

2008 ANNUAL CASE SUMMARY REPORT AQUATIC DIAGNOSTIC LABORATORY

Mississippi State University
College of Veterinary Medicine
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MISSION STATEMENT

The Aquatic Diagnostic Laboratory is dedicated to the success of Mississippi's commercial catfish industry through service, research, and teaching. Our staff and fish health professionals strive to support the industry's efforts to produce a high quality, economical, and profitable product. Our goals are derived from the needs of the industry and aimed at developing management strategies for controlling the impact of diseases that affect profitability. These goals can only be accomplished through mutual respect, cooperation, and the maintenance of a close supportive relationship with our clients.

2008 CVM AQUATIC DIAGNOSTIC LABORATORY SUMMARY

Diagnostics

In 2008, the Aquatic Diagnostic Laboratory (ADL) at Stoneville received a total of 554 fish diagnostic cases. These cases were received from 59 different farms. This is a 44.5% decrease in the number of submissions over the 999 cases in 2007. There were 1007 water quality samples that were analyzed representing a 9.8% decrease over the 1117 samples received in 2007. These decreased numbers most likely reflect the contraction of the industry because of the economic downturn. This makes it difficult to interpret the differences in numbers of the different diseases compared to those in previous years. However, these numbers should still reflect the relative incidence of that disease in the industry. We highly encourage producers to submit cases so that we can better understand their needs and provide as much assistance as possible.

Individual case submissions represent a composite sample of fish collected from a single pond. The numbers reported are derived solely from submissions processed by the ADL and do not necessarily reflect actual disease prevalence in the field. Routine diagnostic procedures include evaluation of gill clips and skin scrapes for parasites, external and internal examination for signs of disease, bacterial and viral cultures, histopathology, and water quality evaluation. The ADL works closely with MAFES fish health professionals to offer treatment recommendations, monitor disease trends, provide surveillance for new and emerging diseases, provide field service investigation, and maintain a database of epidemiologic information on diseases of catfish. The ADL supports the research efforts of other NWAC units, including MAFES, MSU-Extension Service, College of Veterinary Medicine, and USDA/ARS Catfish Genetics Research Unit. Furthermore, the laboratory provides an outlet for the dissemination of fish health research efforts back to producers.

Bacterial diseases dominated the number of cases submitted as in previous years. Columnaris as a single disease accounted for 73 cases but in combination with other diseases was seen in 231 submissions, a 46.2 % decrease from the previous year. There

were 28 cases of Enteric Septicemia of Catfish (ESC) as a sole etiologic entity and in combination with other diseases was seen in 117 of submissions, a 68.8% decrease from 2007. The seasonal incidence of these diseases together with Saprolegnia and Proliferative Gill Disease (PGD) is charted below.

Proliferative gill disease (PGD) remained the most commonly diagnosed parasitic disease at 33.7%. This is almost double the previous year's percentage. The other parasitic diseases *Ichthyophthirius multifiliis* (Ich) was only 0.8% which about the same than the previous year (0.6%), while *Bolbophorus sp.* trematode cases comprised 0.3% of cases submitted. Although this has decreased, farmers are encouraged to continue surveillance efforts and to control ram's horn snails (intermediate host of the parasite) with lime or copper sulfate, particularly if pelicans are visiting their ponds. *Bolbophorus sp.* trematodes are capable of killing fingerlings and increasing susceptibility to ESC, as well as decreasing feed consumption in larger fish.

Saprolegnia was seen in 9.2% of the cases (approximately the same as in 2007 – 8 %). We saw no Channel Catfish Virus cases last year, which may reflect the limited fingerling production in the industry in 2008. The number of anemia cases decreased to 2.7%, and Visceral Toxicosis of Catfish (VTC) was 5.4 % of cases submitted.

We are here to serve the industry and encourage producers to continue to take advantage of the diagnostic service especially during these difficult economic times. Please do not hesitate to have producers contact the laboratory if they have any mortalities. We are more than willing to visit farms and, if possible, provide on-site service.

Highlights

Studies funded by Intervet/Schering-Plough Animal Health are being conducted with the antibiotic florfenicol (Aquaflor®) to evaluate its effectiveness against columnaris disease. The pharmacokinetics of florfenicol are being investigated to better understand the drug's duration in the catfish which will help determine its ability to control mortality from ESC and Columnaris Disease.

The faculty at the ADL are involved in these studies as well as other studies to increase our understanding of the both *Edwardisella ictaluri* and *Flavobacterium columnare* in the pond environment which will hopefully allow for predicting outbreaks and possibly better management schemes for these diseases. Molecular methods developed to ascertain the concentration of *Henneyguya ictaluri* in pond water are being extended to other pathogens to help in the development of management schemes for the various diseases.

VTC and Anemia studies are ongoing. We would like to request the assistance of producers and encourage them to submit fish that they believe may have these diseases. Not only will this help us understand the incidences of these diseases but, it will provide us the needed tissues from affected fish to conduct research studies. Since we are unable to induce clinical anemia similar to what is seen on farms, the studies on the effects of

enteral supplementation of iron has been limited as anemic foodfish are required for the studies.

Scientific Publications:

Barko J, Sorenson P, Garvey J, Gaunt P, Hupy C, Thompson F, Mac M, Ritter D, and Bornholdt D. 2008 Science management review: Upper Midwest Environmental Sciences Center Report of the Review Panel, 22 pages.

Camus, AC, PL Shewmaker, MJ Mauel, and DJ Wise. 2008. Streptococcal arthritis, osteolysis, myositis, and spinal meningitis in channel catfish *Ictalurus punctatus* broodstock. *Journal of Aquatic Animal Health*. 20: 54-62.

Gaunt PS. 2008 Efficacy of florfenicol for control of mortality associated with *Streptococcus iniae* in tilapia (*Oreochromis* spp.): a dose titration study. Intervet-SPAH Report no. 49959, 96 pages.

Griffin M, DJ Wise, AC Camus, MJ Mauel, TE Greenway, LM Pote. 2008. A real-time polymerase chain reaction assay for the detection of the myxozoan parasite *Henneguya ictaluri* in channel catfish. *Journal of Veterinary Diagnostic Investigations*. 20(5):559-66.

Griffin M, LM Pote, DJ Wise, TE Greenway, MJ Mauel, AC Camus. 2008. A novel *Henneguya* species from channel catfish described by morphological, histological, and molecular characterization. *Journal of Aquatic Animal Health*. 20(3):127-35.

Mauel MJ, Ware C, P Smith. 2008. Growth of *Piscirickettsia salmonis* on enriched blood agar. *Journal of Veterinary Diagnostic Investigations*. 20(2):213-214.

Soto E, M Lawrence, MJ Mauel. 2008. Improved pulsed-field gel electrophoresis procedure for the analysis of *F. columnare* isolates previously affected by DNA degradation. *Veterinary Microbiology*. 128: 207-212.

Soto E, MJ Mauel, A Karsi, ML Lawrence 2008. Genetic and virulence diversity of *Flavobacterium columnare*. *Journal of Applied Microbiology*. 104: 1302-1310.

Wise DJ, MJ Griffin, JS Terhune, LM Pote and LH Khoo 2008. Induction and evaluation of Proliferative Gill Disease in Channel Catfish Fingerlings. *Journal of Aquatic Animal Health*, 20(4):236-244.

Presentations, Abstracts and Posters:

Beecham RV, MJ Griffin, SB Bailey, DJ Wise, MJ Mauel, LM Pote, CD Minchew. 2008. The effects of proliferative gill disease (PGD) on the blood physiology of channel, blue and hybrid (blue x channel) catfish fingerlings. *Aquaculture America*, Feb 10-13, 2008. Orlando, FL

Gaunt P, Gao D, Sun F., Endris R. Efficacy of Aquaflor® (Florfenicol) in Channel Catfish (*Ictalurus punctatus*) for the control of mortality associated with columnaris disease. *Aquaculture America* 2008, Feb 10-13, 2008, Orlando, FL.

Gaunt P, Gao D, Sun F., Endris R. Efficacy of Aquaflor® (Florfenicol) in Channel Catfish (*Ictalurus punctatus*) for the control of mortality associated with columnaris disease. *Midcontinent Warmwater Fish Culture Workshop*. Feb 4-6, 2008, Paris, AR.

Gaunt P, Gao D, Sun F., Endris R. Columnaris disease: Use of Aquaflor® (Florfenicol) in Channel Catfish (*Ictalurus punctatus*) for the control of mortality. *March Seminar-Alabama Fish Farming Center Greensboro* March 27, 2008, Greensboro, AL

Griffin MJ, DJ Wise, AC Camus, MJ Mauel, TE Greenway and LM Pote. 2008. A real-time polymerase chain reaction assay for the detection and quantification of the myxozoan parasite *Henneguya ictaluri* in commercial channel catfish ponds. Aquaculture America, Feb 10-13, 2008. Orlando, FL.

Griffin MJ, DJ Wise, AC Camus, MJ Mauel, TE Greenway and LM Pote. 2008. Variation in susceptibility of three species of catfish to *Henneguya ictaluri* infection. Aquaculture America, Feb 10-13, 2008. Orlando, FL.

Griffin MJ, DJ Wise, AC Camus, MJ Mauel, TE Greenway and LM Pote. 2008. A Novel *Henneguya* sp. n. from channel catfish *Ictalurus punctatus* described by morphological, histological and genealogical characteristics. Aquaculture America, Feb 10-13, 2008. Orlando, FL.

Khoo, L. 2008 Piscine kidney – tubular and interstitial response to insults. Proceedings of the 33rd Eastern Fish Health Workshop, p 68, Atlantic Beach, NC, Mar 31 – Apr 4, 2008.

Mauel MJ. 2008 Franciselliosis: One of the New Kids on the Block. 33rd Annual Eastern Fish Health Workshop. March 31- April 4, 2008. Atlantic Beach, NC.

Pote LM, MJ Griffin, DJ Wise, L Khoo, A Brandon, A Camus, A Goodwin, TE Greenway and MJ Mauel. 2008. The Myxozoa: New Species and Old Species Behaving Badly. 33rd Annual Eastern Fish Health Workshop. March 31- April 4, 2008. Atlantic Beach, NC.

Mississippi State University - College of Veterinary Medicine

Aquatic Diagnostic Laboratory - Stoneville, MS

2008 Annual Case Summary

Disease Diagnoses as a Percentage of Total Case Submissions (Diagnostic & Research)

Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
<i>Aeromonas hydrophilia</i>						2		1					3	0.4
Anemia			1		1	2		4		2			10	1.5
Anemia, Columnaris (Col)								4					4	0.6
Anemia, Col, Enteric Septicemia (ESC)									1				1	0.1
Anemia, ESC										1			1	0.1
Anemia, Proliferative Gill Dis.(PGD)					1								1	0.1
Columnaris			5	30	2	10	1	11	7	4	3		73	11.5
Columnaris, <i>E. tarda</i>				1	1				1	1			4	0.6
Columnaris, <i>E. tarda</i> , PGD				1									1	0.1
Columnaris, <i>E. tarda</i> , Saprolegniosis				1									1	0.1
Columnaris, ESC				1	1	2	1	22	18	2			47	7.4
Columnaris, ESC, Brown Blood								1		1			2	0.3
Columnaris, ESC, PGD				2	6	3		1	2	1			15	2.3
Columnaris, Ichthyophthirius (Ich)			1										1	0.1
Columnaris, Parasitism			2										2	0.3
Columnaris, PGD			5	16	10	3		1		1	1		37	5.8
Columnaris, PGD, Ich					1								1	0.1
Columnaris, PGD, Saprolegnia			2	8									10	1.5
Columnaris, Saprolegnia	4	2	15	2							3	1	27	4.2
Columnaris, Saprolegniosis, Ich			1										1	0.1
Columnaris, Trematode				1									1	0.1
Col, Visceral Toxicosis (VTC) confirmed			1										1	0.1
Dermocystidium, presumptive							1						1	0.1
ESC			2			2	6	10	3	4	1		28	4.4
ESC, <i>E. tarda</i>									1				1	0.1
ESC, <i>E. tarda</i> , <i>Aeromonas</i> , PGD										1			1	0.1

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ESC, <i>E. tarda</i> , Columnaris, PGD					1								1	0.10
ESC, PGD				2	1	1		3	4	1	3		15	2.30
ESC, Saprolegnia			1										1	0.10
ESC, VTC, suspect				1									1	0.10
<i>E. tarda</i>					2	1	2	1	5		2		13	2.00
<i>E. tarda</i> , PDG, ESC					2				1				3	0.40
<i>E. tarda</i> , PGD				7	4				1				12	1.90
Gas Bubble Disease							1		7				8	1.20
Health Check			1				1						2	0.30
Ich			2										2	0.30
Klebsiella							1						1	0.10
Nematodes								8					8	1.20
No Evidence of Infectious Disease	4	7	17	13	9	15	12	9	12	5	6	1	110	17.40
Parasitism	5	4	2										11	1.70
Parasitism, Saprolegnia		1	2										3	0.40
PGD	2	5	12	45	15	8	5	1	1	4	2		100	15.80
PGD, Microcystin Toxicity		1											1	0.10
PGD, Parasitism			1	3									4	0.60
PGD, Saprolegnia		2	2										4	0.60

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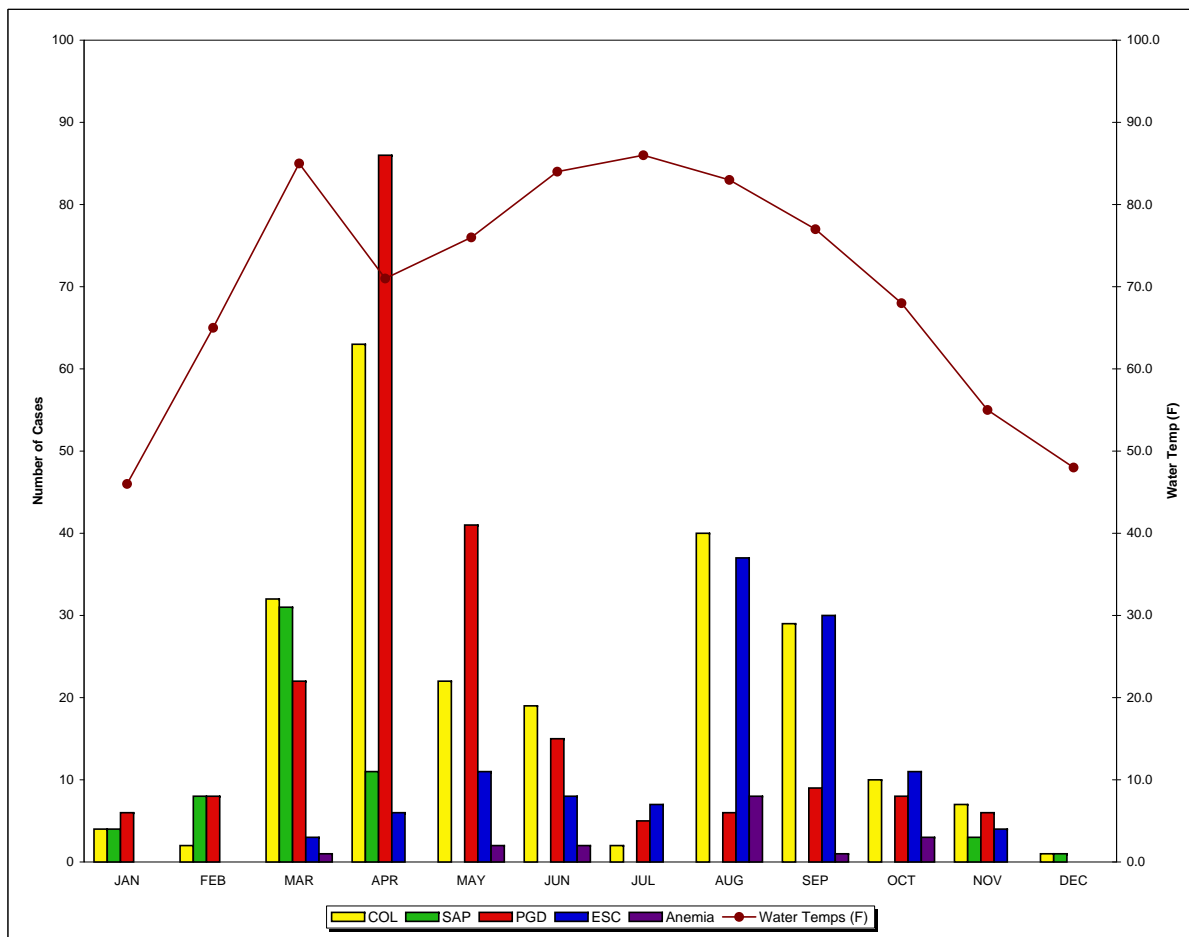
**Aquatic Diagnostic Laboratory - Stoneville, MS
2008 Annual Case Summary**

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Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
PGD, VTC, confirmed	2												2	0.3
PGD, VTC, suspect	2												2	0.3
Saprolegnia		3	8										11	1.7
Streptococcus spp, Columnaris						1							1	0.1
Trematodes, PGD				1									1	0.1
Undetermined	1		4	2	1	1		1					10	1.5
Visceral Toxicosis of Catfish, conf.	2		3	2								1	8	1.2
VTC, presumptive	3	3	6	4							2		18	2.8
VTC, confirmed, Parasitism			1										1	0.1
VTC, confirmed, PGD, E.tarda				1									1	0.1
Cases submitted by Farmers	24	28	95	142	51	42	26	70	49	23	4	0	554	87.9
Cases submitted for Research	1	0	2	2	7	9	5	8	15	5	19	3	76	12.0
Catfish Cases	25	28	97	142	58	49	29	76	59	27	22	3	615	97.0
Other Species				2		2	2	2	5	1	1		15	2.4
TOTALS													630	100.0
Water Farms	8	5	13	19	10	7	10	10	6	10	5	3	106	
Quality Ponds	66	65	112	103	180	76	186	28	42	39	84	26	1007	

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 2008 Annual Case Summary
 Seasonal Occurrence of Major Farm Diseases

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
COL	4	2	32	63	22	19	2	40	29	10	7	1	231
SAP	4	8	31	11	0	0	0	0	0	0	3	1	58
PGD	6	8	22	86	41	15	5	6	9	8	6	0	212
ESC	0	0	3	6	11	8	7	37	30	11	4	0	117
Anemia	0	0	1	0	2	2	0	8	1	3	0	0	17
Water Temps (F)	46.0	65.0	85.0	71.0	76.0	84.0	86.0	83.0	77.0	68.0	55.0	48.0	



Mississippi State University - College of Veterinary Medicine
Aquatic Diagnostic Laboratory - Stoneville, MS
2008 Annual Case Summary

Major Disease Diagnoses as a Percentage of Diagnostic Case Submissions^(*1)

Disease	Total # Disease Cases	% Total Disease Cases
Columnaris	231	36.7%
ESC	117	18.6%
PGD	212	33.7%
Saprolegnia	58	9.2%
CCV	0	0.0%
Anemia	17	2.7%
Brown Blood	2	0.3%
Ich	5	0.8%
VTC	34	5.4%
Health Check ^(*2)	2	0.3%
Bolbophorus	2	0.3%

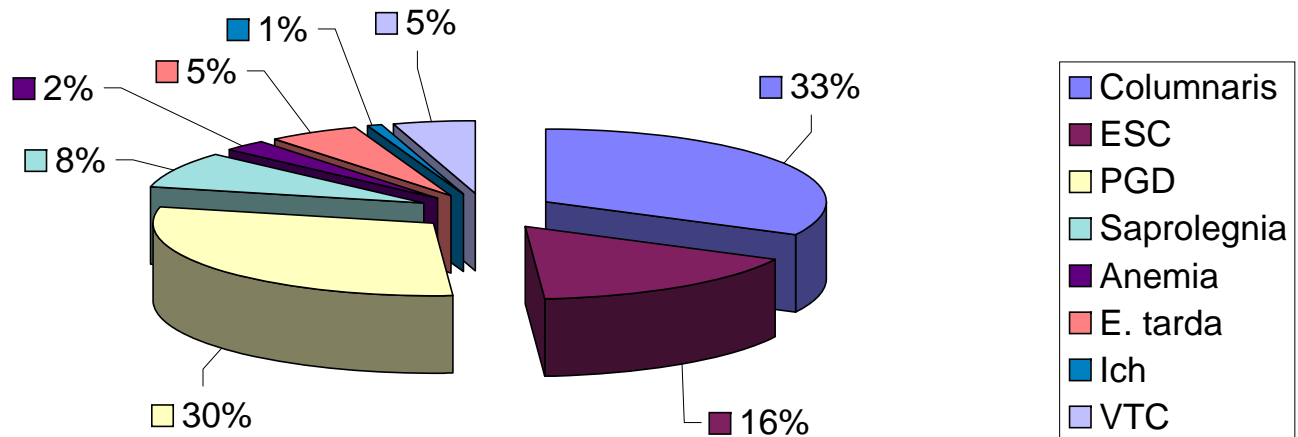
(*1) A case may be represented by more than one disease.

(*2) Cases from healthy ponds for monitoring/pre-purchase exams.

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Aquatic Diagnostic Laboratory - Stoneville, MS
2008 Annual Case Summary
Incidence of Antibiotic Resistance

Organism	# Tested	Romet (%)	Terramycin (%)	Aquaflor® (%)	Romet & Terramycin (%)	Romet & Aquaflor® (%)	Terramycin & Aquaflor® (%)
<i>Flavobacterium columnare</i>	231	0	1(0.43%)	0	0	0	0
<i>Edwardsiella ictaluri</i>	117	0	0	0	0	0	0
<i>Edwardsiella tarda</i>	38	0	1(2.6%)	0	0	0	0
<i>Aeromonas spp.</i>	4	0	0	0	0	0	0

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2008 Annual Case Summary
Major Disease Diagnoses as a Percentage of Diagnostic Case Submissions



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2008 Annual Case Summary
Yearly Trends in Disease Diagnosis as a Percentage of Submissions

Disease	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Average
Columnaris	45.5	42.6	37.2	44.5	44.7	40.9	48.3	68.4	37.5	36.7	44.6%
ESC	41.2	33.5	36.4	39.8	34.7	30.8	33.8	56.5	32.8	18.6	35.8%
PGD	30	29.8	20.1	16.3	10.8	10.7	8.9	17.8	18.4	33.7	19.7%
Saprolegnia	8.7	10.5	10.4	10.1	5.3	3.7	4.1	8.4	8	9.2	7.8%
CCV	1.8	2.3	7.3	5.8	8.9	10.8	9.2	5.9	2	0	5.4%
Anemia	2.8	4.9	5	5.3	5.2	2.1	4.6	4.9	10.7	2.7	4.8%
Ich	0.7	2.7	1.8	2.2	0.5	5	1.3	0.8	0.6	0.8	1.6%
Bolbophorus	1.5	5.6	4.4	2	1.1	2.6	3.6	0.7	1.5	0.3	2.3%
VTC			2.5	2	3.7	3.2	1.0	3.1	1.3	5.4	2.2%
No Pathogens	15.2	15	19.2	16.2	18.3	20.8	12.4	20.3	17.1	17.5	17.2%
Number of Cases	2007	2189	1602	1057	832	778	602	845	1144	630	1168.6