



Cage Aquaculture for Farm Ponds

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In Virginia, there are over 80,000 farm ponds. The primary function for many of these ponds was for irrigation and flood control. Many of these ponds are used for recreational fisheries. By growing fish in cages, these ponds can create a low impact, sustainable aquaculture system that can be used for family sustenance or create another revenue source for the farm.

Cage aquaculture is the most suitable production system for farm ponds. The bottom and shape of most farm ponds precludes many other fish production systems. Cage aquaculture is growing fish in a confined netted structure in a pond. This allows easy access and harvest by the producer/ farm pond owner.

The simplest cage that can be built is a round cage that is 4 ft in diameter by 4 ft in depth. This type of cage runs about \$60-\$80 each for materials. Cages can come in different sizes and designs. A 4 x 4 x 4 ft square cage is commonly used but is more costly to build than a round cage. A 4 x 4x



Cage Operation in Lunenburg County

Site Selection

- **About one acre or larger farm pond**
- **Pier for attaching cages**
- **Two to three feet clearance between cages**
- **At least two feet clearance from the bottom of the cage to the bottom of the pond**

8 ft cage is about as big as you need. However there are cage designs that are bigger. For the farm pond owner a simple 4 x 4 round cage is all that is needed.

There are several different species of fish that are suitable for cage aquaculture. The most successful fish for cage culture in Virginia is the rainbow trout. The first attempt at doing cage culture should be with rainbow trout in the winter. Trout is the easiest and has the highest success rate.

Trout

Trout are a cold water species requiring water temperatures below 70° F. When temperatures go above 70° F, mortalities will result. Trout grow very well in the winter in cages between 55° to 65° F. Trout will feed at 45° F. Rainbow trout are stocked in the late fall and when water temperatures stay below 70° F. This is late October or early November. Fish are held in cages all winter long and fed. Trout are harvested by mid-April and no later than May 1st. Holding trout any longer than this risk problems with pond temperatures rising into the 70° F range.

It is recommended that 250 rainbow trout be stocked in 4 x 4 ft round cage. These numbers work quite well. The size of the trout should be about 3-4 fish per pound. Fish are about 4 oz at this size. This size of trout will run about 90 cents.

Harvest size is 14-16 ozs. This will require about 20-24 ozs of feed or around 375 pounds of feed for 250 trout. This is 9 1/3 bags (40 lb bags) of feed. You can figure about 2 lbs of feed will produce a pound of fish. Trout are more efficient at converting feed to flesh. Trout requires about 38% protein feed that about 3/32 in pellet size.

Stocking fish into cages

The stocking rate for cages ranges from a minimum of 6 fish per cu ft to about 13 fish per cu ft of water.

Higher numbers can be more challenging than a lower numbers of fish per cu ft of water. This is due to disease problems that can occur with heavier stocking densities of fish in cages. One reason that trout works so well is the stocking of 250 fish in a 4 x 4 round cage in less than 5 fish per cu ft of water. Trout in this type of cage is ok. Other fish go with at least 6 fish per cu ft of water.

Catfish

Raising channel catfish in cages is more of a challenge, but not impossible. Good husbandry is needed for success. When stocking catfish in cages, the density must be high enough to breakdown their aggressive behavior towards each other. Cage should be stocked with a minimum of 6 fish per cu ft of water. Generally 300 catfish can be placed in 4 x 4 round cages. Large catfish fingerlings are used for stocking cages. This size should be no less than 85 lbs / 1000 fish. These catfish fingerlings run about 7-8 inches in size. A smaller size will take too long to grow within one summer. This will result in over wintering catfish in the cages.

Feeding Fishes in Cages

- Use a good commercial fish feed
- Feed only the amount that is consumed in five to seven minutes
- Feed one or two times per day
- Size the pellet to the size of fish
- Protein levels of 32% to 36 %
- Feed seven days a week during summer
- Feed two or three times per week in the winter

Catfish can be stocked in March, April, or early May. Catfish are stocked into the same cage that the trout were in. Make sure that all trout have been removed before stocking catfish. Catfish are fed a floating pellet that's 32% protein at 2% - 3% body weight each day. The ideal situation is to grow the trout in the winter and raise the catfish in the summer. This way you are using the same cages to get two crops of fish.

Materials for a 4 ft by 4 ft Round Cage

- 13 ft of 1/2 or 3/4 inch mesh plastic netting 4 ft wide
- 13 ft of 1/8 inch mesh by 18 inches for feed ring
- Pieces of mesh for the top and bottom
- 12'6" length of 3/4 " black plastic pipe with connectors
- Four Floats or a float ring
- Wood slats 1 x 1/2 x 44" for support
- Plastic Wire Ties; 4-6" type
- Heavy Duty Cable ties for Floats

Aeration

A pond that's about 1 acre in size with 1-2 cages can generally get by without aeration. When cages are in a ½ acre pond, one should consider having aeration to move water through the cages. Having electricity at the pond will increase the usefulness of the pond for cage aquaculture. A simple Kasco type aerator is the standard recommendation for cage aquaculture.



Permits and Regulations

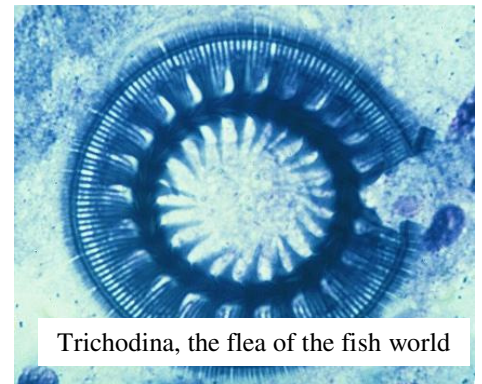
You will not need any permits if you are raising fish for personal consumption. If you want to sell your fish to the public, you will need a permit. Permits are obtained from DGIF. You will need a "Hold and Sell" permit. This cost 10.00 dollars from DGIF. If you plan to propagate fish, you will need the "Propagation, Hold and Sell" permit. This one cost \$12.50. These permits are renewed annually. You can obtain the permit by calling 804/367-1000 or going to www.dgif.virginia.gov/permits/.

Fish Health

As with any production systems, cage production of has its share of disease problems. Caged fish can have problems with external parasites and an assorted group of bacterial pathogens. Good aquaculture practices will minimize these problems.

The most common external parasite that is found associated with caged fish is a ciliated protozoan parasite known as Trichodina. Other protozoan parasites that are problematic with cage culture are Ich, Ambiphrya, and Trichophrya. These parasites are found on the gills and skin of fish.

Another type of parasite generally called gill worms are found on fish. These multicellular parasites are worm-like with hooks that resemble anchors on the posterior end of the body.



Trichodina, the flea of the fish world

There are several bacterial pathogens associated with cage culture. The two most common ones are columnaris and Aeromonas. Columnaris attacks the skin and gills of the fish. Aeromonas is typically a systemic bacteria that produces externs skin lesion and ulcers.

Controls for these problems are limited and restricted in use. Before you attempt any treatment for a disease problem, you should always consult first with you fish health specialist for proper control measures.

Marketing: Fish are ready for harvest. What to do?

If you are looking at trying to sell your fish, try to pre-sell them. Don't wait until the last minute to sell fish. Have a plan for selling fish. Most of your markets will be local niche sales, such as civic organizations for a fish fry or to individuals coming to the farm. You may plan for 500 to 1000 lbs of fish to sell at the end the production cycle. Find your customers before the fish are harvest.

Fish can be processed for your own personal use. Having fish in your diet promotes a healthy life style. 500 to 1000 lbs will feed a family a healthy diet for some time. Fish should be frozen with water (this prevents freezer burn) or vacuum packed for the freezer. The freezer life of fish is 6-12 months depending on packing procedures for the freezer.