STURGEON FARMING WITH MINIMUM RESOURCES

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GAJENJE JESETRI SA MINIMALNIM RESURSIMA

Abstrakt
Rad daje prikaz načina gajenja jesetarskih riba sa minimalnim resursima. Razmatra se izbor lokacije, oprema na ribnjaku, recirkulacioni sistem, mehanička i biološka filtracija, UV sterilizacija, aeracija, zagrevanje vode i tankovi.

Ključne reči*: jesetarske ribe, gajenje, minimalni resursi*

Sturgeons are starting to get more and more attention due to the high profit that they can provide to farmers. But, this profit is not coming easily; it needs many years until the sturgeon females reach sexual maturity, it requires high costs for initial investment and especially high costs throughout the years.

In this article we will try to find solutions for low investment in sturgeon farming that also involves low running costs. Minimizing the initial cost normally means low productivity for the farm, or bad results in the end. Experience teaches us that a sturgeon farm can be build with minimum budget as long as the processes involved in farming are completely understood.

Location

The first resource that can be minimized is land. Nowadays, the price of land has reached record levels, especially if it is located next to a river or another water source. Excavating the ponds, or constructing big tanks on this land also involves high prices.

The solution is to build a sturgeon farm on a minimum piece of land, where by means of high intensification a big production of sturgeons can be obtained.

Recirculated systems, although seem as a high investment, can be realized with minimum costs, as long as alternatives for special equipments are found. The recirculated aquaculture system requires usually a building or an enclosure where the tanks and special equipments are clever arranged to occupy minimum space.

The popular belief is that recirculated system requires very high costs for energy (pumping and heating). These costs can be minimized by designing the system in a such manner that low energy pumps can be used. Linear circulation of water can be achieved with minimum costs.

Equipments

Today's farms that work on this system (recirculation) are equipped with high tech filters, pumps, UV sterilization units, oxygen injectors, etc. These equipments are usually expensive, especially because a sturgeon farm is relatively big because of the great size of fish that are cultured.

Mechanical filtration

The first expensive equipment that can be replaced is the mechanical filter. Normally in high budget farms, drum filters are used to separate the suspended solid wastes from the water. This type of filters are constructed from stainless steel, are equipped with sensors, control panels, rinsing pumps and engines. This kind of technology is expensive, and a single drum filter can cost for a sturgeon farm, over 25.000 Euros, and up to four pieces are required.

This step in water treatment can be successfully realized by decantation vortexes. These are special designed tanks that allow water to settle, at the bottom solid wastes are settled and clear water is collected from the surface. Depending on the size of the farm, one ore more vortexes are needed to produce clear water, free of solid wastes. The solid wastes can be eliminated from this vortex automatically by using submerged low flow pumps, or by using electro-valve mounted at the vortex's siphon.

Biological filtration

Eliminating ammonia and nitrites from the water can be done by using biofilters. These are nitrification chambers, where specific aerobic bacteria oxidize the ammonia and nitrites to less toxic elements such as nitrates. Unfortunately, at this day there is no cheaper alternative to replace the biofilter material, unless high surface materials are used in order to reduce the need of this material. Biofilter media has a specific surface reported to the volume of up to 900 m^2/m^3. Other materials have a active surface of only 150 m^2/m^3. Also the price of these two materials are different. But using high quality biofilter will reduce the cost of all the biofilter.

Another way in reducing the cost of this equipments, and especially the running cost is by using these materials in smaller rounded tanks, where water from the first filter (vortex) is moving the material, ensuring in this way also the necessary oxygen for the bacteria. The other, more expensive type of using these materials is by suspending them in trickling towers, or by moving them in moving beds by means of strong aeration from high power air-blowers.

These methods can save up to 20% of the initial investments in biofilters (less material) but will safe all the energy costs required otherwise with pumping in trickling towers or pumping air by high power blowers.

UV sterilization

Although it seems that this step is very complicated, and requires special equipments, by understanding how a UV sterilization unit works, the farmer can build his own.

The principle of this units is to allow water to get in contact as close as possible, and as long as possible to the crystal tubes that have inside UV lamps. The distance between these crystal tubes should not be larger that 4 cm. Water sterilization UV lamps will be used, and they are available for purchase at many dealers, as well as the crystal tubes and electric transformers. Of course that this units will not have sensors that informs about the life span of the lamps, but as long as the farmer will change constantly these lamps there shouldn't be any problems. Also, cleaning of crystal tubes will be done manually once a week or every two weeks.

Aeration/oxygenation

Normally, oxygen reservoirs in the shape of 2 to 20 m^3 cisterns are used in sturgeon farming, but such investment starts with 15.000 Euros, which can be too much for some farmers.

This process can be done with simple welding oxygen bottles equipped with reductor, rubber hose and a ceramic diffuser at the end. Each bottle wave an average span of two weeks, and one is required at every fish tank. Of course, using pure oxygen to biofilter will increase the efficiency of biofiltration.

Using a oxygen-meter is a very good ideea, because the farmer will adjust the flow of oxygen upon its needs, saving also oxygen.

In case of emergency, electric aerators mounted on each tank will be used.

Pumping

Designing a system that requires a minimum difference in level between the fish tanks and the water treatment brings the major save in energy but also in initial investment. Linear water circulation consumes less energy in pumping, but also involves in cheaper pumps.

Vertical propeller pumps, are cheap, can work continuously, move huge amounts of water but can work efficiently only in low-level differences.

If the farmer would use trickling towers for biofiltration and drum filters for mechanical filtration, he will have some water level differences that will need normal submerged pumps, that are expensive and have a major power consumption.

A normal submerged pump that moves 1500 m^3 of water per hour will cost over 30.000 Euros (made for aquaculture purposes) and will consume over 40 KW of electric energy each hour to pump the water to a level of more that 2 meters. On the other hand, a vertical propeller pump, that makes the same work, at lower water level difference (close to zero) will cost maximum 5.000 Euros and will have a power consumption of less than 5 KW of electric energy each hour.

Heating

The sturgeon requires a constant optimum temperature in water which according to the specie is between 18-25°C. It is very hard and expensive to heat the water, therefore, heating the air in the building where sturgeons are reared is easier and less costly. Insulating the building is a requirement.

One of the best ways to heat the air is using thermal central units that burns wood or wood wastes.

Fish tanks

Expensive fiber glass tanks can be successfully replaced with concrete tanks, build under the room level. Thermal insulation is mandatory.

The cement will be covered with special polyurethane elastomers to ensure a clean smooth surface.

The tanks will have a round shape, especially where the bottom is joining the vertical walls.

All fish tanks will have the evacuation centered, where a siphon is leading the water toward the exterior monk like construction.

The water alimentation will be made tangential by using cheap plastic tubes, welded.

Instead of conclusion

Most of the costs will be in construcing the building, most of it will be made of concrete (fish tanks, channels, water treatment basins) and walls will be build from sandwich panels that ensure a good thermal isolation.

Water used in these systems is originating from underground, and a small amount of it is needed in a whole day.

Populating the farm with large enough sturgeon fingerlings fully weaned to dry feed will lower the chance of mortality. Using high quality feed is mandatory in order to obtain good results and to shorten the period to marketing the sturgeons. These two expenses (fingerlings and feed) cannot be minimized, although on the whole, good quality feed is more economical and good fingerlings with low mortality are also economical.

Sturgeons can be reared in recirculated system with minimum expenses regarding the initial costs and also regarding the running costs, as long as the culture processes are fully understood. These economical methods will slightly increase the need of workers (cleaning of vortex, and biofilter maintenance will be a daily task), as well as feeding.