

2020 ANNUAL REPORT



OADDL

College of Veterinary Medicine

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ACCREDITATION

The Oklahoma Animal Disease Diagnostic Laboratory is accredited as a full-service laboratory for all animal species by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). Current certification expires December 31, 2024.



MISSION STATEMENT

The Oklahoma Animal Disease Diagnostic Laboratory promotes the overall well-being of animals through diagnostic testing, instruction of professional veterinary students, and research in diseases of economic importance to Oklahoma and beyond.

VISION STATEMENT

The Oklahoma Animal Disease Diagnostic Laboratory will be recognized as a leader in veterinary diagnostics through excellence in diagnostic service, research efforts leading to improved animal disease testing and surveillance, and sustained accreditation by the American Association of Veterinary Laboratory Diagnosticians.

MESSAGE FROM THE DIRECTOR

We are delighted to share with you this annual report, which outlines OADDL activities and accomplishments in calendar year 2020. It would be an understatement to say that 2020 was a momentous year. Despite the challenges imposed by the COVID-19 pandemic, OADDL remained focused on and committed to its goal of providing high quality and timely diagnostic services to all our clients. Following are some highlighted accomplishments of the year:

- A new Director was hired and joined the OADDL Team on 4/30/2020.
- Two new OADDL-based pathologists (one board-certified and one board-eligible) joined the Team on 6/30/2020.
- OADDL was the first veterinary diagnostic laboratory to begin conducting COVID-19 testing on human samples. From 3/31/2020 to 9/3/2020, we conducted 111,093 COVID-19 real-time PCR tests.
- 18,224 cases were submitted from veterinarians, animal owners, livestock producers, and industry partners.
- Cases were submitted from all of Oklahoma's 77 counties and 43 states in the United States.
- A total of 115,046 tests performed (a 16.5% increase from 2019). Decreases in workload in certain areas were attributable to the COVID shut down, while increases in other areas resulted from the onboarding of new tests, notably swine serologies.
- 86,966 tests were performed for diseases of economic importance to Oklahoma and the US, including reportable diseases (a 17 % increase in surveillance testing from 2019).
- Each quarterly OADDL electronic newsletter was distributed to ~3,000 OADDL stakeholders.
- Over 6,400 diagnostic reports sent to OADDL clients outside routine business hours – an indication of our strong commitment to timeliness of test results.
- We partnered with UPS to implement self-service online discounted shipping label printing for easy sample submission to the Lab.
- Our technical personnel successfully completed proficiency tests for 18 pathogens.
- The entire OADDL Team remained fully staffed and working on-site during the pandemic.

All these successes were made possible by OADDL's committed, conscientious and dedicated Team, to whom I am very thankful. I also want to thank Dr. Jerry Ritchey for his leadership as Interim Director for the latter part of 2019 and the first part of 2020 and for assuring a very smooth transition to me as incoming Director. Finally, I want to thank all our stakeholders – clients, industry partners, state authorities, the CVM, and our Board of Advisers – for their strong support of OADDL in the past years. Although we are still in the throes of the pandemic, I feel very optimistic about OADDL's momentum and the exciting times ahead.



Jerry T. Saliki, DVM, PhD, DACVM
Professor and Director

WHAT OUR STAKEHOLDERS SAY ABOUT US

"Thank you for all that you have done to **help the State of Oklahoma** during this challenging time in our history. In the Ag world, we rely on your **expertise** and **knowledge** on almost a daily basis during times of uncertainty. Thank you for being a **true example of the "One Health" philosophy**.

"**We appreciate the commitment** made by the Diagnostic Animal Laboratory to accept and test COVID-19 specimens. Your show of support is both **humbling** and **inspiring** during these challenging times."

"I received our qPCR results yesterday - **thanks a million**. You guys are **amazing**. Very glad we are able to work together."

"**Thank you** Emily. **I can't thank you guys enough** for being on top of this despite the challenges of Oklahoma weather."

"OADDL's discounted UPS program gets all our samples to the lab next day. I think that is the case with most of Oklahoma. **Great program** and **online label creation works real well**. **Special thanks** to OADDL for doing that for us."

"I really **appreciate the extra effort** Dr. Ramachandran and the OADDL staff made to get this result to me quickly. Please express my thanks to those who went **above** and **beyond** to get the results to me quickly."

"OADDL has provided Aviagen an **outstanding service** with serology and follow-up testing needed to meet our NPIP certification requirements. By sending our testing to OADDL instead of Alabama, we (you) **shortened the testing time** from 5 weeks to 10 days. I like that OADDL has the primary, secondary and final tests for Pullorum and AI.

"You guys are **awesome**; Amazingly **quick turnaround time!** So pleased."

WHAT OUR STAKEHOLDERS SAY ABOUT US

(CONTINUED)

"Might have the **fastest** Coccidia OPG turnaround time **in the country.**"

"I was in a pinch last week and the OADDL staff helped me get the test results back in time for my client; I **can't say thank you enough** for that!"

"Appreciate that we can **quickly get Pathologists** and **other experts** on the phone or email quickly for individual questions."

"The results were urgent to allow a kid to take their pig to a show. I **really appreciate the extra effort** Dr Ramachandran and the OADDL staff made to **get this result to me quickly.**"

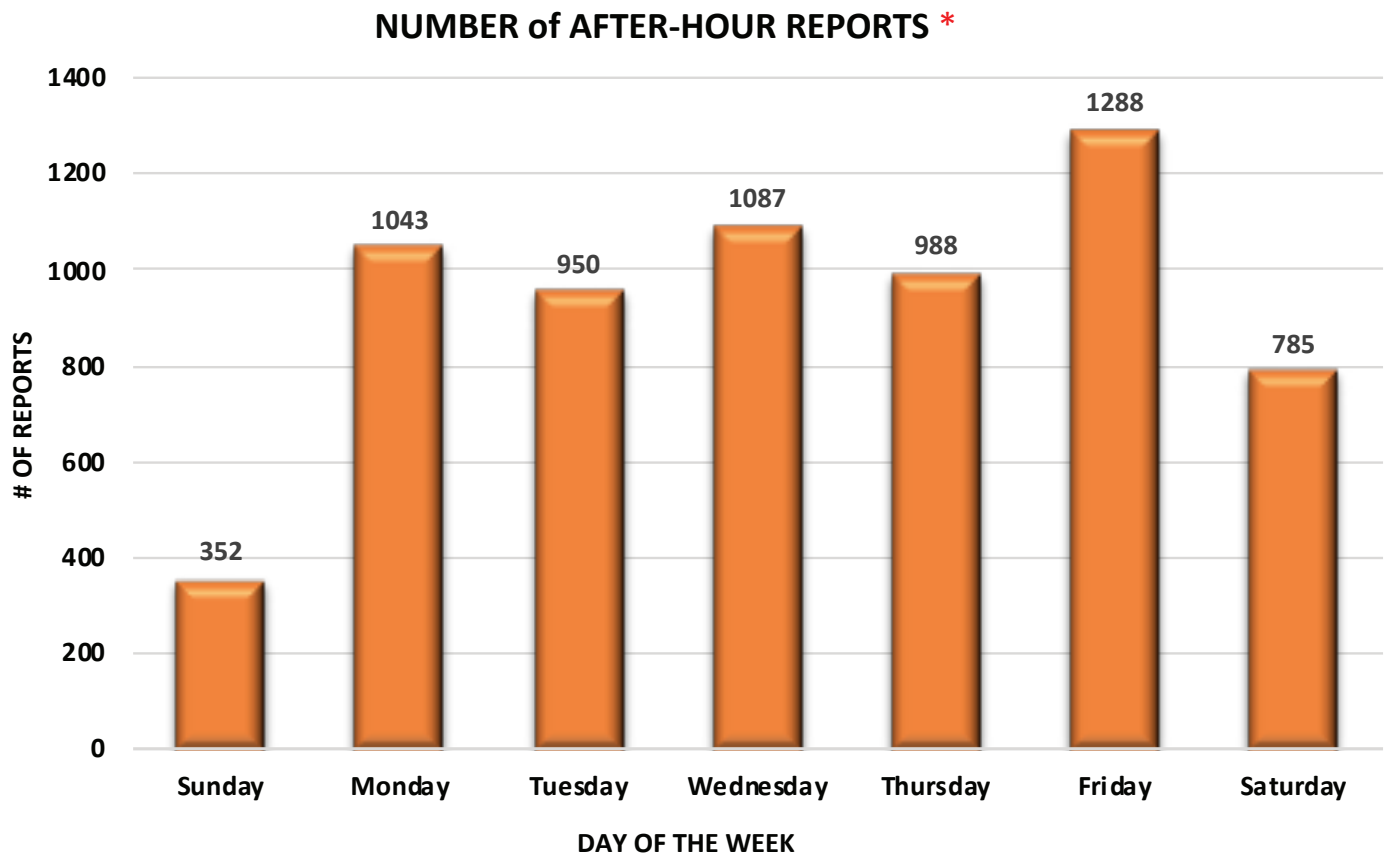
"**Friendly** billing staff."

"Appreciate the **customer service.**"

"Couldn't be **more happy** with OADDL!"

"The State should invest more in OADDL given the lab's **testing capabilities** and **readiness to respond** to animal and human disease threats. OADDL is the **crown jewel of CVM** and its most **responsive** and **outwardly facing** unit".

CLIENT SERVICE BEYOND BUSINESS HOURS: CY 2020



* Includes Preliminary, Final and Addended reports reviewed and sent by staff (no auto-generated reports).

COUNTIES OF OKLAHOMA SERVED: CY 2020

COUNTIES OF OKLAHOMA (n = 77 served)

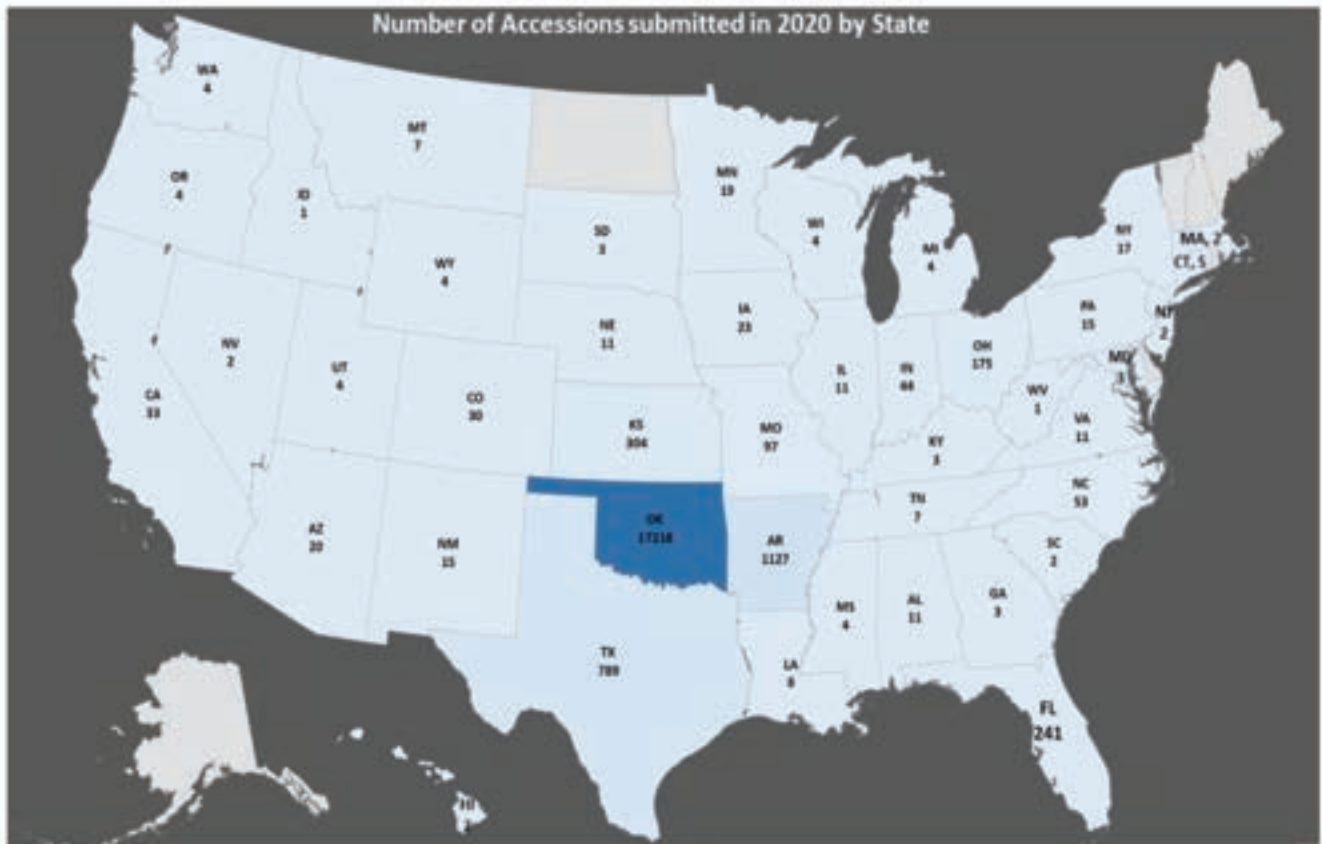
COUNTY	# OF ACCESSIONS	COUNTY	# OF ACCESSIONS	COUNTY	# OF ACCESSIONS	COUNTY	# OF ACCESSIONS
Adair	199	Delaware	48	Lincoln	746	Pittsburg	191
Alfalfa	75	Dewey	135	Logan	525	Pontatoc	151
Atoka	63	Ellis	78	Love	41	Pottawatomie	352
Beaver	19	Garfield	668	Major	189	Pushmataha	61
Beckham	237	Garvin	293	Marshall	180	Roger Mills	65
Blaine	181	Grady	258	Mayes	201	Rogers	261
Bryan	261	Grant	97	McClain	414	Seminole	127
Caddo	202	Greer	33	McCurtain	120	Sequoyah	242
Canadian	349	Harmon	154	McIntosh	121	Stephens	426
Carter	269	Harper	76	Murray	132	Texas	580
Cherokee	102	Haskell	197	Muskogee	186	Tillman	52
Choctaw	215	Hughes	503	Noble	305	Tulsa	744
Cimarron	2	Jackson	115	Nowata	37	Wagoner	165
Cleveland	618	Jefferson	191	Okfuskee	122	Washington	160
Coal	91	Johnston	54	Oklahoma	1667	Washita	47
Comanche	235	Kay	365	Okmulgee	208	Woods	48
Cotton	100	Kingfisher	170	Osage	115	Woodward	60
Craig	77	Kiowa	159	Ottawa	146		
Creek	264	Latimer	225	Pawnee	264		
Custer	136	Le Flore	232	Payne	5699		



STATES SERVED: CY 2020

STATES (n = 43 served)

STATE	# OF ACCESSIONS	STATE	# OF ACCESSIONS	STATE	# OF ACCESSIONS	STATE	# OF ACCESSIONS
AL	11	IL	11	MT	7	SC	2
AR	1127	IN	44	NC	53	SD	3
AZ	20	KS	304	NE	11	TN	7
CA	33	KY	3	NJ	2	TX	789
CO	30	LA	8	NM	15	UT	4
CT	5	MA	2	NV	2	VA	11
FL	241	MD	3	NY	17	WA	4
GA	3	MI	4	OH	175	WI	4
HI	2	MN	19	OK	17218	WV	1
IA	23	MO	97	OR	4	WY	4
ID	1	MS	4	PA	15		



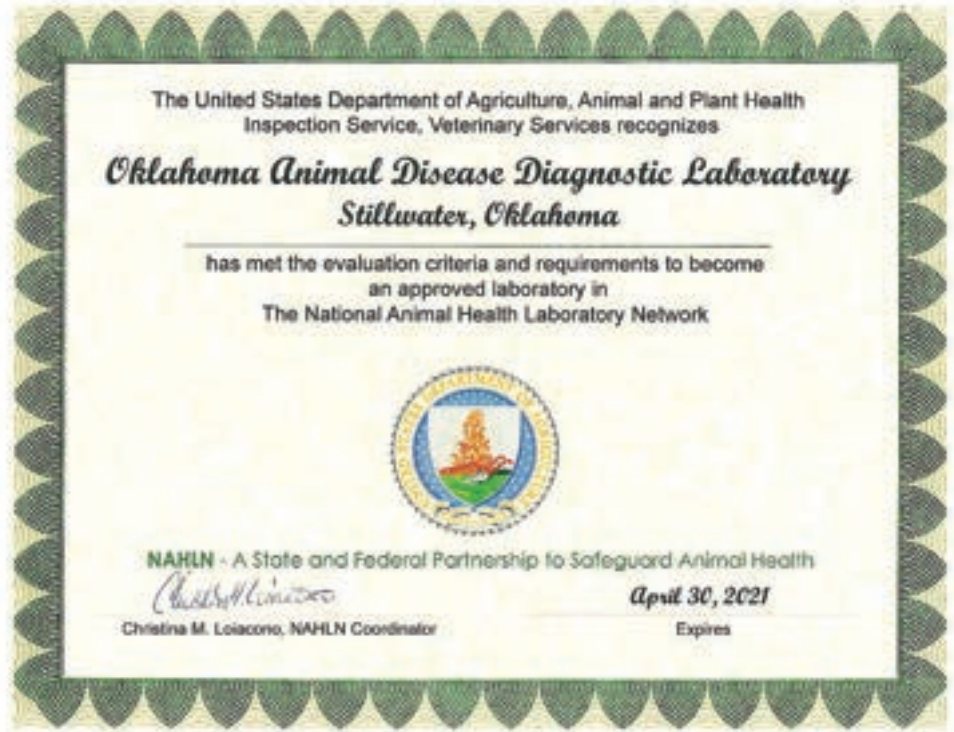
NAHLN MEMBERSHIP AND VET-LIRN PARTICIPATION

NAHLN MEMBERSHIP

OADDL is a Level 1 member of the National Animal Health Laboratory Network (NAHLN), which is a partnership between the U.S. Department of Agriculture (USDA) and the AAVID. Level 1 is the highest among NAHLN designations and Oklahoma is one of only 19 states to have a Level 1 NAHLN Laboratory. NAHLN consists of a network of diagnostic laboratories in the U.S. that provide targeted surveillance for new and emerging foreign animal diseases.

In 2020, OADDL undertook the following activities in support of the NAHLN's missions:

- Service on the second vendor sub-committee – **Akhilesh Ramachandran.**
- Service on Sub-committee on SOP change request process – **Akhilesh Ramachandran.**
- NAHLN Exercises and Drills Working Group webinar on experiences and lessons learned by NAHLN labs responding to the COVID-19 pandemic. Speakers: **JT Saliki, Emily Cooper.**
- Methods Technical Working Group core annual meeting – **Akhilesh Ramachandran.**
- NAHLN exercise - emergency validation of oral fluids for ASF PCR testing: **Emily Cooper.**
- Second Vendor platform evaluation: our molecular lab helped in evaluating two Bio-Rad PCR platforms.



Vet-LIRN MEMBERSHIP

OADDL participates in the Veterinary Laboratory Investigation and Response Network (Vet-LIRN) - a network of animal health diagnostic laboratories that assist the U.S. Food and Drug Administration (FDA) in investigating potential problems with regulated animal feeds and drugs. OADDL is currently in the second year of a 5-Year cooperative grant in support of the lab's participation in Vet-LIRN. Activities in support of Vet-LIRN in 2020 include:

- Submission of bacterial isolates for FDA antimicrobial resistance study.
- Participation in a collaborative genome sequencing project.



NEW TESTS INTRODUCED: CY 2020

MOLECULAR DIAGNOSTICS

COVID-19 Environmental Sample Real Time PCR

Sample: Water
Test Fee: \$90.00
TAT: 2-4 business days

COVID-19 Real Time PCR for animals

Samples: Nasopharyngeal Swab, Oral Swab, Nasal Swab, Rectal Swab, Fecal Swab, Oropharyngeal Swab
Test Fee: \$50.00
TAT: 2-3 business days

SEROLOGY

Swine Serology Panel 1 (includes Brucella, PRRS and PRV)

Sample: Serum
Test Fee: \$ 15.00
TAT: 1-3 business days

Bluetongue C-ELISA

Sample: Serum
Test Fee: \$ 10.50
TAT: 1-3 business days

***Brucella spp.* Fluorescence Polarization Assay (FPA)**

Sample: Serum
Test Fee: \$4.40
TAT: 1-3 business days

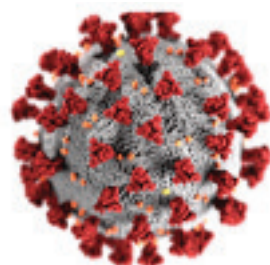
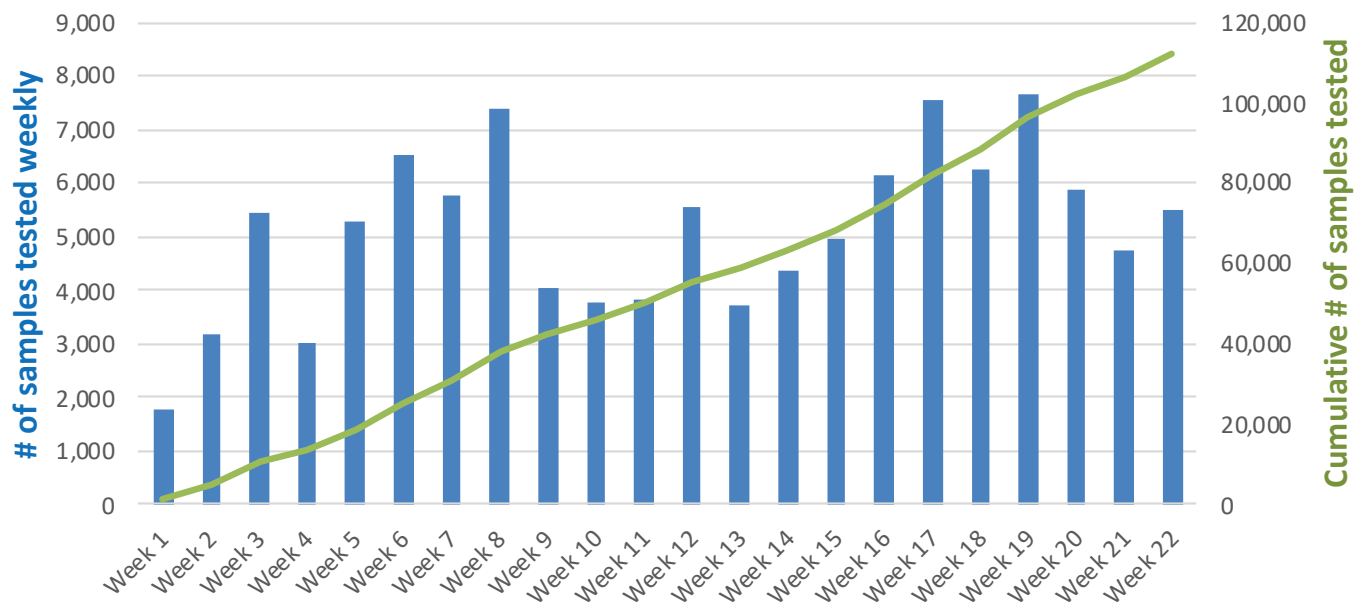
PRRS ELISA

Sample: Serum
Test Fee: \$ 7.00
TAT: 1-3 business days

COVID-19 TESTING IN HUMANS

On March 16, 2020, the first case of COVID-19 was reported in Oklahoma. Realizing the urgency of the situation and the dire need for testing, OADDL immediately sprang into action and became the first veterinary diagnostic laboratory in the nation to test human samples, starting on March 31, 2020. From that date through September 3, 2020 (when human testing was discontinued at OADDL), a total of 111, 093 human cases had been tested. The graph below shows weekly numbers tested.

2020 COVID-19 human testing at OADDL



SARS-CoV 2

SERVICE TO THE OKLAHOMA HORSE RACING COMMISSION

OADDL maintains an annually renewable service contract with the Oklahoma Horse Racing Commission (OHRC).

The service provided is to conduct complete necropsies of all horses that die or are euthanized at OHRC-licensed racetracks: Remington Park, Will Rogers Downs, and Fair Meadows. Additionally, drug screens are pursued when indicated. This service falls under

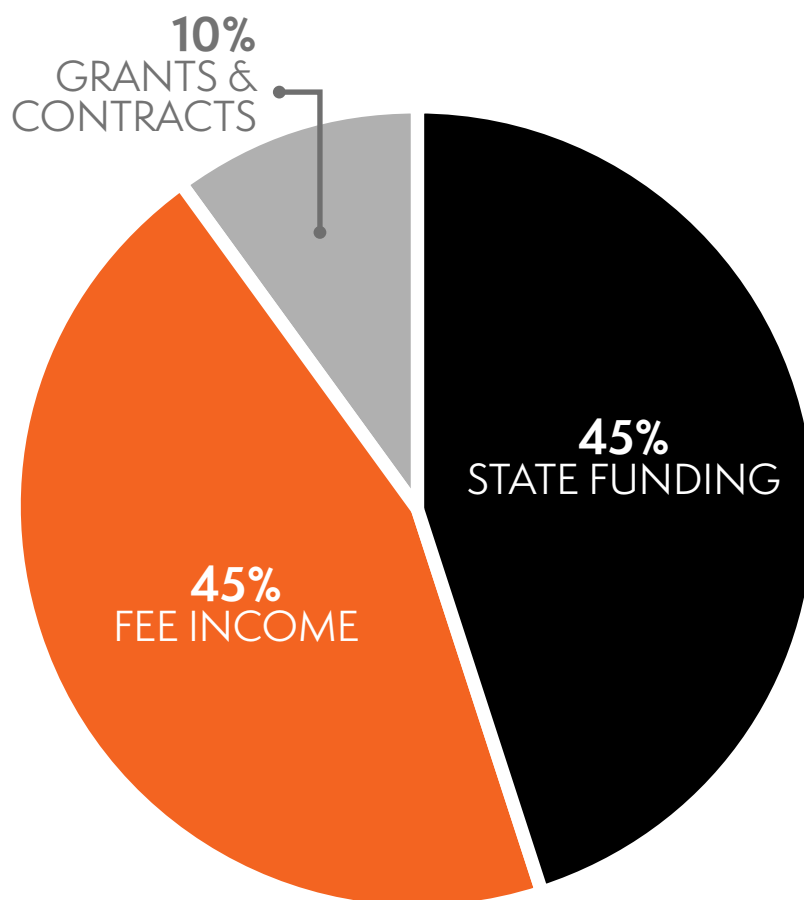
the recommendation of the American Association of Equine Practitioners (AAEP)

to not only detail the pathologic findings in each case but to provide a database for epidemiological studies. The data is used in part to identify the catastrophic musculoskeletal injury (CMI) index, a number representing the rate of fatal musculoskeletal injuries to the number of horses that race. This Oklahoma-specific CMI can then be compared to the national rate of fatal injuries.

Forty-six horses were submitted to OADDL for necropsy during calendar year 2020. The same number of horses were submitted the prior calendar year in 2019. The specifics for each case are compiled to describe the injuries, both musculoskeletal and non-musculoskeletal. From this data, attempts can be made to determine the cause of the injuries and possibly develop prevention strategies. Additionally, injury and fatality patterns may be detected that could prompt more thorough investigation by the OHRC. This collaboration between OADDL and OHRC helps enhance Oklahoma's equine racing industry, while assuring continual improvement in equine welfare.



FUNDING SOURCES



TOTAL: \$3,542,609

OADDL FUNDED CONTRACTS AND GRANTS

- NAHLN Level 1 Laboratory funding, OADDL: \$300,000
- Oklahoma Department of Agriculture, Food and Forestry funding to OADDL: \$150,000
- Oklahoma Horse Racing Commission-renewed annual contract; **Saliki, J**
- VET-LIRN FDA 5-Year Grant Award: \$ 190,570 (FY 2020: \$41,370); **Ramachandran, A**
- Zoetis-Field Evaluation of Vetcyte Feline Fecal Parasite Egg Detection \$56,000.00 (May 1st 2020 to January 31st 2021) **Scimeca, R**

QUALITY SYSTEM: PROFICIENCY TESTING

CY 2020 PROFICIENCY TEST	AGENCY	LAB SECTION*
IBQAS **	AAVLD	Bacteriology (Lab-wide)
African Swine Fever (ASF) Real-Time PCR	NAHLN	Molecular Diagnostics (6)
Anaplasmosis ELISA	USDA	Serology (Lab-wide)
Antimicrobial Susceptibility Proficiency Test	NAHLN	Bacteriology (Lab-wide)
Avian Influenza AGID	USDA	Serology (Lab-wide)
Avian Influenza ELISA	USDA	Serology (Lab-wide)
Avian Influenza (AIV) Real-Time PCR	NAHLN	Molecular Diagnostics (5)
Avian Paramyxovirus Type 1 Real-Time PCR	NAHLN	Molecular Diagnostics (5)
bioPRYN Pregnancy ELISA	bioPRYN	Serology (Lab-wide)
Bluetongue ELISA	USDA	Serology (Lab-wide)
Bovine Leukemia Virus ELISA	USDA	Serology (Lab-wide)
<i>Brucella abortus</i> Card	USDA	Serology (3)
<i>Brucella abortus</i> FPA	USDA	Serology (3)
Classic Swine Fever (CSF) Real-Time PCR	NAHLN	Molecular Diagnostics (5)
Equine Infectious Anemia (EIA) ELISA	USDA	Serology (Lab-wide)
Foot and Mouth Disease Virus Real-Time PCR	NAHLN	Molecular Diagnostics (5)
Johne's Disease ELISA	USDA	Serology (Lab-wide)
Johne's Real-Time Direct PCR	USDA	Molecular Diagnostics (Lab-wide)
Johne's Real-Time Pooled Direct PCR	USDA	Molecular Diagnostics (Lab-wide)
Leptospirosis MAT	USDA	Serology (Lab-wide)
MS/MG ELISA ***	PDRC****	Serology (Lab-wide)
MS/MG PCR ***	PDRC****	Molecular Diagnostics (Lab-wide)
NPIP Salmonella Group D Culture	NPIP	Bacteriology (Lab-wide)
Piroplasmosis c-ELISA	USDA	Serology (2)
Pseudorabies gB ELISA	USDA	Serology (3)
SARS-CoV-2 Inter-laboratory comparison	VetLIRN	Molecular Diagnostics (Lab-wide)
Swine Influenza Virus (SIV) Real-Time PCR	NAHLN	Molecular Diagnostics (5)

- * (Lab-wide) indicates the laboratory is certified (#) indicates the number of individuals authorized.
- ** Internal Bacteriology Quality Assurance Survey
- *** *Mycoplasma synoviae* and *Mycoplasma gallisepticum*
- **** Poultry Diagnostic and Research Center

INFRASTRUCTURE IMPROVEMENTS

RENOVATION OF BACTERIOLOGY LABORATORY



BEFORE

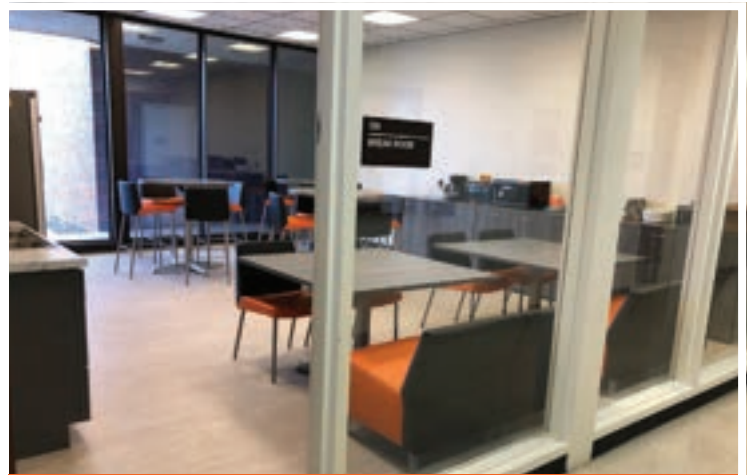


AFTER

RENOVATION OF BREAK ROOM



BEFORE



AFTER

SURVEILLANCE AND REPORTABLE DISEASE TESTING: 2-YEAR TREND

SURVEILLANCE AND REPORTABLE DISEASE TESTING	CALENDAR YEAR	
	2019	2020
African Swine Fever (ASF) PCR †	4	7
Avian Influenza		
Avian Influenza ELISA	1995	2610
Avian Influenza PCR †	183	196
Avian Influenza serum Agar Gel Immunodiffusion (AGID) *	11	6
Avian Paramyxovirus-1 (END) PCR †	223	119
<i>Bacillus anthracis</i> Culture	7	4
Bluetongue Disease		
Bluetongue c-ELISA	33	38
Bluetongue AGID	13	45
Bluetongue Virus PCR *	91	48
Bluetongue Virus VI †	11	0
<i>Brucella</i> spp.		
<i>Brucella abortus</i> BAPA †	22	58
<i>Brucella abortus</i> Card Agglutination Test *	4399	4327
<i>Brucella abortus</i> Complement Fixation (CF) †	33	12
<i>Brucella abortus</i> RAP †	4	0
<i>Brucella abortus</i> Standard Plate †	4	9
<i>Brucella abortus</i> Fluorescent Polarization Assay (FPA)	1	1665
<i>Brucella canis</i> AGID †	1	2
<i>Brucella canis</i> Card Test	251	234
<i>Brucella canis</i> IFA	19	37
<i>Brucella canis</i> 2-Mercaptoethanol Tube Agglutination †	1	2
<i>Brucella melitensis</i> Card Test *	19	20
<i>Brucella ovis</i> ELISA †	20	17
<i>Brucella</i> spp. Culture	76	59
<i>Brucella</i> spp. PCR †	3	2
Chronic Wasting Disease (CWD) IHC PrP	8	3
Classical Swine Fever (CSF) PCR †	4	7
<i>Coxiella burnetii</i> (Q-Fever)		
<i>Coxiella burnetii</i> (Q-Fever) Complement Fixation (CF) †	10	1
<i>Coxiella burnetii</i> (Q-Fever) c-ELISA †	12	9
<i>Coxiella burnetii</i> (Q-Fever) IFA †	0	1
<i>Coxiella burnetii</i> (Q-Fever) PCR †	17	7

† Referral Laboratory testing

* Includes In-house and Referral Laboratory testing

† Results messaged to NAHLN

SURVEILLANCE AND REPORTABLE DISEASE TESTING: 2-YEAR TREND

(CONTINUED)

SURVEILLANCE AND REPORTABLE DISEASE TESTING	CALENDAR YEAR	
	2019	2020
Eastern Equine Encephalomyelitis (EEE) IgM Capture ELISA ^r	28	16
Equine Infectious Anemia (EIA)		
Equine Infectious Anemia c-ELISA	2155	1994
Equine Infectious Anemia PCR ^r	1	0
Epizootic Hemorrhagic Disease (EHD) PCR [*]	21	1
Equine Herpesvirus		
Equine Herpesvirus 1 (EHV-1) Real-Time PCR	1189	211
Equine Herpesvirus 4 (EHV-4) PCR	6	4
Equine Herpesvirus SN	1	5
Equine Piroplasmosis		
<i>Babesia caballi</i> c-ELISA	200	259
<i>Theileria (Babesia) equi</i> c-ELISA	264	400
Equine Viral Arteritis (EVA) Virus		
Equine Viral Arteritis (EVA) PCR ^r	15	19
Equine Viral Arteritis (EVA) Virus Isolation ^r	16	2
Equine Viral Arteritis (EVA) SN and VN	72	64
<i>Francisella tularensis</i> (Tularemia)		
Tularemia PCR [*]	6	3
Tularemia Plate Agglutination Test ^r	6	-
Foot & Mouth Disease Virus Real-Time PCR [†]	10	6
Infectious Laryngotracheitis (ILT) ^r	1	-
Johne's Disease		
Johne's Disease Complement Fixation (CF) ^r	13	3
Johne's Direct Fecal Real-Time PCR (single)	263	318
Johne's Direct Fecal Real-Time PCR (pooled)	4	10
Johne's Disease ELISA	2354	2704
Leptospirosis-canine		
<i>Leptospira</i> Microscopic Agglutination Test (canine)	53	25
<i>Leptospira</i> sp. Real-Time PCR (canine)	19	9
<i>Mycoplasma</i> spp. (avian)		
<i>Mycoplasma gallisepticum</i> / <i>Mycoplasma synoviae</i> ELISA	18445	21599
<i>Mycoplasma gallisepticum</i> / <i>Mycoplasma synoviae</i> PCR (single)	11	8
<i>Mycoplasma gallisepticum</i> / <i>Mycoplasma synoviae</i> PCR (pooled)	33	43
<i>Mycoplasma gallisepticum</i> Hemagglutination Inhibition	318	216
<i>Mycoplasma synoviae</i> Hemagglutination Inhibition	318	216

^r Referral Laboratory testing

^{*} Includes In-house and Referral Laboratory testing

[†] Results messaged to NAHLN

SURVEILLANCE AND REPORTABLE DISEASE TESTING: 2-YEAR TREND

(CONTINUED)

SURVEILLANCE AND REPORTABLE DISEASE TESTING	CALENDAR YEAR	
	2019	2020
Porcine Reproductive and Respiratory Syndrome Virus (PRRSV)		
PRRSV ELISA *	49	1676
PRRSV Real-time PCR (single and pooled samples) *	7524	10016
Pseudorabies Virus		
Pseudorabies gB and g1 ELISA	3647	5462
Pseudorabies PCR r	4	7
Rabies r	59	53
Salmonella spp.		
<i>Salmonella</i> spp. Culture	329	251
<i>Salmonella pullorum</i> Agglutination-Rapid Serum Test	1	0
<i>Salmonella pullorum</i> Microagglutination Titer	2	0
<i>Salmonella pullorum/typhoid</i> Microagglutination Screen	18302	21957
<i>Salmonella pullorum</i> Screening (NPIP culture)	32	6
Streptococcus equi PCR	40	20
Swine Influenza Virus (SIV) PCR-Domestic Swine	3	4
Swine Influenza Virus (SIV) PCR (single and pooled samples)	3303	3093
<i>Tritrichomonas foetus</i>		
<i>T. foetus</i> Real-Time PCR (single and pooled samples)	7517	6597
<i>Tritrichomonas foetus</i> Culture	6	46
Vesicular Stomatitis Virus		
Vesicular Stomatitis Virus Neutralization-Indiana r	42	37
Vesicular Stomatitis Virus Neutralization-New Jersey r	42	37
West Nile Virus		
West Nile Virus IgM Capture ELISA r	37	23
West Nile Virus PCR *	2	1
Total Number of Tests	74238	86966

* Includes In-house and Referral Laboratory testing

r Referral Laboratory testing

PREVALENCE OF MAJOR DISEASE AGENTS IN DIAGNOSTIC SAMPLES: CY 2020

DISEASE PREVALENCE BY SPECIES

INTERPRETIVE NOTES:

1. This data includes only agent detection or antibody test results that indicate current infection with the disease agent as opposed to any antibody tests, which simply indicate exposure to the disease agent or vaccination.
2. The prevalence numbers shown here indicate only the prevalence in the diagnostic samples tested and not prevalence of the diseases in the general animal population.

BOVINE DISEASES

DISEASE/TEST	NUMBER OF TESTS	% POSITIVE
Anaplasmosis cELISA	551	45%
Anaplasmosis PCR	95	41%
<i>Bibersteinia trehalosi</i> Culture	103	2%
BLV PCR	6	3%
BRSV PCR	51	14%
BVDV ELISA	3446	0.2%
BVDV PCR	120	12%
Coronavirus PCR	87	10%
<i>Histophilus somni</i> Culture	103	17%
IBR PCR	83	1%
Johne's Disease ELISA	1819	7%
Johne's Disease PCR	137	18%
Leptospirosis MAT	470	9%
Leptospirosis PCR	18	6%
<i>Mannheimia haemolytica</i> Culture	103	23%
<i>Mycoplasma bovis</i> PCR	53	53%
<i>Pasteurella multocida</i> Culture	103	15%
Rabies Direct FA	11	9%
<i>Salmonella</i> spp. Culture	65	12%
Tritrichomoniasis PCR*	11436	0.3%
<i>Trueperella pyogenes</i> Culture	103	17%

EQUINE DISEASES

DISEASE/TEST	NUMBER OF TESTS	% POSITIVE
Equine Herpesvirus Type-1 PCR	209	7%
Leptospirosis MAT	7	29%
Leptospirosis PCR	1	0% †
Rabies Direct FA	3	0% †
<i>Salmonella</i> spp. Culture	51	25%

† 0% = No Positive Test results for listed disease
* Number of animals tested (single & pooled)

CANINE DISEASES

DISEASE/TEST	NUMBER OF TESTS	% POSITIVE
Canine Distemper Virus PCR	31	23%
Leptospirosis MAT	22	18%
Leptospirosis PCR	8	13%
Parvovirus PCR	51	65%
Rabies Direct FA	12	0% †

FELINE DISEASES

DISEASE/TEST	NUMBER OF TESTS	% POSITIVE
Cytosuxoon spp. PCR	8	38%
Rabies Direct FA	10	0% †
Tritrichomoniasis PCR	3	67%

CAPRINE DISEASES

DISEASE/TEST	NUMBER OF TESTS	% POSITIVE
BRSV PCR	1	0% †
BVDV ELISA	12	0% †
BVDV PCR	9	0% †
CAE cELISA	417	5%
Johne's Disease ELISA	579	3%
Johne's Disease PCR	43	53%
Leptospirosis MAT	12	16%
Leptospirosis PCR	3	0% †
Rabies Direct FA	1	0% †

OVINE DISEASES

DISEASE/TEST	NUMBER OF TESTS	% POSITIVE
BVDV ELISA	6	0% †
BVDV PCR	120	12%
CAE cELISA	5	0% †
Johne's Disease ELISA	181	2%
Johne's Disease PCR	170	0% †

† 0% = No Positive Test results for listed disease

ANTIMICROBIAL SUSCEPTIBILITY PROFILES: BOVINES AND CANINES

Note: Data reported as: % susceptible (# isolates tested)

BOVINES

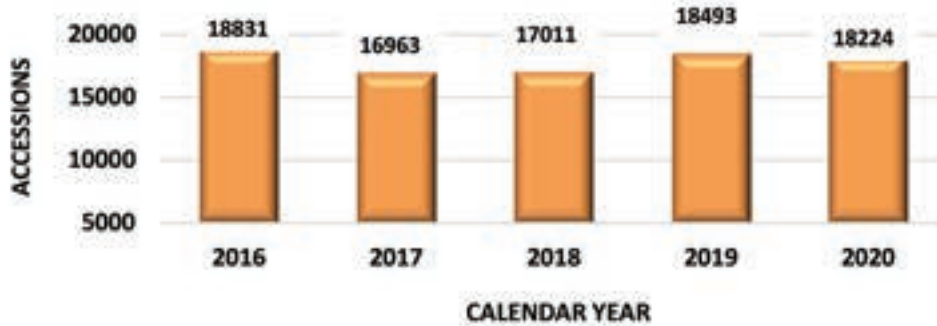
ANTIBIOTIC	<i>Histophilus somni</i>	<i>Mannheimia haemolytica</i>	<i>Pasteurella multocida</i>
Ceftiofur	93% (14)	100% (15)	100% (7)
Danofloxacin	64% (14)	47% (15)	100% (7)
Enrofloxacin	79% (14)	47% (15)	100% (7)
Florfenicol	93% (14)	73% (15)	100% (7)
Gamithromycin	64% (14)	47% (15)	29% (7)
Penicillin	79% (14)	27% (15)	86% (7)
Spectinomycin	71% (14)	47% (15)	29% (7)
Tetracycline	14% (14)	33% (15)	29% (7)
Tildipirosin	100% (14)	53% (15)	43% (7)
Tilmicosin	71% (14)	40% (15)	43% (7)
Tulathromycin	71% (14)	47% (15)	43% (7)

CANINES

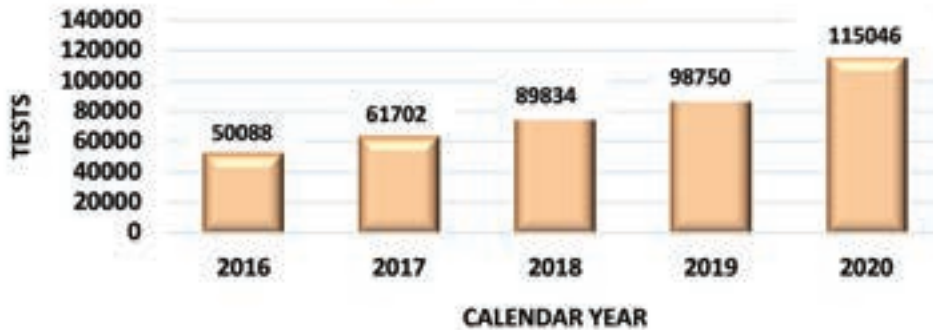
ANTIBIOTIC	URINE		EARS		SKIN and WOUNDS
	<i>Escherichia coli</i>	<i>Staph. pseudintermedius</i>	<i>Pseudomonas aeruginosa</i>	<i>Staph. pseudintermedius</i>	<i>Staph. pseudintermedius</i>
Amikacin	94% (49)	100% (18)	90% (21)	100% (19)	100% (54)
Amoxicillin/Clavulanic Acid	78% (49)	78% (18)	0% (21)	74% (19)	56% (54)
Ampicillin	53% (49)	33% (18)	0% (21)	32% (19)	31% (54)
Cefalexin	71% (49)		0% (21)		
Cefazolin	57% (49)	78% (18)	0% (21)	74% (19)	56% (54)
Cefovecin	71% (49)	78% (18)	0% (21)	74% (19)	54% (54)
Cefpodoxime	71% (49)	78% (18)	0% (21)	74% (19)	56% (54)
Ceftazidime	78% (49)		95% (21)		
Cephalothin		78% (18)		74% (19)	56% (54)
Chloramphenicol	76% (49)	83% (18)	0% (21)	84% (19)	89% (54)
Clindamycin		72% (18)		68% (19)	65% (54)
Doxycycline	71% (49)		0% (21)		
Enrofloxacin	63% (49)	67% (18)		74% (19)	63% (54)
Erythromycin		72% (18)		68% (19)	65% (54)
Gentamicin	84% (49)	94% (18)	86% (21)	89% (19)	77% (54)
Imipenem	100% (49)	78% (18)	48% (21)	74% (19)	56% (54)
Marbofloxacin	63% (49)	67% (18)		84% (19)	70% (54)
Minocycline		67% (18)		74% (19)	59% (54)
Nitrofurantoin		100% (18)		95% (19)	100% (54)
Orbifloxacin	63% (49)				
Oxacillin + 2% NaCl		78% (18)		74% (19)	56% (54)
Penicillin		33% (18)		32% (19)	31% (54)
Piperacillin/Tazobactam	100% (49)		95% (21)		
Pradofloxacin	63% (49)	61% (18)		42% (19)	43% (54)
Rifampin		100% (18)		89% (19)	98% (54)
Tetracycline	69% (49)	67% (18)	0% (21)	68% (19)	52% (54)
Trimethoprim/Sulfamethoxazole	67% (49)	72% (18)	0% (21)	79% (19)	59% (54)
Vancomycin		100% (18)		89% (19)	98% (54)

ACCESSIONS AND GENERAL TESTING: 5-YEAR TRENDS

5-YEAR ACCESSION TREND



5-YEAR TEST TREND



ACCESSIONS BY SPECIES: 5-YEAR TREND

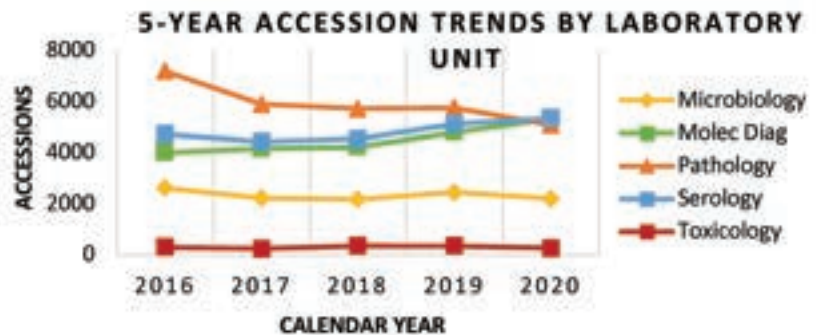
SPECIES	CALENDAR YEAR					% CHANGE
	2016	2017	2018	2019	2020	
Bovine	5365	5426	5111	5385	5578	4%
Canine	6120	5387	5221	5284	4882	-8%
Equine	3348	2927	2881	3294	3094	-6%
Porcine	438	456	979	1413	1936	37%
Feline	1103	1063	894	952	1053	11%
Avian	528	468	554	637	436	-32%
Caprine	230	278	315	391	322	-18%
Sm An Other	299	308	343	350	280	-20%
Ovine	88	53	73	81	81	0%
Alpaca/Llama	52	43	41	54	50	-7%
Lg An Other	41	38	40	61	49	-20%
Multiple Species	0	22	34	40	27	-33%
Caged Pet	4	1	8	14	13	-7%
Camelid	18	13	10	16	11	-31%

ACCESSIONS BY LABORATORY UNIT: 5-YEAR TREND

Year	Microbiology *	Molecular Diagnostics	Pathology **	Serology	Toxicology	Total Accessions
2020	2200	5317	5093	5353	261	18224
2019	2456	4800	5755	5131	351	18493
2018	2178	4219	5716	4544	354	17011
2017	2222	4165	5900	4430	246	16963
2016	2617	4005	7185	4724	300	18831

* Includes Bacteriology, Mycology and Mycoplasmaology

** Includes Histology and Pathology (Necropsy)



TEST NUMBERS BY LABORATORY UNIT: 5-YEAR TREND

Year	Microbiology *	Molecular Diagnostics	Pathology **	Serology	Toxicology	Total Tests
2020	5005	26709	6663	76170	499	115046
2019	5261	22269	7918	62617	685	98750
2018	5154	16248	7259	60489	684	89834
2017	4556	11401	7601	37672	472	61702
2016	5798	10384	9192	24112	602	50088

* Includes Bacteriology, Mycology and Mycoplasmaology

** Includes Histology and Pathology (Necropsy)

NUMBER OF TESTS PER LAB UNIT: CY 2020



MICROBIOLOGY-MYCOLOGY: 5-YEAR TEST TREND

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Fungal Culture *	147	123	111	124	117	-6%
Research Testing	10	76	30	12	8	-33%
Histoplasma Enzyme Immunoassay **	-	-	-	-	6	N/A
Diff-Quik/Gram Stain	0	1	0	0	0	N/A
Direct Examination	2	1	0	0	0	N/A
Total Tests Per Year	159	201	141	138	131	-5%

* Includes individual testing from Test Package

** In-house and Referral Laboratory Testing

MICROBIOLOGY-MYCOPLASMOLOGY: 5-YEAR TEST TREND

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
<i>Mycoplasma</i> spp. Culture	66	33	26	11	8	-27%
Total Tests Per Year	66	33	26	11	8	-27%

MICROBIOLOGY-BACTERIOLOGY TEST PACKAGES: 5-YEAR TEST TREND

TEST PACKAGE	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Anaerobic and Aerobic Cultures and up to 2 Antibiotic Susceptibilities	371	278	392	464	385	-17%
Aerobic Culture and up to 2 Antibiotic Susceptibilities	694	439	492	498	374	-25%
Urine Culture and up to 2 Antibiotic Susceptibilities	438	362	448	398	329	-17%
Fungal and Aerobic Cultures and up to 2 Antibiotic Susceptibilities	65	61	53	13	58	346%
Salmonella Culture with Antibiotic Susceptibility	56	21	12	61	29	-52%
Total Test Packages Per Year	1253	883	1005	1434	1175	-18%

MICROBIOLOGY-BACTERIOLOGY:

5-YEAR TEST TREND

TEST	CALENDAR YEAR: Jan-Dec					% CHANGE
	2016	2017	2018	2019	2020	
Aerobic Culture †	2025	1885	2074	2264	1733	-23%
Antibiotic Susceptibility Test †	1532	948	1233	1179	1050	-11%
Research Testing	454	206	209	97	636	556%
Anaerobic Culture †	448	326	453	552	545	-1%
<i>Campylobacter fetus</i> Culture	298	211	238	244	228	-7%
<i>Salmonella</i> spp. Culture †	287	151	165	181	168	-7%
<i>Clostridium perfringens</i> Culture	117	118	121	157	119	-24%
Milk Culture	65	54	130	98	107	9%
<i>Brucella</i> spp. Culture	103	65	73	76	59	-22%
<i>Salmonella</i> Culture (Environmental Sample)	79	71	77	87	54	-38%
<i>Tritrichomonas foetus</i> Culture	65	135	93	6	46	667%
<i>Campylobacter jejuni</i> Culture	12	36	33	36	39	8%
<i>Clostridium</i> sp. Culture	-	14	28	40	26	-35%
Blue Green Algae-Microscopic Screening	44	71	33	40	25	-38%
<i>Mycobacterium paratuberculosis</i> Culture †	-	-	-	-	12	N/A
<i>Salmonella pullorum</i> Screening	0	2	7	32	6	-81%
<i>Bacillus anthracis</i> Culture	1	6	6	7	4	-43%
<i>Salmonella</i> Serotyping †	7	2	0	4	3	-25%
<i>Clostridium chauvoei</i> Fluorescent Antibody	-	-	-	-	2	N/A
All Other Tests	36	21	14	10	4	-60%
Total Tests Per Year	5573	4322	4987	5112	4866	-5%

† Includes individual tests from *Test Packages*

† Referral Laboratory testing

MOLECULAR DIAGNOSTICS PANELS: 3-YEAR TEST TREND

PANEL	CALENDAR YEAR			
	2018	2019	2020	% CHANGE
Bovine Respiratory Disease PCR Panel-Comprehensive *	18	43	49	14%
Bovine Viral Respiratory PCR Panel-Basic **	1	3	0	-100%
Total Panels Per Year	19	46	49	7%

* Includes Bovine Viral Diarrhea Virus (BVDV), Bovine Respiratory Syncytial Virus (BRSV), Infectious Bovine Rhinotracheitis Virus (IBR), Bovine Coronavirus (BCV), and *Mycoplasma bovis*

** Includes BVDV, BRSV, and IBR

MOLECULAR DIAGNOSTICS: 5-YEAR TEST TREND

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
PRRS Virus Real-Time PCR (single and pooled)	7	2116	5537	7517	10016	33%
<i>T. foetus</i> Real-Time PCR (single and pooled)	7232	7174	6783	6210	6597	6%
Porcine Coronavirus Multiplex PCR (single and pooled)	-	-	778	2114	4625	119%
Swine Influenza Virus PCR (single and pooled)	-	-	1251	3303	3093	-6%
Johne's Direct Fecal Real-Time PCR (single and pooled)	91	250	265	267	328	21%
Equine Herpesvirus 1 (EHV-1) Real-Time PCR	144	69	61	1189	211	-82%
Avian Influenza PCR	177	743	184	183	196	7%
Bovine Viral Diarrhea Virus PCR *	157	109	139	191	146	-24%
Avian Paramyxovirus-1 (END) PCR	153	114	122	223	119	-47%
<i>Anaplasma marginale</i> PCR	121	105	71	147	95	-35%
SARS [CoV-2] Real-Time PCR-Environmental	-	-	-	-	93	N/A
Bovine Coronavirus PCR *	50	40	54	104	93	-11%
Infectious Bovine Rhinotracheitis (IBR) Virus PCR *	113	97	84	112	89	-21%
PRRS Virus PCR (single and pooled) ^r					78	N/A

^r Referral Laboratory Testing

* Includes individual testing from Molecular Diagnostics Panels

MOLECULAR DIAGNOSTICS: 5-YEAR TEST TREND (CONTINUED)

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Canine Respiratory Panel (qPCR) <i>r</i>	-	-	-	-	56	N/A
<i>Clostridium perfringens</i> Multiplex PCR	55	50	56	56	56	0%
<i>Mycoplasma bovis</i> PCR *	16	25	47	49	55	12%
Canine Parvovirus PCR	22	35	30	44	53	20%
Pooled Coronavirus PCR <i>r</i>	-	-	-	-	52	N/A
BRSV PCR *	8	14	25	52	57	10%
Bluetongue Virus PCR	49	106	20	82	48	-41%
<i>Mycoplasma gallisepticum</i> / <i>M. synoviae</i> PCR (single and pooled)	-	-	62	33	51	16%
Rotavirus Antigen ELISA	47	45	48	55	42	-24%
<i>Leptospira</i> sp. Real-Time PCR	81	61	62	46	36	-22%
16S Sequencing	51	21	35	18	35	94%
Canine Distemper Virus PCR	38	46	266	66	31	-53%
Feline Respiratory Panel (qPCR) <i>r</i>	-	-	-	-	24	N/A
SARS (CoV-2) N1 and N2 Gene Real-Time PCR	-	-	-	-	22	N/A
<i>Streptococcus equi</i> PCR	-	-	7	40	20	-50%
Equine Viral Arteritis PCR <i>r</i>	-	-	-	-	19	N/A
SIV PCR Sequencing <i>r</i>	-	-	-	-	17	N/A
PRRS Virus Sequencing <i>r</i>	-	-	-	-	16	N/A
Canine Herpesvirus PCR	-	-	-	3	15	400%
BVDV Virus Isolation <i>r</i>	-	-	-	-	13	N/A
Ehrlichia PCR	5	9	11	13	12	-8%
<i>Mycoplasma</i> spp. PCR <i>r</i>	-	-	-	-	12	N/A
Porcine Circovirus (Type 2 and Type 3) PCR <i>r</i>	-	-	-	-	11	N/A
All Other Tests	175	151	221	128	165	29%
Total Tests Per Year	10384**	11401	16248	22269	26709	20%

r Referral Laboratory Testing

* Includes individual testing from Molecular Diagnostics Panels

** Includes 1579 research PCRs

PATHOLOGY-NECROPSY: 5-YEAR TEST TREND

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Gross Necropsy	954	907	916	953	757	-21%
Rabies Examination	71	81	60	59	53	-10%
Spinal Examination	8	9	29	14	10	-29%
Tissue Preparation	4	5	7	7	4	-43%
Chronic Wasting Disease	6	0	6	7	3	-57%
Research/Special Studies Necropsy	42	0	45	37	0	-100%
Small Animal Limb Examination with Disposal	9	7	4	6	0	-100%
OHRC Joint Exam *	38	9	-	-	-	N/A
Total Tests Per Year	1138	1026	1080	1096	827	-25%

* Testing included in Gross Necropsy data as of CY 2017

MISCELLANEOUS NECROPSY DATA: CY 2020

NECROPSY ACCESSIONS BY CLIENT	# OF ACCESSIONS
Total # of Necropsy Accessions	757
VMH * Accessions	261
Client Accessions (not VMH)	496

* CVM Teaching Hospital

NECROPSY ACCESSIONS BY TEST TYPE	# OF ACCESSIONS
Necropsy only	67
Necropsy + Histology only	287
Necropsy + Histology + Other Testing	379
Necropsy + Other Testing (no Histology)	24

NECROPSY ACCESSIONS BY SPECIES	# OF ACCESSIONS
Canine	194
Bovine	165
Equine	118
Avian	65
Feline	59
Small Animal Other	58
Caprine	46
Ovine	23
Porcine	18
Alpaca	5
Large Animal Other	4
Caged Pet Mammal	1
Llama	1

RABIES TESTING: 5-YEAR TREND

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Gross Necropsy	954	907	916	953	757	-21%
Rabies Examination	71	81	60	59	53	-10%
Spinal Examination	8	9	29	14	10	-29%
Tissue Preparation	4	5	7	7	4	-43%
Chronic Wasting Disease	6	0	6	7	3	-57%
Research/Special Studies Necropsy	42	0	45	37	0	-100%
Small Animal Limb Examination with Disposal	9	7	4	6	0	-100%
OHRC Joint Exam *	38	9	-	-	-	N/A
Total Tests Per Year	1138	1026	1080	1096	827	-25%

* Testing included in Gross Necropsy data as of CY 2017.

MISCELLANEOUS NECROPSY DATA: CY 2020

RABIES TESTING BY SPECIES: CY 2020

SPECIES	TOTAL # OF TESTS	POSITIVE RESULT	NEGATIVE RESULT	NO RESULT
Canine	12	-	12	-
Bovine	11	1	10	-
Feline	10	-	10	-
Bat	5	2	3	-
Raccoon	5	-	3	2
Equine	3	-	3	-
Skunk	3	2	1	-
Antelope	1	-	1	-
Caprine	1	-	1	-
Opossum	1	-	1	-
Rabbit	1	-	1	-
Total Results	53	5	46	2

PATHOLOGY-HISTOLOGY: 5-YEAR TEST TREND

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Histology-Short Report	3906	3440	3283	3480	2950	-15%
Special Stains	1011	781	1056	1465	1177	-20%
Histology Necropsy Workload	715	698	741	785	644	-18%
Slide Preparation--No Interpretation	5	1	4	1	232	23100%
Histology-Long (Detailed) Report	693	384	274	233	195	-16%
Decalcification	110	98	88	157	141	-10%
Zoo Pathology Surveillance	111	106	124	131	88	-33%
Immunohistochemistry (IHC) †	39	78	129	138	83	-40%
H & E Slide for Research	78	95	93	111	74	-33%
Additional Biopsy > 3 Tissues Submitted	244	129	148	140	71	-49%
H & E Recut	60	15	17	38	65	71%
Unstained Sections for Research	-	-	6	13	30	131%
Paraffin Scrolls For PCR	3	6	12	27	25	-7%
Poultry Histopathology	40	65	62	43	20	-53%
IHC for PI BVDV †	902	574	101	36	8	-78%
Special Stains for Research	10	7	4	6	7	17%
Duplicate H & E	19	8	2	1	6	500%
Step Sections	6	5	1	7	6	-14%
H & E Slide for Teaching	6	13	7	5	5	0%
Special Stains for Teaching	9	4	4	3	4	33%
Mast Cell Tumor (MCT) Prognostic Panel †	-	-	-	-	2	N/A
Clonality PCR Testing †	-	-	-	-	1	N/A
Process and Embed Only For Research	51	15	0	0	1	N/A
Slide Consultation	3	0	0	2	1	-50%
Serial Sections, Unstained	22	49	15	0	0	N/A
Serial H & E Sections	4	1	5	0	0	N/A
Staining Process Only, H & E	-	2	1	0	0	N/A
Scrapie IHC PrP Testing	1	1	0	0	0	N/A
Lab Animal Pathology Surveillance	1	0	0	0	0	N/A
IHC For Research †	2	0	2	-	0	N/A
IHC for Teaching †	3	-	-	-	0	N/A
Total Tests Per Year	8054	6575	6179	6822	5836	-14%

† Referral laboratory testing

MICELLANEOUS BIOPSY-RELATED DATA: CY 2020

BIOPSY DATA: CY 2020	TOTAL
Number of Short-Format Reports	2950
Number of Detailed-Format Reports	195

SPECIAL STAIN	# Of Requests
GMS	357
Gram's	321
Acid Fast (Ziehl-Neelsen)	148
Fite's Acid Fast	73
PAS	48
Toluidine Blue	39
Giemsa	37
Iron (Prussian Blue)	27
Trichrome	27
Congo Red	19
Copper (Rhodanine)	19
Melanin-Bleach	16
Steiner	14
Von Kossa	13
Fontana-Masson's	10
Bile/Bilirubin (Hall's)	9
PTAH	0
Alcian Blue 2.5	0
Luxol Fast Blue	0
Total Stains	1177

BIOPSY SLIDES	# Of SLIDES
Total Number of Biopsy Slides	14039
H&E Stains	
Total Number of H&E Slides	12253
H & E from Biopsy	7144
H & E from Necropsy	3634
H & E - Research	457
H & E - Teaching	170
IHC Stains	
IHC Slides for BVDV PI (Ear Notch)	8
IHC Slides (not including BVDV PI)	69
Special Stains	
Total Number of Special Stains Slides	1177

SEROLOGY PANELS AND PROFILES: 5-YEAR TEST TREND

PANEL/PROFILE	TESTS	CALENDAR YEAR: Jan-Dec					
		2016	2017	2018	2019	2020	% CHANGE
Pseudorabies gB ELISA & Brucella	Pseudorabies gB ELISA, B. abortus	1049	1768	3377	3646	3773	3%
Swine Serology Panel 1	Brucella FPA, Pseudorabies Virus ELISA, PRRSV ELISA	-	-	-	-	1665	N/A
Bovine Serum ELISA Panel	BVDV Antigen Capture ELISA, BLV ELISA, Johne's ELISA	1320	644	871	255	300	18%
Abortion Panel Bovine	BVDV Antigen Capture ELISA, BVD Type 1 SN, IBR SN, Lepto MAT, Neospora ELISA, B. abortus	310	242	261	306	224	-27%
Canine Tick Profile	E. canis SNAP, RMSF IFA, Lyme, Anaplasma phagocytophilum / A. platys	49	36	44	43	46	7%
Bovine Respiratory Panel	BRSV VN, BVDV-1a VN, BVDV-1b VN, BVDV-2 VN, IBR VN, H. somni AGGL, M. haemolytica AGGL, PI-3 VN	-	-	-	-	10	N/A
Goat Abortion Panel	Bluetongue Virus AGID, B. abortus AGGL, Q-Fever ELISA, Toxoplasma IgG IFA, Leptospira MAT	-	-	-	-	3	N/A
Tick Panel ELISA	Anaplasma phagocytophilum/ A. platys, Ehrlichia canis/ E. ewingii, Borrelia burgdorferi	-	1	0	0	2	N/A
Equine Abortion Profile †	Lepto MAT, EHV-1, EVA	6	6	-	-	-	N/A
Bovine Serum ELISA Panel 2 †	BVDV Antigen Capture ELISA, BLV ELISA, Anaplasmosis c-ELISA	15	0	-	-	-	N/A
Total Panels/Profiles Per Year		2749	2697	2553	4250	6023	42%

† Test discontinued after CY 2017

SEROLOGY: 5-YEAR TEST TREND

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
<i>Salmonella pullorum/typhoid</i> Microagglutination Screen	-	-	10199	18302	21957	20%
<i>Mycoplasma gallisepticum</i> / <i>Mycoplasma synoviae</i> ELISA	-	8414	18008	18445	21599	17%
<i>Brucella abortus</i> BAPA, Card, CF, FPA and STP r*	2674	2459	3906	4370	6065	39%
Pseudorabies (PRV) gB and g1 ELISA r*	10693	1787	3390	3647	5462	50%
BVDV Antigen Capture ELISA *	6095	4385	4284	3295	3446	5%
Johne's Disease ELISA and CF r*	2492	1923	2602	2354	2707	15%
Avian Influenza ELISA	-	841	1802	1995	2610	31%
Equine Infectious Anemia (EIA) ELISA	1905	1735	1787	2155	1994	-7%
Bovine Leukemia Virus (BLV) ELISA and AGID r*	2254	1864	2018	1507	1754	16%
PRRS ELISA	8	25	-	-	1676	N/A
Bovine Pregnancy ELISA	471	639	609	737	1406	91%
Anaplasma c-ELISA *	845	743	437	546	563	3%
<i>Leptospira</i> Microscopic Agglutination (MAT) *	1488	836	502	665	542	-18%
Goat and Sheep Pregnancy ELISA	26	151	214	548	523	-5%
BVDV Type I Serum Neutralization SN and VN r*	931	575	387	465	446	-4%
CAE c-ELISA / OPP c-ELISA	110	138	401	533	422	-21%
<i>Theileria (Babesia) equi</i> c-ELISA r	274	256	215	264	400	52%
Infectious Bovine Rhinotracheitis (IBR) SN *	856	398	344	309	284	-8%
<i>Brucella canis</i> Card Test, AGID, IFA and Tube Agglutination r*	184	230	421	270	279	3%
<i>Babesia caballi</i> c-ELISA r	99	139	130	200	259	30%
<i>Neospora</i> c-ELISA r*	653	442	283	330	239	-28%
<i>Mycoplasma gallisepticum</i> Hemagglutination Inhibition r	-	57	117	156	216	38%
<i>Mycoplasma synoviae</i> Hemagglutination Inhibition r	-	57	117	156	216	38%
Caseous Lymphadenitis SHI r	10	26	-	-	160	N/A
Parainfluenza 3 SN and VN r*	291	7	48	166	144	-13%
Rocky Mountain Spotted Fever (RMSF) IFA *	152	85	94	82	107	30%
Bluetongue c-ELISA and AGID r*	54	59	-	-	86	N/A
Vesicular Stomatitis Virus VN (Indiana and New Jersey) r	-	-	-	-	74	N/A
Equine Viral Arteritis (EVA) SN and VN r*	56	52	-	-	64	N/A
Lyme Disease SNAP *	48	38	44	43	48	12%
<i>E. canis/E. ewingii</i> SNAP *	48	37	44	43	48	12%
<i>Anaplasma phagocytophilum/A. platys</i> SNAP *	48	37	44	43	48	12%
Heartworm ELISA *	2	0	1	13	46	254%

r In-House and/or Referral Laboratory Testing

* Includes individual tests from Serology Panels and Profiles

SEROLOGY: 5-YEAR TEST TREND

(CONTINUED)

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Equine Protozoal Myeloencephalitis (EPM) IFAT <i>r</i>	40	41	-	-	40	N/A
BRSV SN and VN <i>r</i> *	17	7	0	0	31	N/A
Canine Herpesvirus VN <i>r</i>	-	-	-	-	24	N/A
West Nile Virus (WNV) IgM ELISA <i>r</i>	58	29	-	-	23	N/A
End Point Titration SN	19	20	25	28	21	-25%
<i>Brucella melitensis</i> Card Test	-	-	12	9	20	122%
<i>Brucella ovis</i> ELISA <i>r</i>	10	18	-	-	17	N/A
Eastern Equine Encephalitis (EEE) IgM ELISA <i>r</i>	16	12	-	-	16	N/A
BVDV Type II Serum Neutralization SN and VN <i>r</i> *	226	21	0	0	11	N/A
Q-Fever (<i>Coxiella burnetii</i>) c-ELISA, CF and IFA <i>r</i>	-	-	-	-	11	N/A
<i>Histophilus somni</i> AGGL <i>r</i>	-	-	-	-	10	N/A
<i>Mannheimia haemolytica</i> AGGL <i>r</i>	-	-	-	-	10	N/A
All Other Tests	583	9089	8004	11	46	318%
Total Tests Per Year	24112	37672	60489	62617	76170	22%

r In-House and/or Referral Laboratory Testing

* Includes individual tests from Serology Panels and Profiles

OUTSOURCED TESTING: 2-YEAR TREND

Note: Outsourced Testing is testing not affiliated with one of the primary laboratory units of OADDL. All Outsourced Testing is performed at a referral laboratory.

TEST	CALENDAR YEAR		
	2019	2020	% CHANGE
Cytology	119	246	107%
CBC and Blood Chemistry Panel	36	36	0%
Complete Blood Count (CBC) only	17	29	71%
Fructosamine	13	24	85%
Progesterone Level	15	18	20%
Urinary Calculi Analysis	-	15	N/A
Cortisol Level	4	11	175%
Fluid Analysis with Cytology	-	11	N/A
Thyroid Testing (T3, T4, Panel)	19	10	-47%
All Other Tests	95	66	-31%
Total Tests Per Year	318	466	47%

TOXICOLOGY: 5-YEAR TEST TREND

Note: Except where indicated as *In-house* all Toxicology testing is performed at a referral laboratory.

TEST	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
Mineral Panel	85	66	72	116	98	-16%
Water Quality	53	53	61	55	98	78%
Nitrate Quantitation-Aqueous Fluid	95	76	116	120	72	-40%
Trace Mineral - Copper	88	55	90	74	30	-59%
Drug Screen	3	7	26	17	23	35%
Trace Mineral - Lead	6	11	19	30	17	-43%
Trace Mineral - Selenium	87	50	81	55	16	-71%
Magnesium	1	0	2	7	16	129%
Toxicology - Special Testing	30	37	44	14	12	-14%
Anticoagulant/Rodenticides	6	12	16	6	11	83%
Bone Marrow Fat Analysis	-	-	-	7	11	57%
Nitrate Quantitation-Forage	48	27	35	27	11	-59%
Mycotoxin Screen	10	14	18	17	10	-41%
All Other Tests	90	64	104	140	74	-47%
Total Tests Per Year	602	472	684	685	499	-27%

TEST RELATED SUPPLIES SENT TO CLIENTS: 5-YEAR TREND

SUPPLY	CALENDAR YEAR: Jan-Dec					
	2016	2017	2018	2019	2020	% CHANGE
<i>Tritrichomonas foetus</i> PBS Transport Tube	-	-	1689	9157	11028	20%
3 oz. 10% Buffered Formalin Jar	1508	1157	851	722	720	N/A
<i>Campylobacter fetus</i> Media	225	194	212	207	228	10%
Molecular Avian Influenza Swabs	175	74	270	141	62	-56%
Bacterial Culturette w/o Charcoal	75	45	24	208	52	-75%
BHI Broth Media	112	147	271	130	35	-73%
<i>Tritrichomonas foetus</i> Transport Medium Pouch	4923	4842	6357	2315	28	-99%
Total Supplies	6731	6238	9133	12609	12153	-4%

OADDL BOARD OF ADVISORS

BOARD MEMBER

Dr. K. Shawn Blood

Dr. Becky Brewer

Dr. Leslie Cole

Dr. Rod Hall

Dr. Steve Hart (Board Chair)

Dr. Michael Johnston

Mr. Michael Kelsey

Dr. W. H. Mitchell (Vice Chair/Secretary)

Dr. Ken Powell

Dr. Carlos Risco

Dr. Donna Slater

Mr. Stan Stromberg

Dr. Jeff Studer

Dr. Michael Tripp (Past Chair)

Dr. Bret White

Dr. Barry Whitworth

GROUP REPRESENTED

Pharmaceutical Industry

USDA APHIS Area Veterinarian in Charge (AVIC)

OVMA Representative

State Veterinarian

Small Ruminant Industry

Equine Industry

Executive Vice President of Oklahoma Cattlemen's Association

Mixed Animal Practice

Poultry Industry

Dean, College of Veterinary Medicine

Small Animal Practice

Director of Food Safety Services

Director, CVM Veterinary Medical Hospital

Swine Industry

Food Animal Practice

Oklahoma Cooperative Extension

PERSONNEL: ADMINISTRATION, FACULTY AND STAFF: CY 2020

ADMINISTRATION	POSITION
Jerry Saliki **	Professor OADDL Director (May 2020 to Present) Section Head: Serology
Emily Cooper	Assistant Director/Quality Manager Section Head: Receiving Office
Ryan Van Fleet	Coordinator of Business Office Coordinator of Human Resources

FACULTY	POSITION	AREAS OF INTEREST
Giselle Cino **	Assistant Professor Anatomic Pathologist Section Head: Pathology Services	Infectious Disease Swine Diseases Emerging and Transboundary Diseases Ocular Pathology
Valerie McElliott	Assistant Professor Pathologist	Musculoskeletal Pathology Neuropathology Electron Microscopy
Craig Miller	Assistant Professor Pathologist	Infectious Disease Neoplastic Disease Immunopathology
Sunil More	Assistant Professor Pathologist	Respiratory Disease Infectious Disease
Akhilesh Ramachandran	Associate Professor Section Head: Microbiology Section Head: Molecular Diagnostics	Bacteriology Molecular Diagnostics
Jerry Ritchey	Professor Pathologist OADDL Interim Director (May 2019-April 2020) Head, Veterinary Pathobiology Department (Jan-Oct)	Infectious Disease Cardiopathology Central Nervous System

** Joined OADDL in CY 2020

PERSONNEL: ADMINISTRATION, FACULTY AND STAFF: CY 2020

(CONTINUED)

FACULTY

Tim Snider

POSITION

Professor
Pathologist

AREAS OF INTEREST

Gastrointestinal Disease
Reproductive Pathology
Infectious Pathology

Brianne Taylor **

Assistant Professor
Pathologist

Infectious Disease
Equine Pathology

STAFF

Allen, Noah

Bircher, Noelle **

Broyles, Brigett

Clouse, Cayla

Encarnacion-A., Perla

Forsythe, Kaycee

Gaffney, Katie *

Hamilton, Brianne **

Holcomb, Christian *

Hoyt, Amy

Jackson, Jennifer *

Johns, Carolyn

Jones, Alan *

Madden, Robin

Medellin, Alejandra **

Olko, Emmy

Patel, Girish **

Peake, Brittanie

Pettit, Dustin

Stair, Eron

Stanley, Crystal

Talbot, Danyelle

Talent, Scott

Taylor, Stephanie

Werner, Madison *

Windiate, Victoria

LABORATORY UNIT

Microbiology

Microbiology

General Office

Receiving Office; Necropsy

Histology

Molecular Diagnostics

Molecular Diagnostics

Serology

Microbiology

Serology

Serology; Molecular Diagnostics

Receiving Office; Necropsy

Serology

Molecular Diagnostics

Molecular Diagnostics

Receiving Office; Necropsy

Molecular Diagnostics

Molecular Diagnostics

Histology

Histology

Serology

Accounting

Microbiology

General Office

Receiving Office; Necropsy

OADDL Informatics; CVM

Laboratory Safety

POSITION

Senior Laboratory Technologist

Senior Laboratory Technologist

Medical Records Technician

Diagnostic Technician

Senior Laboratory Technologist

Senior Laboratory Technologist

Senior Laboratory Technologist

Senior Laboratory Technologist

Senior Laboratory Technologist

Laboratory Manager

Senior Laboratory Technologist

Receiving Office and Necropsy Supervisor

Senior Laboratory Technologist

Laboratory Manager

Senior Laboratory Technologist

Diagnostic Technician

Post-Doctoral Fellow

Laboratory Supervisor

Laboratory Manager

Senior Laboratory Technologist

Senior Laboratory Technologist

Accounting Specialist

Laboratory Manager; QA Assistant

Medical Records Data Entry Technician

Diagnostic Technician

Coordinator

* Left OADDL in CY 2020

** Joined OADDL in CY 2020

AWARDS, HONORS, CERTIFICATIONS

OADDL Employees of the Month Award:

Mady Werner, January 2020

Brigett Broyles, February 2020

Jennifer Jackson, March 2020

Robin Madden, April 2020

Brittanie Peake, May 2020

Amy Hoyt, July 2020

Katie Gaffney, August 2020

Dr. Giselle Cino, September 2020

Emily Looper, October 2020

Cayla Clouse, November 2020

Brianna Hamilton, December 2020

OADDL Receives Energy Leadership Award December 2020

Emily Cooper and **Amy Hoyt**, Stratton Staff Award Nominees

Craig Miller, DVM, PhD, DACVM, Co-director of the Summer Research Training Program

Craig Miller, DVM, PhD, DACVM, faculty advisor for OSU SAVMA

Akhilesh Ramachandran, BVSc & AH, PhD, DACVM, 2020 Distinguished Early Career Faculty Award

Jerry Ritchey, DVM, Ph.D., DACVP, 2020 OSU-CVM, Class of 2023 Class Teaching Award

Jerry Ritchey, DVM, Ph.D., DACVP, 2020 OSU-CVM, Class of 2020 Commencement Address (by class vote)

Jerry Saliki, DVM, PhD, President-elect of the American Association of Veterinary Laboratory Diagnosticians

Ruth Scimeca, VMD, MSc, PhD, DACVM, nominated to represent the College of Veterinary Medicine in the National Phi Zeta Manuscript Award Competition February 2020

Ruth Scimeca, VMD, MSc, PhD, DACVM, earned diplomate status in the parasitology section (November 2019) Scimeca is an assistant professor in the Department of Veterinary Pathobiology

Timothy Snider, DVM, Ph.D., DACVP, received the Zoetis Teaching Award

Brianne Taylor, DVM, earned Certificate of Completion of Anatomic Pathology Residency Program, June 2020

OUTREACH AND PRESENTATIONS TO THE PUBLIC AND CLIENTS

OADDL hosted poultry wet lab for thirty veterinary students sponsored by Aviagen. March 2020

Giselle Cino, DVM, PhD, DACVP, Basic Science session judging committee – Phi Zeta Research Day, KSU. March 2020.

Giselle Cino, DVM, PhD, DACVP, Young Investigator Student Award judge – American Association of Swine Veterinarians. February 2020.

Giselle Cino, DVM, PhD, DACVP, Young Investigator Travel Award judge - American College of Veterinary Pathologists (ACVP) Annual meeting. November 2020.

Giselle Cino, DVM, PhD, DACVP. *Confirmed Cases of Cache Valley Virus and Related Viruses at KSVDL*. KSVDL Diagnostic Insights. March, 2020

More S, DVM, PhD, DACVP and **Ramachandran A**, BVSc, PhD, DACVM. *Sporotrichosis in a Cat and her Veterinarian*. OADDL E-News, Winter 2020.

Saliki J, DVM, PhD, DACVP. *A Diagnostic Lab at the Cutting Edge of One Health – COVID-19 Testing*. OADDL E-News, Special Issue, June 2020.

Drs. Jerry Malayer and Carlos Risco, Rep. Frank Lucas, Hannah Felder, class of 2021, and **Dr. Tim Snider** (OSU CVM '96) participated in AAVMC Advocacy Day. March 2020

Jerry Ritchey, DVM, PhD, DACVP, demonstrated comparative anatomy to multiple fourth grade science classes at Spring Creek Elementary School in Edmond, OK. March 2020

Jerry Ritchey, DVM, PhD, DACVP, served on the 2020 Board of Directors for the American College of Veterinary Pathologists.

Jerry Ritchey, DVM, PhD, DACVP, OSU-CHS Pre Health Round up- 30 min presentation on what veterinary diagnosticians do. Audience: High School students with STEM interests. December 2020.

Tim Snider, DVM, PhD., DACVP ('96), and Rod Hall, DVM ('77), state veterinarian presented "*Oklahoma Veterinary Practitioners' Guide to Animal Cruelty: Virtual Class*". June 2020

ATTENDANCE AT MEETINGS

Cino, G: 2nd Annual Veterinary Diagnostics Conference, Nanjing, China, September 2020. Presenter.

Saliki, JT: 2nd Annual Veterinary Diagnostics Conference, Nanjing, China, September 2020. Organizing Committee member.

Saliki, JT: Annual Conference of the AAVLD, October 2020. Plenary session co-chair.

Cooper EJ, Madden R, Patil G, Pettit D, Ramachandran A, Windiate V: Annual Conference of the AAVLD, October 2020.

POSTERS, SCIENTIFIC PRESENTATIONS, SCIENTIFIC PUBLICATIONS

Giselle Cino, DVM, PhD, DACVP. Invited Speaker, Oklahoma State University Fall Veterinary Conference (virtual): *Small Animal Alopecias – A Diagnostic Pathologist’s Perspective*. November 4-6, 2020

Giselle Cino, DVM, PhD, DACVP. Invited Speaker, Online International Webinar on Biotechnology: Modern Molecular Approaches, Tirupati, Andhra Pradesh, India. Presenter – *“Unraveling the mystery: a series of unexpected discoveries and how technology helped”*. September 10-11, 2020

Giselle Cino, DVM, PhD, DACVP. Invited Speaker, 2nd Annual Veterinary Diagnostics Conference, Nanjing, China – Pre-meeting mini-symposium: Common causes of skin diseases in dogs and cats. *“Non-inflammatory alopecia in dogs and cats”*. September 2020

Smith, AC, **Fu DJ, Cino-Ozuna AG.** *Things that go lumpy in the night. “Lumpy jaw”, pneumonia, and septic myocarditis due to Actinomyces spp. in a Sugar Glider (Petaurus bravigeppus)*. Presented at the American College of Veterinary Pathologists (ACVP) Annual Meeting, Oct 30-Nov 1, 2020.

Giovani Trevisan,¹ Leticia C. M. Linhares, Kent J. Schwartz, Eric R. Burrough, Edison de S. Magalhães, Bret Crim, Poonam Dubey, Rodger G. Main, Phillip Gauger, Mary Thurn, Paulo T. F. Lages, Cesar A. Corzo, Jerry Torrison, Jamie Henningson, Eric Herrman, Rob McGaughey, **A. Giselle Cino-Ozuna**, Jon Greseth, Travis Clement, Jane Christopher-Hennings, Daniel C. L. Linhares. *Data standardization implementation and applications within and between diagnostic laboratories: integrating and monitoring enteric coronaviruses*. Journal of Veterinary Diagnostic Investigation. Manuscript in press.

Megan C. Niederwerder, Ana M.M. Stoian, Diego G. Diel, Scott Dee, Matthew Olcha, Laura A. Constance, Vlad Petrovan, **Ada Giselle Cino-Ozuna**, and Raymond R.R. Rowland. *Mitigating the risk of African swine fever virus in feed with antiviral chemical additives*. Transboundary and Emerging Diseases. 2020;00:1–10. <https://doi.org/10.1111/tbed.13699>

Shivanna V, **Cino-Ozuna AG**, Ganta CK, and Marthaler D. *Pseudocowpox Virus Infection in an American bison (Bison bison)*. BMC Veterinary Research. 2020; 16: 241. <https://doi.org/10.1186/s12917-020-02464-7>

Sheppard S, Higginbotham ML, Springer N, Shivanna, V. and **Cino-Ozuna AG.** *Pathology in Practice: Hemangiosarcoma*. JAVMA. September 1, 2020, Vol. 257, No. 5, Pages 499-501. <https://doi.org/10.2460/javma.257.5.499>

Browning GR, Carpenter JW, Tucker-Mohl K, Drozd M, and **Cino-Ozuna AG.** *Pathology in practice: Pneumothorax in a rabbit*. JAVMA. April 15, 2020, Vol. 256, No. 8, Pages 873-877. <https://doi.org/10.2460/javma.256.8.873>

Adeline N Boettcher, Yunsheng Li, Amanda Ahrens, Matti Kiupel, Kristen Byrne, Crystal L Loving, **A. Giselle Cino-Ozuna**, Jayne Wiarda, Malavika Adur, Blythe Schultz, Jack Swanson, Elizabeth Snella, Sam Ho, Sara Charley, Zoe E Kiefer, Joan Cunnick, Ellie Putz, Guiseppe Dell’Anna, Jackie Jens, Swanand Ramesh Sathe, Frederick Goldman, Erik Westin, Jack Dekkers, Jason Ross, Christopher Tuggle. *Novel engraftment and T cell differentiation of human hematopoietic cells in Art-/- IL2RG-/- SCID pigs*. Frontiers in Immunology. 11:100, February 2020. <https://doi.org/10.3389/fimmu.2020.00100>

POSTERS, SCIENTIFIC PRESENTATIONS, SCIENTIFIC PUBLICATIONS

(CONTINUED)

Lihua Wang, Shijiang Mi, Rachel Madera, Lillianne Ganges, Manuel V. Borca, Jingqiang Ren, Chase Cunningham, **Ada G. Cino-Ozuna**, Hongwei Li, Changchun Tu, Wenjie Gong, Jishu Shi. *A neutralizing monoclonal antibody-based competitive ELISA for classical swine fever C-strain post-vaccination monitoring*. BMC Veterinary Research. 2020; 16:14. <https://doi.org/10.1186/s12917-020-2237-6>

Madera, R.; Wang, L.; **Cino-Ozuna, A. G.**; and Shi, J. (2020) "The Impact of Attenuated Porcine Reproductive and Respiratory Syndrome (PRRS) Vaccine on the Efficacy of Subunit Classical Swine Fever Vaccine," Kansas Agricultural Experiment Station Research Reports: Vol. 6: Iss. 10. <https://doi.org/10.4148/2378-5977.8015>

Jinhwa Lee, Dingping Bai, Yonghai Li, Yuhao Li, **Ada Cino-Ozuna**, Michael Duff, Yuekun Lang, Jianmei Yang, Yuju Yang, Jingjiao Ma, Sunyoung Sunwoo, Juergen Richt, and Wenjun Ma. *Bat influenza vectored NS1-truncated live vaccine protects pigs against heterologous virus challenge*. Journal of Virology. <https://doi.org/10.1101/2020.11.18.38925>

Ridpath, JF, Fulton, RW, Bauermann, FV, Falkenberg, SM, Welch, J, **Confer, AW**: *Sequential Exposure to Bovine Viral Diarrhea Virus and Bovine Coronavirus Results in Increased Respiratory Disease Lesions: Clinical, Immunologic, Pathologic, and Immunohistochemical Findings*. Journal of Veterinary Disease Investigation, 32: 513-526, 2020.

Kao, E. Cowan, S., Nafe, L., **Miller, C.** *A New Therapy to Improve Survival of Cats with Acute Cytauxzoonosis*. First Place oral presentation for the 2020 Oklahoma State University Three Minute Thesis Competition.

Kao, E., Cowan, S., **Miller, C.** *Droplet digital polymerase chain reaction as a novel diagnostic to detect cytauxzoonosis in domestic cats*. Oral presentation at the 2020 Virtual ISCAID symposium. September 11-12, 2020.

Tamil Selvan, M., Zhai, B., Cowan, S., **Miller, C.** *Immunomodulatory effects of cannabinoid type-2 receptor agonist on FIV infection in vitro*. Oral presentation at the 2020 Virtual ISCAID symposium. September 11-12, 2020.

Chang, L., Kao, E., Cowan, S., Scimeca, R., **Miller, C.** *Replicating Cytauxzoon felis life cycle using Amblyomma americanum and feline embryonal macrophage cells*. Poster presentation at the 2020 National Veterinary Scholars Symposium. August 4-6, 2020.

Spoorthi BC, **More SS**, Gautham SA, Ghosh S, Saha I, Maiti AK. *Role of free radical scavenging activity of vasoactive intestinal peptide in the attenuation of mitochondrial dysfunction to ameliorate dextran sulphate sodium-induced colitis in mice: Implications in ulcerative colitis*. Journal of Digestive Diseases Volume 21, Issue 12, December 2020 p 711-723.

A Pathologic Perspective of COVID-19: Parallels with Severe Influenza Virus Pneumonia. Teluguakula Narasaraju, **Sunil More**, Marko Radic, Vincent TK Chow. OSF Preprints

POSTERS, SCIENTIFIC PRESENTATIONS, SCIENTIFIC PUBLICATIONS

(CONTINUED)

Avellar, H. K., Williams, M. R., Brandão, J., Narayanan, S., **Ramachandran, A.**, Holbrook, T. C., Schoonover, M. J., Bailey, K. L., Payton, M. E., Pai, K. K., and Timmons, C. T. *Safety and efficacy of cold atmospheric plasma for the sterilization of a Pasteurella multocida-contaminated subcutaneously implanted foreign body in a rabbit model*, American Journal of Veterinary Research (Accepted, September, 2020).

Narayanan, S., **Ramachandran, A.**, Aakur, S. N., Bagavathi, A. *A Framework for Animal Genome Sequence Classification with Graph Representations and Deep Learning*, ICMLA 2020 - 19th IEEE International Conference on Machine Learning and Applications, Virtual Conference, Worldwide (Accepted: September, 2020).

Rodenbaugh, C., **Ramachandran, A.** and Brandão, J. (2020) *Lancefield Group A Streptococcus-Associated Dermatitis in an African Pygmy Hedgehog (Atelerix albiventris)*. Journal of Exotic Pet Medicine, **33**, 27-30.

Glassman, A.R., **Ramachandran, A.**, Lyon, S.D., Robertson, J., Kanda, I. and Brandão, J. (2020) *Streptococcal toxic shock syndrome in a captive kinkajou (Potos flavus)*. Journal of Exotic Pet Medicine, **33**, 42-45.

Pulavendran S, Prasanthi M, **Ramachandran A**, Grant R, **Snider TA**, Chow VTK, **Malayer JR**, Teluguakula N. *Production of Neutrophil Extracellular Traps Contributes to the Pathogenesis of tularemia*. *Frontiers in Immunology*. 11: 679.

Chien RC, **Ritchey JW**. *Pathology in Practice*. J Am Vet Med Assoc. 2020. 1;256(9):995-998. doi: 10.2460/javma.256.9.995. PMID: 32301655.

Maria Z, Campolo AR, Scherlag BJ, **Ritchey JW**, Lacombe VA. *Insulin Treatment reduces susceptibility to atrial fibrillation in Type 1 diabetic mice*. *Front Cardiovasc Med*. 2020 Aug 12;7:134. doi: 10.3389/fcvm.2020.00134. eCollection 2020. PMID: 32903422.

Ojo BA, Lu P, Alake SE, Keirns B, Anderson K, Gallucci G, Hart MD, El-Rassi GD, **Ritchey JW**, Chohanadisai W, Lin D, Clarke S, Smith BJ, Lucas EA. *Pinto beans modulate the gut microbiome, augment MHCII protein, and antimicrobial peptide gene expression in mice fed a normal or western-style diet*. *J Nutr Biochem*. 2021 Feb;88:108543. doi: 10.1016/j.jnutbio.2020.108543. Epub 2020 Nov 1. PMID: 33144228

Sauvé CC, Hernández-Ortiz A, Jenkins E, Mavrot F, Schneider A, Kutz S, **Saliki JT**, Daoust P-Y. *Exposure of the Gulf of St. Lawrence grey seal Halichoerus grypus population to potentially zoonotic infectious agents*. *Dis Aquat Org* 142:105-118.

Spetter MJ, Louge Uriarte EL, Armendano JI, Morrell EL, Cantón GJ, Verna AE, Dorsch MA, Pereyra SB, Odeón AC, **Saliki JT**, González Altamiranda EA (2020). *Detection methods and characterization of bovine viral diarrhea virus in aborted fetuses and neonatal calves over a 22-year period*. *Braz. J. Microbiol*; <https://doi.org/10.1007/s42770-020-00296-z>

POSTERS, SCIENTIFIC PRESENTATIONS, SCIENTIFIC PUBLICATIONS

(CONTINUED)

Scimeca et al. 2020 Seroprevalence, DNA isolation, and genetic characterization of *Toxoplasma gondii* from black bear (*Ursus americanus*) sera collected in Eastern Oklahoma. *Parasitology Research* 119 (8) [10.1007/s00436-019-06535-z](https://doi.org/10.1007/s00436-019-06535-z)

Scimeca RC, Cotey S, Chang L, Will E and Reichard MV. Prevalence of *Sarcocystis* spp. in North American river otters (*Lontra canadensis*) collected in Michigan. American Association of Veterinary Parasitologists 64rd Annual Meeting. June 20-23. Virtual meeting

Thomas JE, **Scimeca RC**, Schunak B, Ohmes CM, Dunca KT, Lineberry MW, Beam RA, Whitley D and Reichard MV. Sequential histologic comparisons of naïve and subsequent *Amblyomma americanum* bite lesions from induced infestations on dogs and cats. American Association of Veterinary Parasitologists 64rd Annual Meeting. June 20-23. Virtual meeting.

Cotey S, **Scimeca RC**, Chang L, Will E and Reichard MV. *Toxoplasma gondii* Prevalence and Partial Genotypes in North American River Otters (*Lontra canadensis*) from the Upper Peninsula of Michigan. American Association of Veterinary Parasitologists 64th Annual Meeting. June 20-23. Virtual meeting

Scimeca RC, Hawton A, Caron M, Matt M, Kanda I, Brandão J and Reichard M. Prevalence and genetic characterization of *Toxoplasma gondii* strains from 31 passerine species collected in North-central Oklahoma. American Association of Veterinary Parasitologists 64th Annual Meeting. June 20-23. Virtual meeting.

T. Snider DVM, PhD., DACVP, Invited Speaker, Oklahoma State University Fall Veterinary Conference (virtual): Companion Animal Session III: Clinical Intersections – Pathology Cases: A Fast Paced Potpourri. November 4-6, 2020.

Taylor BM, Chaffin MK, Hoffmann AR, Edwards JF, Arenas-Gamboa AM. Immersion Foot Syndrome in 6 Equids Exposed to Hurricane Floodwaters. *Veterinary Pathology*. 2020;57(2):290-295.

INSTRUCTION OF VET MED AND OSU STUDENTS

- VMED 7591 International Veterinary Medicine/**Cino G, Snider**
- VCS 7953 / VCS 7072 Veterinary Diagnostics/**McElliott V (IOR), Cino G, Miller C, More S, Ritchey J, Snider T, Taylor B**
- VBSC 5000 Master's Research and Thesis/**Miller C**
- VBSC 6000 PhD Research and Dissertation/**Miller C**
- VCS 7072 Veterinary Diagnostic Rotation (Year IV)/**More S**
- VBSC 5023 Pathobiology (IOR)/**Ritchey J**
- VMED 7253 Veterinary Immunology (IOR)/**Ritchey J**
- VMED 7264 General Pathology/ **Ritchey J**
- VMED 7614 Cardiopulmonary System/ **Ritchey J**
- VMED 7933 Diagnostics (Year IV)/**Ritchey J**
- VCS 7072 Diagnostics (Clinical parasitology- Year IV)/**Scimeca R**
- VMED 7223 Parasitology I/**Scimeca R** (2 lectures)
- VMED 7323 Parasitology II/**Scimeca R** (2 lectures)

GLOSSARY

AGGL	Agglutination Test	ILT	Infectious Laryngotracheitis
AGID	Agar Gel Immunodiffusion Assay	IOR	Instructor of Record
ASF	African Swine Fever	MAT	Microscopic Agglutination Test
BAPA	Buffered Acidified Plate Antigen	MS/MG	Mycoplasma synoviae/Mycoplasma gallisepticum
BHI	Brain Heart Infusion medium	NPIP	National Poultry Improvement Plan
BLV	Bovine Leukemia Virus	OHRC	Oklahoma Horse Racing Commission
BRSV	Bovine Respiratory Syncytial Virus	OSDH	Oklahoma State Department of Health
BVD/BVDV	Bovine Viral Diarrhea/ BVD Virus	OPG	Oocyst per gram of feces
c-ELISA	Competitive (blocking) ELISA	OPP	Ovine Progressive Pneumonia
CAE	Caprine Arteritis Encephalitis	OVMA	Oklahoma Veterinary Medical Association
CBC	Complete Blood Count	PAS	Periodic Acid-Schiff stain
CF	Complement Fixation	PBS	Phosphate-buffered Saline medium
CMI	Catastrophic Musculoskeletal Injury	PCR	Polymerase Chain Reaction
CSF	Classical Swine Fever	PI BVDV	Persistently Infective BVDV
CVM	College of Veterinary Medicine	PI3	Parainfluenza Virus 3
EEE	Eastern Equine Encephalitis	PrP	Prion Protein
EHD	Epizootic Hemorrhagic Disease	PRRS(V)	Porcine Reproductive and Respiratory Syndrome/PPRS Virus
EHV	Equine Herpesvirus	PRV	Pseudorabies Virus
EIA	Equine Infectious Anemia	PTAH	Phosphotungstic Acid Hematoxylin stain
ELISA	Enzyme-Linked Immunosorbent Assay	RAP	Rapid Automated Presumptive
END	Exotic Newcastle Disease	RMSF	Rocky Mountain Spotted Fever
EVA	Equine Viral Arteritis	SHI	Synergistic Hemolysin Inhibition
FA	Fluorescent Antibody	SIV	Swine Influenza Virus
FPA	Fluorescence Polarization Assay	SN	Serum Neutralization
GMS	Grocott's Methenamine Silver stain	SPT	Standard Plate Test
H&E	Hematoxylin and Eosin Stain	VI	Virus Isolation
IBR	Infectious Bovine Rhinotracheitis	VMH	OSU CVM Veterinary Medical Hospital
IFA/IFAT	Indirect Fluorescent Antibody/IFA Test	VN	Virus Neutralization
IHC	Immunohistochemistry	WNV	West Nile Virus
IgG	Immunoglobulin G		
IgM	Immunoglobulin M		
IHC	Immunohistochemistry		