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2017 Catfish Verification Results Split-Pond and Intensive Aeration Systems

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Crop verification is a valuable tool in the Extension education program in Arkansas. The verification program started with cotton in the late 1970s and has expanded to most of the commodity crops since that time. Catfish verification efforts began in the early 1990s and as technologies evolved verification changed to accompany the more intensive production methods.

Results showed that one pond in the intensive aeration study was a "bust." The majority of the fish in that pond succumbed to a PGD (proliferative gill disease) infection. The pond was restocked at a later date but that production was not included in the study results. Production value in that pond was considered 0. Other ponds in the two studies performed well, with net production ranging from 10,000 pounds per acre to over 18,500 pounds per acre. Feed conversion varied from 1.8 to 2.77, averaging less than 2.2.

Producers involved in the study agreed to follow Extension recommendations. Records kept for verification purposes included initial stocking numbers and weights, pounds of feed used and harvest numbers and weights. Other records such as aeration hours, transportation costs and general maintenance costs are supplied to economic researchers.

The minimum recommended fish size for verification studies was 6.5 inches in length. Six ponds were utilized in each system. Split-ponds ranged in size from 8 to 14 acres in total size, while intensive aeration ponds ranged from 4.2 to 5.5 acres. For the split-ponds, large water wheel and screw type pumps were used for water circulation purposes. Grow-out areas of the split-ponds had 30 to 50 hp of permanent aeration available. The intensive aeration ponds were supplied with 35 hp aeration per pond. Oxygen levels in the ponds were computer monitored. The goal was to maintain 4 ppm or higher oxygen levels at all times. Back up generation units were available in the event of power failure as well as tractor powered paddlewheels.

Fish were fed to satiation. The producer began the year feeding with 32 percent crude protein diet and had the option to change to 28 percent protein diet for the duration of the summer months. Once autumn arrived, the producers changed back to the 32 percent diet. Water quality was monitored at weekly intervals by the verification coordinator. Close attention was paid to total ammonia nitrogen (T.A.N.) levels, nitrite-nitrogen levels, and chloride levels. Fish harvest began once a desirable minimum size was reached assuming the fish were on flavor. This past year, fish harvests did not move as well in a timely manner. Several processors now have a sizable supply of their own fish and choose to move those fish first.

The split-ponds performed well with the exception of one of the 8-acre units (Table 1). Estimated percentage loss for that pond was over 36 percent. As expected, losses of that magnitude

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Table 1: 2017 Catfish Verificaiton Split-Pond Results

ACRES	NO. FISH STOCKED	WEIGHT IN LBS	AV. SIZE LBS	LBS FEED	TOTAL HARVEST LBS	NET HARVEST LBS	PER ACRE HARVEST GROSS	PER ACRE HARVEST NET	AV. SIZE LBS	F.C.R	% LOSS
12	120,000	44,400	0.370	300,766	210,792	166,392	17,566	13,886	1.8	1.81	2.4
14	125,000	30,500	0.244	368,065	200,328	169,828	14,308	12,130	1.98	2.17	19.1
8	80,000	13,280	0.166	218,000	92,000	78,720	11,500	9,840	1.8	2.77	36.2
8	85,000	23,800	0.280	230,000	132,500	108,700	16,562	13,588	1.8	2.12	13.4
8	90,000	4,140	0.046	315,161	145,749	141,609	18,218	17,701	2.1	2.23	22.3
10	128,000	27,904	0.218	370,600	213,179	185,275	21,317	18,528	1.85	2.00	10.0
TOTAL	628,000	144,024	0.229	1.8 M	994,548	850,524	16,576 AV	14,175 AV		2.12	15.9

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also had an effect on gross production and F.C.R. Gross production was under 10,000 pounds per acre and F.C.R. was 2.77. Production in the other split-ponds was within the ranges seen across the industry for similar type systems, 12,000 to 18,000 pounds per acre.

Total pond losses attributed to P.G.D. have been seen in the past and this did occur in one of the intensive aeration ponds (Table 2). Production values for the pond were assigned 0. Naturally, no production impacted per acre production, lowering the average to 10,000 pounds per acre. Losses such as this illustrate the risk involved in catfish farming.

Fish losses averaged 15 percent, not accounting for the total loss in the intensive aeration pond. A 15 percent loss is seen across the industry.

Both of these systems are highly productive, and both have problems. To best utilize these systems, fish need to be moved in a timely manner once fish are of sufficient size and on flavor. This did not occur this year. Producers had to wait longer than usual to move fish. This adds to production costs.

Table 2: 2017 Catfish Verificaiton Intensive Aeration Results

ACRES	NO. FISH STOCKED	WEIGHT IN LBS	AV SIZE LBS	LBS FEED	TOTAL HARVEST LBS	NET HARVEST LBS	PER ACRE HARVEST GROSS	PER ACRE HARVEST NET	AV. SIZE LBS	F.C.R.	% LOSS
4.2	39,000	16,210	0.413	140,950	79,650	63,440	18,964	15,105	2.40	2.22	15.0
4.2	38,400	15,860	0.413	107,935	83,000	67,140	19,762	15,986	2.54	1.61	14.9
4.2	38,000	12,935	0.337	163,625	79,700	66,765	18,976	15,896	2.47	2.45	15.1
4.2	43,600	14,185	0.325	102,625	57,995	43,810	13,808	10,431	1.56	2.34	14.7
4.2	43,000	15,825	0.360	102,345	60,350	44,525	14,369	10,601	1.65	2.30	14.9
5.5	0	0	0	0	0	0	0	0	0	0	100
TOTAL	202,000	74,475	0.369	617,480	360,695	285,680	12,656 AV	10,024 AV		2.16	

Evaluation of Channel Catfish (*Ictalurus punctatus*) Fry Production in Indoor Hatchery Systems

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Channel catfish production is the most important aquaculture industry in the U.S. However, the industry has been declining since 2002. The industry has developed hybrid catfish as a way to improve production but optimization of current channel catfish production processes should also be considered. One such area for consideration is the stocking of fry/fingerlings in nursery ponds. Traditionally, stocking of sac-fry has been done directly into nursery ponds in order to decrease costs of production, labor and the risk associated with hatchery operations (disease outbreaks, power failure, etc.) However, fry survival in ponds is not well known. Some commercial catfish farmers have reported high rates of mortality in nursery ponds. Research has shown that by rearing fry in the hatchery from 7 to 25 days before stocking into ponds, survival rates were much improved. To examine this further, we conducted a pilot study to evaluate growth rate and density conditions in channel catfish fry reared in indoor hatchery systems.

Yolk-sac fry were produced at the Aquaculture Experimental Research Station at the University of Arkansas at Pine Bluff. Yolk-sac fry were stocked into 80-gallon troughs and once the fry began to swim up they were fed a sinking fry meal 0.8 mm 50 percent crude protein and 17 percent lipid content (Purina, Aquamax fry starter 100), and after 20-days, fry were offered a mix of the fry meal with a 1.2 mm extruded sinking pellet with the same crude protein and lipid content (Purina, Aquamax fry starter 200). Feed was offered by using a 12-h automatic belt feeder that was set up on each trough as well as on each circular fiberglass tank where fry were raised. Fry were counted for each culture unit. Random samples of fish were taken twice per week from culture units, and then weighed and counted to determine growth. Water temperature and dissolved oxygen were measured in each culture unit once a day.

This study was carried out using three different systems inside the hatchery. After fry hatched, they were transferred to a metallic trough 80-gallon capacity. Stocking density in the trough was 6 pounds per 100 gallons, and after 13-days of culture 98,855 fingerlings were harvested. The average weight was 7,723 fish per pound, and the final density reached 16 pounds per 100 gallons.

Fingerlings were then transferred to two fiberglass tanks 400-gallon capacity, with flow through water at a rate of 1 gallon per minute. Stocking density in those tanks was 3 pounds per 100 gallons, and fingerlings were raised for one week in these two tanks. Fingerlings doubled in size during this period, reaching an average weight of

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3,783 fish per pound, and a final density of 5.8 pounds per 100 gallons, with a total of 87,812 fingerlings harvested.

Finally, fingerlings from the two tanks were transferred into a recirculating aquaculture system, composed of two 1,000-gallon tanks, one sand filter, an electrical pump and a biofilter unit. Stocking density in each tank was 1.2 pounds per 100 gallons. After 50 days of culture, there was a disease outbreak that reduced survival rate to 56 percent. Five days later, fingerlings were harvested with an average weight of 1,144 fish per pound, and final density of 4.3 pounds per 100 gallons. The growth curve for the 75-days of culture is observed in Figure 1.

Feed conversion ratio (FCR) during the first phase in the metallic trough was 0.26; then increased to 0.61 in the fiberglass tanks, and finally in the RAS system went up to 1.46 due to the disease outbreak that affected 44 percent of the population.

This pilot study demonstrated the feasibility of culturing channel catfish fry in indoor systems under high density conditions, although there are potential issues with disease outbreaks and also, depending on the production goals, issues with space availability. However, the development of indoor culture systems might offer some benefits for catfish producers with regard to culturing out of season, potentially to improve survival rates in fingerling production, and improve feed management practices. The risk of reduced growth rates due to overcrowding in indoor systems compared to outdoor ponds was offset by compensatory growth of this species. In fact, fingerlings from different sizes, including organisms from this study were used to stock nursery ponds. After the first two weeks of culturing, organisms that were stocked at 0.6 and 0.8 grams reached over 3.0 grams of size.

Acknowledgments

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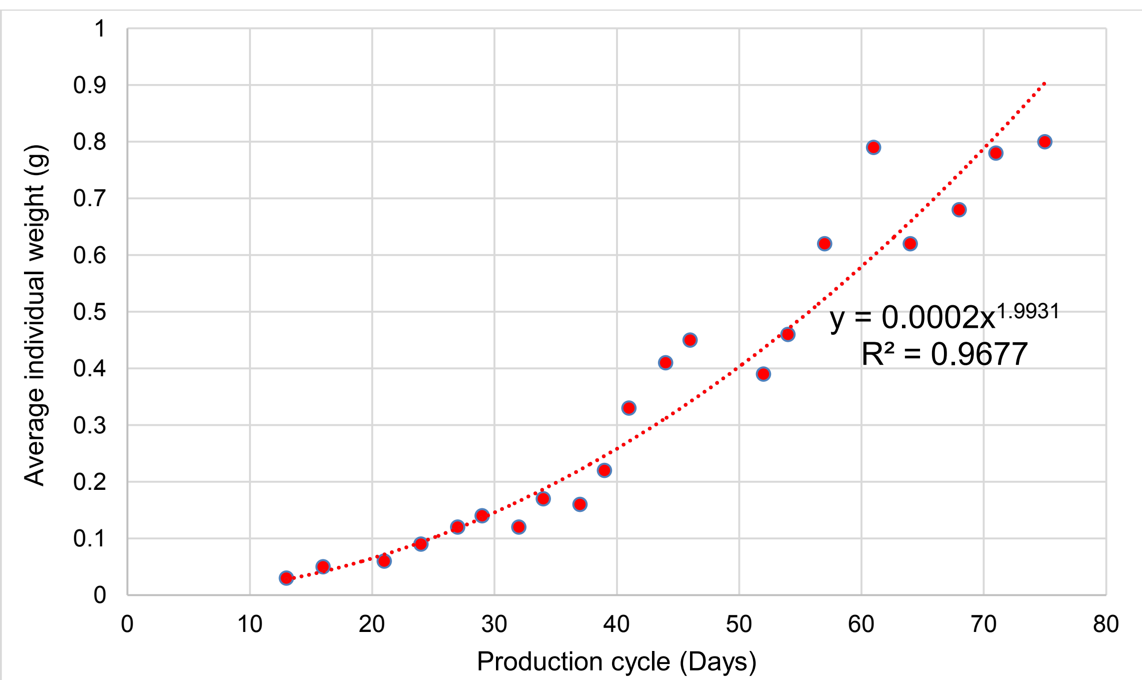

Figure 1: Growth curve for channel catfish fry under different indoor systems. Trough (80 gallons), tank (400 gallons) and then RAS (two tanks 1,000 gallons each).

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Upcoming Events

The American Fisheries Society and the Wildlife Society 2019 Joint Annual Conference

September 29-October 3, 2019, Reno, Nevada

The first ever joint conference of these two organizations is likely to be the largest gathering of fish and wildlife professionals ever. Catch up on the latest wildlife and fisheries research, technology and techniques.
https://afstws2019.org/

Catfish Farmers of Arkansas Annual Meeting

January 30-February 1, 2020, Hot Springs, Arkansas

The annual meeting of the Catfish Farmers of Arkansas covering the latest research, legislation and looming issues relevant to commercial catfish production.
http://www.cfarkansas.com/home.html

Aquaculture America 2020

February 9-12, 2020, Honolulu, Hawaii

International annual conference and exposition with the U.S. Chapter, World Aquaculture Society, National Aquaculture Association and the U.S. Supplier Association.
http://www.was.org/EventCalendar.aspx#7299