;
- populating the basins;

- feeding the fish material that consumes feed;

- monitoring the environmental conditions in the basins;

- determining the rate of growth through periodic control fishing;

- harvest fishing.

Preparing basins for flooding

This operation consists of:

- clearing the vegetation on the bottom of the basin and slopes, cleaning the bottom of the basin of plant debris; it can be done by mowing, raking and piling up plant debris on the edge of the basin.

- checking and repairing (when necessary) water supply and drainage installations, canals and dykes.

- preparing the supply and exhaust installations with valves, sieves and grates.

Administration of amendments, organic and mineral fertilizers

Administration of amendments - quicklime (CaO), on the entire surface of the basin. The amounts of amendments can reach up to 2000 kg/ha depending on the results of the soil analyzes (as a rule, the amounts administered fall between 200-500 kg/ha).

Administration of organic and mineral fertilizers. It is one of the most important works to be carried out because it is essential in the development of phyto- and zooplankton, which constitute the food base for the North American sturgeon species *Polyodon spathula*. Organic fertilizers (fermented manure - horse, bird, sheep, cow) are administered in quantities of up to 5 t/ha, in piles on the slope of the basin or scattered on the bottom of the basin. Mineral fertilizers (ammonium nitrate and calcium superphosphate) are placed on the manure piles. The amount of mineral fertilizers administered can reach up to 75 kg of ammonium nitrate and the same amount of superphosphate. During the vegetative period, both manure and mineral fertilizers can be administered, depending on the results of the hydro-chemical analyses.

Flooding of pools

It is the operation that is usually performed in March and is done 10-15 days before the popular. The basins are flooded at the normal working level, so as to ensure the previously mentioned depths.

In order to prevent the entry of unwanted fish species, flooding is done through a sieve at the 0.5 ha pool and through grates (distance between bars 4-6 mm) at the rearing pools in the second and third summers.

The popularity of pools

It is usually done at the beginning of April for 1- and 2-year-old fish stock (*Polyodon spathula*, *Cyprinus carpio*, *Ctenopharyngodon idella* *Esox lucius*) and at the end of April or the beginning of May

for the pre-developed fry of *P. spathula*.

The main works and actions necessary to be carried out for the proper functioning of the microfarm. The time affected for their fulfillment.

- **The popularity of helestees** with 1-year-old and 2-year-old pups and also with pre-developed polyodon pups – **20 hours**;

- **Daily monitoring** of the concrete situation in the field, which consists of: water temperature measurement; recording the values of the physico-chemical parameters of the water; observations regarding the development of natural food (plankton); control at feeding tables if the feed has been consumed; recording any unnatural behaviour of the fish; checking the condition of dikes, canals and works of art (monks, inlets); the recording of possible mortalities from the population of fish - 1 hour/day, i.e. **200 hours** for the entire growth period.

- **Feed administration**

4 hours/day × 150 feeding days = **600 hours**
(four hours/day means 2 workers × 2 hours/day);

- Ensuring the security service during the day will be the responsibility of the fish farmer (qualified worker in the field of fish breeding) who does the daily monitoring of the situation in the field and who also participates in the administration of feed;

Assurance of security service: 3424 hours.

- Ensuring the day guard service on Sundays and other legal holidays and the night guard service; 16 hours/day on working days and 24 hours/day on non-working days, i.e.:

28 public holidays × 24 hours/day = 672 hours

and 172 working days × 16 hours/day = 2752 hours

(Saturday is considered a working day).

In total: 672 hours + 2752 hours = 3424 hours.

The guards will be trained to do a large part of the daily monitoring of the situation in the field during the time they are on duty.

- **Administration of fertilizers and amendments – 96 hours**;

- **Control fishing: 120 hours** - 10 such actions × 12 hours/fishing = 120 hours (4 fishermen participate in a control fishing for 3 hours. So 4 × 3 = 12 hours,

- **Harvest fishing: 336 hours.**

7 days (one day for the 0.5 ha pool and 3 days for the other pools) × 6 fishermen × 8 hours/day = 336 hours.

Total working hours required to carry out the work to complete a production cycle: **4796 hours** in a year.

These activities and works can be performed with the standards of 1 fish farmer and 3 guards.

No of people	Occupation	Net salary
1	Zootechnician engineer	4000
2	Pisciculturist	2800
3	Guard	2200
1	Accountant	700

Tab.1 Personal angajat

For the execution of specific works in fish farming, the minimum and absolutely necessary facilities can be:

a) Egreta fiberglass boat

It is produced by the "Brateșul" Handicraft Cooperative from Galati Faleztei Boulevard no. 1 and can be purchased at the price of 3,187 RON.

The boat will be used for feed administration and control fisheries. Also, for harvest fishing and for various interventions on works of art, or on the surface of the heleste.

b) Net 100/4

It is produced by Societatea Plase pescărești S.A. Galati, Constantin Brâncoveanu str., no. 3, tel. 0236.473.373. The price of a net of this type (100 m long and 4 m wide, with the side of the eye of 12 mm) is, at the level of 2006, 4,798 RON.

The net is necessary to carry out control fisheries and self-directed harvesting fisheries.

In the case of performing these works with specialized companies, the costs will be very high and inevitably these works will not be executed at the optimal time, leading to delays.

c) Equipment for measuring the physico-chemical parameters of water

In order to monitor the living conditions offered by the aquatic environment (helesteu), a minimum of equipment is needed in terms of water quality measurement and control equipment:

- Oxy Guard Alpha portable oxygen meter

The device measures the concentration of dissolved oxygen in the water (vital for fish breathing).

The device, powered by a 9 V battery, measures dissolved oxygen both in mg/l and in saturation percentages (% sat.)

It is produced by the company OxyGuard Internațional A/S Blakken 59 DK -3460 Birkerød, Danmark (fax +45 45 82 20 94) and can be purchased in Romania from the company Dynavit Ipmex SRL Brașov, str. Vulturului, no. 19, tel/fax 0268 33 21 62, e-mail: happydog@xnet.ro, at the price of 3,040 RON.

The oxygen concentration must be measured daily, in the morning, before sunrise. In winter, in the winter pools, when the water surface is covered with ice, the determination of oxygen will be carried out both in the evening and in the morning.

- Portable oxygen meter model ProfiLine Oxi 197i

It is a device of the same type as the one presented previously and is produced by the company Wissenschaftlich – Technische Werkstätten GmbH & Co. KG Dr. – Karl – Slevogt – Strasse 1, D – 82362 Weilheim, Germany, tel. +49(0)881/183-0, fax +49(0)881/183-420, e-mail Info@WTW.com, internet http:// www. WTW.com and distributed in Romania by ROM TECH SRL, b-dul Burebista 1, bl. D 15/28, Bucharest, tel/fax (021) 3272294, (021) 3272295 or Str. Nicolae Iorga 6, - 24000 Sibiu, tel. 069/233465, fax 069/233482.

For entrepreneurs with financial possibilities, we recommend a portable multi-parameter device model Multi 340i SET 1, which determines, in addition to dissolved oxygen, temperature, pH and conductivity. It is also produced by the WTW company, whose address was previously presented.

- Secchi disc

With this instrument, the transparency of the water is measured, which gives us clues about the richness of the water in plankton, i.e. in natural food for fish. When the water transparency is 30-35 cm, i.e. the water depth at which the Secchi disk is no longer visible, it means that the natural food is well developed and it is a favorable situation for fish growth.

The Secchi disc is a 2 mm thick sheet metal disc with a diameter of 30 cm. On the front it is divided into 4 equal circle sectors (2 white and 2 black), arranged alternately, and on the reverse side it is painted white. On the reverse side, in the center of the disc, a metal piece is attached for tightening, and on the front side, also in the center of the disc, a fastening element to which a 4 m cord is tied. The Secchi disc is not commercially available for to be purchased, but it can be made by hand, which is why I made its description.

Using the disc is simple: gently insert the disc into the water and let it sink to a depth where it is no longer visible. A mark is made on the string and the depth is measured according to the length of the string that entered the water.

- Thermometer for water (up to 50o C)

It is necessary to measure the water temperature, which will be done every day, because depending on this water parameter, decisions are made regarding the feeding of the fish and the size of the maintenance flow.

These activities and works can be performed with the standards of 1 fish farmer and 3 guards.

Sustainable development - The impact of the project on the development of the area and the business environment

It is obvious that the project has a positive effect both on the development of the area where the development is located, as well as on the business environment and the quality of life.

By locating the microfarm in rural areas, local labor will be used.

The implementation of the project will ensure a quality fish production, which will have the effect of increasing the percentage of fish meat consumers. The quantitative and qualitative increase in production will lead to the improvement of the market position of the economic agents, to the increase in the turnover and to the net profit.

The production of sturgeon meat in aquaculture and its entry into the market will have a positive impact on the conservation and protection of sturgeons from the Danube, by reducing fishing pressure, especially poaching.

Market analysis - Market outlet

The description:

The drastic decrease of sturgeon stocks in the lower Danube basin as a result of negative anthropogenic impact on natural reproduction areas and abusive fishing, requires a research effort directed especially for the protection and recovery of these inventories.

Therefore, the restoration of the sturgeon stock through artificial reproduction and growth in conditions

favorable environmental conditions have been the subject of special research-development programs on world plan. In this context, our research on super-intensive growth is also included

of *Acipenser stellatus* chicks, an extremely valuable species from an economic point of view, in a recirculating system with aquarium type enclosures, designed and realized within the department of

"Aquaculture and fishing". In our experiment we took into account both factors biological and medial ones.

→ Market segment:

These products are addressed to niche economic agents who sell rare and luxury products, but also to those who want to develop a similar business

→ Market location:

It is sold in Romania in the form of meat as well as in the form of caviar

→ Application characteristics:

The demand for our product is high in Romania, as well as in Europe, but there are not many suppliers.

→ Possible risks:

As for the risk factors that could negatively influence demand, they are: high costs in terms of production and marketing, which implicitly lead to an increase in the selling price.

Marketing strategy

In terms of market analysis and marketing strategy, we have identified the target market in the western area of our country. Comparing the supply and demand on the sturgeon market, the target market is represented by the big producers in the country or the export. Most of the customers are from Germany and Switzerland. Currently there is no competition in this market due to the small number of companies that have the same product.

We usually set the selling price according to the production cost to which we add an additional 20 percent.

For Răbăgani commune, this profitable business is beneficial due to the fact that it offers jobs in the area and the reinvested profit increases the value of the land in the area.

8) Financial projections

8.1. Material expenses – 35,356 RON

Equipment – 11,085 RON;

Fodder – 21,141 RON;

Fertilizers and amendments – 4,420 RON

• manure – 1,785 RON

5 tons/ha × 10 ha = 50 tons.

50 t × 35.7 RON/t = 1,785 RON

• quicklime (CaO): 1,285 RON;

500 kg/ha × 10 ha = 5,000 kg

5,000 kg × 0.257 RON/kg = 1,285 RON

• ammonium nitrate – 675 RON

75 kg/ha × 10 ha = 750 kg

750 kg × 0.9 RON/kg = 675 RON

• superphosphate – 675 RON

75 kg/ha × 10 ha = 750 kg

750 kg × 0.9 RON = 675 RON

Popular material – 44,850 RON

Pre-developed chickens of *P. spathula* – 2,500

ex. × 3 RON/piece = 7,500 RON

*P. spathula*1 – 1,050 ex. × 15 RON/pc. = 15,750

RON

Carp2 – 2,250 kg × 8 RON/kg = 18,000 RON

Ct. idella2 – 300 kg × 10 RON/kg = 3,000 RON

Pike1 – 600 ex. × 100 g/ex. = 60 kg

60 kg × 10 RON = 600 RON

Total expenses for popular material: 44,850 RON

We mention that only in the first year of exploitation are purchased for the popular one-year-old sturgeon (*P. spathula*). In the following years, it will be populated from its own production.

Other material expenses (water, electricity, fuel, spare parts, repairs) about 6,000 RON.

Labor costs – 37,800 RON

A full-time fish farmer who will also provide security during the day:

900 RON/month × 12 months = 10,800 RON

Three whole guard rules:

750 RON/month × 3 guards × 12 months = 27,000 RON

Total labor costs: 37,800 RON

Total operating expenses for a microfarm of 10 ha – 118,006 RON

Material costs + labor costs

79,606 RON + 37,800 RON = 117,406 RON

The purchase prices for fodder and breeding material do not include VAT.

For the establishment of the 10 ha fishery, the estimated costs amount to 175,000 - 200,000 RON.

It is necessary that the pool for growing polyodon in summer I (0.5ha) be protected with a protection installation against ichthyophage birds made of acacia poles with a length of 2 m and a diameter of 15 cm, on which they are mounted at the upper end a contour made of resinous timber, on which to fasten the relon thread at a distance of 20 cm.

The **SWOT** analysis

Strong points

- The competition is still not very high;
- Demand exceeds supply
- The rarity of eggs, as well as meat

Weaknesses

- The required capital is very high
- The rarity of the species
- The problem is promoting the offer to make the products we offer as well known as possible

Opportunities

- Penetrating new markets
- Roe export
- Meat export

Threats

- the transmission of any diseases that may have occurred in the fish in the upstream fish pond;
- fishing will be done with certain difficulties related to the fact that it is mandatory to fish the downstream basin first and then successively the following ones upstream. This constraint is technically conditioned by the fact that the level of the

upstream basins cannot be lowered if the downstream one is full.

- the filling and emptying times of the hatches will increase because the entry of water into the fish farm will only be possible through the upstream hatch and therefore, they will not be able to be filled simultaneously, but successively.

CONCLUSIONS

The first sturgeon farm in the country was established in 2006 when the first cega specimens from Germany were purchased and two aquariums were populated with the caviar species consisting of 400 embryonic eggs. This is how the first sturgeon farm in the country came into existence, having as its activity both the growth and research of sturgeons, as well as the collection of black fish roe, among the most expensive on the market.

The expenses are easy to amortize in the case of this business because the increased production and the high demand on the market make sturgeon farming a very profitable business. About 100 grams of caviar are obtained from a one-kilogram cega.

Sturgeons are real living factories of black roe. On the black market in Romania, they are sold for less than 500 euros/kg, and on the official market for less than 1,000 euros.

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