Arkansas AQUAFARMING
Cooperative Extension Program
UAPB University of Arkansas at Pine Bluff
School of Agriculture, Fisheries and Human Sciences
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Performance of the Intense Aeration Catfish Verification Ponds for 2016

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Intensive aeration is one of the newer technologies utilized in the production of channel catfish in the United States. This system of production utilizes smaller pond sizes compared to ponds used in traditional catfish production, heavier fish stocking rates, and much higher horse power per acre aeration levels. Net per acre production levels using this production system can approach 20,000 pounds per acre, much greater than production levels in traditional catfish production ponds.

For the 2016 study, six ponds totaling 26.5 acres were used. Pond size ranged from 4.2 acres to 5.8 acres. Each pond had 35 total horse power of aeration, consisting of two 10 horse power aerators, and one 15 horse power aerator. Automated pond dissolved oxygen monitoring systems were also used during this study. Aeration was initiated when oxygen concentrations in the water dropped to 4.0 ppm. As oxygen concentrations dropped lower, additional aeration was started. Aeration was turned off once oxygen levels recovered to the 4.0 ppm level.

Ponds were stocked between February and June of 2016 with blue X channel catfish hybrids ranging from 8,000 to 11,000 fish per acre. The size of the fish stocked ranged from an average of 0.22 pounds to 0.41 pounds. Fish were fed to satiation using a 32% crude protein diet. The total feed tonnage averaged 17.2 tons per acre, ranging from 14 to 23 tons per acre.

The net per acre production ranged from 11,000 to 20,000 pounds per acre with an average production of 15,500 pounds per acre. The feed conversion ratios (FCRs) were good, averaging 2.2, with a range of 2.0 to 2.4.

Fish size at harvest ranged from 1.9 pounds to 2.7 pounds. The larger fish sizes are approaching sizes at which price dockage occurs at the processor. It is imperative that hybrid catfish are not held too long in production systems, otherwise profitability is severely diminished.

Table 1 contains data from the 2016 study. Even though the total pounds of fish harvest were collected, the total number and average fish size were not recorded. The numbers used in this study were based on an 85 percent survival rate, which is standard for the industry.

Table 1. 2016 Verification results for catfish intensive aeration ponds.

POND I.D.	ACRES	DATE STOCKED	NO. FISH	WEIGHT IN LBS	AV. SIZE	LBS FEED	TOTAL HARVEST (LBS)	*NO FISH HARVEST (LBS)	NET LBS HARVEST	PER ACRE HARVEST (NET LBS)	*AV. SIZE (LBS)	F.C.R.
T - 7	4.2	4/20/16	40,727	8,960	0.220	160,015	84,235	34,618	75,275	17,923	2.43	2.12
T - 8	4.2	6/20/16	43,769	11,380	0.260	119,517	70,079	37,203	58,699	13,976	1.88	2.04
T - 9	4.2	6/20/16	38,147	9,880	0.259	155,430	79,762	32,425	69,882	16,639	2.46	2.22
T - 10	4.2	6/20/16	35,355	14,425	0.408	157,695	80,100	30,052	65,675	15,637	2.67	2.40
T - 11	4.2	4/20/16	40,083	7,215	0.180	192,725	89,295	34,071	82,080	19,543	2.62	2.34
T - 12	5.5	2/20/16	45,912	17,860	0.389	123,665	78,339	39,025	60,479	10,996	2.01	2.00
TOTALS	26.5		243,993	69,720	0.286	909,047	481,810	207,394	412,090	15,551	2.32	2.21

*Harvest fish numbers and average fish size data was not collected. For those values, we are assuming a survival rate of 85% and projecting from there.

2016 Arkansas Catfish Split-pond Verification Program Results

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Crop verification in Arkansas is an integral part of the Extension education program. Verification efforts involving cotton were initiated in the late 1970s. This program was very successful and many other commodity crops were then added to the verification program. Catfish verification became part of the effort in the 1990s. As economic conditions worsened for the catfish industry new technologies were needed to improve production efficiencies. One such technology that emerged was the split-pond production system. This technology was soon added to the verification program and is proving highly successful. Results from 2016 showed production levels ranged from 11,400 pounds per acre to over 19,300 pounds per acre. Feed conversion ratios (FCRs) averaged 2.3 for the duration of the study.

Farmers involved in the study agreed to follow Extension recommendations. Records kept for verification study purposes included stocking numbers and weights, pounds of feed used, and harvesting numbers and weights. Other records supplied to economic researchers included costs for hours of aeration, pumping, harvest and transport, and general maintenance.

The study was limited to the use of hybrid catfish only because channel catfish do not survive well in these type systems. Fish stocked were a minimum of 6.5 inches in length. Eight ponds were utilized for the study varying from 6 to 14 acres in size. Fish production areas ranged from 1.25 to 3 acres. Large water wheels and screw type pumps were used to circulate water. The units began operation once dissolved oxygen concentration in the water were consistently above 4.0 parts per million (ppm) and circulated water throughout the day until oxygen concentration fell below the 4.0 ppm threshold in the evening. At this time supplemental aeration was used in the fish production section to maintain 4.0 ppm dissolved oxygen. The fish production area utilized a minimum of 10 horse power per acre. Emergency back-up generation was available as well as tractor powered paddlewheels.

Fish were fed to satiation. Producers began the production season using a 32 percent crude protein diet and switched to 28 percent crude protein diets in the summer months. As autumn approached, the producers returned the fish to the 32 percent diet. Water quality was monitored weekly by an Extension Specialist. Close attention was paid to total ammonia nitrogen concentrations, nitrite-nitrogen concentrations, and chloride concentrations. Fish were harvested once fish flavors were allowable and minimum harvest size was attained.

The results of the 2016 verification study on split ponds are provided in Table 1. The net yield per acre was 15,388 pounds. The average FCR was 2.27. The average weight of fish harvested was 1.8 lbs but ranged from 1.6 to 2.2 lbs.

Split-ponds are a highly productive system for rearing catfish but are not without problems. If these systems are overstocked, oxygen depletions can occur during harvests, so partial harvests, rather than total harvest may be suggested. The water wheels move large volumes of water but have problems with gearbox shearing. Producers are adapting standard electric paddlewheels for this purpose and these units appear to be working fine. It is imperative to have adequate emergency back-up generation and tractor powered units available.

Table 1. Results of the 2016 Arkansas catfish split-pond verification study

Acres	Number Fish/acre	Average Size lbs.	Stocking Weight	Total lbs feed	Net lbs yield	Net lbs/acre	FCR	Average size lbs
12	10,000	0.325	39,000	529,200	229,548	19,129	2.31	2.20
14	9,141	0.155	19,840	434,900	222,113	15,865	1.96	1.80
8	10,550	0.203	17,133	234,832	100,654	12,581	2.33	1.70
8	9,910	0.320	24,775	237,757	90,613	11,426	2.62	1.60
8	10,075	0.340	27,400	262,237	101,171	12,646	2.59	1.80
8	11,250	0.075	6,750	273,532	122,287	15,285	2.23	1.60
10	12,840	0.215	27,600	354,690	152,400	15,240	2.33	1.67
6	16,670	0.320	22,400	250,000	116,229	19,371	2.00	2.00
Average					1,135,015	15,388	2.27	

Precautionary Statements

George Selden
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Pesticides are designed to cause death or harm to their target organisms. Unfortunately, harm may not be limited to the target, but can also negatively impact the individual using the pesticide. Because of this, the EPA requires the inclusion on every label a section titled Precautionary Statements. The precautionary statements section provides information to the user regarding toxicity, irritation and sensitization hazards associated with use of the pesticide, and first aid treatment for exposure. The section also includes information on the proper clothing and equipment that the EPA requires must be worn when loading, mixing and applying the pesticides to reduce potential exposure.

This information is included on the labels of herbicides legal for aquatic use. With one exception, all aquatic herbicides require the wearing of shoes (chemically resistant shoes in diquat's case), socks, long pants, long sleeved shirt and gloves during loading, mixing and application. If the gloves are at least 14 mils thick of barrier laminate, butyl rubber, nitrile rubber or viton rubber, they will be sufficient for all the aquatic herbicides. Coveralls are required for diquat and sodium carbonate peroxyhydrate. Eye protection should be worn for seven of the legal aquatic herbicides, with a face shield being required for mixing or loading diquat. After use, gloves should be washed with soap and water, and clothes should be washed separately with soap and hot water. If any garments manage to become drenched, they should be discarded.

The farm owner is responsible for ensuring that the necessary safety equipment is available for employees. The EPA can impose penalties and fines on farm owners for violations of Worker Protection Standards. Remember to read each label prior to use. For a summary of clothing and equipment necessary for loading, mixing and applying aquatic herbicides, please see Table 1.

Table 1: Safety gear necessary for application of aquatic herbicides.

Herbicide	Shoes	Socks	Long Pants	Long Sleeves	Coveralls	Chemical Resistant Gloves	Water Resistant Gloves	Eye Protection	Wash Clothes with Detergent and Hot Water	Discard Drenched Clothes
Copper	X	X	X	X		X		X	X	X
Diquat	X; Chemical resistant	X	X	X	X	X; ≥14 mils thick of barrier laminate, butyl rubber, nutrile rubber or viton rubber		X; Face Shield when mixing or loading	X	X
Endothall	X	X	X	X		X		X	X	
Carfentrazone	X	X	X	X			X		X	X
SCP	X	X	X	X	X- if using full strength product		X	X	X	X
Flumioxazin	X	X	X	X		X			X	X
2,4-D	X	X	X	X		X		X	X	
Glyphosate	X	X	X	X					X	
Fluridone										
Triclopyr	X	X	X	X		X; ≥14 mils thick of barrier laminate, butyl rubber, nutrile rubber or viton rubber		X	X	X
Imazapyr	X	X	X	X		X			X	X
Imazamox	X	X	X	X		X			X	
Penoxsulam	X	X	X	X; short sleeves for in-water application					X	
Bispyribac Sodium	X	X	X	X		X; ≥14 mils thick of barrier laminate, butyl rubber, nutrile rubber or viton rubber				
Topramezone	X	X	X	X		X; ≥14 mils thick of barrier laminate, butyl rubber, nutrile rubber or viton rubber		X	X	X

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OFFICIAL BUSINESS

Upcoming Events

European Aqua Congress
June 18-19
Paris, France
"Advanced Technology of Aquaculture and Marine Biology." This conference attracts some of the top speakers and vendors from around the world, focusing on cutting edge techniques and technologies. For more information, visit https://euroaquacongress.conferenceseries.com/.

148th Annual Meeting of the American Fisheries Society
August 19-23
Atlantic City, New Jersey
For more information visit http://afsannualmeeting.fisheries.org.

AQUA 2018
August 25-29
Montpellier, France
The Annual International Conference & Exposition of World Aquaculture Society. For information contact the Conference Manager at (760) 751-5505.

UAPB Aquaculture/Fisheries Field Day
October 4
UAPB Aquaculture Research Station, Pine Bluff, Arkansas
Demonstrations and results from current AQFI research projects and practical information for Arkansas stakeholders. For more information, contact Casandra Byrd at (870) 575-8123.

Aquaculture 2019
March 6-10, 2019
New Orleans, Louisiana
Triennial International Annual Conference & Exposition with WAS, Fish Culture Section, AFS, National Shellfisheries Association, U.S. Aquaculture Society, National Aquaculture Association and Aquaculture Suppliers Association. More information at www.was.org.

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