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AQUAFARMING
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Goldfish for Long-term Biocontrol of Watermeal in Ponds

Hugh Thomforde
Extension Aquaculture Specialist, UAPB

Watermeal is a major nuisance aquatic plant that shades out its competition by covering the water surface. In recreational impoundments and farm ponds where watermeal persists, chemical control using fluridone has been found effective as a seasonal remedy, but it is very costly– upwards of $600 per acre per year.

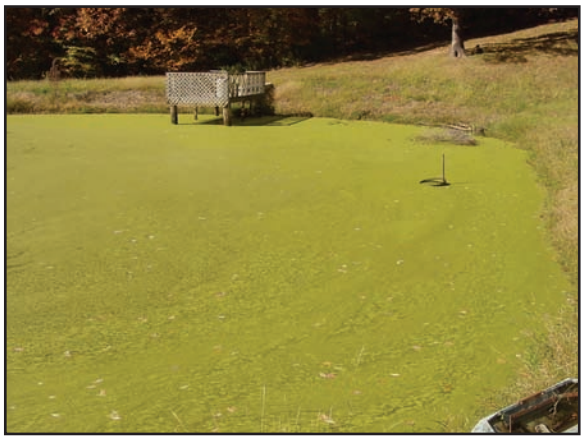
Unfortunately, reintroduction of watermeal following eradication is common. Watermeal readily adheres to the legs of wading birds and can easily be transported to a nearby pond. There is strong interest in treatments that are inexpensive and provide long-lasting control. Although grass carp provide excellent low-cost, long-term control of many common aquatic plants, they have very low preference for watermeal.

In 2004, researchers observed common goldfish in aquaria readily consumed watermeal. Furthermore, researchers noted that watermeal was never a problem in goldfish production ponds. In the fall of 2005 the first field trials of goldfish for biocontrol of watermeal began.

Over the next four years a total of 13 field trials were conducted in small impoundments. Goldfish were stocked at 35 or 65 pounds per acre in ponds located in seven counties throughout the Arkansas delta. Many were cattle-watering farm-ponds receiving high nutrient loads. All ponds were reported by owners to have watermeal continuously blanketing at least half the pond surface for more than a year, and during summer covering the whole surface under calm conditions.

Results from some ponds indicated that goldfish did not control watermeal. The main complicating factor was apparent disappearance of the goldfish. Several owners observed herons and cormorants preying on goldfish. Bass, 6-9 inches, were discovered in three ponds after stocking 3-inch goldfish. Assuming bass devoured the goldfish, additional 12-inch goldfish were stocked at the same pounds per acre, and apparently avoided predation by bass and provided acceptable long-term control of watermeal.

Results from five ponds stocked at 35 lb/acre and one stocked at 65 lb/acre indicate that 3-inch goldfish can provide long-term control of persistent, heavy infestations of water meal on small impoundments in Arkansas. A one-time stocking of goldfish at 35 lb/acre cost $250. This research indicates that goldfish are a low cost alternative for long-term control of watermeal in ponds.



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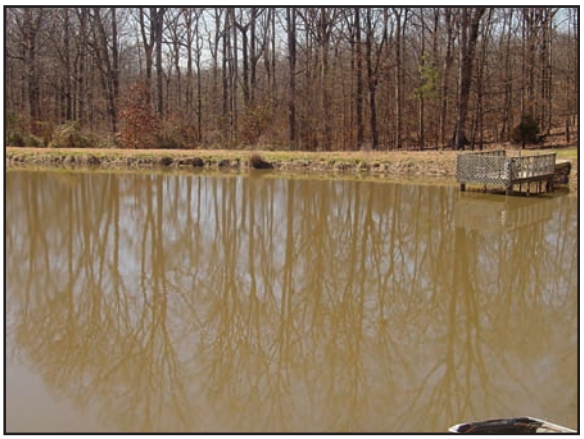

After

Upcoming Events

U.S. Prawn Growers 10th Annual Convention
December 2-3, 2011
Aquaculture Research Center, Kentucky State University, Frankfort, KY
Contact Dolores Fratesi for more information usprawngrowers@yahoo.com

Arkansas Bait and Ornamental Fish Growers Association
February 9, 2012
Lonoke Agriculture Center
Lonoke, AR
Annual educational meeting sponsored by Arkansas Bait and Ornamental Fish Growers Association. For information contact Sathya Kumaran at (501) 676-3124.

Aquaculture 2012
February 29 - March 2
Las Vegas, Nevada
The U.S. Aquaculture Society (formerly U.S. Chapter of WAS) joins with National Aquaculture Association and the U.S. Aquaculture Suppliers Association to produce the annual Aquaculture America meetings. For information contact the Conference Manager at (760) 751-5505.

Arkansas Sport Fish Supplier List to be Updated

Hugh Thomforde, Extension Aquaculture Specialist, UAPB

It is time to update the *Sportfish Suppliers List*. Do you sell live sport fish to the public? Would you like to be included in the next edition of the Arkansas Sport Fish Supplier List? If you would like to be included please fill out the form below and return it by Dec. 1, 2011. Please take a look at the 2008 edition of the Supplier List. It is available on the internet at: http://www.uaex.edu/aqfi/extension/weeds/pdf/Sport-Fish-Supplier-List-2008-1.pdf

Company Name:_____

Address: _____

_____

Contact person: _____

Phone_____ Fax _____

E-mail: _____

Website: _____

Hours and days of the week you are open for sales _____

_____

Types of fish available (largemouth bass, hybrid bream, etc.) _____

_____

Answer the following questions:

Do you require a minimum order? _____If so, please give details.

_____

_____

Do you supply plastic bags and oxygen? _____

Are you able to provide delivery to the client's pond? _____

Return this form by email, mail or fax to:
Hugh Thomforde,
UAPB Fish Diagnostic Lab,
P.O. Box 357,
Lonoke AR 72086,
fax: (501) 676-7847,
email: hthomforde@uaex.edu.

Stocking Fish in Farm Ponds

Anita M. Kelly, Extension Fish Health Specialist, UAPB (Lonoke)

One of the great things about owning a farm pond is that you can stock any combination of fish species you choose. The only drawback is that the results might not meet your expectations. For example, some pond owners like only catfish and bream in their ponds. The result, generally, is a pond full of small bream and very few bream of harvestable size. The bream will also compete with the catfish for food and the result can also be a stunted catfish population. The following is the basics of pond stocking including new or renovated ponds and old ponds that have fish populations already established.

A new or renovated (fish removed by draining or rotenone) pond lets you decide which species of fish to stock. But first you need to determine if the species you want will survive and grow in your pond. Obviously stocking trout in a pond where water temperatures can reach 80 degrees F or higher in the summer is not a good idea. The most recommended combination for good fishing in a farm pond is bass-bream-catfish (bream can be bluegill or bluegill and redear). This combination works well in ponds that are larger than 1-acre in size. Unfertile ponds can usually support about 50 to 150 lbs/acre of fish. Fertilizing fish ponds can increase fish production resulting in more and bigger fish if the pond is managed properly. However, if the pond is only fished occasionally, or not at all, there is little reason to fertilize the pond. Table 1 provides the recommended number of fish for each species to stock in ponds that are either fertilized or unfertilized.

Stocking a new pond with bream fingerlings in the fall and largemouth bass fingerlings the following spring will allow the bream to grow large enough that newly stocked bass cannot eat them. The bream will spawn the following spring providing food for the newly stocked largemouth bass. Channel catfish and grass carp can be stocked in fall or spring, but they need to be stocked before the bass get big enough to eat them.

If you are itching to go fishing, then you might want to consider stocking larger or adult fish. However, the stocking strategy is different – fewer fish are stocked and supplemental forage must be supplied for largemouth bass (Table 2). In the spring, stock bass and bream at the same time. Add 2 to 3 lbs of fathead minnow per acre as a food source for the bass. Channel catfish can also be stocked at the same time as the bass and bream but must be at least 6-8 inches to avoid being eaten by bass.

For older ponds that have fish populations already in them, the stocking is not as straight forward as with a new pond. Ponds that are in balance generally do not need more bass or bream stocked into them. The first thing you should do is determine if your pond is in "balance." This can be done by fishing for large and small bluegill and largemouth bass and keeping track of what you caught. You can then compare what you caught with Table 3 to determine if you need to make adjustments in the largemouth bass or bluegill populations.

Another method is to capture some of the smaller fish using a 20 ft seine that is 4-5 ft deep with 3/8-inch mesh. Make 3-4 seine hauls off shore in several locations and compare what you captured with Table 3. The best time to sample fish is after the largemouth bass and bluegill have spawned, which would be mid-May to late June.

So what do you do if your pond is not in balance? For bass crowded ponds remove approximately 35 lbs of fish per acre in a single year. Thinning the largemouth bass population will increase the food supply for the remaining bass resulting in an increase in size. Bluegill crowded ponds are harder to bring into balance. You may be able to correct the situation by using one of the following methods:

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Table 1. Species selection and stocking rates (fingerlings/acre) for largemouth bass-bream-catfish fisheries in farm ponds.

Pond Type	Largemouth bass	Bluegill*	Redear Sunfish	Channel Catfish	Grass carp
Unfertilized	50	400	100	100	5
Fertilized	100	800	200	200	5

*If stocking bluegill only increase number to include redear stocking numbers.

Table 2. Adult stocking recommendations (fish/acre) for new or renovated ponds.

Species	Number per acre	Size (inches)
Largemouth Bass	20	8 to 14
Bluegill and Redear Sunfish	70 30	3 to 5 3 to 5
Channel catfish	100 if unfertilized 200 if fertilized or fed	6 to 8

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1. Harvest as many bluegill from the pond as possible. This includes angling and using a seine to catch and remove small bluegill.
2. Lower the water level in the pond to one-half of the original volume. This will crowd the bluegill making it easier for the largemouth bass to eat them. Lower the water level in the late summer or fall.
3. Stock 20-30 adult (8-12 inch) largemouth bass per acre. They will eat the bluegill and reduce their population numbers.
4. If none of the above work, then a complete renovation of the pond may be necessary. This would require the pond to be drained and all the fish harvested or killed. Refill the pond and stock according to the guidelines for new ponds.

For more detailed information on stocking your pond, or if you are interested in alternative species for stocking check out the UAPB cooperative extension publications Farm Pond Management for Recreational Fishing (MP360) and Recreational Fishing in Small Impoundments: Alternative Management Options (MP447).

Table 3. Fish population status based on seine and angler catch data.

Population Status	Seine Data	Angler Data
Balanced pond population	Many recently hatched bluegill less than 2 inches; some intermediate (2-4 inch) bluegill; some recently hatched largemouth bass (1-4 inches)	Largemouth bass and bluegill of various sizes
Bluegill crowded	Very few or no recently hatched bluegill; many intermediate size bluegill; no recently hatched largemouth bass	Largemouth bass catch is low and only larger fish (15 inches and longer) are caught; few harvestable size bluegill (6 inches or longer)
Bass crowded	Many recently hatched bluegill; very few or no intermediate size bluegill; very few or no recently hatched largemouth bass	Largemouth bass numerous but small and often thin (12 inches or less); bluegill few but large and robust (8 inches and longer)

Supplemental Feeds – A Better Option for Baitfish?

Rebecca Lochmann, Professor-Fish Nutrition/Feeds, UAPB and Harold Phillips, Research Specialist-Fish Nutrition/Feeds, UAPB

Alternative diets for foodfish are becoming more common due to the high costs of traditional diet ingredients like fish meal and soybean meal. Alternative diets for foodfish could be beneficial for baitfish, but other feeds may be more appropriate and cost-effective for baitfish. Unlike foodfish, baitfish consume a considerable amount of natural foods even in intensive culture. Therefore, they may do well on feeds that are not nutritionally complete, but maximize the use of nutrients in natural foods. These formulas are called "supplemental" feeds. Supplemental feeds are usually lower in protein and micronutrients (such as vitamins and minerals), but may be higher in energy sources such as fat.

Past research indicates that high-fat diets can improve the growth, survival and feed efficiency of baitfish, as well as make them "plumper." Reserves of body fat may be helpful during holding, transport, or retail display when fish are not fed. High-fat diets were commercially available for awhile, but the protein level was the same as other diets (28 or 32%), so the higher fat content made the diets more expensive. This may be why high-fat diets were not widely adopted by the baitfish industry.

However, the diets used in the research also contained only 24% protein and no added vitamins and minerals. These would be considered "supplemental" feeds. The high performance of the baitfish on these diets was probably due to the fat meeting the energy needs of the fish, so that the protein in the natural foods could be used for growth ("protein-sparing" effect). In addition, the fish apparently obtained essential vitamins and minerals from the natural foods, because the diets did not contain the amounts needed by most fish.

There is other evidence that lower-protein diets might be effective for baitfish production. A pond study with golden shiners fed diets with 22 or 28% protein showed that growth was higher in fish fed the 28% diet at four weeks. However, by 10 weeks there were no differences in weight gain, feed conversion, or yield of fish on the different diets.

Taken together, the results indicate that diets with lower protein (22-24%), higher fat (9-13%), and fewer added vitamins and minerals have the potential to support production of baitfish at a lower cost than traditional or alternative diets designed for foodfish.

Ideally, supplemental feeds could be used to minimize growth of baitfish once they reach market size without compromising health or survival. Additional research is needed to test the effects of supplemental diets in baitfish, because the earlier studies did not include any specific measures of health status. Proteins, vitamins, and minerals are critical not only for growth, but for enzyme function, immune response, and overall health.

Go Ahead and Harvest Some Fish!

Nathan Stone, Extension Specialist/Section Leader-Aquaculture, UAPB

Typical fish stocking recommendations for farm ponds call for a mix of largemouth bass and bream (bluegill and redear), and also some channel catfish, if desired. The joint UAPB Cooperative Extension and Arkansas Game and Fish Commission publication MP360, Farm Pond Management for Recreational Fishing (Goodwin et al. 2004), provides specific stocking recommendations based on pond fertility. Generally, in ponds stocked and managed in accordance with these recommendations, the combination of largemouth bass and bream will provide satisfactory (in relation to pond fertility) harvests of these species each year.

Increasingly, we are finding that pond owners do not harvest fish, or practice catch-and-release. However, some harvest of fish is necessary in order to maintain a balanced population of bass and bream. Lack of harvest is likely to result in poor fishing in the future. Swingle and Smith at Alabama Polytechnic Institute (now Auburn University) conducted years of research on various combinations of fish species, and developed the recommendations that we use today. Swingle (1950) stated that "failure to harvest the adult bluegills in bluegill-largemouth bass combinations repeatedly has been found to reduce greatly the production of young bluegills and subsequently reduced the production of bass." He also made clear that failure to harvest bass reduced the growth and survival of young-of-the-year bass and caused large bass to lose weight or condition. In the absence of harvest by fishing, fish will still die from natural causes. Harvesting reduces, to some degree, the loss of fish to natural causes. More importantly, it frees up a greater share of the natural foods so that the remaining fish can grow and reproduce.

For fertile ponds, harvest 10 to 15 pounds of bass per acre each year. A good strategy is to harvest only bass less than 13" in length and bass larger than 16", and to return bass that are between 13" and 16" in length back to the pond. These bass will prey heavily on small bream, reducing their numbers and resulting in larger sized bream. Bream can be harvested as desired; while it is possible to over-fish bream, harvesting 50 to 100 pounds per acre of adult bream each year should increase bream reproduction and result in improved bass growth and condition.

Catfish compete to some degree with other stocked fish, but at the recommended stocking rates of 50 – 100 catfish/acre, this is normally not a major concern if catfish are harvested once they reach eating size. However, if catfish are left to grow to 5 or 10 pounds apiece, the natural foods necessary to sustain this biomass of catfish will likely reduce growth and production of both bream and bass.

The one exception to the benefits of annual harvest is newly-stocked ponds. Bass should not be harvested for the first two to three years after stocking, to let the bass spawn and to build up the population.

Goodwin, A., J. Jackson, N. Stone, T. Burnley, J. Farwick and M. Armstrong. 2004. Farm pond management for recreational fishing. MP360, Cooperative Extension Program, University of Arkansas at Pine Bluff.

Swingle, H. S. 1950. Relationships and dynamics of balanced and unbalanced fish populations. Bulletin No. 274, Agricultural Experiment Station, Alabama Polytechnic Institute, Auburn, AL. Available on-line through Auburn University at:
http://www.aaes.auburn.edu/comm/pubs/bulletins/bull274/index.htm

Two New Herbicides Receive Labels for Use in Arkansas Ponds

George Selden, Extension Specialist-Aquaculture/Diagnostics, UAPB (Newport)

In the past three months, Valent Professional Products has received national and Arkansas labels for two new aquatic herbicides. They are Clipper, with the active ingredient flumioxazin, and Tradewind, which contains bispyribac-sodium as an active ingredient.

Clipper is a broad spectrum contact herbicide which works by inhibiting an enzyme required for photosynthesis. As such, it needs sunlight to work. It is supposed to be effective against a wide variety of aquatic weeds that can be a problem in Arkansas. Examples include alligator weed, water pennywort, filamentous algae including pithophora, duckweed, southern naiad and variable lead pondweed. The label contains specific instructions on application method depending upon target plant.

Clipper is a water dispersible granule which is mixed with water. In some instances, enhanced effectiveness against some weeds (including pithophora) can be achieved with tank mixing with diquat. Clipper is very sensitive to the receiving water pH. At low pH the active ingredient flumioxazin can be active up to five days, at pH 7.5-8.0 it has a half-life of one to two days, but at pH above 9, it can break down in as little as 20-25 minutes. As such, its use is not advised at water pH greater than 8.5.

Clipper needs a contact time of one to four hours for maximum absorption. Clipper has no water use restrictions with the exception of irrigation, which is five days, and it is not to be used in water used for crawfish farming.

In Arkansas, Clipper will be priced at approximately $130/lb in 5lb bottles. Its labeled use rates are 100-400 ppb, which equates to 0.53-2.1 lbs/acre/ft. At the 100 ppb use rate, it will cost approximately $69/acre/ft.

Tradewind is a systemic herbicide that works by inhibiting acetolactate synthase (ALS), a key enzyme in the biosynthesis of the branched-chain amino acids. In that regard, it has a similar mode of action to imazamox (Clearcast) and penoxsulam (Galleon).

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Similar to other ALS inhibitors, it is very slow acting, requiring 60-90 days for maximum effectiveness when applied to floating/emergent plants. When applied for control of submersed weeds, applications should be a minimum of 30 days apart.

Tradewind can be applied as a foliar and/or surface spray on floating or emergent vegetation and injected in the water for submersed weeds. It is supposed to be effective against common floating and emergent plants like alligatorweed, duckweed, parrotfeather and water pennywort, and problematic submersed weeds like sago pondweed and hydrilla. It can be mixed with 2,4-D, diquat, or any other registered foliar applied aquatic herbicide for enhanced control of floating or emergent weeds.

Similar too many ALS inhibiting, systemic herbicides, Tradewind is effective at low concentrations (20-45 ppb) and has a long residual activity. This is reflected in its use restrictions. Water treated with Tradewind is not to be used for crop irrigation or watering livestock until analyzed levels are below 1ppb. The half-life of bispyribac-sodium in an aqueous environment is very variable, but in some mesocosm studies, it was approximately 15-20 days. It is also not to be applied to water used for crayfish farming. There are not restrictions for water used for drinking or recreation.

Tradewind will be sold in a pack of four 8-ounce water soluble packets. Labeled rates for a surface application are 1-2oz/acre, and for subsurface application they typically range from 1.1-2.4 oz/acre/ft. At this time, the price is unknown.

With the addition of these two new herbicides, that brings to 14 the number of active ingredients labeled for use in aquatic environment, eight in the past nine years. With the addition of new herbicides with differing modes of action, anyone attempting to manage nuisance aquatic weeds now has more tools to choose from for better control options, and an enhanced ability to prevent the development of resistant plant strains.

Excessive Heat and Assistance Programs Available

Anita M. Kelly, Extension Fish Health Specialist, UAPB (Lonoke)

The Emergency Assistance for Livestock, Honey Bees and Farm-Raised Fish Program (ELAP), established by the 2008 Farm Bill, is intended to provide emergency assistance to eligible producers of livestock, honeybees and farm-raised fish that have losses due to disease, adverse weather or other conditions, including losses due to blizzards and wildfires.

ELAP covers losses occurring on or after Jan. 1, 2008 and before Oct. 1, 2011 that are not covered under other Supplemental Agricultural Disaster Assistance Payment programs established by the 2008 Farm Bill, specifically Livestock Forage Disaster Program (LFP), Livestock Indemnity Program (LIP) and Supplemental Revenue Assistance Payments Program (SURE). The ELAP program is limited to a total of $50 million in payments per year. That means if successful applications totaled more than $50 million, beneficiaries would receive only a percentage of the loss.

To be eligible for ELAP benefits for farm-raised fish death losses, the farm-raised fish must:

- Be bait or game fish that are propagated and reared in a controlled environment;
- Been maintained for commercial use as part of a farming operation;
- Have died as a direct result of an eligible adverse weather or loss condition; and
- Been physically located in the county where the eligible adverse weather or loss condition occurred on the beginning date of the eligible adverse weather or loss condition.

To be eligible for ELAP benefits for farm-raised fish losses, the loss must be due to the direct result of an eligible adverse weather or loss condition, including but not limited to, contaminated water (death losses only), earthquakes, excessive heat (death losses only), excessive winds, flooding, hurricanes, tidal surge, tornadoes and volcanic eruption.

Feed losses are also covered under ELAP. ELAP payments for eligible farm-raised fish feed losses are based on 60 percent of the actual cost of purchased or harvested feed that was intended as feed for eligible farm-raised fish and was damaged because of an eligible adverse weather or loss condition in the calendar year in which the loss occurred.

To qualify for the ELAP, producers must meet the risk management purchase requirement by either obtaining a policy or plan of insurance, under the Federal Crop Insurance Act or Non Insured Crop Assistance Disaster Assistance Program (NAP) coverage.

To apply for ELAP benefits, producers who suffered farm-raised fish losses should submit a notice of loss to the local FSA service center that maintains the farm records for their business. Producers need to notify the FSA office within 30 days of the loss becoming apparent. Formal applications are due by Jan. 30, 2012.

NAP (Noninsured Crop Disaster Assistance Program) Coverage is available for catfish under this program. NAP eligible aquacultural species only include:

- Any species of aquatic organisms grown as food for human consumption as determined by Commodity Credit Corporation.
- Fish raised as feed for other fish that are consumed by humans; and
- Ornamental fish propagated and reared in an aquatic medium.

Coverage for 2011 crop year (Oct. 1, 2010-Sept. 30, 2011) must have been purchased no later than Sept. 1, 2010.

To qualify for these programs you must also register with the FSA office by Sept. 30, 2011. If you have questions or need further information, contact Carroll Brown or Tony Franco for NAP and ELAP Programs and the Production Adjustment/Compliance/GIS Division for the SURE Program. The Arkansas State FSA Office phone number is 501-301-3052.

Dog Food for Catfish?

Rebecca Lochmann, Professor-Fish Nutrition/Feeds, UAPB and Harold Phillips, Research Specialist-Fish Nutrition/Feeds, UAPB

High feed costs are a problem not only for commercial aquaculture, but for recreational pond owners as well. When a farm pond contains several hundred fish there is less natural foods (plankton, insects) per fish compared to when there are fewer fish. Farm ponds stocked at high densities require some type of fertilization or for fish to be fed in order to maintain their populations. Some farm pond owners like to fed their fish and observe them. Some pond owners use dog food for their fish, but is this a good practice?

Fish feeds vary in quality and price, but even the "budget" feeds can cost twice as much as other feeds like dog food. A 28%-protein catfish feed made with ingredients like corn gluten feed is an example of a low-cost ($30/bag) fish feed. A budget dog food may cost $15/bag, and it also contains more plant products than a premium dog food. The basic nutritional value of these feeds is compared below:

Ingredient	Fish eed F	Dog Food
Crude Protein (%, min.)	28.0	21.0
Crude Fat (%, min.)	4.5	8.0
Crude Fiber (%, max.)	8.0	4.0
Linoleic Acid* (%, min.)	not listed	1.5
Vitamin C (ppt)	1.0	25.0

* Linoleic acid is an essential fat. Abbeviations are: min. (minimum); max. (maximum); ppt (parts per thousand).

One of the main differences between fish and dog foods is that fish feeds are higher in protein. Fish feeds cost more because protein is the most expensive part of feed. Protein quickly affects growth, and young fish need more protein than older fish. However, when fish are first stocked they may be able to get some protein from the plankton (tiny plants and animals in the pond). Larger fish (that are not spawning) need less protein because they are growing more slowly. Nevertheless, a fish food may produce faster growth than a dog food, unless there is sufficient natural food to supply protein.

The utility of a feed for a farm pond depends partly on the fish population (types of fish, density, age and size). One scenario is a pond stocked with 400 catfish, and 200 bream (half of them hybrids). To avoid stunting, enough food must be available for all of the fish (from feed and natural foods) to grow normally. If faster growth of the fish is a priority, then better results may be obtained with fish diets that supply more protein and other nutrients. However, if natural foods (such as minnows) are available and the feed is just an extra source of energy, then a cheaper feed could give good results. For instance, if maintenance (of fish weight and health) is the main goal, then cheaper feeds (like dog food) may be a realistic option.

Commercial feeds also have properties besides nutrition that could affect their use. For instance, if a large-kibble dog food is used, small fish may not be able to eat it. Bream have very small mouths, and newly stocked fish may not be able to eat anything larger than 1/8-inch wide. The stability of the pellet (how long it stays intact in the water) could also affect feeding. Large, stable pellets would be eaten mostly by larger fish, but unstable pellets could break apart faster and provide smaller particles for smaller fish. Eventually, any pellet will break up over time and can serve as a fertilizer to stimulate plankton.

Single ingredients (like corn or cottonseed meal) are even cheaper than dog food. However, these products lack nutrients that fish require and will act mainly as fertilizers for plankton. Small fish can feed on plankton, but it is not an adequate food for larger juveniles and adults.

Ultimately, the choice of a feed to use in a farm pond depends on the financial situation and goals of the individual owner, the density and sizes of fish in the pond, and the natural foods (plankton, minnows) that could reduce the need to use a high-cost feed.

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UAPB Hosts Aquatic Sciences Day

Anita M. Kelly, Extension Fish Health Specialist, UAPB (Lonoke)

More than 600 students from 17 Arkansas schools participated in Aquatic Sciences Day at the University of Arkansas at Pine Bluff's Aquaculture Research Station. Hosted by UAPB's Aquaculture/Fisheries Center, the annual event introduces high school students to aquaculture and fisheries and provides career and educational information.

Students, teachers and chaperones moved between 21 interactive outdoor learning stations manned by UAPB professors, Extension specialists, students and staff as well as Arkansas Game and Fish Commission employees. The stations included information on aquatic weeds, aquaponics, collecting fish in the wild, harvesting and feeding fish, and about paddlefish and other large river fish to name just a few. They were introduced to marine aquaculture with a station on marine oysters. They also were provided the real reason for the fish and bird kills that occurred over the past winter.

For more information about Aquatic Sciences Day or to be put on the mailing list for information about next year's event, contact Casandra Hawkins-Byrd at (870) 575-8123 or email cbyrd@uaex.edu.

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The purpose is to advance aquaculture production in Arkansas by providing reliable, practical, timely information.