2006 annual report

Veterinary Diagnostic Laboratory

College of Veterinary Medicine
Iowa State University
Ames, Iowa

IOWA STATE UNIVERSITY

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VDL Mission Statement

It is the mission of the Iowa State University Veterinary Diagnostic Laboratory to provide comprehensive and cutting edge diagnostic services to veterinarians, producers, and animal owners in Iowa and nationally. The lab is responsible for delivering accessible, timely, accurate, valid, and consistent test results to aid in the protection of animal and human health. Other services include a wide range of surveillance testing for early detection and identification of foreign animal and emerging domestic disease agents, as well as acts of bioterrorism directed at human and livestock populations and agricultural food supplies. The VDL also provides educational opportunities to professional and graduate students, as well as local, national and international scientists, diagnosticians and practitioners. Research is an important component of the tripartite mission as faculty and staff develop state-of-the-art diagnostic tools and techniques and also direct studies which provide new insights and deeper understanding of pathogenesis, transmission, and immunomodulation of infectious diseases.

Message from VDL Director of Operations

Dear Clients, Colleagues and Friends of the ISU VDL,

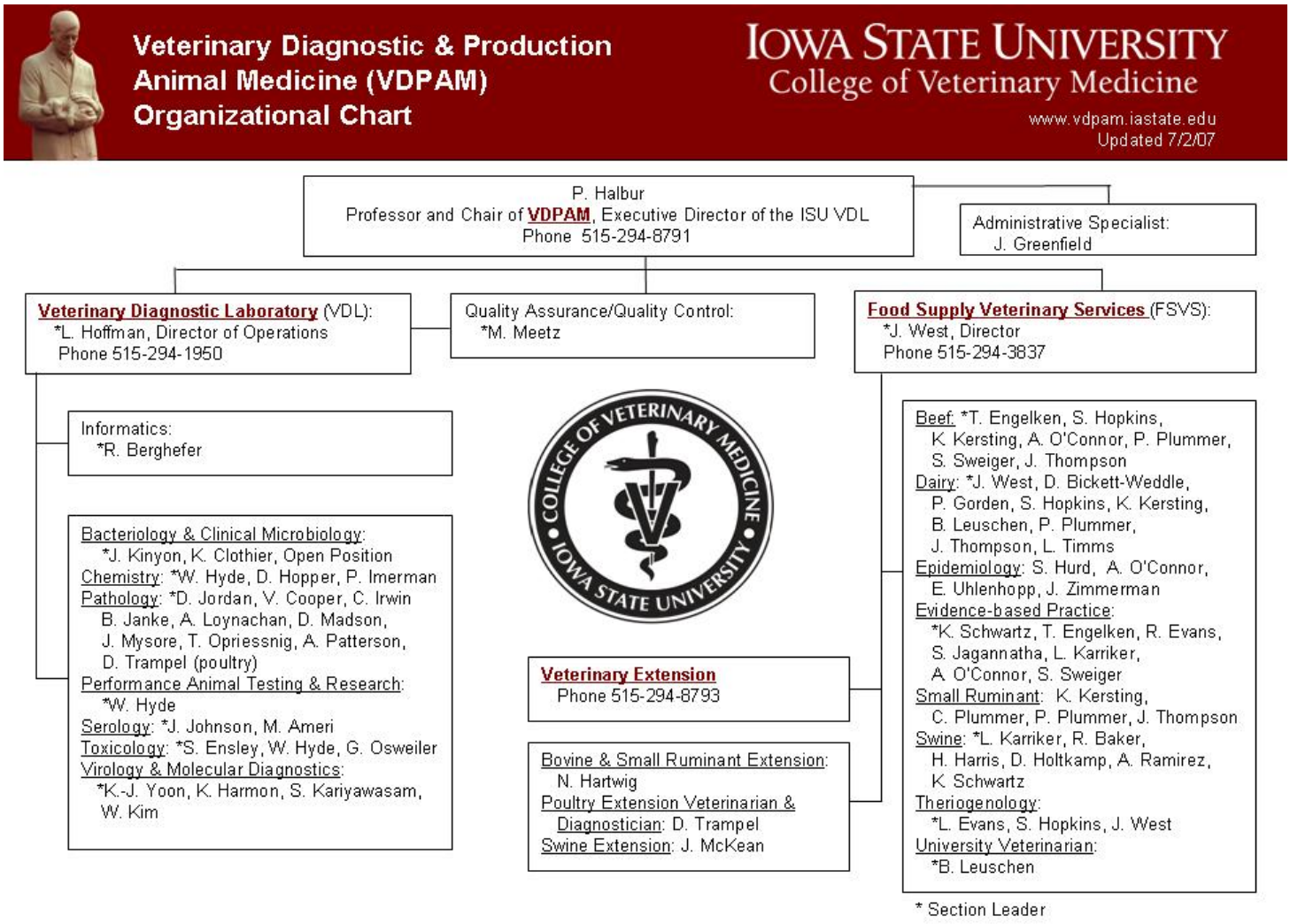
After 32 years in my role as bacteriology section leader, I am honored and humbled by the opportunity to serve as Director of Operations in the ISU VDL. I have always been passionate about quality service and supporting the outstanding people whom we employ in the laboratory, and now I can engage in frontline change and vision with Dr Halbur and Dean Thomson, two of the most incredibly dedicated and talented leaders in the veterinary community. They truly understand the necessity of blending excellent diagnostic services, outstanding research, competent teaching, and energetic outreach so that our goal of achieving premier leadership and quality in diagnostics and production medicine can be built and sustained.

We hope you enjoy this compilation of diagnostic accession statistics and case information for calendar year 2006, as well as highlights and special achievements from each section including Quality Assurance, Information Technology, Bioanalytical Services and Molecular Diagnostics, areas of extraordinary growth in the past year. We know you will be interested in the section that captures the incredible professional achievements of individual faculty and staff.....we are very proud of their many contributions in service, but equally so in research and teaching.

Best wishes and thank you for continued confidence in our services,

Lorraine Hoffman, Ph.D.

VDPAM Organizational Chart



VDPAM Advisory Board

Name	Title/Position	Company/Clinic	City
Dr Pat Halbur	Chair of VDPAM, Executive Director of the ISU VDL	ISU College of Vet Med, VDPAM	Ames, IA
Dr James West	Director of Food Supply Veterinary Services (FSVS)	ISU College of Vet Med, VDPAM	Ames, IA
Dr Lorraine Hoffman	Director of Operations, ISU VDL	ISU College of Vet Med, VDPAM	Ames, IA
Dr Duane Acker	Former Undersecretary of Agriculture, former University President, former Dean, former Department Chair	ISU Animal Science Collaborating Professor	Atlantic, IA
Dr Mark Brinkman	Progressive practitioner with swine, beef, and small animal focus	Veterinary Medical Center	Williamsburg, IA
Kevin & Terri Carstensen	Chair of the Iowa Beef Industry Council - Terri President of the ICA - Kevin Beef producers	Iowa Beef Industry Council, Iowa Cattlemen's Association	Odebolt, IA
Dr Jerry DeWitt	Director of the Leopold Center for Sustainable Agriculture	ISU Dept of Ag	Ames, IA
Dr Ann Garvey	State Public Health Veterinarian	Iowa Dept. of Public Health	Des Moines, IA
Dr John Hicks	Progressive practitioner with swine and beef focus	Carroll Veterinary Clinic	Carroll, IA
Steve Kerns	Immediate Past President IPPA, pork producer, seedstock producer	Kerns Farms	Clearfield, IA
Dr W. Eugene Lloyd	Toxicologist, Entrepreneur, lead donor of the W. Eugene and Linda Lloyd Veterinary Teaching Hospital at the ISU CVM	Lloyd, Inc	Shenandoah, IA
Eric Lyons	Dairy producer		Toledo, IA
Dr Rodger Main	Murphy Brown Western Operations, integrated food supply company	Prestage-Stoecker Farms, Murphy Brown	Ames, IA
Jim McKnight	Iowa Farm Bureau, Board Member, beef and swine producer	Iowa Farm Bureau	Afton, IA
Bill Northey	Iowa Secretary of Agriculture	Department of Agriculture & Land Stewardship	Des Moines, IA
Lucy Norton	Iowa Renewable Fuels Association-Managing Director	Iowa Renewable Fuels Association	Johnston, IA
Dr Jodi Pettit	Progressive practitioner with swine, beef, and small animal focus.	Audubon-Manning Veterinary Clinic	Audubon, IA
Kim Reis	Director, Iowa Turkey Federation	West Liberty Foods	Ellsworth, IA
Dr Dave Schmitt	Acting State Veterinarian for Iowa	Iowa Department of Agriculture and Land Stewardship	Des Moines, IA
Marsha Spykerman	Sheep producer, Executive Director of the Iowa Sheep Industry Association	Iowa Sheep Industry Association	Sibley, IA
Dr Mahlon "Whitey" Vorhies	Former Director SDSU and KSU VDLs, former Department Chair at KSU		Amana, IA

VDL Faculty List

Name	Position	Specialty	Email
Dr Pat Halbur	Chair of VDPAM and Executive Director of the ISU VDL	Administration, Circovirus, Hepatitis E Virus, Swine Respiratory Disease, PRRSV	pghalbur@iastate.edu
Dr Lorraine Hoffman	Director of Operations, ISU VDL	Administration, Diagnostic Bacteriology, Antimicrobial Susceptibility Testing	lhoffman@iastate.edu
Dr Mehrdad Ameri	Assistant Professor	Immunology, Serology, Clinical Pathology	ameri@iastate.edu
Dr Kris Clothier	Adjunct Instructor, Bacteriology	Beef, Cattle Herd Health, FADs, Johne's Disease	clothier@iastate.edu
Dr V.L. Cooper	Senior Clinician, Pathologist	BVD, Beef Cattle, Dairy, Caprine, Equine, Canine, Feline	vcooper@iastate.edu
Dr Steve Ensley	Clinician and Toxicology Section Leader	Toxicology, Field Investigation of Tox Issues, Drinking Water Quality, corn co-products	sensley@iastate.edu
Dr Karen Harmon	Adjunct Assistant Professor, Molecular Microbiology	Molecular Testing and Characterization of Animal Bacteria and Viruses	kharmon@iastate.edu
Dr Walter Hyde	Professor and Section Leader, Chemistry, Racing Chemistry, Bioanalytical Services	Toxicology, Chemistry, Analytical Toxicology	wghyde@iastate.edu
Dr Paula Imerman	Adjunct Assistant Professor and Lab Manager	Chemistry/Toxicology	pmartin@iastate.edu
Dr Bruce Janke	Professor, Pathology	Swine Influenza, Enteric Diseases of Pigs, Pathology	bhjanke@iastate.edu
Dr John Johnson	Clinician and Serology Section Leader	Development of Serology Tests and Quality Assurance	jkjohn@iastate.edu
Dr Dianna Jordan	Assistant Professor/Pathologist, Pathology Section Leader	Swine Disease Diagnosis, Haemophilus parasuis and Actinobacillus suis	dmjordan@iastate.edu
Dr Subhashinie Kariyawasam	Clinician	Molecular Diagnostics and Research, Avian E. coli	skariya@iastate.edu
Dr Won-Il Kim	Clinician	Molecular Diagnostics and Research, PRRSV, SIV, Circovirus	kwi0621@iastate.edu
Ms. Joann Kinyon	Adjunct Assistant Professor, Bacteriology/Clinical Microbiology Section Leader	Bacteriology/Clinical Microbiology	jkinyon@iastate.edu
Dr Al Loynachan	Assistant Professor	Pathology, Swine and Equine Diseases	alanl@iastate.edu
Dr Darin Madson	Adjunct Instructor, Pathology	Swine Disease Diagnosis, Nursery/Grow-Finish Health	madson@iastate.edu
Dr Jay Mysore	Associate Professor	Pathology, Helicobacter pylori, Swine Dysentery	jmysore@iastate.edu
Dr Tanja Opriessnig	Assistant Professor, Pathologist	Porcine Circovirus, Erysipelas, Hepatitis E virus, Porcine Parvovirus, Swine Respiratory Diseases	tanjaopr@iastate.edu
Dr Gary Osweiler	Professor, Toxicologist	Toxicology, Agricultural Chemicals, Poisonous Plants and Mycotoxins	osweiler@iastate.edu
Dr Kyoung-Jin Yoon	Professor and Section Leader for Virology and Molecular Diagnostics	Viral Diseases, PRRSV, Influenza, PCV2, Development of Diagnostic Tools	kyoon@iastate.edu
Dr Jeffrey Zimmerman	Professor, Epidemiologist	Ecology of Viral Infections of Swine	jjzimm@iastate.edu

VDL Staff List

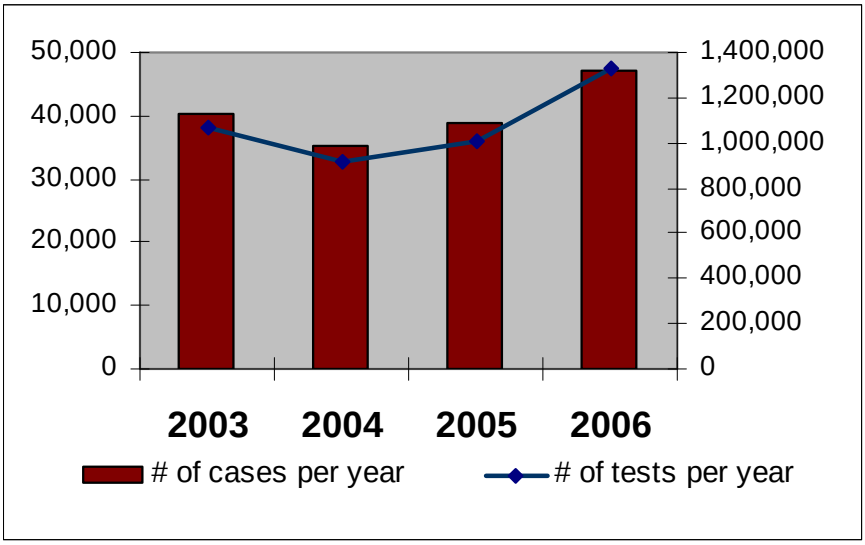
Name	Position	Phone	Email
Bacteriology		294-1217	
Carter, Sylvia	Lab Technician	294-1217	cartersy@iastate.edu
Etter, Sara	Research Associate	294-1217	setter@iastate.edu
Friesen, Stacy	Research Associate	294-1217	sfriesen@iastate.edu
Frisk, David	Clerk	294-9411	dcfrisk@iastate.edu
Fulster, Susan	Lab Technician	294-1036	sfulster@iastate.edu
Gabler, Miranda	Research Associate	294-1217	mcgabler@iastate.edu
Klinefelter, Tim	Research Associate	294-1217	tjkline@iastate.edu
McDeid, Leona	Assistant Scientist	294-1217	lmcdeid@iastate.edu
Murphy, Dorothy	Lab Technician	294-9411	dmurphy@iastate.edu
Naberhaus, Nadine	Research Associate	294-8791	nkeever@iastate.edu
Ouyang, Grace	Research Associate	294-5974	gouyang@iastate.edu
Thompson, Curt	Assistant Scientist	294-9896	curtt@iastate.edu
Bioanalytical Services			
Aufernonak, Iryna	Research Associate	294-5572	iryna@iastate.edu
Hansell, Raquel	Research Associate	294-4761	rhansell@iastate.edu
Kinker, Julia	Research Associate	294-1950	jakinker@iastate.edu
Sickau, Diane	Research Associate	294-4761	dmsickau@iastate.edu
Chemistry			
Domoto, Marlaine	Research Associate	294-1718	mdomoto@iastate.edu
Hunter, Kim	Lab Technician	294-1215	klhunter@iastate.edu
Moore, Ronda	Research Technician	294-1454	ramoore@iastate.edu
Schrunk, Dwayne	Lab Technician	294-1215	duey@iastate.edu
Clerical		294-1950	
Adams, Carolyn	Clerk	294-2375	cka@iastate.edu
Alt, Nancy	Clerk	294-6128	nalt@iastate.edu
Berrett, Kathy	Administrative Specialist	294-1015	kberrett@iastate.edu
Finch, Mary	Clerk	294-8799	mafinch@iastate.edu
Holdredge, Jennifer	Account Clerk	294-4769	jholdred@iastate.edu
Lee, Chris	Account Clerk	294-9644	cllee@iastate.edu
Meraz, Chris	Clerk	294-1726	cmeraz@iastate.edu
Olson, Linda	Clerk	294-1950	llolson@iastate.edu
Tuttle, Vanna	Clerk	294-4808	vanna@iastate.edu
Wilson, Kris	Clerk	294-4581	kwilson@iastate.edu
Zagar, Rose	Clerk	294-1951	rzagar@iastate.edu
Histopathology		294-1204	
Branaman, Rosalyn	Histology Technician	294-1204	rbran@iastate.edu
Cavanaugh, David	Assistant Scientist	294-1204	dcavanau@iastate.edu
Schwarz, Brenda	Lab Technician	294-5254	bschwarz@iastate.edu
Watts, Capri	Histology Technician	294-1204	cwatts@iastate.edu
Informatics			
Berghefer, Randy	System Administrator, Section Leader	294-1950	rberghef@iastate.edu
Hall, Tim	System Support Specialist	294-1753	tlhall@iastate.edu
Jaya, Arnon	Systems Analyst	294-1753	arnon@iastate.edu
Mindham, Steve	System Support Specialist	294-0144	steveo@iastate.edu
Rearick, John	Systems Analyst	294-1753	jrearcik@iastate.edu
Pathology			

Grover, Ray	Lab Technician	294-1188	rgrover@iastate.edu
Jacobsen, Jessica	Research Associate	294-0277	jacobsen@iastate.edu
Jennings, Michael	Lab Technician	294-1188	jennings@iastate.edu
Quality Assurance			
Meetz, Michael	Assistant Scientist	294-1056	mmeetz@iastate.edu
Racing Chemistry		294-0508	
Chang, Jenny	Lab Technician	294-3130	jchang@iastate.edu
Crawford, Bethany	Lab Technician	294-0508	bcrawf@iastate.edu
Dobson, Lori	Lab Technician	294-3130	lweyer@iastate.edu
Endreland, Luanne	Lab Technician	294-3130	luanne@iastate.edu
Greulich, David	Research Associate	294-3183	greulich@iastate.edu
Kasper, Lisa	Lab Technician	294-0508	lkasper@iastate.edu
Kind, Al	Program Manager	294-0506	mchem1@iastate.edu
Morgan, Martha	Research Associate	294-0508	martimor@iastate.edu
Novak, Renee	Research Associate	294-3130	rnovak@iastate.edu
Peterson, Jacqueline	Research Associate	294-3130	jdpeters@iastate.edu
Rahfeldt, Angela	Research Associate	294-0508	arr@iastate.edu
Rice, Somchai	Lab Technician	294-0508	somchai@iastate.edu
Schultz, Dan	Lab Technician	294-3130	dschultz@iastate.edu
Sieve, Kristal	Lab Technician	294-3130	krisl@iastate.edu
Stewart, Jason	Lab Technician	294-0508	geeky74@iastate.edu
Wulf, Larry	Lab Technician	294-3183	spuds@iastate.edu
Serology			
Block, Suzanne	Lab Technician	294-5974	suzy@iastate.edu
Clauson, Sue	Clerk	294-1532	sclauson@iastate.edu
Dunn, Linda	Lab Technician	294-1718	lstens@iastate.edu
Emge, Patrick	Lab Technician	294-1797	pthx@iastate.edu
Fowles, Beverly	Lab Technician	294-1036	bfowles@iastate.edu
Garcia, Audrey	Clerk	294-1532	agarcia@iastate.edu
Heinen, Sheila	Lab Technician	294-1043	synr@iastate.edu
Jarboe, Charlene	Lab Technician	294-5923	cjarboe@iastate.edu
Kalkwarf, Erin	Research Associate	294-5474	kalkwarf@iastate.edu
Lin, Kathy	Lab Technician	294-3398	kathylin@iastate.edu
Middleton, Shawna	Research Associate	294-5974	shawnalm@iastate.edu
Nelson, Nancy	Lab Technician	294-2133	nnelson@iastate.edu
Norris, Sheila	Research Associate	294-2133	snorris@iastate.edu
Puentes, Maria	Research Associate	294-5974	mpuentes@iastate.edu
Schuller, Bruce	Lab Assistant	294-1036	bruces@iastate.edu
Virology			
Behrens, Katie	Research Associate	294-5572	kbehrens@iastate.edu
Boesenberg, Kelly	Research Associate	294-5572	kellyisu@iastate.edu
Bracewell, Sarah	Research Associate	294-9863	sbracewe@iastate.edu
Chriswell, Amy	Research Associate	294-5572	ahoffman@iastate.edu
Harmon, Kristie	Research Associate	294-9863	kjharmon@iastate.edu
Kostohryz, Scott	Research Associate	294-5572	kosridge@iastate.edu
Stensland, Wendy	Research Associate	294-9724	wbuff@iastate.edu
Zhou, Fanghong	Research Associate	294-4066	fhzhou@iastate.edu

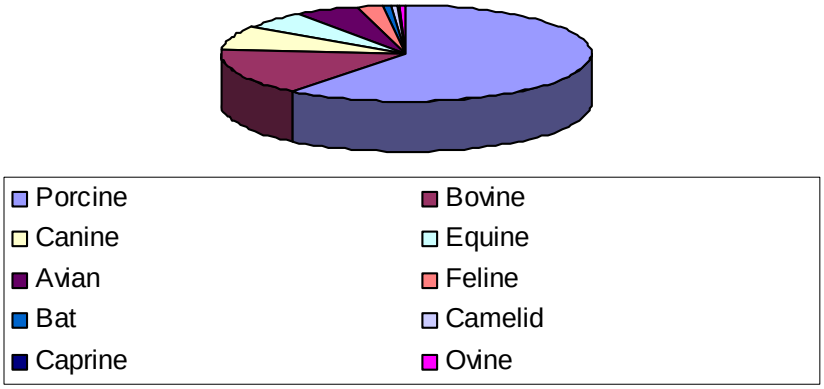
Overview of Testing

2006 ISU VDL Accessions	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
	Number of Accessions												
Total Accessions	**3,581**	**3,333**	**4,442**	**3,623**	**4,142**	**3,880**	**3,417**	**4,159**	**4,077**	**4,319**	**4,342**	**3,923**	**47,238**
Top 10 species													
Porcine	2,096	2,058	2,438	1,998	2,384	2,322	2,028	2,435	2,399	2,624	2,776	2,542	28,100
Bovine	619	577	800	678	718	574	447	535	512	589	718	615	7,382
Canine	289	312	385	281	326	269	269	299	348	328	284	286	3,676
Equine	161	143	358	347	323	306	246	291	271	197	111	81	2,835
Avian	124	156	205	133	159	186	195	283	316	367	246	223	2,593
Feline	83	79	85	78	64	64	91	80	96	87	75	76	958
Bat	14	8	16	4	27	32	22	95	22	7	15	7	269
Camelid	8	15	20	23	27	21	21	25	18	33	16	13	240
Caprine	30	16	32	16	19	14	20	17	17	19	9	14	223
Ovine	22	19	45	14	32	21	17	15	13	5	8	12	223
Total by Section													
Bacteriology	1,210	1,320	1,577	1,272	1,364	1,142	1,131	1,291	1,262	1,570	1,574	1,397	16,110
BAS	206	241	331	221	274	355	271	299	431	343	344	319	3,635
Chem/Tox	82	100	140	140	167	121	119	117	94	101	95	81	1,357
Pathology	1,154	1,240	1,440	1,167	1,302	1,129	1,051	1,228	1,215	1,522	1,594	1,380	15,422
Serology	1,536	1,471	1,994	1,596	1,911	1,793	1,582	1,923	1,829	1,706	1,719	1,464	20,524
Virology / Molecular Diagnostics	1,174	1,177	1,373	1,220	1,357	1,254	1,092	1,377	1,336	1,774	1,832	1,642	16,608

Comparison of Numbers of Accessions and Tests



2006 Accessions by Species



2006 Porcine submissions	Number of Accessions
Total submissions	**28,100**
Bacteriology only cases	3,757
Serology only cases	15,397
Toxicology only cases	3,373
Virology/molecular only cases	3,878
Histopathology only	3,362

2006 Bovine submissions	Number of Accessions
Total submissions	**7,382**
Bacteriology only cases	520
Serology only cases	2,477
Toxicology only cases	169
Virology/molecular only cases	140
Diagnoses from tissues	4,757
Skin test for BVDV Persistent Infection	1,596

Surveillance Testing

ISU VDL remains a leader in the use of "meat juice" for surveillance. Surveillance testing of slaughter swine for pseudorabies continues to be conducted through the "meat juice" collection and processing network set up by VDPAM professor, Dr James McKean. As demand for PRV testing decreases, opportunities to increase the use of this surveillance procedure for PRRSV and others diseases are being evaluated. The Iowa Johne's surveillance program was initiated in 2006. Dr Darrell Trampel has been integral in developing an avian influenza virus surveillance program that was initiated in 2005.

2006 VDL surveillance testing	Number of tests
AIV PCR - Wildlife, backyard, and game birds	496
AIV Serology	13,780
Brucella serology/Feral Swine	114
CSF PCR	1,441
Johne's fecal culture	341
Johne's serology	1,601
Meat juice – PRRSV serology	185,981
Meat juice – PRV serology	278,978
PRV tissue FA	172
PRV Serum Random Sampling	5,402
Salmonella enteritidis (poultry)	2,992

Laboratory Section Overviews

Bacteriology

First row: Sylvia Carter, David Frisk, Jill Olson, Dr Kris Clothier. Second row: Curt Thompson, Tim Klinefelter, Dee Murphy, Leona McDeid, Grace Ouyang, Nadine Naberhaus, Joann Kinyon, Linda Terry.

- The Bacteriology group includes 13 full-time staff, 8 student employees and 1 graduate student in the areas of Diagnostic Bacteriology, Clinical Microbiology, Molecular Bacteriology, Media Prep, Salmonella Poultry Surveillance, and Johne's testing.

- The section received 16,110 cases and tested over 96,000 individual samples. Most of this was culture work with more than 9,000 antimicrobial susceptibility tests.

- Examples of active research projects in the Bacteriology Section include the development of improved PCR methods for *Brachyspira sp.* in pigs and *Mycoplasma bovis* in beef and dairy cattle, development of multiplex PCR's for pathogens associated with Porcine Respiratory Disease Complex (PRDC), improving and monitoring antimicrobial susceptibility testing, development of models and assays for better understanding the pathogenesis and improving the diagnosis of enteric diseases associate with *Clostridium difficile* and *C. perfringens* type A, and further characterization of *Erysipelothrix rhusiopathiae* isolates.

- The ISU VDL began using the Johne's culture by liquid Trek ESP system which reduces the number of days on test significantly. Heavy shedders can frequently be identified in as little as 1-2 weeks. Maximum incubation time for negative samples with this liquid media is 7-8 weeks, compared to 16 weeks when using solid media.

Bacteriology **2006**	Number of Accessions	Number of Tests
Total	**16,110**	**97,176**
Cultures	22,677	52,425
Antimicrobial susceptibilities	6,907	9,068

Bacteriology **2006 by Month**	Number of Accessions	Number of Tests
Total	**16,110**	**97,176**
January	1,210	7095
February	1,320	7433
March	1,577	8277
April	1,272	7834
May	1,364	9187
June	1,142	7263
July	1,131	6338
August	1,291	8089
September	1,262	8775
October	1,570	8561
November	1,574	8915
December	1,397	9409

Bacteriology **2006 by Species**	Number of Accessions
Total	**16,110**
Porcine	9,673
Bovine	2,383
Canine	1,622
Avian	487
Equine	475
Feline	457
Caprine	132
Ovine	123
Cervidae	29
Rodent	16
Camelid	13
Lagomorpha	12

Bacteriology **4- year trend**	2003	2004	2005	2006
	Number of Tests			
Antinuclear Antibody	23	16	12	19
App - Serotype	257	164	158	196

Bacterial ID Extended	2,044	693	1,119	1,453
Bacterial ID Short	3,826	5,689	6,008	7,059
Bacterial identification from mailed culture	82	51	81	77
Blood Culture	17	27	28	45
Brachyspira Culture Result	625	1,737	1,203	1,267
Campy Culture	282	428	356	407
Campy Trich	650	958	1,162	913
Chlamydia agELISA	66	47	68	55
Clin Micro Culture - Aerobic and Anaerobic	887	995	1,187	1,206
Clostridium difficile culture	17	9	34	44
Clostridium FA	48	28	30	21
Clostridium perfringens Genotyping	106	213	180	148
Coliform Test (Membrane Filter)	9	3	7	7
Culture of feed for Clostridium perfringens	1	1	2	-
Culture Summary	511	473	495	427
Direct Smear	115	106	140	123
E. coli genotyping	-	145	406	366
E.coli K99 LA Typing	337	343	373	386
Egg Culture	18	72	112	133
Elisa Clostridium difficile toxin A/B	185	271	267	264
Enrichments	797	988	1,822	599
Equine Kirby Bauer Susceptibility	208	155	211	210
E-TEST Susceptibility	44	52	83	73
Food Animal Susceptibility	6,396	6,136	6,484	7,627
Fungal Culture Results	296	267	353	281
Identification System	42	33	67	72
Johne's Culture	244	377	532	545
Johne's Liquid Culture	-	-	-	182
Leptospira FA	433	449	454	498
Mastitis Susceptibility	51	150	191	138
Milk Culture	395	525	429	348
Milk Culture – Bulk Tank	27	19	24	34
Multiresistant Kirby Bauer Susceptibility	32	64	54	86
Mycoplasma Culture	228	409	275	1,669
Mycoplasma Id	75	95	60	95
Occult Heartworm Antibody Elisa	17	2		
Occult Heartworm Antigen Elisa	289	103		
Parvo Virus Elisa	13	11	11	3
PCR - Actinobacillus pleuropneumoniae	1	2		1
PCR - Haemophilus parasuis		65	95	112
PCR - Lawsonia intracellularis	66	910	756	338
PCR - Lepto			390	556
PCR - Mycoplasma hyopneumoniae	408	1,120	2,261	3,676
PCR - Pasteurella multocida	2			
PCR - Pasteurella multocida toxin	4	73	36	25

Porcine Kirby Bauer Susceptibility	7	17	11	51
Poultry - Salmonella Enrichment	442	-	-	-
Poultry - Salmonella Environmental	1918	2693	2805	143
Rheumatoid Factor Agglutination	4	2	1	4
Routine Culture	41,935	39,921	37,588	49,360
Routine Culture - Aerobic and Anaerobic	704	984	1,465	1,859
Salmonella Id	922	1,024	914	1,392
Serogrouping Lancefield & Salmonella	38	56	46	25
Serotype - S. suis	328	70	42	46
Slant Request	392	423	360	308
Special Culture (Nasal, Feces, Semen, Other)	1,215	967	608	281
SRID for IgG	31	30	55	4
Standard Plate Count Results	130	104	34	48
Susceptibility - Bovine Mastitis Kirby Bauer	37	34	20	11
Susceptibility - Companion/Equine	97	108	136	98
Susceptibility - Poultry	119	109	128	86
Susceptibility - Small Animal Kirby Bauer	777	814	830	870
Susceptibility - Bovine Resp. Kirby Bauer	31	22	33	26

Bacteriology **2006 Salmonella serotypes**	Bovine	Porcine
Group B		
Typhimurium	15	379
Derby	4	143
Heidelberg	4	73
Agona	5	44
Group C1		
Choleraesuis		194
Infantis		35
Montevideo	7	
Group C2		
Muenchen		14
Newport	10	10
Group D		
Dublin	49	
Group E		
Anatum	5	32
Seftenberg		22
Muenster	15	
Uganda	10	
Other		
Worthington		22
Untypeable		35

Bacteriology **2006 APP serotypes**	Porcine
Untypeable	61
Type 1	13
Type 3	10
Type 5	39
Type 7	52

Antimicrobial Susceptibility Profiles

MIC Susceptibility Profile of Bovine Pathogens Submitted to ISU VDL in 2006

	Ecoli K99 -	Ecoli K99 +	H som	M bov	M haem	P mul	P tre	S dubl	S new	S typh	S ugan
Number of Isolates	138	55	65	7	138	129	5	49	10	10	10
Antimicrobials*	Percent Susceptible***										
Ampicillin	20	5	100	100	72	97	0	8	10	30	0
Ceftiofur **	64	42	100	100	99	100	100	22	10	90	0
Chlortetracycline	96	84	100	4	14	100	0	10	40	20	0
Clindamycin	1	1	78	0	0	0	0	0	0	0	0
Danofloxacin**	94	83	94	35	72	100	100	100	20	100	100
Enrofloxacin**	96	83	94	35	73	100	100	100	20	100	100
Erythromycin	3	0	92	0	0	86	0	0	0	0	0
Florfenicol**	95	89	98	11	7	100	4	10	20	40	0
Gentamicin	89	88	40	49	60	100	94	90	100	90	10
Neomycin	48	51	8	9	21	100	29	50	20	80	30
Oxytetracycline	60	51	72	4	12	100	0	10	0	20	0
Penicillin	79	22	100	0	0	29	0	0	0	0	0
Sulphachlorpyridazine	52	96	89	5	8	100	10	0	100	10	0
Sulphadimethoxine	19	25	31	4	7	86	0	0	0	0	0
Sulphathiazole	31	20	29	5	12	86	0	0	0	20	0
Tilmicosin **	84	69	98	0	0	100	0	0	20	0	0
Trimethoprim/Sulfamethoxaz	71	90	95	25	39	86	78	80	80	90	90

Spectinomycin data - not listed due to changes in the panel concentrations this year.

Ecoli K99 - - E.coli, K99 negative
Ecoli K99 + - E.coli, K99 positive
H som - Histoplilus somni
M bov - Moraxella bovis
M haem - Mannheimia haemolytica
P mul - Pasteurella multocida
P tre - Pasteurella trehalosi
S dubl - Salmonella dublin
S new - Salmonella newport
S typh - Salmonella typhimurium
S ugan - Salmonella uganda

* In vitro antimicrobial test results do not represent therapeutic recommendations from the VDL or personnel therein. Extra/Off label usage of an antimicrobial which is limited/prohibited for certain species may result in legal action by FDA-CVM

** These are the only antimicrobials with valid breakpoints correlated with clinical outcome (respiratory diseases)

*** Percent of isolates with a susceptible MIC value

MIC Susceptibility Profile of Bovine Mastitis Pathogens Submitted to ISU VDL in 2006

	E coli	E faem	Ente	K pneu	P mult	S aur	S dys	S epi	S ube
Number of Isolates	25	1	9	3	4	27	14	13	13
Antimicrobial*	Percent susceptible***								
Ampicillin	72	0	11	0	100	59	100	85	92
Ceftiofur	96	0	89	100	100	96	93	100	100
Cephalothin	84	0	0	67	100	96	93	100	92
Erythromycin	0	0	0	0	0	78	100	77	85
Oxacillin	ND	ND	ND	ND	ND	96	ND	100	ND
Penicillin	0	0	0	0	100	59	100	85	62
Penicillin/Novobiocin**	0	100	0	0	100	100	93	100	100
Pirlimycin**	0	100	0	0	0	78	100	69	85
Sulfadimethoxine	56	0	56	67	75	96	86	100	8
Tetracycline	48	0	67	67	41	85	79	85	62

E coli - *Escherichia coli*
E faem - *Enterococcus faecium*
Ente - *Enterobacter species*
K pneu - *Klebsiella pneumoniae*
P mul - *Pasteurella multocida*
S aur - *Staphylococcus aureus*
S dys - Streptococcus dysgalactiae
S epi - *Staphylococcus epidermitis*
S ube - *Streptococcus uberis*

* In vitro antimicrobial test results do not represent therapeutic recommendations from the VDL or personnel therein. Extra/off label usage of an antimicrobial which is limited or prohibited for certain species may result in legal action by FDA-CVM.

**These are the only antimicrobials with valid breakpoints correlated with clinical outcome (respiratory diseases).

*** Percent of isolates with a susceptible MIC value.

MIC Susceptibliity Profile of Porcine Pathogens Submitted to ISU VDL in 2006

	A suis	APP	B bron	E coli	Erysip	H ecol	HPS	Pm A	Pm D	S suis	S typh	S chol
Number of Isolates	334	179	86	461	14	947	539	998	598	1301	379	194
Antimicrobials*	**Percent Susceptibile*** **											
Ampicillin	96%	78%	9%	33%	100%	29%	100%	98%	98%	99%	12%	31%
Ceftiofur **	100%	100%	0%	66%	100%	68%	100%	100%	100%	100%	91%	100%
Chlortetracycline	92%	69%	99%	7%	7%	8%	100%	98%	96%	23%	5%	21%
Clindamycin	0%	0%	0%	0%	79%	0%	5%	0%	0%	20%	0%	0%
Enrofloxacin	100%	100%	76%	98%	100%	100%	100%	100%	100%	99%	100%	100%
Erythromycin	0%	0%	0%	0%	100%	0%	12%	7%	1%	21%	0%	0%
Florfenicol **	100%	99%	56%	10%	7%	18%	100%	100%	100%	100%	3%	96%
Gentamicin	99%	9%	99%	73%	0%	70%	99%	100%	100%	98%	85%	99%
Neomycin	90%	5%	98%	59%	0%	53%	87%	98%	94%	61%	82%	100%
Oxytetracycline	52%	12%	99%	6%	7%	5%	97%	82%	63%	8%	5%	21%
Penicillin	0%	3%	0%	0%	100%	0%	15%	92%	95%	93%	0%	0%
Spectinomycin	29%	24%	1%	29%	100%	29%	97%	58%	48%	65%	3%	51%
Sulfachlorpyridazine	97%	95%	15%	31%	0%	26%	94%	55%	40%	66%	6%	16%
Sulfadimethoxine	89%	54%	10%	24%	7%	18%	69%	44%	40%	61%	2%	13%
Sulfathiazole	91%	66%	12%	30%	7%	21%	71%	41%	41%	65%	6%	16%
Tiamulin **	4%	99%	0%	0%	86%	0%	86%	20%	2%	95%	0%	0%
Tilmicosin **	97%	99%	9%	0%	93%	0%	95%	96%	70%	20%	0%	0%
Trimethoprim/ Sulfamethoxazole	100%	99%	27%	77%	50%	79%	99%	97%	99%	99%	86%	100%
Tylosin tartrate	NI	0%	NI	0%	NI	NI	NI	2%	0%	NI	NI	NI

A suis - *Actinobacillus suis*
APP - *Actinobacillus pleuropneumoniae*
B bron - *Bordetella bronchiseptica*
E coli - non-hemolytic *E.coli*
Erysip - *Erysipelothrix*
H ecol - hemolytic *E.coli*
HPS - *Haemophilus parasuis*
Pm A - *Pasteurella multocida* Type A
Pm D - *Pasteurella multocida* Type D
S chol - *Salmonella choleraesuis*
S suis - *Streptococous suis*
S typh - *Salmonella typhimurium*

* In vitro antimicrobial test results do not represent therapeutic recommendations from the VDL or personnel therein.
Extra/Off label usage of an antimicrobial which is limited/prohibited for certain species may result in legal action by FDA-CVM of an antimicrobial.
** These are the only antimicrobials with valid breakpoints correlated with clinical outcome (respiratory diseases)
*** Percent of isolates with a susceptible MIC value
NI = Not interpretable; there are no interpretations from CLSI.

Disk Diffusion Susceptibility Profile of Equine Pathogens submitted to the ISU VDL from January 2005 through June 2007

	A equ	B bron	P aer	P cab	Past	R equ	S aur	S equi	S equs	S typh	S zoo
Number of Isolates*	15	3	26	3	3	12	18	24	24	2	100
Antimicrobials**	Percent susceptible***										
Amikacin	40%	67%	92%	100%	67%	100%	100%	13%	0%	100%	5%
Ampicillin	93%	0%	0%	100%	100%	8%	67%	100%	100%	100%	100%
Ceftiofur	100%	0%	0%	100%	100%	42%	89%	100%	100%	100%	100%
Cephalothin	100%	67%	0%	100%	100%	0%	89%	100%	100%	100%	100%
Clindamycin	34%	79%	58%	0%	0%	33%	33%	0%	100%	0%	0%
Enrofloxacin	75%	58%	100%	67%	67%	100%	100%	27%	94%	100%	100%
Erythromycin	99%	88%	100%	92%	0%	100%	67%	0%	94%	7%	0%
Gentamicin	62%	67%	92%	100%	67%	100%	100%	88%	89%	67%	100%
Neomycin	3%	0%	13%	92%	100%	67%	67%	35%	100%	20%	100%
Oxacillin	ND	ND	ND	ND	ND	ND	ND	ND	89%	ND	ND
Penicillin	100%	100%	100%	0%	0%	67%	67%	0%	61%	27%	0%
Rifampin	98%	96%	100%	92%	0%	100%	100%	0%	94%	47%	0%
Sulfachloro	32%	54%	71%	92%	67%	67%	100%	15%	72%	87%	50%
Tetracycline	16%	13%	100%	58%	67%	67%	100%	4%	89%	100%	100%
Ticarcillin	100%	100%	100%	8%	67%	100%	100%	77%	89%	100%	100%
Ticarcillin/Clav	100%	100%	100%	33%	67%	100%	100%	65%	89%	100%	100%
Trimeth/Sulpha	80%	100%	92%	17%	67%	100%	100%	0%	89%	93%	100%

A equ - Actinobacillus equuli
B bron - Bordetella bronchiseptica
P aer - Pseudomonas aeruginosa
P cab - Pasteurella caballi
Past - Pasteurella species
R equ - Rhodococcus equi
S aur - Staphylcoccus aureus
S equi - Streptococcus equi
S equs - Streptococcus equisimillis
S thyp - Salmonella typhimurium
S zoo - Streptococcus zooepidemicus

* **number of isolates tested in 30 months**
** In vitro antimicrobial test results do not represent therapeutic recommendations from the VDL or personnel therein. Extra/off label usage of an antimicrobial which is limited or prohibited for certain species may result in legal action by FDA-CVM.
*** Percent of isolates with a susceptible value

Disk Diffusion Susceptibility Profile of Canine Pathogens Submitted to ISU VDL in January 2005 through June 2007

	B bron	E coli	E faec	E faem	Ente	K pneu	P aer	P mult	Pseu	S aur	S int	Strep
Number of Isolates*	36	341	89	47	62	24	94	35	47	49	241	68
Antimicrobials**	Percent Susceptible***											
Amikacin	97%	98%	3%	6%	94%	96%	94%	89%	85%	98%	99%	4%
Amoxicillin/Clavulanic Acid	92%	65%	99%	49%	19%	79%	3%	100%	40%	98%	94%	100%
Ampicillin	28%	30%	99%	45%	6%	4%	1%	100%	28%	35%	30%	100%
Ceftiofur	3%	86%	39%	11%	82%	83%	2%	100%	45%	98%	94%	100%
Cephalothin	64%	25%	3%	9%	10%	58%	1%	100%	30%	98%	94%	100%
Clindamycin	0%	0%	2%	21%	0%	0%	0%	6%	6%	96%	81%	65%
Enrofloxacin	92%	81%	22%	4%	85%	88%	19%	100%	57%	98%	92%	71%
Erythromycin	22%	0%	13%	2%	2%	0%	0%	74%	0%	90%	81%	94%
Gentamicin	92%	92%	81%	45%	94%	96%	90%	97%	81%	98%	94%	53%
Neomycin	94%	86%	9%	9%	82%	79%	35%	91%	81%	94%	90%	1%
Orbifloxacin	58%	77%	1%	0%	66%	88%	13%	89%	49%	94%	88%	29%
Oxacillin	ND	ND	ND	ND	ND	ND	ND	ND	ND	94%	89%	ND
Penicillin	0%	0%	92%	34%	2%	0%	0%	100%	0%	35%	29%	100%
Sulfachloropyridazine	25%	77%	8%	2%	85%	88%	11%	100%	66%	51%	70%	71%
Tetracycline	97%	72%	61%	34%	65%	63%	4%	100%	62%	73%	65%	9%
Trimethoprim/Sulpham ethoxazole	31%	77%	97%	30%	87%	88%	7%	97%	53%	78%	63%	100%

B bron - *Bordetella bronchiseptica*
E coli - *Escherichia coli*
E faec - *Enterococcus faecalis*
E faem - *Enterococcus faecium*
Ente - *Enterobacter species*
K pneu - *Klebsiella pneumoniae*
P aer - *Pseudomonas aeruginosa*
P mult - *Pasteurella multocida*
Pseu - *Pseudomonas species*
S aur - *Staphylococcus aureus*
S int - *Staphylococcus intermedius*
Strep - *Streptococcus canis*

*** number of isolates tested in 30 months**

** In vitro antimicrobial test results do not represent therapeutic recommendations from the VDL or personnel therein. Extra/off label usage of an antimicrobial which is limited or prohibited for certain species may result in legal action by FDA-CVM.

*** Percent of isolates with a susceptible MIC value

Disk Diffusion Susceptibility Profile of Canine Ear Canal Pathogens Submitted to ISU VDL from January 2005 through June 2007

	E coli	E fael	P aer	Prot	Pseu	S can	S epi	S equs	S int	S schl	S aur	Strep
Number of Isolates*	36	15	128	43	16	16	21	24	24	25	35	96
Antimicrobial	Percent Susceptible**											
Amikacin	100%	13%	81%	98%	84%	44%	100%	96%	96%	84%	0%	97%
Amoxicillin/Clavulanic Acid	53%	93%	1%	91%	100%	100%	100%	83%	83%	8%	100%	98%
Cefpodoxime	86%	0%	2%	93%	100%	53%	100%	79%	79%	8%	97%	97%
Cephalothin	28%	0%	0%	79%	100%	56%	100%	79%	83%	8%	94%	98%
Ciprofloxacin	86%	13%	80%	100%	75%	69%	90%	92%	96%	92%	83%	97%
Clindamycin	0%	13%	1%	0%	75%	50%	100%	96%	92%	4%	80%	89%
Enrofloxacin	86%	27%	19%	95%	81%	63%	86%	92%	92%	48%	71%	96%
Gentamicin	92%	67%	72%	98%	63%	69%	100%	96%	88%	72%	49%	97%
Imipenem	100%	100%	96%	95%	100%	100%	100%	83%	83%	92%	100%	98%
Marbofloxacin	86%	60%	70%	100%	94%	75%	86%	92%	96%	76%	91%	96%
Neomycin	81%	7%	23%	91%	6%	31%	100%	100%	92%	32%	3%	98%
Orbifloxacin	83%	0%	14%	81%	6%	31%	81%	92%	92%	44%	20%	94%
Polymixin B	97%	13%	98%	0%	13%	44%	100%	96%	79%	92%	6%	93%
Tetracycline	72%	60%	2%	5%	19%	75%	90%	83%	71%	16%	6%	77%
Ticarcillin/Clavulanic Acid	75%	93%	62%	95%	94%	100%	100%	79%	83%	44%	97%	96%
Ticarcillin	72%	47%	79%	93%	100%	81%	95%	79%	83%	68%	94%	98%
Tobramycin	89%	60%	89%	98%	31%	50%	100%	92%	88%	84%	9%	95%
Trimethoprim/ Sulfadiazine	83%	67%	1%	91%	94%	56%	86%	83%	54%	12%	91%	76%
Oxacillin	0%	0%	2%	2%	0%	0%	90%	75%	79%	0%	3%	97%
Vancomycin	3%	53%	0%	2%	6%	13%	0%	0%	0%	0%	0%	0%

E coli - *Escherichia coli*
E fael - *Enterococcus faecalis*
Ente - *Enterobacter species*
P aer - *Pseudomonas aeruginosa*
Prot - *Proteus species*
P seu - *Pseudomonas species*
S can - *Streptococcus canis*
S epi - *Staphylococcus epidermidis*
S equs - *Streptococcus equisimilis*
S int - *Staphylococcus intermedius*
S schl - *Staphylococcus schleiferi*
S aur - *Staphylococcus aureus*
Strep - *Streptococcus species*

* number of isolates tested in 30 months

** Percent of isolates with a susceptible value

Bioanalytical Services (BAS)

Bradley Halverson, Diane Sickau, Ashley Fleischhacker, Julia Kinker, Not pictured: Dr Water Hyde, Section Leader,

The Bioanalytical Services program is dedicated to providing accurate and rapid PRRSV testing to Swine Artificial Insemination Centers, (Boar Studs) and other swine production systems desiring a frequent and rapid PRRSV surveillance testing program. Both European and North American strains of PRRSV are screened for in serum samples, semen samples and blood swabs. The BAS group is determined to provide the most advanced surveillance screening available.

Bioanalytical Services **4-year Totals**	2005	2006
Totals	**6,621**	**20,314**
PCR Based detection in Semen	3,311	5,081
PCR Based detection in Serum	1,769	8,535
PCR Based detection in Blood Swabs	1,541	6,698

Bioanalytical Services **2006 by Month**	Number of Accessions	Number of Tests
Total	**3,635**	**20,314**
January	206	1,047
February	241	1,264
March	331	1,710
April	221	962
May	274	1,435

June	355	2,266
July	271	2,115
August	299	1,611
September	431	2,307
October	343	1,901
November	344	1,772
December	319	1,924

Chemistry/Toxicology (Chem/Tox)

First row: Kim Hunter, Dr Paula Imerman, Dwayne Schrunk. Second row: Ronda Moore, Lisa Kasper, Olga.

Toxicology: Dr Steve Ensley, Dr Gary Osweiler.

The Chem/Tox Section provides diagnostic toxicology and analytical chemistry analysis to VDL diagnosticians, toxicologists, producers and stakeholders in the field investigating suspected toxicological problems by analyzing animal tissues, feed, environmental or other samples suspected to contain toxic substances. Examples of tests conducted by the Chem/Tox group includes testing and identification of a variety of agricultural chemicals, pesticides, feed additives, drugs, various serum chemistries (such as serum calcium, magnesium, potassium and sodium), nitrates/nitrites and sulfate, feed and supplement analysis, heavy metal testing, foods and feedstuff analysis for mycotoxins and other feed products and toxins.

The Chem/Tox Section is dedicated to providing relevant scientific testing to samples collected from a field situation and reporting results in a timely period at an affordable cost. The Chem/Tox section also supports a wide variety of research projects at ISU, other universities and the private sector. Examples of active research projects include corn co-product use, water quality, melamine toxicosis, and aflatoxin toxicosis.

New Initiatives in Toxicology and Chemistry: Outreach involving corn co-products

- Attended nine public or invited meetings in Iowa to engage College of Veterinary Medicine in Biofuel and Corn Co-products Issues.
- Established a multidisciplinary working group in veterinary medicine in cooperation with animal science (Dr M. P. Hoffman) and plant sciences (Dr Gary Munkvold) to initiate corn co-products information exchange and research
- Four Iowa presentations to producer, extension and departmental groups on corn co-products issues and problems.
- Supported extension area drought meetings in Holstein and Mapleton, IA.

Diagnostic Services in Toxicology

- Approximately 1575 phone calls to or from veterinarians, producers and the public to assist with diagnostic submissions or to answer general or specific questions about toxicology.
- VDL Accessions with requests for toxicology assistance totaled 865. Many of these requests were to rule out a specific poison as a differential diagnosis, or to assess the mineral nutrient status of farm animals. From these, 70 positive diagnoses were generated for specific poisonings. These diagnoses included in order of most to least frequent: copper, lead, antifreeze, organophosphate insecticides, Japanese yew, salt/water imbalance, monensin, mycotoxins, urea, ergot, aflatoxin, ammonia, arsenic and abuse drugs. Animals most frequently poisoned were cattle, sheep, dogs, swine and poultry.
- Toxicology assisted in the diagnosis and food safety assessment of a major cattle pesticide poisoning which resulted in the loss of more than 160 feeder cattle. This was accomplished by a combination of veterinary toxicology consultation and extensive chemistry laboratory analysis. This case illustrates the role of toxicology in safeguarding the health and wholesomeness of livestock products.

Chemistry/Toxicology **2006 by Month**	Number of Accessions	Number of Tests
Total	**1,357**	**2,123**
January	82	180
February	100	141
March	140	281
April	140	182
May	167	259
June	121	182
July	119	157
August	117	135
September	94	210
October	101	125
November	95	162
December	81	114

Chemistry/Toxicology **2006**	Number of Accessions	Number of Tests
Top 10 Tests		
Selenium in tissue or feed	201	219
Copper in feed or tissue	125	170
Vitamin E in liver	120	127
Mycotoxin Panel	66	96
Manganese in feed or tissue	54	57
Antibiotics -Chlortetracycline - quantitative	50	81
Selenium in blood, serum, or plasma	47	78
Lead in blood or water	38	40
Antibiotics - Tylosin - quantitative	37	68
Lead in feed or tissue	32	34

Toxicology 2006 Diagnosis of Toxicosis by Species										
	Avian	Bovine	Canine	Caprine	Equine	Feline	Ovine	Porcine	Lagomorph	Total
Copper		2	3	2			15	1		23
Lead	4	7								11
Ethylene glycol			6			1				7
Organophosphate		2	1					2		5
Idiopathic		1	1			1			1	4
Yew		3			1					4
Sodium								3		3
Ergot		2								2
Monensin	1	1								2
Mycotoxin			2							2
Urea		2								2
Aflatoxin			1							1
Ammonia		1								1
Arsenic		1								1
Drug			1							1
Selenium					1					1

Chemistry/Toxicolcogy 4- year trend	2003	2004	2005	2006
	Number of Tests			
Total	**1,696**	**1,861**	**1,934**	**2,123**
Aflatoxin - qualitative	19	4	2	23
Aflatoxin - qualitative M1 Liver				2
Ammonia Nitrogen	22	3	11	8
Antibiotics - Chlortetracycline - quantitation	9	9	79	81
Antibiotics - Lincomycin - quantitation			1	5
Antibiotics - Oxytetracycline - quantitation	19		8	5
Antibiotics - Penicillin - quantitation	1		1	5
Antibiotics - Tetracycline - quantitation	4			5
Antibiotics - Tylosin - quantitation		9	81	68
Anticoagulant - Brodifacoum - quantitation		2		
Anticoagulant - Bromodiolone - quantitation	1			
Anticoagulant - Dicoumarol - quantitation				1
Anticoagulant - Diphacinone - quantitation	2			
Anticoagulant Panel	12	13	8	24
Arsenic in Feed or Tissue	3	25	15	10
Arsenic-Fluids	3		1	3
Ash				1
Barbiturates	1		2	3
Bone Ash	2	18	2	27
Bone Density		14	2	16
Cadmium in Feed or Tissue				1
Caffeine		1	1	
Calcium in feed or tissue	4	26	7	39
Calcium in Serum/Plasma/Eye/Water			23	2
Carbamate Panel			4	2
Carbamate - Individual qualitative	1			
Carboxyhemoglobin	17	1		3

Chlorinated Hydrocarbon - Individual - quantitation		1		
Chloride in Feed or Tissue				3
Chloride in fluids			22	1
Chlorinated Hydrocarbon Panel		6		
Cholinesterase	13	15	21	26
CNS Canine Panel		8	7	5
Copper Blood	1	1	1	
Copper in Feed or Tissue	121	101	104	170
Copper in liver biopsy		5	6	18
Copper in serum or water	71	88	44	58
Coumestrol quantitation			2	3
Custom Chemistry	70	39	60	76
Cyanide		1	2	3
Ergopeptine Panel	2	3	9	9
Ergotamine - qualitative-TLC	1			
Ethylene Glycol	2	1	5	2
Feed Particle Size	1		1	2
Fluoride	2		7	2
Fluoride - tissue			4	2
Fumonisin B1 - qualitative	35	1	7	7
Gossypol		3		
Hormonally active feed compounds panel		1	8	1
Iron in feed or tissue	5	6	3	25
Iron in liver biopsy		2	1	1
Iron in serum or water	17	24	28	89
Lasalocid - qualitative	1	8	12	5
Lead in blood	28			
Lead in blood or water	22	46	53	40
Lead in feed or tissue	29	44	47	34
Lead in paint			1	
Magnesium in feed or tissue	1	2	1	7
Magnesium in fluids		1	29	2
Manganese in feed or tissue.	7	2	6	57
Manganese in serum or water	3	4	5	1
Melengesterol Acetate - quantitation	3	3	1	2
Mercury in Blood		8	1	
Mercury in feed or tissue				1
Methemaglobin		2		
Microtox Test		10	2	
Moisture	12	2	13	15
Molybdenum in Feed or Tissue	8	1	2	8
Monensin - qualitative	4	13	19	12
Monensin - quantitative	3	10	10	9
Mycotoxin Panel	78	81	61	96
Mycotoxin - individual quantitation	37	22	13	
Mycotoxin - individual quantitation			9	30
Nitrates in feed	8	3	7	8
Nitrates in serum or eye fluid	9	13	23	7
Nitrite or Nitrate in water	4	3	28	2
Ochratoxin - qualitative				1
Organophosphate – Individual - qualitative			1	15

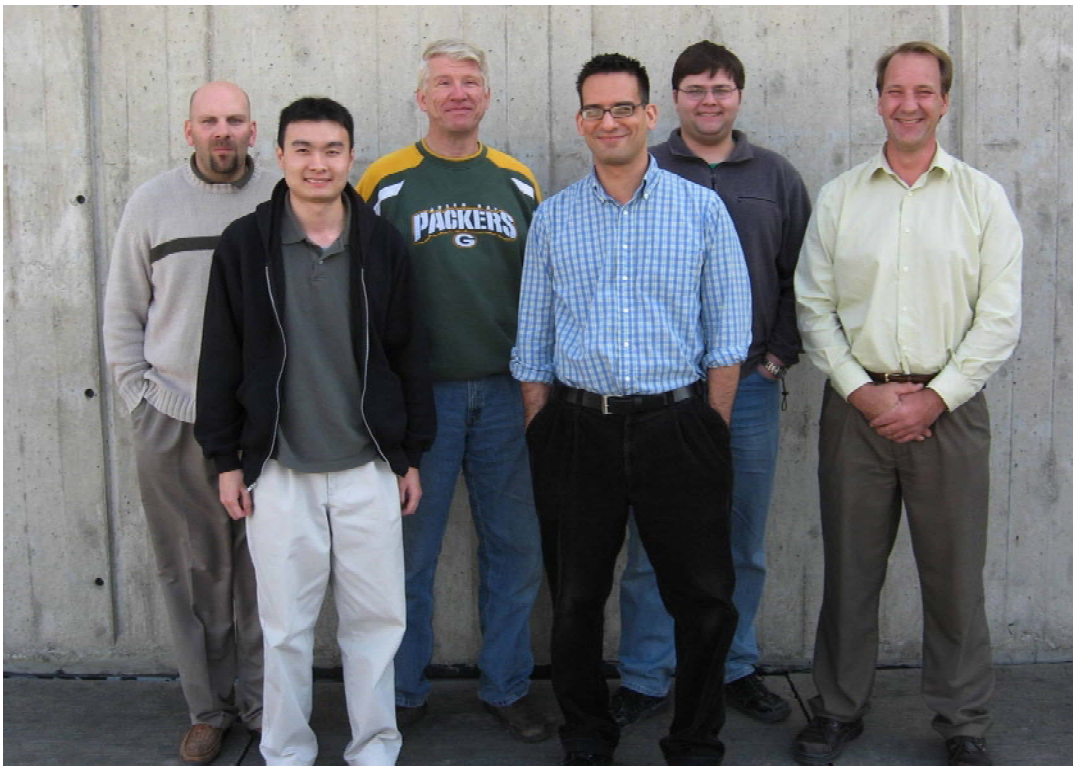
Organophosphate Panel	11	15	25	16
Organophosphate quantitation	1	5	2	14
pH	7	18	38	8
Phenylarsonic compounds			1	
Phosphorus in feed or tissue	4	25	6	37
Phosphorus in fluids			5	
Potassium in feed	1			
Potassium in fluids			3	2
Selenium in Blood/serum/plasma	328	364	232	193
Selenium in Tissue or feed	199	203	148	219
Slaframine	2	3	4	1
Sodium in feed or tissue	6	1	4	11
Sodium in fluids			23	1
Strychnine	3	5		3
Sulfate in Feed	4	2	4	28
Sulfate in Water	5	3	27	20
Sulfonamide - qualitative	10		3	
T-2 toxin qualitative				2
Total Dissolve Solids		1	1	
Tremorgen panel	1	1	5	3
Urea	5	3	3	9
V9 mineral panel	27	32	49	26
Vitamin A in serum	14	21	5	13
Vitamin A palmitate liver - quantitation		1	2	4
Vitamin D3 in feed	2	7	11	10
Vitamin E acetate in feed - quantitation	3	1	7	1
Vitamin E in liver	110	157	116	127
Vitamin E in serum	146	220	207	108
Vomitoxin-qualitative	2	1	2	9
Water Quality Panel	16	15	28	32
Zearalenone/Zearalenol - qualitative	10	1	7	3
Zinc in feed or tissue	15	15	23	24
Zinc in liver biopsy		3	2	1
Zinc in serum or urine	46	29	7	9

Clerical

First row: Vanna Tuttle, Chris Lee, Rose Zagar, Nancy Alt. Second row: Mary Finch, Linda Olson, Jennifer Holdredge, Carolyn Adams, Kris Wilson, Chris Meraz.

The clerical section of the Veterinary Diagnostic Laboratory has grown by two positions in 2006 and duties have been reorganized to facilitate the work flow and meet ever increasing customer expectations. The clerical section has made advancements in the area of financial tracking through the use of a computer database that allows us to filter information and generate expense reports to better manage and understand our financial trends. Work is underway on developing new and updating current standard operating procedures (SOP's). We are dedicated to providing outstanding support to our faculty and the highest quality and professional service to our clients.

Informatics



Steve Mindham, Arnon Jaya, Tim Hall, Neil Boyes, John Rearick, Randy Berghefer, Section Leader

Informatics: The Informatics Group is dedicated to providing accurate, timely and secure results reported across all departments, clients, state and national agencies. The Informatics group consists of six full-time employees covering areas of application development, web development, Dashboard database development, and desktop and server support roles.

Four new positions were created in 2006-2007. Information Technology Manager brings together all areas of IT and focuses the group on accomplishing the goals set forth by the team. A Web Programmer was tasked with expanding web-based submission forms to collect data from clients for accessions and an evidence-based medicine data warehouse. A Dashboard Developer created a repository of historical data for VDPAM and its external clients. Finally, a new Systems Support Specialist position, provided internal desktop and server support. This represents an increase of three people over the previous year. The Informatics group also supports a wide variety of research projects at Iowa State University, other universities, and the private sector.

The Informatics group supports the VDL Laboratory Information Management System. ISULIMS is a front end database access program developed in-house to access the secured databases housing all of the case and result information from the lab. This massive system has been expanded and upgraded from one server to three servers. This upgrade provided 50% increased speed in returned case reports and sample searches on our database and increased current and future database capacity to 4.8 terabytes. The Informatics group also supports 220 in-house desktop and laptop computers and 11 servers total.

Reports reaching clients electronically in 2006 has increased by 36 % representing a cost savings by reducing the amount of postage applied to regular mailings. Web-based reporting has increased 300% in 2006 over 2005. Through the first eight months of 2007 we have already exceeded totals numbers of web reports available showing a continuing trend towards this method of delivery. 2005 marked the first time

web submissions were available to clients resulting in 497 cases submitted in this manner. In 2006, we saw this number grow to 2315 cases submitted by clients through the web submittal process.

Several new initiatives have been undertaken in the Informatics group. Among these are:

- improving chain of custody of samples through sample and barcode tracking
- paperless process improvement project which focuses on accuracy and efficiency across the lab
- a new syndrome test request process
- increased email reporting, faxing and accounting improvements.
- a Web Developer project designed to improve and increase web reporting and submission of cases electronically. This project will create web-based reports clients can generate based on custom queries of the data warehouse, raising the quality of service and enabling the study of evidence-based medicine. This also focuses on communicating with clients to learn how they would like to use the information they submit to the lab so a suitable web application can be designed to satisfy their needs.
- a Dashboard project designed to bring Evidenced Based Medicine to diagnostic and production animal medicine. The creation of the data warehouse will allow for end user modifiable report capability and provide accessibility in which multiple external and internal resources can utilize the data warehouse through the web. This accessibility will ultimately create data sharing and integration from clients and other institutions for usability and analysis by all that contribute to the data warehouse to benefit and further Evidence Based Medicine initiatives. The benefits of this collaboration of data will help create a foundation to aid veterinarians in assessing risk and supply the information to confront that risk, help to improved disease surveillance tools and aid in new client acquisition to VDPAM through innovative information technology capabilities.

IT efforts in the future will continue to emphasize accurate and timely and secure results, focusing on continual improvement in QA/QC and expanding the clients' use of raw data to facilitate their decision making abilities to maximize resources.

Pathology Section

Capri Watts, Dawn Fennemann, Alan Elsberry, Joe Brodie, Brenda Schwartz, Rosalyn Branaman.

Mike Jennings, Jessica Boer, Ray Grover.

Faculty: Dr Dianna Jordan, Section Leader, Dr Bruce Janke, Dr Vickie Cooper, Dr Christa Irwin, Dr Alan Loynachan, Dr Darin Madson, Dr Tanja Opriessnig, Dr Abby Patterson, Dr Darrell Trampel.

In 2006, the Pathology Section of the ISU VDL coordinated the processing of 14,932 cases, a 20% increase over 2005. For the second year in a row, this was a record number of pathology cases for the ISU VDL. In addition to necropsy and histopathologic examination services, the Pathology Section offers immunohistochemical staining for 24 different infectious agents, as well as routine special stains for various cellular elements. Over 57,000 slides were examined in 2006.

The Pathology Section is currently staffed by 6 faculty pathologists (DVM, PhD), including three new faculty who joined the department during the last year. The pathologists are assisted by 4 necropsy technicians. The histopathology laboratory is staffed by 6 full-time technicians and additional part-time help.

In addition to providing diagnostic and consultation services for clients, faculty in this section have teaching and research responsibilities. Nearly half of the fourth year veterinary students spend at least two weeks on a clinical rotation for credit in the ISU VDL assisting with the processing of cases and learning by hands-on experience how to conduct necropsies, do appropriate sample selection, develop an appropriate list of differential diagnoses, and order the appropriate tests to confirm or rule out those diagnoses. A number of veterinary medical students from CVMs around the nation also spent time in the ISU VDL, particularly for the opportunity to be exposed to large numbers of cases from food producing animals. Graduate education in pathology also is provided and a new graduate student, Darin Madson, joined the department in 2006. Numerous visiting scholars from around the world also spent various amounts of time in the Pathology Section.

Pathology **2006 by Month**	Number of Accessions	Number of Tests
Total	**29,482**	**98,922**
January	2,011	9,782
February	1,955	7,439
March	2,406	8,576
April	2,609	8,275
May	2,772	8,519
June	2,255	7,002
July	2,028	5,879
August	2,438	9,454
September	2,510	9,164
October	2,743	7,795
November	2,932	9,181
December	2,823	10,090

Pathology **4-year Trends**	2003	2004	2005	2006
	Number of Tests			
Totals	**75,470**	**82,649**	**91,476**	**98,922**
Hematoxylin and Eosin Slides	28,283	29,199	34,701	40,342
Biopsy Hematoxylin and Eosin Slides	1,094	1,061	1,296	1,225
Special Stains	433	359	234	187
Immunohistochemistry - BVD PI Biopsy	28,497	36,708	38,184	36,901
Immunohistochemistry - Porcine				13,043
Immunohistochemistry - Bovine				1,752
Immunohistochemistry - Unclassified	17,163	15,322	17061	5472

Pathology **2006 Diagnoses - Top 3**	Number of Accessions
PRRS	**3,979**
Pneumonia	2,217
Systemic Infection	1,715
Abortion	43
Encephalitis	2

Enteritis	2
Porcine Circovirus	**2,039**
Systemic Infection	1,028
Pneumonia	932
Enteritis	65
Abortion	13
Encephalitis	1
SIV	**1,224**
Pneumonia	1,224

Porcine enteric disease trends

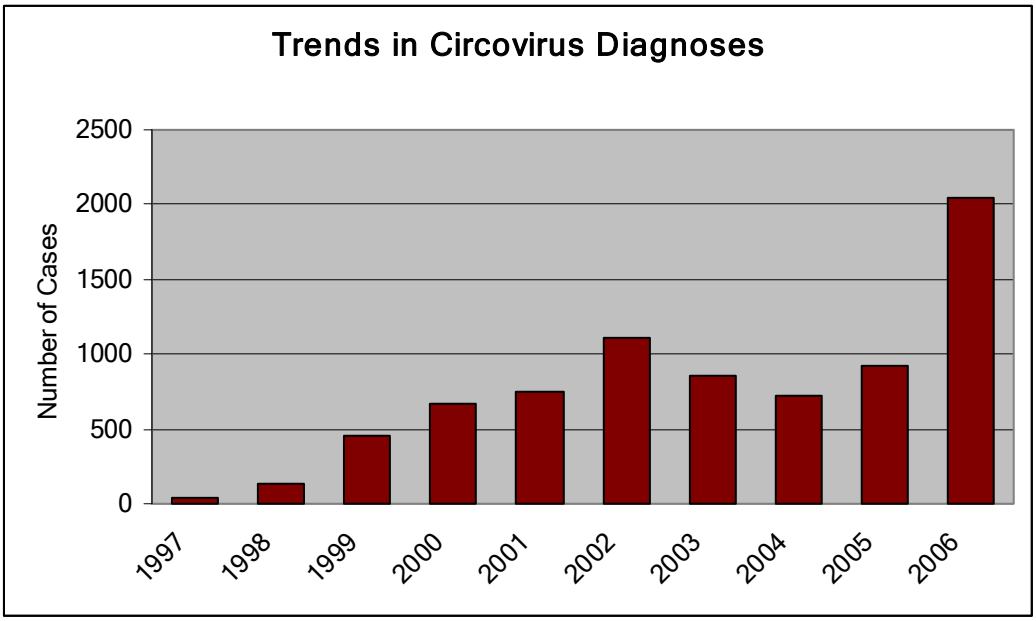
Disease	2000	2001	2002	2003	2004	2005	2006
Clostridium difficile	2	44	61	32	45	33	31
Clostridium perfringens	53	73	76	60	98	95	38
Clostridium perfringens type A	12	31	40	31	73	68	53
Clostridium perfringens type C	13	28	21	24	16	4	10
Coccidiosis	137	217	161	107	106	85	106
E. coli	212	253	328	205	254	284	302
Hemolytic E. coli	201	321	249	196	189	158	195
Hemorrhagic bowel syndrome	15	35	44	22	25	17	20
Proliferative enteritis	115	154	176	171	289	274	211
Rotavirus	118	164	158	124	94	77	100
Salmonella sp.	145	200	200	165	138	119	254
Salmonella cholerasuis	3	5	3	15	14	9	6
Salmonella type B	35	37	22	34	62	81	190
Swine dysentery	2	7	8	-	1	1	3
TGEV	84	32	88	107	113	90	106

Porcine Septicemic disease trends

Disease	2000	2001	2002	2003	2004	2005	2006
Actinobacillus suis	51	53	72	53	33	47	45
Arcanobacterium pyogenes	12	13	26	22	16	6	6
Bacterial-unspecified	95	5	-	125	87	23	97
E. coli	22	35	33	9	12	13	27
Erysipelas	17	66	35	15	7	5	15
Haemophilus parasuis	66	72	73	47	56	42	53
Miscellaneous	69	100	142	0	0	0	97
Salmonella sp.	81	139	163	125	98	48	86
Salmonella cholerasuis	64	99	89	61	42	36	55
Streptococcus sp.	115	142	195	114	81	18	20
Streptococcus suis	66	80	152	79	88	99	134

Pathology 2006 Diagnoses by Species	Number of Accessions
Porcine	
Pneumonia	6,025
PRRS	2,216
SIV	1,224
Streptococcus suis	900
Pasteurella multocida	1069
Mycoplasma hyopneumoniae	629
Porcine circovirus	932
Haemophilus parasuis	230
Bordetella bronchiseptica	143
Actinobacillus pleuropneumoniae	125
Actinobacillus suis	183
Ascarid	7
Enteritis	1,962
E.coli	497
Salmonella	460
Porcine Proliferative Enteritis	211
Clostridium perfringens	191
Coccidia	106
TGE	106
Rotavirus	100
Porcine circovirus	65
Clostridium difficile	31
PCVAD	2039
Abortion	250
PRRSV	43
Bacterial	20
Porcine circovirus	13
Septicemia	553
Streptococcus suis	147
Salmonella	141
Haemophilus parasuis	53
Endocarditis	48
Actinobacillus suis	45
Meningitis	105
Streptococcus suis	52
Haemophilus parasuis	4
Arcanobacterium (Actinomyces) pyogenes	3
Hepatitis	89
Cardiomyopathy (Mulberry Heart Disease)	63
Porcine Dermatitis / Nephropathy Syndrome	57
Arthritis	46
Streptococcus suis	8
Haemophilus parasuis	5
Mycoplasma hyorhinis	2
Dermatitis	43
Myocarditis	40

Edema Disease	18
Erysipelas	15
Metabolic Bone Disease	8



Trends in PCV2 associated diseases in ISU VDL cases	2000	2001	2002	2003	2004	2005	2006
Total	**665**	**749**	**1,116**	**852**	**719**	**917**	**2,039**
Pneumonia	404	379	557	407	346	383	932
PMWS	209	255	346	283	227	270	-
Systemic infections	49	94	179	129	113	213	1,028
Enteritis	2	11	25	23	21	26	65
Abortion	1	10	9	3	2	2	13
PDNS	7	8	12	7	16	23	9

Pathology 2006 Diagnoses by species	Number of Accessions
Bovine	
Pneumonia	654
Mycoplasma bovis	108
Mannheimia hemolytica	90
Pasteurella multocida	77
Haemophilus somnus	40
BRSV	29
AIP	26
BVDV	8
IBR	2
Enteritis	603
Cryptosporidia	85
E. coli	84
Bovine coronavirus	77

Salmonella	63
Rotavirus	53
Abortion	246
Idiopathic	187
Bacterial	18
IBR	4
Neospora	2
BVD	1
BVD	70
Systemic infection	70
Encephalitis	47
Polioencephalomalacia	13
Listeriosis	13
Haemophilus somnus	1
Idiopathic	13
Rabies	2
Abomasitis	27
Idiopathic	16
Clostridium sp	4
Deficiency	13
Selenium	4
Manganese	4
Vitamin E	2
Neoplasms	9
Acidosis	2
Arthritis	2
Mycoplasma bovis	2
Blackleg	2
Canine	
Neoplasm	657
Dermatitis	141
Enteritis	79
CPV	40
Pneumonia	31
Hepatic	24
Inflammatory mass	24
Intoxication	15
Antifreeze	6
Copper	3
Abortion	6
Distemper	6
Blastomycosis	3
Encephalitis	3
Caprine/Ovine	
Pneumonia	53
Mannheimia hemolytica	18
Mycoplasma	9
Pasteurella	7
Abortion	67
Toxoplasmosis	5
Campy	9
Enteritis	33
Coccidiosis	10
Johne’s	9

Encephalitis	13
Polio	8
Listeria	3
Hepatic	17
Intoxication	17
Copper	10
Deficiency	2
Equine	
Neoplasm	23
Abortion	17
Uterine biopsy	17
Salmonellosis	16
Pneumonia	11
Dermatitis	10
Hepatic	9
Dermatitis	8
Rodococcosis	8
Intestinal Accident	5
Lawsonia	4
Feline	
Neoplasm	113
Pneumonia	26
Dermatitis	24
FIP	12
Enteritis	10
Gingivitis	6
Hepatic	5
Myocardiopathy	3
Encephalitis	2
Toxoplasmosis	2

Quality Assurance

Linda Smith, Shawna Middleton, Mike Meetz, Section Leader

Quality Assurance: A VDL Quality System Coordinator was appointed in June of 2006 and began full-time duty in September. The primary responsibilities of this position include developing, coordinating, implementing and monitoring all quality, safety and facilities projects within the laboratory. The development of a VDL Quality System Program is necessary to meet the essential requirements for accreditation by American Association of Veterinary Laboratory Diagnosticians (AAVLD). In addition, it will insure and sustain high quality test performance and accurate, consistent, and timely results to meet the ever-increasing diagnostic, research and outreach demands of our clients. Documentation of policies and standardization of procedures (SOP's) along with sample tracking, development of training manuals, implementation of a bio-safety program, instrument calibration, document control, and validation records are primary components of this plan.

A quality system timeline is in place to assist in monitoring and implementing the short and long-term goals of this program. It is critical that preparation for the accreditation site visit in November in 2007 follows a consistent and well-planned paradigm so that all goals can be accomplished in the proper time-frame.

There have been 18 infrastructure projects and construction upgrades begun (some are finished) since summer of 2006, including a new molecular laboratory and upgrade of a BSL-3 unit which will greatly expand the lab's capacity for developing and applying cutting edge molecular procedures and conducting relevant surveillance testing.

Racing Chemistry

Faculty and Staff: Walter Hyde, Section Leader, Al Kind, Kathy Berrett, Jenny Chang, Luanne Endreland, Dave Greulich, Martha Morgan, Renee Novak, Jackie Peterson, Somchai Rice, Dan Schultz, Kristal Sieve, Jason Stewart, Lori Weyer.

The Racing Chemistry Section is dedicated to providing timely and state-of-the-art drug screening and forensic confirmation to state and national agencies involved in pari-mutuel racing and research. The Racing Chemistry Lab provides both routine and specialized drug testing tailored to the jurisdictional authority, on drugs of concern and with research that improves the ability to detect the presence of drugs in the pari-mutuel animal and to predict what the analytical findings mean.

Racing Chemistry presently serves the Iowa, Kentucky, Virginia, New Mexico and Trinidad/Tobago racing jurisdictional authorities, providing all of their testing. This results in testing approximately 30,000 samples annually. The Racing Chemistry Program also serves the Association of Racing Commissioners, Int. as one of two national Research and Reference Programs. The Racing Program provides a nationally recognized equine proficiency lab testing program that allows jurisdictional authorities to assess the performance quality of their laboratory in pari-mutuel drug testing.

Serology

First row: Sheila Heinen, Theresa Gard, Patrick Emge, Erin Kalkwarf, Sheila Norris, Maria Puentes. Second row: Sue Clauson, Suzanne Block, Charlene Jarboe, Nancy Nelson. Third row: Linda Dunn, Bruce Schuller, Shawna Middleton, Kathy Lin, Audrey Garcia, Dr John Johnson, Bev Fowles.

The serology section is dedicated to high quality, rapid turn-around time of results on samples submitted and has made substantial investments in continuous quality assurance programs in 2006 including a QA/QC manager for the serology section. During the past year they have initiated daily statistical process control (SPC) tracking of controls on many ELISA assays with a desired goal of making SPC charting of all assays a reality in the upcoming year. By daily reviewing these SPC charts, technicians are able to monitor day-to-day consistency of their assay, identify specific points in the testing process that lack desired consistency, and thereby become actively involved in process troubleshooting and process improvement. These SPC charts serve not only as a means of self-evaluation for the technician, but also drive continuous improvement of the testing process to deliver the most consistent and accurate results possible to clients.

The serology section also expanded the scope of tests available to clients. Examples include the introduction of the Swine Influenza Virus (SIV) NP and NS1 ELISAs this year. These two ELISAs provide clients tests with a greater degree of diagnostic sensitivity in the area of Swine Influenza serodiagnostics. Where conventional serologic diagnostic capabilities have failed to maintain diagnostic sensitivity due to the rapid evolution of the virus resulting in ever increasing antigenic diversity of the influenza virus, the NP ELISA can be used to definitively document exposure to any type A influenza virus. The NS1 ELISA allows differentiation of antibodies present solely as the result of vaccination, in that SIV negative pigs vaccinated with SIV vaccine will not mount an antibody response to the NS1 protein. The serology section has also enhanced diagnostic capabilities for an important reportable disease by adding the Bluetongue ELISA test. This assay does not suffer from the cross-reaction problem with Epizootic Hemorrhagic Disease (EHD) as does the AGID test for Bluetongue. We have improved our turn-around time for Equine Infectious Anemia (EIA) diagnostics with the addition of the EIA ELISA. We also introduced the PCV2 serum virus neutralization test and the PCV2 FFN tests to help address diagnostic questions related to this increasingly important disease. The correlation between low or no SN antibodies to PCV2 and PCVAD has been established by a number of researchers prompting us to offer this assay.

Serology efforts in the future will continue to emphasize improved QA/QC, offering diagnostically sensitive and specific tests, and development of new assays needed to best meet the needs of the veterinary community and their clients. As always, the serology section welcomes your comments and suggestions on how they might improve their tests and services to you.

Serology 2006 by Month	Number of Accessions	Number of Tests
Total 2006	**20,524**	**984,335**
January	1,536	104,247
February	1,471	90,752
March	1,994	78,771
April	1,596	60,667
May	1,911	71,041
June	1,793	76,747
July	1,582	87,489
August	1,923	109,429
September	1,829	100,396
October	1,706	73,188
November	1,719	72,248
December	1,464	59,360

Serology 2006 by Species	Number of Tests
Porcine	866,744
Bovine	62,819
Avian	14,844
Equine	5,386
Canine	1,500
Cervidae	1,308
Caprine	864
Camelid	836
Primate	299
Ovine	264
Bovine Exotic	67
Unknown	64
Non-Animal	14
Rodent	14
Bison	11
Feline	7
Equine Exotic	1
Marsupial	1

Serology **4-year trend**	2003	2004	2005	2006
	Number of Tests			
Total	**720,416**	**643,077**	**691,573**	**984,335**
Ana marginale CARD		1		
Ana marginale CF	1,273	661	807	768
Anaplasma cELISA	184	3,851	1,495	5,965
APP screen (no serotyping)	6,374	10,791	9,206	7,282
APP serotype 1 only	39	204	73	4
APP serotype 3 only	1,760	4,260	3,958	2,347
APP serotype 5 only	176	220	20	78
APP serotype 7 only	259	359	143	186
APP TYPE 157	46	172	432	577
Avian influenza AGID	289	8,605	88	27,691
Avian Influenza ELISA	4,727	2,280	98	766
Avian Pneumovirus ELISA		1,591	6,217	7,613
B. Canis RSAT	827	950	1,507	957
Bluetongue Virus AGID	699	571	677	735
Bovine coronavirus IFA		2	3	
Bovine leukemia virus AGID	3,133	3,505	2,861	9,190
BRSV VN	748	760	564	794
Brucella BAPA SCREEN	2,053	1,149	1,626	7,115
Brucella CARD test	1,746	1,962	3,114	3,127
Brucella RAP	8,422	9,428	5,685	7,188
Brucella RIV	323	500	167	444
Brucella SPT	1,872	823	464	492
Brucella STT	905	802	1,258	1,435
BVD type 1 VN	2,233	1,983	2,329	2,411
BVD type 2 VN	1,975	1,803	1,952	2,028
Canine herpesvirus VN	39	14	61	19
Caprine arthritis-encephalitis AGID	139	111	307	646
EHD virus AGID	511	620	597	630
EIA virus AGID	6,231	5,970	4,971	2,595
EIA virus ELISA			210	2,378
EMC virus VN	64	97		
Feline leukemia virus ELISA	2		4	
FIV ELISA	3	3	2	
Hemophilus somnus CF	709	470	369	295
Homologous Swine influenza Virus HI			190	41
IBR (BHV-1) VN	1,978	2,126	1,850	1,894
Johne's (bovine) CF	405	459	496	690
Johne's (bovine) ELISA	10,853	14,942	10,350	21,075
Johne's (ovine) AGID	28	70	186	124
LEPTO 5 MAT	3,611	2,305	2,945	2,746
LEPTO 6 MAT	4,415	4,528	5,797	4,501
Leptospira australis MAT	259	292	343	285
Leptospira autumnalis MAT		3	3	1
Leptospira ballum MAT	258	292	337	285
Leptospira bataviae MAT		1		
Leptospira bratislava MAT		28	28	142

Leptospira canicola MAT	571	787	1	65
Leptospira copenhageni MAT	10	3		
Leptospira grippotyphosa MAT	286	795	1	89
Leptospira hardjo MAT	28	123	1,150	135
Leptospira ictero MAT	562		1	65
Leptospira pomona MAT	8	1		155
Leptospira pyrogenes MAT		1		
Leptospira sejroe MAT	249	417	462	285
Leptospira swazjak MAT		1		
Leptospira tarassovi MAT	258	292	428	285
Leptospria hebdomadi MAT	23	12	10	
M hyopneumoniae CF	1	20	13	12
M hyopneumoniae DAKO ELISA	2,734	1,020	2,018	2,492
M hyopneumoniae ELISA	32,951	22,719	25,956	30,246
Mhyo immunoblot test	4			
Neospora caninum ELISA	1,550	978	906	6,097
Ovine progressive pneumonia AGID	49	66	93	93
Parainfluenza 3 Virus VN	477	623	459	752
Porcine Circovirus II - IFA screen	2,376	3,393	3,685	6,296
Porcine Circovirus II - IFA titer	82	10	161	98
Porcine Circovirus II C - ELISA		118	1,501	22,520
PPV HI	4,377	4,078	4,292	5,791
PRRS Fluorescent Focus Neutralization		643	468	331
PRRS IFA European		411	1,435	1,738
PRRS virus ELISA	100,609	87,498	153,916	351,677
PRRS virus IFA	2,311	2,537	4,495	2,827
PRV - ELISA SCREEN	4,478	3,002	2,692	796
PRV g1 ELISA	349,672	325,532	304,344	299,816
PRV VN	1,521	1,382	1,844	2,813
PRV-ALA SCREEN	2,117	881	539	1,803
PRVgB - ELISA SCREE				765
Pullorum - typhoid AGG	2	120	7	57
SIV NP Elisa				5
SIV NS - 1 Elisa				47
Swine influenza Virus H1N1 (99) HI			9,112	23,899
Swine influenza Virus H1N1 ELISA	3,381	2,145	3,246	18,349
Swine influenza Virus H1N1 HI	47,721	28,036	15,045	191
Swine influenza Virus H1N1 HI Pfizer	16,346	11,236	12,045	7,967
Swine influenza Virus H3N2 ELISA			1,310	7,206
Swine influenza Virus H3N2 HI	69,999	48,544	52,412	43,853
TGE virus VN	1,784	1,470	1,906	1,659
TGE/PRCV	2,828	2,689	8,344	11,824
Toxoplasma LAT	136	164	474	340
VS virus Indiana strain VN	589	844	1,466	1,642
VS virus New Jersey strain VN	589	836	1,466	1,643
West Nile Virus Capture IgM ELISA	169	86	80	71

Meat juice surveillance samples	2006
Total	**464,959**
PRV	278,978
PRRSV	185,981

Virology & Molecular Microbiology Section

First row: Kelly Boesenberg-Smith, Fanghong Zhou, Wendy Stensland, Sarah Bracewell, Dr Karen Harmon. Second row: Dr Kyoung-Jin Yoon, Scott Kostohryz, Kristie Harmon, Dr Subhashinie Kariyawasam, Katie Behrens, Amy Chriswell, Dr Won-Il Kim.

The virology and molecular microbiology section is the most rapid growing section at the VDL and is dedicated to high quality of results in a very reliable and timely manner, continuous R&D on "state-of-the art" or "cutting-edge" technology applicable to veterinary diagnostics, continuing education in diagnostic microbiology, and supporting various research activities among VDL faculty. The section is staffed with 4 faculty, 9 full-time technical staff, 2-3 student employees, 1 post-doctoral fellow and 4 graduate students in the areas of diagnostic virology, molecular diagnostics, rabies testing, NAHLN surveillance testing, research, and teaching. Some of highlights in accomplishments during the last year include:

- The section received 24,541 cases and conducted 74,711 tests as regular diagnostic testing as illustrated in tables below, which accounts for 200% increase in work load from 2005.

- The section played a key role in the nation-wide first ever large-scaled AIV surveillance on migratory water fowls. The section also actively participated in AI and END surveillance on backyard poultry and game birds, CSF surveillance on domestic and feral swine and PRV surveillance on domestic swine to enhance safe guards for livestock in the State of Iowa and the nation from FAD.

- The section made significant contribution to a state-wide BVDV survey to establish a better understanding of BVD PI status in the State of Iowa and developing a better monitoring tool for prevention and control of BVD.
- To meet rapidly growing demand for molecular diagnostics, the section has been well equipped with state-of-the art high throughput instruments and implemented cross training among technical staff on highly demanded and/or surveillance testing for uninterrupted service to clientele. Furthermore, more and more conventional laboratory procedures have been converted to nucleic acid-based assays for better turnaround or increased sensitivity. Yet, the section has kept classical laboratory tests to be prepared for the emergence of a previously unrecognized disease.

Discovery of H3N1 SIV (new subtype) and "PRNS" virus (aka "Virus X") was exemplary to the combined skill set between classical and molecular assays in place within the section.

- Faculty members in the section were very productive in research particularly in areas of PRRS, influenza and PCVAD as evident by a long list of publications and presentations. Due to active and sustained research effort, faculty of the section was able to provide science-based diagnostic information which was of tremendous help to practitioner's sound decision making for intervention or management. Effort was also made in applying research finding to diagnostic medicine. Development of an ELISA test for SIV, which can overcome less optimal performance of the current SIV serologic assays due to continuous antigenic drift among the virus, is a notable accomplishment which will be significant contribution to swine industry in the US and globally.

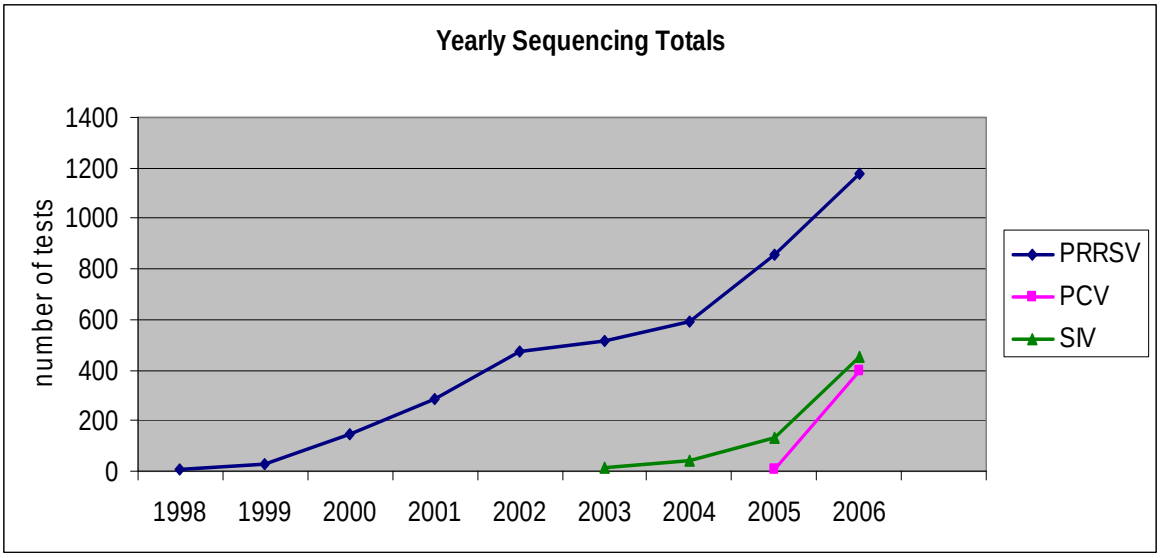
- The section was very instrumental in the creation of the BAS section which provides a critical testing service to boar studs for PRRSV.

- The section played a critical role in rabies testing for the State of Iowa which is one of major public health concern.

Virology **2006 by Month**	Number of Accessions	Number of Tests
Total	**24,541**	**74,681**
January	1,726	4,169
February	1,538	4,062
March	1,995	8,016
April	1,751	5,274
May	2,089	7,818
June	1,874	9,751
July	1,570	3,373
August	2,001	7,380
September	1,942	4,337
October	2,518	5,627
November	2,624	7,712
December	2,913	7,162

Virology **4-year Trends**	**2003**	**2004**	**2005**	**2006**
	Number of Tests			
Total	**19,081**	**24,352**	**42,269**	**74,681**
Antigen ELISA	3,045	1,970	2,102	20,354
FA test	1,880	1,061	712	728
PCR	11,565	19,418	37,830	49,467
Rabies	1,198	1,236	1,095	975
Return of virus Isolate	44	48	73	131
RFLP Analysis	25	28	26	17
Sequencing	262	569	874	1,399
Virus isolation exam	1,534	1,152	2,129	1,735
Virus propagation	21	17	51	8
Virus quantitation	13	1,051	941	4,592

2006 Virology	Number of Accessions	Number of Tests
Total	**24,541**	**74,681**
ELISA		**20,354**
Bovine coronavirus AgELISA	149	160
Bovine coronavirus AgELISA modified	6	6
BVD virus AgELISA	413	19,051
BVD virus AgELISA modified	96	269
Influenza A virus AgELISA	1	1
Parvovirus AgELISA	18	19
Rotavirus AgELISA	770	848
Frozen tissue section FA test	**425**	**728**
PCR		**49,467**
PCR - APP	1	1
PCR - Avian influenza virus	325	496
PCR - Bovine Coronavirus	128	159
PCR - BRSV	88	100
PCR - BVDV fluid	154	505
PCR - BVDV genotyping	4	7
PCR - BVDV genotyping	2	2
PCR - BVDV tissue/blood	136	479
PCR - Classical Swine Fever surveillance	169	299
PCR - Clostridium perfringens	144	148
PCR - E. coli	333	366
PCR - Haemophilus parasuis	79	112
PCR - Lawsonia intracellularis	238	338
PCR - Mycoplasma hyopneumoniae	3,249	3,676
PCR - Pasteurella multocida	5	25
PCR - PCV fluid	648	3,928
PCR - PCV tissue	359	754
PCR - PCV2 Fluid	100	412
PCR - PCV2 Tissue	32	54
PCR - PPV	108	152
PCR - PRRS ORF5	27	28
PCR - PRRSV fluid	5,796	23,365
PCR - PRRSV tissue	5,315	6,038
PCR - SIV	5,008	6,490
PCR - TGE/PRCV	680	950
PCR - WNV	6	8
PCR idiopathic	209	533
Rabies		**971**
Rabies- human exposure FA	740	742
Rabies-non human exposure FA	216	229
Sequencing		**1,399**
Sequencing and Analysis	497	572
Sequencing and Analysis - PRRSV	660	764
Sequencing and Analysis - SIV	58	63
Virus Isolation		**1,735**
Virus Quantitation		**4,592**



Rabies 2006 Accessions	Negative	Positive	Unsuitable	No Test	Inconclusive	Total
Grand Total	**874**	**41**	**21**	**18**	**17**	**971**
Bat	227	19	6	17	1	270
Feline	239	5	3		1	248
Canine	197	2	3		1	203
Bovine	61	2			6	69
Raccoon	61		1		1	63
Skunk	14	12	2	1		29
Equine	18	1			1	20
Caprine	10					10
Squirrel	10					10
Opossum	3		4		1	8
Ovine	8					8
Mink	5					5
Mouse	3				1	4
Woodchuck	4					4
Rat	2		1			3
Chipmunk	1				1	2
Coyote	2					2
Fox	2					2
Ground Squirrel	2					2
Llama	1		1			2
Badger					1	1
Beaver					1	1
Donkey	1					1
Gopher	1					1
Guinea Pig					1	1
Muskrat	1					1
Porcine	1					1

Rabies 2006 Accessions	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Grand Total	**68**	**47**	**67**	**68**	**95**	**105**	**87**	**157**	**93**	**66**	**76**	**42**	**971**
Bat	14	8	16	4	26	33	21	97	22	7	15	7	270
Feline	16	12	12	24	18	29	33	26	25	25	19	9	248
Canine	21	14	17	20	20	19	10	17	21	15	17	12	203
Bovine	2	4	6	9	15	3	7	7	5	5	2	4	69
Raccoon	3	4	4	4	8	8	5	4	3	6	10	4	63
Skunk		3	6	4	1	2	5	2	2	1	2	1	29
Equine	6	1			1	3		1	3	1	3	1	20
Caprine			1			3	2			1	2	1	10
Squirrel	1	1			1	1		1	4	1			10
Opossum				1						3	4		8
Ovine	2		2		3				1				8
Mink	1					1	1		2				5
Mouse			2						1		1		4
Woodchuck			1			1	1	1					4
Rat				1					1			1	3
Chipmunk						1			1				2
Coyote									1			1	2
Fox	1				1								2
Ground squirrel					1			1					2
Llama	1						1						2
Badger							1						1
Beaver										1			1
Donkey											1		1
Gopher				1									1
Guinea Pig						1							1
Muskrat												1	1
Porcine									1				1

Rabies Positive Trends	2003	2004	2005	2006
Total submissions	**1198**	**1236**	**1095**	**975**
Total positives	**78**	**81**	**101**	**41**
Bat	29	35	43	19
Bovine	4	9	6	2
Canine	4	4	2	2
Canine Exotic	0	1	0	0
Equine	3	0	0	1
Feline	5	6	21	5
Mustelid	33	26	29	12

Papers and Presentations

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Opriessnig T, **Halbur PG**. Porcine circovirus type 2 (PCV2)-infection decreases the efficacy of a modified live porcine reproductive and respiratory syndrome virus (PRRSV) vaccine. *Proc 37th AASV, Kansas City, Missouri,* 37:453-454, March 2006.

Opriessnig T, **Halbur PG**. Transmission of PCV2 through consumption of meat or other products from pigs experimentally infected with PCV2. Volume 1:164. *19th International Pig Veterinary Society Congress, Copenhagen, Denmark,* July 16-19, 2006.

Opriessnig T, **Halbur PG**. Transmission of PCV2 through consumption of pork products from pigs experimentally infected with PCV2. 12-13. *45th Annual Meeting North Central Conference of Veterinary Laboratory Diagnosticians, Lincoln, Nebraska,* June 8-9, 2006.

Opriessnig T, **Halbur PG**. Use of an experimental model to test the efficacy of planned exposure to live porcine reproductive and respiratory syndrome virus (PRRSV). *Proc 37th AASV, Kansas City, Missouri,* 37:455-456, March 2006.

Opriessnig T, Johnson J, Yoon KJ, **Halbur PG**. Comparison of ELISA assays and PCR for the detection of anti-PCV2-antibodies and PCV2-antigen or DNA in porcine serum and fecal samples. 49:83. *AAVLD 49th Annual Conference, Minneapolis, MN*, October 12-18, 2006.

Opriessnig T, L. Hoffman, **Halbur PG**. Development of an immunohistochemistry assay for the detection of *Erysipelothrix rhusiopathiae* antigen in formalin-fixed tissues. 49:123. *AAVLD 49th Annual Conference, Minneapolis, MN*, October 12-18, 2006.

Opriessnig T, Lunney KJ, Kuhar D, Thacker E, **Halbur PG**. Comparison of cytokine profiles in pigs singularly or coinfected with PCV2, or *Mycoplasma hyopneumoniae*. Volume 1:170. *19th International Pig Veterinary Society Congress, Copenhagen, Denmark,* July 16-19, 2006.

Opriessnig T, Lunney KJ, Thacker E, **Halbur PG**. Comparison of cytokine profiles in pigs singularly or coinfected with PCV2, or *Mycoplasma hyopneumoniae*. 10-11. *45th Annual Meeting North Central Conference of Veterinary Laboratory Diagnosticians, Lincoln, Nebraska,* June 8-9, 2006.

Opriessnig T, McKeown NE, Meng XJ, **Halbur PG**. Comparison of pathogenicity of US PCV2 field isolates in an experimental pigs model. *Proc 37th AASV, Kansas City, Missouri,* 37:451-452, March 2006.

Opriessnig T, McKeown NE, Meng XJ, **Halbur PG**. Experimental confirmation that PCV2 isolates differ in virulence. Volume 1:167. *19th International Pig Veterinary Society Congress, Copenhagen, Denmark,* July 16-19, 2006.

Opriessnig T, Thacker E, **Halbur PG**. Chlortetracycline is effective in reducing lesions in pigs coninfected with *Mycoplasma hyopneumoniae* and porcine circovirus type 2. Volume 2:302. *19th International Pig Veterinary Society Congress, Copenhagen, Denmark,* July 16-19, 2006.

Opriessnig T, Thomas P, Meng XJ, McKeown NE, **Halbur PG**. Comparison of the efficacy of three different serotherapy regimens and vaccination with a chimeric PCV1-2 vaccine to protect pigs against PCV2 infection and disease. Volume 1:160. *19th International Pig Veterinary Society Congress, Copenhagen, Denmark,* July 16-19, 2006.

Opriessnig T, **Yoon K-J**, Russell L, **Halbur PG**. No Evidence of infectivity of PCV2 nucleic acids present in spray-dried plasma protein. 14-15. *45th Annual Meeting North Central Conference of Veterinary Laboratory Diagnosticians, Lincoln, Nebraska,* June 8-9, 2006.

Opriessnig T, **Zhou EM, Yoon KJ**, **Halbur PG**. Effectively using diagnostic tools for PCV2-asscociated diseases. *In:* PCV2/PMWS seminar#7: Understanding factors that impact disease expression and control. 9-19. *37th AASV, Kansas City, Missouri,* March 2006.

Pogranichniy R, Schwartz K, Wu W-H, **Yoon K-J**. 2006. Viral and clinical characterization of a novel viral agent isolated from pigs with reproductive and/or neurologic disorder. Proceedings, Annual Meeting of American Society for Virology, #19-1.

Pogranichniy R, **Yoon K-J,** Roof M. 2006. Experimental attempt to prevent PMWS in CDCD pigs using inactivated PCV2. Proceedings, 2nd International Scientific Conference on Infectious and Parasitic Diseases of Animals, p27.

Pogranichniy RM, Schwartz K, **Yoon K-J**. 2006. Experimental reproduction of porcine reproductive and neurologic syndrome by a novel pestivirus-like virus. Proceedings, 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, p81.

Pogranichniy RM, **Yoon K-J**. 2006. Isolation of a novel agent associated with reproductive and/or neurologic disorder in pigs. Proceedings, 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, p82.

Prickett J, Simer R, **Kim W-I**, **Yoon K-J**, **Zimmerman J.** 2006. Detection of PRRSV infection using pen-based oral fluid samples: Field study. Proceedings, Conference of Research Workers on Animal Diseases, abstract #72. Blackwell Publishing, Ames, IA.

Prickett J, Simer R, **Kim W-I, Yoon K-J**, **Zimmerman J**. 2006. Detection of PRRSV infection using pen-based oral fluid samples: Field study. Proceedings, International Symposium on PRRS, poster #15.

Prickett J, Simer R, **Yoon K-J**, **Zimmerman J**. 2006. Detection of PRRSV infection using pen-based oral fluid samples: Experimental study. Proceedings, International Symposium on PRRS, poster #14.

Prickett J, Simer R, Zhou EM, **Yoon K-J, Zimmerman J.** 2006. An alternative method for PRRSV surveillance: Experimental data. Proceedings, North Central Conference of Veterinary Laboratory Diagnosticians, pp 7-8.

Prickett J, Simer R, Zhou EM, **Yoon K-J, Zimmerman J.** 2006. An alternative method for PRRSV surveillance: Field data. Proceedings, North Central Conference of Veterinary Laboratory Diagnosticians, p9.

Prickett J, Simer R. Zhou E-M, **Yoon K-J**, **Zimmerman J**. 2006. An alternate method for PRRSV surveillance: Experimental Data. Proceedings, 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, P78.

Prickett J, Simer R. Zhou E-M, **Yoon K-J**, **Zimmerman J**. 2006. An alternate method for PRRSV surveillance: Field Study. Proceedings, 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, P79.

Trampel DW, Zhou EM, **Yoon K-J**, Koehler KJ. 2006. Detection of antibodies in serum and egg yolk following infection of chickens with an H6N2 avian influenza virus. Proceedings, IFSS Symposium.

Wu W-H, Cha S-H, **Kim W-I, Yoon K-J**. 2006. 2b peptide based ELISA as a potential DIVA test for PRRS virus. Proceedings, 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, p76.

Wu W-H, **Yoon K-J.** 2006. Potential DIVA test for PRRS virus. Proceedings, North Central Conference of Veterinary Laboratory Diagnosticians, p4.

Wu, W-H, **Kim W-I**, Kim J-J, **Yoon K-J**. 2006. Improved serology testing for swine influenza virus (SIV). Proceedings, Annual Meeting of American Association of Swine Veterinarians, pp 465-466.

Wu, W-H, **Kim W-I,** Kim J-J, **Yoon K-J**. 2006. Subtype-unrestricted differential ELISA for serodiagnosis of swine influenza virus. International Pig Veterinary Society Congress, #P-09-18.

Yoon K-J. 2006. RFLP analysis of PRRS viruses: Use and limitations. IVMA Update 14(11):9. EBM

Yu S, **Opriessnig T**, Kitikoon P, Nilubol D, **Halubr PG**, Thacker E. Detection of PCV2 replication in immune cell populations in vitro and in vivo. *87th CRWAD, Chicago, Illinois*, abstract #176, p 162, Dec 3-5 2006.

Yu S**, Opriessnig T**, Kitikoon P, Nolubol D, **Halbur PG,** Thacker E. Porcine circovirus type 2 (PCV2) distribution and replication in tissues early in infection. *Proc. 87th CRWAD, Chicago, Illinois*, abstract #P120, p 124, Dec 3-5 2006.

Invited Presentations by ISU VDL faculty

Cooper VL. 2006. Getting Value Out of Your Diagnostic Dollar. Iowa Veterinary Medical Association Winter Meeting. Feb. 08. pp. 93-94.

Cooper VL. 2006. North Central Iowa Veterinary Medical Association meeting - M. bovis/Brucella canis/Dropping like flies. May 09.

Ensley SM. 14th Annual Swine Disease Conference for Swine Practitioners Ames, Iowa, Thursday November 9, Friday November 10, 2006.

Ensley SM. Bio-fuel Co-products Potential Pitfalls/Future.

Ensley SM. DDGS and Swine Health, Professional Development for Extension Agents, Kildee Hall, 10/24/06.

Ensley SM. Drought Intervention Strategies, Holstein and Mapleton, Iowa. 8/1/06.
Health Issues with DDGS, Professional Development for Extension Agents, Kildee Hall, 10/10/06.

Herman JR, Munoz-Zanzi CA, **Yoon K-J**, **Zimmerman J**. 2006. Susceptibility of young pigs to PRRSV infection by aerosol route of exposure. International Symposium on PRRS, Chicago, IL; December.

Janke BH. Diagnostic trends in swine influenza: A review. Proceedings, *14th Annual Swine Disease Conference for Swine Practitioners*, Iowa State University, Ames, IA, Nov 9-10, 2006.

Janke BH. Pigs, poultry, people and pandemic influenza: The virus carousel. IVMA Winter Mtg, Feb 7-8, 2006.

Janke BH. Vaccination for swine influenza and avian influenza. Harvard University Asian Flus and Avian Influenza Workshop, Harvard University, Cambridge, MA, Dec 8-9, 2006.

Johnson J. AASV, Swine Influenza Diagnostic Challenges, March 4, 2007, Orlando.

Johnson J. Fall Swine Conference, PCV2 Serology Impacts on Vaccine Timing, November 10, 2006, Ames.

Johnson J. IVMA Fall Meeting,VDL Diagnostic Report and Sample Submissions, September 29, 2006, Ames.

Jordan DM. Critical review of Clearance of the Carrier State of Anaplasmosis presented at the Western States Conference in February 2006 as part of the Evidence Based Medicine Panel.

Jordan DM. *Porcine Pasteurellosis* for Al-Pharma presented at AASV, March 2006.

Madson DM. Draxxin: The US perspective, Pfizer-Canada Draxxin launch, Quebec, November 3-5, 2006.

Opriessnig T, Zhou EM, **Yoon K-J**, **Halbur PG.** 2006. Effectively using diagnostic tools for PCV2-assocaited diseases. Pre-conference workshop: PMWS. Annual Meeting of American Association of Swine Veterinarians, Kansas City, KS; March.

Opriessnig T. Effectively using diagnostic tools to diagnose PCV2 associated disease. PCV2 Training Workshop; Fort Dodge Animal Health. May 17, 2006

Opriessnig T. PCV2 and associated diseases. Boehringer Ingelheim Vetmedica Swine Health Advisory Board Meeting, April 11, 2006, Des Moines, Iowa.

Opriessnig T. PCV2 ELISA testing and genotype differences. PCVAD Research Award Breakfast, September 25, 2006, Minneapolis, Minnesota.

Opriessnig T. PCVAD – the academic perspective. Teleconference and webcast on PCV2, Indiana Pork Producer Association, July 26, 2006, Panelist

Opriessnig T.PCV2 infection and genetic resistance. Fall Semester 2006 AB&G Seminar Series, October 3, 2006.

Osweiler GD. Presentation of Pope Award, Life Awards and Graduate Student and Best Manuscript Awards at AAVLD Annual Meeting, Minneapolis, MN, October 15, 2006

Pogranichniy R, **Yoon K-J,** Roof M. 2006. Experimental attempt to prevent PMWS in CDCD pigs using inactivated PCV2. 2nd International Scientific Conference on Infectious and Parasitic Diseases of Animals, Kosice, Slovak of Republic; September.

Yoon K-J, Harmon K, **Hyde W, Janke B**. 2006. Methodology of PRRS virus PCR at ISU VDL. Pre-conference workshop: Boar Stud Issues. Annual Meeting of American Association of Swine Veterinarians. Kansas City, KS; March.

Yoon K-J, Russell L. 2006. Spray drying and viral infections: CSFV, PRRSV and PCV2. Korean Ministry of Agriculture and Forest, Gwacheon, Kyunggido, Korea; April

Yoon K-J, Russell L. 2006. Spray drying and viral infections: CSFV, PRRSV and PCV2. Korean Feed Association, Seoul, Korea; April.

Yoon K-J. 2006. Evolutionary Biology of virus infections: assessment of impact on the pathogenesis, diagnostics and disease control using PRRSV as model. Workshop on Norman Borlaug Young Scientists Program at Iowa State University. Academy of Agriculture and Forest Sciences, Bucharest, Romania; May.

Yoon K-J. 2006. PCV2 and PMWS: old virus and new disease. Department of Diagnostic Medicine and Pathobiology, Kansas State University, Manhattan, KS; April.

Yoon K-J. 2006. Prevention and control attempts for PRRS and research update. Virology Division, National Veterinary Research and Quarantine Service, Ministry of Agriculture and Forestry, Anyang, Korea; August.

Yoon K-J. 2006. Update on avian pneumovirus in Iowa. Turkey Research Review and Avian Pneumovirus Symposium organized by the Minnesota Turkey Council. Willmar, MN; September.

Yoon K-J. 2006. Update on PCV2 research and control strategies. Choong-Ang Vaccine Company, Daejeon, Korea; August.

Zimmerman J, McKean J, **Yoon K-J**. 2006. Epidemiología, diagnóstico, y experiencias de erradicación del virus de pseudorabia [Epidemiology, diagnosis and experience of pseudorabies virus eradication]. VI. Jornadas de Actualización en Medicina y Producción de Cerdos. Facultad de Ciencias Veterinarias, Universidad Central de Venezuela. Maracay, Venezuela; November.

All other presentations including abstracts by ISU VDL faculty

Cha S-H, Chang C-C, **Kim W-I**, Molina R, **Zimmerman JJ**, **Yoon K-J**. 2006. Evolutionary biology of PRRS viruses in pigs: mutations and recombination. International Symposium on PRRS, Chicago, IL; December.

Cha S-H, **Kim W-I**, Wu W-H, Molina R, **Yoon K-J**. 2006. Emergence of new strains of PRRSV by recombination during in vivo replication. Annual Meetings of American Society for Virology, Madison, WI; July.

Cha S-H, **Yoon K-J**. 2006. Impact generated by viral recombination on molecular epidemiology of PRRS viruses. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Cha S-H, **Yoon K-J**. 2006. Impact of PRRSV recombination on PRRSV molecular diagnostics. North Central Conference of Veterinary Laboratory Diagnosticians, Lincoln, NE; June.

Choi K-S, Ko Y-J, Nah J-J, Kang S-Y, **Yoon K-J**, Kim Y-J, Kim H-J, J Y-S, Kang M-I. 2006. A monoclonal antibody-based competitive ELISA for detection of West Nile virus (WNV) neutralizing antibodies in animal sera. Fall Conference of Korean Society of Veterinary Science, Chungmoo, Kyungnam, Korea; September.

Harmon, K.M. October 2006. Development of a real-time PCR for the specific detection of *Leptospira borgpetersenii* serovar hardjo. Proc AAVLD 49th Annual Conf . p202.

Hermann JR, **Yoon K-J**, Hoff SJ, Burkhardt A, **Zimmerman JJ**. 2006. An update on PRRSV aerobiology research. Allen D. Leman Swine Conference, St. Paul, MN; September.

Hermann JR, **Yoon K-J**, Hoff SJ, **Zimmerman JJ.** 2006. Probability of porcine reproductive and respiratory syndrome (PRRS) virus infection via aerosol route of exposure. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Hermann JR, **Yoon K-J**, Hoff SJ, **Zimmerman JJ.** 2006. Stability of infectious porcine reproductive and respiratory syndrome virus in aerosols. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Imerman PM. Determination of Gentamicin in Feline Kidney: A Case of Apparent Nephrotoxicity **P.M. Imerman**[1] and M.J. Yaeger[1] 49th Annual AAVLD Conference, Minneapolis, MN October 12-18, 2006.

Jordan DM, Taylor-Vokes, RJ, **Halbur PG**, **Hoffman L,** Ross RF. 2006 Experimental Challenge Model for Actinobacillus suis-presentation AAVLD in Minneapolis MN

Kim W-I, Cha S-H, **Yoon K-J**. 2006. Role of structural proteins in cross neutralization among PRRS viruses. International Symposium on PRRS, Chicago, IL; December.

Kim W-I, **Cooper VL**, Chang C-C, **Yoon K-J**. 2006. Molecular study on the reversion of attenuated PRRS viruses to a virulent strain. Proceedings, Conference of Research Workers on Animal Diseases, Chicago, Illinois; December.

Kim W-I, Faaberg K, Roof M, **Yoon K-J**. 2006. Requirement of structural proteins in *in vitro* cross neutralization among PRRS viruses. Conference of Research Workers on Animal Diseases, Chicago, IL; December.

Kim W-I, Kim J-J, **Yoon K-J**. 2006. Surrogate phenotypic and genetic markers for PRRS viruses related to the modified live PRRS vaccine strains. International Pig Veterinary Society Congress, Copenhagen, Denmark; July.

Kim W-I, Wu W-H, **Yoon K-J**. 2006. Immunological significance of genetic variation in ORF5 of PRRS virus. Annual Meeting of American Society for Virology, Madison, WI; July.

Kim W-I, **Yoon K-J**. 2006. Genetic determinants for different phenotypes of wild-type and attenuated PRRS viruses. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Kim W-I, **Yoon K-J**. 2006. Phenotypic and genetic difference between wild-type and attenuated porcine reproductive and respiratory syndrome viruses. North Central Conference of Veterinary Laboratory Diagnosticians, Lincoln, NE; June.

Kinyon JM. ETK – Susceptibility Testing; and Surveillance work in the Bacteriology Section.

Koynarski TV, **D. M. Jordan**, *Escherichia coli* phenotype, genotyping and relation t histopathology; poster
- 2006 ISU CVM Summer Scholar Research Day, Ames, Iowa
- 2006 LSU Merck/Merial Veterinary Scholar National Symposium, New Orleans
- 2006 AAVLD in Minneapolis

Ma W, Lekcharoensuk P, Lager KM, Webby R, **Yoon K-J**, **Janke BH**, Richt JA. 2006. The role of avian/human-like influenza polymerase genes in the adaptation of influenza viruses to pigs. Conference of Research Workers on Animal Diseases, Chicago, IL; December.

Ma W, Lekcharoensuk P, Lager KM, Webby R, **Yoon K-J**, Juergen RA. 2006. The role of avian polymerase gene in the adaptation of influenza virus to pigs. Annual Meeting of American Society for Virology, Madison, WI; July.

Opriessnig T, **Johnson J**, **Yoon K-J**, **Halbur PG**. 2006. Comparison of ELISA assays and PCR for the detection of anti-PCV2-antibodies and PCV2-antigen in porcine serum and fecal samples. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Opriessnig T. Update on PCVAD, Fairmont Veterinary Clinic, May 22, 2006.

Pogranichniy R, Schwartz K, Wu W-H, **Yoon K-J**. 2006. Viral and clinical characterization of a novel viral agent isolated from pigs with reproductive and/or neurologic disorder. Annual Meeting of American Society for Virology, Madison, WI; July.

Pogranichniy RM, Schwartz K, **Yoon K-J**. 2006. Experimental reproduction of porcine reproductive and neurologic syndrome by a novel pestivirus-like virus. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Pogranichniy RM, **Yoon K-J**. 2006. Isolation of a novel agent associated with reproductive and/or neurologic disorder in pigs. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Prickett J, Simer R, Kim W-I, **Yoon K-J**, **Zimmerman J.** 2006. Detection of PRRSV infection using pen-based oral fluid samples: Field study. International Symposium on PRRS, Chicago, IL; December.

Prickett J, Simer R, Kim W-I, **Yoon K-J**, **Zimmerman J.** 2006. Detection of PRRSV infection using pen-based oral fluid samples: Field study. Conference of Research Workers on Animal Diseases, Chicago, IL; December.

Prickett J, Simer R, **Yoon K-J**, **Zimmerman J**. 2006. Detection of PRRSV infection using pen-based oral fluid samples. International Symposium on PRRS, Chicago, IL; December.

Prickett J, Simer R. **Zhou E-M, Yoon K-J**, **Zimmerman J**. 2006. An alternate method for PRRSV surveillance: Experimental Data. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Prickett J, Simer R. **Zhou E-M**, **Yoon K-J**, **Zimmerman J**. 2006. An alternate method for PRRSV surveillance: Field Study. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Prickett J[a], Simer R, **Zhou EM**, **Yoon KJ**, **Zimmerman JJ.** 2006. An alternative method for PRRSV surveillance: Experimental data. 45th North Central Conference of Veterinary Laboratory Diagnosticians. Lincoln, NE; June. ([a]Recipient of graduate student award)

Sylliaasen P, DK Meyerholz, and **DM Jordan,** Mapping of Vascular Endothelial Growth Factor in Swine Tissues. 2006 ISU CVM Summer Scholar Research Day, Ames, Iowa

Wagenaar SR, C. Thompson, **D. M. Jordan**, Characterization of *Actinobacillus suis* by pulse-field gel electrophoresis; poster 2006 poster CRWAD

Wu W-H, Cha S-H, **Kim W-I**, **Yoon K-J***. 2006. 2b peptide based ELISA as a potential DIVA test for PRRS virus. 49th Annual Meeting of American Association of Veterinary Laboratory Diagnosticians, Minneapolis, MN; October.

Wu W-H, **Yoon K-J*.** 2006. Potential DIVA test for PRRS virus. North Central Conference of Veterinary Laboratory Diagnosticians, Lincoln, NE; July.

Wu, W-H, **Kim W-I**, Kim J-J, **Yoon K-J***. 2006. Improved serology testing for swine influenza virus (SIV). Annual Meeting of American Association of Swine Veterinarians, Kansas City, KS; March.

Wu, W-H, **Kim W-I,** Kim J-J, **Yoon K-J**. 2006. Subtype-unrestricted differential ELISA for serodiagnosis of swine influenza virus. International Pig Veterinary Society Congress, Copenhagen, Denmark; July.

Yaeger MJ, Songer GJ, **Kinyon J**. The Predictive Value of Gross and Microscopic Lesions Associated with *Clostridium difficile* Infection in Neonatal Pigs. 49th Annual AAVLD Meeting, October 12-19, Mpls, MN.

Active or New Grants and Contracts by ISU VDL Faculty Funded in 2006

Clothier K. Johne's Disease Educational Program; distribution of educational materials to veterinarians and producers. $5000. 2006-2007. 1 yr.

DeWitt, Dennis, ISU Extension Livestock Field Specialist, Principal Investigator, Co-Investigators: **Dr Steve Ensley**, DVM, ISU Veterinary Toxicologist, Diagnostic Lab. **Dr Paula Imerman, Ph.D.,** VDPAM, ISU Veterinary Diagnostic Lab. Dr Beth Doran, ISU Extension Beef Field Specialist Dr Kris Kohl, ISU Extension Agricultural Biosystems Engineer. Total Sulfur Intake Determination from Beef Cattle Utilizing Corn Co-Products. Iowa Beef Center, $5,000.00, November 2006- 1year.

Doran, Beth, ISU Extension Beef Field Specialist, Principle Investigator Co-Investigators: Dan Loy, ISU State Extension Beef Specialist Dan Morrical, ISU State Extension Grazing Specialist **Steve Ensley**, ISU Clinician – VDPAM **Paula Imerman**, ISU Veterinary Diagnostic Lab Gary Munkvold, ISU Endowed Chair – Plant Pathology/Seed Science. Lick Tanks to Deliver Condensed Corn Distillers Solubles to Summer Grazing Beef Cows. Iowa Beef Center. $4,889.00 November 2006- 1year.

Halbur PG, **Opriessnig T**, Kuster C, Evans RB. The role of boar semen in porcine circovirus type 2 (PCV2) transmission: Validation of diagnostic tools and determination of infectivity of PCV2 positive samples. National Pork Board. $49,613. 2006-2007. 1yr.

Halbur PG, **Opriessnig T**. Understanding if porcine circovirus type 2 strain differences explain the recent Canadian outbreak. National Pork Board. $50,110. 2006-2007. 1 yr.

Hoffman, LJ. NAHLN Grant CREES $300,000. 2006-2007 1 year.

Hyde W. Drug Testing and Research Provision to Kentucky Horse Racing Authority, CY 2006, approximately $800,000

Hyde W. Drug Testing and Research Provision to Trinidad/Tobago Racing Commission, CY 2006, approximately $40,000

Hyde W. Drug Testing and Research Provision to Virginia Racing Commission, CY 2006, approximately $80,000

Hyde W. et all. Mycotoxins in Dry Distiller's Grains (DDG), ISU-VDPAM and Novecta, Approximately $6,000

Imerman P., **S. Ensley, G. Osweiler** and **W. Hyde**. Drug Testing and Research Provision to Iowa Racing and Gaming Commission, CY 2006, approximately $500,000

Imerman Paula M, Ph.D., Co-principal Investigator: **Steve M. Ensley,** DVM, Ph.D. Proposal for Analysis of 12 Antibiotics in Kidney and Urine, Principal Investigator: Dee Griffin University of Nebraska, $58,000.00. November 2006- April 30 2007.

Janke BH (PI), Thacker EL, Webby RJ, Lager KM, Richt JA. Pathogenesis of infection in swine with highly pathogenic avian influenza viruses. CDC. $798,663. 2006-2008.

Jordan DM, **Kris Clothier, Curt Thompson, Vicki Cooper, Joann Kinyon**, Development and validation of real-time PCR for the detection of *Mycoplasma bovis*, $5000 2006-2007

Jordan DM (PI) and NA Cornick; Characterization of virulence factors of *E. coli* from post-weaned pigs with diarrhea; $20,000 USDA Formula Funds (1/1/2007 - 12/30/2007)

Jordan DM (PI), O Sahin, P Plummer, S Robbe-Austerman, Q Zhang; Iowa Sheep and Wool Promotion Board "A cross sectional study of sheep abortions in Iowa" April 2006- September 2007; $2500.

Kohut ML, Wannermuhler MJ, Buss JE, **Yoon K-J**, Cunnick JE, Nett D. Exercise-induced immunomudulation in the aged: Mechanisms. National Institute of Health. $2,582,768. 2006-2011. 5 yr

Meng X-J, **Halbur PG, Opriessnig T.** Pathogenicity of the ORF3 gene-silence mutant of type 2 porcine circovirus in pigs: A study towards the development of a marker vaccine. National Pork Board. $50,000. 1yr.

Meng X-J, **Halbur PG, Opriessnig T.** Risk assessment of hepatitis E virus-contaminated commercial pig livers sold in local grocery stores in the United States. National Pork Board. $40,000. 1 yr.

Munkvold, G.P. (ISU Plant Pathology), **P.M. Imerman**, **S.M. Ensley, G.D. Osweile**r (ISU VDPAM) Cooperators: Dan Loy, Rod Berryman (ISU Animal Sci.), H.J. Sellers (ISU Coop. Ext.), Jim Secor (ISU Research Farms) Fungi and potential for mycotoxin development in ethanol fermentation co-products. Investigators. Iowa Beef Center, $5,000.00, November 2006- 1year.

Opiessnig T, **Halbur PG**, **Yoon K-J, Hyde W**. The role of boar semen in porcine circovirus type 2 (PCV2) transmission: Determination of effect of PCV2 positive semen samples on sow performance and reproduction. Iowa Livestock Health Advisory Council. $24,996. 2006-2007. 1 yr

Opiessnig T, **Halbur PG**, **Yoon K-J**. Understanding the role of PCV2 in the recent North Carolina disease outbreaks. Iowa Livestock Health Advisory Council. $24,983. 2006-2007. 1 yr

Opriessnig T, **Halbur PG**, Rothschild M. Investigations on breed-dependent differences in susceptibility to PCV2. Iowa Pork Producer Association. $49,893. 2006-2007. 1 yr.

Opriessnig T, Halbur PG. Comparison of different PCV2-antibody ELISA assays and their ability to detect PCV2-specific antibodies after PCV2-vaccination or after infection with genetically distinct PCV2-isolates. Boehringer Ingelheim. Advanced PCVAD Research Award 2006. $25,000. 2006-2007. 1 yr.

Opriessnig T, Thacker E, Yu Shan, **Halbur PG**. Characterization and comparison of the immune response to PCV2 in pigs of different genotype. Boehringer Ingelheim. Advanced PCVAD Research Award 2006. $25,000. 2006-2007. 1 yr.

Osweiler, G.D. Evaluation of a Novel Bedding Material for Research Animals and Pets, Green Products, Inc. and IPRT-ISU, $ 7,385, March 30, 2006, one year.

Osweiler, GD, PM Imerman[1], M. P. Hoffman[2], **S. M. Ensley**[1], **WG Hyde**[1], Wayne Roush[3] Characterization of Potential Risk Factors of Corn Distillers Solubles to Beef Cattle IBC POW Priority: Increase Effective Use of Grain Coproducts by 2011. Iowa Beef Center, $4,432.00. November 2006- 1year.

Swackhammer, Clete, Byron Leu, Appanoose and Davis Counties ISU Extension, **Steve Ensley**, **Paula Imerman**, ISU Veterinary Diagnostic Lab. Determining sulfur concentrations in feedstuffs on farms where PEM has been diagnosed in South central Iowa. Iowa Beef Center. $600.00 December 2006- 1year.

Yaeger MJ, **Kinyon JM**, Songer JG. Diagnosis and Prophylaxis of Clostridial Enteritides in Piglets. 2006 – 2008 IPPA $76,245. 2006-2007.

Zhang, Q (PI), O Sahin, P Plummer, S Robbe-Austerman, **DM Jordan,** M Yaeger, **L Hoffman.** Campylobacter-associated Abortion in Sheep. IHLAC. $25,000 (first year) April 1, 2006-March 31, 2008.

Grants and Contracts by ISU VDL faculty – Pending

Cornick N and **DM Jordan;** Role of Role of F4/F18 negative *E. coli* in post-weaning diarrhea and edema disease; National Pork Board Research Proposal, October 2006, one year, $51,922

Ensley SM, J. Russell, **K. J. Yoon**. Grazing Management Effects on Pathogen Loading of Midwestern Pasture Streams, USDA NRICGP 2007-000141. $399,769. 2007. 3 years.

Hurd HS, J. Dickson, M. Bryden, A. O'Connor. **D Jordan**, R. Baker, D. Holtkamp; Quantifying the connection between animal health and public health risk: Data and tools for decision making

Imerman PM and **Walt Hyde**. Analyzing goat serum and/or tissue samples for Tulathromycin by LC/MS. Ron Griffin ISU/USDA. August 2006. $????

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Glossary

AgELISA	Antigen-capture ELISA
AGG	Agglutination
AGID	Agar gel immunodiffusion
ALA	Automated latex agglutination
BAPA	Buffered acidified plate antigen test
BRSV	Bovine respiratory syncytial virus
BVDV	Bovine viral diarrhea virus
cELISA	Competitive (blocking) ELISA
CF	Complement fixation
CSF	Classical Swine Fever
EDTA	Ethylenediaminetetraacetate
ELISA	Enzyme-linked immunosorbent assay
EM	Electron microscopy
FA	Fluorescent antibody
FAD	Foreign Animal Diseases
FADDL	Foreign Animal Disease Diagnostic Laboratory (USDA)
FATS	Fluorescent antibody tissue section
FFN	Fluorescent focus neutralization
FSVS	Food Supply Veterinary Services
HI	Hemagglutination inhibition
IBT	Immunoblot assay
IFA	Indirect fluorescent antibody
IHC	Immunohistochemistry
IPT	Immunoperoxidase test
LAT	Latex agglutination
Mab	Monoclonal antibody
MAT	Microscopic agglutination test
NADC	National Animal Disease Center (USDA:ARS)
NVSL	National Veterinary Services Laboratories (USDA:APHIS)
PAM	Production Animal Medicine, Iowa State University
PCFIA	Particle concentration fluorescence immunoassay
PCR	Polymerase chain reaction
PCV	Porcine circovirus
PI	Persistent infection
PPV	Porcine parvovirus
PRCV	Porcine respiratory coronavirus
PRRS virus	Porcine reproductive and respiratory syndrome virus
PRV	Pseudorabies (Aujeszky's disease) virus
RAP	Rapid automated presumptive test
RFLP	Restriction fragment length polymorphism
RIV	Rivanol precipitation – plate agglutination test
RSAT	Rapid slide agglutination test
SIV	Swine influenza virus
SPT	Standard plate agglutination test
STT	Standard tube agglutination test
TGEV	Transmissible gastroenteritis virus
VDL	Veterinary Diagnostic Laboratory, Iowa State University
VDPAM	Department of Veterinary Diagnostic and Production Animal Medicine
VI	Virus isolation
VME	Veterinary Medicine Extension, Iowa State University
VMRI	Veterinary Medical Research Institute, Iowa State University
VN	Serum-virus neutralization