

Water Exchanges in Crawfish Production: Avoiding Too Much of a Good Thing

Introduction

Water quality in crawfish ponds is probably the most important factor influencing survival and growth, and dissolved oxygen is considered to be the most important component of water quality. Water quality is influenced by many environmental and biological factors, such as the type of vegetation planted in the summer, when the vegetation is planted, how the vegetation is managed prior to flooding and when the pond is flooded. Most water quality problems in crawfish ponds occur in the fall, usually during the first two to six weeks after ponds are flooded, but problems can also occur later in the early spring when pond water warms up. Unusual conditions can occasionally cause poor water quality even during the late fall and winter.



Healthy forage



Bad forage

For as long as people have been farming crawfish in south Louisiana, the cure for most water quality problems has been to simply pump water from wells or surface sources to replace stale or “bad” water in crawfish ponds. Unfortunately, unnecessary water exchanges can cause as many problems as inattention to poor water quality. In this age of increasing fuel costs, monitoring oxygen levels regularly after flooding and taking corrective management steps when necessary are probably the most cost-effective ways to improve yields and profits in most crawfish farms. In this way, production problems are avoided and so are unnecessary pumping costs.

Water Exchanges in Crawfish Production

Although the term “water quality” refers to a number of different parameters in crawfish production, dissolved oxygen is by far the most important water quality consideration for farmers. Generally, if oxygen can be maintained at good levels, other components of water quality will be satisfactory for crawfish. Replacing bad water in a crawfish pond with fresh, oxygenated water usually helps maintain satisfactory water quality, but experience has shown that it is more cost-effective to drain a portion of “sour” water from a crawfish pond and then pump oxygenated water to replace it than it is to drain and pump at the same time. If a producer drains and fills at the same time, many areas of the pond may not be completely flushed of bad water.



Oxygenated well water



Capturing water for reuse

Aerated water must move throughout a crawfish pond to allow for maximum survival, growth and yield. It is important to match pumps and transport systems (pipes, canals or ditches) to maximize energy efficiency and water distribution while minimizing pumping costs. Many ponds can be designed or modified to recirculate and aerate water, and this approach is often less expensive than flushing ponds.

As a general rule, crawfish farmers require a minimum of 2.5 to 4 acre-feet of water per surface acre to initially flood ponds, replace water lost from evaporation and seepage, and maintain satisfactory water quality during the 7- to 10-month production season. Rainfall can replace some of the water lost through evaporation and seepage, but pumping is required to supply the difference. Since every inch of pumped water is expensive, water exchanges should be undertaken only when necessary.

When Should Water be Exchanged?

The general rule is: If dissolved oxygen levels are 2 ppm or more at dawn, the water quality is probably satisfactory for crawfish. If levels fall and remain below 1 ppm throughout most of the day for a week or more, corrective action should be taken to add oxygenated water. Dissolved oxygen should be measured regularly throughout the season, but especially during warm weather in the fall and again in the spring. Most low-oxygen problems in the fall are associated with the natural breakdown of flooded vegetation, while springtime problems are more related to hot water and crowded conditions within traps.

Dissolved oxygen levels are usually lowest early in the morning, so this is when they should be checked.

The first sample should be taken where new water enters the pond, at a depth half-way between the surface and the pond bottom. Also, check at two additional locations in the pond, preferably in one area of good water circulation and one point far away from the pump.



A simple paddlewheel for circulation



Splash screen for well water

some groundwater), it must be aerated to add oxygen and remove these potentially toxic compounds.

Sources of Water

Surface water is satisfactory for crawfish production if it is unpolluted, pesticide-free and nuisance predator fish such as bullheads and perch can be screened out. Although cheaper to pump, surface water is usually not as reliable in quantity and quality as well water. Unfortunately, wells also have some drawbacks. Although they can provide predator-free water, they have a limited discharge capacity and higher investment and pumping costs. Because well water contains no oxygen and is often high in iron and toxic hydrogen sulfide (the source of the “rotten egg” smell in



Splash screen for surface water



Volunteer forage

Early Season Water Quality

The period immediately following fall flooding is critical for water quality management in crawfish production. It is almost never a good idea to flood crawfish ponds to full depth before late September. This is because there are few crawfish hatchlings prior to this time, and also due to the severe water quality problems brought on by high temperatures. Extreme heat depletes oxygen in the water, often causing significant crawfish mortality unless water can be exchanged almost continuously. Since this option is not economical for crawfish producers due to high pumping costs, early flooding is not recommended.

For most types of vegetation other than green, growing rice, flooding with warm water can cause rapid decay and result in high demand for oxygen. Sub-lethal low oxygen may not kill crawfish directly but it can result in chronic physiological stress that reduces growth and survival during molting. The warmer the water's

temperature, the less oxygen can be dissolved in it, so early flooding puts crawfish producers at a disadvantage in terms of oxygen management, even when other conditions are acceptable.

Complete water exchanges may be required in the early fall when warm water is first flooded onto vegetation, but these situations can and should be avoided. Occasionally, crawfish producers attempt to capture heavy September rainfalls to produce an earlier harvest, but this practice often leads to loss of early hatchlings due to inability to maintain suitable water quality once vegetation begins to rapidly break down. When vegetation management follows recommended practices – where rice is planted in early August – several inches of water



Rice as forage

can be held with a growing rice crop without causing water quality problems or any serious harm to crawfish. This allows early-emerging brood stock and their young to find an acceptable environment waiting for them when they leave their burrows.

Ideally, sustained air temperatures should be in the low to mid-80s in the afternoon and low to mid-60s in the morning before beginning fall flood up, and this usually occurs in early October in southern Louisiana. These milder temperatures allow crawfish producers more “breathing room” when it comes to managing oxygen levels, because cooler water can hold more oxygen. Flooding at this time still allows for emergence of the bulk of the young-of-the-year crawfish hatch.



Rice harvest

Summer Vegetation Production and Management

The type of forage planted for crawfish and how that forage is managed prior to flood-up greatly affects water quality during the first critical months following flooding. Best water quality is maintained in ponds with rice planted in early- to mid-August, because the oxygen demand of green, actively growing rice is low. This in turn results in an optimum environment for newly-hatched young-of-the-year crawfish and virtually eliminates the need for largewater exchanges. Savings in pumping costs are usually significant.

Conversely, rice-crawfish rotation ponds with large amounts of rice stubble and straw following rice harvest are likely to have serious oxygen problems after fall flood-up unless the straw is baled and removed, burned, or chopped and irrigated to speed breakdown and reduce oxygen demand. Producers in south Louisiana may benefit by waiting until mid-October or later to flood these rotational ponds.

Ponds that are not deliberately planted with rice or sorghum sudangrass and have large amounts of volunteer grasses usually have severe oxygen depletions soon after flood-up because grasses decompose quickly. Ponds with large amounts of aquatic plants like alligatorweed usually have fewer oxygen problems, but this type of vegetation is not desirable for high yields in crawfish production.



Alligator weed

Summary

Investing in the equipment, facilities and manpower to monitor and maintain proper water quality in crawfish production, especially with regard to dissolved oxygen, is generally very cost-effective. A number of practices, however, can be adopted to reduce the need for water exchanges. These practices, in turn, reduce overall costs, increase production efficiency, and reduce potential or perceived negative impacts to surrounding watersheds.