KENTUCKY
AQUATIC FARMING

A Newsletter for Kentuckians Interested in Improving Fish and Shellfish Production, and Pond Management.

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INSIDE . . .

Aquaculture Program
Kentucky State University
www.KSUAquaculture.org

FEDERAL ORDER

Viral Hemorrhagic Septicemia (VHS)

The purpose of this Federal Order is to prevent the spread of viral hemorrhagic septicemia (VHS) into aquaculture facilities. This order is issued pursuant to the Animal Health Protection Act (AHPA). The AHPA authorizes the Secretary of Agriculture to prohibit or restrict the importation or movement in interstate commerce of any animal, article, or means of conveyance if the Secretary determines that the prohibition or restriction is necessary to prevent the introduction or dissemination of any pest or disease of livestock into or within the United States.

Due to outbreaks of VHS, the Administrator of the Animal and Plant Health Inspection Service (APHIS) has determined that it is necessary, in order to prevent the spread of VHS into aquaculture facilities, to prohibit the importation of certain species of live fish from two Canadian Provinces into the United States and the interstate movement of the same species of live fish from the eight States bordering the Great Lakes as described in this Order.

(a) Prohibited International Areas:
Effective immediately, the importation of certain species of live fish into the United States from the Canadian Provinces of Ontario and Quebec is prohibited. The Administrator may also designate other countries or portions thereof as prohibited areas under this Order. Thereafter, the importation into the United States of any regulated species of live fish (as specified below) from an area designated as a prohibited area will be subject to this Order.

(b) Prohibited Domestic Areas:
Effective immediately, the interstate movement of certain species of live fish from specified areas in the United States is prohibited. The Administrator may also designate other States or portions thereof as prohibited areas under this Order. Thereafter, the interstate movement of any regulated species of live fish (as specified below) from an area designated as a prohibited area will be subject to this Order. The following States are designated as prohibited domestic areas: Illinois, Indiana, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin.

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KENTUCKY STATE UNIVERSITY/UNIVERSITY OF KENTUCKY
U.S.D.A. COOPERATIVE EXTENSION SYSTEM AND KENTUCKY COUNTIES COOPERATING

FEDERAL ORDER
Viral Hemorrhagic Septicemia (VHS)
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(c) Regulated Species of Live Fish:

The following are regulated species of live fish:

Atlantic cod *Gadus morhua*
Black crappie *Pomoxis nigromaculatus*
Bluegill *Lepomis macrochirus*
Bluntnose minnow *Pimephales notatus*
Brown bullhead *Ictalurus nebulosus*
Brown trout *Salmo trutta*
Burbot *Lota lota*
Channel catfish *Ictalurus punctatus*
Chinook salmon *Oncorhynchus tshawytscha*
Coho salmon *Oncorhynchus kisutch*
Chum salmon *Oncorhynchus keta*
Emerald shiner *Notropis atherinoides*
Freshwater drum *Aplodinotus grunniens*
Gizzard shad *Dorosoma cepedianum*
Grayling *Thymallus thymallus*
Haddock *Gadus aeglefinus*
Herring *Clupea* spp.
Japanese flounder *Paralichthys olivaceus*
Largemouth bass *Micropterus salmoides*
Muskellunge *Esox masquinongy*
Pacific cod *Gadus macrocephalus*
Pike *Esox lucius*
Pink salmon *Onchorhynchus gorbuscha*
Pumpkinseed *Lepomis gibbosus*
Rainbow trout *Oncorhynchus mykiss*
Redhorse sucker *Moxostoma* spp.
Rock bass *Ambloplites rupestris*
Rockling *Onos mustelus*
Round goby *Neogobius melanostomus*
Smallmouth bass *Micropterus dolomieu*
Sprat *Sprattus* spp.
Turbot *Scophthalmus maximus*
Walleye *Sander vitreus*
White bass *Morone chrysops*
White perch *Morone americana*
Whitefish *Coregonus* spp.
Yellow perch *Perca flavescens*

If other species are identified as VHS susceptible, the Administrator will amend this list of regulated species and will specify the regulated species of live fish on the APHIS Web site at www.aphis.usda.gov/vs/aqua/.

APHIS Factsheet

Veterinary Services

November 2006

Q. *What is VHS?*
A. VHS is a highly contagious pathogen of fresh and saltwater fish. It causes clinical signs including internal hemorrhaging and death in susceptible species. Some fish will show no external signs while others show signs including bulging eyes, bloated abdomens, inactive or overactive behavior, and hemorrhaging in the eyes, skin, gills and at the base of the fins. Infected fish may also have lesions that look like those caused by other fish diseases. Therefore, testing is necessary to determine whether fish are infected. VHS has been reported in several of the Great Lakes and related tributaries where a number of large-scale die-offs of wild fish have occurred. The disease does not pose a risk to people, but the VHS virus has been found to infect at least 37 fish species.

Q. *How did VHS arrive in the Great Lakes area?*
A. It is not known how the disease arrived in the Great Lakes area. In the past, VHS was thought to be a concern only for trout and a few other freshwater fish raised for commercial aquaculture in Europe. The disease was first detected in Lake Ontario in 2005 and has since been detected in Lake St. Clair, Lake Erie and the St. Lawrence River, as well as Conesus Lake. As a result of additional research, we now know that the disease was present in Lake St. Clair as early as 2003. Before being detected in the Great Lakes area, VHS was limited in North America to saltwater finfish from the Atlantic and Pacific oceans. The recent outbreak in the Great Lakes region appears to be a new strain of the virus. This new strain is responsible for die-offs in many freshwater species.

Q. *What initial action did the U.S. Department of Agriculture (USDA) take in response to this disease threat?*
A. On Oct. 24, 2006, USDA's Animal and Plant Health Inspection Service (APHIS) issued an emergency order prohibiting the importation of 37 species of live fish from two Canadian provinces into the United States and the interstate movement of the same species from the eight States bordering the Great Lakes. The emergency order was issued in response to the rapid spread of VHS in the Great Lakes region. In addition, the Great Lakes strain of the virus impacts a greater number of fish species.

Q. *Why did USDA revise the initial Federal Order?*
A. Following the release of this emergency order, APHIS held a two-day meeting to discuss VHS and the development of a Federal regulatory program. During this meeting, APHIS received several recommendations from participants regarding modifications to the Federal Order that could be made to alleviate impacts on industry and related businesses in the Great Lakes region while still protecting against the spread of VHS. On Nov. 14, 2006, APHIS modified the Federal Order to allow live fish of

VHS-susceptible species to move from the eight States bordering the Great Lakes provided that certain conditions are met. With the exception of salmonids, the movement of VHS-susceptible species from Quebec and Ontario, Canada into the United States remains prohibited under the Federal Order.

Q. *Has VHS been found in commercially raised fish in the United States?*
A. No. Detections of VHS have been limited in North America to the wild ocean-going and freshwater fish. The goal of the Federal Order is to prevent the spread of the disease to aquaculture facilities.

Q. *What States are included in the amended Federal Order and why?*
A. The following States are included in the Federal Order: Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin. The States of New York, Pennsylvania, Michigan and Ohio have experienced fish die offs due to VHS. While such die offs have not been observed in Illinois, Indiana, Minnesota and Wisconsin, these States are considered to be at-risk of having the disease because they too are part of the Great Lakes watershed and unimpeded natural fish movements between these bodies of water can spread the disease. Entire States rather than watersheds are included in the Federal Order because of the unrestricted intrastate movement of fish through human activity. Future surveillance may be able to more closely delineate the presence of VHS in specific areas.

Q. *Why is the Federal Order necessary?*
A. The goal of the Federal Order is to prevent the spread of VHS into aquaculture facilities while also preventing the spread of the disease from the Great Lakes area to uninfected bodies of water. APHIS will continue to gather more information about the disease in order to provide the best possible protection against VHS.

Q. *Is APHIS going to follow the Federal Order with official rulemaking?*
A. Yes. APHIS will be drafting an interim rule to further address the international and domestic movement of VHS-susceptible fish. The rule will be published in the Federal Register along with a notice for public comment. The Federal Order will remain in effect until the interim rule is published in the Federal Register.

Q. *Do the requirements in the Federal Order only apply to live fish?*
A. Yes. Fertilized eggs or other gametes, dead fish, and tissues (organs, blood, scales, etc.) are not covered under the Federal Order and may continue to move to diagnostic labs or in commerce.

Q. *What conditions must be met under the Federal Order to move live VHS-susceptible species interstate for slaughter?*
A. In order for live VHS-susceptible species to move interstate for slaughter, the fish must be:

- Intended for human consumption.
- Transported to a state-inspected slaughter facility that discharges waste water into a municipal sewage system that includes waste water treatment. As an alternative, the facility can also dispose of waste water in a non-discharging, settling pond or a settling pond with disinfection according to Environmental Protection Agency (EPA) and state requirements. Offal, including carcasses, from the slaughter facility must be either rendered or composted.
- Accompanied by the proper USDA documentation (VS form 1-27) for the movement of restricted animals if not tested for VHS.

Q. *What is a settling pond with disinfection?*
A. A settling pond is one of several ways a slaughter facility or processing plant can remove waste water. No all settling ponds incorporate a disinfection process. State agencies overseeing slaughter plants ensure that the disinfection process meets applicable Environmental Protection Agency and State regulatory standards.

Q. *What conditions must be met under the Federal Order to move live VHS-susceptible fish for research and testing?*
A. In order for live VHS-susceptible species to move to research and diagnostic laboratories, the fish must be:

- Accompanied by the proper USDA documentation (VS form 1-27) for the movement of restricted animals stating the fish are destined for a research or diagnostic laboratory. The laboratory must be approved by State, Tribal or Federal authorities for aquatic animal health.
- Received at a facility where waste fluids and carcasses are considered medical waste and disposed of according to EPA and State requirements.

Q. *Where can producers get a VS form 1-27?*
A. VS form 1-27 is available through APHIS' Veterinary Services' (VS) area offices. A list of the area offices is available at www.aphis.usda.gov/vs/area_offices.htm. Please contact the area office in your State, and staff will complete the form for you, sign it and provide you with a copy to accompany your shipment.

Q. What conditions must be met under the Federal Order to move live VHS-susceptible species for purposes other than slaughter, research or diagnostics?
A. In order to move live VHS-susceptible species for purposes other than slaughter, research or diagnostics, the fish must be transported with documentation from appropriate State, Tribal, or Federal authorities for aquatic animal health stating that the fish have tested negative for the VHS virus under existing national and international standards specified in the Federal Order. National standards for testing are detailed in the American Fisheries Society Suggested Procedures for the Detection and Identification of Certain Finfish and Shellfish Pathogens also referred to as the AFS Blue Book. The blue book is available online at www.fisheries.org/fhs. International standards for testing are included in the World

Organization for Animal Health (OIE) Manual of Diagnostic Tests for Aquatic Animals, which is available online at www.oie.int/eng/normes/fmanual/A_00022.htm.

Q. *Does this mean that live fish can move interstate from the 8 States included in the Federal Order if they test negative for VHS?*
A. Live fish can move interstate if they test negative for VHS and are accompanied by documentation from the appropriate State, Tribal or Federal authority for aquatic animal health. This documentation ensures that all testing is conducted in accordance with the Federal Order at an approved State, Tribal or Federal laboratory.

Q. What type of documentation is required?
A. The appropriate documentation is determined by the competent State, Tribal or Federal authority for aquatic animal health. It could be a letter, health certificate or permit depending on individual State, Tribal or Federal requirements.

Q. *What is a competent authority for aquatic animal health?*
A. A competent authority is defined as the State, Tribal or Federal Agency that has jurisdiction over aquatic animal health. It is recommended that producers contact their State aquaculture coordinator for more information. A list of State aquaculture coordinators can be found at www.aphis.usda.gov/vs/aqua/ under General Information.

Q. *Who determines whether the testing meets national and international standards?*
A. The appropriate State, Tribal or Federal competent authority in the originating jurisdiction will make that determination.

Q. *Do all species of fish need to be tested for VHS?*
A. No. Only live VHS-susceptible species originating from the 8 States included in the Federal Order need to be tested before moving interstate. The list of VHS susceptible species included in the Federal Order can be found at: www.aphis.usda.gov/vs/aqua/. This list may be updated as our knowledge of species susceptibility increases.

Q. *Is testing farm based or fish-lot based?*
A. The State, Tribal or Federal competent authority for aquatic animal health in the originating jurisdiction will make that determination.

Q. *How can producers find approved laboratories for VHS testing?*
A. APHIS recommends that producers contact their State or Tribal competent authority for aquatic animal health. The appropriate authority will determine which laboratories are approved to test for VHS. These laboratories may include State, Federal and University labs.

Q. *How can producers find aquatic animal health professionals to collect samples for VHS testing?*
A. APHIS recommends that producers contact their State aquaculture coordinator to provide assistance in locating an aquatic animal health professional. A list of State aquaculture coordinators can be found at www.aphis.usda.gov/vs/aqua/ under General Information.

Q. *Does the Federal Order have any implications for the 42 States not included in the emergency action?*
A. States not included in the Federal Order can continue to move live VHS-susceptible fish species with out restriction. In addition, fish originating in States not included in the Federal order can transit the affected Great Lakes States without oversight.

Q. *Do any requirements other than those included in the Federal Order need to be met to move live VHS-susceptible species interstate?*
A. Yes. In addition to the Federal Order, producers need to meet their existing State requirements as well as any requirements stipulated by the receiving State.

Q. *Can live VHS-susceptible fish be imported into the United States from Canada?*
A. VHS-susceptible fish from all Canadian provinces except Ontario and Quebec can continue to move in U.S. commerce without restriction. With the exception of salmonids, all live VHS-susceptible species from Ontario and Quebec are prohibited from entering the United States at this time. VHS-susceptible species of salmonid fish may enter the United States from Ontario and Quebec only if they meet the requirements specified in the U.S. Fish and Wildlife Service Title 50 Certification. These requirements can be found in 50 CFR 16.13.a.3 and 16.13.b. For a copy of the certificate, please go to www.fws.gov/forms/3-2274.pdf.

Q. *Does APHIS have plans to provide compensation for income lost as a result of the Federal Order?*
A. No. Under the Animal Health Protection Act, APHIS only has the authority to provide compensation for animals depopulated as part of a disease eradication program. Under the Federal Order APHIS is not requiring the destruction of VHS-susceptible species, we are only regulating their movement. The revisions to the original Federal Order allow some movement while still protecting against the spread of VHS.

United States Department of Agriculture
Animal and Plant Health Inspection Service
Safeguarding American Agriculture

2007 American Heartland Aquaculture Conference

Rend Lake Resort & Conference Center
Whittington, Illinois
Friday, January 19 *and* Saturday, January 20

Friday, January 19, 2007

10:30-5:00 Tour Logan Hollow FishFarm and Southern Illinois University
4:00-6:00 Registration
5:30-6:30 Social
6:30-8:00 Banquet
8:00- State Association Meetings

Saturday, January 20, 2007

7:00-8:00 Breakfast Buffet
8:15-8:30 Welcome
8:30-9:00 Developing biosecurity barriers using HACCP Bob Pitman
9:00-9:45 Marketing options for small aquaculture producers David Cline
9:45-10:15 Energy saving via off-peak power use and automated oxygen sensing devices - John Murdock
10:15-10:45 Break
10:45-11:15 Overview of pond aeration, de-stratification and water circulation - Forrest Wynne
11:15-11:45 An overview of live hauling practices and markets Shawn Coyle
11:45-12:15 Current disease topics: Aquaflor medicated feed, winter fungus, and columnaris - Bob Durborow
12:15-1:30 Lunch
1:30-2:00 Producing sunfish indoors: an evaluation of system performance and costs - Chuck Hicks
1:30-2:00 Managing your recreational pond to produce trophy bass - David Cline
2:00-2:30 Taxidermy niche market - Cecil Baird
2:00-2:30 Low input freshwater shrimp production Bill Wurts
2:30-3:00 Aquaculture 101 - for beginners or for those interested in being beginners - Forrest Wynne
2:30-3:00 What do chefs want? Marketing locally grown hybrid striped bass directly to restaurants Angela Caporelli
3:00-3:30 Managing fee fishing operations - Forrest Wynne
3:00-3:30 Live transport of freshwater prawn Angela Caporelli

FOR MORE INFORMATION

Contact these people or visit the Missouri Aquaculture Association web site at www.moaa.pond.org for details.
Illinois - Paul Hitchens, 618-453-5590, hitchens@siu.edu
Indiana - Martha Render, 219-275-8851, 1hoosiers@ffni.com
Kentucky - Forrest Wynne, 270-247-2334, fwynne@uky.edu
Missouri - Bart Hawcroft, 866-466-8283, bart.hawcroft@mda.mo.gov

DIRECTIONS

Rend Lake Resort and Conference Center is at Wayne Fitzgerrell State Park. Follow I-57 to the Whittington exit (exit 77). Turn onto Route 154 and go west 2.0 miles. At the sign for Wayne Fitzgerrell State Park, turn right and go north on the park road for 2.8 miles. The resort is on the left.

RESERVATIONS

Reservations should be made directly with the resort. A block of rooms has been reserved for the conference and will be held until December 6, 2006. Be sure to register before then and to mention "American Heartland Aquaculture" or "block 595" to receive the $60.00 rate on hotel and cabin rooms. To see the conference center and rooms visit the Rend Lake web site www.rendlakeresort.net.

Rend Lake Resort, 11712 East Windy Lane,
Whittington, IL 62897
800-633-3341, 618-629-2584 (fax)

REGISTRATION INFORMATION

Name(s):_____
_____
_____
Company:_____
Address:_____
City: _____
State: _____ Zip: _____
Phone: _____
E-mail: _____
Total Enclosed: $_____

Do you plan to join the Logan Hollow Fish Farm/ SIUC tour? ____ Yes ____ No

Registration is $55.00 for members of state associations and $65.00 for non-members. The registration fee includes the tours, a banquet on Friday, and breakfast and lunch on Saturday. To reduce conference costs and help with planning, there will be no onsite registration. The last day to pre-register is Friday, December 29, 2006. Conference registration forms and payment (checks payable to MoAA) should be mailed to:

Missouri Aquaculture Association
P.O. Box 6864
Jefferson City, MO 65102

Please note that annual dues should be sent to state associations, not included with the conference registration. Contact one of the people listed at left for details on how to join the aquaculture association in your state.

Economics of Micro-Scale Tilapia *(Oreochromis aureus)* Processing in Kentucky's Mobile Processing Unit (MPU)

Figure 1. *Tilapia are grown in cages in Kentucky, usually as a polyculture species with freshwater prawns.*

Figure 2. *Mobile Processing Unit (MPU) can be rented from Kentucky State University for $100 a day. It must be located and "hooked-up" at a qualified docking station.*

Advance reservations and a nominal deposit are necessary to guarantee specific rental dates.

Call Steve Skelton (KSU) at (502) 597-7501 or Angela Caporelli (KDA) at (502) 564-4983 with inquiries.

Brandon Williams and Siddhartha Dasgupta
Aquaculture Research Center, Kentucky State University

Tilapia are a freshwater tropical fish that must be harvested from ponds prior to lethal cold water temperatures in the fall and winter (Figure 1). In Kentucky, tilapia are commonly cultured in cages submerged in ponds. This growout phase occurs in 4 months (June through September) during which a 4 oz fish grows to 1.5 lbs or larger.

Processing tilapia is done throughout the state in simple micro-scale hand processing facilities. Producers who lack access to these facilities have a HACCP-approved, low-cost alternative: the statewide mobile processing unit (MPU), which is now owned by Kentucky State University (Figure 2). No product liability insurance is required by the processor under the new arrangement with KSU. Currently, the MPU costs $100 per day to rent and operators are required to take a one-time training course (cost: $75, and $50 for annual renewal) to learn safe and sanitary operating procedures. This article examines the economics of micro-scale tilapia processing in the MPU based on a management/disassembly model.

Tilapia processing is similar to that of other scaled finfish, i.e., the fish are first chill-killed in an ice bath, followed by evisceration, filleting, skinning, bone removal, and packaging. Figure 3 shows the product flow schematic through the disassembly line in the MPU. For general information on fish processing in Kentucky, consult the Processing and Marketing Manual published by Kentucky State University by Sid Dasgupta, Forrest Wynne, Angela Caporelli, and Lee Meyer, available for free online at www.ksuaquaculture.org.

The MPU can accommodate a maximum of 6 workers and a manager with one additional individual manning the holding and chill-killing tanks outside of the MPU. We assumed that one processing day included an 8-hour operating shift and an additional

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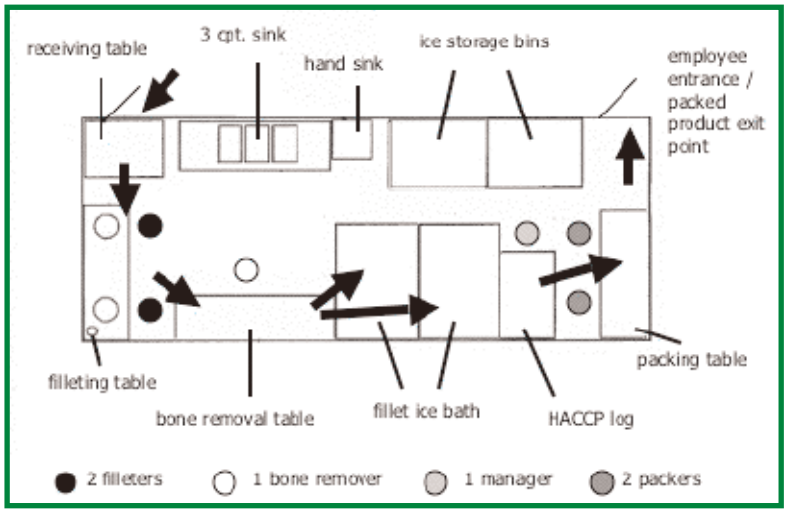

Figure 3. *Product flow through the MPU.*

Economics of Micro-Scale Tilapia *(Oreochromis aureus)* Processing in Kentucky's Mobile Processing Unit (MPU)

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Table 1.
Micro-scale processing prices and technical coefficient data.

Input price *(whole live tilapia cost)*	$3.30/kg ($1.50/lb)
Output price *(frozen fillet price)*	$17.60/kg ($8.00/lb)
Labor	$8.00/hr
Management	$10.00/hr
Dress out *(fillet yield)*	34.46%
Fillet time	1.09 minutes/fish/person
De-boning time	0.54 minutes/fish/person
Fillet rinsing time	1.50 minutes/fish/person
Packaging time	1.01 minutes/fish/person

Table 2. .

Total cash costs ($/day) of tilapia processing.

2 Electric fillet knives	$50
Packaging	$50
MPU rental	$100
MPU training fee (annual)	$75
Whole tilapia (1,898 lb)	$3,796
Labor (wage rate x hours/day)	$384
Management (wage rate x hours/day)	$90
Electricity	$5.13
Water (4500L or 1200 gallons)	$6.42
Ice (863 kg or 1,898 lb)	$142.35
Total daily cash costs	$4,698.90

*Further details available in Dasgupta et al. (2003).

30 minutes before and after processing operations for chill-kill tank setup and breakdown, and other sanitation procedures such as pressure washing the MPU. Offal, the leftover fish waste, is buried at the end of a processing day.

Interviews with KY tilapia producers revealed that the average fish size was 1.75 lbs and we also found prices, dress out yields, and processing times. This information is summarized in Table 1. Cash costs of processing ($/day) are listed in Table 2. In this article, we determined the amount of tilapia processed per day to maximize the returns to management per processing day based on MPU capacity. We assumed that all output were frozen fillets that were sold at the retail/direct to consumer price of $8.00/lb.

Results

Assuming that processors paid $2.00/lb for whole tilapia, the profit maximizing solution was to process 1,097 tilapia (1,646 lbs, 137 fish/hr) with 3 employees filleting, 1 removing bones, and 2 packing the fillets for frozen storage. This resulted in a daily production level of 654 lbs of fillets with a breakeven price of $7.18/lb and a return to management, excluding fixed costs, of $513.87/day based on daily cash costs for the MPU (Table 2). The minimum number of fish necessary to break even was 488. The maximum price payable for whole live tilapia was $2.31/lb. Processing added value to whole fish by $0.48/lb and fillets by $1.38/lb. Based on standard tilapia stocking rates of 300 per 8' x 4' x 4' cage, more than 3 cages of tilapia can be processed in the MPU per day.

Conclusions

Interviews with KY tilapia producers revealed that much of their product is sold live to ethnic consumers, while Caucasians prefer fresh fillets. Based on prices that consumers are willing to pay for fillets, $8.00/lb, our results show that the MPU is an economically feasible and practical option for producers without access to site built processing facilities.

Since MPU processing follows all fish processing HACCP guidelines, the resulting tilapia fillets are a high quality product with a long shelf life (6-12 months), when packaged in distilled water and kept frozen. While the output price, $8.00/lb, is not price competitive with imported tilapia ($4-$6/lb) at the retail level, the product quality has been sufficiently superior for consumers to make repeated annual purchases of the Kentucky-grown fillets over the last 5-7 years. However, identifying markets willing to pay the premium for locally-grown, safe, and fresh product is imperative for the long-term survival of this industry.

Since most tilapia producers in KY have not seen a lack of consumer demand, there is hope that the market for this product could be wider than what is currently revealed. A recent marketing study showed that KY-grown tilapia fillets were strongly preferred by consumers in farmers' markets. Several independent, white table cloth restaurants in

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Figure 5. *The MPU can be reserved from KSU by contacting Mr. Steve Skelton at (502) 597-7501.*

Figure 4. *The MPU is approved by county health departments for processing fish and other farm-raised animals.*

Status of Rotenone Availability as a Fish Toxicant for Pond Renovation in Kentucky

by Kerry W. Prather, *Central Fishery District Biologist, Fisheries Division, Kentucky Department of Fish and Wildlife Resources,*
Fisheries Lab., No.1 Game Farm Road, Frankfort, Ky. 40601

In the past, liquid 5% rotenone was used to remove unwanted fish populations in ponds and small lakes in Kentucky. The Kentucky Department of Fish and Wildlife Resources (KDFWR) provided rotenone to private pond and lake owners, at cost, for this process. Several years ago KDFWR discontinued sale and shipment of this chemical due to its classification as a "restricted use chemical". Efforts were made to find other sources for rotenone or an acceptable substitute chemical.

Liquid rotenone, though now harder to find, is still available. One known source is Aquatic Control (Seymour, IN, 800-753-LAKE) with a price of about $100 per gallon, plus a shipping fee of about $100 per gallon. This company specializes in pond and lake management chemicals, equipment and supplies. Other farm supply stores may carry the liquid form in the future. The powdered form of rotenone may be easier to find, less expensive and may be bought at farm supply stores. Price of the powdered form is about $30 for a 5 lb. bag. All sources require a chemical applicator's license from the Division of Pesticides, Kentucky Department of Agriculture in order to purchase rotenone in any form.

Use the following calculations to determine the amount of rotenone needed for a pond:

Liquid: surface acreage x average depth* = number of gallons needed Powdered (5%): 1 pound per 0.185 acre-feet**

The amount of powdered form may vary according to pond fertility and type of use. See label.

*make about seven transects across the pond, side to side from one end of pond to the other, measuring depth every five feet, then average these numbers;

**acre-feet = surface acreage x average depth (surface acreage = length in feet x average width in feet ÷ 43,560 ft^2 per acre)

Application of these products in public waters other than the private pond treated is prohibited. Read product label and follow all precautions listed. Waters treated with these products detoxify within 2 to 4 weeks, depending on pH, temperature, water hardness, and depth. Rotenone is toxic to aquatic animals with gills. Follow label precautions for pets and livestock. Avoid skin contact. Contact your KDFWR district fishery biologist for further information.

2005 Aquaculture Census Shows Significant Growth

WASHINGTON, Oct. 2, 2006 – Aquaculture production is a billion-dollar industry, with sales of fish, shellfish and related products growing by 11.7 percent over the past seven years, according to results of the 2005 Census of Aquaculture.

The 2005 count was the second nationwide aquaculture census conducted by the U.S. Department of Agriculture's National Agricultural Statistics Service (NASS). The first took place in 1998. Results show that between 1998 and 2005, U.S. sales of aquaculture products grew from $978 million to nearly $1.1 billion.

Census results show that food fish – including catfish, perch, salmon, hybrid striped bass, tilapia and trout – accounted for 62 percent of all aquaculture sales in 2005. Mollusks – including abalone, clams, mussels and oysters – comprised 19 percent of 2005 sales. Crustaceans, such as lobsters and shrimp, and ornamental fish, such as koi and tropical fish, each accounted for approximately 5 percent of sales. They were followed by baitfish at 4 percent and sport fish at 2 percent.

Mississippi led the nation in sales of aquaculture products, with $250 million dollars in 2005. Arkansas, Alabama and Louisiana were the other states with sales topping $100 million. Louisiana had the largest number of aquaculture farms. The state's 873 farms were more than double the number in any other state.

The 2005 Census of Aquaculture collected detailed information on issues including production methods, water sources, sales, distribution and farm labor. For the purpose of the census, an aquaculture farm was any commercial or non-commercial place from which $1,000 or more of aquaculture products were raised and sold, or distributed for restoration, conservation or recreational purposes during the census year.

Complete results of the 2005 Census of Aquaculture are available online at: www.nass.usda.gov/aquaculture/index.asp

NATIONAL AGRICULTURAL STATISTICS SERVICE
United States Department of Agriculture • Washington, DC 20250
Ag Statistics Hotline: (800) 727-9540 • www.nass.usda.gov
CONTACT: Krissy Young, (202) 690-8123 • Deborah Norton, (202) 690-8124

Kentucky Department of Fish and Wildlife Resources Permits Reservoir Ranching of Paddlefish in Kentucky Water Supply Lakes

Steve Mims and Rick Onders
Aquaculture Research Center, Kentucky State University

In June 2006, Kentucky Department of Fish and Wildlife Resources (KDFWR) amended regulations to permit the raising of paddlefish in certain water supply lakes throughout our Commonwealth. A water supply lake is defined by KDFWR as follows: it is used for potable water; it is not owned by the State; and, it does not have a fishery management agreement with KDFWR. If you know of a water supply lake in your area that meets these criteria, paddlefish can be stocked and harvested with proper permits obtained through KDFWR either by the municipality or through a third party. A couple of good reasons to stock paddlefish in these lakes (known as reservoir ranching) are the potential for improving water quality and generating future revenue from the caviar and meat.

What is a paddlefish? Many people in Kentucky know this fish as a spoonbill catfish. The error in calling this a spoonbill catfish is that it is not related in any way to catfish. However, it is closely related to sturgeon. The paddlefish is native to 26 states of the United States that are connected to the Mississippi River Basin and adjacent Gulf Shore drainages. The fish is a filter feeder feeding primarily on zooplankton (minute free floating animals). It does not feed on fish. It grows rapidly up to 5 lbs/year in a lake depending on the fertility of the water Female fish produce black roe (fish eggs) in a minimum of 8-10 years in Kentucky. The roe can be processed into premium caviar highly sought after in domestic and international markets. The meat from this fish is a more novel product that is being developed and tested for the marketplace. Some of the attributes of the meat make it highly desirable for consumers: it is totally boneless because the paddlefish has a cartilaginous skeleton; white in color; mild in taste and firm in texture similar to shark or swordfish. Valued–added products such as hot smoked paddlefish or marinated products have demonstrated great market potential. However, currently caviar and meat are mostly obtained from the wild capture fishery which is not sustainable for further market development. In other words, the market cannot be expanded to meet consumer demands because the supply of these fish in the wild cannot be increased. Reservoir ranching would provide a way to increase paddlefish numbers to supply caviar and meat for the growing market.

Reservoir ranching of paddlefish is a low stocking, non-polluting culture system for producing sustainable meat and caviar products. Paddlefish greater than 12 inches would be stocked in a qualified water supply lake and would forage on natural foods. They are usually stocked at 5 to 20 fish per acre depending on the fertility of the lake. Paddlefish co-exist well with most native sport fish (i.e. basses and pan-fish) and seldom are caught on hook and line. Some fish farmers have indicated that paddlefish in catfish ponds have improved water quality; this might also occur in the lakes where paddlefish are stocked. Paddlefish harvested at maturity would be captured in large mesh (minimum of 5 inches) gill nets during the winter months (December through March) to avoid interfering with other user groups on the lake. Harvest gear, time, etc. are regulated through 301 KAR 1:115 Propagation of aquatic organisms (see http://www.lrc.ky.gov/kar/301/001/115.htm).

We will be glad to help you find potential water supply lakes and work with the associated municipalities in raising paddlefish and joining in on this pioneer industry. If you would like more information, contact Dr. Steven D. Mims at steven.mims@kysu.edu

Economics of Micro-Scale Tilapia *(Oreochromis aureus)* Processing in Kentucky's Mobile Processing Unit (MPU)

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Lexington and Louisville have also experienced a strong inclination to purchase fresh, locally-produced fish fillets in modest quantities (approximately 400 lb/month/restaurant), at a significant premium over comparable imported frozen products. While these restaurants make allowances for seasonal availability of product, success in these markets would require a processors' willingness to supply a consistent quantity and quality of product over time.

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USE OF COMMON AND ORNAMENTAL (KOI) CARP TO CONTROL FILAMENTOUS ALGAE AND ROOTED PLANTS IN KENTUCKY AQUACULTURE PONDS.

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Controlling unwanted filamentous algae and aquatic plants is a common problem for fish farmers. Aquatic vegetation interferes with stocking and may cause mortality when fry or fingerlings become entangled. Vegetation also interferes with feeding, especially when algae mats or submerged/emergent plants block access to feed. Heavy plant infestations reduce the pond space available for fish and in effect, increase density. This can result in poor growth performance and increase the risk of disease. Finally, seines used in harvest may become fouled, and the animals being harvested can become entangled in the vegetative mass, increasing stress on the animals along with harvest cost.

Aquatic plants are controlled by mechanical, chemical or biological means. Mechanical control, using rakes or cutters, can be effective but is labor intensive and not practical for large aquaculture ponds. Chemical herbicides have the potential of eradicating plants and algae quickly, but, unless a phytoplankton bloom is established immediately, many aquatic plants will regrow, requiring reapplication of chemicals that can be expensive and toxic to aquatic animals.

Biological control refers to the use of certain fish to control aquatic plants either by eating them or altering the pond environment. The grass carp Ctenopharyngodon idella is one species used for biological control. Grass carp are an herbivorous species native to eastern Asia but widely introduced worldwide. Grass carp will eat and control succulent submerged and emergent plants as well as floating leafed species when stocked appropriately; however, they do not control filamentous algae well. Most states (including Kentucky) allow only sterile triploid grass carp to be stocked. Recommended stocking rates are based on the type of vegetation to be controlled and the degree of infestation and are usually 7 to 25 per acre. The procedures used to insure that each fish sold is triploid add to the cost of producing grass carp. Therefore, the cost of stocking juveniles is relatively high, between $8 and $12 per fish.

Common carp Cyprinus carpio can also be stocked to control aquatic vegetation. Carp will feed on plants and their feeding behavior tends to inhibit growth of both filamentous algae and rooted plants. This is due to increased turbidity from stirring bottom mud, which reduces transparency and inhibits the light necessary for plants and filamentous algae to grow while promoting the development of a phytoplankton bloom. The recommended stocking rate ranges from 60 to 160 carp per acre, depending on the severity of the vegetation problem and the size of the carp being stocked. However, ponds stocked with carp for vegetation control should be monitored closely to insure that the increased turbidity is sufficient to inhibit plant growth without interfering with the growth and health of the animals being cultured in the pond, and carp should be added or removed accordingly. It should also be noted that carp will not control free floating plants like duck weed or water meal. Carp should be stocked in the fall when plants are

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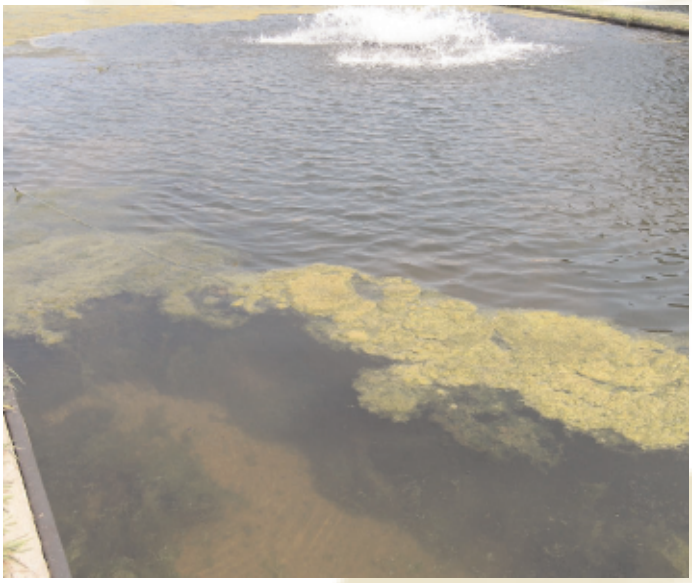

Filamentous algae is a problem in this fish pond. Note the transparency of the water in the foreground.

In this pond, koi have been stocked to control algae and other plants, which are absent. The green color of the water indicates presence of a phytoplankton bloom.

Purchase Area Catfish Farm For Sale

Bill Byerley and his family recently purchased a Catfish farm in Lowes, Kentucky in the Purchase Area and are interested in selling or leasing the farm. The farm is on 16 acres and consists of nine lakes. It started out years ago as a pay lake then turned into a fish farm for production. The property is all set up for farming fish complete with nets and a processing building. They currently have a website for the property at www.kentuckyproperties.org

They would like to see the property used as productively as possible for fish farming or for preservation. The Byerleys can be contacted at Email bill@pagedesk.com, Home Phone 815/462-4721, Work 815/462-6000, or Cell 815/931-8168.

USE OF COMMON AND ORNAMENTAL (KOI) CARP TO CONTROL FILAMENTOUS ALGAE AND ROOTED PLANTS IN KENTUCKY AQUACULTURE PONDS.

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declining, or early spring when they are still dormant. This will help to insure effective control, because the carp will begin active feeding at the same time that plants begin growing in the spring. Although carp are common in

Kentucky streams, lakes and rivers, it may be difficult for fish farmers to obtain suitable numbers of carp of appropriate size for stocking. In addition, common carp collected from the wild can carry parasites or disease to the farm. An alternative is to stock ornamental koi. Koi are of the same species as their wild common carp cousins. They originated in Japan in the early 19th century. Japanese farmers raising common carp for food noticed color variations in the offspring of normally drab colored carp in their ponds and began to selectively breed the colored fish. Today, koi are widely known as popular ornamental fish, especially among water garden and backyard pond enthusiasts. Disease free koi juveniles of uniform size and age are available from producers with prices ranging from about $2.75 each for 3″-5″ fish to about $5.50 each for 5″-6″ fish. Koi should be stocked at the same rates and with the same precautions applied to common carp.

Both common carp and their koi cousins will reproduce in aquaculture ponds. This creates a management problem with common carp; however, koi offspring can be seined and moved to grow out ponds, providing an additional profit opportunity for the farm. An alternative is to segregate fish by sex when they have reached maturity and stock fish of only one sex to prevent reproduction. (Mature males will produce thick white milt when gently stripped in the early spring. In general, ripe females will show distended abdomens; however, positive identification of females is more difficult).

Koi have been used to control filamentous algae and rooted plants in experimental paddlefish rearing ponds at KSU Aquaculture Research Center for the past five seasons with excellent results. *(Please see the photographs on page 10.)* During this time, no chemicals have been used and the koi have completely eradicated formerly heavy plant and algae infestations. However, before you stock koi in your pond, please contact an Aquaculture Extension Specialist to get advice on avoiding potential problems that may arise from stocking koi.

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KENTUCKY AQUACULTURE ASSOCIATION
Membership Application

Do you give permission to display the following information in an Agricultural Directory? ❑ *Yes* ❑ *No*

AQUACULTURE BACKGROUND *(check more than one where appropriate):*
❑ Producer ❑ Live Hauler ❑ Processor ❑ Pay Lake Owner
❑ Feed Mill ❑ Extension/Research
❑ Other (explain) _____

SPECIES
❑ trout ❑ minnows ❑ largemouth bass ❑ catfish ❑ bluegill
❑ hybrid striped bass ❑ freshwater shrimp ❑ red claw crayfish
❑ paddlefish
❑ Other (explain) _____

WATER SOURCE *(if applicable):*
❑ well ❑ spring ❑ watershed pond ❑ stream or lake
❑ Other (explain) _____
Number of ponds or raceways: _____
Total acreage (if ponds) _____
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Kentucky Aquaculture Association Dues: $25.00
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Please return this application to the address listed below:
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