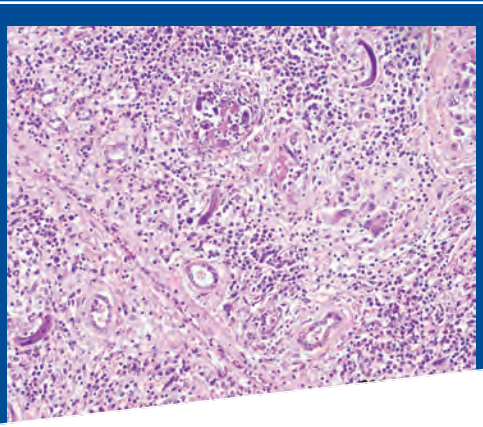
SDSU

South Dakota Animal Disease Research and Diagnostic Laboratory

Annual Report 2017



ADRDL

ANIMAL DISEASE RESEARCH & DIAGNOSTIC LABORATORY

BROOKINGS, SOUTH DAKOTA

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

FY2017 Annual Report
July 1, 2016 - June 30, 2017

MISSION: Veterinary and Biomedical Sciences

To protect and improve the health of animals, the viability of the SD agricultural industry and the welfare of society through high quality diagnostic, analytical, research, Extension and teaching activities.

MISSION: Diagnostic Laboratory

To provide high quality veterinary diagnostic services as a means to promptly and accurately establish causes of animal health problems. Such diagnoses will aid attending veterinarians and health officials in the treatment, control, prevention and surveillance of animal diseases to the benefit of the SD and national livestock industry, other animal owners and public health.

MISSION: Research

To utilize contemporary methods in the biological and life sciences to elucidate mechanisms controlling health and disease in animals and humans by the development of methods to diagnose, moderate and eliminate diseases.

MISSION: Teaching and Advising

Provide cutting edge animal health and biomedical science courses for the training of undergraduate and graduate students that incorporate problem-solving and critical thinking skills using traditional and applied genomic technology solutions. Effectively advise undergraduate students in the pre-veterinary medicine curriculum and MS and PhD graduate students. Provide degree programs to allow our students to be competitive in the animal health and biomedical science fields. Provide opportunities for practicing veterinarians and non-traditional students in the animal health field to obtain graduate degrees.

MISSION: Veterinary Extension

To provide outstanding educational opportunities for veterinarians, the livestock industry, Extension educators and other citizens regarding animal health, zoonotic diseases and food safety issues and position the ADRDL and the Veterinary and Biomedical Sciences Department as primary sources of that information.

South Dakota
Animal Disease Research and Diagnostic Laboratory

Annual Report—Fiscal Year 2017

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Director's Message

This March 2017 was a "historical" time period when the SD Animal Disease Research and Diagnostic Laboratory (ADRDL) renovation and expansion project was funded through the legislature. The approximate $60M project to renovate and expand the SD Animal Disease Research and Diagnostic Laboratory was funded to provide critical research and diagnostic support to protect our citizens and livestock industry from disease outbreaks. The laboratory has a major responsibility throughout the years ahead and we appreciate the support provided. Our thanks were given in my speech during the August 31, 2017 Groundbreaking Ceremony…..

Thank you everyone for being here! It is an honor to have the Governor present and it is a great day to celebrate the Groundbreaking for the SD Animal Disease Research and Diagnostic Laboratory! (Or the "ADRDL"…which is sometimes difficult to have roll off your tongue when discussing in legislative sessions, so thank you for putting it out there this past session).

The initial laboratory was established by State Statute in 1967 and was designated to reside at SDSU under the supervision of the Board of Regents. Since then, its mission has not changed; which is to provide high quality veterinary diagnostic services and perform research as a means to promptly and accurately establish causes of animal health problems. This is to promote health and control disease in animals and people. In this regard we are also grateful to have a good partnership with the SD Department of Health and their support through Dr. Lon Kightlinger and Dr. Tim Southern. I would also like to recognize the ADRDL Department Heads and Associate Director from past years who kept this mission going and are here today, Dr. John Thompson, Dr. David Zeman and Dr. Darrell Johnson. Our mission has local to global significance, since disease knows no boundaries.

This was evident during the highly pathogenic avian influenza outbreak in 2015 where the initial outbreak in the Midwest started in Minnesota and travelled quickly to South Dakota. So, first of all I would like to thank the Faculty and staff at the laboratory for continuing to serve the people and animals in our great state, especially during those times when it became very busy 24/7. Our staff and Faculty have blue or yellow name tags on, so be sure to talk to them while you are here to discuss further how we can best serve you.

I would also like to thank those that were here when the building project began and who through their persistence, vision, patience and with their own specific expertise, carried on with the project, even when it didn't seem likely. These would be Dr. Barry Dunn (who was the Agriculture and Biological Sciences Dean at the time), Dr. Daniel Scholl (our current VP of Research at SDSU) and Les Olive (SDSU Campus architect). I would also like to thank our financial experts at SDSU, Wes Tschetter and Mike Holbeck for their understanding and support of the project, while even learning some microbiological terms, abbreviations and diagnostic test names! In addition, I would like to thank Peter Wong (of the architectural firm ED2 International) who gave us a big vision to shoot for and subsequently the Clark Enersen Group including Greg Lattig, Andy Stepp and others who reshaped, confirmed and refined that vision and carried it through, by spending considerable, detailed time with us to design a building that is tailored to our needs to serve you.

I would also like to thank those leaders who have vision and "know how to get things done".. The Governor and the Governor's office (Nathan Sanderson in particular in that office), lifted this project up and made it become a reality along with other legislators and significant support from the agriculture and veterinary communities, which are a phenomenal group of people in this state.

When I came to SD in 1983 and was practicing veterinary medicine in Rapid City, I saw the beauty of the state, and when I came to the laboratory in 1990 to start work on a research project involving a new animal disease called Porcine reproductive and respiratory syndrome (PRRS), I saw the creativity, hard work and persistence of

the people in SD (and in particular in this laboratory), and when I became the director of the laboratory in 2013 to the present, I have now seen the generosity and drive of the people of SD.

There will be many people thanked today and we hope to leave no one unmentioned, but I know there are many of you that put in a good word for us that we may not have known about. So, we are thankful to all of you, it is an honor to have the Governor here today and thank you again for celebrating this day with us.

(Dr. Dusty Oedekoven, our State Veterinarian, and a major advocate in this funding project, continued the celebration as our Master of Ceremony).

Participating in the groundbreaking ceremony were (L-R in picture):

Mike Jaspers, SD Secretary of Agriculture, Rufus DeZeeuw, SD Sheepgrowers; Dave Zeman, SD Poultry Industries, ADRDL director emeritus; Jennifer Stalley, SD Veterinary Medical Association; Mike Held, SD Farm Bureau; Jodie Anderson, SD Cattlemen; Patty Bacon, Brookings City Council; Glenn Muller, SD Pork Producers; Nathan Sanderson, Director of Policy & Operations, SD Governor's office; Dustin Oedekoven, SD Animal Industry Board; Barry Dunn, President, SDSU; Governor Dennis Daugaard; Jane Hennings, ADRDL Director - Veterinary and Biomedical Sciences Department Head; Mike Rush, SD Board of Regents; State Representative Larry Tidemann; State Representative Lee Qualm; Lorin Pankratz, SD Pork Producers; Brenda Forman, SD Association of Cooperatives - Ag Unity; State Representative Mary Duvall; Bill Kluck, SD Stockgrowers; Don Marshall, Interim Dean, SDSU College of Agriculture and Biological Sciences; Daniel Scholl, SDSU Vice President for Research and Economic Development

Annual Report Highlights 2017

- On March 9, 2017, Bill 172 (The SD Governor's Bill) was amended to become the only bill needed to fund the renovation and expansion of the SD Animal Disease Research and Diagnostic Laboratory. The bill was passed in both Houses and consisted of $58,639,637 needed for the project with $6M contributed by the SDSU/ADRDL; $2.6M one time fund transfer through the Livestock Disease Emergency and Animal Remedy Funds; and bonding of $50,039,637. The funding for bond repayment came from property tax relief put in place last year from the passage of the half-penny sales tax. The Governor's Bill (SB 182) reduced the tax break somewhat. This funding came in a year of reduced resources throughout the state, which shows the generosity and support from the agriculture communities, citizens and government of the state!

- Dr. Melissa Behr, Board-Certified Veterinary Pathologist joined the laboratory in March this year. She had previously worked at the University of Wisconsin-Madison from 2008-2017, was the Director of Anatomic Pathology at Wadsworth Center, at the New York State Department of Health, Albany, NY from 2001-2008, as a Clinical Assistant Professor of Pathology at the University of Illinois-Urbana from 1999-2001; Staff Pathologist at the New Mexico Veterinary Diagnostic Service from 1987-1999 and a Pathologist and Laboratory Animal Veterinarian at the Los Alamos National Laboratory in New Mexico from1986-1993.

- A SD Governor's Office of Economic Development Center Grant was obtained which brings together 3 researchers & PI from the lab and SDSU Veterinary & Biomedical Sciences Department, Biology, Microbiology Department (2 Faculty), Dietetics, Health and Nutritional Sciences Department (1 Faculty) and the USD School of Medicine (2 Faculty), plus industry partners, Sanford Profile and Land O'Lakes. The $3.8 million grant over 5 years will allow the Center for Biologics Research and Commercialization (CBRC) to contribute to the economic development of the state through applied research in the areas of probiotics, nutraceuticals, vaccines, diagnostic assays, reagents and immunotherapies.

- The laboratory was recently chosen to participate in the FDA's National Antimicrobial Resistance Monitoring System (NARMS), which screens retail meat products to determine the prevalence of antibiotic resistant bacteria within these products. NARMS was launched in 1996 as a collaborative effort of the FDA, CDC, USDA and state laboratories around the country. Since antimicrobial resistance is recognized as one of the greatest global challenges to public health, by joining the retail meat testing component of NARMS, the laboratory is helping the U.S. to do its part to protect the public and to preserve antimicrobials for the future.

- In the Clinical Pathology Section, a new Vet Axcel chemistry analyzer from Alfa Wassermann was added which can process up to 15 patient samples at once and 285 tests per hour. The current tests include routine chemistry, enzyme, lipid, thyroid (T4), and electrolyte assays on serum and more and a full chemistry profile and smaller custom profiles for both large and small animals based on client needs.

- Bovine Tuberculosis (TB) was identified in cows during routine slaughter inspection by USDA Food Safety Inspection Service inspectors at two Nebraska slaughter plants in February, 2017. The laboratory was able to assist in collection of samples for confirmation of these cases.

- Dr. Eric Nelson (PhD), Virologist in the laboratory and Assistant Department Head was awarded as a "Distinguished Professor" in 2017, which recognizes the most outstanding faculty members at SDSU who have achieved recognition in their disciplines as leading scholars and educators. This award is SDSU's highest level of scholarly distinction granted to a faculty member. Those who earn the designation "Distinguished Professor" are models of professional accomplishment, who, in addition to this accomplishment, demonstrate good character, professional integrity, and exemplary citizenship within the university community and in the state and region.

FACULTY AND STAFF
July 1, 2016 – June 30, 2017

ADMINISTRATION
Jane Christopher-Hennings, DVM, MS, Professor, Head and Director
Eric Nelson, PhD, Professor, Assistant Department Head

PATHOLOGY
Melissa Behr, DVM, Diplomate, ACVP, Professor
Larry Holler, DVM, PhD, Professor
David E. B. Knudsen, DVM, MS, Diplomate, ACLAM, Professor
Dale Miskimins, DVM, MS, Professor
Angela Pillatzki, DVM, MS, Diplomate, ACVP, Assistant Professor

BACTERIOLOGY
Larry Holler, DVM, PhD, Professor – Section Leader
Nuria Garcia-Fernandez, DVM, PhD, BS, Research Associate II
Lucinda Bloker, BS, Microbiologist
Marlene Braun, BS, Microbiologist
Kara Hendrickson, BS, Microbiologist
Jamie Flint, BS, Laboratory Technician
Tracy Irion, Laboratory Aide

CLINICAL PATHOLOGY
Angela Pillatzki, DVM, MS, Diplomate, ACVP, Assistant Professor – Section Leader
Julie Colby, MS, Microbiologist
Karen Belau, Laboratory Technician

EXTENSION
Russell Daly, DVM, MS, Professor
Dale Miskimins, DVM, MS, Professor
Larry Holler, DVM, PhD, Professor

FOOD SAFETY
Alan Erickson, PhD, Professor – Section Leader
Laura Ruesch, MS, Research Associate II
Debra Murray, CLT, Senior Microbiologist
Zachery Lau, BS, Laboratory Technician

HISTOPATHOLOGY/IMMUNOHISTOCHEMISTRY
Angela Pillatzki, DVM, MS, Diplomate, ACVP, Assistant Professor – Section Leader
Frank Qin, MS, Senior Microbiologist
Amanda Brock, BS, Senior Microbiologist

MOLECULAR DIAGNOSTICS
Travis Clement, MS, BS, Research Associate III – Section Leader
Julie Nelson, MS, Research Associate II
Matthew Dammen, MS, Senior Microbiologist
Dana Rausch, MS, Senior Microbiologist
Roger Chapin, BS, Senior Microbiologist
Michael Dunn, BS, Senior Microbiologist
Kelly Schmit, BS, Senior Microbiologist
Melissa Lorenzen, BS, Microbiologist

QUALITY CONTROL
Rajesh Parmar, MS, Research Associate III
Amanda Brock, BS, Senior Microbiologist

RESEARCH
Alan Young, PhD, Professor, Research Coordinator
Christopher Chase, DVM, PhD, Professor, Diplomate ACVM, Virology and Immunology
Alan Erickson, PhD, Professor
Radhey Kaushik, PhD, Professor
Feng Li, PhD, Professor
Eric Nelson, PhD, Professor
Diego Diel, PhD, Assistant Professor
Joy Scaria, PhD, Assistant Professor
Jane Christopher-Hennings, DVM, MS, Professor
Steven Dilberger-Lawson, PhD, Research Associate III
Travis Clement, MS, BS, Research Associate III
Aaron Singrey, MS, Research Associate II

CHEMICAL SAFETY/BIOSAFETY
Alan Erickson, PhD, Professor, Chemical Safety Officer
Rajesh Parmar, MS, Research Associate III, Safety Committee Co-Chair

SEROLOGY
Eric Nelson, PhD, Professor – Section Leader
Aaron Singrey, MS, Research Associate II
Linda Fawcett, BS, Senior Microbiologist
Tami Messenger, BS, Senior Microbiologist
Craig Welbon, BS, Senior Microbiologist
Grant Miller, BS, Microbiologist

VIROLOGY
Diego Diel, PhD, Assistant Professor – Section Leader
Fernando Vicosa Bauermann, DVM, PhD, Research Associate II
Craig Long, MS, Senior Microbiologist
Pam Leslie-Steen, MS, Assistant Professor – Co-Section Leader (12-21-16)

TEACHING FACULTY
Beverly Cassady, BS, DVM, Lecturer

CLERICAL AND RECEIVING STAFF
Rita Miller, Program Assistant I – Section Leader
Aren Field, BS, Laboratory Tehnician
Laura Schanning, BS, Laboratory Technician
Margaret Janssen, Laboratory Technician
Celena Sass, Laboratory Technician
Janice Kampmann, Secretary
Gerri Murphy, Word Processor
Nan Nesbit, Secretary (8-19-16)

INFORMATION SYSTEMS
Jon Greseth, BS, Computer Support Analyst
Vijaya Akode, MS, BS, Programmer/Analyst

ACCOUNTING/PURCHASING/HUMAN RESOURCES
Bridget Skeels, MBA, Budget and Administration Coordinator
Jolene Landmark, Accountant

MAINTENANCE
Brent Driver, Building Maintenance Specialist
Jerry Anderson, Senior Building Maintenance Worker (06-21-16)

NECROPSY
Samantha Stykel, BS, Laboratory Technician

ADJUNCT PROFESSORS
Scott Dee, Pipestone Veterinary Clinic, DVM, University of Minnesota, 1987; PhD, University of Minnesota, 1996 Nursery Depopulation

Benjamin Hause, Cambridge Technologies, PhD, South Dakota State University; MS, University of Minnesota

Mauro Moraes, CEVA Biomune, MD in Veterinary Medicine, Federal University of Santa Maria, Brazil, 1993; PhD in Microbiology, Federal University of Vicosa, Brazil, 2001 Microbiology (07/21/16)

GRADUATE STUDENTS OR VISITING SCIENTISTS
Christopher Chase, DVM, PhD, Professor, Diplomate ACVM, Graduate Coordinator
Tatiane Cargnin Faccin, PhD, Postdoctoral Research Associate, Visiting Scientist
Mayara Maggioli, PhD, Postdoctoral Research Associate
Karim Adelsalam, DVSc, MS, Graduate Research Assistant
Linto Antony, PhD, Graduate Research Assistant
Milton Thomas, PhD, Graduate Research Assistant
Supapit Wongkuna, MS, Graduate Research Assistant, Visiting Scientist
Gavin Fenske, BS, Graduate Research Assistant
Maureen Hoch Vieira Fernandes, BS, Graduate Research Assistant
Sudeep Ghimire, BS, Graduate Research Assistant
Lok Joshi, BS, Graduate Research Assistant
Marcelo deLima, DVM, Postdoctoral Research Associate, Visiting Scientist (03-15-17)
Faten Okda, DVM, MS, Postdoctoral Research Associate (06-22-17)
Kyle Hain, BS, Graduate Research Assistant (08-12-16)
Megan Syrstad, BS, Graduate Research Assistant (06-21-17)

EMERITUS FACULTY
David Francis, 2015
Edward Hamilton, 2007
Darrell Johnson, 2000
Duane Matthees, 2011
Robert Swanson, 1996
Nancy Thiex, 2011
David Zeman, 2013

SOUTH DAKOTA

ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

HOURLY ASSISTANTS

JULY 1, 2016 – JUNE 30, 2017

***Undergraduate or Temporary Assistants*:**

Samuel Alfred, Madison Bieber, Katanna Biesemeier, Collin Bruns, Connor Bushman, Alaine Buysse, Lauren Chrinside, Michaela Erickson, Amanda Farr, Andrew Foley, Alex Fonder, Kelsey Garber, Amre Gaskins, Jessica Leat, Lindsay Miller, Anna Mohr, Kristen Mohr, Tierney Mullaney, Jaelin Otta, Ashley Ourada, Laura Pelzel, Tyler Pieper, Jasmine Piepho, Jessica Roberts, Alex Rogen, Sayan Sahu, Thomas Salentiny, Anastasia Schroeder, Audrey Souza, Ashley Swanson, Bobbie Till, Austin VanAsselt, Ashley Waagen

South Dakota
Animal Disease Research and Diagnostic Laboratory

AWARDS AND RECOGNITION

July 1, 2016 - June 30, 2017

Longevity pins were awarded to the following individuals for years of service:

Craig Long	10 years
David Knudsen	15 years
Rajesh Parmar	15 years
Frank Qin	15 years
Craig Welbon	15 years
Julie Nelson	20 years

SOUTH DAKOTA
ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
ADVISORY COMMITTEE

JULY 1, 2016 – JUNE 30, 2017

Animal Disease Research and Diagnostic Laboratory
Jane Christopher-Hennings, DVM, MS, Head and Director, VBSD/ADRDL

Animal Industry Board/South Dakota State Veterinarian
Dustin Oedekoven, DVM

South Dakota Cattlemen's Association
Tom Stenberg, DVM

South Dakota Federation of Dairy Farmers
Greg Ode

South Dakota Game, Fish, and Parks Department
Tom Kirschenmann

South Dakota Pork Producers Council
Glenn Muller, Executive Director
Lewis Bainbridge

South Dakota Poultry Industries
David H. Zeman, DVM, PhD

South Dakota Sheep Grower's Association
Rufus DeZeeuw, Jr.

South Dakota State University, College of Ag/Bio Science
Daniel Scholl, Interim Dean

South Dakota Stockgrower's Association
Bob Hutchinson

Cow/Calf Producer (Representative-at-large)
Ralph Jones

Veterinary and Biomedical Science Department/ADRDL, Faculty Representative
Russell Daly, DVM, MS

South Dakota Veterinary Medical Association
Jennifer Stalley, DVM, Executive Director
Travis White, DVM, President (2016-2017)
Kevin Klozenbucher, DVM (Food Animal Representative)
Steve Smith, DVM (Member-at-large)
Jill Hyland Ayers, DVM (Companion Animal Representative)

SOUTH DAKOTA
LIST OF REPORTABLE AND QUARANTINABLE DISEASES
2017

Any licensed veterinarian, any person operating a diagnostic laboratory, or any person who has been informed, recognizes or should recognize by virtue of education, experience, or occupation, that any animal or animal product is or may be affected by, or has been exposed to, or may be transmitting or carrying any of the following conditions, must report that information.

What to Report:

- Any incidents involving undiagnosed disease conditions causing high morbidity and/or high mortality must be reported immediately.
- ***Foreign Animal Disease**: A foreign animal disease is a disease which is native to another country, but is not currently found in domestic animals, domestic poultry, wildlife or the environment of the United States.
- **Zoonoses/Zoonotic Diseases**: Diseases and infections that are naturally transmitted between vertebrate animals and humans. (report immediately)
- OIE Listed Diseases: To view the list follow the link: http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2011/

Report Immediately upon Discovery	Report within Two Days of Discovery	Report Weekly (Diagnostic Facilites)
*Any foreign animal disease Any new emerging disease Syndromes Anthrax Avian Chlamydophilosis (Ornithosis - Psittacosis) Avian Encephalomyelitis (Infectious Encephalomyelitis) Avian Infectious Laryngotracheitis Avian Influenza Avian Metapneumovirus (Turkey rhinotracheitis) Babesiosis Bovine Spongiform Encephalopathy Brucellosis caused by B. abortus, B.canis, B. melitensis, B. ovis, and B. suis Chronic Wasting Disease (Cervids) Contagious Caprine Pleuropneumonia Contagious Equine Metritis Epizootic Hemorrhagic Disease (EHD) Equine Encephalomyelitis (Eastern & Western) Equine Encephalomyelitis (Venezuelan) EHV-1 associated diseases (respiratory, abortion, neurologic/EHM) Equine Infectious Anemia (EIA) Equine Viral Arteritis Newcastle Disease Plague (*Yersinia pestis*) Pseudorabies Pullorum Disease Q-fever (Coxiella burnetii) Rabies Rabbit Hemorrhagic Disease Scabies Scrapie Swine Vesicular Disease Toxicosis Transmissible Spongiform Encephalopathy (Feline & Mink) Trichomoniasis Tuberculosis Tuberculosis (Avian) Tularemia (Francisella tularensis) Vesicular Exanthema Vesicular Stomatitis	Anaplasmosis Avian Infectious Bronchitis Campylobacteriosis (Campylobacter fetus venerealis) Contagious Agalactia (Mycoplasma spp.) Cysticercosis (metacestode stage of *Taenia saginata* or *Taenia solium*) Diphtheria (Corynebacterium diphtheriae) Duck Viral Enteritis (Duck Plague) Duck Viral Hepatitis Enzootic Abortion of Ewes (Chlamydophila) Fowl Cholera (Pasteurella multocida) Fowl Pox Fowl Typhoid Infectious Bursal Disease Leishmaniasis Listeriosis Malignant Catarrhal Fever Marek's Disease Potomac Horse Fever Rocky Mountain Spotted Fever Salmonellosis (S. abortus ovis) Salmonellosis (Salmonella enteriditis) Salmonellosis (Salmonella newport MDR-Ampc) Salmonellosis (Salmonella typhimurium) Swine Enteric Coronavirus Disease (SECD) PEDV, PDCoV, and TGE Toxoplasmosis Trichinosis West Nile Virus **Where to Report:** **South Dakota Animal Industry Board** **Call - 605-773-3321** **Website - AIB DISEASE REPORTING** http://dev.sdda.sd.gov/boards-and-commissions/animalindustry-board/diseaseinvestigation.html	Blastomycosis Bluetongue BLV (Enzootic Bovine Leukosis) Bovine Papular Stomatitis Bovine Viral Diarrhea Caprine Arthritis/Encephalitis Canine Ehrlichiosis Caseous Lymphadenitis Cryptosporidiosis Dermatophilosis Histoplasmosis Hydatid Disease (*Echinococcus granulosus* or *Echinococcus multilocularis*) Infectious Bovine Rhinotracheitis (IBR-IPV) Leptospirosis Lyme Disease (Borrelia burgdorferi) Maedi-Visna (Ovine Progressive Pneumonia) Mycoplasma gallisepticum (MG) Mycoplasma synoviae (MS) Ovine Pulmonary Adenomatosis Paramyxovirus (2-9) Paratuberculosis (Johne's disease) Porcine Reproductive and Respiratory Syndrome (PRRS)

07/25/2017

2017 U.S. National List of Reportable Animal Diseases (NLRAD) - National Animal Health Reporting System (NAHRS) Reportable Disease List

Changes from previous year:

Porcine:

Removed: C801 Swine erysipelas
(Non OIE listed-commodity recommendation)

Equine:

Added: C752 Pigeon fever (*Corynebacterium pseudotuberculosis,* ulcerative lymphangitis)
(Non OIE listed-commodity recommendation)

C753 Strangles (*Streptococcus equi equi)*
(Non OIE listed-commodity recommendation)

Aquatic:

Removed non OIE listed diseases

Added: Crustacean N451 Necrotising hepatopancreatitis (OIE-listed 2016)

BOVINE

A010 Foot-and-mouth disease (FMD)
A020 Vesicular stomatitis (VS)
A040 Rinderpest
A060 Contagious bovine pleuropneumonia (*Mycoplasma mycoides mycoides*)
A070 Lumpy skin disease
A080 Rift Valley fever
A090 Bluetongue
N001 Crimean Congo hemorrhagic disease
2001 Akabane (congenital arthrogryposis-hydranencephaly syndrome)
B051 Anthrax (*Bacillus anthracis*)
B052 Aujesky's disease (Pseudorabies)
B053 Echinococcosis / hydatidosis (*Echinococcus granulosus, E. multilocularis*)
B055 Heartwater (*Cowdria ruminantium*)
B057 Q Fever (*Coxiella burnetii*)
B058 Rabies
B059 Paratuberculosis (Johne's disease − (*Mycobacterium avium paratuberculosis*)
B060 New World screwworm (*Cochliomyia hominivorax*)
B061 Old World screwworm (*Chrysomya bezziana*)
B101 Anaplasmosis (*Anaplasma marginale, A. centrale*)
B102 Babesiosis (*Babesia bovis, B.bigemina*)
B103 Bovine brucellosis (*B.abortus*)
B152 Caprine and ovine brucellosis (*B. melitensis*)
B253 Porcine brucellosis (*B.suis*)
B104 Bovine genital campylobacteriosis (*Campylobacter fetus venerealis*)
B105 Bovine tuberculosis (*Mycobacterium bovis*)
N117 Bovine viral diarrhea (BVD)

B108 Enzootic bovine leukosis (BLV)
B109 Hemorrhagic septicemia (*Pasteurella multocida,* serotypes B/Asian or E/African)
B110 Infectious bovine rhinotracheitis/infectious pustular vulvovaginitis (IBR/IPV)
B111 Theileriasis (*Theileria annulata, T. parva*)
B112 Trichomoniasis (*Tritrichomonas [Trichomonas] foetus*)
B113 Trypanosomiasis (tsetse-transmitted) (*Trypanosoma congolense, T. vivax, T. brucei brucei, T. evansi*)
B114 Malignant catarrhal fever (specify wildebeest or sheep form)
B115 Bovine spongiform encephalopathy (BSE)
N158 Epizootic hemorrhagic disease (EHD)
C613 Melioidosis (*Burkholderia pseudomallei*)

CAPRINE AND OVINE

A010 Foot-and-mouth disease (FMD)
A020 Vesicular stomatitis (VS)
A040 Rinderpest
A050 Peste des petits ruminants
A080 Rift Valley fever
A090 Bluetongue
A100 Sheep pox and goat pox
N001 Crimean Congo hemorrhagic disease
2001 Akabane (congenital arthrogryposis-hydranencephaly syndrome)
B051 Anthrax (*Bacillus anthracis*)
B052 Aujesky's disease (Pseudorabies)
B053 Echinococcosis / hydatidosis (*Echinococcus granulosus, E. multilocularis*)
B055 Heartwater (*Cowdria ruminantium*)
B057 Q Fever (*Coxiella burnetii*)
B058 Rabies
B059 Paratuberculosis (Johne's disease – *Mycobacterium avium paratuberculosis*)
B060 New World screwworm (*Cochliomyia hominivorax*)
B061 Old World screwworm (*Chrysomya bezziana*)
B103 Bovine brucellosis (*B.abortus)*
B105 Bovine tuberculosis (*Mycobacterium bovis*)
B111 Theileriasis (*Theileria annulata, T. parva*)
B152 Caprine and ovine brucellosis (*B. melitensis*)
B151 Ovine epididymitis (*Brucella ovis* infection)
B153 Caprine arthritis / encephalitis (CAE)
B154 Contagious agalactia (*Mycoplasma agalactiae, M. capricolum capricolum, M. putrefaciens, M. mycoides mycoides, M. mycoides mycoides LC*)
B155 Contagious caprine pleuropneumonia (*Mycoplasma capricolum capripneumoniae*)
B156 Enzootic abortion of ewes (ovine chlamydiosis, *Chlamydophila abortus*)
B158 Nairobi sheep disease
B159 Salmonellosis (*Salmonella abortusovis*)
B160 Scrapie
B161 Maedi-visna / ovine progressive pneumonia
B352 Tularemia (*Francisella tularensis*)
N002 West Nile fever
C613 Melioidosis (*Burkholderia pseudomallei*)

C706 Mange (*Sarcoptes scabiei var ovis, Chorioptes bovis, Psoroptes ovis, Psoroptes cuniculi, Psoregates ovis*)

EQUINE

A020 Vesicular stomatitis (VS)
A110 African horse sickness
B051 Anthrax (*Bacillus anthracis*)
B053 Echinococcosis / hydatidosis (*Echinococcus granulosus, E. multilocularis*)
B058 Rabies
B060 New World screwworm (*Cochliomyia hominivorax*)
B061 Old World screwworm (*Chrysomya bezziana*)
B062 Trichinellosis (*Trichinella spp.*)
B201 Contagious equine metritis (*Taylorella equigenitalis*)
B202 Dourine (*Trypanosoma equiperadum*)
N220 Equine encephalomyelitis (Eastern)
N221 Equine encephalomyelitis (Western)
B205 Equine infectious anemia (EIA)
B206 Equine influenza
B207 Equine piroplasmosis (babesiosis, *Babesia [Piroplasma] equi, B. caballi*)
B208 Equine rhinopneumonitis (EHV-1)
B208a Equine herpesvirus myeloencephalopathy (EHV1 – EHM)
B209 Glanders (*Pseudomonas mallei*)
B211 Equine viral arteritis (EVA)
B212 Japanese encephalitis
B215 Surra (*Trypanosoma evansi*)
B216 Venezuelan equine encephalomyelitis
B352 Tularemia (*Francisella tularensis*)
N002 West Nile fever
W075 Hendra
C613 Melioidosis (*Burkholderia pseudomallei*)
C752 Pigeon fever (*Corynebacterium pseudotuberculosis, ulcerative lymphangitis)*
C753 Strangles (*Streptococcus equi equi*)

PORCINE

A010 Foot-and-mouth disease (FMD)
A020 Vesicular stomatitis (VS)
A030 Swine vesicular disease
A040 Rinderpest
A120 African swine fever
A130 Classical swine fever (hog cholera)
N258 Nipah virus encephalitis
B051 Anthrax (*Bacillus anthracis*)
B052 Aujesky's disease (Pseudorabies)
B053 Echinococcosis / hydatidosis (*Echinococcus granulosus, E. multilocularis*)
B058 Rabies
B060 New World screwworm (*Cochliomyia hominivorax*)
B061 Old World screwworm (*Chyrsomya bezziana*)
B062 Trichinellosis (*Trichinella spp.*)

B212 Japanese encephalitis
B252 Infection with *Taenia solium* (Porcine Cysticercosis)
B253 Porcine brucellosis (*B. suis*)
B254 Transmissible gastroenteritis (TGE)
B257 Porcine reproductive and respiratory syndrome (PRRS)
B352 Tularemia (*Francisella tularensis*)
C613 Melioidosis (*Burkholderia pseudomallei*)
2006 Vesicular exanthema
2010 Swine Enteric Coronavirus Disease (SECD) (Porcine epidemic diarrhea virus – PEDV; Porcine delta coronavirus − PDCoV)

AVIAN

A150h Highly pathogenic avian influenza (reporting of occurrence in all birds)
A150i Low pathogenic avian influenza (H5 or H7 subtypes) (Poultry only)
A160 Newcastle disease (Exotic) (Domestic birds)
N315 Turkey rhinotracheitis (Domestic birds)
B301 Avian infectious bronchitis
B302 Avian infectious laryngotracheitis
B304 Duck viral hepatitis (Domestic birds)
B308 Fowl typhoid (*Salmonella gallinarum*)
B309 Infectious bursal disease (Gumboro disease)
B311 Avian Mycoplasmosis (*Mycoplasma gallisepticum*)
B312 Avian chlamydiosis (psittacosis and ornithosis, *Chlamydia psittaci*)
B313 Pullorum disease (*Salmonella pullorum*)
N316 Avian Mycoplasmosis (*Mycoplasma synoviae*)

AQUATIC

B401 Fish: Viral hemorrhagic septicemia (VHS)
N416 Fish: Infectious salmon anemia (ISA)(HPR-deleted)
N416a Fish: Infectious salmon anemia (ISA)(HPR-deleted)
B404 Fish: Spring viremia of carp (SVC)
B405 Fish: Infectious hematopoietic necrosis (IHN)
B413 Fish: Epizootic hematopoietic necrosis disease
N417 Fish: Epizootic ulcerative syndrome (EUS) (Infection with *Aphanomyces invadans)*
N418 Fish: Gyrodactylosis (*Gyrodactylus salaris*)
N419 Fish: Red sea bream iridoviral disease
N420 Fish: Koi herpesvirus disease
2011 Fish: Infection with salmonid alphavirus
N430 Mollusc: Infection with *Bonamia ostreae*
N431 Mollusc: Infection with *Bonamia exitiosa*
N432 Mollusc: Infection with *Marteilia refringens*
N433 Mollusc: Infection with *Perkinsus marinus*
N434 Mollusc: Infection with *Perkinsus olseni*
N435 Mollusc: Infection with *Xenohaliotis californiensis*
N436 Mollusc: Infection with abalone herpes virus
N450 Crustacean: Taura syndrome
N451 Crustacean: White spot disease

N446 Crustacean: Necrotising hepatopancreatitis (Candidatus *Hepatobacter penaei) (*NHP, early mortality syndrome)
N452 Crustacean: Yellowhead (Infection with Yellowhead virus genotype 1)
N455 Crustacean: Infectious hypodermal and haematopoietic necrosis
N456 Crustacean: Crayfish plague (*Aphanomyces astaci*)
N457 Crustacean: Infectious myonecrosis
N458 Crustacean: White tail disease
N459 Crustacean: Acute hepatopancreatic necrosis disease (*V. parahemolyticus* pVA-1 plasmid*)*

FARMED CERVIDS

A010 Foot-and-mouth disease (FMD)
A020 Vesicular stomatitis (VS)
A040 Rinderpest
A080 Rift Valley fever
N001 Crimean Congo hemorrhagic fever
2001 Akabane (congenital arthrogryposis-hydranencephaly syndrome)
A090 Bluetongue
B051 Anthrax (*Bacillus anthracis*)
B052 Aujesky's disease (Pseudorabies)
B053 Echinococcosis / hydatidosis (*Echinococcus granulosus, E. multilocularis*)
B055 Heartwater (*Cowdria ruminantium*)
B057 Q Fever (*Coxiella burnetii*)
B058 Rabies
B059 Paratuberculosis (Johne's disease – *Mycobacterium avium* paratuberculosis)
B060 New World screwworm (*Cochliomyia hominivorax*)
B061 Old World screwworm (*Chyrsomya bezziana*)
B103 Bovine brucellosis (*B. abortus*)
B152 Caprine and ovine brucellosis (*B. melitensis*)
B253 Porcine brucellosis (*B. suis*)
B105 Bovine tuberculosis (*Mycobacterium bovis*)
B114 Malignant catarrhal fever
N156 Chronic wasting disease (CWD)
N158 Epizootic hemorrhagic disease (EHD)
C613 Melioidosis (*Burkholderia pseudomallei*)

LAGOMORPH (Rabbits & Hares)

B351 Myxomatosis
B352 Tularemia (*Francisella tularensis*)
B353 Rabbit hemorrhagic disease

OTHER DISEASES

B501 Leishmaniosis
N502 Camelpox

AMPHIBIAN DISEASES

N601 Infection with *Batrachochytrium dendrobatidis*
N602 Infection with ranavirus

BEE (APIARY) (optional reporting requirement as other agencies responsible)

B451 Acarapisosis of honey bees (Infestation with *Acarapis woodi)*
B452 American foulbrood of honey bees (Infection with *Paenibacillus larvae)*
B453 European foulbrood of honey bees (Infection with *Melissococcus plutonius)*
B455 Varroosis of honey bees (Infestation with *Varroa spp.)*
2008 Tropilaelaps infestation of honey bees (Infestation with *Tropilaelaps spp.)*
2009 Small hive beetle infestation (Infestation with *Aethina tumida*)

REFEREED JOURNAL PUBLICATIONS—2016

Amachawadi, R.G., M. Thomas, T.G. Nagaraja, J. Scaria. Genome sequences of *Salmonella enterica* subsp. *enterica* serovar lubbock isolated from liver abscesses of feedlot cattle. Genome Announcement 4(3):e00319-16 pii:300319016PMID:27151794

Burmakina, G., A. Malogolovkin, E.R. Tulman, L. Zsak, G. Delhon, D.G. Diel, N.M. Shobogorov, Y.P. Morgunov, S.Y. Morgunov, G.F. Kutish, D. Kolbasov, D.L. Rock. African swine fever virus serotype-specific proteins are significant protective antigens for African swine fever. Journal of General Virology doi: 10.1099/jgv.0.000490

Cardenas-Garcia, S., R.P. Dunwoody, V. Marcano, D.G. Diel, R.J. Williams, R.M. Gogal, Jr., C.C. Brown, P.J. Miller, C.L. Alfonso. Effects of chicken interferon gamma on Newcastle disease virus vaccine immunogenicity. Public Library of Science One 13:11(7):e0159153 doi:10.1371/journal.pone.0159153

Chase, C. Inflammation alters nutrient metabolism and animal performance. Journal of Animal Science 94:e-supplement

Chase, C. Inflammation alters nutrient metabolism and animal performance. Journal of Dairy Science 99:e-supplement 1:88

Chen, Z., S. Liu, W. Sun, L. Chen, D. Yoo, F. Li, S. Ren, L. Guo, X. Cong, J. Li, S. Zhou, J. Wu, Y. Du, J. Wang. Nuclear export signal of PRRSV $NSP_{1\alpha}$ is necessary for type I IFN inhibition. Journal of Virology 499:278-287 doi:10.1016/j.virol.2016.07.008

Clement, T., A. Singrey, S. Lawson, F. Okda, J. Nelson, D. Diel, E.A. Nelson, J. Christopher-Hennings. Quantitation of porcine epidemic diarrhea virus neutralizing antibodies in sow serum, colostrum, milk and piglet serum after feedback. Journal of Swine Health and Production 24:147-153

Cockrum, R.R., S.E. Speidel, J.L. Salak-Johnson, C.C.L. Chase, R.K. Peel, R.L. Weaber, G.H. Loneagan, J.J. Wagner, P. Boddhireddy, M.G. Thomas, K. Prayaga, S. DeNise, R.M. Enns. Genetic parameters estimated at receiving for circulating cortisol immunoglobulin G, interleukin 8, and incidence of bovine respiratory disease in feedlot beef steers. Journal of Animal Science 2016.94 doi:10.2527/jas2015-0222

Daly, R., N. Hill. Characterizing the role of animal exposures in cryptosporidiosis and Shiga toxin-producing *Escherichia coli* infections: South Dakota, 2012. Zoonoses and Public Health 63:467-476

Dee, S., C. Neill, A. Singrey, T. Clement, R. Cochrane, C. Jones, G. Patterson, J. Christopher-Hennings, E. Nelson. Modeling the transboundary risk of feed ingredients contaminated with porcine epidemic diarrhea virus. BMC Veterinary Research 12:51

Diel, D.G., S. Lawson, F. Okda, A. Singrey, T. Clement, M.H.V. Fernandes, J. Christopher-Hennings, E.A. Nelson. Porcine epidemic diarrhea virus: An overview of current virological and serological diagnostic methods. Journal of Virus Research pii: S0168-1702(16)30209-X doi: 10.1016/j.virusres.2016.05.013

Erickson, A. Anatomy of Domestic Animals. Minnetonka, MN: Bluedoor Publishing, January 2016 ISBN978-1-59984-927-0

Fulton, R.W., J.M. d'Offay, C. Landis, D.G. Miles, R.A. Smith, J.T. Saliki, J.F. Ridpath, A.W. Confer, J.D. Neil, R. Eberle, T.J. Clement, C.C.L. Chase, J.L. Burge, M.E. Payton. Detection and characterization of viruses as field and vaccine strains in feedlot cattle with bovine respiratory disease. Journal of Vaccine 34(30):3478-3492 pii: S0264-410X(16)30149-9 http://doi.org/10.1016/j.vaccine.2016.04.020

Goodell, C.K., J. Zhang, E. Strait, K. Harmon, D. Patnayak, T. Otterson, M. Culhane, J. Christopher-Hennings, T. Clement, P. Leslie-Steen, R. Hesse, J. Anderson, K. Skarbek, A. Vincent, P. Kitikoon, S. Swenson, M. Jenkins-Moore, J. McGill, R. Rauh, W. Nelson, C. O'Connell, R. Shah, C. Wang, R. Main, J.J. Zimmerman. Ring test evaluation of the detection of influenza A virus in swine oral fluids by real-time reverse-transcription polymerase chain reaction and virus isolation. Canadian Journal of Veterinary Research 80(1):12-20 PMID:26733728

Hain, K.S., L.R. Josh, F. Okda, J. Nelson, A. Singrey, S. Lawson, A. Pillatzki, G.F. Kutish, E.A. Nelson, E.F. Fore, D.G. Diel. Immunogenicity of a recombinant parapoxvirus expressing the spike protein of porcine epidemic diarrhea virus. Journal of General Virology 97:2719-2731 doi:10.1099/jgv.0.000586

Hu, Y., X. Cong, L. Chen, J. Qi, X. Wu, M. Zhou, D. Yoo, F. Li, W. Sun, J. Wu, X. Zhao, Z. Chen, J. Yu, Y. Du, J. Wang. Synergy of the TLR_3 and $_7$ ligands significantly enhances function of DCs to present inactivated PRRSV antigen through TRIP/MyD88-NF-$_k$B signaling pathway. Scientific Report 6:23977 doi:10.1038/srep23977 PMID:27046485

Joshi, L.R., M.H.V. Fernandes, T. Clement, S. Lawson, A. Pillatzki, T.P. Resende, F. Vanucci, G.F. Kutish, E.A. Nelson, D.G. Diel. Pathogenesis of Senecavirus A infection in finishing pigs. Journal of General Virology doi:10.1099/jgv.0.000631

Joshi, L., K. Mohr, T. Clement, K. Hain, B. Myers, J. Yaros, E. Nelson, J. Christopher-Hennings, D. Gava, R. Schaefer, L. Caron, S. Dee, D. Diel. Detection of the newly emerging picornavirus Senecavirus A in pigs, mice and houseflies. Journal of Clinical Microbiology 54:1536-1545 doi:10.1128/JCM.03390-15

Lokhandwala, S., X. Fang, K. Adelsalam, S.D. Waghela, J. Bray, L.M. Njongmeta, A. Herring, C.C.L. Chase, W. Mwangi. Priming cross-protective bovine viral diarrhea virus-specific immunity using live-vectored mosaic antigens. Public Library of Science One 12, e0170425 doi:10.1371/journal.pone.0170425

Mitra, N., N. Cernicchiaro, S. Torres, F. Li, B.M. Hause. Metagenomic characterization of the virome associated with bovine respiratory disease in feedlot cattle identified novel viruses and suggests an etiologic role for influenza D virus. Journal of General Virology 97(8):1771-1784

Neiger, R., M. Thomas, S. Das, M. Barnes, B. Fletcher, K. Snekvik, J. Thompson, J. Scaria. Draft genome sequences of three *Flavobacterium psychrophilum* strains isolated from Coldwater Disease outbreaks in three production hatcheries. Genome Announcement 14(2) pii:300035-16PID:26966210

Okda, F., S. Lawson, X. Liu, A. Singrey, T. Clement, J. Nelson, J. Christopher-Hennings, E.A. Nelson. Development of monoclonal antibodies and serological assays including indirect ELISA and fluorescent microsphere immunoassays for diagnosis of porcine deltacoronavirus. BMC Veterinary Research 12:95 doi:10.1186/s12917-016-0716-6

Perry, G., E. Larimore, M. Crosswhite, B. Neville, V. Cortese, R. Daly, G. Stokka, J. Rodgers, J. Seeger, C. Dahlen. Safety of vaccination with an inactivated or modified live viral reproductive vaccines when compared to sterile saline in beef cows. Journal of Veterinary Science Research 2(2):035

Rock, D.L., D.G. Diel, A. Malogolovkin, G. Burmakina, N. Salnikov, D. Kolbasov, E.R. Tulan, G. Kutish, G. Delhon. Identification of the serotype-specific proteins in African Swine fever facilitates vaccine design and development. *National Hog Farmer* April 2016 pg 32-36 http:://nationalhogfarmer.com/health/blueprint-identifiaion-serotype-specific-proteins-african-swine-fever

Scott, A., B. McCluskey, M. Brown-Reid, D. Grear, P. Pitcher, G. Ramos, D. Spencer, A. Singrey. Porcine epidemic diarrhea virus introduction into the United States: Root cause investigation. Preventative Veterinary Medicine 123:192-201

Song, Y., P. Singh, E. Nelson, S. Ramamoorthy. A computationally-designed serological assay from the porcine epidemic diarrhea virus. Journal of Clinical Microbiology doi:10.1128/JCM.00460-16

Swartz, J.E., D.W. Brake, E.E. Grings, E.A. Nelson, C.L. Wright, J.A. Walker, E.J. Blon, G.A. Perry. Effects of enzymatically hydrolyzed yeast supplementation and supplementation frequency on nitrogen balance and apparent digestibility in periparturient beef cows. Journal of Animal Science 94(2):169-170

Useh, N.M., E.O. Ngbede, N. Akange, M. Thomas, A Foley, M. Chan Keena, E. Nelson, J. Christopher-Hennings, M. Tomita. H. Suzuki, J. Scaria. Draft genome sequences of 37 *Salmonella enterica* strains isolated from poultry sources in Nigeria. Genome Announcement 4(3) pii:e00315-16.PMID:27151793 doi:10.1128/genomeA.00315-16

Vitosh-Sillman, S., J. Loy, B. Brodersen, C. Kelling, A. Doster, C. Topliff, E. Nelson, J. Bai, L. Peddireddi, B. Hause, R. Hesse. Experimental infection of conventional nursing pigs and their dams with porcine deltacoronavirus. Journal of Veterinary Diagnostic Investigation 28:468-497

Wang, X., E.A. Nelson. Ultrastructure and morphogenesis of PEDV in PEDV-infected Vero-76 cells. Current Topics in Virology 13:41-46

Wang, X., H. Zhang, A. Able, E. Nelson. Protein kinase R (PKR) plays a pro-viral role in porcine reproductive and respiratory syndrome virus (PRRSV) replication by modulating viral gene transcription. Archives of Virology 161(2):327-333 doi:10.1007/s00705-015-2671-0

Wang, Y., X. Yuan, L Qi, Y. Zhang, H. Xu, J. Yank, W. Ai, W. Qi, M. Liao, D. Wang, M. Song, F. Li. H_9N_2 avian influenza virus-derived natural reassortant H_5N_2 virus in swan containing the hemagglutinin segment from Eurasian H_5 avian influenza virus with an in-frame deletion of four basic residues in the polybasic hemagglutinin cleavage site. Journal of Infectious Genetic Evolution 40:17-20

Yu, K., X. Ma, Z. Sheng, L. Qi, C. Liu, D. Wang, B. Huang, F. Li, M. Song. Identification of goose-origin parvovirus as a cause of newly emerging beak atrophy and dwarfism syndrome in ducklings. Journal of Clinical Microbiology 54(8):1999-207

Zhai, S.L., W.K. Wei, X.P. Li, X.H. Wen, X. Zhou, H. Zhang, D.H. Lv, F. Li, D. Wang. Occurrence and sequence analysis of porcine deltacoronaviruses in southern China. Journal of Virology 13:136 doi:10.1186/s12985-016-0591-6

OTHER PUBLICATONS—2016

Abdelsalam, K., N. Thakur, J. Sobraske, C.C.L. Chase. The indirect effect of BVDV on peripheral blood total lymphocyte population. Proceedings, 7th BVDV Symposium Evolution of Ecology of BVDV: Implications for Health and Control, Chicago, IL, December 6-7, 2016 (p 23)

Antony, L., M. Thomas, S. Ghirmire, A. Foley, M. Keena, D. Francis, R. Kaushik, J. Scaria. Defined bacterial mix for prophylaxis against *Clostridium difficile* infection. Proceedings, 76th American Society for Microbiology, North Central Branch, Ames, IA, October 21-22, 2016 (presented)

Chase, C. Faculty success story. Camtasia Studio, Instructional Design Services Newsletter, March 28-April 1, 2016

Chase, C. Current concepts in dairy cattle vaccinology. Proceedings, 48th Conference of American Association of Bovine Practitioners, Charlotte, NC, September 15-17, 2016 (pp 89-94)

Chase, C. Mucosa immunity and *E. coli.* Pig333.com, November 8, 2016; https:///www.pig333.com/e-coli/mucosa-immunity-and-e-coli_11790/

Chase, C. Science and practice of innate immunity. Proceedings, International Bayer Beef Symposium, San Jose, Costa Rice, April 26-28, 2016 (pp 3031; presented)

Chase, C. Transdermal devices in PRRSV immunization (1/2) Pig333.com, June 3, 2016; https://www.pig333.com/prrs/transdermal-devices-in-prrsv-immunization-1-2_11061/

Chase, C. Transdermal devices in PRRSV immunization (2/2). Pig333.com, July 5, 2016; https://www.pig333.com/prrs/transdermal-devices-in-prrsv-immunization-2-2_11385/

Chase, C. Usefulness (or not) of inflammatory biomarkers – The good, the bad and ugly. Proceedings, Symposium of American Registry of Professional Animal Scientists, Salt Lake City, UT, July 20, 2016 (abstract 0187; presented)

Chase, C., L. Braun, T. Clement, R. Daly, G. Burcham, D. O'Toole. Are all bovine herpesvirus-1 reproductive disease events vaccine-induced? Proceedings, 48th Conference of American Association of Bovine Practitioners, Charlotte, NC, September 15-17, 2016 (in press)

Chase, C., L. Braun, T. Clement, R. Daly, G. Burcham, D. O'Toole. IBRV reproductive loss – Vaccine or field virus using single nucleotide polymorphisms (SNPS) to sort out vaccine-induced reproductive disease. Proceedings, 29th World Buiatrics Congress, Dublin, Ireland, July 3-8, 2016 (p 419, abstract P02-002-233; presented)

Christopher-Hennings, J. Director's message: Innovation in the laboratory being proactive in the protection of animal health. Animal Health Matters 19(3):2

Christopher-Hennings, J. Director's message: Legislature gives support for planning funds for possible ADRDL expansion. Animal Health Matters 19(2):1

Christopher-Hennings, J. Director's message: The ADRDL in state statute. Animal Health Matters 19(1):2

Clement, T., R. Rauh, W. Nelson, J. Kelly, E. Nelson, J. Christopher-Hennings. A cost effective method for surveillance of PRRSV and IAV-S in oral fluids using a newly developed multiplex rtRT-PCR. Proceedings, North American PRRS Symposium, Chicago, IL, December 3-4, 2016 (poster P2)

Daly, R. ADRDL accepting sponge samples for trichomoniasis testing. Animal Health Matters 19(2):5

Daly, R. Anaplasmosis: Is it a problem on the Northern Plains? *iGrow,* SDSU Extension Beef; *iGrow,* SDSU Extension Dairy

Daly, R. Antibiotic use in cattle: A guide for the non-livestock producers. *iGrow,* SDSU Extension Solutions 0644

Daly, R. Bred heifer health management the subject of February 17 heifer development webinar. *iGrow,* SDSU Extension Beef

Daly, R. Caring for animals when the power goes out. *iGrow,* SDSU Extension Beef; *iGrow,* SDSU Extension Dairy; *iGrow,* SDSU Extension Horse; *iGrow,* SDSU Extension Sheep; *iGrow,* SDSU Extension Swine

Daly, R. Continuing education events. Animal Health Matters 19(1):7; 19(2):7; 19(3):7

Daly, R. Dairy calf respiratory disease: Treatment in the aftermath of old weather. *iGrow,* SDSU Extension Dairy

Daly, R. Darrell Johnson honored by department. Animal Health Matters 19(1):3

Daly, R. Hammering out the details as the VFD rule approaches. *iGrow,* SDSU Extension Beef; *iGrow,* SDSU Extension Dairy; *iGrow,* SDSU Extension Sheep; *iGrow,* SDSU Extension Swine

Daly, R. In memory: Myron Olson. Animal Health Matters 19(2):5

Daly, R. Johne's disease: Managing manure exposure is key in containment for cow-calf herds. *iGrow,* SDSU Extension Beef

Daly, R. Molecular diagnostics section evolves, adds new tests. Animal Health Matters 19(3):4-5

Daly, R. New employees: Accountant Jolene Landmark. Animal Health Matters 19(3):6

Daly, R. New employees: Aren Field, laboratory technician. Animal Health Matters 19(3):6

Daly, R. New employees: Laboratory technician Samantha Stykel, necropsy. Animal Health Matters 19(3):6

Daly, R. New employees: Programmer/analyst Vijaya Akoda, information technology. Animal Health Matters 19(3):6

Daly, R. New hires: Laboratory technician Jamie Flint, media prep. Animal Health Matters 19(2):6

Daly, R. New hires: Microbiologist Kara Hendrickson, bacteriology section. Animal Health Matters 19(2):6

Daly, R. New hires: Microbiologist Marlene Braun, bacteriology. Animal Health Matters 19(2):6

Daly, R. New hires: Research associate Fernando Vicosa-Bauermann, virology section. Animal Health Matters 19(2):6

Daly, R. Pieces and parts: Reminder: Case history helps calf scours diagnosis. Animal Health Matters 19(1):6

Daly, R. Pieces and parts: Dr. Beverly Shelbourn joins veterinary and biomedical sciences department as instructor. Animal Health Matters 19(1):6

Daly, R. Pieces and parts: Laura Schanning joins ADRDL in specimen receiving. Animal Health Matters 19(1):6

Daly, R. Pieces and parts: New anaplasmosis PCR test online at ADRDL. Animal Health Matters 19(1):6

Daly, R. Pieces and parts: SDSU extension publishes cow-calf best management practices manual. Animal Health Matters 19(1):6

Daly, R. Pork Quality Assurance advisor training scheduled at SDSU. Animal Health Matters 19(1):3

Daly, R. Pre-veterinary students honored by SDVMA and SDSU through stethoscope ceremony. Animal Health Matters 19(2):3

Daly, R. Retirement congratulations: Regg Neiger. Animal Health Matters 19(2):6

Daly, R. Retirement congratulations: Russell Lokken. Animal Health Matters 19(2):6

Daly, R. Safeguarding our food supply: The role of SDSU's veterinary lab. *iGrow,* SDSU Extension Health Families

Daly, R. SDSU pre-veterinary students accepted to veterinary schools for fall 2016. Animal Health Matters 19(2):3

Daly, R. Serology section meets demands for rapid, accurate testing. Animal Health Matters 19(2):4-5

Daly, R. Small ruminant, poultry serology offerings expanded at the ADRDL. Animal Health Matters 19(3):3

Daly, R. South Dakota One Health meeting covers bacterial zoonotic disease. Animal Health Matters 19(3):3

Daly, R. Specimen receiving and necropsy sections at the ADRDL: Getting the diagnostic process off to a great start. Animal Health Matters 19(1):4

Daly, R. Trichomoniasis: A resurgent threat to beef breeding herds. *iGrow,* SDSU Extension Beef

Daly, R. 2016-2017 SDSU veterinary and biomedical sciences department scholarship award winners. Animal Health Matters 19(2):3

Daly, R. Understanding the veterinary client patient relationship. *iGrow,* SDSU Extension Beef; *iGrow,* SDSU Extension Dairy; *iGrow,* SDSU Extension Sheep; *iGrow,* Extension Swine

Daly, R. Upcoming holiday schedule for the ADRDL. Animal Health Matters 19(3):3

Daly, R. VBSD/ADRDL researchers benefit from new Oscar Olson Research Laboratories at SDSU. Animal Health Matters 19(1):1-5

Daly, R. Veterinary and biomedical sciences department professor emeritus Francis continues to share his expertise. Animal Health Matters 19(2):7

Daly, R. Veterinarians updated on antibiotic use at Bailey Herd Health Conference. Animal Health Matters 19(1):7

Daly, R. Wildfire aftermath: Beef cattle health considerations. *iGrow,* SDSU Extension Beef

Daly, R. Zika virus reminds us of the importance of detecting emerging diseases. *iGrow,* SDSU Extension Beef; *iGrow,* SDSU Extension Dairy; *iGrow,* SDSU Extension Sheep

Daly, R., L. Holler. Producers, veterinarians, and health officials becoming more aware of dairy calf salmonellosis. *iGrow,* SDSU Extension Beef; *iGrow,* SDSU Extension Dairy

Daly, R, J. Walker. Can you “make” a cow deliver better colostrum? *iGrow,* SDSU Extension Beef

Daly, R., K.C. Willis, K. Brown, D. Brown, B. Mulligan, C. Welbon, L. Fawcett. Sampling to determine prevalence of dogs serologically positive for *Brucells canis,* Pine Ridge and Rosebud Indian Reservations, South Dakota, 2015-16. Proceedings, 125th South Dakota Veterinary Medical Association, Rapid City, SD, August 17-20 (p. 49, presented)

Darweesh, M.F., M.K.S. Rajput, L.J. Braun, J. Rohila, C.C.L. Chase. Potential role of cellular S100A9 protein in BVDV induced immunosuppression through BVDV Npro protein interaction. Proceedings, 7th BVDV Symposium Evolution of Ecology of BVDV: Implications for Health and Control, Chicago, IL, December 6-7, 2016 (p 38)

Das, S., L. Ruesch. Detection of *Salmonella* in mouse feces and raw pet food using ABI 7500 FAST real-time PCR system. Proceedings, 2016 Vet-LIRN Methods Cooperative Agreement Program Meeting, Silver Spring, MD, January 11-12 (presented)

Dee, S., C. Neill, A. Singrey, T. Clement, J. Christopher-Hennings, E. Nelson. An evaluation of porcine epidemic diarrhea virus survival in individual feed ingredients in the presence or absence of a liquid antimicrobial. Proceeding, 47th American Association of Swine Veterinarians, New Orleans, LA, February 27-March 1, 2016 (pp 54-56; presented)

Dee, S., C. Neill, A. Singrey, T. Clement, R. Cochrane, C. Jones, G. Patterson, G. Spronk, J. Christopher-Hennings, E. Nelson. Modeling the transboundary risk of feed ingredients contaminated with porcine epidemic diarrhea virus. Proceedings, 47th American Association of Swine Veterinarians, New Orleans, LA, February 27-March 1, 2016 (poster P421; presented)

Dee, S., G. Spronk, E. Nelson, D. Diel, T. Clement, A. Singrey, F. Bauermann, J. Christopher-Hennings, C. Jones, R. Cochrane, G. Patterson. Modeling the transboundary survival of foreign animal disease pathogens in contaminated feed ingredients. Proceedings, PRRS Symposium, Chicago, IL, December 3-4, 2016 (poster, P93)

Fawcett, L. ADRDL continues their critical role supporting animal exports. Animal Health Matters 19(3):7

Fernandes, M.H.V., F. Okda, L.R. Joshi, K.S. Hain, E.A. Nelson, J. Christopher-Hennings, F.A. Osorio, H. Vu, D.G. Diel. Evaluation of immunodominant B- and T-cell epitopes as inducers of protective immunity against porcine reproductive and respiratory syndrome virus. Proceedings, 97th Conference of Research Workers in Animal Disease, Chicago, IL, December 4-6, 2016 (poster P53, presented)

Gava, D., L.R. Joshi, K.A. Mohr, V. Haach, L. Caron, R. Schaefer, D.G. Diel. Genetic characterization of phylogenetic analysis of Senecavirus A circulating in the U.S. and in Brazil. Proceedings, XXVII Brazilian Congress of Virology, Pirenópolis, Goiás, Brazil, September 18-21, 2016 (abstract, poster)

Gava, D., M.P. Lorenzett, V. Haach, D. Driemeier, L.R. Joshi, K.A. Mohr, D.G. Diel, L. Caron, N. Morés, M.A.Z. Morés, R. Schaefer. Neonatal pig mortality associated with Senecavirus A. Proceedings. XXVII Brazilian Congress of Virology, Pirenópolis, Goiás, Brazil, September 18-21, 2016 (abstract, presented)

Gillette, B., T. Clement, C. Chase. An update: Differentiation of field strains from vaccine strains of BoHV-1 using genomic sequencing. Proceedings, 125th South Dakota Veterinary Medical Association, Rapid City, SD, August 17-20, 2016 (pp 45-47, presented)

Hain, K., A. Singrey, L. Joshi, F. Okda, J. Nelson, S. Lawson, M. Martins, A. Pillatzki, G. Kutish, E.A. Nelson, E.F. Flores, D.G. Diel. Development of a recombinant parapoxvirus expressing the spike protein of porcine epidemic diarrhea virus. Proceedings, 97th Conference of Research Workers in Animal Disease, Chicago, IL, December 4-6, 2016 (abstract 094)

Holler, L.D. Bovine abortion – Sample submission guidelines. Animal Health Matters 19(3):2

Joshi, L.R., K.A. Mohr, D. Gava, G. Kutish, P. Piñeyro, J. Zhang, L. Caron, R. Schaefer, D.G. Diel. Genetic characterization and phylogenetic analysis of Senecavirus A. Proceedings, North American PRRS Symposium, Chicago, IL, December 3-4, 2016 (poster)

Joshi, L.R., M.H.V. Fernandes, T. Clement, S. Lawson, T.P. Resende, F.A. Vanucci, E.A. Nelson, D.G. Diel. Infection dynamics and pathogenesis of Senecavirus A in swine. Proceedings, 2016 Allen D. Leman Swine Conference, St. Paul, MN, September 17-20, 2016 (abstract, presented)

Joshi, L.R., M.H.V. Fernandes, R. Clement, S. Lawson, T.P. Resende, F.A. Vanucci, E.A. Nelson, D.G. Diel. Pathogenesis and infection dynamics of Senecavirus A in pigs. Proceedings, North American PRRS Symposium, Chicago, IL, December 3-4, 2016 (poster P42, presented); Proceedings, 97th Conference of Research Workers in Animal Diseases, Chicago, IL, December 4-6, 2016 (p. 204)

Joshi, L.R., M.H.V. Fernandes, T. Clement, S.R. Lawson, F. Vanucci, E.A. Nelson, D.G. Diel. Pathogenesis of Senecavirus A in swine. Proceedings, 59th American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, October 13-19, 2016 (p. 149, presented)

Joshi, L.R., M.V.H. Fernandes, T. Clement, S. Lawson, T.P. Resende, F.A. Vanucci, E.A. Nelson, D.G. Diel. Senecavirus A causes vesicular disease in swine. Proceedings, 125th South Dakota Veterinary Medical Association, Rapid City, SD, August 17-20 (p. 43, presented)

Joshi, L.R., S.R. Lawson, M.H.V. Fernandes, J. Christopher-Hennings, E.A. Nelson, D.G. Diel. Serological responses to Senecavirus A infection in pigs. Proceedings, 59th American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, October 13-19, 2016 (p. 125, presented)

Kraft, J.B., K. Woodard, L. Ginenez-Lirola, B. Setness, J. Ji, P. Lasley, E. Nelson, J. Zhang, D. Baum, P. Gauger, J. Zimmerman, R. Main. Serum and mammary secretion antibody responses in PEDV-exposed gilts following PEDV vaccination. Proceedings, 59th American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, October 13-19, 2016 (p.146); Proceedings, North American PRRS Symposium, Chicago, IL, December 3-4, 2016 (poster P67); Proceedings, 97th Conference of Research Workers in Animal Diseases, Chicago, IL, December 4-6, 2016 (p. 150)

Kramer L., M.S. Mayes, J. Brown, L. Braun, E. Fritz-Waters, J. Williams, A. Wollums, C. Chase, J.M. Reecy. Evaluation of response to vaccination for four viruses that contribute to bovine respiratory disease complex in Angus cattle. Proceedings, XXIV Conference of Plant and Animal Genome, San Diego, CA, January 9-13, 2016 (abstract P0533)

Lawson, S., L. Joshi, M.F. Maggioli, M.H.V. Fernandes, F. Okda, J. Christopher-Hennings, E.A. Nelson, D.G. Diel. Immune responses to Senecavirus A in pigs. Proceedings, 97th Conference of Research Workers in Animal Disease, Chicago, IL, December 4-6, 2016 (abstract 190)

Lawson, S.R., A. Singrey, L. Joshi, J. Leat, J. Nelson, D.G. Diel, J. Christopher-Hennings, E.A. Nelson. Development of antibody reagents and assays for Senecavirus A serodiagnosis. Proceedings, 51st National Collegiate Honors Council, Seattle, WA, October 12-16 (abstract, presented); Proceedings, 59th American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, October 13-19 (p. 219); Proceedings, North American PRRS Symposium,

Chicago, IL, December 3-4, 2016 (poster P10, presented); Proceedings, 97th Conference of Research Workers in Animal Disease, Chicago, IL, December 4-6, 2016 (poster P80)

Liu, R. C. Sreenivasan, D. Wang, F Li. Influenza D viruses in swine, cattle, and other agricultural animals. Animal Health Matters 19(2):2

Miskimins, D. Ascarid larval migration as a cause of liver lesions in swine. Proceedings, 2016 Western Conference of Veterinary Diagnostic Pathologists, Saskatoon, Saskatchewan, Canada, October 1 (abstract, presented)

Miskimins, D. *Clostridium sordellii* infections in cattle. Zoetis/ SDSU Scientific Exchange, Brookings, SD, February 23 (abstract, presented); Proceedings, 125th South Dakota Veterinary Medical Association, Rapid City, SD, August 19 (p. 53, abstract, presented)

Miskimins, D., M. Jones. Toe abscess (toe tip necrosis) in feeder cattle. *iGrow,* SDSU Extension Beef, April 7; *Drover's Journal,* April 11

Rajput, M.K.S., M.F. Darweesh, L.J. Braun, J. Kerkvliet, A. Hoppe, C.C.L. Chase. Both cytopathic and non-cytopathic BVDV utilize autophagy for their efficient replication. Proceedings, 7th BVDV Symposium Evolution of Ecology of BVDV: Implication for Health and Control, Chicago, IL, December 6-7, 2016 (p 14)

Resende, T.P., L.R. Joshi, M. Sturow, E.A. Nelson, F.A. Vannucci, D.G. Diel. Evidence of Senecavirus A replication in tonsillar lymphoid cells. Proceedings, 2016 Allen D. Leman Swine Conference, St. Paul, MN, September 17-20, 2016 (abstract, poster, presented)

Rock, D.L., D.G. Diel, A. Malogolovkin, G. Burmakina, N. Salnikov, D. Kolbasov, E.R. Tulman, G. Kutish, G. Delhon. Identification of the serotype-specific proteins in African swine fever facilitates vaccine design and development. *National Hog Farmer,* April 2016, pg 32-36

Rogen, A., D. Rausch, M. Dammen, T. Clement, J. Christopher-Hennings, D. Diel. Method development for whole genome sequencing of porcine reproductive and respiratory syndrome virus (PRRSV). 2016 EXPL EXPO, South Dakota State University, Brookings, SD, April 4 (poster, presented)

Setness, B., J. Bjustrom-Kraft, K. Woodard, L. Giménez-Lirola, Y. Sun, P. Lasley, Q. Chen, J. Zhang, E. Nelson, D. Baum, P. Gauger, J. Zimmerman, R. Main. Do sows and gilts previously infected with PEDV respond differently to PEDV vaccination? Proceedings, 47th American Association of Swine Veterinarians, New Orleans, LA, February 27-March 1, 2016 (poster P277; presented)

Singh, P., J. Karsky, E. Nelson, S. Ramamoorthy. Quantification of the porcine epidemic diarrhea virus (PEDV) by a colorimetric assay. Proceedings, 97th Conference of Research Workers in Animal Disease, Chicago, IL December 4-6, 2016 (abstract)

Sreenivasan, C., M. Thomas, L. Antony, D. Francis, F. Li, R.S. Kaushik. Characterization of porcine respiratory primary epithelial cells: Differential replication of influenza virus types. Proceedings, 76th American Society of Microbiology, North Central Branch, Ames, IA, October 21-22, 2016 (presented); Proceedings, 97th Conference for Research Workers in Animal Diseases, Chicago, IL, December 4-6 (poster P75; presented)

Thakur, N., L.J. Braun, K. Abdelsalam, J. Sobraske, C.C.L. Chase. BVDV infection significantly affect bovine neutrophils activity. Proceedings, 7th BVDV Symposium Evolution of Ecology of BVDV: Implication for Health and Control, Chicago, IL, December 6-7, 2016 (p 38)

Thomas, M., A Thachil, S. Ghimire, A. Glaser, A. Pillatzki, E. Nelson, J. Christopher-Hennings, R. Daly, J. Scaria. Genotypic and phenotypic characterization of *Salmonella enterica* serovar *dublin* in cattle. Proceedings, 59th American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, October 13-19, 2016 (presented)

Thomas, M., S. Ghimire, A. Fonder, A. Khoruts, M. Sadowsky, D. Francis, J. Scaria. Development of a humanized piglet model for the integrative analysis of microbiome and metabolome of the gut. Proceedings, 2016 Mayo Clinic Metabolomics Symposium, Rochester, MN, October 15-16 (abstract, presented)

Tripathy, D.N, L.R. Joshi, K.S. Hain, G.F. Kutish, A.G. Armien, P.C. Lehman, P. Leslie-Steen, R. Neiger, D.G. Diel. Co-infection with fowlpox virus strains carrying variable sequences of reticuloendotheliosis virus. Proceedings, 2016 American Association of Avian Pathologists, San Antonio, TX, August 5-9, 2016 (abstract, presented)

VanNoort, R., A. Nelsen, A.E. Pillatzkie, D. Diel, F. Li, E. Nelson, X. Wang. Intranasal immunization of pigs with porcine reproductive and respiratory syndrome virus-like particles plus 2'3'-cGAMP VacciGrade™ adjuvant exacerbates viremia after virus challenge. Proceedings, 76th Conference of North Central Branch, American Society for Microbiology, Ames, IA, October 21-22, 2016 (presented); Proceedings, North American PRRS Symposium, Chicago, IL, December 3-4, 2016 (poster P78)

Wang, M., L. Schneider, K. Hubbard, D. Grotelueshen, R. Daly, G. Stokka, R. Wills, D. Smith. Beef producer survey of the cost to prevent and treat bovine respiratory disease in calves prior to weaning. Proceedings, 97th Conference of Research Workers in Animal Disease, Chicago, IL December 4-6, 2016 (abstract 085)

Wormstadt, T., C. Sreenivasan, L. Antony, M. Thomas, R.S. Kaushik. Characterization of porcine primary respiratory epithelial cells. 2016 Biology/Microbiology Day of Scholars, South Dakota State University, Brookings, SD, April 25, 2016 (poster; presented)

PRESENTATIONS—2016

ABDELSALAM, KARIM

Presentations

1) The indirect effect of BVDV on peripheral blood total lymphocyte population. 7th BVDV Symposium Evolution of Ecology of BVDV: Implications for Health and Control, Chicago, IL, December 7

CHASE, CHRISTOPHER C.L.

Presentations

1) The GLOBAL interface between animal and human HEALTH. Harding Distinguished Lecture Series: Governing GLOBAL HEALTH in an Interconnected World, South Dakota State University, Brookings, SD, January 29

2) Mucosal immunology: Microbial interaction, stress and cytokine production. Zoetis/South Dakota State University Scientific Exchange, Brookings, SD, February 23
3) Polio vaccination – no MLV in the US since 2000: Are we there for IBR and cattle reproductive disease? Zoetis/South Dakota State University Scientific Exchange, Brookings, SD, February 23
4) Hey Doc the vaccine didn't work? Understanding the good, the bad and the ugly of the immune response (Parts 1 and 2). 2016 Georgia Food Animal Veterinary Conference, Tifton, GA, March 19
5) Understanding the role of immunity in swine performance. 5th Feet First Seminar, Dinklage, German, April 14; Vught, The Netherlands, April 15
6) The good, the bad and the ugly of the mucosal immunology: Microbial interaction, stress and cytokine production. Nutreco, Boxmeer, The Netherlands, April 18
7) Nature and causes of disease. United States Dairy Consortium, Clovis, NM, June 13
8) Immunity starts from within Microbes are us. United States Dairy Consortium, Clovis, NM, June 14
9) Vaccines. United States Dairy Consortium, Clovis, NM, June 15
10) Science and practice of innate immunity. Bayer Animal Health, Monheim, German, July 1
11) Zelnate and its effect on innate immune response. Bayer Animal Health, Monheim, Germany, July 1
12) IBRV reproductive loss – Vaccine or field virus using single nucleotide polymorphisms (SNPS) to sort out vaccine-induced reproductive disease. World Buiatrics Congress, Dublin, Ireland, July 3-8
13) Immunological aspects during BRD. Hipra Move to Vaccination Conference, Dublin, Ireland, July 3
14) Cow herd vaccination and herd immunity. Hipra University, Dublin, Ireland, July 4
15) BVDV – A collection of things. Bovela Mode of Action Meeting, Kansas City, MO, September 7
16) BHV-1 vaccine. 49th Conference of American Association of Bovine Practitioners, Charlotte, NC, September 13-17
17) Calf health. 49th Conference of American Association of Bovine Practitioners, Charlotte, NC, September 13-17
18) Dairy vaccination and practical immunology. 49th Conference of American Association of Bovine Practitioners, Charlotte, NC, September 13-17
19) Immunology and body defenses against disease. Dairy Cow Health, Manchester, England, November 8-11
20) Colostrum – It is more than an antibody. Canadian Dairy Nutrition Conference, Montreal, Quebec, Canada, November 15-17
21) BVDV and Zika – What are the parallels. Egypt Society of Virology Meeting, Cairo, Egypt, November 25-December 2.
22) Both cytopathic and non-cytopathic BVDV utilize autophagy for their efficient replication. 7th BVDV Symposium Evolution of Ecology of BVDV: Implications for Health and Control, Chicago, IL, December 6
23) BVDV infection significantly affect bovine neutrophils activity. 7th BVDV Symposium Evolution of Ecology of BVDV: Implications for Health and Control, Chicago, IL, December 6
24) Potential role of cellular S100A9 protein in BVDV induced immunosuppression through BVDV Npro protein interaction. 7th BVDV Symposium Evolution of Ecology of BVDV: Implications for Health and Control, Chicago, IL, December 6

25) The indirect effect of BVDV on peripheral blood total lymphocyte population. 7th BVDV Symposium Evolution of ecology of BVDV: Implications for Health and Control, Chicago, IL, December 7

Media

1) Trust the gut, beat stressful weaning lags. *National Hog Farmer,* 61(2):8-10
2) A new chapter in managing bovine respiratory disease. Bayer Animal Health, Beck Ag Connects Audio Conference (via webinar), March 4; March 8; August 9; August 11; August 15
3) Time your calfhood vaccination program for best results. *Beef Magazine,* March 24 (http://beefmagazine.com/vaccination/time-your-calfhood-vaccination-program-best-results
4) The difference between antibiotic resistance and residues. *Progressive Cattleman,* May 2016 6(5):20-21 http://www.pressivecattle.com/topics/herd-health/7295-the-difference-between-antibiotic-resistance-and-residues

CHRISTOPHER-HENNINGS, JANE

Presentations

1) Planning for the future of veterinary diagnostics and research in South Dakota − South Dakota Veterinary Medical Association Advisory Meeting updates. Pierre, SD, January 26
2) Planning for the future of veterinary diagnostics and research in South Dakota – South Dakota Veterinary Medical Association Advisory Meeting updates. James Bailey Herd Health Conference, Brookings, SD, February 13
3) Planning for the future of veterinary diagnostics and research in South Dakota – South Dakota Veterinary Medical Association Advisory Meeting updates. Brookings Rotary, Brookings, SD, March 8
4) Planning for the future of veterinary diagnostics and research in South Dakota – South Dakota Veterinary Medical Association Advisory Meeting updates. ADRDL Advisory Committee, Brookings, SD, June 29
5) Midwest region updates. American Association of Veterinary Laboratory Diagnosticians, Las Vegas, NV, February 4; Aurora, CO, July 28-29
6) Planning for the future of veterinary diagnostics and research in South Dakota – South Dakota Veterinary Medical Association Advisory Meeting updates. 125th South Dakota Veterinary Medical Association, Rapid City, SD, August 17
7) Planning for the future of veterinary diagnostics and research in South Dakota – South Dakota Veterinary Medical Association Advisory Meeting updates. South Dakota Biotech, Brookings, SD, September 15
8) Planning for the future of veterinary diagnostics and research in South Dakota – South Dakota Veterinary Medical Association Advisory Meeting updates. South Dakota Eminent Farmer, Rancher, and Homemaker, Brookings, SD, September 23
9) The benefits of combining research with diagnostics and field investigations. Biology/Microbiology Graduate Association, South Dakota State University, Brookings, SD, November 4
10) Planning for the future of veterinary diagnostics and research in South Dakota – South Dakota Veterinary Medical Association Advisory Meeting updates. Ag Unity, Pierre, SD, November 10

Media

1) Planning for the future of veterinary diagnostics and research in South Dakota. *Tri-State Neighbor,* August 30

CLEMENT, TRAVIS

Presentations

1) ADRDL/VBSD on-line case submission form. PIC Health Team Veterinary Meeting, Atlanta, GA, October 19-20
2) A cost effective method for surveillance of PRRSV and IAV-5 in oral fluids using a newly developed multiplex rtRT-PCR. 97th Conference of Research Workers in Animal Diseases, Chicago, IL December 2-6

DALY, RUSSELL

Presentations

1) Raising cattle without antibiotics in natural and organic systems. Ranchers Forum, Mission, SD, January 12
2) Feed-grade antibiotic use in cattle: Survey of veterinarians and producers. James Bailey Herd Health Conference, Brookings, SD, February 13; Zoetis/South Dakota State University Technical Exchange, Brookings, SD, February 23
3) Using feed-grade antibiotics in livestock: What changes should we prepare for? Purina Feeds Producer Meeting, Arlington, SD, February 24; DeSmet, SD, February 24; Volga, SD, February 25; Dell Rapids, SD, March 29; Salem Veterinary Clinic Producer Meeting, Salem, SD, March 2
4) Lameness and handling in the dairy beef industry. I-29 Moo University Dairy Beef Short Course, Worthing, SD March 29
5) Cow-calf health update from the SDSU Veterinary Diagnostic Laboratory. Purina PBST Meeting, Sioux Falls, SD, April 27
6) Johne's disease and anaplasmosis in Northern Plains beef herds. Dakotaland Feeds Sales Representative Meeting, Huron, SD, May 5
7) Veterinary public health issues in South Dakota. South Dakota Department of Health Staff Meeting, Pierre, SD, June 1
8) Swine health issues: PEDV update – PRRS virus infection and elimination. US Soybean Export Council, Chinese Delegation, Brookings, SD, June 4; China Swine Health Delegation to US, Brookings, SD, June 14
9) What's new at the SDSU ADRDL and Veterinary Science Department. Brookings Lions Club, Brookings, SD, June 13
10) One health: How animal and human health intersected during the HPAI Outbreak of 2015. 2016 South Dakota Public Health Association Conference, Sioux Falls, SD, June 30
11) Bovine respiratory disease in weaned calves: A South Dakota perspective. Nursing Calf Respiratory Disease Forum, Pierre, SD
12) *Brucella canis* in stray dogs on Pine Ridge and Rosebud Indian Reservations. 125th South Dakota Veterinary Medical Association, Rapid City, SD, August 19; South Dakota One Health Meeting, Chamberlain, SD, August 25
13) Using feed grade antimicrobials in livestock: What changes should we prepare for? Groton Veterinary Clinic Producer Meeting, Groton, SD, August 22; Mid-River Veterinary Clinic Producer Meeting, Chamberlain, SD, August 29; TriTech Producers' Meeting, Mitchell, SD, November 10; South Dakota Cattlemen's

Association Convention, Watertown, SD, November 29; Colton Farmer's Elevator Producer Meeting, Colton, SD, December 22
14) Unintended consequences: Could MLV vaccines be harming reproduction? Applied Strategies in Beef Cow Reproduction Symposium, Des Moines, IA, September 6
15) Influence of vaccination with an inactivated or MLV reproductive vaccine on reproductive parameters in beef cows. 49th Conference of American Association of Bovine Practitioners, Charlotte, NC, September 14
16) Johne's disease. Nathan Palm Angus, Watertown, SD, December 7

Media

1) PEDV. KWAT Radio Ag Hour, January 5
2) Cow side of colostrum production. SDSU *iGrow* Radio, January 8
3) Trichomoniasis flares up once again in South Dakota. *Farm Forum,* January 8
4) Helping the cow make better colostrum. *Farm Forum,* January 22
5) Colostrum, avian influenza, ADRDL. KWAT Radio Ag Hour, January 29
6) Heifer webinar. SDSU *iGrow* Radio webinar, February 4
7) Zika virus and the importance of detecting emerging diseases. *Farm Forum,* February 5
8) Zika virus. SDSU *iGrow* Radio, February 9
9) Health management of the bred heifer. *iGrow* webinar, February 17
10) Calving time issues. Red River Farm Network, February 19
11) Understanding the bugs helps lice control in cattle. *Farm Forum,* February 19
12) Could your calves give you the scours? *Farm Forum,* March 4
13) Cryptosporidiosis in calves and people. SDSU *iGrow* Radio, March 4
14) Contours Program. SDSU Extension, South Dakota Public TV, April 3; April 17
15) Johne's disease. SDSU *iGrow* Radio, March 18; WNAX Radio, April 19
16) Johne's disease: A challenging problem for cattle herds. *Farm Forum,* March 18
17) Ticks. *Tri State Livestock News,* March 18
18) Trichomoniasis. SDSU *iGrow* Radio, March 24
19) Trichomoniasis, Johne's, PEDV, calving. KWAT Radio Ag Hour, March 25
20) As calving season progresses, scour "bugs" can build up. *Farm Forum,* April 1
21) Contours. South Dakota State University Extension, South Dakota Public Television, April 3; South Dakota Public Television, April 17
22) Rabies. SDSU *iGrow* Radio, April 8; *Sioux Falls Argus Leader,* April 8
23) Tick paralysis: Another potential problem for dogs this spring and summer. *Farm Forum,* April 15
24) Knowing how to respond to the risk of rabies. *Farm Forum,* April 29
25) Anthrax. SDSU *iGrow* Radio, May 11; July 11
26) Solving the veterinary student debt issue. *Farm Forum,* May 13
27) Keeping farm visitors safe. *Farm Forum,* May 27
28) Anaplasmosis. SDSU *iGrow* Radio, June 6
29) Anaplasmosis: Could it come to your herd? *Farm Forum,* June 10
30) VFD's. SDSU *iGrow* Radio, June 14
31) Heat Stress. WNAX Radio, June 17
32) The effect of spaying a dog. *Farm Forum,* June 24
33) Anaplasmosis, heat stress. KWAT Ag Hour, June 27
34) Anaplasmosis. SDSU *iGrow* News Release, June 27
35) "Sudden death" or "suddenly found dead"? *Farm Forum,* July 8
36) Lice in Cattle. *Beef Magazine,* July 11
37) Heat Stress. *Yankton Press and Dakotan,* July 18; KWAT Ag Hour, July 19

38) Keeping pets cool. SDSU *iGrow* News Release; SDSU i*Grow* Radio; South Dakota Public Radio, July 20
39) Making sure your cattle keep their tails: Watch for ergot on pasture. *Farm Forum,* July 22
40) Blue green algae: What it can do to animals. *Farm Forum,* August 5
41) Understanding veterinary client patient relationship. *Farm Forum,* August 19
42) Tularemia. SDSU *iGrow* Radio, August 26
43) Consider your safety when working around cattle. *Farm Forum,* September 2
44) Pre-conditioning vaccines. SDSU *iGrow* Radio, September 12
45) Veterinary feed directive. KWAT Ag Hour, September 13; SDSU *iGrow* Radio, October 12; *Charolais Journal,* October 18; *TriState Neighbor,* December 22
46) Dart guns might not work as well as we think they do. *Farm Forum,* September 16
47) Stress in calves and pneumonia. SDSU *iGrow* Radio, September 22
48) Epizootic hemorrhagic disease. Brookings Radio, September 26
49) The connection between stress and cattle pneumonia. *Farm Forum,* September 30
50) Finding a sick calf: An art or a science. *Farm Forum,* October 14
51) Epizootic hemorrhagic disease, veterinary feed directive. KWAT Ag Hour, October 24
52) The value of the animal diagnostic laboratory. *Farm Forum,* October 28
53) Senecavirus. SDSU *iGrow* Radio, November 7
54) Animal contact in public settings. *Food Safety News,* November 8
55) What does it take to keep workers safe at the diagnostic lab? *Farm Forum,* November 11
56) Calving time issues. *Progressive Cattleman,* November 14
57) Turkey production. *Pierre Capital Journal,* November 21
58) Food Safety. SDSU *iGrow* Radio, November 22
59) Safeguarding the food we eat: Another role of the SDSU's veterinary diagnostic lab. *Farm Forum,* November 25
60) Cold stress in animals. WNAX Radio, December 6
61) Frostbite in calves. SDSU *iGrow* Radio, December 7
62) How can an animal health lab benefit human health? *Farm Forum,* December 9
63) Cold weather, veterinary feed directive, ADRDL expansion plans. KWAT Ag Hour, December 19
64) Dairy calf pneumonia. SDSU *iGrow* Radio, December 21
65) Is 2017 the year for another avian influenza outbreak? *Farm Forum,* December 23
66) Blizzard conditions and animals. WNAX Radio, December 26

DIEL, DIEGO

Presentations

1) Development of ORFV as a vaccine delivery platform for use in livestock. Ceva Biomune, Lenexa, KS, March 21
2) Senecavirus A: An emerging pathogen in swine populations, 125th South Dakota Veterinary Medical Association, Rapid City, August 19
3) Keeping SD farms and ranches safe through promoting animal health. 2016 Eminent Farmer and Rancher Day, South Dakota State University, Brookings, SD, September 23

Media

1) Senecavirus A: Genetic diversity and recent South American experience. Swine Health Information Center, Senecavirus A Webinar, May 18

FERNANDES, MAUREEN

Presentations

1) A CRISPR/Cas9 and Cre/Lox systembased express vaccine development strategy against re-emerging pseudorabies virus. Journal Club, South Dakota State University, Brookings, SD, February 3
2) Zika virus infects human cortical neural progenitors and attenuates their growth. Journal Club, South Dakota State University, Brookings, SD, March 20

GHIMIRE, SUDEEP

Presentations

1) Bacteriophage combinations significantly reduce *Clostridium difficile* growth *in vitro* and proliferation *in vivo*. Journal Club, South Dakota State University, Brookings, SD, October 19
2) Human commensals producing a novel antibiotic impair pathogen colonization. Journal Club, South Dakota State University, Brookings, SD, November 9

GRESETH, JON

Presentations

1) Use of VADDS at ADRDL/VBSD. 2016 ATC (VADDS) User Group Meeting, Sioux Falls, SD, October 4

HAIN, KYLE

Presentations

1) Volunteer running suppresses tumor growth through epinephrine- and IL-6-Dependent NK cell mobilization and redistribution. Journal Club, South Dakota State University, Brookings, SD, March 23
2) Normalizing the environment recapitulates adult human immune traits in laboratory mice. Journal Club, South Dakota State University, Brookings, SD, April 11
3) Development and characterization of a recombinant ORF virus vector expressing the spike protein of porcine epidemic diarrhea virus. MS Defense, South Dakota State University, Brookings, SD, July 12

HAUFFE, IAN

Presentations

1) A highly conserved GEQYQQLR epitope has been identified in the nucleoprotein of Ebola virus by using an *in silico* approach. Journal Club, South Dakota State University, Brookings, SD, August 31

HOLLER, LARRY

Presentations

1) GM_1 ganglioside, mad cows and Huntington's disease. Shepherd's Weekend, Michigan Sheep Breeders Association, Lansing, MI, January 9
2) Reproductive failure in sheep. Shepherd's Weekend, Michigan Sheep Growers Association, Lansing, MI, January 10

JOSHI, LOK

Presentations

1) Elevation of CpG frequencies in influenza A genome attenuates pathogenicity but enhances host response to infection. Journal Club, South Dakota State University, Brookings, SD, November 30
2) Pathogenesis of Senecavirus A in pigs. 97th Conference of Research Workers in Animal Diseases, Chicago, IL, December 2-6

KAUSHIK, RADHEY

Presentations

1) The GLOBAL interface between animal and human HEALTH. Harding Distinguished Lecture Series: Governing GLOBAL HEALTH in an Interconnected World, South Dakota State University, Brookings, SD, January 29

LAWSON, STEVE

Presentations

1) Development of antibody reagents and serological assays for Senecavirus A. 97th Conference of Research Workers in Animal Diseases, Chicago, IL, December 2-6

LI, FENG

Presentations

1) One Health. 2016 Philosophy for Success Symposium, South Dakota State University, Brookings, SD, April 4

MISKIMINS, DALE

Presentations

1) Anthrax, tularemia and plague. South Dakota One Health, Oacoma, SD, August 25

NELSON, ERIC

Presentations

1) Product development and technology transfer approaches in veterinary diagnostics. 8th Avera/South Dakota State University Research Symposium, Brookings, SD, October 26

OKDA, FATEN

Presentations

1) Zika virus: Guidelines for pregnant women. Journal Club, South Dakota State University, Brookings, SD, January 27
2) Influence on the behavior of lung cancer H1299 cells by silencing SLC35F2 expression. Journal Club, South Dakota State University, Brookings, SD, March 3

3) Type III interferons produced by human placental trophoblasts confer protection against Zika virus infection. Journal Club, South Dakota State University, Brookings, SD, April 20

SCARIA, JOY

Presentations

1) The GLOBAL interface between animal and human HEALTH. Harding Distinguished Lecture Series: Governing GLOBAL HEALTH in an Interconnected World, South Dakota State University, Brookings, SD, January 29
2) NC-1202 annual update. 97th Conference of Research Workers in Animal Diseases, Chicago, IL, December 2-6

SREENIVASAN, CHITHRA

Presentations

1) Zika virus associated with microcephaly. Journal Club, South Dakota State University, Brookings, SD, February 16
2) Influenza virus targets class I MHC educated NK cells for immunoevasion. Journal Club, South Dakota State University, Brookings, SD, March 30

WANG, ZHAO

Presentations

1) Packaging and prefusion stabilization separately and additively increase the quantity and quality of respiratory syncytial virus (RSV)-neutralizing antibodies induced by an RSV fusion protein expressed by a parainfluenza virus vector. Journal Club, South Dakota State University, Brookings, SD, October 26
2) Defective HIV-1 proviruses produce novel protein-coding RNA species in HIV-infected patients on combination antiretroviral therapy. Journal Club, South Dakota State University, Brookings, SD, November 16

YOUNG, ALAN

Presentations

1) Opportunities for targeted vaccines to cervids. 2016 North American Deer Farmer's Conference, Tulsa, OK, March 16-18
2) A baculovirus-vectored immunogen production platform. 2016 CEEZAD Annual Conference, Nebraska City, NE, October 31-November 2

RESEARCH PROJECTS 2016-2017

Animal Health

A-405-11 Identification of common antigens to create a universal porcine ETEC vaccine—Francis (October 2011-September 2016)

A-522-14 Role of migratory leukocytes in acute immune responses of animals—Young, Syrstad, Chase, Bott, Knudsen (December 2014-October 2019)

Experiment Station

H-391-11 Infectious disease pathogenesis study and prevention development—Zhang, Francis, Moxley, Robertson, Fang, Casey (March 2011-September 2016)

H-392-11 Improved methods for the diagnosis of porcine reproductive and respiratory syndrome and other important viral diseases of swine—Nelson, Christopher-Hennings, Fang (March 2011-September 2016)

H-411-11 Bovine viral diarrhea virus infections in cattle: Implications on innate immunity and acquired immune development—Chase, Holler (October 2011-September 2016)

H-475-13 Epidemiology and control of haemonchosis and toxocarosis in cattle, sheep, and bison herds within the USA northern Great Plains—Hildreth, Holler, Daly (December 2013-November 2018)

H-517-14 Improved strategies for prevention and control of viral diseases of livestock—Diel, Nelson, Christopher-Hennings, Lawson (October 2014-September 2019)

H-532-14 Integrative approaches to reduce enteric diseases in livestock and for the improvement of food safety—Scaria (January 2015-September 2019)

H-547-15 Study of biology and role of innate immune cells, innate immunity, microbiota and enteric and respiratory pathogens of food animals—Kaushik (July 2015-September 2019)

H-620-16 Improved diagnostic and control strategies for viral diseases of swine—Nelson, Diel, Christopher-Hennings (October 2016-September 2021)

H-621-16 Bovine viral diarrhea virus: Understanding the contribution of live BVDV virus vaccines to immune modulation—Chase, Scaria (October 2016-September 2021)

R-410-11 An integrated approach to control of bovine respiratory diseases (NC-1027)—Chase, Daly (October 2011-September 2016)

R-518-14 Detection and control of porcine reproductive and respiratory syndrome virus and emerging viral diseases of swine (NC-229)—Christopher-Hennings, Diel, Nelson (October 2014-September 2019)

R-540-15 Enteric diseases of food animals: Enhanced prevention, control and food safety—Scaria (July 2015-September 2017)

R-655-16 NC-1192: An integrated approach to control of bovine respiratory diseases (NC-1027)—Chase, Daly (October 2016-Sepember 2021)

SD00376 Survey of infectious, toxicologic, and nutritional diseases of livestock—Diagnostic Laboratory (July 1986-September 2019)

National Pork Board

- Development of a multivalent vector platform to control swine enteric coronavirus disease—Diel, Nelson, Christopher-Hennings, Pillatzki (April 2015-November 2016)
- Swine influenza and porcine epidemic diarrhea vaccine—Hause, Li (May 2015-April 2016)
- Determination of the *Salmonella enterica* prevalence in lymph nodes from market hogs and sows—Scaria, Christopher-Hennings, Daly, Erickson, Thomas, Mikel, Rajashekara (September 2016-August 2017)

- Development of a bELISA for serological diagnostics and surveillance of SVA infection—Lawson, Diel, Clement, Singrey, Christopher-Hennings, Nelson (May 2017-June 2018)

National Pork Board International Trade Program

- Microbiological status of offal products from pork processing facilities in the United States—Erickson, Mikel, Ruesch, Christopher-Hennings, Fuhrman, Ertl (September 2016-August 2017)

USDA/APHIS/Veterinary Services

- National Animal Health Laboratory Network: Swine surveillance (swine influenza virus, PEDV, TGEV, PDCoV)—Christopher-Hennings, Parmar, ADRDL/VBSD Staff (April 2007-June 2016)
- National Animal Health Laboratory Network: Swine surveillance (pseudorabies virus)—Christopher-Hennings, Parmar, ADRDL/VBSD Staff (April 2007-September 2016)
- National Animal Health Laboratory Network: Swine surveillance (classical swine fever virus)—Christopher-Hennings, Parmar, ADRDL/VBSD Staff (April 2007-March 2017)
- National Animal Health Laboratory Network: NAHLN Blanket Purchase Agreement—Christopher-Hennings, Parmar, ADRDL/VBSD Staff (October 2013-September 2018)
- National Animal Health Laboratory Network: Member Laboratory Cooperative Agreement—Christopher-Hennings, Parmar, Greseth, Miller, Clement (April 2015-April 2017)
- National Animal Health Laboratory Network: Establishing and adopting universally recognized diagnostic data standards and systems of electronic messaging necessary for transcending inter-laboratory connectivity and the next generation of web-based swine health information management tools for both non-program disease and program disease applications at four swine-centric veterinary diagnostic labs in the National Animal Health Laboratory Network (SDSU portion)—Christopher-Hennings, Daly (July 2016-September 2017)
- National Animal Health Laboratory Network: NAHLN Blanket Purchase Agreement—Christopher-Hennings, Parmar, ADRDL/VBSD Staff (September 2016-August 2021)
- National Animal Health Laboratory Network: NAHLN level 2 laboratory work plan—Christopher-Hennings, Parmar, ADRDL/VBSD Staff (June 2017-June 2018)

USDA/Agricultural Research Service

- Development of monoclonal and polyclonal antibodies against PEDV PLP2/production of monoclonal antibodies in swine viruses—Lawson, Singrey, Diel, Nelson (June 2017-June 2018)

USDA/Food Safety and Inspection Service

- Food Emergency Response Network (FERN)—Ruesch, Christopher-Hennings, Daly, Parmar (September 2011-Ongoing)
- FERN: Enhancement of laboratory testing capability for microbiological threat agents at the South Dakota State University Department of Veterinary and Biomedical Sciences—Ruesch, Erickson, Murray, Lau (September 2011-Ongoing)

USDA/NIFA/AFRI

- Innovative strategies to enhance PRRSV-specific innate and mucosal immunity—Fang, Gourapura, Nelson, Christopher-Hennings, Zhang (May 2012-April 2017)
- Designing epitope-based vaccines to improve efficacy and detection (PCV2)—Ramamoorthy, Pillatzki, Webb, Nara, Nelson (June 2015-May 2017)
- Novel porcine epidemic diarrhea virus vaccine pipeline—Wang, Nelson, Kaushik, Li (December 2015-December 2017)
- Mentoring undergraduate student in precision livestock production for the 21st century—Gonda, Scaria, etal (2016-2019)

National Council for Scientific and Technological Development/Federal University of Santa Maria, Brazil

- Development of viral vector platform for prevention and control of animal rabies—Flores, Weiblen, Diel (October 2014-September 2017)

National Institute of Health

- Study of novel influenza C virus—Li, Kaushik, Wang (September 2014-July 2017)

National Institute of Health/Vanderbilt University

- Studies on emergent diarrheagenic *Escherichia coli* pathogens—Gomez, Francis (December 2014-November 2016)

National Science Foundation/BioSNTR

- Influenza antibodies and vaccine—Li, Wang, Hoppe (July 2014-June 2019)

American Association of Swine Veterinarians

- An evaluation of a shipping model to investigate foreign animal disease introduction into the USA—Dee, Nelson, Diel, Clement, Singrey, Christopher-Hennings (March 2016-February 2017)

Boehringer-Ingelheim Vetmedica

- Production and characterization neutralizing monoclonal antibodies against PEDV and PDCoV—Diel, Nelson, Lawson, Christopher-Hennings (February 2015-December 2015)

Elanco Animal Health

- Development and evaluation of viral vectored vaccines for use in cattle—Diel (April 2016-March 2018)

North Dakota Agricultural Products Utilization Commission

- Designing epitope based vaccine for improved immunogenicity—Ramamoorthy, Nelson, Pillatzki (January 2015-January 2018)
- Improved vaccines for PRRSV prophylaxis—Ramamoorthy, Nelson, Pillatzki (February 2015-February 2018)
- Rapid-response vaccines and diagnostic tests against PEDV—Ramamoorthy, Nelson, Pillatzki (February 2015-February 2018)
- Polymeric adjuvants for peptide vaccines—Voronov, Ramamoorthy, Pillatzki, Stafslien, Nelson (June 2015-June 2017)

North Dakota Department of Agriculture

- Laboratory ISO 17025 accreditation for ADRDL Food Safety Section—Erickson, Ruesch, Parmar (October 2012-September 2017)

Ralco Animal Health

- The effect of essential oils on calf growth and immune function—Casper, Chase (2015-2016)

Sanford Health/South Dakota State University/Research and Development Innovation

- Fortification of Profile® diet with probiotics to improve gut health—Scaria, Francis, Kaushik (August 2015-August 2017)

South Dakota Beef Industry Council

- Control of *Salmonella* to improve pre-harvest food safety and antibiotic stewardship in beef production—Scaria, Gonda, Christopher-Hennings, Daly, Pillatzki (October 2015-September 2017)
- Determination of microbial and host factors contributing *Salmonella* persistence in cattle —Scaria, Gonda, Christopher-Hennings, Daly, Pillatzki (October 2015-September 2017)
- Identification of microbial risk factors that cause *Salmonella* persistence and infection in beef cattle—Scaria, Gonda, Christopher-Hennings, Daly, Pillatzki (October 2015-September 2016)

South Dakota Department of Health, Office of Public Health Preparedness and Response

- State public health veterinarian services—Daly (April 2011-Ongoing)

South Dakota Governor's Office of Economic Development

- South Dakota Center for Biologics Research and Commercialization—Christopher-Hennings, Chaussee, Diel, Herrmann, Li, Nelson, Scaria, Kattelmann, Wang (July 2016-June 2017)

South Dakota Soybean Research & Promotion Council

- Evaluation of a microbially-converted soybean meal on nursery pig immune status and disease resistance—Levesque, Brown, Gibbons, Kaushik, Diel (October 2014-June 2016)

South Dakota State University/Agricultural Experiment Station/NIFA

- Swine and bovine influenza virus—Li (September 2013-August 2018)

South Dakota State University Foundation/Griffith Graduate Research 2016

- Griffith graduate agriculture research award: Kyle Hain travel support for research presentation—Diel (April 2016-May 2018)

South Dakota Veterinary Medical Association

- South Dakota Veterinary Medical Association: Logistics support—Christopher-Hennings, Daly, Miller, Kampmann (December 2006-December 2016)

Swine Health Information Center

- Evaluating the survival of foreign animal disease (FAD) viral surrogate pathogens in feed ingredients shipped from China to the US—Dee, Nelson, Diel, Neill (April 2016-April 2017)
- Detection and differentiation of influenza Types A, B, C and D in swine—Li, Clement, Christopher-Hennings, Nelson, Rauh, Hause (November 2016-November 2017)
- Development of a high throughput real-time RT-PCR assay (dry, room temperature stable and fluid formats) for the detection and discrimination of Senecavirus A (SVA), foot-and-mouth disease virus (FMDV) ad swine vesicular disease virus (SVDV) —Rauh, Diel, Fowler, Howson, Christopher-Hennings (November 16-October 17)
- Development of rapid diagnostic capability for encephalomyocarditis virus (EMCV)—Diel, Clement, Lawson, Bauermann, Christopher-Hennings, Nelson, Rauh (November 2016-November 2017)
- Evaluation of the risk of transboundary movement of ASFV via contaminated feed ingredients—Dee, Diel, Nelson, Niederwerder, Rowland, Tokach, Woodworth, Dritz, Jones (February 17-February 18)

Texas A&M

- Validation of methods for detection of *Campylobacter* in veterinary patients—Das (September 2013-August 2016)

United States Department of Health and Human Services, Food and Drug Administration

- NGS based tracking of antibiotic resistance in *Salmonella*—Scaria, Thomas, Ruesch (June 2016-September 2018)

United States Department of Health and Human Services, Food and Drug Administration, National Antimicrobial Resistance Monitoring System (NARMS) CAP

- NARMS antibiotic resistance surveillance in retail meat samples from South Dakota and North Dakota—Erickson, Ruesch, Daly, Lau, Fischer, Grondahl (September 2016-August 2021)

United States Department of Health and Human Services, Food and Drug Administration/South Dakota Department of Health

- NGS based foodborne pathogen tracking—Scaria, Christopher-Hennings (April 2015-March 2018)

United States Department of Health and Human Services, Food and Drug Administration/Veterinary Laboratory Response Network

- Center for Veterinary Medicine Vet-LiRN Veterinary Diagnostic Laboratory Program—Scaria, Ruesch (September 2012-Ongoing)
- Detection of *Salmonella* in mouse feces and raw pet food using ABI 7500 FAST real time PCR—Das, Daly, Ruesch, Aguair (September 2013-August 2018)

United States Department of Homeland Security/Center of Excellence in Emerging Zoonoses and Animal Disease/Kansas Bioscience Authority

- Rift Valley Fever (RVD): Development of reference cell lines and assays to assess immunity—Young, Richt, Faburay, Morozov (June 2010-June 2016)
- Development of marker immunological assays for Rift Valley fever vaccination—Young (July 2011-June 2016)
- Pathogen detection and discovery—Christopher-Hennings (2012-2016)
- Development of efficacious DIVA compatible Rift Valley fever virus vaccines—Young (July, 2013-June 2016)
- Oral vaccine delivery of recombinant subunit vaccines for animal diseases—Young (September 2015-December 2016)

United States Department of Homeland Security/VST/Medgene Labs

- Development of tools for analysis of EHD vaccination—Young (September 2015-December 2016)

USAID/Egyptian Educational and Cultural Bureau

- Training grant for Egyptian scientists—Chase (July 2000-Ongoing)

Zoetis Animal Health/Pfizer Animal Health

- Bovine respiratory disease/swine respiratory disease antimicrobial susceptibility program—Holler (January 2006-Ongoing)
- Impact of switching well-vaccinated cows/heifers from MLV to a killed vaccine prebreeding on reproductive success—Perry, Daly (March 2016-April 2017)

COURSE OFFERINGS—DEPARTMENT OF VETERINARY AND BIOMEDICAL SCIENCES

VET 103-S01	Introduction to Veterinary Medicine, 1 cr. (Daly)
VET 109-S01	1st Year Seminar—2 cr. (Daly)
VET 183-S01D	Veterinary Medical Terminology, 1 cr. (Erickson)
VET 223-S01	Anatomy and Physiology of Domestic Animals, 4 cr. (Erickson)
VET 223L-S01-S06	Anatomy and Physiology of Domestic Animals Lab, (Erickson)
VET 403-S01/503-S01	Animal Diseases and Their Control, 3 cr. (Daly)
VET 424-S01/524-S01	Medical and Veterinary Virology, 3 cr. (Wang)
VET 476-S01/576-S01	Advanced Mammalian Physiology, 4 cr. (Erickson)
VET 491-S01/591-S01	Independent Study, 1-3 cr. (Veterinary & Biomedical Sciences Faculty)
VET 492-S01	Topics, 1-3 cr. (Veterinary & Biomedical Sciences Faculty)
VET 493-S01	Workshop, 1-4 cr. (Veterinary & Biomedical Sciences Faculty)
VET 494-S01	Internship, 1-12 cr. (Pillatzki)
VET 494-S01	Insp—Comparative Veterinary Anatomy, 3 cr. (Erickson)
VET 494-S02	Internship, 1 cr. (Veterinary & Biomedical Services Faculty)
VET 496-S01	Field Experience, 1-12 cr. (Veterinary & Biomedical Sciences Faculty)
VET 497-S01	Cooperative Education, 1-12 cr. (Veterinary & Biomedical Sciences Faculty)
VET 498-S01, S04	Undergraduate Research / Scholarship, 1-4 cr. (Scaria, Veterinary & Biomedical Sciences Faculty, Diel, Chase)
VET 498-S01-S03	Undergraduate Research / Scholarship, 1-3 cr. (Diel, Scaria, Chase)
VET 498-S03	Undergraduate Research / Scholarship, 3 cr. (Erickson)
VET 592-S01D	Topics—Vaccinology, 2 cr. (Chase)
VET 788-S01	Master's Research Problems, 2-3 cr. (Veterinary & Biomedical Sciences Faculty)

VET 791-S01	Independent Study—Flow Cytometry, 1-4 cr. (Young)
VET 791-S01	Independent Study—Virology, 3 cr. (Chase)
VET 791-S01, S03, S05	Independent Study—Faculty Seminar, 1 cr. (Wang, Chase)
VET 791-S02	Independent Study—Vaccinology, 1-4 cr. (Chase)
VET 791-S04	Independent Study—Microbiome / Immunology, 1-2 cr. (Chase)
VET 793-S01	Workshop, 1-4 cr. (Veterinary & Biomedical Sciences Faculty)
MICR 424-S01/524-S01	Medical and Veterinary Virology, 3 cr. (Wang)
MICR 433-S01/533-S01	Medical Microbiology, 3 cr. (Kaushik)
MICR 439-S01	Medical and Veterinary Immunology, 3 cr. (Kaushik)
MICR 492-S01D/592-S02D	Tp—Immunology, 3 cr. (Chase)
MICR 492-S02D/592-S01D	Tp—Virology, 3 cr. (Chase)
MICR 498-S01, S02, S04	Undergraduate Research / Scholarship, 1-12 cr. (Li, Wang)
MICR 498-S01, S05, S08	Undergraduate Research / Scholarship, 1-4 cr. (Li, Chase, Kaushik)
MICR 592-S01	Tp—Medical and Veterinary Immunology, 3 cr. (Kaushik)
MICR 792-S01	Topics—Biomedical Sciences, 1 cr. (Li)
MICR 798-S01, S02	Thesis—Research, 1-7 cr. (Li, Kaushik)
MICR 798-S01-S03, S06-S07	Thesis, 1-7 cr. (Kaushik, Wang, Marzano)
BIOS 663-S01	Advanced Concepts Infectious Disease, 6 cr. (Young)
BIOS 663-S02D	Advanced Concepts Infectious Disease, 6 cr. (Chase)
BIOS 788-S01, S02, S04	Master's Research Problems, 1-3 cr. (Chase)
BIOS 791-S01D	Independent Study—Advanced Molecular and Cellular Biology, 6 cr. (Chase)
BIOS 798-S01, S10, S15, S23	Thesis—Biology / Microbiology, 1-10 cr. (Kaushik, Li, Wang)
BIOS 798-S14, S17	Thesis—NRM, 1-10 cr. (Kaushik, Young)

BIOS 798-S04, S08, S20, S24, S26-S29 S33, S43	Thesis—Veterinary Science, 1-10 cr. (Chase, Diel, Scaria, Young, Li)
BIOS 798-S03-S06, S19, S22, S31, S35, S39-S41	Thesis, 1-10 cr. (Chase, Young, Wang, Christopher-Hennings, Kaushik, Li)
BIOS 898D-S05-S06, S11-S12, S40, S46	Dissertation—PhD-Biology / Microbiology, 1-7 cr. (Wang, Kaushik, Li, Diel)
BIOS 898D-S08-S11, S18-S20, S29-S34, S60	Dissertation—PhD-Veterinary Science, 1-7 cr. (Chase, Li, Young, Nelson, Francis, Christopher-Hennings)
BIOS 898D-S13, S15, S27, S33-S36, S38-S39	Dissertation—PhD, 1-7 cr. (Kaushik, Li, Holler, Nelson, Young, Diel)

South Dakota
Animal Disease Research and Diagnostic Laboratory

Analysis of Workload

July 1, 2016 - June 30, 2017

Requests for Laboratory Assistance

July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1,893	2,089	1,937	1,769	1,812	1,875	1,996	1,936	2,425	2,187	2,308	2,147	24,374

Laboratory Examinations

30,720	33,723	32,062	37,224	41,948	45,185	47,170	39,105	40,802	49,643	38,834	43,562	479,978

Work Load Comparison With Prior Years

Requests for Laboratory Assistance

FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14	FY15	FY16	FY17
25,281	23,753	22,149	19,188	19,975	20,707	21,752	22,634	26,713	26,425	24,374

Laboratory Examinations

426,569	414,223	367,937	314,091	442,630	591,014	425,873	400,292	510,559	495,462	479,978

South Dakota
Animal Disease Research and Diagnostic Laboratory

Total Laboratory Testing by Section -- FY2017

July 1, 2016 - June 30, 2017

PATHOLOGY	
Necropsy Cases	2,406
PATHOLOGY TOTAL	**2,406**
CLINICAL PATHOLOGY	
Hematology	
Complete Blood Count	396
Blood Count	179
Coombs	1
HCT	1
Urine and Fluids	
Cytology	91
Fluids Analysis	6
Leukocyte Lineage	9
Rumen pH	8
Urinalysis	43
Clinical Chemistry	
Serum Chemistry Profile	
Dairy Management	1
Electrolyte (Anion Gap)	1
Equine	31
NSAIDS	2
Porcine	5
Renal	2
Ruminant	38
Small Animal	121
Small Animal Pre-surgical	178
Individual Tests	
Alanine Transaminase (ALT, SGPT)	1
Albumin	33
Alkaline Phosphatase	1
Aspartate Transaminase	38
Beta Hydroxybutyric Acid (BHA)	5
Bilirubin, Direct	3
Bilirubin, Total	1
Blood Urea Nitrogen (BUN)	14
Calcium	68
Chloride	1
Cholesterol (HDL)	42
Creatinine	43
Creatinine Phosphokinase (CPK)	3

Glucose	47
Lipase	10
Magnesium	7
Non-esterified Fatty Acids (NEFA)	71
Phosphate	49
Potassium	39
Protein, Total	16
Sodium	38
Triglycerides	80
Parasitology	
Cyanobacteria	1
Cryptosporidia Exam	650
Fecal Egg Count	15
Fecal Flotation	762
Fecal Occult Blood	2
Fecal Sedimentation	41
Parasite Identification	6
Tritrichomonas foetus Culture	55
Immunology	
Bovine IgG Assay	40
Fecal ELISA	
Coronavirus	662
Giardia	48
Parvovirus	13
Rotavirus	647
Heartworm Antigen	10
Progesterone	2
Thyroid Hormone	216
CLINICAL PATHOLOGY TOTAL	**4,893**
HISTOPATHOLOGY	
Immunohistochemistry	629
Tissue Sections - H&E	13,332
Tissue - Special Stains	227
HISTOPATHOLOGY TOTAL	**14,188**
BACTERIOLOGY	
Aerobic Culture	11,839
Anaerobic Culture	910
Antimicrobial Susceptibility	1,936
Bacillus anthracis Culture	24
Bovine Ocular Culture	144
Brachyspira Culture	13
Campylobacter Culture	225
Clostridium difficile Toxin A/B II	11
Clostridium Direct FA	34
Culture for *Dermatopohilus congolenris*	1
Darkfield Screen	130

Francisella tularensis Culture	14
E. coli K99 IFA	246
Giemsa Anthrax Screen	22
Johne's Culture	39
Listeria Culture	20
Milk Bulk Tank Culture	31
Milk Sample Culture	205
Mycology Culture	434
Mycology Non-specific Fluorescence Test	9
Mycoplasma Culture	462
Mycoplasma Milk Screen	16
Salmonella Enrichment	439
Salmonella Serotyping	169
Yersinia pestis Culture	7
BACTERIOLOGY TOTAL	**17,380**

FOOD SAFETY

Aerobic Plate Count	385
Campylobacter Direct	86
E. coli O157:H7 BAX PCR	161
E. coli Petrifilm	119
FERN Surveillance Project	110
Kidney Inhibition Swab	28
Listeria monocytogenes	174
Listeria sp.	153
NARMS *Campylobacter*	203
NARMS *Enterococcus*	136
NARMS *E. coli*	133
NARMS *Salmonella*	399
Non-O157 STEC Culture	1
Non-O157 STEC 0 Group PCR	12
Non-O157 STEC Screening PCR	66
Salmonella BAX PCR	576
Salmonella Research	127
Salmonella RTE BAX PCR	100
Salmonella Offal	350
STEC O Group	4
STEC Screen PCR	101
Toxoplasma PCR Offal	370
Yeast and Mold Count	3
Yersinia Offal	370
FOOD SAFETY TOTAL	**4,167**

SEROLOGY

Anaplasmosis	
Competative Enzyme-linked Immunoassay	2,074
Avian Influenza	
AGID (Egg products)	114

AGID (Production birds)	6,524
Bluetongue	
Enzyme-linked Immunoassay (ELISA)	13,258
Bordetella aviam/ "turkey coryza"	
ELISA	325
Bovine Leukemia Virus	
AGID	3
ELISA	30,657
Bovine Pregnancy Test	6,943
Bovine Respiratory Syncytial Virus	
SN	90
Bovine Viral Diarrhea Virus	
ACE	9,841
Bovine Viral Diarrhea Virus I	
SN	377
Bovine Viral Diarrhea Virus II	
SN	385
Brucella	
BAPA	3,998
Card	1,585
Plate	260
Rivanol	17
Tube	7,373
Brucella - Canine	
IFA	110
Brucella - Small Ruminant	
Card	62
Brucella ovis	
ELISA	1,975
Epizootic Hemorrhagic Disease	
AGID	45
Equine Infectious Anemia	
ELISA	2,734
Feline Immunodeficiency Virus	
ELISA	32
Feline Infectious Peritonitis	
ELISA	19
Feline Leukemia Virus	
ELISA	32
Hemorrhagic Enteritis Virus (HEV)	
ELISA	325
Infectious Bovine Rhinotracheitis	
SN	399
Leptospira	
bratislava	597
canicola	597
grippotyphosa	597
hardjo	597

icterohemorrhagiae	597
pomona	597
Mycoplasma hyopneumoniae	
ELISA	21,104
ELISA DAKO	342
Neospora	
ELISA	872
Newcastle Disease (NDV)	
ELISA	325
Ornithobacterium rhinotracheale (ORT)	
ELISA	325
Ovine Progressive Pneumonia	
AGID	21
Ovine Progressive Pneumonia/ Caprine Arthritis Encephelitis	
ELISA	410
Parainfluenza-3	
SN	35
Paratuberculosis (Johne's)	
ELISA	49,420
Porcine Epidemic Diarrhea Virus	
IFA	7,270
Porcine Respiratory and Reproductive Syndrome	
ELISA	44,647
Fluorescent Focus Neutralization (FFN)	1,496
IFA (European Strain)	70
IFA (North American Strain)	75
Oral Fluid (ELISA)	606
Pseudorabies	
gB ELISA	1,579
gB ELISA NAHLN	305
Pseudorabies Differential Test	
G1 ELISA	4
G1 ELISA NAHLN	1
Q Fever ELISA	17
Swine Influenza Virus	
ELISA	526
SEROLOGY TOTAL	**222,589**

VIROLOGY

Bovine	
Bovine Respiratory Syncytial Virus FA	582
Bovine Viral Diarrhea Virus FA	1,062
Bovine Viral Diarrhea Virus PCR Typing	2
Coronavirus FA	314
Infectious Bovine Rhinotracheitis Virus FA	799
Parainfluenza-3 Virus FA	9
Rotavirus FA	306
Virus Isolation	1,074

Canine	
Adenovirus FA	4
Coronavirus FA	3
Distemper Virus FA	26
Herpesvirus FA	20
Parvovirus FA	19
Virus Isolation	3
Caprine	
Virus Isolation	4
Environmental	
Virus Isolation	56
Equine	
Herpesvirus FA	4
Virus Isolation	4
Feed	
Virus Isolation	71
Feline	
Feline Infectious Peritonitis Virus FA	1
Feline Panleukopenia Virus FA	8
Viral Rhinotracheitis Virus FA	7
Virus Isolation	3
Ovine	
Border Disease Virus FA	104
Coronavirus FA	4
Parainfluenza-3 Virus FA	23
Respiratory Syncytial Virus FA	32
Rotavirus FA	9
Toxoplasma IFA	114
Virus Isolation	12
Porcine	
Circovirus II FA	19
Parvovirus FA	3
Porcine Respiratory and Reproductive Syndrome Virus FA	203
Porcine Respiratory and Reproductive Syndrome Virus VI	74
Porcine Respiratory and Reproductive Syndrome Virus VI Titration	4
Pseudorabies Virus FA	1
Rotavirus FA	107
Swine Influenza Virus FA	179
Swine Influenza Virus VI	33
Swine Influenza Virus VI NAHLN	28
Transmissible Gastroenteritis Virus FA	116
Virus Isolation	64
Wild/Other Animal	
Bovine Viral Diarrhea Virus FA	23
Coronavirus FA	1
Distemper Virus FA	12
Infectious Bovine Rhinotracheitis Virus FA	7
Parainfluenza-3 Virus FA	1
Respiratory Syncytial Virus FA	5

Rotavirus FA	2
Virus Isolation	12
Rabies	464
Research	
Virus Isolation	582
Virus Titration	367
VIROLOGY TOTAL	**6,986**

MOLECULAR DIAGNOSTICS

5' UTR Bovine Viral Diarrhea Virus Sequencing	11
Anaplasma marginale PCR	342
APMV1 Newcastle DV Matrix	12
Avian Influenza Screen	136
BCV (Multiplex with BRSV)	342
BHV-1 (Multiplex with BVDV)	365
Bluetongue Virus	872
BLV	345
BRSV (Multiplex with BCV)	342
BVD Detection	1,241
BVD Ear Notch	1,372
Circovirus II	448
Classical Swine Fever	209
Clostridium Genotype	85
Epizootic Hemorrhagic Disease Virus	50
Escherichia coli Sterotyping	50
Foot and Mouth Disease NAHLN	15
Influenza A	759
Johne's	2,095
Lawsonia intracellularis	155
Leptospira sp.	293
Mycoplasma bovis	97
Mycoplasma hyopneumoniae	2,189
Porcine Epidemic Diarrhea Virus	16,572
Porcine Epidemic Diarrhea Virus Sequencing	3
Porcine Parvovirus	13
Porcine Reproductive and Respiratory Syndrome	
Oral Fluids	33,222
Semen	284
Serum	86,521
Tissue	396
Oral Fluids/Tissue (started June 1, 2017)	2,255
Porcine Rotavirus A	178
Porcine Rotavirus B	178
Porcine Rotavirus C	178
PRRS Sequencing	734
PRRS ORF5 Sequencing	706

Seneca Valley Virus	925
Swine Deltacoronavirus	16,582
Swine Influenza Virus	9,064
Swine Influenza Virus Sequencing (H, M, N gene)	56
Swine Influenza Virus Subtyping (H and N)	103
TGE	16,582
Tritrichomonas foetus	8,023

* From 2009-present, both NAHLN and non-NAHLN SIV tests are included.

MOLECULAR DIAGNOSTICS TOTAL	**204,400**
CONTRACT TESTING	
Chronic Wasting Disease Antigen ELISA	510
CONTRACT TESTING CWD TOTAL	**510**
SPECIALIZED RESEARCH TESTING	
Porcine Epidemic Diarrhea Virus FFN	2,340
Porcine Epidemic Diarrhea Virus VI Titration	113
Porcine Reproductive and Respiratory Syndrome Virus VI Titration	6
SPECIALIZED RESEARCH TESTING TOTAL	**2,459**
TOTAL OF ALL LABORATORY SECTIONS	**479,978**

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
JULY 1, 2016 – JUNE 30, 2017

AVIAN

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	Bordetella avium			*Bordetella bronchiseptica*			*Escherichia coli*			*Gallibacterium anatis*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amoxicillin	1	0	0	1	0	0	38	1	24	1	0	0
Ceftiofur	1	0	0	0	0	1	61	0	2	1	0	0
Clindamycin	0	0	1	0	0	1	0	0	63	0	0	1
Enrofloxacin	1	0	0	0	1	0	57	5	1	1	0	0
Erythromycin	NI			NI			NI			NI		
Florfenicol	1	0	0	0	1	0	9	41	13	1	0	0
Gentamicin	1	0	0	1	0	0	43	3	17	1	0	0
Neomycin	1	0	0	1	0	0	41	0	22	1	0	0
Novobiocin	1	0	0	0	0	1	0	0	63	0	0	1
Oxytetracycline	1	0	0	1	0	0	21	0	42	0	0	1
Penicillin	0	0	1	0	0	1	0	0	63	0	0	1
Spectinomycin	0	1	0	0	0	1	0	46	17	0	1	0
Streptomycin	0	0	1	0	0	1	33	0	30	1	0	0
Sulphadimethoxine	1	0	0	0	0	1	18	0	45	0	0	1
Sulphathiazole	0	1	0	0	0	1	0	23	40	0	0	1
Tetracycline	NI			NI			21	0	42	NI		
Trimethoprim/Sulphamethoxazole	1	0	0	0	0	1	60	0	3	1	0	0
Tylosin Tartrate	NI			NI			NI			NI		

AVIAN IN VITRO SENSITIVITY TESTS (CON'T)

	Hemolytic *Escherichia coli*			*Ornithobacterium rhinotracheale*			*Pasteurella multocida*			Pseudomonas aeruginosa		
	S	I	R	S	I	R	S	I	R	S	I	R
Amoxicillin	2	0	0	8	0	0	3	0	0	0	0	1
Ceftiofur	2	0	0	6	2	0	3	0	0	0	0	1
Clindamycin	0	0	2	7	0	1	0	0	3	0	0	1
Enrofloxacin	2	0	0	4	1	3	3	0	0	1	0	0
Erythromycin	NI			NI			0	2	1	NI		
Florfenicol	1	1	0	8	0	0	3	0	0	0	0	1
Gentamicin	2	0	0	5	2	1	3	0	0	1	0	0
Neomycin	2	0	0	7	0	1	3	0	0	1	0	0
Novobiocin	0	0	2	8	0	0	3	0	0	0	0	1
Oxytetracycline	2	0	0	3	0	5	3	0	0	0	0	1
Penicillin	0	0	2	0	0	8	2	0	1	0	0	1
Spectinomycin	0	2	0	2	6	0	0	3	0	0	0	1
Streptomycin	2	0	0	4	0	4	0	0	3	0	0	1
Sulphadimethoxine	2	0	0	2	0	6	1	0	2	0	0	1
Sulphathiazole	0	1	1	0	2	6	0	1	2	0	1	0
Tetracycline	2	0	0	NI			2	0	0	0	0	1
Trimethoprim/Sulphamethoxazole	2	0	0	7	0	1	3	0	0	NI		
Tylosin Tartrate	NI			NI			0	0	3	NI		

AVIAN IN VITRO SENSITIVITY TESTS (CON'T)

	Salmonella sp.			*Staphylococcus aureus*			*Staphylococcus* sp.			*Streptococcus gallolyticus*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amoxicillin	21	0	8	NI			0	1	0	1	0	0
Ceftiofur	28	0	1	1	0	0	1	0	0	1	0	0
Clindamycin	0	0	29	1	0	0	1	0	0	0	0	1
Enrofloxacin	28	0	1	1	0	0	1	0	0	0	1	0
Erythromycin	NI			1	0	0	1	0	0	1	0	0
Florfenicol	1	24	4	0	1	0	0	1	0	1	0	0
Gentamicin	17	3	9	1	0	0	1	0	0	0	0	1
Neomycin	27	0	2	1	0	0	1	0	0	0	0	1
Novobiocin	0	0	29	1	0	0	1	0	0	1	0	0
Oxytetracycline	17	0	12	0	0	1	1	0	0	0	0	1
Penicillin	0	0	29	NI			0	0	1	1	0	0
Spectinomycin	0	18	11	0	0	1	0	0	1	0	0	1
Streptomycin	12	0	17	1	0	0	1	0	0	0	0	1
Sulphadimethoxine	4	0	25	1	0	0	0	0	1	0	0	1
Sulphathiazole	0	16	13	0	1	0	0	0	1	0	0	1
Tetracycline	17	0	12	0	0	1	1	0	0	0	0	1
Trimethoprim/Sulphamethoxazole	29	0	0	1	0	0	1	0	0	NI		
Tylosin Tartrate	NI			NI			NI			NI		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
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BOVINE

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Columns ok going down	*Bibersteinia trehalosi*			*Campylobacter fetus*			*Campylobacter jejuni*			*Escherichia coli*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	16	0	3	1	0	0	4	0	0	2	0	31
Ceftiofur	19	0	0	1	0	0	0	0	4	7	0	26
Chlortetracycline	9	8	2	1	0	0	0	0	4	0	0	33
Clindamycin	0	0	19	1	0	0	4	0	0	0	0	33
Danofloxacin	13	0	6	1	0	0	2	0	2	9	0	24
Enrofloxacin	14	0	5	1	0	0	3	0	1	10	0	23
Florfenicol	15	0	4	1	0	0	4	0	0	0	5	28
Gentamicin	17	0	2	1	0	0	4	0	0	19	4	10
Neomycin	14	0	5	1	0	0	4	0	0	6	0	27
Oxytetracycline	2	0	17	1	0	0	0	0	4	0	0	33
Penicillin	1	0	18	0	0	1	0	0	4	0	0	33
Spectinomycin	0	18	1	1	0	0	4	0	0	0	10	23
Sulphadimethoxine	12	0	7	1	0	0	1	0	3	0	0	33
Tiamulin	5	0	14	0	0	1	4	0	0	0	0	33
Tilmicosin	14	0	5	1	0	0	4	0	0	0	0	33
Trimethoprim/Sulphamethoxazole	15	0	0	1	0	0	0	0	4	8	0	25
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	NI			NI			NI			NI		

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Escherichia coli K99			Hemolytic *Escherichia coli*			*Histophilus somni*			*Mannheimia haemolytica*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	3	0	8	5	0	3	108	1	0	153	2	15
Ceftiofur	8	0	3	6	0	2	106	1	2	170	0	0
Chlortetracycline	1	0	10	2	0	5	89	16	4	142	22	6
Clindamycin	0	0	11	0	0	7	53	43	13	0	1	169
Danofloxacin	9	0	2	5	0	2	105	0	4	144	0	26
Enrofloxacin	9	0	2	5	0	2	104	3	2	152	1	17
Florfenicol	0	3	8	1	5	1	100	6	3	151	3	16
Gentamicin	8	1	2	6	0	1	0	0	0	154	1	15
Neomycin	4	0	7	5	0	2	13	0	96	139	0	31
Oxytetracycline	1	0	10	2	0	5	46	7	56	124	5	41
Penicillin	0	0	11	0	0	8	91	0	18	30	0	140
Spectinomycin	0	4	7	0	5	2	61	31	17	2	143	25
Sulphadimethoxine	2	0	9	5	0	3	46	0	63	116	0	54
Tiamulin	0	0	11	0	0	7	108	0	1	28	0	142
Tilmicosin	0	0	11	0	0	7	92	8	9	132	11	27
Trimethoprim/Sulphamethoxazole	5	0	6	5	0	2	NI			166	0	4
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	NI			NI			56	26	27	1	0	169

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Moraxella sp.			*Pasteurella multocida*			*Pasteurella* sp.			*Pseudomonas aeruginosa*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1	0	0	180	0	0	1	0	0	0	0	2
Ceftiofur	1	0	0	179	0	1	1	0	0	0	0	2
Chlortetracycline	1	0	0	167	12	1	1	0	0	0	0	2
Clindamycin	0	1	0	1	0	179	0	0	1	0	1	2
Danofloxacin	1	0	0	161	0	19	1	0	0	0	0	2
Enrofloxacin	1	0	0	172	3	5	1	0	0	1	0	1
Florfenicol	1	0	0	170	1	9	1	0	0	0	0	2
Gentamicin	1	0	0	132	38	10	1	0	0	2	0	0
Neomycin	1	0	0	59	0	121	0	0	1	2	0	0
Oxytetracycline	1	0	0	116	4	60	1	0	0	0	0	2
Penicillin	1	0	0	129	0	51	0	0	1	0	0	2
Spectinomycin	0	1	0	11	131	38	0	0	1	0	1	2
Sulphadimethoxine	1	0	0	75	0	105	1	0	0	0	0	2
Tiamulin	1	0	0	21	0	159	0	0	1	0	0	2
Tilmicosin	1	0	0	133	12	35	1	0	0	0	0	2
Trimethoprim/Sulphamethoxazole	NI			168	0	0	1	0	0	NI		
Tulathromycin	NI			161	4	15	NI			NI		
Tylosin Tartrate	NI			0	2	178	NI			NI		

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Salmonella sp.			*Staphylococcus aureus*			*Streptococcus dysgalactiae*			*Streptococcus gallolyticus*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	24	0	29	1	0	0	2	0	0	0	1	0
Ceftiofur	28	1	24	1	0	0	2	0	0	1	0	0
Chlortetracycline	16	1	36	1	0	0	0	0	2	0	0	1
Clindamycin	0	0	53	1	0	0	1	0	1	0	0	1
Danofloxacin	40	0	13	1	0	0	0	0	2	0	0	1
Enrofloxacin	44	3	6	1	0	0	2	0	0	0	0	1
Florfenicol	4	19	30	0	0	1	2	0	0	0	1	0
Gentamicin	52	0	1	1	0	0	2	0	0	1	0	0
Neomycin	32	0	21	1	0	0	2	0	0	0	0	1
Oxytetracycline	17	0	36	1	0	0	0	0	2	0	0	1
Penicillin	0	0	53	1	0	0	2	0	0	0	0	1
Spectinomycin	0	26	27	0	0	1	2	0	0	0	0	1
Sulphadimethoxine	14	0	39	1	0	0	2	0	0	0	0	1
Tiamulin	0	0	53	1	0	0	2	0	0	0	0	1
Tilmicosin	0	0	53	1	0	0	1	0	1	1	0	0
Trimethoprim/Sulphamethoxazole	43	0	10	1	0	0	NI			NI		
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	NI			NI			NI			NI		

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Streptococcus suis			*Yersinia enterocolitica*		
	S	I	R	S	I	R
Ampicillin	1	0	0	0	0	1
Ceftiofur	1	0	0	1	0	0
Chlortetracycline	0	0	1	0	0	1
Clindamycin	0	0	1	0	0	1
Danofloxacin	0	0	1	1	0	0
Enrofloxacin	0	0	1	1	0	0
Florfenicol	1	0	0	1	0	0
Gentamicin	0	0	1	1	0	0
Neomycin	1	0	0	1	0	0
Oxytetracycline	0	0	1	0	0	1
Penicillin	0	0	1	0	0	1
Spectinomycin	0	0	1	1	0	0
Sulphadimethoxine	0	0	1	0	0	1
Tiamulin	0	0	1	0	0	1
Tilmicosin	0	0	1	0	0	1
Trimethoprim/Sulphamethoxazole	NI			1	0	0
Tulathromycin	NI			NI		
Tylosin Tartrate	NI			NI		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
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MILK SAMPLES

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	Enterobacter sp.			*Escherichia coli*			Hemolytic *Escherichia coli*			*Pasteurella multocida*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1	0	0	1	0	2	1	0	0	2	0	0
Ceftiofur	1	0	0	3	0	0	1	0	0	2	0	0
Cephalothin	1	0	0	1	0	2	1	0	0	1	0	0
Erythromycin	1	0	0	NI			NI			1	0	0
Oxacillin+2%Nacl	1	0	0	0	0	3	0	0	1	1	0	0
Penicillin	1	0	0	0	0	3	0	0	1	0	0	2
Penicillin / Novobiocin	1	0	0	0	0	3	0	0	1	1	0	0
Pirlimycin	1	0	0	0	0	3	0	0	1	1	0	0
Sulphadimethoxine	1	0	0	0	0	3	0	0	1	1	0	1
Tetracycline	1	0	0	1	0	2	1	0	0	0	0	1

	Serratia marcescens			*Staphylococcus aureus*			*Staphylococcus chromogenes*			*Streptococcus dysgalactiae*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1	0	0	6	0	0	1	0	0	NI	0	0
Ceftiofur	0	0	1	6	0	0	1	0	0	2	0	0
Cephalothin	0	0	1	6	0	0	1	0	0	2	0	0
Erythromycin	0	1	0	4	1	1	1	0	0	2	0	0
Oxacillin+2%Nacl	0	0	1	5	0	0	1	0	0	2	0	0
Penicillin	1	0	0	5	0	1	1	0	0	NI	0	0
Penicillin / Novobiocin	1	0	0	6	0	0	1	0	0	2	0	0
Pirlimycin	0	0	1	4	0	2	1	0	0	2	0	0
Sulphadimethoxine	0	0	1	3	0	3	1	0	0	2	0	0
Tetracycline	1	0	0	5	1	0	1	0	0	2	0	0

MILK SAMPLE IN VITRO SENSITIVITY TESTS (CON'T)

	Streptococcus sp.			*Streptococcus uberis*		
	S	I	R	S	I	R
Ampicillin	0	0	1	0	0	1
Ceftiofur	1	0	0	2	0	0
Cephalothin	0	0	1	2	0	0
Erythromycin	NI			2	0	0
Oxacillin+2%Nacl	0	0	1	2	0	0
Penicillin	0	0	1	0	0	1
Penicillin / Novobiocin	0	0	1	2	0	0
Pirlimycin	0	0	1	2	0	0
Sulphadimethoxine	0	0	1	2	0	0
Tetracycline	0	1	0	2	0	0

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
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OVINE

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	Bibersteinia trehalosi			*Campylobacter fetus*			*Campylobacter jejuni*			*Escherichia coli*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	2	0	0	5	0	0	9	0	1	1	0	0
Ceftiofur	2	0	0	0	0	5	0	0	10	1	0	0
Chlortetracycline	1	1	0	5	0	0	1	0	9	1	0	0
Clindamycin	0	0	2	0	5	0	10	0	0	0	0	1
Danofloxacin	2	0	0	3	0	2	6	0	4	1	0	0
Enrofloxacin	2	0	0	5	0	0	7	0	3	1	0	0
Florfenicol	2	0	0	4	1	0	10	0	0	0	1	0
Gentamicin	2	0	0	5	0	0	10	0	0	1	0	0
Neomycin	2	0	0	5	0	0	10	0	0	1	0	0
Oxytetracycline	1	0	1	5	0	0	1	0	9	1	0	0
Penicillin	1	0	1	0	0	5	0	0	10	0	0	1
Spectinomycin	0	2	0	3	2	0	9	1	0	0	1	0
Sulphadimethoxine	2	0	0	0	0	5	2	0	8	1	0	0
Tiamulin	1	0	1	0	0	5	9	0	1	0	0	1
Tilmicosin	2	0	0	5	0	0	10	0	0	0	0	1
Trimethoprim / Sulphamethoxazole	2	0	0	0	0	5	2	0	8	1	0	0
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	NI			NI			NI			NI		

OVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Histophilus somni			*Mannheimia haemolytica*			*Pasteurella multocida*			Pseudomonas *aeruginosa*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1	0	0	10	0	0	6	0	0	0	0	3
Ceftiofur	1	0	0	10	0	0	6	0	0	0	0	3
Chlortetracycline	1	0	0	9	1	0	6	0	0	0	0	3
Clindamycin	1	0	0	0	0	10	0	0	6	0	0	3
Danofloxacin	1	0	0	10	0	0	6	0	0	1	0	2
Enrofloxacin	1	0	0	10	0	0	6	0	0	2	0	1
Florfenicol	1	0	0	10	0	0	6	0	0	0	0	3
Gentamicin	NI			10	0	0	6	0	0	3	0	0
Neomycin	0	0	1	10	0	0	6	0	0	3	0	0
Oxytetracycline	1	0	0	8	1	1	6	0	0	0	0	3
Penicillin	1	0	0	2	0	8	4	0	2	0	0	3
Spectinomycin	1	0	0	0	10	0	0	6	0	0	0	3
Sulphadimethoxine	1	0	0	9	0	1	5	0	1	0	0	3
Tiamulin	1	0	0	7	0	3	0	0	6	0	0	3
Tilmicosin	1	0	0	10	0	0	5	1	0	0	0	3
Trimethoprim / Sulphamethoxazole	NI			10	0	0	6	0	0	0	0	0
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	1	0	0	0	0	10	0	0	6	NI		

OVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Salmonella sp.			*Staphylococcus aureus*		
	S	I	R	S	I	R
Ampicillin	2	0	0	0	0	0
Ceftiofur	2	0	0	1	0	0
Chlortetracycline	2	0	0	0	0	1
Clindamycin	0	0	2	1	0	0
Danofloxacin	2	0	0	1	0	0
Enrofloxacin	2	0	0	1	0	0
Florfenicol	2	0	0	0	1	0
Gentamicin	2	0	0	1	0	0
Neomycin	2	0	0	1	0	0
Oxytetracycline	2	0	0	0	0	1
Penicillin	0	0	2	0	0	0
Spectinomycin	0	1	1	0	0	1
Sulphadimethoxine	1	0	1	1	0	0
Tiamulin	0	0	2	1	0	0
Tilmicosin	0	0	2	1	0	0
Trimethoprim / Sulphamethoxazole	2	0	0	1	0	0
Tulathromycin	NI			NI		
Tylosin Tartrate	NI			NI		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
JULY 1, 2016 – JUNE 30, 2017

PORCINE

The antimicrobial susceptibility test report does not represent a treatment recommendation. The veterinarian treating the animals has sole responsibility for recommending therapy and providing information on withholding and/or withdrawal times for market consumption.

S = Susceptible; I = Intermediate; R = Resistant; NI = No Interpretation

	Actinobacillus equuli			*Actinobacillus suis*			*Bordetella bronchiseptica*			*Enterococcus* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1	0	0	17	0	1	2	1	18	1	0	0
Ceftiofur	1	0	0	18	0	0	0	0	21	0	0	1
Chlortetracycline	1	0	0	17	1	0	21	0	0	0	0	1
Clindamycin	0	0	1	1	0	17	1	0	20	0	0	1
Danofloxacin	1	0	0	14	0	4	9	0	12	0	0	1
Enrofloxacin	1	0	0	18	0	0	16	3	2	0	0	1
Florfenicol	0	0	1	11	5	2	10	6	5	0	1	0
Gentamicin	0	1	0	17	1	0	14	0	7	1	0	0
Neomycin	0	0	1	14	0	4	14	0	7	0	0	1
Oxytetracycline	0	0	1	5	0	13	7	0	14	0	0	1
Penicillin	0	0	1	9	0	8	7	0	14	0	0	1
Spectinomycin	0	0	1	2	13	3	3	7	11	0	0	1
Sulphadimethoxine	0	0	1	5	0	13	7	0	14	0	0	1
Tiamulin	0	0	1	7	0	11	4	0	17	0	0	1
Tilmicosin	0	0	1	3	0	15	5	1	15	0	0	1
Trimethoprim/Sulphamethoxazole	0	0	1	6	0	2	6	0	7	NI		
Tulathromycin	NI			NI			NI			NI		
Tylosin (Tartrate/Base)	NI			0	0	1	0	0	1	NI		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Escherichia coli			*Haemophilus parasuis*			Hemolytic *Escherichia coli*			*Pasteurella multocida*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	12	0	35	16	2	0	21	0	80	40	0	0
Ceftiofur	31	1	15	17	0	1	73	0	28	40	0	0
Chlortetracycline	3	0	44	18	0	0	4	0	97	38	1	1
Clindamycin	5	1	41	2	0	16	4	1	96	5	1	34
Danofloxacin	20	0	27	13	0	5	59	0	42	25	0	15
Enrofloxacin	32	4	11	17	1	0	83	7	11	39	1	0
Florfenicol	23	6	18	8	5	5	49	32	20	24	11	5
Gentamicin	36	2	9	15	1	2	87	1	13	37	1	2
Neomycin	33	0	14	15	0	3	79	0	22	32	0	8
Oxytetracycline	5	1	41	2	0	16	23	1	77	13	3	24
Penicillin	15	0	32	3	0	15	24	0	77	12	0	28
Spectinomycin	6	23	18	2	8	8	12	64	25	6	21	13
Sulphadimethoxine	16	0	31	5	0	13	38	0	63	12	0	28
Tiamulin	11	0	36	5	0	13	28	0	73	12	0	28
Tilmicosin	10	1	36	4	1	13	15	5	81	13	2	25
Trimethoprim/Sulphamethoxazole	17	0	12	11	0	2	53	0	9	17	0	8
Tulathromycin	NI			NI			NI			NI		
Tylosin (Tartrate/Base)	0	0	4	NI			0	0	9	0	0	4

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Proteus vulgaris			*Salmonella* sp.			*Staphylococcus aureus*.			*Staphylococcus epidermidis*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	0	0	1	25	0	35	0	0	2	0	0	1
Ceftiofur	1	0	0	47	0	13	1	1	0	1	0	0
Chlortetracycline	0	1	0	14	0	46	0	0	2	0	0	1
Clindamycin	0	0	1	3	4	53	0	0	2	0	0	1
Danofloxacin	0	0	1	35	0	25	0	0	2	0	0	1
Enrofloxacin	1	0	0	52	1	7	2	0	0	1	0	0
Florfenicol	1	0	0	33	16	11	2	0	0	1	0	0
Gentamicin	1	0	0	50	1	9	2	0	0	1	0	0
Neomycin	1	0	0	48	0	12	2	0	0	1	0	0
Oxytetracycline	0	0	1	15	3	42	1	0	1	0	0	1
Penicillin	1	0	0	21	0	39	1	0	1	1	0	0
Spectinomycin	0	1	0	10	28	22	1	1	0	1	0	0
Sulphadimethoxine	0	0	1	29	0	31	1	0	1	1	0	0
Tiamulin	0	0	1	20	0	40	2	0	0	1	0	0
Tilmicosin	0	0	1	10	4	46	0	0	2	0	0	1
Trimethoprim/Sulphamethoxazole	0	0	0	28	0	7	0	0	0	0	0	0
Tulathromycin	NI			NI			NI			NI		
Tylosin (Tartrate/Base)	NI			0	0	5	NI			NI		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Staphylococcus hyicus			*Streptococcus agalactiae*			*Streptococcus dysgalactiae*			*Streptococcus suis*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	0	0	0	1	0	0	8	0	0	133	11	2
Ceftiofur	1	0	0	1	0	0	8	0	0	140	4	2
Chlortetracycline	0	0	1	0	0	1	0	1	7	17	22	107
Clindamycin	0	0	1	0	0	1	1	1	6	7	3	136
Danofloxacin	0	0	1	1	0	0	7	0	1	78	0	68
Enrofloxacin	0	0	1	1	0	0	8	0	0	111	15	20
Florfenicol	0	1	0	0	1	0	4	2	2	74	43	29
Gentamicin	0	0	1	0	0	1	7	0	1	110	5	31
Neomycin	0	0	1	1	0	0	7	0	1	122	0	24
Oxytetracycline	0	0	1	0	0	1	2	0	6	38	3	105
Penicillin	0	0	1	0	0	1	2	0	6	39	0	107
Spectinomycin	0	0	1	0	0	1	2	4	2	10	74	62
Sulphadimethoxine	0	0	1	0	0	1	4	0	4	59	0	87
Tiamulin	0	0	1	0	0	1	4	0	4	31	0	115
Tilmicosin	0	0	1	0	0	1	2	0	6	32	6	108
Trimethoprim/Sulphamethoxazole	1	0	0	1	0	0	4	0	0	71	0	26
Tulathromycin	NI			NI			NI			NI		
Tylosin (Tartrate/Base)	NI			NI			NI			0	0	16

South Dakota
Animal Disease Research and Diagnostic Laboratory

Salmonella Isolations

July 1, 2016 - June 30, 2017

	TOTAL	Avian	Bovine	Canine	Environ-mental	Equine	Ovine	Porcine
4,[5],12:di-	1		1					
4,5,12:i	25	1	3					21
61:k:1,5,7	1						1	
III 61:k:1,5,7	3						1	2
adelaide	1		1					
agona	8	2	1					5
albany	2	2						
anatum	1		1					
bovis-morbificans	2		1					1
cannstatt	4							4
cerro	3		3					
cholerasuis	1							1
cholerasuis (kunzendorf)	2							2
derby	11		1					10
dublin	19		19					
enteritidis	1							1
hadar	4	4						
heidelberg	9	1	7					1
infantis	8	3	1					4
krefeld	1							1
lille	2		2					
liverpool	1							1
london	2							2
mbandaka	1	1						
meleagridis	1		1					
montevideo	11	4	6		1			
muenchen	1							1
muenster	1		1					
newport	1							1
ohio	1							1
putten	2							2
rissen	3							3
roodepoort	1		1					
schwarzengrund	1	1						
senftenberg	2	1			1			
thompson	1		1					
typhimurium	8	1	1	1		1		4
uganda	6	5	1					
worthington	1							1
TOTAL	154	26	53	1	2	1	2	69

South Dakota
Animal Disease Research and Diagnostic Laboratory

Serology

July 1, 2016 - June 30, 2017

Disease	Positive	Negative	Other	Total
Anaplasmosis				
Competitive Enzyme-Linked Immunoassay	209	1,865	0	2,074
Avian Influenza				
AGID (Production birds)	0	6,524	0	6,524
AGID (Egg products)	0	114	0	114
Bluetongue				
Enzyme-Linked Immunoassay (ELISA)	286	12,967	5	13,258
Bordetella avium/ "turkey coryza"				
ELISA	157	168	0	325
Bovine Leukosis Virus				
AGID	2	1	0	3
ELISA	2,541	28,106	10	30,657
Bovine Pregnancy Test	5,549	1,391	3	6,943
Bovine Respiratory Syncytial Virus				
SN	85	4	1	90
Bovine Viral Diarrhea Virus				
ACE	417	9,406	18	9,841
Bovine Viral Diarrhea Virus I				
SN	360	17	0	377
Bovine Viral Diarrhea Virus II				
SN	372	13	0	385
Brucella				
BAPA	2	3,986	10	3,998
Card	1	1,582	2	1,585
Plate	0	257	3	260
Rivanol	0	15	2	17
Tube	0	7,371	2	7,373
Brucella - Canine				
IFA	3	107	0	110
Brucella - Small Ruminant				
Card	0	60	2	62
Brucella ovis				
ELISA	28	1,947	0	1,975
Epizootic Hemorrhagic Disease				
AGID	12	33	0	45
Equine Infectious Anemia				
ELISA	1	2,733	0	2,734
Feline Immunodeficiency Virus				
ELISA	1	31	0	32
Feline Infectious Peritonitis				
ELISA	12	7	0	19
Feline Leukemia Virus				
ELISA	4	28	0	32

Hemorrhagic Enteritis Virus (HEV)				
ELISA	295	30	0	325
Infectious Bovine Rhinotracheitis				
SN	363	34	2	399
Leptospira				
bratislava	36	551	10	597
canicola	18	579	0	597
grippotyphosa	44	553	0	597
hardjo	23	574	0	597
icterohemorrhagiae	33	564	0	597
pomona	85	512	0	597
Mycoplasma hyopneumoniae				
ELISA	1,788	19,314	2	21,104
DAKO	162	179	1	342
Neospora				
ELISA	125	747	0	872
Newcastle Disease (NDV)				
ELISA	46	279	0	325
Ornithobacterium rhinotracheale (ORT)				
ELISA	184	141	0	325
Ovine Progressive Pneumonia				
AGID	1	20	0	21
Ovine Progressive Pneumonia/Caprine Arthritis Encephelitis				
ELISA	65	345	0	410
Parainfluenza-3				
SN	35	0	0	35
Paratuberculosis (Johne's)				
ELISA	3,967	45,450	3	49,420
Porcine Epidemic Diarrhea Virus				
IFA	34	7,235	1	7,270
Porcine Respiratory and Reproductive Syndrome				
ELISA	1,610	43,011	26	44,647
Fluorescent Focus Neutralization (FFN)	1,073	423	0	1,496
IFA (European Strain)	3	67	0	70
IFA (North American Strain)	8	67	0	75
Oral Fluids (ELISA)	519	87	0	606
Pseudorabies				
g B ELISA	2	1,573	4	1,579
g B ELISA NAHLN	0	304	1	305
Pseudorabies Differential Test				
G1 ELISA	0	4	0	4
G1 ELISA NAHLN	0	1	0	1
Q Fever				
ELISA	0	17	0	17
Swine Influenza				
ELISA	168	358	0	526
TOTAL	**20,729**	**201,752**	**108**	**222,589**

South Dakota
Animal Disease Research and Diagnostic Laboratory

Rabies Examination

July 1, 2016 - June 30, 2017

	Positive		Negative			
	Human Exposure	No Human Exposure	Human Exposure	No Human Exposure	Untestable*	Total Specimens
Bat	4		111	8	9	132
Beaver			1			1
Bovine	2		32	11	11	56
Canine			43	3	2	48
Caprine	1		5	1		7
Coyote			1			1
Deer			4	2		6
Donkey			1			1
Equine			4			4
Feline			106	6	1	113
Fox			1	1		2
Gopher					1	1
Mink					1	1
Mouse			3			3
Muskrat			1			1
Opossum			4	1	1	6
Ovine			5	1	1	7
Raccoon			30	9		39
Rat					1	1
Skunk	2	5	14	7	2	30
Squirrel			1			1
Woodchuck	_	_	3	_	_	3
Total	9	5	370	50	30	464

*Untestable: Complete, well preserved, fresh, bilateral sections of brain tissue are required for testing. Samples may be untestable due to formalin fixation, trauma, and autolysis.

South Dakota
Animal Disease Research and Diagnostic Laboratory

Positive Rabies Cases

July 1, 2016 - June 30, 2017

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	Total
Bat	0	2	1	0	0	0	0	0	0	0	0	0	3
Bovine	1	0	1	1	0	0	0	0	0	0	0	0	3
Caprine	0	0	0	0	0	0	1	0	0	0	0	0	1
Skunk	0	1	1	2	0	0	0	0	3	0	0	0	7
TOTAL	1	3	3	3	0	0	1	0	3	0	0	0	14

South Dakota
Animal Disease Research and Diagnostic Laboratory

Molecular Diagnostics

July 1, 2016 - June 30, 2017

BOVINE

Disease	Positive	Negative	Other	Total
5' UTR Bovine Viral Diarrhea Virus Sequencing	0	0	11	11
Anaplasma marginale	88	254	0	342
Bluetongue Virus	1	871	0	872
Bovine Coronavirus	69	273	0	342
Bovine Herpes Virus 1	18	336	11	365
Bovine Leukosis Virus	119	226	0	345
Bovine Respiratory Syndrome Virus	56	274	12	342
Bovine Viral Diarrhea Detection	163	1,078	0	1,241
Bovine Viral Diarrhea Ear Notch	123	1,249	0	1,372
Epizootic Hemorrhagic Disease Virus	28	22	0	50
Leptospira sp.	1	292	0	293
Mycobacterium paratuberculosis (Johne's)	407	1,685	3	2,095
Mycoplasma bovis	58	39	0	97
Tritrichomonas foetus	7	8,000	16	8,023

PORCINE

Disease	Positive	Negative	Other	Total
Circovirus II	147	300	1	448
Circovirus II Sequencing	0	0	0	0
Classical Swine Fever	0	207	2	209
Lawsonia intracellularis	76	79	0	155

Mycoplasma hyopneumoniae	132	2,057	0	2,189	
Porcine Epidemic Diarrhea Virus	818	15,713	41	16,572	
Porcine Epidemic Diarrhea Virus Sequencing	0	0	3	3	
Porcine Parvovirus	6	7	0	13	
Porcine Respiratory and Reproductive Syndrome					
North American-like					
Oral Fluids	699	15,742	170	16,611	UNTIL 5/31/17
Serum	0	142	0	142	
	4,659	40,084	16	44,759	
Tissue	53	145	0	198	UNTIL 5/31/17
European-like					
Oral Fluids	17	16,536	58	16,611	UNTIL 5/31/17
Serum	0	142	0	142	
	112	44,639	8	44,759	
Tissue	2	196	0	198	UNTIL 5/31/17
Porcine Respiratory and Reproductive Syndrome					
Oral Fluids / Tissue	71	2,175	9	2,255	STARTING 6/1/17
Porcine Rotavirus A	107	71	0	178	
Porcine Rotavirus B	83	95	0	178	
Porcine Rotavirus C	57	121	0	178	
PRRS Sequencing	0	0	734	734	
PRRSV ORF5 Sequencing	0	0	706	706	
Seneca Valley Virus	131	794	0	925	
Swine Deltacoronavirus	29	16,502	51	16,582	
Swine Influenza Virus	1,934	7,048	82	9,064	
Swine Influenza Virus Sequencing (H, M, N gene)	0	0	56	56	
Swine Influenza Virus Subtyping (H and N)	0	0	103	103	
Swine Influenza Virus Subtyping (H and N) NAHLN	0	0	0	0	
Transmissible Gastroenteritis	2	16,529	51	16,582	

AVIAN

Disease	Positive	Negative	Other	Total
Avian Influenza Screen	65	71	0	136

MISCELLANEOUS

Disease	Positive	Negative	Other	Total
APMV1 Newcastle DV Matrix	0	12	0	12
Clostridium perfringens Genotyping (refer to next page for details)	0	0	85	85
Escherichia coli	1	49	0	50
Foot and Mouth Disease NAHLN	0	15	0	15
Influenza A	1	758	0	759

South Dakota
Animal Disease Research and Diagnostic Laboratory

Molecular Diagnostics -- Clostridium Genotyping

July 1, 2016 - June 30, 2017

	Genotype A	Genotype A/ Beta 2 Toxin	Genotype A/ Enterotoxin	Genotype C	Genotype E/ Beta 2 Toxin	Genotype E/ Beta 2 Toxin Enterotoxin	Genotype E/ Enterotoxin	Total
Bovine	44	13	1	1	1	3	1	64
Caprine	3	1	0	0	0	0	0	4
Deer	1	0	0	0	0	0	0	1
Equine	0	1	0	1	0	0	0	2
Ovine	1	0	0	0	0	0	0	1
Porcine	0	10	0	0	0	0	0	10
TOTAL	49	25	1	2	1	3	1	82

SOUTH DAKOTA

ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

DIAGNOSES BY SPECIES

Diagnoses for each animal species are listed in alphabetical order under various organ systems by the following scheme:

0 Body as a Whole (multisystemic disease and all toxicoses)

1 Integumentary

2 Musculoskeletal

3 Respiratory (including nasal passages)

4 Cardiovascular

5 Hemic and Lymphatic

6 Digestive (including lip, oral structures, liver, and pancreas)

7 Urogenital (including prepuce, scrotum, vulva, and mammary gland)

8 Endocrine

9 Nervous

X Special Senses (including eyelid and pinna)

DIAGNOSIS BY SPECIES AND ORGAN SYSTEM
July 1, 2016 - June 30, 2017

	TOTAL
AVIAN, MISCELLANEOUS	
BODY AS A WHOLE	
Avian, tuberculosis, *Mycobacterium*	1
No diagnosis	1
Normal tissue	1
Septicemia, bacterial, miscellaneous	3
Septicemia, *Salmonella*	1
West Nile virus infection	1
CARDIOVASCULAR	
Myocarditis	1
DIGESTIVE	
Hepatopathy	1
Intestine enteritis, coccidia	1
MUSCULOSKELETAL	
Joint arthritis, *Escherichia coli*	1
Joint arthritis, *Staphylococcus aureus*	1
CHICKEN	
BODY AS A WHOLE	
Adenocarcinoma	1
Septicemia, bacterial, miscellaneous	1
Septicemia, *Escherichia coli*	1
Septicemia, *Pasteurella multocida*	1
CARDIOVASCULAR	
Cardiomyopathy	1
DIGESTIVE	
Hepatitis	1
Intestine enteritis, coccidia	3
Intestine enteritis, *Salmonella* sp.	1
Intestine parasitism, ascarids	1
Intestine parasitism, strongyles	2
RESPIRATORY	
Bacterial pneumonia	1
Lung pneumonia, *Pasteurella multocida*	1
Pneumonia, *Ornithobacterium rhinotracheale*	1
Tracheitis	1
Tracheitis, laryngotracheitis virus	2

COCKATIEL

RESPIRATORY

Lung pulmonary, congestion	1

PHEASANT

BODY AS A WHOLE

No diagnosis	1
Septicemia, *Escherichia coli*	2
Starvation / inanition	1

DIGESTIVE

Intestine entritis, coccidia	3
Intestine enteritis, *Salmonella*	1

HEMIC AND LYMPHATIC

Marble spleen disease	1
Splenitis	1

RESPIRATORY

Viral pneumonia	1

PIGEON

BODY AS A WHOLE

Normal tissue	1

DIGESTIVE

Avian, ingluvitis	1

TURKEY

BODY AS A WHOLE

Autolysis	1
Emaciation	1
Gout	1
Hemorrhage	2
Polyserositis	2
Septicemia, *Escherichia coli*	22
Septicemia, *Salmonella*	6
Septicemia, *Streptococcus* sp.	1
Starvation / inanition	1
Trauma	1

CARDIOVASCULAR

Bacterial pericarditis	1

Cardiomyopathy	1
Heart, epicarditis	2
DIGESTIVE	
Atrophic enteritis	1
Avian ingluvitis	2
Enteritis, idiopathic	1
Gastric impaction	1
Intestine enteritis, *Escherichia coli*	4
Intestine enteritis, coccidia	10
Intestine enteritis, *Salmonella*	8
HEMIC AND LYMPHATIC	
Marble spleen disease	1
Splenosis	1
MUSCULOSKELETAL	
Joint arthritis, bacterial, miscellaneous	2
RESPIRATORY	
Airsacculitis	5
Bacterial pneumonia	1
Bronchopneumonia	2
Lung pneumonia, *Bordetella bronchiseptica*	1
Lung pneumonia, *Escherichia coli*	12
Lung pneumonia, *Salmonella* sp.	1
Pneumonia, *Ornithobacterium rhinotracheale*	14
Sacculitis, yolk	1
UROGENITAL	
Nephrosis, idiopathic	1

ANTELOPE

BODY AS A WHOLE	
Bluetongue	1
Epizooti hemorrhagic disease	2

BAT

NERVOUS	
Rabies	2

BEAVER

RESPIRATORY	
Bacterial pneumonia	1

BIGHORN SHEEP

BODY AS A WHOLE	
Copper deficiency	2
Trauma	1
DIGESTIVE	
Intestine enteritis, *Clostridium perfringens*	1
Intestine enteritis, coccidia	2
Intestine parasitism, strongyle	2
NERVOUS	
Brain, meningoenephalitis	1
RESPIRATORY	
Bronchointerstitial pneumonia	1
Lung pneumonia, *Biebersteinia trehalosi*	2
Lung pneumonia, *Pasteurella multocida*	2
Lung pneumonia, *Trueperella pyogenes*	1
Parasitic pneumonia	1

BISON (AMERICAN)

BODY AS A WHOLE	
Copper deficiency	1
Copper higher than normal	1
No diagnosis	1
Selenium higher than normal	1
Selenium toxicosis	1
DIGESTIVE	
Abomasum abomasitis	1
Intestine enteritis, *Clostridium perfringens*	1
Intestine enteritis, coccidia	3
RESPIRATORY	
Lung hemorrhage	1
Lung pleuritis	1
Lung pneumonia, *Histophilus somni*	1
Lung pneumonia, *Mannheimia haemolytica*	2
Lung pneumonia, *Mycoplasma bovis*	1
Lung pneumonia, *Pasteurella multocida*	1
Parasitic pneumonia	1

BOVINE

BODY AS A WHOLE	
Abscess	5
Anaphylaxis (Type 1 hypersensitivity)	2

Ascites	1
Autolysis	37
BLV PCR positive	7
BVD virus infection (virus isolation)	20
BVD virus PCR positive	84
Congenital anomaly	3
Copper deficiency	9
Copper higher than normal	8
Copper marginal	4
Emaciation	2
Fat serous atrophy	1
Heat prostration	3
Hemorrhage	2
Herpesvirus DN599 infection, virus isolation	12
Infectious bovine rhinotracheitis	6
Infectious bovine rhinotracheitis, virus isolation	5
Iron higher than normal	1
Lead toxicosis	7
Leptospirosis	1
Listeria septicemia	2
Nitrate / nitrite toxicosis	1
No diagnosis	35
Normal tissue	41
Omphalitis (navel ill)	15
Peritonitis	25
Salt toxicosis	2
Sarcocystosis	4
Selenium higher than normal	15
Seleniuim toxicosis	1
Septicemia, bacterial, miscellaneous	18
Septicemia, *Escherichia coli*	51
Septicemia, *Histophilus somni*	3
Septicemia, *Mannheimia haemolytica*	2
Septicemia, *Pasteurella multocida*	1
Septicemia, *Salmonella*	23
Septicemia, *Trueperella pyogenes*	3
Starvation / Inanition	3
Steatitis	1
Tetanus	1
Toxicosis, copper	2
Trauma	3
Zinc higher than normal	2

CARDIOVASCULAR

Acute heart failure	1
Bacterial pericarditis	4
Blood vessels thrombosis	1
Cardiomyopathy	1
Congenital, patent ductus arteriosis	1
Edema	3
Heart endocarditis, valvular	5

	Heart, epicarditis	3
	Myocardial necrosis	7
	Myocarditis	19
	Vasculitis	1
CHEMISTRY		
	Nitrate level, high	2
	Nitrate level, toxic	1
	Water, high levels of sulfate	3
DIGESTIVE		
	Abomasum abomasitis	12
	Abomasum abomasitis, *Clostridium* sp.	12
	Abomasum abomasitis, mycotic	5
	Abomasum perforation	5
	Abomasum rupture	2
	Abomasum ulceration	4
	Atrophic enteritis	7
	Bacterial enteritis	15
	Bovine papular stomatitis	1
	Cryptosporidiosis	211
	Enteritis due to BVD	4
	Enteritis, colitis	17
	Enteritis, idiopathic	56
	Enteritis, Johne's disease	136
	Enteritis, older bovine total cases	254
	Enteritis, *Yersinia enterocolitica*	1
	Enteritis, *Yersinia pseudotuberculosis*	1
	Enteritis, young calf total cases	351
	Esophagitis	2
	Gastritis	1
	Gastrointestinal intussusception	1
	Giardiasis	1
	Hepatic glycogenosis	1
	Hepatic lipidosis	4
	Hepatitis	13
	Hepatitis, likely toxic	1
	Hepatopathy	8
	Intestinal infarction	1
	Intestinal torsion	2
	Intestine enteritis, *Clostridium perfringens*	83
	Intestine enteritis, *Clostridium perfringens* Type A	3
	Intestine enteritis, *Clostridium perfringens* Type A beta 2	10
	Inestine enteritis, *Clostridium perfringens* Type C	1
	Intestine enteritis, *Clostridium sordelli*	1
	Intestine enteritis, coccidia	66
	Intestine enteritis, coronavirus	61
	Intestine enteritis, *Escherichia coli*	14
	Intestine enteritis, necrotic	3
	Intestine enteritis, rotavirus	96
	Intestine enteritis, *Salmonella*	25

Intestine hemorrhage	1
Intestine parasitism, strongyles	7
Intestine parasitism, whipworms	2
Intestine perforation	1
Intestine, jejunal hemorrhage syndrome	5
Liver abscess	2
Liver hepatitis, necrotic	3
Liver parasitism, trematode	1
Liver passive congestion	2
Pharyngitis	1
Rectal prolapse	1
Reticulum reticulitis, traumatic	6
Rumen acidosis / grain overload	1
Rumen rumenitis	6
Rumen rumenitis, mycotic	2
Rumen tympany, bloat	5
HEMIC AND LYMPHATIC	
Anaplasmosis	6
Hematoma	1
Lymphosarcoma	2
INTEGUMENTARY	
Cystic mammary gland ducts	1
Dermatitis, focal	1
Dermatitis, nonspecific	2
Dermatophytosis ringworm	1
Mastitis	1
Mastitis (*Staphylococcus aureus)*	6
Melanocytoma	1
Milk sample mastitis, bulk tank	5
Milk sample mastitis, clinical	18
Panniculitis	1
Papilloma	1
Squamous cell carcinoma, ocular	1
MUSCULOSKELETAL	
Clostridial myositis, blackleg	2
Joint arthritis, bacterial, miscellaneous	6
Joint arthritis, *Escherichia coli*	1
Joint arthritis, *Mycoplasma bovis*	1
Joint arthritis, *Mycoplasma* sp.	7
Joint arthritis, *Trueperella pyogenes*	1
Muscle myopathy, nutritional	4
Muscle myositis, *Clostridium* (ME)	2
Myopathy, Monensin toxicosis	1
Myositis	2
Rhabdomyosarcoma	2
Synovitis	8
Vertebral fracture	1

NERVOUS

Brain encephalitis, abscess	1
Brain encephalitis, bacterial, miscellaneous	2
Brain encephalitis, *Histophilus somni*	2
Brain encephalitis, nonsuppurative	1
Brain encephalitis, suppurative	2
Brain encephalomalacia, polio	9
Brain hemorrhage	2
Brain meningitis, *Escherichia coli*	13
Brain meningitis, suppurative	14
Brain meningoencephalitis	3
Hydrocephalus	1
Listeria monocytogenes encephalitis	2
Rabies	3
Thromboembolic meningoencephalitis	2

RESPIRATORY

Asphyxiation	1
Aspiration pneumonia	6
Bacterial pneumonia	32
Bronchitis	5
Bronchointerstitial pneumonia	27
Bronchopneumonia	39
Fibrinous pneumonia	3
Interstitial pneumonia	15
Laryngitis	2
Lung edema	9
Lung hemorrhage	2
Lung pneumonia, abscess	12
Lung pneumonia, acute, atypical interstitial	19
Lung pneumonia, *Bibersteinia trehalosi*	8
Lung pneumonia, bovine respiratory coronavirus	20
Lung pneumonia, BRSV	35
Lung pneumonia, BVD virus	6
Lung pneumonia, *Escherichia coli*	3
Lung pneumonia, *Histophilus somni*	96
Lung pneumonia, IBR virus	5
Lung pneumonia, *Mannheimia haemolytica*	132
Lung pneumonia, *Mycoplasma* sp.	158
Lung pneumonia, *Pasteurella multocida*	138
Lun pneumonia, PI3 virus	3
Lung pneumonia, *Salmonella* sp.	3
Lung pneumonia, *Trueperella pyogenes*	29
Lung pulmonary, atelectasis	2
Lung pulmonary, congestion	12
Lung pulmonary, ephysema	2
Meconium aspiration syndrome (aspiration pneumonia)	9
Nasal carcinoma	1
Nasal isolation, *Mannheimia haemolytica*	12
Nasal isolation, *Pastuerella multocida*	16
Pleuritis	11

Pneumonia, *Mycoplasma bovis*	37
Pulmonary adenocarcinoma	1
Rhinitis	2
Sinusitis, *Mycoplasma* sp.	1
Tracheitis	2
SPECIAL SENSES	
Eye keratoconjunctivitis, *Moraxella*	21
Uveitis	1
UROGENITAL	
Abortion associated with *Neospora*-like organisms	3
Abortion due to *Campylobacter*	1
Abortion due to IBR	1
Abortion with congenital anomaly	4
Abortion, *Campylobacter jejuni*	3
Abortion, hepatitis	1
Abortion, hepatopathy	1
Abortion, myocarditis	1
Abortion, placentitis	48
Abortion, pneumonia	10
Abortion, pneumonia, peribronchiolar lymphoid hyperplasia	2
Abortion, *Salmonella* sp.	2
Abortion, *Trueperella pyogenes*	17
Bacterial abortion	8
Chronic tubulointerstitial nephritis	4
Cystitis	2
Endometritis, bacterial	2
Granulosa cell tumor	1
Idiopathic abortion	127
Kidney, nephrosis	3
Kidney, pyelonephritis	3
Kidney, renal dysplasia	1
Metritis	4
Milk, *Mycoplasma* sp. isolated	1
Mycotic abortion	3
Nephritis	8
Rupture of urinary bladder	1
Urinary calculi, urolithiasis	1
Vagina, vaginitis, bacterial, miscellaneous	1
Vas deferens	2

CANINE

BODY AS A WHOLE	
Abscess	1
Anaplastic sarcoma	5
Anaplastic tumor	1
Anticoagulant type toxicosis	2
Blastomycosis	3

Compatible with vaccination reaction	1
Congenital anomaly	2
Granulation tissue	1
Hamartoma	4
Hemorrhage	3
Herpesvirus infection, canine	2
Inflammatory mass	1
Leiomyosarcoma	2
Neoplasm, adenoma (site not specified)	1
Neoplasm, infiltrative lipoma	1
Neoplasm, lipoma	23
Neoplasm, polyp	5
No diagnosis	15
Normal tissue	11
Omphalitis (navel ill)	1
Peritonitis	2
Septicemia, bacterial, miscellaneous	4
Septicemia, *Escherichia coli*	4
Septicemia, *Salmonella*	1
Septicemia, *Streptococcus* sp.	1
Starvation / inanition	1
Steatitis	1
Toxicosis, strychnine	1
Trauma	2
CARDIOVASCULAR	
Blood vessels thrombosis	1
Edema	1
DIGESTIVE	
Acanthomatous epulis	2
Ameloblastoma	1
Anal gland carcinoma	1
Campylobacter enteritis	2
Colorectal polyp	1
Cryptosporidiosis	23
Enteritis, idiopathic	2
Eosinophilic enteritis	1
Epulis	4
Gastrointestinal intussusception	2
Giardiasis	4
Gingival hyperplasia	3
Gingivitis	3
Glossitis	2
Hepatic lipidosis	2
Hepatitis	1
Intestine enteritis, coccidia	2
Intestine enteritis, *Escherichia coli*	3
Liver hepatitis, necrotic	1
Neoplasm, fibromatous epulis of periodontal ligament origin	9
Odontoma	1

Oral neoplasm, melanoma	4
Oral neoplasm, squamous cell carcinoma	1
Parvovirus enteritis	5
Salivary gland adenoma	1
Sialocele	1
Stomatitis	2
HEMIC AND LYMPHATIC	
Hemangioma	7
Hemangiopericytoma	17
Hemangiosarcoma	5
Hematoma	2
Hemosiderosis	1
Hyperplastic lymph node	1
Lymphosarcoma	11
Plasma cell neoplasm, plasmacytoma	7
Seroma	1
Splenic nodular hyperplasia	1
INTEGUMENTARY	
Actinic keratosis	1
Adenitis (sweat gland)	1
Alopecia	1
Apocrine gland adenocarcinoma	2
Bacterial dermatitis	4
Basal cell carcinoma	10
Calcinosis circumscripta	3
Cellulitis	7
Chalazion	1
Chronic hyperplastic dermatitis	11
Collagen hyperplasia	2
Compatible with vaccination reaction	1
Cystic mammary gland ducts	1
Dermal fibrosis (collagen nevus)	6
Dermal hair follicle cyst	20
Dermal sebaceous nevus	2
Dermatitis, focal	2
Dermatitis, granulomatous	3
Dermatitis, immune mediated	2
Dermatitis, lick granuloma	2
Dermatitis, mycotic (fungal)	1
Dermatitis, nonspecific	4
Dermatitis, pemphigus foliaceous	1
Dermatitis, scar	4
Dermatitis, skin, viral plaque pigmented	1
Dermatitis, *Staphylococcus* sp.	1
Dermatopathy, nutritional	1
Dermatophytosis ringworm	4
Endocrine dermatopathy	2
Epidermal cyst	10
Fibroma	20

Fibrosarcoma	8
Focal adnexal dysplasia	9
Folliculitis	3
Foreign body granuloma	3
Furunculosis	5
Histiocytoma	30
Keratoacanthoma	2
Malignant melanoma	11
Mammary adenoma	16
Mammary carcinoma	10
Mammary carcinoma adenocarcinoma	14
Mammary hyperplasia	13
Mast cell tumor	6
Mast cell tumor, grade I, well differentiated	43
Mast cell tumor, grade II, differentiated	22
Mast cell tumor, grade III, poorly differentiated	6
Mastitis	1
Meibomian gland adenoma	5
Melanocytoma	6
Mixed mammary tumor	12
Neoplasm, cutaneous lymphoma	16
Neoplasm, intracutaneous cornifying epithelioma	1
Neoplasm, sebaceous gland adenoma	12
Neoplasm, trichoblastoma	9
Neoplasm, trichoepithelioma	10
Neoplasm, trichofolliculoma	2
Neoplasm, tricholemmoma	1
Panniculitis	5
Papilloma	5
Perianal gland carcinoma	11
Pilomatrixoma	2
Round cell tumor	1
Sebaceous epithelioma	1
Sebaceous gland carcinoma	13
Sebaceous gland hyperplasia	11
Skin, onychitis	1
Sweat gland adenoma	4
Sweat gland cyst	5
MUSCULOSKELETAL	
Chondroma	1
Diaphragmatic hernia	1
Fractured bone	1
Hernia inguinal	1
Multilobular osteochondrosarcoma skull	1
Osteosarcoma	4
Synovitis	1
Vertebrae fracture	1
NERVOUS	
Brain encephalitis, bacterial, miscellaneous	1

Brain encephalitis, canine distemper	8
Brain encephalitis, nonsuppurative	1
Degenerative myelopathy	1
Meningioma	1
Nerve neoplasm, schwannoma	4

RESPIRATORY

Aspiration pneumonia	1
Bacterial pneumonia	2
Bronchointerstitial pneumonia	2
Bronchopneumonia	1
Lung edema	1
Lung hemorrhage	1
Lung pneumonia, *Bordetella bronchiseptica*	3
Lung pneumonia, *Streptococcus* sp.	1
Lung pulmonary, atelectasis	1
Lung pulmonary, emphysema	1
Meconium aspiraton syndrome (aspiration pneumonia)	1
Pyothorax	1

SPECIAL SENSES

Ceruminous gland adenoma	1
Ear isolation, *Malassezia pachydermatis*	2
Neoplasm, meibomian gland epithelioma	2
Otitis externa	4

UROGENITAL

Abortion, *Brucella* sp.	1
Abortion, *Campylobacter jejuni*	1
Chronic tubulo interstitial nephritis	1
Cystic endometrial hyperplasia	1
Cystitis	9
Endometritis, bacterial	1
Interstitial cell tumor	2
Nephritis	1
Orchitis	1
Papilloma squamous	5
Prostatic carcinoma	1
Renal tubular carcinoma	1
Sertoli cell tumor	1
Squamous cell carcinoma, urinary	1
Transitional cell carcinoma	1

CAPRINE

BODY AS A WHOLE

Congenial anomaly	1
Copper marginal	1
No diagnosis	3

	Normal tissue	1
	Pregnancy toxemia (ketosis)	1
	Septicemia, *Streptococcus* sp.	1
	Toxicosis copper	1
CARDIOVASCULAR		
	Myocarditis	1
DIGESTIVE		
	Abomasum displacement`	1
	Cryptosporidiosis	5
	Enteritis, idiopathic	4
	Enteritis, Johne's disease	11
	Enterotoxemia	1
	Hepatic lipidosis	1
	Intestine displacement	1
	Intestine enteritis, *Clostridium perfringens*	5
	Intestine enteritis, *Clostridium perfringens* A beta 2	1
	Intestine enteritis, coccidia	13
	Intestine enteritis, *Escherichia coli*	3
	Intestine parasitism, *Nematodirus*	1
	Intestine parasitism, strongyles	11
	Liver hepatitis, necrotic	1
	Parasitic colitis, *Trichuris*	1
ENDOCRINE		
	Goiter	1
HEMIC AND LYMPHATIC		
	Lymph node lymphadenitis, caseous	14
INTEGUMENTARY		
	Milk sample mastitis, clinical	1
	Neoplasm, squamous cell carciunoma	1
	Seborrheic dermatosis (idiopathic)	1
NERVOUS		
	Brain encephalomalacia, leuko	1
	Brain encephalomalacia, polio	2
	Rabies	1
RESPIRATORY		
	Aspiration pneumonia	2
	Bacterial pneumonia	2
	Bronchitis	1
	Bronchopneumoia	2
	Lung edema	1
	Lung pneumonia, *Bibersteinia trehalosi*	1
	Lung pneumonia, *Mannheimia haemolytica*	8
	Lung pneumonia, *Mycoplasma* sp.	3

Lung pneumonia, *Pasteurella multocida*	2
Lung pulmonary, congestion	2
UROGENITAL	
Abortion due to *Coxiella*	1
Abortion, *Campylobacter jejuni*	1
Abortion, goiter	1
Abortion, myocarditis	2
Abortion, placentitis	4
Abortion, *Toxoplasma gondii*	1
Bacterial abortion	3
Endometritis, bacterial	1
Idiopathic abortion	8

COYOTE

DIGESTIVE	
Fracture of hepatic lobe	1
MUSCULOSKELETAL	
Fractured bone	1

DEER

BODY AS A WHOLE	
Abscess	2
Autolysis	3
BVD virus PCR-positive	1
Copper marginal	1
Epizootic hemorrhagic disease	25
No diagnosis	2
Normal tissue	1
Peritonitis	2
Septicemia, bacterial, miscellaneous	3
Septicemia, *Mannheimia haemolytica*	1
Septicemia, *Pasteurella multocida*	1
Starvation / Inanition	1
Trauma	1
DIGESTIVE	
Abomasum abomasitis	1
Abomasum abomasitis, mycotic	1
Bacterial enteritis	1
Enteritis colitis	1
Hepatitis	2
Intestine enteritis, *Clostridium perfringens*	4
Intestine enteritis, coccidia	1
Liver bile duct hyperplasia	1
Typhlitis	1

HEMIC AND LYMPHATIC

Hematoma	1
Lymphosarcoma	1

INTEGUMENTARY

Parasitic dermatitis	2

MUSCULOSKELETAL

Muscle myositis, *Clostridium* (ME)	1
Umbilical hernia	1
Vertebrae fracture	1

NERVOUS

Brain encephalomalacia	1
Brain meningitis, suppurative	1
Parasitic meningitis / myelitis	2

RESPIRATORY

Bronchointerstitial pneumonia	2
Bronchopneumonia	1
Lung pneumonia, abscess	1
Lung pneumonia, *Mycoplasma* sp.	3
Lung pneumonia, parasitic, miscellaneous	1
Lung pneumonia, *Pasteurella multocida*	3
Lung pneumonia, *Trueperella pyogenes*	2
Nasal parasitism, *Oestrus ovis*	2
Pleuritis	1

DONKEY

DIGESTIVE

Enteritis, idiopathic	2

NERVOUS

Bacterial encephalitis	1

EQUINE

BODY AS A WHOLE

Emaciation	1
Granulation tissue	3
No diagnosis	1
Normal tissue	1
Septicemia, *Acintobacillus equuli*	1

Septicemia, bacterial, miscellaneous	2
Septicemia, *Escherichia coli*	1
DIGESTIVE	
Enteritis colitis	1
Hepatic lipidosis	1
Intestine enteritis, bacterial, miscellaneous	1
Intestine enteritis, *Clostridium perfringens*	1
Intestine enteritis, necrotic	1
Intestine parasitism, ascarids	1
Intestine parasitism, strongyles	2
HEMIC AND LYMPHATIC	
Strangles	1
INTEGUMENTARY	
Chronic hyperplastic dermatitis	1
Malignant melanoma	2
Melanocytoma	1
Neoplasm, squamous cell carcinoma	2
Sarcoid	1
MUSCULOSKELETAL	
Myopathy	1
NERVOUS	
Brain encephalitis, nonsuppurative	1
Encephalitis, mycotic	1
RESPIRATORY	
Lung pneumonia, *Rhodococcus equi*	1
Lung pneumonia, *Streptococcus equii*	1
SPECIAL SENSES	
Eye neoplasm, miscellaneous	1
UROGENITAL	
Bacterial abortion	1
Idiopathic abortion	2
Kidney, nephrosis	1

FELINE

BODY AS A WHOLE	
Adenocarcinoma	1
Anaplastic sarcoma	1
Ascites	1
Autolysis	1
Blastomycosis	2
Neoplasm, lipoma	1

	No diagnosis	26
	Normal tissue	4
	Peritonitis	1
	Septicemia, *Francisella tularensis*	3
	Trauma	1
CARDIOVASCULAR		
	Blood vessels thrombosis	1
DIGESTIVE		
	Cryptosporidiosis	5
	Enteritis colitis	2
	Feline infectious peritonitis	2
	Gingival hyperplasia	2
	Gingivitis	4
	Hepatopathy	2
	Intestine enteritis, feline panleukopenia	2
	Intestine parasitism, ascarids	1
	Intestine parasitism, cestodes	1
	Marked diffuse hepatic lipidosis	1
	Oral neoplasm, miscellaneous	1
	Oral neoplasm, squamous cell carcinoma	4
	Salivary gland cardinoma	1
	Stomatitis	1
ENDOCRINE		
	Diabetes mellitus	1
HEMIC AND LYMPHATIC		
	Lymphadenitis	2
	Lymphosarcoma	1
	Plasma cell neoplasm, plasmacytome	1
	Splenitis	1
INTEGUMENTARY		
	Alopecia	1
	Basal cell carcinoma	8
	Dermal hair follicle cyst	1
	Dermatitis, non-specific	1
	Dermatitis, *Staphylococcus* sp.	1
	Dermatophytosis ringworm	3
	Epidermal cyst	1
	Fibroma	1
	Fibrosarcoma, feline	6
	Fibrosarcoma, feline, vaccine induced	3
	Folliculitis	1
	Hypersensitivity (allergic) dermatitis	1
	Mammary adenoma	1
	Mammary carcinoma	3
	Mastitis	1

Melanocytoma	1
Neoplasm, cutaneous lymphoma	3
Neoplasm, papilloma	1
Neoplasm, sarcoid	1
Neoplasm, sebaceous gland carcinoma	1
Neoplasm, squamous cell carcinoma	2
Neoplasm, sweat gland adenoma	1
Neoplasm, trichoblastoma	1
Panniculitis	1
MUSCULOSKELETAL	
Myositis	1
Osteitis	1
Osteosarcoma	1
NERVOUS	
Brain meningitis, suppurative	3
Brain meningoencephalitis	2
RESPIRATORY	
Interstitial pneumonia	2
Lung edema	2
Lung pneumonia, *Escherichia coli*	1
Lung pulmonary, congestion	1
Nasal isolation, *Pasteurella multocida*	1
Pleuritis	1
Rhinitis	1
SPECIAL SENSES	
Ceruminous gland adenoma	1
Conjunctivitis	1
Eye neoplasm, melanoma	1
Ophthalmitis	1
Otitis externa	1
Uveitis	1
UROGENITAL	
Cystitis	1
Glomerulonephritis	1
Kidney, nephrosis	1

GUINEA PIG

BODY AS A WHOLE	
Abscess	1
INTEGUMENTARY	
Dermatitis, focal	1
Panniculitis	1

LLAMA

DIGESTIVE

Intestine enteritis, coccidia	1
Intestine parasitism, *Nematodirus*	1
Intestine parasitism, strongyles	1
Intestine parasitism, *Trichuris*	1

MINK

BODY AS A WHOLE

Septicemia, bacterial, miscellaneous	1

CARDIOVASCULAR

Myocarditis	1

DIGESTIVE

Liver congestive heart failure (right)	1
Rectal prolapse	1

HEMIC AND LYMPHATIC

Lymphosarcoma	1

INTEGUMENTARY

Bacterial dermatitis	1
Mastitis	1
Pododermatitis	1

NERVOUS

Brain meningitis, suppurative	2

RESPIRATORY

Lung pneumonia, bacterial, miscellaneous	1
Lung pneumonia, *Escherichia coli*	4
Pleuritis	6

SPECIAL SENSES

Otitis externa	1

UROGENITAL

Cystitis	1
Urinary calculi, urolithiasis	2

MOUSE

BODY AS A WHOLE		
	Autolysis	1
	Normal tissue	1
INTEGUMENTARY		
	Cellulitis	1
NERVOUS		
	Hydrocephalus	1

MULE

INTEGUMENTARY		
	Neoplasm, squamous cell carcinoma	1

OVINE

BODY AS A WHOLE		
	Autolysis	5
	Copper higher than normal	1
	Copper marginal	2
	No diagnosis	2
	Normal tissue	1
	Peritonitis	1
	Septicemia, bacterial, miscellaneous	1
	Septicemia, *Escherichia coli*	3
	Toxicosis copper	1
CARDIOVASCULAR		
	Vasculitis	1
DIGESTIVE		
	Abomasum abomasitis, *Clostridium* sp.	1
	Cryptosporidiosis	2
	Enteritis, idiopathic	2
	Enterotoxemia	1
	Hemonchosis, acute abomasal hemorrhage	1
	Hepatitis	3
	Hepatopathy	2
	Intestinal obstruction	1
	Intestine enteritis, *Clostridium perfringens*	5
	Intestine enteritis, coccidia	12
	Intestine parasitism, *Nematodirus*	1
	Intestine parasitism, strongyles	2
	Intestine parasitism, *Trichuris*	1
	Liver abscess	1
	Rumen acidosis / grain overload	2

ENDOCRINE		
	Goiter	1
HEMIC AND LYMPHATIC		
	Lymph node lymphadenitis, caseous	3
INTEGUMENTARY		
	Contagious ecthyma (ORF)	1
MUSCULOSKELETAL		
	Joint arthritis, *Trueperella pyogenes*	1
	Muscle myopathy, nutritional	1
	Myopathy	1
	Myositis	2
NERVOUS		
	Brain encephalitis, nonsuppurative	2
	Brain encephalomalacia	1
	Brain encephalomalacia, polio	2
	Meningioma	1
RESPIRATORY		
	Bronchointerstitial pneumonia	1
	Bronchopneumonia	2
	Interstitial pneumonia	1
	Lung pneumonia, abscess	1
	Lung pneumonia, bacterial, miscellaneous	1
	Lung pneumonia, *Bibersteinia trehalosi*	2
	Lung pneumonia, *Histophilus somni*	1
	Lung pneumonia, *Mannheimia haemolytica*	9
	Lung pneumonia, ovine progressive	2
	Lung pneumonia, *Pasteurella multocida*	5
	Meconium aspiration syndrome (aspiration pneumonia)	1
	Pleuritis	1
UROGENITAL		
	Abortion due to *Campylobacter*	4
	Abortion due to *Chlamydophila abortus*	1
	Abortion with congenital anomaly	1
	Abortion, *Campylobacter foetus* ssp. *intestinalis*	1
	Abortion, *Campylobacter jejuni*	10
	Abortion, *Pasteurella haemolytica*	1
	Abortion, placentitis	9
	Abortion, *Salmonella* sp.	1
	Abortion, *Toxoplasma gondii*	11
	Abortion, *Trueperella pyogenes*	3
	Bacterial abortion	10
	Idiopathic abortion	22
	Kidney, nephrosis	2

Metritis	1
Nephritis	1
Vas deferens	1

PORCINE

BODY AS A WHOLE

Abscess	3
Autolysis	2
Circovirus identified -- no disease	1
Erysipelas	1
Hemorrhage	2
No diagnosis	7
Normal tissue	11
PCV2 disease multi-systemic	5
Polyserositis	2
Polyserositis, *Haemophilus parasuis* Glasser's	1
Polyserositis, *Streptococcus suis*	2
Septicemia, *Actinobacillus suis*	6
Septicemia, bacterial, miscellaneous	3
Septicemia, *Escherichia coli*	1
Septicemia, *Haemophilus parasuis*	3
Septicemia, *Pasteurella multocida*	1
Septicemia, *Salmonella*	9
Septicemia, *Streptococcus suis*	18
Septicemia, *Trueperella pyogenes*	1
Trauma	1
Virus isolation, PRRS	4

CARDIOVASCULAR

Bacterial pericarditis	2
Cardiomyopathy	1
Heart endocarditis, bacterial, miscellaneous	2
Heart epicarditis	2
Mulberry heart disease	12
Myocarditis	1

DIGESTIVE

Atrophic enteritis	7
Cholangitis	1
Colitis, *Clostridium difficile*	2
Enteritis due to TGE	1
Enteritis colitis	8
Enteritis, idiopathic	5
Enteritis, nursing total cases	54
Enteritis, weaned total caes	104
Gastric ulcer	8
Gastritis	1
Hepatopathy	2
Intestinal torsion	2

Intestine enteritis, bacterial, miscellaneous	4
Intestine enteritis, *Clostridium perfringens*	13
Inestine enteritis, *Clostridium perfringens* type A	3
Intestine enteritis, *Clostridium perfringens* type A beta 2	4
Intestine enteritis, coccidia	7
Intestine enteritis, *Escherichia coli*	80
Intestine enteritis, necrotic	1
Intestine enteritis, porcine delta coronavirus	1
Intestine enteritis, porcine epidemic diarrhea virus	6
Intestine enteritis, porcine proliferative	7
Intestine enteritis, rotavirus	32
Intestine enteritis, rotavirus A	36
Intestine enteritis, rotavirus B	23
Intestine enteritis, rotavirus C	21
Intestine enteritis, *Salmonella*	41
Intestine enteritis, viral, miscellaneous	1
Intestine hemorrhage	1
Intestine parasitism, ascarids	2
Liver parasitism, *Ascaris*	1
Mesenteric torsion	7
Pharyngitis	2
HEMIC AND LYMPHATIC	
Hematoma	1
Lymphadenitis, bacterial	1
Lymphosarcoma	1
Spleen infarction	1
Splenic torsion	1
INTEGUMENTARY	
Cellulitis	1
Dermatitis, *Staphylococcus hyicus*	3
MUSCULOSKELETAL	
Bone osteodystrophy, rickets	1
Fractured bone	2
Joint arthritis, bacterial, miscellaneous	3
Joint arthritis, *Mycoplasma hyosynoviae*	1
Joint arthritis, *Mycoplasma* sp.	1
Joint arthritis, *Streptococcus suis*	4
Joint arthritis, *Trueperella pyogenes*	1
Myopathy	1
Myositis	1
Osteochondrosis	2
Osteomyelitis, bacterial	1
Osteoporosis	1
Synovitis	1
Umbilical hernia	1
NERVOUS	
Brain encephalitis, abscess	1

Brain encephalomalacia	2
Brain meningitis, *Streptococcus suis*	24
Brain meningitis, suppurative	4
Viral encephalitis	2
RESPIRATORY	
Bronchitis	4
Bronchointerstitial pneumonia	3
Bronchopneumonia	6
Inclusion body rhinitis	2
Interstitial pneumonia	7
Lung edema	1
Lung hemorrhage	1
Lung pneumonia, *Actinobacillus suis*	9
Lung pneumonia, acute atypical interstitial	1
Lung pneumonia, bacterial, miscellaneous	5
Lung pneumonia, *Bordetella bronchiseptica*	14
Lung pneumonia, *Haemophilus parasuis*	14
Lung pneumonia, *Mycoplasma hyopneumoniae*	21
Lung pneumonia, *Mycoplasma* sp.	1
Lung pneumonia, parasitic, *Metastrongylus*	1
Lung pneumonia, *Pasteurella multocida*	30
Lung pneumonia, PRRS	38
Lung pneumonia, *Salmonella* sp.	1
Lung pneumonia, *Streptococcus suis*	63
Lung pneumonia, swine influenza virus	26
Lung pneumonia, *Trueperella pyogenes*	2
Lung pulmonary, atelectasis	2
PCV2 disease pneumonia	11
Pleuritis	3
Rhinitis	1
Tracheitis	3
UROGENITAL	
Abortion associated with PRRS	2
Abortion, placentitis	1
Abortion, pneumonia	1
Bacterial abortion	9
Idiopathic abortion	23
PRRS virus positive by PCR	42
Uterine prolapse	1
Uterine torsion	1

RABBIT

DIGESTIVE	
Enteritis colitis	1
Enteritis, idiopathic	1
Intestine enteritis, coccidia	1
Intestine obstruction	1

NERVOUS
Brain, meningoencephalitis 1

RESPIRATORY
Interstitial pneumonia 1
Lung pneumonia, *Bordetella bronchiseptica* 1
Rhinitis 1

UROGENITAL
Nephritis 1

RACCOON

BODY AS A WHOLE
No diagnosis 5

DIGESTIVE
Intestine parasitism, ascarids 1

NERVOUS
Brain encephalitis, canine distemper 4

RESPIRATORY
Viral pneumonia 1

RHINO

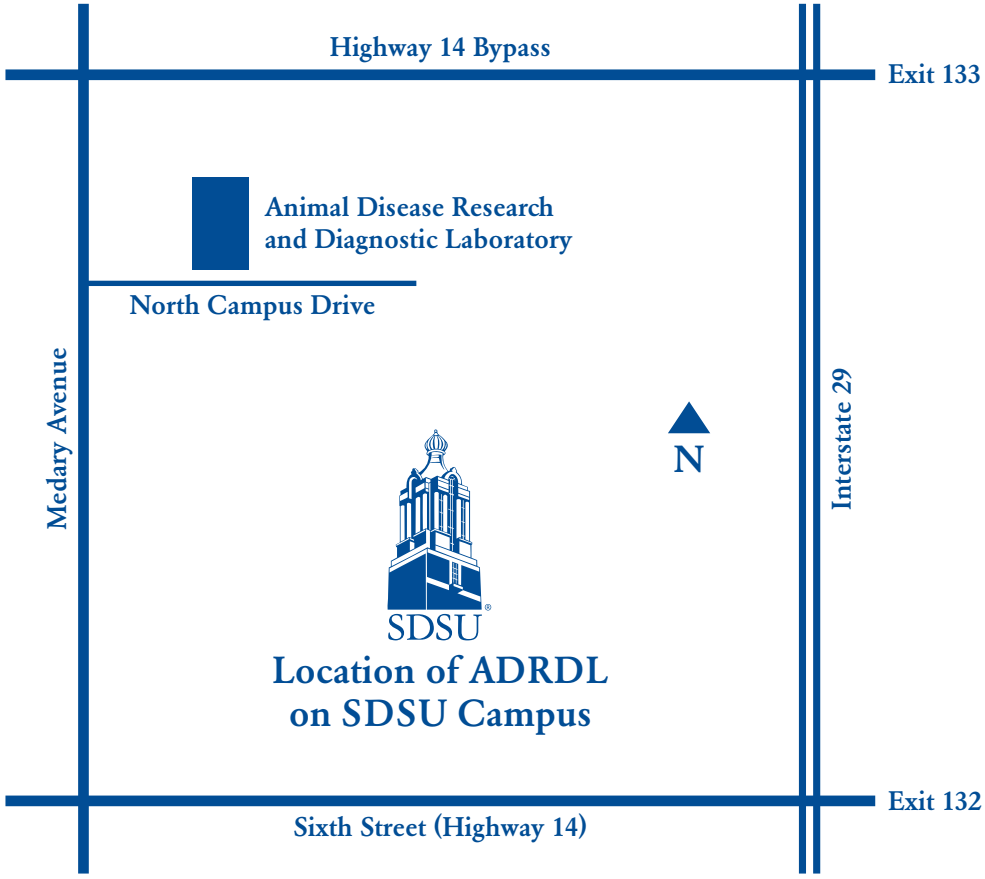
BODY AS A WHOLE
Normal tissue 1

SKUNK

NERVOUS
Rabies 5

WOODCHUCK

NERVOUS
Brain encephalitis, nonsuppurative 1


Highway 14 Bypass
Exit 133
Animal Disease Research
and Diagnostic Laboratory
North Campus Drive
Medary Avenue
Interstate 29
N
SDSU
Location of ADRDL
on SDSU Campus
Exit 132
Sixth Street (Highway 14)

Architect rendering of the ADRDL addition

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