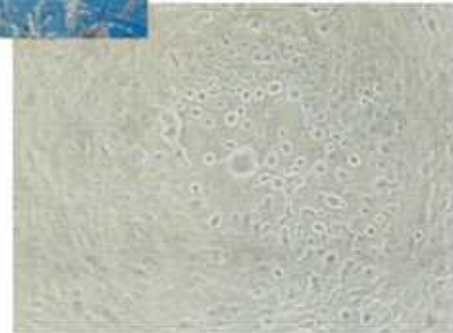
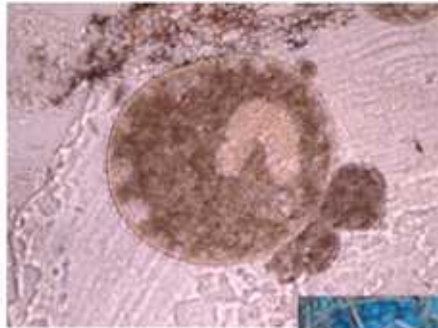


2004 ANNUAL CASE SUMMARY REPORT

AQUATIC DIAGNOSTIC LABORATORY



Mississippi State University
College of Veterinary Medicine

Thad Cochran National Warmwater Aquaculture Center

Stoneville, MS 38776
662-686-3302

DIAGNOSTIC CASE SUMMARY

In 2004, the Aquatic Diagnostic Laboratory (ADL) at Stoneville received a total of 1770 fish case submissions, 778 diagnostic and 992 research. Diagnostic cases were received from 96 farms, or approximately 25% of the Mississippi industry. In addition, 978 water quality samples from 60 farms were analyzed. Compared to 2003, the total number of case submissions decreased slightly from 832, while the number of water samples increased from 851. The Laboratory staff would like to stress that we are here to serve the industry and encourage producers to continue to take advantage of this valuable free service.

As in previous years, the bacterial diseases enteric septicemia of catfish (ESC) and columnaris disease dominated the numbers of producer submitted cases. Examined as a single disease, ESC accounted for 4.3% of cases, but in combination with other agents was diagnosed in 30.7% of cases (34.6% in 2003). While alone, columnaris accounted for 5.7% of cases, in combination with other pathogens, columnaris was present in 40.9% of all cases (44.7% in 2003), making it the most common disease seen by the ADL. ESC and columnaris were diagnosed together in 6.6% of case submissions. These numbers have remained relatively consistent over the past eight years, where on average ESC was diagnosed in 36.4% and columnaris in 43.7% of all cases.

Proliferative gill disease (PGD) was the third most commonly diagnosed disease, representing 10.7% of cases (10.8% in 2003). Saprolegnia, the cause of winter fungus, was present in 3.7% of cases, down from 5.4% in 2003. The number of channel catfish virus (CCV) disease cases rose from 8.9% in 2003 to 10.8% in 2004 and remained above the 8-year average of 5.4%. The number of channel catfish anemia (CCA) cases decreased from 5.2% in 2003 to 2.1% for 2004 and fell below the 8-year average of 3.8%. *Ichthyophthirius multifiliis* (Ich) cases increased from 0.5% last year to 5.0% in 2004, well above the 8-year average of 1.8%. Cases of visceral toxicosis (VTC) remained relatively constant at 3.2% versus 3.7% in 2003.

The percent of *Bolbophorus* trematode cases remained below the high of 5.6% seen in 2000, but rose from 1.1% in 2003. Resurgence of the parasite is largely attributed to the establishment of a resident population of white pelicans in Humphreys County. Farmers are encouraged to renew surveillance efforts for and control numbers of ram's horn snail hosts of the parasite, particularly if pelicans are visiting their ponds. *Bolbophorus* trematodes are capable of killing fingerlings and increasing susceptibility to ESC, as well as decreasing feed consumption in larger fish.

As in the past, 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 incidence in the field. Routine diagnostic procedures include evaluation of gill clips and skin scrapes for parasites, external and internal inspection 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-ES, College of Veterinary Medicine, and USDA-ARS Genetics Unit. Furthermore, the laboratory provides an outlet for the dissemination of information gained from research efforts back to producers.

HIGHLIGHTS

A previously unknown streptococcal bacterial infection causing mortalities, spinal deformities, and reproductive failure in catfish broodstock was identified, characterized, and Koch's postulates fulfilled. To date, four outbreaks have been confirmed, but at present the significance of this emerging disease is unclear. Findings have been submitted in the form of a manuscript to the Journal of Aquatic Animal Health. Producers noting emaciation, humped backs, and bloody sores along the jaw at the time of broodstock selection are encouraged to contact the Laboratory.

Research into the cause of channel catfish anemia (CCA), a well-known but poorly understood cause of mortalities, demonstrated a rapid and complete resolution of the condition in affected fish following the administration of injectable iron in two separate trials. Research into potential causes for the development of iron deficiency anemia is ongoing.

A collaborative working group was formed to continue research into the cause of visceral toxicosis of catfish (VTC). The working group is composed of scientists from the Aquatic Diagnostic Laboratory, MAFES, USDA-ARS-CGU, College of Veterinary Medicine, and State Chemistry Laboratory. In laboratory trials conducted at the ADL, the suspected toxin was found to affect a number of fish species in experimental challenges.

Extensive trials were conducted to evaluate the virulence of an isolate of channel catfish virus causing unusually high mortalities on a farm raising NWAC-103 strain catfish. Although considered preliminary, results of challenge trials indicate the field-isolate produces mortalities approximately twice as high as those caused by the original type strain of CCV archived by the American Type Culture Collection. The NWAC-103 was found to be intermediate in susceptibility to the field isolate in trials performed collaboratively with USDA scientists.

The FDA approval process for use of the antibiotic florfenicol (Aquaflor®) continued to move forward. Final approval of the drug for use in catfish is anticipated in 2005 and will provide farmers a new tool for combating ESC. Following the success of trials in catfish, the Schering-Plough pharmaceutical company funded new drug efficacy and dose titration trials for the use of florfenicol against *Streptococcus iniae* infections in tilapia. The results of these trials will be submitted to the FDA as a component of the drug approval application process.

A graduate student was recruited and has begun development of a real-time PCR assay to quantify numbers of *Henneguya ictaluri* spores in pond water. When validated, the assay will be used to predict proliferative gill disease outbreaks and evaluate the efficacy of control measures.

Drs. Camus and Gaunt served as Organizing Committee Members for the Animal Disease Research Workers in Southern States, Southern Conference of Researchers in Aquatic Diseases, and Southern Conference on Animal Parasites meetings. Dr. Camus chaired the 9th Biennial Fish Diagnosticians Workshop, hosted by MSU-CVM. Dr. Camus participated in the National Aquatic Animal Health Plan Work Group to develop Warmwater Finfish Disease Program Standards. Faculty attended various national fish health meetings including the American Fisheries Society-Fish Health Section, USFWS 10th Annual Investigational New Drug Workshop, World Aquaculture Society, and Eastern Fish Health Meeting.

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BOOK CHAPTERS

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Gaunt, P. Overview of Florfenicol Research in Channel Cafish: Efficacy, Safety, Residue Depletion Studies, and Application to the Catfish Industry. NWAC Fall Seminar. Stoneville, Mississippi.

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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	%
Columnaris (Col)	0	0	8	18	8	8	16	28	10	3	1	0	100	5.65%
Col, Enteric Septicemia (ESC)	0	0	0	0	8	7	17	41	29	11	0	0	113	6.38%
Col, Channel Catfish Anemia (CCA), ESC	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
Columnaris & Ich	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
Columnaris, Parasitism	0	0	1	3	0	0	0	0	0	0	0	0	4	0.23%
ESC, Columnaris, Parasitism	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
ESC	0	0	0	0	5	1	13	22	18	16	1	0	76	4.29%
ESC, Columnaris, & PGD	0	0	0	0	0	2	0	0	0	0	0	0	2	0.11%
ESC & Parasitism	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
CCV	0	0	0	0	0	37	14	0	1	0	0	0	52	2.94%
CCV & Columnaris	0	0	0	0	0	4	12	4	1	0	0	0	21	1.19%
CCV, ESC, & Columnaris	0	0	0	0	0	0	1	0	1	0	0	0	2	0.11%
CCV & ESC	0	0	0	1	1	0	2	2	0	1	0	0	7	0.40%
CCA	0	0	0	0	1	0	1	2	1	1	0	0	6	0.34%
CCA & Columnaris	0	0	0	1	1	0	0	2	0	1	1	0	6	0.34%
CCA & PGD	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06%
CCA, Columnaris, & Saprolegnia (SAP)	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06%
Brown Blood & ESC	0	0	0	0	0	0	0	0	0	1	1	0	2	0.11%
Brown Blood, ESC, & Columnaris	0	0	0	0	0	0	0	0	0	1	1	0	2	0.11%
Brown Blood	0	0	0	0	0	0	0	0	0	0	1	0	1	0.06%
Brown Blood & Columnaris	0	0	0	0	0	0	0	0	0	0	1	0	1	0.06%
Visceral Toxicosis of Catfish (VTC)	0	0	14	3	0	0	0	0	0	0	1	0	18	1.02%
VTC (presumptive)	0	0	1	2	0	0	0	0	0	1	1	0	5	0.28%
VTC (presumptive), PGD	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06%
VTC, PGD	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06%

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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	%
Saprolegnia	1	0	11	0	0	0	0	0	0	0	1	0	13	0.73%
Saprolegnia & <i>Edwardsiella tarda</i>	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06%
Saprolegnia, Parasitism	0	0	1	0	0	0	0	0	0	0	0	0	1	0.06%
Saprolegnia, Columnaris, PGD	0	0	0	2	0	0	0	0	0	0	0	0	2	0.11%
Saprolegnia, Col. & Aeromonas	0	0	1	0	0	0	0	0	0	0	0	0	1	0.06%
Saprolegnia, Columnaris	0	0	6	4	0	0	0	0	0	0	0	0	10	0.56%
PGD	0	0	3	20	6	1	0	0	1	0	0	0	31	1.75%
PGD, Columnaris	0	0	1	16	3	0	0	0	0	1	0	0	21	1.19%
PGD, ESC	0	0	1	0	5	0	0	0	0	2	0	0	8	0.45%
PGD & Parasitism	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06%
PGD & Ich	0	0	1	0	0	0	0	0	0	0	0	0	1	0.06%
PGD, Columnaris, & Parasitism	0	0	0	1	0	0	0	0	0	0	0	0	1	0.06%
Parasitism	0	0	3	1	0	0	0	0	1	0	2	0	7	0.40%
PGD, Columnaris, & ESC	0	0	0	0	9	0	1	0	0	2	0	0	12	0.68%
Aeromonas, Plesiomonas	0	0	1	0	0	0	0	0	0	0	0	0	1	0.06%
Aeromonas & CCA	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
Aeromonas, Columnaris	0	0	0	0	0	0	1	0	0	0	0	0	1	0.06%
<i>Aeromonas hydrophila</i>	0	0	0	0	1	4	3	0	1	0	0	0	9	0.51%
Aeromonas & ESC	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
Aeromonas & Pseudomonas	0	0	0	0	0	2	1	1	0	0	0	0	4	0.23%
Aeromonas & Trematode	0	0	0	0	0	0	1	0	0	0	0	0	1	5.00%
Aeromonas, CCV, & Columnaris	0	0	0	0	0	0	1	0	0	0	0	0	1	0.06%
Aeromonas & PGD	0	0	0	0	0	0	1	0	0	0	0	0	1	0.06%
Aeromonas, Columnaris, Parasitism	0	0	0	0	0	0	0	0	0	0	1	0	1	0.06%
Ich	7	25	5	0	0	0	0	0	0	0	0	0	37	2.09%
Tarda	0	0	0	0	0	0	1	0	0	0	0	0	1	0.06%
<i>Pseudomonas aeruginosa</i>	0	0	0	0	0	0	0	0	0	0	1	0	1	0.06%

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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	%
Red Spot Filets & Columnaris	0	0	0	0	0	0	0	0	1	0	0	0	1	0.06%
Branchiomyces	0	0	0	0	0	3	0	0	0	0	0	0	3	0.17%
Branchiomyces & CCV	0	0	0	0	0	1	0	0	0	0	0	0	1	0.06%
Branchiomyces & Columnaris	0	0	0	0	0	0	1	0	0	0	0	0	1	0.06%
Streptococcus	0	0	0	0	0	0	0	1	0	0	0	0	1	0.06%
Trematode & ESC	0	0	0	0	0	0	2	0	0	0	0	0	2	0.11%
Trematode, Columnaris	0	0	0	0	0	0	0	2	0	0	0	0	2	0.11%
Trematode	0	0	0	0	0	2	3	1	0	0	0	0	6	0.34%
Trematode, Col, ESC	0	0	0	0	0	5	0	0	3	1	0	0	9	0.51%
Trematode & Parasites	0	0	1	0	0	0	0	0	0	0	0	0	1	0.06%
Research	2	4	33	14	8	135	23	53	238	369	98	15	992	56.05%
<i>Aphanomyces invadens</i>	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
Health Check	13	5	15	32	7	39	22	5	16	5	2	1	162	9.15%
Fungus	0	0	0	0	1	0	0	0	0	0	0	0	1	0.06%
Cases submitted by Farmers	21	21	74	110	63	116	114	111	84	47	16	1	778	43.95%
Cases submitted for Research	2	4	33	14	8	135	23	53	238	369	98	15	992	56.05%
Catfish Cases	22	23	106	123	69	247	136	160	321	416	111	16	1750	98.9%
Other Species	1	2	1	1	2	4	1	4	1	0	3	0	20	1.1%
TOTALS	23	25	107	124	71	251	137	164	322	416	114	16	1770	100%
Water	7	4	13	20	18	17	14	15	17	16	6	2	149	
Quality	49	27	68	141	112	148	24	54	135	110	54	56	978	

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

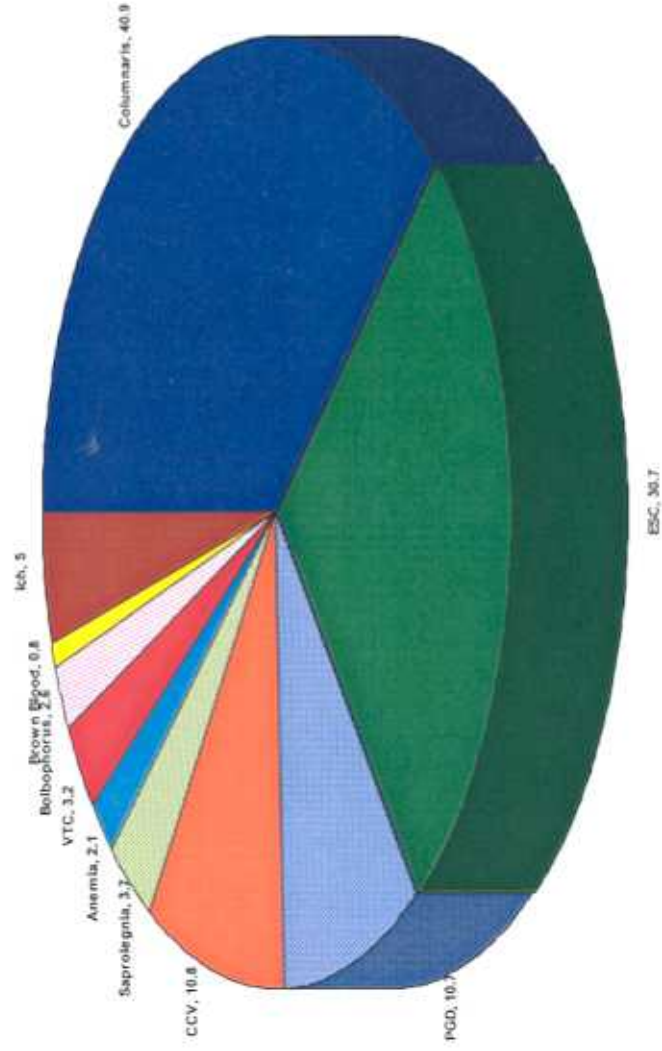
Disease	Total # Disease Cases	% Total Disease Cases
Columnaris	318	40.9%
ESC	239	30.7%
PGD	83	10.7%
Saprolegnia	29	3.7%
CCV	84	10.8%
Anemia	16	2.1%
Brown Blood	6	0.8%
Ich	39	5.0%
VTC	25	3.2%
Health Check ^(*)	162	20.8%
Bolbophorus	20	2.6%

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

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

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Major Disease Diagnoses as a Percentage of Diagnostic Case Submissions



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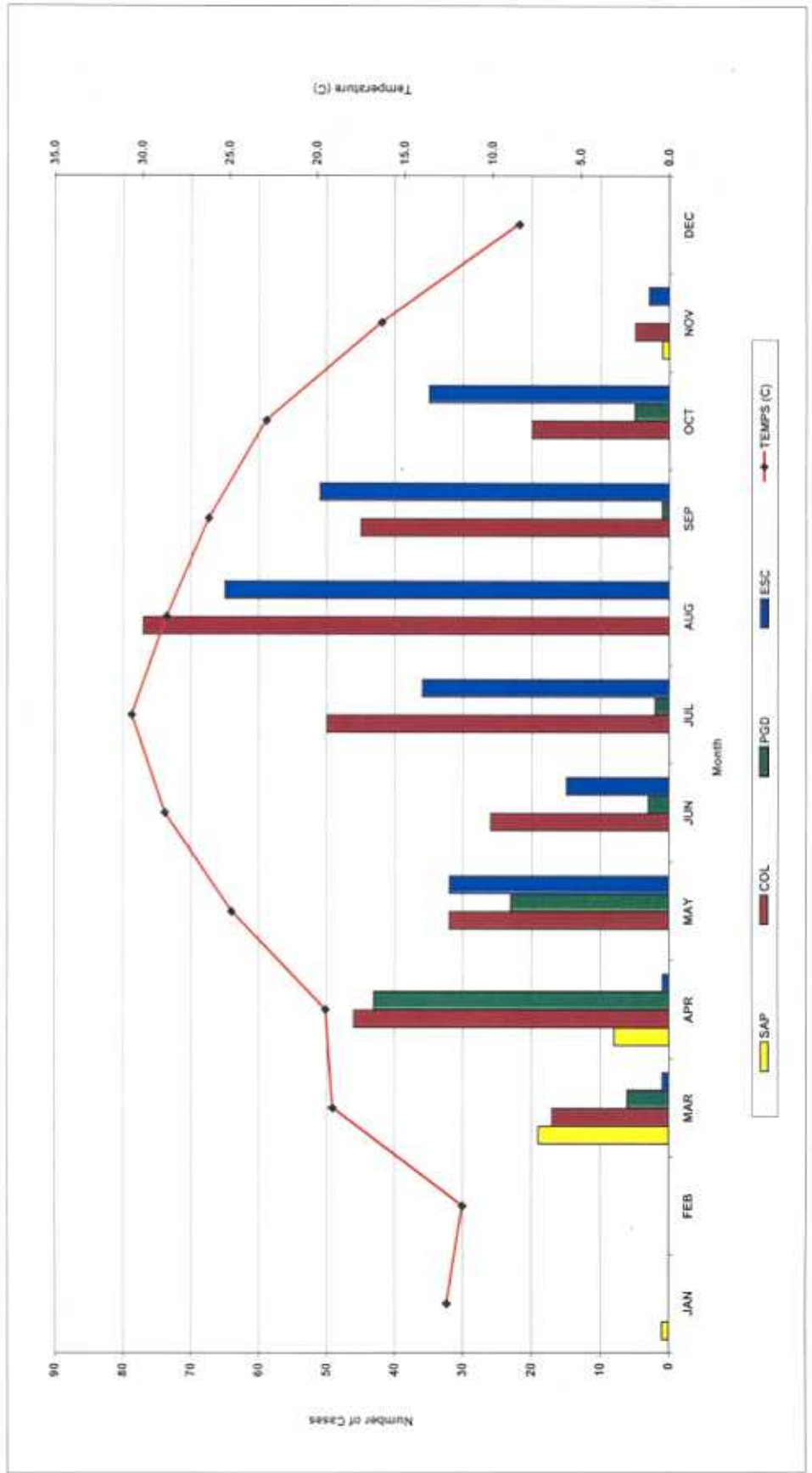
Trends in Disease Diagnoses as a Percentage of Diagnostic Case Submissions Over Time

Average	Disease	2004	2003	2002	2001	2000	1999	1998	1997
44.1%	Columnaris	40.9	44.7	44.5	37.2	42.6	45.5	44.8	49.1
37.2%	ESC	30.8	34.7	39.8	36.4	33.5	41.2	41.2	33.6
21.7%	PGD	10.7	10.8	16.3	20.1	29.8	30	16.3	28.6
8.6%	Saprolegnia	3.7	5.3	10.1	10.4	10.5	8.7	8.6	6.4
4.6%	CCV	10.8	8.9	5.8	7.3	2.3	1.8	3.1	3
4.0%	Anemia	2.1	5.2	5.3	5	4.9	2.8	3.0	1.7
1.3%	Ich	5	0.5	2.2	1.8	2.7	0.7	0.5	0.8
2.9%	Bolbophorus	2.6	1.1	2	4.4	5.6	1.5		
2.7%	VTC	3.2	3.7	2	2.5				
15.6%	No Pathogens Found	20.8	18.3	16.2	19.2	15	15.2	11.4	13.6
1452	Number of Cases	778	832.0	1057	1602	2189	2007	1647	831

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Seasonal Occurrence of Major Farm Diseases

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTALS
SAP	1	0	19	8	0	0	0	0	0	0	1	0	29
COL	0	0	17	46	32	26	50	77	45	20	5	0	318
PGD	0	0	6	43	23	3	2	0	1	5	0	0	83
ESC	0	0	1	1	32	15	36	65	51	35	3	0	239
TEMPS (C)	12.6	11.7	19.1	19.5	24.9	28.7	30.6	28.6	26.2	22.9	16.3	8.5	



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Incidence of Antibiotic Resistance

Organism	# Tested	Romet Only	Percent	Terramycin Only	Percent	Both	Percent
<i>Flexibacter columnare</i>	318	0	0.0%	1	0.0%	0	0.0%
<i>Edwardsiella ictaluri</i>	239	0	0.0%	0	0.0%	0	0.0%
<i>Pseudomonas</i>	1	0	0.0%	0	0.0%	1	100.0%

MISSION

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 effect profitability. These goals can only be accomplished through mutual respect, cooperation, and the maintenance of a close supportive relationship with our clients.