2007 ANNUAL CASE SUMMARY REPORT AQUATIC DIAGNOSTIC LABORATORY

Mississippi State University
College of Veterinary Medicine
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Stoneville, MS 39776
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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 effect profitability. These goals can only be accomplished through mutual respect, cooperation, and the maintenance of a close supportive relationship with our clients.

2007 CVM AQUATIC DIAGNOSTIC LABORATORY SUMMARY

Diagnostics

In 2007, the Aquatic Diagnostic Laboratory (ADL) at Stoneville received a total of 999 fish diagnostic cases. These cases were received from 97 different farms. This is an 18% increase in the number of submissions over the 845 cases in 2006. There were 1117 water quality samples that were analyzed representing a 17% increase over the 954 samples received in 2006.

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 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 information gained from research efforts back to producers.

Bacterial diseases again dominated the number of cases submitted. Columnaris as a single disease by itself account for 102 cases but in combination of multiple diseases was seen in 429 submissions, a 3% increase from the previous year. There were 124 cases of Enteric Septicemia of Catfish by itself and in combination with other diseases was seen in 375 of submissions, a 9% increase. The continued increase in the last couple of years may be attributable to the recent introduction of the antibiotic, florfenicol, which is labeled for the control of ESC and also has a conditional approval by the FDA for use in control of Columnaris disease. It is dispensed by a Veterinary Feed Directive order from

a licensed veterinarian and producers are encouraged to submit fish immediately if they suspect disease is occurring in a pond, and if they intend to use *any* medicated feed. 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 18.4% (approximately the same as in the previous years). The other parasitic diseases *Ichthyophthirius multifiliis* (Ich) was only 0.6% which about the same as in 2006 (0.8%), while *Bolbophorus* trematode cases comprised 1.5% of cases submitted, which was a slight increase from the previous year (0.7%) and 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* trematodes are capable of killing fingerlings and increasing susceptibility to ESC, as well as decreasing feed consumption in larger fish.

Saprolegnia was seen in 8% of the cases (approximately the same in 2006 – 8.4%). The number of channel catfish virus (CCV) disease cases decreased again to 2.0% from 9.2% in 2005 to 5.9% in 2006. The number of anemia cases increased to 10.7% of the cases and Visceral Toxicosis of Catfish (VTC) was 1.3% of cases submitted.

We are here to serve the industry and encourage producers to continue to take advantage of the diagnostic service.

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Highlights

The antibiotic florfenicol (Aquaflor®) was has been granted conditional approved for use in catfish to control mortality associated with Columnaris. The drug's sponsor Schering–Plough Animal Health has funded new studies to evaluate the effectiveness of florfenicol against columnaris infections. The results of these trials will be submitted to the FDA as a component of the drug approval application process against this disease agent.

The faculty at the ADL are involved in these studies as well as other studies increase our understanding of the both *Edwardisellia ictaluri* and *Flavobacterium columnare* in the pond environment which will hopefully allow for predicting outbreaks and possibly better management schemes for these diseases.

Since the discovery of the association of botulinum type E toxin with VTC, there is continued research in this disease and we would like to continue to enlist the assistance of farmers to bring suspect VTC fish to the Aquatic Diagnostic Laboratory in Stoneville. Ongoing VTC research requires a supply of blood from affected fish and bringing in fish would be a tremendous aid. It will also give us a better idea of the incidence of the disease and allow us to collect pond information that might help in elucidating the source of the toxin.

Molecular methods have been developed to ascertain the concentration of *Henneguya ictaluri* in pond water. This relatively quick method may be used a management tool to ascertain if it is safe to stock fish in the pond.

We are also continuing research into anemia that appears to be increasing in incidence and occurring over a broader range of temperatures. Since the successful initial trials using parenteral iron, there has been yet another separate trial looking at both parentral and limited enteral iron supplementation. The former method yield similar results to the earlier trials but the enteral route yielded mixed results.

Scientific Publications:

Silverstein, P., Bosworth B., Gaunt P. (2008) Differential susceptibility of blue catfish, channel catfish and blue x channel hybrids to channel catfish virus. Journal of Fish Diseases 31:77-79.
Gaunt, P., Kalb S.R., Barr J.R. (2007) Detection of botulin type E toxin in channel catfish with visceral toxicosis syndrome using catfish bioassay and endoprep mass spectrometry. Journal of Veterinary Diagnostic Investigation, 19(4):349-354.
Mauel, M.J., Miller D.L., Merrill A.L. (2007) Hematological and serum biochemical values of healthy hybrid tilapia (*Oreochromis aureus* x *Oreochromis nilotica*) maintained in a recirculating system. Journal of Zoo and Wildlife Medicine, 38(3):420-424.
Mauel, M.J., Soto E., Moralis J. Hawke J. (2007) A piscirickettsiosis-like syndrome in cultured tilapia (Oreochromis niloticus) in Latin America with a Francisella sp. As the pathogenic agent. Journal of Aquatic Animal Health, 19(1):27-34.

Presentations, Abstracts and Posters:

Gaunt, P**.** Running a clinical trial, 144th AVMA Annual Convention, Jul 14-18, 2007, Washington D.C.
Gaunt, P. Group Panel Presentations, 144th AVMA Annual Convention, July 14-18, 2007, Washington D.C.
Gaunt, P. MSU CVM Aquatic Diagnostic Laboratory Update, Mississippi Farm Bureau Federation, Aquaculture Summer Commodity Conference. May 10, 2007.
Gaunt, P. Catfish botulism. World Aquaculture Society, Feb 26- Mar 2, 2007, San Antonio, TX.
Gaunt, P. Eficacia de flofenicol (Aquaflor) en tilapia (noloticus de oreochromis) con la infección del estreptococo iniae (presented in Spanish) Feb 26- Mar 2, 2007, San Antonio, TX.
Gaunt P. Aquaflor® for control of mortality associated with ESC: One year later. Fish Diagnosticians Workshop, 10th Biennial Meeting, College Station, TX Feb 10-11, 2007.
Gaunt P. Aquaflor® : How did it start? Fish Diagnosticians Workshop, 10th Biennial Meeting, College Station, TX Feb 10-11, 2007.
Griffin, M., Wise D.J., Mauel, M.J., Camus A.C., Greenway T.E., Pote L.M. Monitoring *Henneguya ictaluri* infection in channel catfish, blue catfish and channel x blue backcross hybrids using histopathology and real-time PCR, Jun4-6 2007. Annual Meeting Fish Health Sections of the American Fisheries Society, Grand Teton National Park, WY.

Soto, E., Lawrence M., Karsi A., Mauel M.J. Genetic and virulence diversity of *Flavobacterium columnare.* Jun 4-6 2007. Annual Meeting Fish Health Sections of the American Fisheries Society, Grand Teton National Park, WY.

Mauel, M.J. Franciselliosis, an emerging disease in fish. Fish Diagnosticians Workshop, 10th Biennial Meeting, College Station, TX Feb 10-11, 2007.

Williams,M.L, Lawrence M.L., Mauel, M.J. DNA fingerprinting of *Edwardsiella ictaluri* using pulsed field gel electrophoresis and repetitive sequence –PCR, 32nd Annual Eastern Fish Health Workshop, Jun 18-22 2007 Gettysburg, PA.

Mississippi State University - College of Veterinary Medicine

Aquatic Diagnostic Laboratory - Stoneville, MS

2007 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	%
Acinetobacter lwoffii	0	0	1	0	0	0	0	0	0	0	0	0	1	0.09%
Aeromonas hydrophilia	0	0	0	0	0	2	1	2	1	0	0	0	6	0.52%
Aeromonas , PGD,	0	0	0	0	0	1	0	0	0	0	0	0	1	0.09%
Anemia, Brown Blood, Columnaris	0	0	0	0	0	0	0	0	0	0	1	0	1	0.09%
Branchiomyces	0	0	0	0	0	1	1	0	0	0	0	0	2	0.17%
Brown Blood (Methemaglobinemia)	0	0	0	0	0	0	0	2	0	1	0	0	3	0.26%
Brown Blood, ESC	0	0	0	0	0	0	0	0	0	1	0	0	1	0.09%
CCA (Channel catfish Anemia)	0	1	0	4	4	22	8	5	18	13	2	0	77	6.73%
CCA, Col, ESC(Enteric Septicmia)	0	0	0	0	1	2	3	0	3	2	0	0	11	0.96%
CCA, Columnaris (Col)	0	0	0	0	0	1	4	3	2	4	2	1	17	1.49%
CCA, Columnaris, PGD	0	0	1	0	0	0	0	0	0	0	0	0	1	0.09%
CCA, ESC	0	0	0	0	1	3	1	0	0	2	0	0	7	0.61%
CCA, ESC, Parasitism	0	0	0	0	1	0	0	0	0	0	0	1	2	0.17%
CCA, ESC, PGD	0	0	0	0	1	0	0	0	0	0	0	0	1	0.09%
CCA, Parasitism	0	0	0	0	0	0	0	1	0	0	0	0	1	0.09%
CCA, PGD	0	0	0	0	0	1	0	1	0	0	0	0	2	0.17%
CCA, Saprolegnia	0	0	0	0	0	0	0	0	0	0	0	1	1	0.09%
CCA, VTC	0	0	0	0	0	0	0	0	0	0	0	1	1	0.09%
CCV	0	0	0	0	0	3	6	0	0	0	0	0	9	0.79%
CCV, Columnaris, ESC	0	0	0	0	0	0	1	0	2	0	0	0	3	0.26%
CCV, Columnaris	0	0	0	0	0	1	5	1	4	0	0	0	11	0.96%
Clinostomum	1	0	0	1	0	0	0	0	0	0	0	0	2	0.17%
Columnaris	1	0	20	25	7	2	12	6	21	2	3	3	102	8.92%
Columnaris, *E. tarda*	0	0	0	0	0	0	0	2	0	0	0	0	2	0.17%
Columnaris, *E. tarda* , Parasitism	0	0	0	1	0	0	0	0	0	0	0	0	1	0.09%
Columnaris, *E. tarda,* PGD	0	0	0	1	0	0	0	0	0	0	0	0	1	0.09%

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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, ESC	0	0	0	5	23	7	37	4	60	22	0	0	158	13.81%
Columnaris, ESC, Parasitism	0	0	0	1	3	1	0	0	0	0	0	0	5	0.44%
Columnaris, ESC, PGD	0	0	0	6	8	0	2	1	6	4	0	0	27	2.36%
Columnaris, ESC, Saprolegnia	0	0	0	0	0	0	0	0	0	0	0	2	2	0.17%
Columnaris, ESC, Trematode	0	0	0	0	0	0	0	0	2	0	0	0	2	0.17%
Columnaris, Ich	0	0	0	2	0	0	0	0	0	0	0	0	2	0.17%
Columnaris, Ich	0	0	0	2	0	0	0	0	0	0	0	0	2	0.17%
Columnaris, Parasitism	0	0	2	1	2	1	0	0	0	0	0	0	6	0.52%
Columnaris, PGD	0	0	5	27	5	0	0	0	0	1	0	0	38	3.32%
Columnaris, PGD, Saprolegnia	0	0	4	4	0	0	0	0	0	0	0	1	9	0.79%
Columnaris, Saprolegnia	0	2	10	11	1	0	0	0	0	0	0	3	27	2.36%
Columnaris, Trematode	0	0	0	0	0	1	1	1	0	0	0	0	3	0.26%
Death by Trauma	1	0	0	0	0	0	0	1	0	0	0	0	2	0.17%
E. tarda	0	0	2	0	1	3	1	0	6	2	1	1	17	1.49%
E. tarda , PGD	0	0	0	0	4	0	0	0	0	0	0	0	4	0.35%
ESC	0	0	3	3	13	11	39	12	24	19	0	0	124	10.84%
ESC, Parasitism	0	0	0	0	1	0	0	0	0	0	0	0	1	0.09%
ESC, Parasitism, PGD	0	0	0	0	1	0	0	0	0	0	0	0	1	0.09%
ESC, PGD	0	0	3	6	7	3	1	4	3	0	0	0	27	2.36%
ESC, Saprolegnia	0	0	0	0	0	0	0	0	0	0	1	1	2	0.17%
ESC, Trematode	0	0	0	0	0	1	0	0	0	0	0	0	1	0.09%
Health Check	1	2	1	0	0	0	0	0	0	0	0	0	4	0.35%
Ich	1	0	1	3	0	0	0	0	0	0	0	0	5	0.44%
No Evidence of Infectious Disease	0	4	16	29	28	38	16	24	20	14	4	3	196	17.13%
Parasitism	0	0	1	2	1	2	0	0	0	0	1	2	9	0.79%

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Disease	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	%
Parasitism, Saprolegnia	1	0	0	0	0	0	0	0	0	0	0	1	2	0.17%
PGD	1	3	16	48	10	3	0	3	0	0	0	5	89	7.78%
PGD, Parasitism	0	0	2	0	0	0	0	0	0	0	0	0	2	0.17%
PGD, Saprolegnia	0	1	4	2	0	0	0	0	0	0	0	0	7	0.61%
Saprolegnia	2	18	14	3	0	0	0	0	0	1	1	2	41	3.63%
Possible CCA	0	0	1	3	0	0	0	0	0	0	0	0	4	0.35%
Research	0	0	0	0	31	0	0	0	0	0	0	0	31	2.71%
Trematode	0	0	0	1	0	8	2	0	0	0	0	0	11	0.96%
Undetermined	0	0	1	0	2	0	0	1	0	0	0	0	4	0.35%
VTC (presumptive)	0	3	2	0	0	0	0	0	0	0	1	1	7	0.61%
Cases submitted by Farmers	6	32	99	184	117	104	130	60	136	85	17	29	999	87.33%
Cases submitted for Research	5	2	11	6	40	14	11	14	36	4	0	2	145	12.67%
Catfish Cases	10	34	108	189	154	118	141	74	172	84	16	28	1128	98.6%
Other Species	1	0	2	1	3	0	0	0	0	5	1	3	16	1.1%
TOTALS	11	34	110	190	157	118	141	74	172	89	17	31	1144	100%
Water Farms	2	7	21	29	22	22	22	16	24	14	10	11	200	
Quality Ponds	27	45	64	134	133	141	46	56	159	132	97	83	1117	

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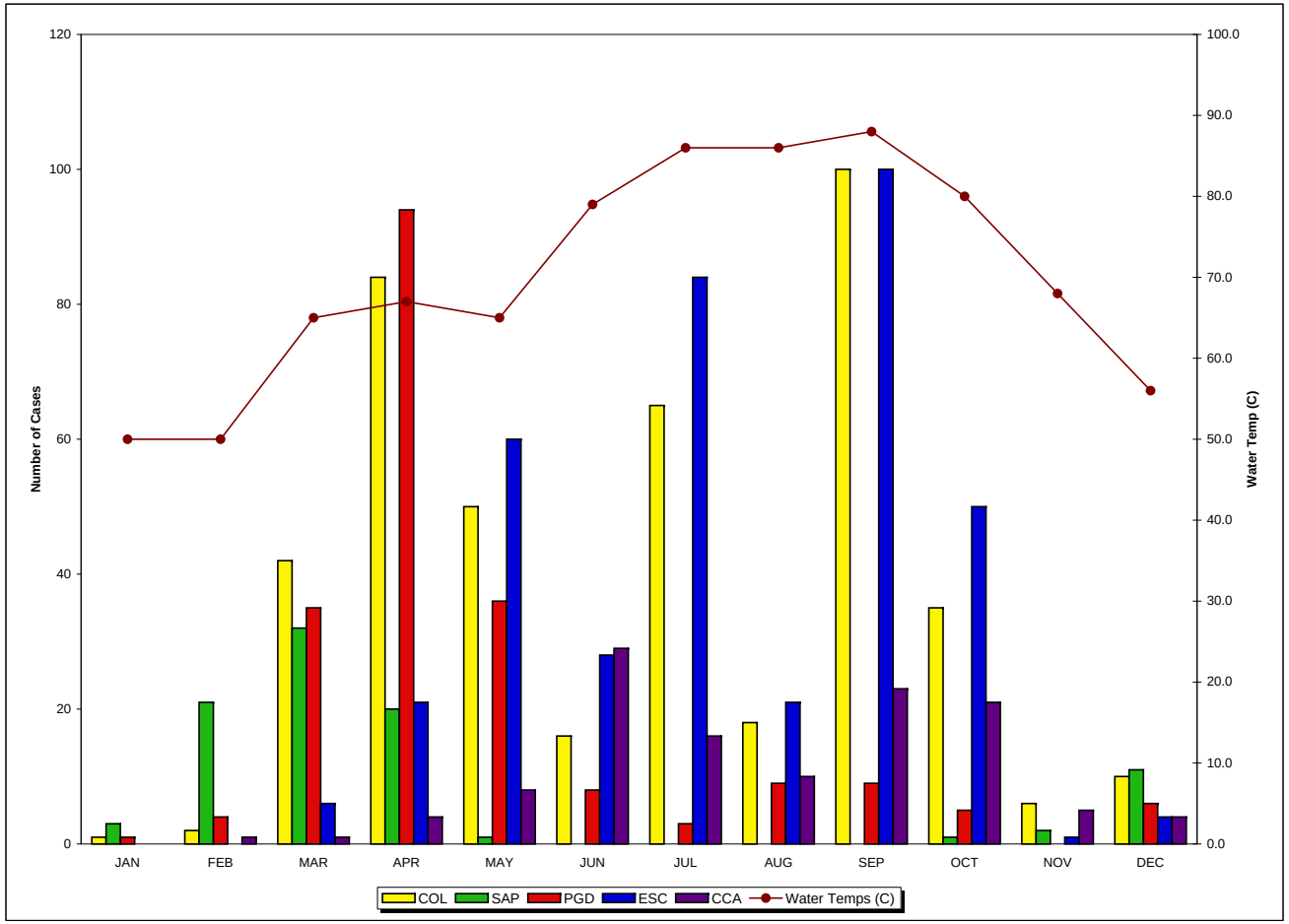
2007 Annual Case Summary

Seasonal Occurrence of Major Farm Diseases

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAl
COL	1	2	42	84	50	16	65	18	100	35	6	10	**429**
SAP	3	21	32	20	1	0	0	0	0	1	2	11	**91**
PGD	1	4	35	94	36	8	3	9	9	5	0	6	**210**
ESC	0	0	6	21	60	28	84	21	100	50	1	4	**375**
CCA	0	1	1	4	8	29	16	10	23	21	5	4	**122**
Water Temps (C)	50.0	50.0	65.0	67.0	65.0	79.0	86.0	86.0	88.0	80.0	68.0	56.0	



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Aquatic Diagnostic Laboratory - Stoneville, MS

2007 Annual Case Summary

Major Disease Diagnoses as a Percentage of Diagnostic Case Submissions[*1]

Disease	Total # Disease Cases	% Total Disease Cases
Columnaris	429	37.5%
ESC	375	32.8%
PGD	210	18.4%
Saprolegnia	91	8.0%
CCV	23	2.0%
Anemia	122	10.7%
Brown Blood	5	0.4%
Ich	7	0.6%
VTC	15	1.3%
Health Check [*2]	4	0.3%
Bolbophorus	17	1.5%

[*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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Incidence of Antibiotic Resistance

Organism	# Tested	Romet (%)	Terramycin (%)	Aquaflor® (%)	Romet & Terramycin (%)	Romet & Aquaflor® (%)	Terramycin & Aquaflor® (%)
Flexibacter columnare	**429**	0	0	0	0	0	0
Edwardsiella ictaluri	**375**	0	0	0	0	0	**7(1.87%)**
Edwardsiella tarda	**25**	0	**1(4.00%)**	0	**2(8.00%)**	0	0
Aeromonas spp.	**7**	0	0	0	0	0	0

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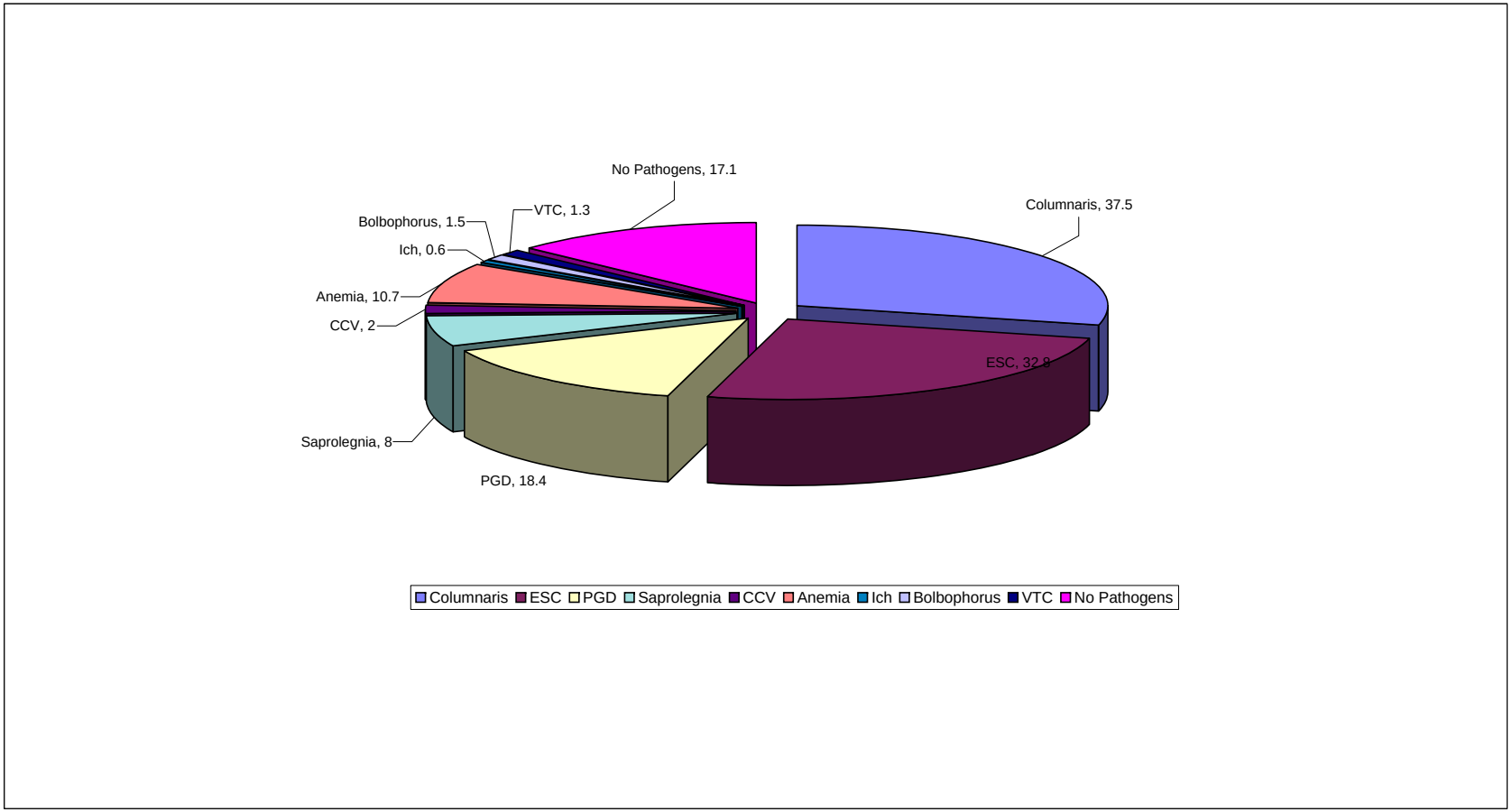
2007 Annual Case Summary
Major Disease Diagnoses as a Percentage of Diagnostic Case Submissions



Mississippi State University - College of Veterinary Medicine

Aquatic Diagnositc Laboratory- Stoneville, MS

2007 Annual Case Summary

Yearly Trends in Disease Diagnosis as a Percentage of Submissions

Disease	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average
Columnaris	45.5	42.6	37.2	44.5	44.7	40.9	48.3	68.4	37.5	45.5%
ESC	41.2	33.5	36.4	39.8	34.7	30.8	33.8	56.5	32.8	37.7%
PGD	30	29.8	20.1	16.3	10.8	10.7	8.9	17.8	18.4	18.1%
Saprolegnia	8.7	10.5	10.4	10.1	5.3	3.7	4.1	8.4	8	7.7%
CCV	1.8	2.3	7.3	5.8	8.9	10.8	9.2	5.9	2	6.0%
Anemia	2.8	4.9	5	5.3	5.2	2.1	4.6	4.9	10.7	5.1%
Ich	0.7	2.7	1.8	2.2	0.5	5	1.3	0.8	0.6	1.7%
Bolbophorus	1.5	5.6	4.4	2	1.1	2.6	3.6	0.7	1.5	2.6%
VTC			2.5	2	3.7	3.2	1.0	3.1	1.3	1.9%
No Pathogens	15.2	15	19.2	16.2	18.3	20.8	12.4	20.3	17.1	17.2%
Number of Cases	2007	2189	1602	1057	832	778	602	845	1144	1228