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**NATIONAL WARMWATER AQUACULTURE CENTER**  
Delta Branch Experiment Station



**Mississippi State**  
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TO: Joey Lowery, President, Catfish Farmers of America

FROM: Dr. Craig S. Tucker  
Research Professor, Mississippi State University  
Director, Thad Cochran National Warmwater Aquaculture Center  
Director, USDA-NIFA Southern Regional Aquaculture Center

SUBJECT: Catfish Definitions

Thank you for giving me the opportunity to comment on the issue of what defines a catfish and how that definition should best be used to protect the American consumer.

As you recall, I've been involved in this debate since the very beginning. In 2001, I wrote an editorial for the Jackson, Mississippi, *Clarion Ledger* explaining my concerns. I argued that when American consumers buy food at the supermarket or restaurant, they should have confidence that a particular name accurately describes the product they are buying and how that food was produced. The primary issue at that time was marketplace identity and the usurping of a trusted name by foreign imports. The basis for my argument was simple: if there are large differences in the safety and quality of competing products, and if consumers are educated to appreciate those differences, then proper choices would be made at the marketplace.

However, the intervening period has shown that this simple supposition cannot work. Although Federal and State laws were developed to distinguish among the various "catfish-like" products, marketplace confusion and obfuscation still abounds. In part, the confusion is a holdover from days when imported silurids were marketed outright as "catfish." Additional problems derive from unscrupulous substitution of fish at the retail level, where country-of-origin may not be required.

If the issues were simply market identity and product loyalty, my 2001 argument would still be valid. However, Federal and State regulatory agencies consistently report that imported "catfish-like" products are contaminated with potentially harmful substances, particularly antibiotic residues.

Catfish aquaculture in the United States is conducted in closed ponds supplied with unpolluted ground water. Antibiotics are seldom used in the final foodfish growout phase, and all aspects of chemical and drug use are strictly enforced by regulatory agencies. Nearly all imported catfish, including the pangasid catfishes basa and tra, are raised in either open net pens suspended in public waters or in ponds flushed with large volumes of water pumped from public waters. This results in an open hydrological connection between the water supply and culture system and, following that, the culture system and the outside environment. As a consequence of the "openness" of the culture system, fish are potentially exposed to polluted water and any waste produced by the fish (including intestinal wastes with antibiotic residues) is discharged directly to the environment. Food safety and environmental

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sustainability are affected by these fundamental differences in production practices used for U.S. farm-raised catfish and imported catfishes.

Raising fish in polluted environments predisposes animals to infectious diseases and, as a consequence, culture relies on antibiotic use to sustain production. Indiscriminate therapeutic drug use is verified by data from random Federal and State inspections, which clearly show a high incidence of residues of antibiotics and drugs in catfishes produced overseas. These data are particularly disconcerting given the low sampling rate in these inspections.

Inspections consistently find imported fish with residues of antibiotics that are of “high enforcement priority” within the United States (FDA-CVM Supplemental Policy 1240.4200) and are on the “forbidden list” of drugs (40 CFR 530.41) that are prohibited from use in food-producing animals in the United States. Criteria used to regulate drugs with “high enforcement priority” include the human food safety concerns of carcinogenicity, toxicity, and transfer of antibiotic resistance factors. Specific risks vary depending on the antibiotic in question. For example, chloramphenicol use in food animal production is prohibited due to concerns that residues may cause aplastic anemia in consumers. Nitrofurans, on the other hand, are banned because they are considered to be carcinogenic and genotoxic, and consumption over time of product contaminated with nitrofurans may present a human health risk.

In effect, drugs (several of which are found in imported catfishes) are on the “forbidden list” because no safe “minimum residue limit” can be identified for that particular substance. Accordingly, it is reasonable for American consumers to expect that all items in their food supply—whether domestically produced under U.S. regulatory oversight or imported— should be free of those drugs.

In a broader sense, abundant misuse of antibiotics in an attempt to maintain fish health is a strong indicator of underlying issues that may also affect food safety and environmental sustainability. Production of fish in substandard or polluted environments predisposes fish to disease, and may expose fish to other contaminants of human health concern. Rampant misuse of antibiotics is *de facto* an unsustainable and environmentally harmful practice. Overall, it is clear that significant differences in food safety and environmental impacts exist between U.S. farm-raised catfish and certain imported silurids.

Acknowledging that differences in food safety and environmental impact exist among the various silurids has changed the issue of product identity from the realm of marketing to that of public health. So, the question becomes, “What is the best approach to protecting consumers when food choices involve similar products of widely differing safety?” Attempting to differentiate products and relying on consumer-educational programs is clearly inefficient given the level of confusion and product substitution at the marketplace. I now believe the most effective approach to protecting the American consumer and assuring greater environmental protection is to hold all products to the same set of standards. Accordingly, all products that can conceivably be confused with, or sold as, “catfish” should be subject to the same strict quality and safety oversight envisioned for catfish grown in United States aquaculture.

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**Present Position**

Research Professor, Mississippi State University  
Director, MSU-USDA Thad Cochran National Warmwater Aquaculture Center  
Director, USDA-NIFA Southern Regional Aquaculture Center

**Education**

B.S (Zoology)	1974	Humboldt State University,
M.S. (Fisheries)	1976	Auburn University
Ph.D (Microbiology)	1978	Auburn University

**Post-graduate Training**

Post-Doctoral Investigator, Woods Hole Oceanographic Institution, 1978-1980

**Professional Responsibilities**

Level I Graduate Faculty, Mississippi State University  
Managing Editor, Journal of the World Aquaculture Society (1994-2001)  
Associate Editor, Journal of the World Aquaculture Society (1990-1994; 2001-2004)  
Associate Editor, Journal of Applied Aquaculture (1992-2007)  
Associate Editor, North American Journal of Aquaculture (2003-2007)

**Teaching**

Water Quality Management (WL 5173-7173) Mississippi State University, 1989-1994  
Aquatic Weed Control, United States Fish and Wildlife Service, San Marcos Warmwater Fish Culture  
Short Course. Taught in 1983, 1984, 1985.  
Water Quality. Gulf Coast Consortium on Aquatic Pathobiology, Aquatic Animal Medicine Short Course.  
Taught in 1992 in at Texas A&M, Galveston, and 1993 and 1994 at Louisiana State University

**Professional Recognition (selected examples)**

United States Aquaculture Society, Career Distinguished Service Award, 2009  
Mississippi State University Faculty Research Award, 2008  
College of Forest Resources, Mississippi State University, Research Award, 2007  
USDA Certificate of Appreciation for Outstanding Service, 2004  
Catfish Farmers of America, Researcher of the Year 2003  
World Aquaculture Society, Exemplary Service Award 2001  
First Mississippi Corporation Award, Mississippi Agricultural Researcher of the Year 1997  
Delta Council, Mississippi Agricultural Researcher of the Year 1993

**Professional Committees and other Service (selected examples since 2000)**

Faculty Promotion and Tenure Committee, Department of Wildlife and Fisheries, Mississippi State  
University, 2002-2006 (Chair 2005-2006); 2007-2009  
Lead Representative for Aquaculture, American Water Works Association, USEPA Copper Herbicides  
Re-Registration Review Committee, 2006  
USDA-CSREES National Coordinating Council for Aquaculture, 1997-  
Mississippi Interagency Task Force on Aquatic Invasive Species, 2004-  
USFWS Asian Carp Work Group, National Invasive Species Task Force, 2003-  
USDA-ARS Aquaculture Strategic Planning Work Group, 2002, 2008.  
Mississippi Interagency Nutrients Task Force, Mississippi Department of Environmental Quality, 2000-  
2001.

**Selected Publications** (out of 85 refereed journal articles, 7 books, 18 book chapters, and 140 other publications)

**Books**

- Tucker, C. S. and J. A. Hargreaves. 2008. Environmental Best Management Practices for Aquaculture. Blackwell Publishing, Ames, Iowa. 582 pages. ISBN 0813820279.
- Tucker, C. S. and J. A. Hargreaves. 2004. Biology and Culture of Channel Catfish. Elsevier, Amsterdam, The Netherlands. 676 page. ISBN 044505768.
- Boyd, C. E. and C. S. Tucker. 1998. Aquaculture Pond Water Quality Management. Kluwer Academic Publishers, Boston, Massachusetts. 700 pages. ISBN 0412071819.
- Tave, D. and C. S. Tucker. 1994. Recent Developments in Catfish Aquaculture. Haworth Press, Binghamton, New York. 389 pages. ISBN 1560220473.
- Boyd, C. E. and C. S. Tucker. 1992. Water Quality and Pond Soil Analyses for Aquaculture. Alabama Agricultural Experiment Station, Auburn, Alabama. 183 pages. ISBN 0817307214.
- Tucker, C. S. and E. H. Robinson. 1990. Channel Catfish Farming Handbook. Van Nostrand Reinhold, New York, New York. 454 pages. ISBN 0442318367.
- Tucker, C. S. 1985. Channel Catfish Culture. Elsevier Science Publishers, Amsterdam, The Netherlands. 657 pages. ISBN 0444425276.

**Book Chapters** (selected examples since 2000)

- Tucker, C.S., J.A. Hargreaves, and C.E. Boyd. 2008. United States aquaculture and the environment. Pages 3-54 in "Environmental Best Management Practices for Aquaculture." Blackwell, Ames, Iowa.
- Tucker, C.S. and J.A. Hargreaves. 2004. Water quality management. Pages 215-278 in "Biology and Culture of Channel Catfish," Elsevier, Amsterdam, The Netherlands.
- Tucker, C.S. and J.A. Hargreaves. 2003. Copper sulfate to manage cyanobacterial off-flavors in pond-raised channel catfish. Pages 133-146 in "Off-Flavors in Aquaculture," American Chemical Society, Washington, D.C.
- Tucker, C.S. 2003. Channel catfish. Pages 346-363 in "Aquaculture: Farming Aquatic Animals and Plants," Blackwell Publishing, Ltd., Oxford, UK.
- Tucker, C.S. 2000. Channel catfish. Pages 153-170 in "Encyclopedia of Aquaculture," Wiley Interscience, New York.

**Refereed Journal Articles** (selected examples since 2000)

- Wise, D.J., T.A. Hanson, and C.S. Tucker. 2008. Farm-level economic impacts of trematode *Bolbophorus* sp. infections of channel catfish *Ictalurus punctatus*. North American Journal of Aquaculture
- Boyd, C.E., C. Tucker, A. McNevin, K. Bostick, and J. Clay. 2007. Indicators of resource use efficiency and environmental performance in aquaculture. Reviews in Fisheries Science 15:327-360.
- Tucker, C.S. 2005. Effluents from channel catfish hatcheries in northwest Mississippi. North American Journal of Aquaculture 67:354-358.
- Tucker, C.S., J.A. Hargreaves, and S.K. Kingsbury. 2005. Dietary phosphorus modifications in practical diets do not affect waterborne phosphorus concentrations and phytoplankton abundance in channel catfish ponds. North American Journal of Aquaculture 67:114-121.
- Tucker, C.S. and J.A. Hargreaves. 2003. Management of effluents from channel catfish (*Ictalurus punctatus*) embankment ponds in the southeastern United States. Aquaculture 266:5-21.
- Tucker, C.S., S.K. Kingsbury, and R.L. Ingram. 2003. Tissue residues of diuron in channel catfish *Ictalurus punctatus* exposed to the algicide in consecutive years. Journal of the World Aquaculture Society 34:203-209.
- Hargreaves, J.A. and C.S. Tucker. 2003. Defining loading limits of static ponds for catfish aquaculture. Aquacultural Engineering 28:47-63.
- Tucker, C.S. 2000. Off-flavor problems in aquaculture. Critical Reviews in Fisheries Science 8(1):1-44.