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- 
- 
- 
- 
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- [About](#)
  - [Who We Are](#)
  - [Our History](#)
  - [Our Team](#)
  - [Sustainable Development Goals](#)
  - [Careers](#)
- [Membership](#)
  - [Overview](#)
  - [Our Members](#)
  - [Corporate Membership](#)
- [Resources](#)
- [Certification](#)
  - [Best Aquaculture Practices](#)
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  - [Who We Are](#)
  - [Our History](#)
  - [Our Team](#)
  - [Sustainable Development Goals](#)
  - [Careers](#)
- [Membership](#)
  - [Overview](#)
  - [Our Members](#)
  - [Corporate Membership](#)
- [Resources](#)
- [Certification](#)
  - [Best Aquaculture Practices](#)
  - [Best Seafood Practices](#)
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- [Advocate Magazine](#)
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Health & Welfare

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pH field measurements improve catfish fry survival



1 July 2008 James A. Steeby, Ph.D. Charles C. Mischke, Ph.D.



## Stocking into ponds with pH greater than 8.0 can result in mortalities



While being transported from hatcheries to ponds, catfish fry commonly experience high densities and dropping pH in the tank water.

Recent research has shown that seven to fourteen days posthatch, channel catfish fry suffer large mortalities if subjected to an abrupt rise in pH of 0.5 (Fig. 1). In order to assess the implications of this condition for hatchery management, the authors carried out a study where pH values were measured in commercial hatcheries and a variety of ponds into which fry were stocked during the 2007 hatchery season in Mississippi, USA.

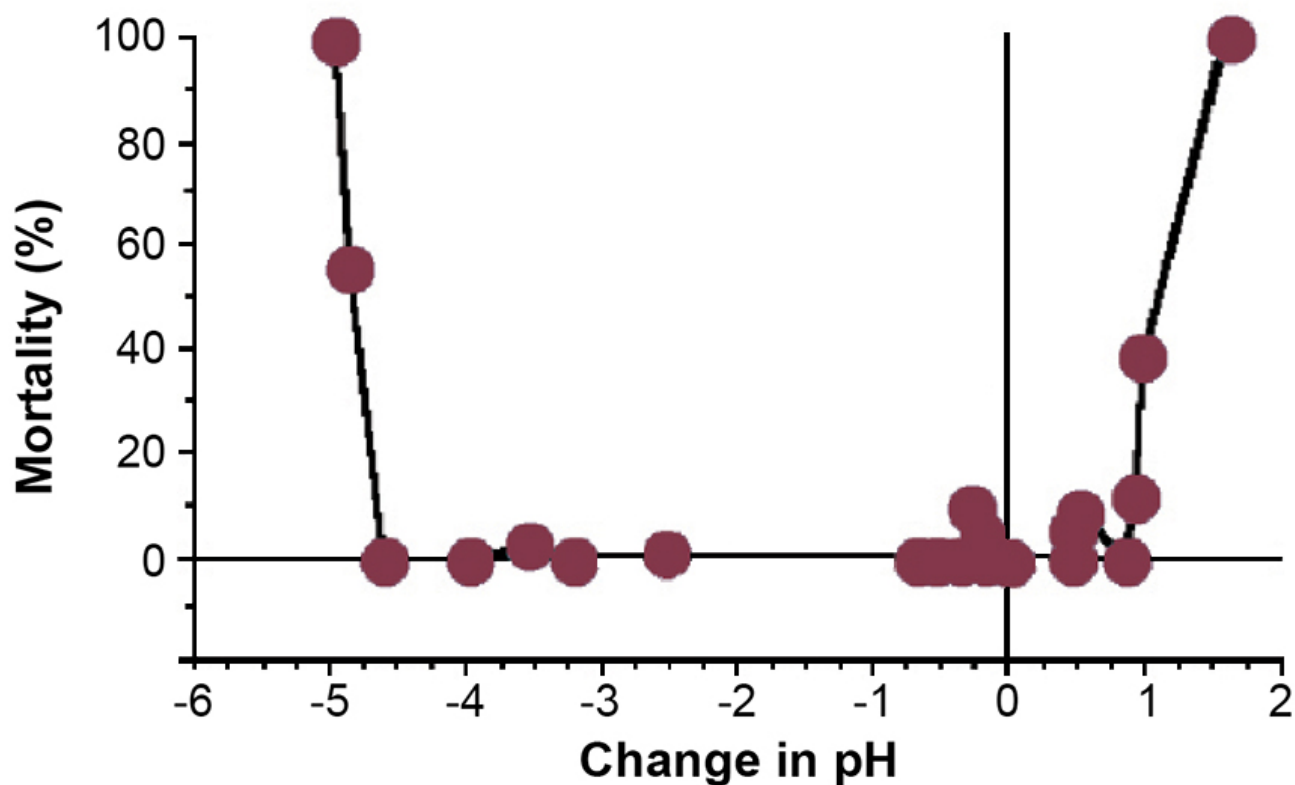


Fig. 1: Mortality of catfish fry exposed to an abrupt change in pH.

## Water conditions

Most commercial catfish hatcheries in Mississippi use groundwater supplied from a deep aquifer. These wells range 200 to 400 meters deep in most cases. They are typically moderately alkaline 150 to 200 mg/l and extremely soft with no iron. Calcium chloride is added to the incoming water by metered pumps to raise hardness from near 0 to 50 mg/l.

In the hatchery tanks and troughs containing 4- to 6-day posthatch fry, pH ranged 7.2 to 8.6. Most commonly, pH values were 7.4 to 7.9 in troughs containing 400 to 600 fry/l with water flow rates near 12 l/minute. Values for pH in ponds prepared for receiving fry were commonly 7.8 to 8.2.

## Fry transport

However, when fry are loaded into transport tanks, they commonly experience densities of 1,700 to 2,000 fry/l for up to 30 minutes. In these tanks, liquid oxygen is bubbled through porous ceramic diffusers to maintain adequate dissolved-oxygen levels, but with no water exchange, the pH drops to 7.4 in most cases.

Pond water added to the transport tanks by small pump from the receiving ponds is used to adjust water temperature to near that of the ponds. Adjustment of pH by pumping pond water, however, is difficult, as the densely loaded fry constantly add carbon dioxide to the water through respiration. Temperature adjustment is usually achieved within 15 minutes, but pH can remain nearly unchanged.

## High pH

Under these conditions, stocking of fry into ponds with pH greater than 8.0 can result in mortalities. Ponds with dense submerged weed problems – such as filamentous algae like (*Chara*) or (*Najas*) species – can be especially problematic, as they can have pH levels over 9.0 even in the early morning. Ponds freshly filled with water from the shallow alluvial aquifer were more nearly the same pH as the transport tanks.

## Recommendations

Measuring pH in transport tanks and receiving ponds at the time of stocking using a pH pen is highly recommended. Transport tank water may require the addition of buffering agents if the hatchery source water is low in hardness. It is likely that most finfish species are vulnerable to pH shock if stocked seven to 14 days posthatch.

(Editor's Note: This article was originally published in the July/August 2008 print edition of the Global Aquaculture Advocate.)

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