5.0 Equipment

Script:

The basic part of the system is cement, in this case. So, what we chose primarily here in Northern Vietnam is the cement type systems where we put down a cement floor and have cement walls. And remember, the raceway system is not a tank in the sense of the word that it's holding any pressure. The walls are primarily to keep the fish in the right place, and keep the water moving in the right direction.

So, it doesn't mean that these walls need to be constructed of concrete. They could be constructed of many different materials. You have cement, you have the cement base, which is about 2.5 meters down, and then the cement walls that create the walls. So, that's 30 meters long. Then you have gates made of metal, and these gates are to keep the fish in and keep the fish out, depending on where they're placed.

We typically have a gate at the two meter mark, a gate at the 25 meter mark, and a gate at the 30 meter mark. And those gates usually actually have two slots, because at some point you may want to change the gates, either for the size of the mesh or for cleaning. Gates are made of metal because we've found in the past that if farmers, when they tried to use other materials, sometimes for nylon for example, they would actually blow out, and of course, a key part of the system is to keep the fish in the system. If they escape the system, then you've completely lost the control over the system.

The other part, the really critical part of this system is the white water unit. I mean, it's really the heart of the system. And it's usually made out of a combination of a metal rack that holds a hood, so it's a hood at about a 45 degree angle that allows the directionality of the water flow. So, you have a rack of the diffuser pipes underneath that are fed by a blower. And those, as the water comes up, come with the air lift, it hits there and moves in that direction.

Now, we would like to see in reality that these systems are interchangeable with the white water units in the pond. So, ideally these systems actually will float within that two meter area. It'll be on floats so that as the water level may change due to rain or through evaporation, that we're always seeing that those white water system moving up and down. We want to see about 2.5 centimeters of freeboard above the water, or the lip of that hood.

Some of the other critical aspects, of course, are to have supplemental aeration within the pond itself. We want to see that there are a way to put other abilities to aerate the system, in case you have high density, or you have a situation where there's cloudy days, oxygen may be an issue. The blower system is, of course, very important. We recommend that they not only have the primary blower, but have a secondary blower available in

Key Points:

- Raceway systems use cement floors and walls to keep the fish in the right place and keep the water moving.
- Using a white-water unit is critical to the success of the system.
- The white-water unit moves the water through the system.
- It is also essential to have a backup generator so there is access to electricity all of the time.

case there's a problem with the primary blower, so they can switch over quickly.

The flexibility of the system needs to be there. You need to ensure you have attachments that are detachable, so you can remove the racks or remove the whole white water system, white water unit. Move it out, put a new one in. At the end of the system where we have the quiescent zone, we typically see what farmers are putting in is a moveable collection unit. And what this is usually done is it's on a rail system, which moves it back and forth. It has a large kind of suction unit at the bottom with a V area, allows it to suck up all that solid waste. And that solid waste is taken out of the pond and put into a separate area. Now, it could be put into row crops, it could be put into a cyclone unit that separate out the solids. Essentially, that's to remove that nutrient from the ponds, but allow you to use it for other things.

Think some of the other areas that you need to pay attention to are, in particular, the electricity. So, we need to have a backup generator with a quick auto-start. The intent here is that at any time if there's a power outage, that the auto-start generator will come in right away. And this actually needs to be tested quite often. You need to being sure that it's tested under load. It's not just turned on and turned off for a second. What should actually happen is that once in a while you should turn it off completely and see what happens, and then run it for an hour, make sure it can run under load. Because if the system stops at these high densities, you're going to have either significant stress and/or mortalities. And that's something we want to avoid.