Tank-based clarias culture in Nigeria: preliminary information

There have been several study tours from Uganda to Nigeria to visit fish farms and the visitors return with “miraculous” fish production information and wish to imitate the perceived situation for Uganda. In short, the impression is that if a person puts their catfish into a concrete tank and does not change the water, they will get huge production. Like magic. A short description of this phenomenon was written up by Jim Miller but his disclaimers at the beginning of the article have been ignored. One should always be wary of these “something for nothing” reports.

Tanks do not grow fish. Good water quality and good feed grow fish. Poor quality feed does not grow fish very well and it reduces the amount of fish a tank can hold OR it increases the necessary water exchange needed to keep the fish in good health and growing.

Farmers often answer questions of visitors fairly truthfully but they usually ignore some of their crises and problems. As well, in Nigeria, most farmers do not measure water flow rates and are not aware how important these are to production. If a visitor appears on the farm, they may not see the water being exchanged in tanks and often do not think to ask. Additionally, they may ask the wrong person- the one who is not working every day on the farm.

Here is what I found out for the tank-based clarias production:

Tank sizes vary but are usually about 12 to 20 cubic meters of production volume each. This does not count the freeboard. Taking a tank of 2 metersx6 meters x1.2 meters deep, we have 14.4 cubic meters volume. I was told that a crop of catfish can be produced in 4 to 6 months. Each crop is about 1.2 to 1.4 tons; however, if home-made feed is used, it can be 0.9 tons. Most owners will change the water 2 to 3 times per week in these tanks. Most water is from a borehole, but the borehole water is still quite warm given that much of the clarias culture takes place at or near sea level.

The imported feed that is used contains about 45% crude protein —for the grow-out. The people using the imported feed have higher productions and often either bigger fish or shorter grow-out times than those using home-made feeds. This makes perfect sense.

So let’s take 14.4 cubic meters water, change it 3 times per week, for 26 weeks. This makes 1,137 cubic meters. Let’s use a yield of 1 ton. This works out to be a water requirement of 1.14 cubic meters per kg of fresh fish produced.

Now, let’s take some pond data. If a pond is run with “static water”, meaning that the pond is filled and then only evaporation and seepage are replaced, it really requires 2 to 3 times the actual pond volume in total water needs. So, for every 1 cubic meter of pond volume, 2 to 3 cubic meters of water must be available. If the pond is located in an area where rainfall is 1,000 mm per year or more, one of the cubic meters can be had from precipitation but ONLY if the standpipe is correctly installed and the water level is kept in a way that the rainwater actually remains in the pond and doesn’t wash out the overflow.

Production of 20 to 25 tons per ha are possible in static water ponds if they are average 1 meter deep. This is with the 30% crude protein pellets currently produced by Ugachick. A better cooked feed of higher protein would give a bit better production per cubic meter: probably 3 kgs per cubic meter.

So, taking a requirement of 2 cubic meters water for every cubic meter pond volume, and the typical production of about 2-3 kg catfish per cubic meter pond, then you only need 1 cubic meter water for 1 kg catfish production. If you need 3 cubic meters water to produce the 2 kgs fish, then it makes 1.5 cubic meters water per kg fish. Compare with above and….ITS THE SAME THING!!!!

You can argue details if you want but just know that you should plan on 1 to 1.5 cubic meters of water to get 1 kg of catfish production. If you do everything just right and use exquisite feed, it could come down to maybe 0.5 cubic meters water per kg fish. This is a lower water requirement than for other fish because clarias can breathe air and the water is just needed to either wash out or to dilute the wastes. Yes, a recirculating system will reduce your water needs but it also increases pumping costs and management costs and risk.

So, the lesson is: you cannot get something for nothing. Tanks are fine, and are preferable in many circumstances, but they are not magic.

Another lesson is: COMPACT YOUR POND LEVEES WHEN CONSTRUCTING!!!

It has a **huge** impact on water needs for fish production. And remember, you cannot effectively compact layers of more than 15cm at a time. Those who think they can are cheating.

Tanks are adviseable if:

* You do not have much space
* The soil is sandy, or rocky or otherwise prone to seepage
* You have access to water all the time (i.e. do not depend on rain) so can flow water through the tanks or change water more than once a week.
* The water you have access to is not very costly to pump and it is of good temperature. This is very important. If your water is 20C for example, and you wish to grow clarias in tanks, it would be very difficult to do it as flow through or even frequent water exchange because each time you change water, the fish will be too cold.
* You need to have very close control over your fish- predators and thieves are too numerous.
* **You can get a complete diet feed at a reasonable cost**

Note that tanks do not have to be concrete; they can be of rather simple construction to save money but every time you save money in one way, it often increases expenditure in another. For example, saving money in construction often increases the cost of management because harvesting is often more time consuming, etc. Concrete tanks are hard to move if you change your mind about being a fish farmer or about where to put the tank. Other materials such as fiberglass are more expensive but result in a tank that can be moved or sold if you decide fish farming is not for you. Cheap materials do not last as long.

Ponds are good to use if:

* You have sufficient land
* The soil contains at least 25% clay and few rocks or trees.
* You wish to capture rainfall and store it
* The feed you can get is not as high in protein as the imported feed (30% crude protein works OK in ponds in Uganda).

You will need to consider other means of harvesting; a scoop net is not going to make it if you are harvesting a large pond.

There are many variations: liners, (make sure they are UV-resistant);

Fiberglass tanks, plastic tanks, etc. etc.

Per unit cost to construct large containers is always less than for small containers but the size of container (pond or tank) should be gauged by the typical harvest amount you wish to have. No reason to harvest too many fish and have to throw them back.

K. Veverica

Auburn University

Dept of Fisheries and Allied Aquacultures