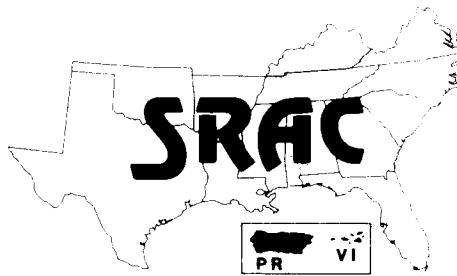


**Southern
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Cage Culture

Cage Culture Problems

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High density aquaculture has been described by the United States Department of Agriculture as the most intensive form of agriculture practiced on a large scale in this country today. Cage culture is one of the most intense forms of aquaculture. Due to its intense nature, cage culture can have problems. Anticipation can solve at least some of them.

Signs of fish stress

One problem with most types of fish culture is that the fish are difficult to observe. Ponds are usually turbid and observation of the fish impossible. Fish are generally shy and attempt to hide from people. Sampling fish to observe them may stress the fish and lead to secondary diseases. This is why observation during feeding is critical. Feeding is the only time when the fish will readily come to the surface for observation. Cages are collections of individual fish and many times behave differently, not unlike groups of people. Some cages of fish will feed readily with people all around them. Others will wait until people are gone and all is quiet.

It is critical to watch closely and note the behavior of the fish feeding in order to recognize behavior changes. Usually changes in behavior are caused by changes in their environment (i.e., the pond) or in their health. These changes may be the first signs of stress. Learn to recognize the common signs of stress which may include:

- a reduction in the amount of feed eaten,
- feeding stops suddenly,
- fish are at the surface gulping for air,
- fish are swimming erratically,
- discolorations are seen on the skin of the fish,
- dead or dying fish,
- and any other strange behaviors.

If any of the above signs appear, ask yourself why? Do not let the question go unanswered for long, or a new question can appear: Where do I bury the fish? Try to analyze the problem and come up with a solution or reason for the behavior. Here are a few possible reasons or problems which could have produced these behaviors. This is by no means

a complete discussion and should be taken as only some of the possibilities.

A reduction in feeding could mean disease, parasite load, low oxygen, or one of several water quality problems (e.g., ammonia, etc.). Has the weather changed? Has the pond water color changed? If it is a heavily overcast and windless day, it may simply be a temporary low but not critical oxygen problem. If the pond is changing color or a surface scum has suddenly appeared, it may also be low oxygen (see Signs of pond stress which follows). A sudden halt to feeding usually suggests oxygen problems; diseases, parasites and other water quality problems usually do not disrupt all the fish immediately. Likewise, fish at the surface gulping for air (usually observed at or before dawn), when the day before everything seemed fine, is a sign of critically low oxygen. Aerate now--in 30 minutes it may be too late!

Skin discolorations, spots, fin erosion, erratic swimming, or other strange behaviors are usually signs of diseases or parasites. If diseases or parasites are the problem, then dead fish usually start to appear soon. A few dead fish each day usually indicate some type of slowly

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spreading disease or parasite problem. Progressively more dead fish each day is a sign of a very serious disease problem. Dying fish or fish with suspected diseases or parasites should be diagnosed immediately. Take a live sample of fish and a water sample to your nearest fish disease diagnostic lab. Many state fisheries Extension programs offer disease diagnosis. Contact your county Extension office or state fisheries (aquaculture) specialist for information on how to properly package and ship fish samples.

Any disease diagnostic lab will be able to give you the best treatment alternatives for the disease or parasite. If diagnosed as an internal bacterial disease, the most practical treatment is usually to feed a medicated feed (e.g., Terramycin). If an external bacteria or parasite is the problem a water treatment may be necessary.

Depending on the disease, water treatment may require treating the entire pond or it may be possible to bag the cage in plastic and treat just the cage. Treating the entire pond may be too expensive to be justified, but some parasites can be eliminated only by treating the entire pond. Bag treatment can cause serious oxygen stress if supplemental aeration is not provided in the bag and should only be used for certain diseases which are not spread from the pond.

Signs of pond stress

Ponds can also be stressed from an accumulation of nutrients and/or from overfeeding (see SRAC Publication No. 161, Cage Culture--Site Selection and Water Quality and SRAC Publication No. 164, Cage Culture--Handling and Feeding Caged Fish). Pond stress in this case is synonymous with water quality problems. Common examples of pond problems are:

- excessive plankton blooms (pea green),
- surface scums,
- strong odors,

- excessive weed growth (macrophytes),
- or a rapid change in water color.

All of these are symptomatic of excessive nutrients and can become problems in any pond as it ages (a process called eutrophication). In most aquaculture ponds it is symptomatic of overstocking and/or overfeeding. Excessive plankton blooms (less than 12 inches visibility on a Secchi disk) can cause oxygen depletions at night or on heavily overcast days. The same is true of excessive macrophytic growth. Also, surface scums can shade out the rest of the phytoplankton bloom, causing oxygen depletions, and have been identified with off-flavor problems. Strong odors are identified with decaying plant material and usually signal pending oxygen depletions caused by decay. Rapid changes in color also signal phytoplankton die-offs and pending oxygen depletions. In some cases chemical control of the plants may be warranted. In most cases supplemental aeration will be necessary to maintain the fish. At times of severe plankton die-offs supplemental aeration may not be able to keep oxygen above critical levels in the cage. In these cases it may be necessary to release the fish into the pond hoping that they can spread out and survive, or move them into another pond.

The ability to recognize and prevent potential oxygen problems is usually better than trying to save the fish after the dissolved oxygen has dropped in the pond. Remember that dissolved oxygen stress is one of the chief causes of secondary infections. Contact your county agent or state fisheries (or aquaculture) specialist for information on diseases or how to measure and predict dissolved oxygen levels in ponds.

Signs of human error

Of course we could blame ourselves for all of the above, and in most cases we would be justified. Aside from that, common errors made by people include:

- picking ponds with pre-existing problems,
- poor cage construction,
- stocking undersized or poor quality fingerlings,
- stocking too many fish per cage,
- stocking too many fish per pond,
- stocking too few fish per cage,
- feeding poor quality feed,
- overfeeding,
- disturbing and poor handling of the fish,
- and not observing the fish.

These problems are very common, particularly with beginning cage culturists. All of these problems have been discussed in this and other SRAC publications in this series.

Other problems and observations

Biofouling is a common cage problem. Biofouling is the growth of algae and bryozoans (soft bodied, jelly-like animals) on the sides of the cage. These creatures restrict water flow through the cage and cause water quality problems (LODOS).

Periodically check the sides of the cage (but do not lift the cage out of the water) and remove any biofouling organisms with a stiff brush or broom. **Do not stress the fish.**

Overwintering in cages is another problem. Some species overwinter better than others, but in general, overwintering should be discouraged. Try to feed your fish on warm and sunny winter days and be prepared to give medicated feed to the fish if bacterial problems develop in the spring.

All fish farming, including cage production, is "crisis management." Visit the pond and observe the fish daily. Plan ahead and be prepared for emergencies. If you are inexperienced and a problem arises, get help.