School of Agriculture, Fisheries & Human Sciences

COOPERATIVE EXTENSION PROGRAM
University of Arkansas at Pine Bluff

Arkansas Aquafarming

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Aquaculture/Fisheries Field Day to be Held October 5

The Aquaculture/Fisheries Center Field Day will be Thursday, October 5, 8:30 a.m. to noon, at the Aquaculture Research ponds at the University of Arkansas at Pine Bluff. The Field Day features tractor and walking tours, a poster display and a sponsored trap shoot. Demonstrations include the following:

- **The Seinitizer: Only You Can Prevent Disease Transmission** (techniques and equipment that can prevent the spread of disease; cheap, easy and safe disinfectants, cleaning seines)
- **Channel Catfish vs. Hybrids: A Growout Challenge** (preliminary results of ongoing growth studies comparing the channel catfish and channel catfish/blue catfish cross)
- **Why Chemical Treatments Fail: Are You Getting Dead Spots?** (efficient chemical application methods)
- **Statewide Distribution and Impact of the Catfish Trematodes** (the distribution of this parasite and its control)
- **Baitfish Certification Program** (what it is, how it works and benefits farmers)
- **Producing Hybrid Catfish Fry** (specialized techniques, equipment and the costs)
- **Judging Potassium Dose Effectiveness in Muddy Water and Thick Algae Blooms** (obtaining the correct dosage)
- **Cool Season Feeding of Catfish: Time to Change Your Oil?** (catfish nutrition with growth and changing water temperatures)
- **Handheld Computers: The Farm at Your Fingertips** (Using Personal Data Assistants to have farm info at your fingertips)
- **Electrical Safety Demonstration** (safety around power lines)
- **Understanding Electrical Costs** (reducing costs by managing electric fees)

The Field Day is cohosted by the United States Department of Agriculture-Agriculture Research Service (USDA-ARS) Aquaculture Systems Research Unit (ASRU). The fall meeting of the Catfish Farmers of Arkansas will be held at the end of the field day. To get to the Field Day, take Hwy 79 to Oliver Road (turn at the new UAPB football stadium) and follow the signs to the Agriculture Research Station. For more information, contact Nathan Stone at (870) 575-8138 or email nstone@uaex.edu.

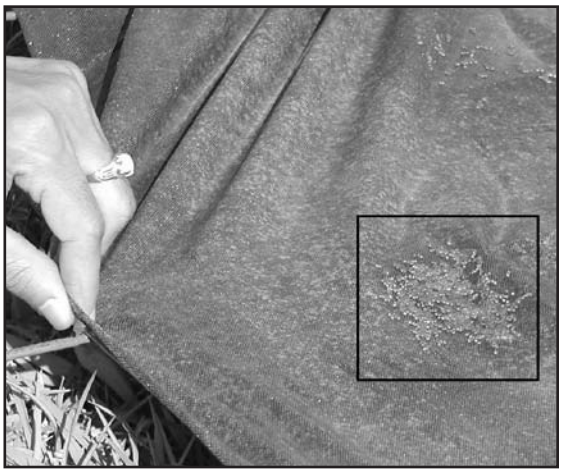
Spawning Fathead Minnows

Nathan Stone, Extension Fisheries Specialist, and Ignacio Masson, Graduate Student

Plastic irrigation tubing (*gut* pipe or poly pipe) is often used as a spawning substrate by fathead minnow producers because used pipe is available for free. However, recent research (Masson et al. 2006) has confirmed that fathead minnow eggs do not stick well to smooth surfaces. While rough or textured surfaces retained 72 to 77 % of eggs, only 41% of eggs stuck to poly pipe. Eggs that do not stick in the nest are not likely to survive. Benoit and Carlson (1977) first found that fathead minnow eggs do not adhere well to smooth surfaces when they tested a variety of substrates including cement-asbestos tile, glass, stainless steel screen, and sand-coated, shot-peened and unaltered stainless steel. This is an important consideration for fathead minnow farmers who practice fry transfer and seek to maximize the number of young minnows produced in brood ponds. For those farmers that raise minnows in spawning-rearing ponds, it's likely that there will be sufficient reproduction even when smooth substrates are used.

Rough wood and unfinished fiberglass are two substrates that appear to provide decent egg adhesion. Recent studies at UAPB have been conducted using landscape fabric as a spawning substrate. Landscape fabrics are sold as barriers to prevent the growth of terrestrial weeds and are readily available. Such fabrics typically are woven or perforated, providing a roughened surface, and are UV stabilized. Based on preliminary testing, thin fabrics are unlikely to last in ponds and are easily torn. However, the heavier fabrics have held up well.

Fathead minnows are amazingly fecund and produce lots of eggs over time. Gale and Buynak (1982) found that over the spawning season, female fathead minnows spawned an average of every 3.9 days and produced a volume of eggs that was 3.8 to 6.8 times the volume of their own body! Clemment and Stone (2004) determined that one pound of fathead minnows (4 females: 1 male) would produce an average of 2,700 eggs per day. Production ranged from 8 – 28 eggs/female/day. A review of controls for various toxicity studies found that fathead minnow egg production in aquaria typically averaged between 10 and 66 eggs/female/day (typically 20 – 30 eggs/female/day). Unfortunately, current production systems, using spawning-rearing ponds and fry transfer, do not allow us to take full advantage of all these eggs.



Fathead minnow nest on landscape fabric (outlined by a black box).

Is there potential for a hatchery system for fathead minnows, similar to what currently exists for golden shiners and goldfish? There are several obstacles, the first of which is that fathead minnow nests are spread out over substrates, so that collecting eggs requires significant labor. An efficient egg collection system is essential. We know that eggs can be removed from substrates using a 1.5% sodium sulfite solution. Eggs can be left in the sulfite solution for up to 30 minutes without apparent harm, although the solution contains no oxygen. Unfortunately loose fathead minnow eggs, even when rolled in hatchery jars, appear exceedingly susceptible to fungus. A hatching system incorporating a fungus control protocol is required. The ultimate obstacle, however, may be the cost of such a system. Currently, production of farm-raised fathead minnows has been constrained by the availability of cheap, wild-caught minnows. Furthermore, concerns over wild baitfish as potential carriers of exotic diseases or aquatic nuisance species will lead to new restrictions on harvesting minnows from the wild and could provide increased opportunities for producers of farm-raised fathead minnows.

For additional information, see:

Benoit, D. A., and R. W. Carlson. 1977. Spawning success of fathead minnows on selected artificial substrates. Progressive Fish-Culturist 39:67-69.

Clemment, T., and N. Stone. 2004. Collection, removal and quantification of eggs produced by rosy red fathead minnows in outdoor pools. North American Journal of Aquaculture 66:75-80.

Gale, W., and G. Buynak. 1982. Fecundity and spawning frequency of the fathead minnow - a fractional spawner. Transactions of the American Fisheries Society 111:35-40.

Masson, I., N. Stone and Y-W. Lee. 2006. Developing methods for harvesting rosy red fathead minnow eggs. North American Journal of Aquaculture. In press.

Costs of Trematode Treatments

Carole Engle, Professor, Department Head, and Larry Dorman, Extension Fisheries Specialist

The catfish trematode (*Bolbophorus*) has become widespread in the catfish industry. Recent research has shown that even low numbers of catfish trematodes have a significant effect on catfish and may be a common reason for poor feeding and growth (Hanson and Wise, 2005). This parasite has a complex life cycle involving white pelicans, fish, and rams-horn snails. Pelicans often visit ponds at night. They often leave before dawn so their stopovers may go unnoticed. You are at high risk for trematode problems if pelicans visit your ponds, and if rams-horn snails are also present. If trematode infection occurs, you have four options: (1) do nothing, (2) stock triploid black carp, (3) treat with copper sulfate, or (4) treat with hydrated lime. This article reviews costs associated with each of these options.

Option 1: Do Nothing

When the trematode was first found in catfish ponds, attention focused on the extent of mortalities. A recent study has showed decreased yields in ponds with even light infestations of trematodes (Hanson and Wise 2005). The decrease in yields resulted from decreased consumption of feed by fish infected with trematodes. There were 40 ponds sampled in the study. Of these, 17 had no trematodes, 7 had light infestations, 5 moderate, and 11 had severe infestations. The study showed that feed consumption averaged 72 lb/acre/day in ponds not infected with trematodes. Ponds with light infestations consumed 62 lb/acre/day of feed and those with moderate and severe infestations 47 lb/acre/day. On average, feed consumption decreased by 10-25 lb/acre/day in ponds infected with trematodes. If fish are converting feed at 2.5:1 this decrease in feed consumption results in a loss of 4-10 lb/acre/day of production. Hanson and Wise (2005) estimated that light infestations of trematodes result in an 81% decrease in profits (net returns). Losses occur with moderate or severe infestations. The decrease in net returns was $950/acre and $1,073/acre for the moderate and severe infestations, respectively.

Option 2: Stock Black Carp

Black carp (*Mylopharyngodon piceus*) belong to a group of fish commonly called Chinese carp. Black carp have a strong appetite for snails, and have been used worldwide to control snails that serve as intermediate hosts for a variety of parasites. They are also effective at controlling the rams-horn snail that hosts the catfish trematode.

There has been controversy in recent years regarding the culture of Chinese carps. There is common agreement that black carp and other non-native species must not become established in the wild. In Arkansas, only sterile (triploid) black carp are available and legal for use. Prices of fingerling triploid black carp are approximately as follows: $1.50 each for 4-inch fish, $2.50 each for 6-inch fish, and $3.50 each for 10-inch fish. At the recommended stocking rate of 10/acre, it would cost about $250 to stock one 10-acre pond with 6-inch triploid black carp. Additional black carp must be stocked about every 3 years. Thus, the annual cost of the use of triploid black carp would be about $83/year for one 10-acre pond, or $8.30/acre/year.

Option 3: Treat with Copper Sulfate

Copper sulfate has also been recommended to kill the snails that host the trematode. The most common treatment recommended is to apply copper sulfate along the shoreline. For very heavy infestations, it is necessary to treat the entire pond. Typically this is recommended only if the shoreline treatments have not provided adequate control. Table 1 shows the costs associated with one shoreline treatment for one 10-acre pond, for three applications throughout the year, and for one additional whole-pond treatment.

The cost of a single shoreline treatment of copper sulfate on one 10-acre pond at 2005 prices is $250. This is not a task for unskilled workers. It takes two men about 2 hours to treat the pond. At $20/hr for each worker, that comes to $80 for the job. The tractor cost adds another $40, at $20/hr. Thus the total operating costs are $370 for one treatment of a 10-acre pond. The amortized fixed cost of the spray rig needed for the shoreline treatment is $450. Thus the total cost of one shoreline treatment one a 10-acre pond is $820. Three treatments per year would cost $1,560. Whole-pond treatments would cost $770/year more, for a total annual cost of $2,330/year for the 10-acre pond, or $233/acre/year.

The price of copper sulfate doubled in 2006. On the typical 10-acre pond costs increased to $1,070 for a shoreline treatment, $2,310 for three applications a year, and $3,580/year or $358/acre/year if a whole-pond treatment is needed in addition to the three shoreline treatments.

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Option 4: Treat with Hydrated Lime

Table 1 presents the costs of a single shoreline treatment and three treatments per year. The hydrated lime costs $380 and the labor, tractor, and spray rig costs are the same as those for copper sulfate treatments. The total cost of one shoreline treatment is $950 for the 10-acre pond and $1,950 for three applications per year ($195/acre/year).

Limitations: Copper Sulfate and Hydrated Lime

There are limitations to the use of both copper sulfate and hydrated lime. Both are toxic to fish in waters with low alkalinity. It is imperative to check alkalinity prior to treating with either chemical to ensure that it is safe. One farm lost 4,000 lb of broodstock following an application of copper sulfate because they did not first check the alkalinity.

Chemical treatments, especially the shoreline treatments, do not provide 100% control. Some ponds are re-infested quickly by snails not killed by the shoreline treatment or by snails that migrate in from elsewhere. It only takes a few snails and a few visits from pelicans to re-infect a pond. If chemical treatments are used ponds must be treated multiple times.

Stocking triploid black carp is the most cost-effective way to prevent decreased yields that can result from trematode infestations. It takes more time at harvest to manually remove the carp, but black carp provide long-term control at a modest cost. In the event of severe infestations of trematodes, it may be necessary to first treat with chemicals and then stock black carp for longer-term control.

Triploid black carp are an approved aquaculture species in Arkansas, but farms must first establish necessary precautions to prevent escape of the fish to the wild, and obtain a special permit from the Arkansas Game and Fish Commission. Screening both ends of pond drains is recommended, using a mesh size smaller than the smallest black carp. The discovery of black carp, even triploid fish, in natural waters may result in increased regulation, and perhaps prohibition of black carp for any purpose, effectively crippling the catfish industry with trematode infestations.

Hanson, T.R. and D.J. Wise. 2005. Economic analysis projects 10% loss to *Bolbophorus* trematodes in U.S. catfish industry. Global Aquaculture Advocate, December: 64-65.

Table 1. Costs of Treating Ponds with Copper Sulfate and Hydrated Lime (at 2005 prices)

Item	Copper sulfate					Hydrated lime		
	One time	Three applications	Whole pond	Yearly	Costs/acre/ year[d]	One time	Three applications	Costs/acre/ year
Chemical	$250	$750	$500	$1,250		$380	$1,140	
Labor[a]	$80	$240	$120	$360		$80	$240	
Tractor[b]	$40	$120	0	$120		$40	$120	
Boat	0	0	$150	$150		0	0	
Total variable costs	$370	$1,110	$770	$1,880		$500	$1,500	
Fixed costs[c]	$450	$450	0	$450		$450	$450	
TOTAL COST	$820	$1,560	$770	$2,330	$156	$950	$1,950	$195

[a]2 men for 2 hours at $20/hour. [b]2 hours at $20/hour. [c]Annual fixed cost of spray rig. [d]For 3 shoreline applications a year.

Table 2. Summary of Costs of Options for Treating Trematode Infestations

Option	Costs	
	10-acre pond per year	Per acre per year
Do nothing	$3,630 - $10,732	$363- $1,073
Stock black carp	$83	$8.30
Treat with copper sulfate[a]		
2005 prices	$1,560	$156
2006 prices	$2,310	$231
Treat with hydrated lime	$1,950	$195

[a]3 shoreline applications per year

Who is Watching Out for Your Aquaculture Business?

Andy Goodwin, Assistant Director, and Carole Engle, Director, UAPB Aquaculture/Fisheries Center

In the last five years, the aquaculture industry has been faced with one regulatory challenge after another. These have included the EPA and effluent regulations, the U.S. Fish and Wildlife Service and Asian carps, the USDA National Animal Identification System, the OIE guidelines for the shipping and slaughter of aquatic animals, APHIS efforts to control Spring Viremia of Carp Virus, and the new national Aquatic Animal Health Plan. In addition, well-organized environmental and animal rights groups have targeted aquaculture and have managed to impact public opinion. While these groups have primarily focused on Atlantic salmon, the scare tactics used are causing consumers to fear many aquaculture products. At the state and international levels, trade protectionism is a major force influencing exotic species and fish health regulations, and can severely limit your ability to ship fish. All of these initiatives have the potential to put significant new regulatory and financial burdens on fish farmers. Fortunately, there is a way to protect your business.

Federal agencies are legally bound to listen to their stakeholders and to address their concerns. New regulations must be scientifically justified and their economic impact weighed against their potential benefit. Thus, when agencies begin the planning for new regulations, they must include representatives of stakeholder groups in the process. For the aquaculture industry, the stakeholder groups involved are the National Aquaculture Association (NAA), species-specific national groups like the Catfish Farmers of America (CFA), the US Shellfish Association, the National Ornamental Goldfish Association, and the U.S. Trout Growers Association, and state and regional associations like the Arkansas Bait and Ornamental Fish Grower's Association (ABOFGA) and the Catfish Farmers of Arkansas (CFAR). By having a seat at the table, these organizations have a major influence on federal regulations and are able to insist that proposed regulations are rational, scientific, and not financially burdensome. They serve as the counterbalance to the influence of other groups also invited to the table – groups that would not be upset if commercial aquaculture ceased to exist. You probably owe the very existence of your business to the successful efforts of these industry associations.

The power and influence of aquaculture trade associations is directly related to the size of their membership. The bigger the association, the more stakeholders it represents and the more influence it has to negotiate. Equally important, larger numbers of dues-paying members are needed to support lobbying efforts and travel costs for representatives that must attend national meetings. To protect your industry and your business it is vital to join these organizations, pay your dues, and to participate in their efforts to respond to regulatory initiatives. As a baitfish or goldfish producer in Arkansas, you should belong to both the ABOFGA and the NAA. As a catfish farmer, the CFAR and CFA are most critical, but the NAA is also very important. Farmers producing other aquaculture products should belong to the NAA and a national species-specific association. Contact information for membership to these organizations is below. Join and make sure that your voice is heard, and respected during the next regulatory initiative.

Catfish Farmers of Arkansas (CFAR)
2705 Michelle Drive
Mena, AR 71953
Bo Collins, Executive Secretary
phone: (870) 672-1716
e-mail: cfarkansas@sbcglobal.net
web: www.cfarkansas.com

Arkansas Bait and Ornamental Fish Growers Association (ABOFGA)
P. O. Box 509
Lonoke, AR 72086
Eric Park, President
Phone - (501) 231-8607
Margie Saul, Secretary
Phone - (870) 998-2585
e-mail: margiesaul@centurytel.net

National Aquaculture Association (NAA)
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Web - www.catfishfarmersamerica.org

Upcoming Events

Aquatic Sciences Day
Fifth annual event promoting aquaculture and fisheries. High schools: please send students!
9:00 to noon, Thursday, September 21, 2006. Aquaculture and Fisheries Center, University of Arkansas at Pine Bluff, Pine Bluff, Arkansas. Cassandra Hawkins-Byrd (870) 575-8123

Aquaculture/Fisheries Field Day
Semi-annual event for commercial fish farmers. Keep up to date on Arkansas aquaculture.
8:30 to noon, Thursday, October 5, 2006. Aquaculture and Fisheries Center, University of Arkansas at Pine Bluff, Pine Bluff, Arkansas. Nathan Stone (870) 575-8138

Florida Aquaculture Association
Annual fall conference.
November 17-18, 2006. Hillsborough Community College, Brandon Campus (near Tampa), Florida. (863) 293-5710

U.S. Freshwater Prawn and Shrimp Growers Association
Annual meeting.
December 8-9, 2006, Radisson Hotel Opryland, Nashville, Tennessee. Dolores Fratesi (662) 390-3528

American Heartland Aquaculture Conference
Regional trade show and conference. January 19-20, 2007. Jointly sponsored by Illinois, Indiana, Kentucky, and Missouri aquaculture associations. Rend Lake Resort, Whittington, Illinois. Bart Hawcroft (573) 526-6666

Arkansas Aquaculture 2007
Annual educational meeting
January 25-27, 2007. Sponsored by the Catfish Farmers of Arkansas. Embassy Suites Hotel, Hot Springs, Arkansas. Bo Collins (870) 672-1716 or (479) 437-3081

Arkansas Bait and Ornamental Fish Producers
Annual educational meetings.
February 8, 2007. Sponsored by Arkansas Bait and Ornamental Fish Growers Association. Lonoke Community Center, Lonoke, Arkansas. Hugh Thomforde (501) 676-3124

Fish Farming Trade Show and Catfish Farmers of America
Annual convention and trade show.
February 15-17, 2007. First time joint event. Perdido Beach Resort, Orange Beach, Alabama. Sponsored by Catfish Farmers of Arkansas, Catfish Farmers of Mississippi, Alabama Catfish Producers and Louisiana Catfish Farmers Association. Mike McCall (601) 206-1600

Aquaculture America 2007
February 26-March 2, 2007. San Antonio, Texas. Early registration ends January 5, 2006. Sponsored by the U.S. Aquaculture Society and the National Aquaculture Association. (760) 751-5005

Farm Pond Website

Wes Neal, Assistant Professor, Small Impoundments

It takes careful planning and wise management to maintain high-quality fishing in a pond year after year. For about two years, the Cooperative Extension Program at UAPB has maintained a website that provides easy access to pond management expertise for anyone who has access to the internet. At this website you can find information on all aspects of pond management including construction, permits, stocking, management, species selection, fish identification, habitat, and vegetation control. You can also download publications and management resources and find information on fish suppliers near you. New information is added frequently. Recent additions include a farm pond management calendar, a guide to water analysis, and an online survey.

To access the website, follow the links on www.uaex.edu/aqfi or go directly to www.uaex.edu/wneal/pond_management. Then, use the menus to navigate to topics of interest. If you cannot find answers using the standard menu links, check the link entitled *Specific Topics* for additional links. If you still cannot find the information you need, send us an e-mail. Contact information is located at the bottom of the site's homepage. You will receive a quick response to your question, and the site will be updated for future users with similar questions.

Preparing for Electric Power Outages

Steeve Pomerleau, Extension Aquaculture Specialist

Adequate maintenance of electric boxes and aeration units can minimize the risk of power disruption caused by fire ant damage or faulty electric wiring. Although power outages are often outside farmers' control, there are things fish farmers can do to assist their electricity provider to restore service promptly following a power outage.

Verify and update the service location and contact information of your electric accounts. Electrical service on fish farms is often supplied through several different accounts, each supplying a different part of the farm. Each account should have a detailed description of the meter location. The service location is normally printed on the electric bill. Accounts providing power to fish ponds or hatcheries should have a service location such as *Fish Ponds* or F*ish Hatchery* followed by a description of the access roads. Here is an example: *Catfish Ponds 22-23-24-25, Hwy 7, two miles south of Hwy 9, Lake Village, AR 71653*. Such detailed information will help the power company locate the meter and restore service promptly. Verify the service location on your bills and contact the customer service department to offer more details.

It's wise to verify the contact name and phone number in the electric company files. Insist that they keep your account records up to date. You may need to report a power outage by that name and number, or the electric company may try to call you for additional information following the report of a power outage.

Keep a list of all your accounts in your vehicles. Farm managers, night employees on catfish farms, and other key individuals should keep a list of all the electrical account numbers, account names, service locations, and location numbers, along with the emergency phone number to report outages. Keep a laminated sheet with this information in all farm vehicles. With easy and fast access to the information, farmers can rapidly report power outages through the automated company phone system rather than through a representative. Precious time is lost searching for your account information on their computer.

Most information can be found on your electric bills. Note the location number. It may not be printed on the bills. The ten digit location number (*Map Location Number* or *Distribution Location Number*) may be found on a braded or white tab at the meter base or on the pole close to the meter. The location number helps service personnel locate the electric meter with GPS (Global Positioning System).

Report outages through the automated outage phone system. The fastest and easiest way to report a power outage and get it restored is to call the outage number and to use the automated phone system. The automated phone system will answer and give you instructions for reporting your outage. In most cases, you will be asked to dial or speak the account number. It is important to report *all* accounts that are out of service. As soon as the system registers your account numbers, central computers process the information, target the source of the outage, and automatically alert the closest repair technicians.

Reporting power outages through any other means often slows the whole service restoration process. Reporting a power outage by calling the local customer service office or the local repair technician at his house to explain everything does not speed up the process. Restoration will only begin after the account numbers are received by the computerized central processing unit.

Make a separate call for each account out of service (Customers of Entergy Arkansas). Depending on the source of the power outage, you may have more than one account on your farm out of service. Customers of Entergy Arkansas must make separate calls to the outage hotline for each account out of service. If you have ten accounts out of service, call 1-800-9OUTAGE ten times, entering each time a different account number. This allows Entergy's computers to pinpoint the source of the power outage and direct repair technicians to the critical locations.

Complete the *Critical Account Identification Process* form (Customers of Entergy Arkansas). Entergy Arkansas understands the severe implications of power outages on fish farms. They have developed a process to earmark commercial aquaculture accounts, and give them priority in service restoration. To identify critical fish farm accounts, fish farmers must complete the *Critical Account Identification Process* form. The form is available from the Catfish Farmers of Arkansas or UAPB fish disease diagnostic labs.

Column 1: Enter the name of the account as it appears on your bill.

Column 2: Enter the account number as it appears on your bill.

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COOPERATIVE EXTENSION SERVICE
U.S. DEPARTMENT OF AGRICULTURE
UNIVERSITY OF ARKANSAS
P.O. BOX 391
LITTLE ROCK, ARKANSAS 72203

OFFICIAL BUSINESS

NON-PROFIT ORGANIZATION
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PERMIT NO. 502

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Column 3: Enter the service location of the meter as it appears on your bill. The location of the meter should be as precise as possible to help Entergy personnel locate the meter in case of emergency.
Column 4: Enter the distribution location number. This is a ten digit number on a yellow or white tag on the pole close to the meter. This number helps Entergy personnel locate the meter with GPS (Global Positioning System).
Mail the completed form to Entergy Arkansas at the address specified. Keep copies of the completed form in the vehicles of farm managers and night employees.

Thanks to Entergy Arkansas and Craighead Electric Cooperative for comments and suggestions.

Every catfish farm depends on electricity.

Hugh Thomforde
Dr. Hugh Thomforde
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Technical Editor

County Extension Agent

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Layout and Design

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