2014

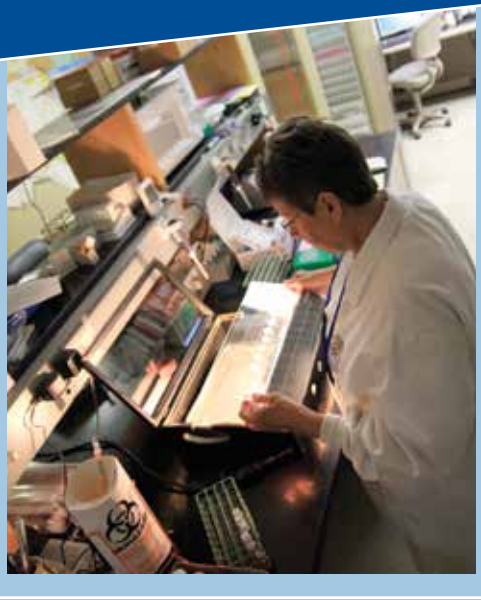
South Dakota Animal Disease Research & Diagnostic Laboratory: Annual Report 2014

Animal Disease Research and Diagnostic Laboratory, South Dakota State University

SDSU

South Dakota Animal Disease Research and Diagnostic Laboratory

Annual Report 2014



ADRDL

ANIMAL DISEASE RESEARCH & DIAGNOSTIC LABORATORY

BROOKINGS, SOUTH DAKOTA

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

FY2014 Annual Report
July 1, 2013 - June 30, 2014

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 2014

CONTENTS

DIRECTOR'S REPORT

The emergence of new infectious diseases in the US points out the necessity of having infrastructures in place to quickly identify them. For example, in public health, the Ebola epidemic which started in March 2014 in Africa and subsequently arrived in the US, pointed out the need to have "public health" infrastructures in place. The World Health Organization (WHO) described in an "Ebola situation assessment - 18 November 2014, "The goal of interrupting chains of Ebola virus transmission depends heavily on laboratory support. This support is needed to confirm or discard suspected cases, guide triage and clinical decisions, aid contact tracing, and facilitate the early detection of cases in people with an exposure history. The WHO goal of aggressive case detection and isolation likewise depends on laboratory support."

Similarly, with emerging diseases in animals, quick detection and isolation of infected animals is critical. The need is again emphasized with the Foot and Mouth Disease Outbreak that occurred in the UK in 2001. In the UK document "Foot and Mouth Disease: Lessons to be Learned Inquiry Report, HC888", it was stated, "The State Veterinary Service should be routinely equipped with the most up-to-date diagnostic tools for use in clinical practice, to contribute to speed and certainty of action at critical times." There were several conditions that contributed to the introduction and widespread dissemination of FMD, one of which was a delay in diagnosis of infected pigs.

Diagnostic laboratories, such as the state veterinary laboratories, including the SD Animal Disease Research and Diagnostic Laboratory (ADRDL) are essential in providing quick results for veterinarians to use in decision making for control of infectious diseases. Currently, molecular diagnostics (PCR based assays) and serology tests are meeting that need due to same day testing. These are the basis of the foreign animal disease and emerging disease diagnostic protocols such as for the enteric swine coronaviruses which were recently identified in the US. Additional diagnostic and research tools were also provided through the laboratory, including research for the development of new vaccines, development of new tests and reagents, pathology evaluations, bacteriology, virology, clinical pathology and food safety testing.

In addition to testing, the department has contributed to economic development for the state. For example, the Veterinary and Biomedical Sciences Department alone has historically produced 58 invention disclosures; 146 patent applications, 73 patents, 16 commercial licenses, 4 licenses with startups and over $14 million in royalties and license fees contributed.

This is why the department has put together a "white paper" describing the need for infrastructure renovation and expansion of the ADRDL in order to continue the economic development, emergency preparedness and responsiveness to guard animal health for the state of South Dakota. This paper discusses the needs that were assessed by the International Architectural Firm ED2. Since the ADRDL is the "State Laboratory", it is charged with protecting the state's $7.3 billion livestock industry and protection of consumer demand for meat and dairy products. In addition, the laboratory is part of the FDA/USDA Food Emergency Response Network (FERN), the USDA National Animal Health Laboratory (NAHLN) and the Veterinary Laboratory Investigation Response Network (VET-LIRN) which perform and

coordinate testing for emergency responses and research in animal infectious disease. Since the ADRDL was last updated (20+ years ago), to focus the future on securing animal health and food safety, we want to be prepared for the next 20 years.

Jane Christopher-Hennings, DVM, MS
Head and Director, VBSD/ADRDL

HIGHLIGHTS OF 2014

- New Faculty:
    - Dr. Angela Pillatzki, Board-certified Veterinary Pathologist; started on June 22, 2014
    - Dr. Diego Diel, with specialties in virus-host interactions and recombinant vaccine development, started on August 22, 2014
    - Dr. Joy Scaria, with specialty in bioinformatics and the role of the microbiome in enteric diseases started on Sept. 22, 2014

- Peter Wong, ED2 International Architect visited the laboratory over several weeks and subsequently provided a 10 page "Needs Analysis Findings, Space Needs, Deficiencies and Concerns" for the SDSU Animal Disease Research and Diagnostic Laboratory, Veterinary and Biomedical Sciences Department.

- On October 3, 2014, Governor Daugaard and the First Lady, several SD representatives and Board of Regents members visited the laboratory. The "needs analysis" information from ED2 International Architects and descriptions of how the laboratory helps with animal health was shared.

- Additional tours and information were provided throughout the year regarding the work that is done at the ADRDL and the need for renovation and expansion, including a high containment, Biosafety Level (BSL) 3 area.

- New tests and reagents were licensed in 2014 which were developed in the Veterinary and Biomedical Sciences Department including monoclonal antibodies, ELISA and PCR tests for porcine epidemic diarrhea virus (PEDV) and porcine deltacoronavirus (PDCoV).

- Acquisition of an Illumina® MiSeq for next generation DNA sequencing.

- Some research laboratories moved to the Animal Science Building (Olson Biochemistry remodeled area) to make room for added testing in the Molecular Diagnostics Section and to expand the research capacity of the department. This allowed for the Serology Section to be moved to the research laboratory in the ADRDL and the Molecular Diagnostics section was moved to the former Serology Section.

- Emphasis was placed on being prepared for the next 20 years for the advancement and protection of animal and public health. Since South Dakota has 3.85 million cattle and calves, 1.2 million hogs and pigs, 92,000 dairy cows (and growing), 275,000 sheep and lambs, 38,700 bison (#1 in National Rank), 2.288 million laying hens, 270,000 honey bee colonies and 4.6 million turkeys (source: 2014 SD Dept. of Agriculture, Pierre, SD), it is important for the state animal health laboratory (the SD Animal Disease Research and Diagnostic Laboratory (SD ADRDL)) to have the necessary infrastructure to handle animal health issues in the state and surrounding area.

FACULTY AND STAFF
July 1, 2013 – June 30, 2014

ADMINISTRATION

Jane Christopher-Hennings, DVM, MS, Professor, Head and Director
Eric Nelson, PhD, Professor, Assistant Department Head
Russell Daly, DVM, MS, Associate Professor, Interim Head and Director (8-21-13)
Tanya Graham, DVM, Associate Director, Diplomate ACVP (7-5-13)

PATHOLOGY

Larry Holler, DVM, PhD, Professor
David E. B. Knudsen, DVM, MS, Diplomate, ACLAM, Professor
Regg Neiger, DVM, PhD, Professor
Dale Miskimins, DVM, MS, Professor
Angela Pillatzki, DVM, MS, Assistant Professor
Tanya Graham, DVM, Professor, Diplomate ACVP (7-5-13)

BACTERIOLOGY

Larry Holler, DVM, PhD, Professor – Section Leader
Seema Das, BS, MS, Senior Microbiologist
Debra Murray, CLT, Senior Microbiologist
Lucinda Bloker, BS, Microbiologist
Cynthia Watt, BS, Microbiologist
Cynthia Troelstrup, Laboratory Technician
Tracy Irion, Laboratory Aide

CLINICAL PATHOLOGY

David E. B. Knudsen, DVM, MS, Diplomate, ACLAM, Professor – Section Leader
Michael Hildreth, PhD, Professor
Julie Colby, MS, Microbiologist
Karen Belau, Laboratory Technician

EXTENSION

Dale Miskimins, DVM, MS, Professor
Russell Daly, DVM, MS, Associate Professor

FOOD SAFETY

Alan Erickson, PhD, Professor – Section Leader
Laura Ruesch, MS, Senior Microbiologist
Mariecil Aguiar, BS, Microbiologist

HISTOPATHOLOGY/IMMUNOHISTOCHEMISTRY

Angela Pillatzki, DVM, MS, Assistant Professor – Section Leader
Frank Qin, MS, Senior Microbiologist
Amanda Brock, BS, Senior Microbiologist
Tanya Graham, DVM, Professor, Diplomate ACVP – Section Leader (7-5-13)

MOLECULAR DIAGNOSTICS
Jane Christopher-Hennings, DVM, MS, Professor – Section Leader
Travis Clement, BS, Research Associate II
Roger Chapin, BS, Senior Microbiologist
Matthew Dammen, MS, Senior Microbiologist
Michael Dunn, BS, Senior Microbiologist
Julie Nelson, MS, Senior Microbiologist
Kelly Schmit, BS, Microbiologist

QUALITY CONTROL
Rajesh Parmar, MS, Laboratory Quality Manager
Seema Das, MS, Senior Microbiologist, Assistant Quality Manager

RESEARCH
Alan Young, PhD, Professor, Research Coordinator
Christopher Chase, DVM, PhD, Professor, Diplomate ACVM, Virology and Immunology
Alan Erickson, PhD, Professor
Michael Hildreth, PhD, Professor
Radhey Kaushik, PhD, Professor
Feng Li, PhD, Professor
Eric Nelson, PhD, Professor
Jane Christopher-Hennings, DVM, MS, Professor
Steven Dilberger-Lawson, PhD, Research Associate III
Lyle Braun, MS, Senior Microbiologist
Diane Baker, MS, Agriculture Research Manager Specialist
Amanda Sondag, BS, Laboratory Technician
Ying Fang, PhD, Associate Professor (8-21-13)
Weiping Zhang, PhD, Associate Professor (8-21-18)
Zhi Sun, PhD, Post-Doctoral Research Associate (7-21-13)
Xiaosai Ruan, PhD, Post-Doctoral Research Associate (8-21-13)

TOXICOLOGY
Regg Neiger, DVM, PhD, ADRDL Toxicology Coordinator

CHEMICAL SAFETY/BIOSAFETY
Alan Erickson, PhD, Professor, Chemical Safety Officer
Rajesh Parmar, MS, Laboratory Quality Manager, Safety Committee Co-Chair
Tanya Graham, DVM, Professor, Diplomate ACVP, Safety Committee Co-Chair (7-5-13)

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

VIROLOGY
Pam Leslie-Steen, MS, Assistant Professor – Co-Section Leader
Christopher Chase, DVM, PhD, Professor – Co-Section Leader
Lyle Braun, MS, Senior Microbiologist
Craig Long, MS, Senior Microbiologist
Stacey Wessels, BS, Senior Microbiologist (7-19-13)
Jennifer Kuipers, BS, Senior Microbiologist (3-21-14)

CLERICAL STAFF
Rita Miller, Office Supervisor
Gerri Murphy, Word Processor
Margaret Janssen, Secretary
Janice Kampmann, Secretary
Nan Nesbit, Secretary
Tamera Englin, Secretary
Kim Hyland, Secretary
Evonne Freyberg, Secretary (8-15-13)

INFORMATION SYSTEMS
Jon Greseth, Computer Support Analyst

ACCOUNTING/PURCHASING/HUMAN RESOURCES
Russell Lokken, MBA, Program Assistant II
Shirley Wiener, Senior Secretary (1-3-14)

MAINTENANCE
Jerry Anderson, Senior Building Maintenance Worker

NECROPSY
Myron Olson, Laboratory Technician

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

Victor Huber, PhD, University of Toledo College of Medicine, 2001 Medical Science

Paul Lawrence, Newport Laboratories, PhD, India, 2000 Molecular Biology & Biotechnology

Joan K. Lunney, Research Scientist, Animal Parasitic Diseases Laboratory, Animal and Natural Resources Institute, Agricultural Research Service, USDA, MD, PhD, Johns Hopkins University, 1976 Biochemistry, Immunology

Mauro Moraes, CEVA Biomune, MD in Veterinary Medicine, Federal University of Santa Maria, Brazil, 1993; PhD, Federal University of Vicosa, Brazil 2001 Microbiology

Dilip Patel, Sterling Technologies, PhD, Oregon State University, 2004 Food Science

Gopinath RajuSeetharaman, PhD, Tamil Nadu Veterinary & Animal Sciences, India, 2000

ADJUNCT PROFESSORS (Cont.)

Thillainayagam Sathiyaseelan, Hematech, Sioux Falls, DVM, PhD, University of Massachusetts at Amherst, 2000 Immunology

Randy Simonson, Newport Laboratories, PhD, University of Minnesota, 1979 Microbiology

GRADUATE STUDENTS

Christopher Chase, DVM, PhD, Professor, Diplomate ACVM, Graduate Coordinator
Chengxian Zhang, MS, Graduate Research Assistant
Maxim Lebedev, BS, Graduate Research Assistant
Yanhua Li, BS, Graduate Research Assistant
Jessica Mediger, BS, Graduate Research Assistant
Kaci Park, BS, Graduate Research Assistant
Mrigendra Rajput, BS, Graduate Research Assistant
Russell Ransburgh, BS, Graduate Research Assistant
Dana Rausch, BS, Graduate Research Assistant
Anwar Sarah, BVMS, MS, Graduate Research Assistant
Chithra Sreenivasas, BS, Graduate Research Assistant
Neelu Thakur, BS, Graduate Research Assistant

EMERITUS FACULTY

James Bailey, DVM – 1986
Edward Hamilton, DVM, MS – 2007
Darrell Johnson, DVM, PhD – 2000
Duane Matthees, PhD – 2011
Robert Swanson, DVM, PhD – 1996
Nancy Thiex, MS – 2011
David Zeman, DVM, PhD – 2013

SOUTH DAKOTA

ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

HOURLY ASSISTANTS

JULY 1, 2013 – JUNE 30, 2014

Temporary Assistants:
Lisa Friedrich, Xiaodong Liu, Dana Rausch

***Undergraduate Assistants*:**
Lindy Artz, Julie Bobb, Nathanael Braselton, Marlene Braun, Amanda Brock, Hannah Brockshus, Jazmine Brown, Jazmine DeBruin, Hannah Ellsworth, Casey Finnicum, Amre Gaskins, Jenna Guthmiller, Kyle Hain, Logan Harris, Amanda Horn, Caitlin Hupp, Erin Johnson, Robert Juenemann, Olivia Kendall, Troy Kopp, Michelle Lenertz, Melissa Long, Danielle Marquardt, Alex Martineau, Jessica Menke, Haley Peterson, Jenetta Porter, Lacey Quail, Kenzie Rathburn, Courtney Schaefer, Keith Schornack, Morgan Spronk, Cassandra Steinle, Alyssa Umbreit, Nicole VandenBerg, Megan Violand, Alexander Vos, Nathan Wilen, Vanessa Yovetich, Eileen Zhang

***Graduate Assistants*:**
Mahmound Darweesh, Faten Okda

South Dakota
Animal Disease Research and Diagnostic Laboratory

AWARDS AND RECOGNITION

July 1, 2013 - June 30, 2014

Pins and/or plaques were awarded to the following individuals for years of service:

Travis Clement	10 years
Aaron Singrey	10 years
Laura Ruesch	15 years
Larry Holler	20 years
Cindy Watt	30 years
Rita Miller	40 years

SOUTH DAKOTA
ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
ADVISORY COMMITTEE

JULY 1, 2013 – JUNE 30, 2014

Animal Disease Research and Diagnostic Laboratory
Jane Hennings, DVM, MS, Head and Director, ADRDL/VBSD (started August 22, 2013)
Russell Daly, DVM, MS, Interim Head and Director (January - August 21, 2013)

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
Barry Dunn, Dean

South Dakota Stockgrower's Association
Bob Hutchinson

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

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

South Dakota Veterinary Medical Association
Jennifer Stalley, DVM, Executive Director
Tom Rentschler, DVM, President (2013-2014)
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

ALL SPECIES	REPORTABLE	QUARANTINABLE
*Any foreign animal disease (see footnote)	X	X
Anaplasmosis	X	
Anthrax	X	X
Any disease associated with food borne illness	X	
Any new emerging disease (Syndromes)	X	
Avian Chlamydophilosis (Ornithosis - Psittacosis)	X	X
Avian Encephalomyelitis (Infectious Encephalomyelitis)	X	X
Avian Infectious Bronchitis	X	
Avian Infectious Laryngotracheitis	X	
Avian Influenza	X	X
Avian Metapneumovirus (Turkey rhinotracheitis)	X	
Babesiosis	X	
Blastomycosis	X	
Bluetongue	X	
BLV (Enzootic Bovine Leukosis)	X	
Bovine Papular Stomatitis	X	
Bovine Viral Diarrhea	X	
*Bovine Spongiform Encephalopathy	X	X
Brucellosis caused by *B. abortus*, **B. melitensis*, *B. suis*, and *B. ovis*	X	X
Brucellosis caused by *B. canis*	X	
Campylobacteriosis (*Campylobacter foetus venerealis*)	X	
Caprine Arthritis/Encephalitis	X	
Canine Ehrlichiosis	X	
Caseous Lymphadenitis	X	
Chronic Wasting Disease (Cervids)	X	X
Contagious Agalactia (*Mycoplasma* ssp.)	X	
*Contagious Caprine Pleuropneumonia	X	X
Contagious Equine Metritis	X	X
Cryptosporidiosis	X	
Cysticercosis (metacestode stage of *Taenia saginata* or *Taenia solium*)	X	
Dermatophilosis	X	
Diphtheria (*Corynebacterium diphtheriae*)	X	
Duck Viral Enteritis (Duck Plague)	X	
Duck Viral Hepatitis	X	
Enzootic Abortion of Ewes (*Chlamydophila*)	X	
Epizootic Hemorrhagic Disease (EHD)	X	
Equine Encephalomyelitis (Eastern & Western)	X	
Equine Encephalomyelitis (Venezuelan)	X	
EHV-1 associated diseases (respiratory, abortion, neurologic/EHM)	X	
Equine Infectious Anemia (EIA)	X	X

ALL SPECIES (con't)	REPORTABLE	QUARANTINABLE
Equine Influenza (Type A)	X	
Equine Rhinopneumonitis	X	
Equine Viral Arteritis	X	
Fowl Cholera (*Pasteurella multocida*)	X	
Fowl Pox	X	
Fowl Typhoid	X	X
Glanders	X	
Giardiasis	X	
Hemorrhagic Septicemia (*Pasteurella multocida*) serotypes B/Asian and E/African	X	
Herpesvirus of Salmonids	X	
Histoplasmosis	X	
Hydatid Disease (*Echinococcus granulosus* or *Echinococcus multilocularis*)	X	
Infectious Bursal Disease	X	
Infectious Hematopoietic Necrosis	X	
Infectious Bovine Rhinotracheitis (IBR-IPV)	X	
Leishmaniasis	X	
Leptospirosis	X	
Listeriosis	X	
Lyme Disease (*Borrelia burgdorferi*)	X	
Maedi-Visna (Ovine Progressive Pneumonia)	X	
Malignant Catarrhal Fever	X	
Marek's Disease	X	
Mycoplasma gallisepticum (MG)	X	
Mycoplasma synovia (MS)	X	
*New and Old World Screwworm Myiasis	X	X
Newcastle Disease	X	X
Ovine Pulmonary Adenomatosis	X	
Paramyxovirus (2-9)	X	
Paratuberculosis (Johne's disease)	X	
Plague (*Yersinia pestis*)	X	X
Porcine Reproductive and Respiratory Syndrome (PRRS)	X	
Potomac Horse Fever	X	
Pseudorabies	X	X
Pullorum Disease	X	X
Q-fever (*Coxiella burnetii*)	X	
Rabies	X	X
Rabbit Hemorrhagic Disease	X	X
Rocky Mountain Spotted Fever	X	
Salmonellosis (*Salmonella abortus ovis*)	X	
Salmonellosis (*Salmonella enteritidis*)	X	
Salmonellosis (*Salmonella newport* MDR-Ampc)	X	
Salmonellosis (*Salmonella typhimurium*)	X	
Scabies	X	X
Scrapie	X	X

ALL SPECIES (con't)	REPORTABLE	QUARANTINABLE
Spring Viremia of Carp	X	
Swine Enteric Coronavirus Disease (SECD), PEDV and PDCoV	X	
*Swine Vesicular Disease	X	X
Toxic Substance Contamination	X	
Toxoplasmosis	X	
Transmissible Gastroenteritis	X	
Transmissible Spongiform Encephalopathy (Feline & Mink)	X	X
Trichinosis (Trichinellosis)	X	
Trichomoniasis	X	
Tuberculosis	X	X
Tuberculosis (Avian)	X	
Tularemia (*Francisella tularensis*)	X	
*Vesicular Exanthema	X	X
*Vesicular Stomatitis	X	X
Viral Hemorrhagic Septicemia	X	
West Nile Virus (flavivirus)	X	

***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.

Many foreign animal diseases can closely resemble domestic diseases, both clinically and grossly; therefore, veterinarians must be extremely vigilant. When examining animals, it is imperative that we remember to consider foreign animal diseases as a potential diagnosis.

Accredited veterinarians are responsible for notifying the State or Federal veterinarian whenever a foreign animal disease is suspected.

High Morbidity/High Mortality

Any incidents involving undiagnosed disease conditions causing high morbidity and/or high mortality must be reported immediately to the South Dakota Animal Industry Board.

Zoonoses/Food-borne Pathogens

Human illness related to an animal disease condition must be reported immediately to the South Dakota Animal Industry Board. (Zoonotic diseases)(Food-borne Pathogens)

***OIE Listed Diseases**

The classification of Diseases Notifiable to the OIE has been consolidated from List A and List B to one list now titled OIE Listed Diseases. To view the list, follow the link below.

http://www.oie.int/animal-health-in-the-world/oie-listed-diseases-2011/

SOUTH DAKOTA

ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

NATIONAL ANIMAL HEALTH REPORTING SYSTEM (NAHRS)

JULY 1, 2013 – JUNE 30, 2014

Bovine

Anaplasmosis (*Anaplasma marginale, A. centrale*)
Anthrax (*Bacillus anthracis*)
Aujesky's Disease (Pseudorabies)
Babesiosis (*Babesia bovis, B. bigemina*)
Bluetongue
Bovine Brucellosis (*Brucella abortus*)
Bovine Genital Campylobacteriosis (*Campylobacter foetus venerealis*)
Bovine Spongiform Encephalopathy (BSE)
Bovine Tuberculosis (*Mycobacterium bovis*)
Bovine Viral Diarrhea (BVD)
Brucellosis (*Brucella melitensis*)
Brucellosis (*Brucella suis*)
Contagious Bovine Pleuropneumonia (*Mycoplasma mycoides mycoides*)
Crimean Congo Hemorrhagic Fever
Echinococcosis / Hydatidosis
Enzootic Bovine Leukosis (BLV)
Enzootic Hemorrhagic Disease (EHD)
Foot and Mouth Disease (FMD)
Heartwater (*Cowdria ruminantium*)
Hemorrhagic Septicemia (*Pasteurella multocida*, serotypes B / Asian or E / African)
Infectious Bovine Rhinotracheitis / Infectious Pustular Vulvovaginitis (IBR / IPV)
Leptospirosis
Lumpy Skin Disease
Malignant Catarrhal Fever (specify Wildebeest- or Sheep-form)
New World Screwworm (*Chrysomyia hominivorax*)
Old World Screwworm (*Chrysomyia bezziana*)
Paratuberculosis (Johne's Disease, *Mycobacterium avium paratuberculosis*)
Q Fever (*Coxiella burnetti*)
Rabies
Rift Valley Fever
Rinderpest
Theileriasis (*Theileria annulata, T. parva*)
Trichomoniasis (*Tritrichomonas* [*Trichomonas*] *foetus*)
Trypanosomiasis (*Trypanosoma congolense, T. vivax, T. brucei brucei, T. evansi*)
Vesicular Stomatitis (VS)

Caprine and Ovine
Anthrax (*Bacillus anthracis*)
Aujesky's Disease (Pseudorabies)
Bluetongue
Bovine Tuberculosis (*Mycobacterium bovis*)
Brucellosis (*Brucella melitensis*)
Caprine Arthritis / Encephalitis (CAE)
Contagious Agalactia (*Mycoplasma agalactiae, M. capricolum capricolum, M. putrefaciens, M. mycoides mycoides, M. mycoides mycoides* LC)
Contagious Caprine Pleuropneumonia (*Mycoplasma capricolum capripneumoniae*)
Crimean Congo Hemorrhagic Fever
Echinococcosis / Hydatidosis
Enzootic Abortion of Ewes (Ovine Psittacosis, *Chlamydia psittaci* [*Chlamydophila abortus*])
Foot and Mouth Disease (FMD)
Heartwater (*Cowdria ruminantium*)
Leptospirosis
Maedi-Visna / Ovine Progressive Pneumonia
Nairobi Sheep Disease
New World Screwworm (*Chrysomyia hominivorax*)
Old World Screwworm (*Chrysomyia bezziana*)
Ovine Epididymitis (*Brucella ovis* infection)
Paratuberculosis (Johne's Disease, *Mycobacterium avium paratuberculosis*)
Peste des Petits Ruminants
Q Fever (*Coxiella burnetti*)
Rabies
Rift Valley Fever
Rinderpest
Salmonellosis (*Salmonella abortus ovis*)
Scrapie
Sheep Pox and Goat Pox
Theileriasis (*Theileria annulata, T. parva*)
Tularemia (*Francisella tularensis*)
Vesicular Stomatitis (VS)
West Nile Fever

Equine
African Horse Sickness
Anthrax (*Bacillus anthracis*)
Contagious Equine Metritis (*Taylorella equigenitalis*)
Dourine (*Trypanosoma equiperadum*)
Echinococcosis / Hydatidosis
Equine Encephalomyelitis (Eastern, EEE)
Equine Encephalomyelitis (Western, WEE)
Equine Herpesvirus Myeloencephalopathy (EHV-1, EHM)
Equine Infectious Anemia (EIA)
Equine Influenza (Virus Type A)

Equine Piroplasmosis (Babesiosis, *Babesia* [*Piroplasma*] *equi, B. caballi*)
Equine Rhinopneumonitis (EVH-1 and EVH-4)
Equine Viral Arteritis (EVA)
Glanders (*Pseudomonas mallei*)
Japanese Encephalitis
Leptospirosis
New World Screwworm (*Chrysomyia hominivorax*)
Old World Screwworm (*Chrysomyia bezziana*)
Rabies
Surra (*Trypanosoma evansi*)
Tularemia (*Francisella tularensis*)
Trichinellosis (*Trichinela spiralis*)
Venezuelan Equine Encephalomyelitis (VEE)
Vesicular Stomatitis (VS)
West Nile Fever

Porcine
African Swine Fever
Anthrax (*Bacillus anthracis*)
Aujesky's Disease (Pseudorabies)
Brucellosis (*Brucella suis*)
Classical Swine Fever (Hog Cholera)
Cysticercosis (*Cysticercus cellulosae* metacestode stage of *Taenia solium*)
Echinococcosis / Hydatidosis
Foot and Mouth Disease (FMD)
Japanese Encephalitis
Leptospirosis
New World Screwworm (*Chrysomyia hominivorax*)
Nipah Virus Encephalitis
Old World Screwworm (*Chrysomyia bezziana*)
Porcine Reproductive and Respiratory Syndrome (PRRS)
Rabies
Rinderpest
Swine Vesicular Disease
Transmissible Gastroenteritis (TGE)
Trichinellosis (*Trichinela spiralis*)
Tularemia (*Francisella tularensis*)
Vesicular Stomatitis (VS)

Poultry
Avian Chlamydiosis (Psittacosis and Ornithosis, *Chlamydia psittaci*)
Avian Infectious Bronchitis
Avian Infectious Laryngotracheitis (ILT)
Duck Viral Hepatitis (DVH)
Fowl Cholera (*Pasteurella multocida*)
Fowl Typhoid (*Salmonella gallinarum*)

Highly Pathogenic Avian Influenza
Infectious Bursal Disease (Gumboro Disease)
Low Pathogenic Avian Influenza (H5 or H7 subtypes)
Marek's Disease
Mycoplasmosis (*Mycoplasma gallisepticum*)
Mycoplasmosis (*Mycoplasma synoviae*)
Newcastle Disease (Exotic)
Pullorum Disease (*Salmonella pullorum*)
Turkey Rhinotracheitis

Aquaculture
Crustacean: Crayfish Plague (*Aphanomyces astaci*)
Crustacean: Infectious Hypodermal and Haematopoietic Necrosis
Crustacean: Infectious Myonecrosis
Crustacean: Necrotizing Hepatopancreatitis
Crustacean: Taura Syndrome
Crustacean: White Spot Disease
Crustacean: White Tail Disease
Crustacean: Yellowhead Disease
Fish: Epizootic Hematopoietic Necrosis
Fish: Epizootic Ulcerative Syndrome
Fish: Gyrodactylosis (*Gyrodactylus salaris*)
Fish: Infectious Hematopoietic Necrosis
Fish: Infectious Salmon Anemia
Fish: Koi Herpesvirus Disease
Fish: Red Sea Bream Iridoviral Disease
Fish: Spring Viremia of Carp
Fish: Viral Hemorrhagic Septicemia (VHS)
Mollusc: Infection with abalone herpes-like virus
Mollusc: Infection with *Bonamia exitiosa*
Mollusc: Infection with *Bonamia ostreae*
Mollusc: Infection with *Marteilia refringens*
Mollusc: Infection with *Perkinsus marinus*
Mollusc: Infection with *Perkinsus olseni*
Mollusc: Infection with *Xenohaliotis californiensis*

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Chase, C. Strategic vaccination: Trying to work around the ups and downs of the immune system. Proceedings, 22nd Northeast Dairy Production Medicine Symposium, Syracuse, NY, March 22-24. CD-ROM. (presented)

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Clement, T., M. Dammen, J. Christopher-Hennings. Maximizing sequencing success in the VDL. Proceedings, 44th American Association of Swine Veterinarians, San Diego, CA, March 2-5 (abstract; presented)

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Daly, R. Ag day at Washington Pavilion. Animal Health Matters 16(1):3.

Daly, R. Animal health effects of October West River blizzard noted at ADRDL. Animal Health Matters 16(3):7.

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Daly, R. Foster calves in the beef herd. *iGrow,* SDSU Extension Beef.

Daly, R. Hennings named veterinary and biomedical sciences department head. Animal Health Matters 16(2):1.

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Daly, R. 2013-2014 SDSU veterinary and biomedical sciences department scholarship award winners. Animal Health Matters 16(2):3.

Daly, R. Use computer spreadsheets or word processing for large sample submissions. Animal Health Matters 16(3):6.

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Darweesh, M.F., M. Rajput, L. Braun, J. Rohila, C. Chase. The role of BVDV Npro in interfering with bovine innate immunity. Proceedings, 32nd American Society for Virology, State College, PA, July 20-24, (abstract P17-2) p. 253.

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Faburay, B., A. Young, I. Morozov, J. Richt. Rift Valley fever virus Gn and Gc glycoprotein-based vaccine elicits neutralizing antibodies in sheep. Proceedings, 117th United States Animal Health Association and 56th American Association of Veterinary Laboratory Diagnosticians, October 17-23, San Diego, CA, p. 140 (abstract, presented).

Hause, B.M., E.A. Collin, R. Liu, R.R. Simonson, F. Li. Proceedings, 94th Conference of Research Workers in Animal Diseases, Chicago, IL, December 8-10 (presented)

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(abstract); Proceedings, Conference of Research Workers in Animal Diseases, Chicago, IL, December 8-10 (abstract 094P; presented).

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Mediger, J., J. Guthmiller, K. Schaffer, L. Braun, C. Chase, R. Daly. Outbreak of epizootic hemorrhagic disease (EHD) in cattle in South Dakota in 2012. Proceedings, Academy of Veterinary Consultants, Colorado Springs, CO, August 1-3, pp. 75-76; Proceedings, 122nd South Dakota Veterinary Medical Association, Sioux Falls, SD, August 11-12, p. 73. (presented)

Miskimins, D. How to enhance diagnostic submissions with digital pictures and videos. Proceedings, 122nd South Dakota Veterinary Medical Association, Sioux Falls, SD, August 13, p. 69. (presented)

Miskimins, D., R. Daly. Tularemia in a South Dakota cat. Animal Health Matters 16(3):6.

Olsen, D., C. Wang, J. Christopher-Hennings, K. Doolittle, S. Abate, K. Harmon, K. Kittawornrat, A. Lizano, R. Main, E. Nelson, T. Otterson, Y. Panyasing, C. Rademacher, R. Rauh, R. Shah, J. Zimmerman. Probability of detecting PRRSV infection using pen-based swine oral fluid specimens as a function of within-pen prevalence. Proceedings, American Association of Swine Veterinarians, San Diego, CA, March 3, pg. 109-110. (abstract; presented)

Park, K., J. Rajput, L.J. Braun, C.C.L. Chase. Effect of bovine herpesvirus 1 and bovine viral diarrhea virus (BVDV) on bovine monocyte-derived dendritic cells. Proceedings, 73rd American Society for Microbiology, North Central Branch, Brookings, SD, October 11-12, (Abstract 2-PP6) p. 31 (presented); Proceedings, 2013 Sanford health-SDSU Biomedical Research Symposium, Sioux Falls, SD, November 19 (presented); Proceedings, 94th Annual Meeting of the Conference for Research Workers in Animal Diseases, Chicago, IL, December 8-10, (Abstract 61P) (presented).

Petersen, A., A. Young. Immunological response to novel anti-tick vaccine candidate in deer. Autumn Immunology Conference, Chicago, IL, November (abstract, presented)

Pierson, M., M. Thomas, M. Khatri, R.S. Kaushi. Lectin binding profile of porcine MD_1-OSU airway epithelial and SD-PJEC intestinal epithelial cell lines. Proceedings, 98th South Dakota Academy of Science, Augustana College, Sioux Falls, SD, April 12-13 (abstract); Department of Biology and Microbiology Scholarship Day, SDSU, Brookings, SD, April 17 (abstract and presented); SDSU Undergraduate Research Scholarship and Creative Activity Day, Brookings, SD, April 22 (abstract and presented).

Robinson, S.R., J. Li, E.A. Nelson, M.P. Murtaugh. Broadly neutralizing antibodies against porcine reproductive and respiratory syndrome virus, a rapidly evolving RNA virus. Proceedings, Conference of Research Workers in Animal Diseases, Chicago, IL, December 8-10 (presented)

Singrey, A., S. Lawson, F. Okda, T. Clement, C. Welbon, J. Christopher-Hennings, E.A. Nelson. Development of monoclonal antibodies and other reagents for detection of porcine epidemic diarrhea virus (PEDV). Proceedings, North American PRRS Symposium, Chicago, IL, December 7-8 (abstract)

Smith, S., A. Eljaki, R. Daly, M. Hildreth. Abstract: Effect of safe-guard free-choice mineral blocks on trichostrongyle nematodes in pastured cattle from eastern South Dakota. Animal Health Matters 16(1):5; Proceedings, 98th South Dakota Academy of Sciences (abstract)

Snow, E., M. Thomas, R.S. Kaushik. Innate immune responses of porcine macrophage $Cdelta_2$+ and $Cdelta_2$- cell lines to bacteria-associated virulence determinants. Department of Biology and Microbiology Scholarship Day, SDSU, Brookings, SD, November 18 (abstract and presented).

Stricker, A.M., D.D. Polson, J. Hennings, T. Clement. Variation in PRS virus ORF5 sequencing within and among 3 state diagnostic laboratories. Proceedings, 44th American Association of Swine Veterinarians, San Diego, CA, March 2-5 (abstract; presented)

Thomas, M., Z. Ran, L. Zhu, B. Hause, M. Khatri, D. Francis, F. Li, R.S. Kaushik. Characterization and comparison of porcine airway and intestinal epithelial cells lines for the infectivity and innate immune responses to influenza virus infection. Sanfordord Health-SDS Biomedical Research Symposium, Sioux Falls, SD, November 19 (P64 and presented); 94th Conference of Research Workers in Animal Diseases, Chicago, IL December 8-10 (abstract 065P; presented).

Thomas, M., Z. Ran, L. Zhu, B. Hause, M. Khatri, D. Francis, F. Li, R.S. Kaushik. Differential expression of viral pattern recognition receptors in porcine airway and intestinal epithelial cells in response to influenza infection. 73rd American Society for Microbiology, North Central Branch, Brookings, SD, October 11-12 (abstract 2.2-OP4, presented)

Wittry, J.J., R. Duede, J. Flint, J.A. Wilson, A.A. Novak, C.D. Carlson, M.B. Hildreth, B.A.R. Hadi. Diel pattern of host-seeking activities of *Culex tarsalis* and *Aedes vexans* in South Dakota. 2013 International Symposium in Integrating Research and Action on Dengue, Yogyakarta, Indonesia, November 29-30 (presented)

Zhy, H., P. Wolk, M. Hildreth, R. Zhou. Genetic transformation of *Anabaena cylindrical* $ATCC_{29414}$. Proceedings, 11th Workshop of Cyanobacteria, Washington University, St. Louis, MO, August 7-11 (presented)

PRESENTATIONS—2013

CHASE, CHRISTOPHER C.L.

Presentations

1) Mucosal immunology 101: The world of alphabet soup unraveled (hopefully??), Zinpro Winter Research Planning Meeting, Chaska, MN, January 10; Lallemand Animal Health Winter Research Planning Meeting, Milwaukee, WI, January 16.
2) Swine immune systems and vaccination. 2013 Manitoba Swine Seminar, Winnipeg, Manitoba, January 31.
3) Basic swine immunology. Fairmont Veterinary Clinic, Fairmont, MN, March 21.
4) Immunology. Novartis Animal Health Veterinary Excellence Series, San Diego, CA, April 19.
5) IBRs impact on reproduction. Novartis Animal Health Veterinary Excellence Series, San Diego, CA, April 20; Seattle, WA, August 16.
6) Priming the immune response immunology 101. 2013 Novartis SIV Summit, Miami Beach, FL, April 26.
7) 2012 EHDV outbreak in deer and cattle in South Dakota. Gap Analysis and Countermeasures Assessment Orbiviruses Workshop, Manhattan, KS, May 14.
8) Immunology. Novartis Animal Health Veterinary Excellence Series, Maple Creek, Saskatoon, Canada, June 4; North Battleford, Saskatoon, Canada, June 5; Drayton Valley, Alberta, Canada, June 24; Camrose, Alberta, Canada, June 26; Airdrie, Alberta, Canada, June 27; Seattle, WA, August 16; Everglade City, FL, October 12, 14, 18; Salmon, ID, October 23.
9) Overview on IBR and its effects on reproduction. Novartis Animal Health Veterinary Excellence Series, Morden, Manitoba, Canada, June 6; Joint Annual Meeting, American Dairy Science Association and American Society of Animal Science, Indianapolis, IN, July 9.
10) BVDV genetic diversity: Understanding how BVDV interacts with the immune system. Novartis Animal Health Veterinary Excellence Series, Morden, Manitoba, Canada, June 6.
11) Strategic vaccination: Maximizing the immune response. Novartis Animal Health Veterinary Excellence Series. Westlock, Alberta, Canada, June 25; Didsbury, Alberta, Canada, June 27; Novartis Animal Health Producer Serminar, Wetaskiwin, Alberta, Canada, June 25; Cardston, Alberta, Canada, June 27.
12) Swine immunology 101. Standard Nutrition and IVS Summer Producer Meeting, Portage la Prairie, Manitoba, Canada, August 7.
13) Immune response in the horse: What makes it work? Equine Nutrition Seminar, Jackson, WY, August 22.
14) Innate and APC responses to BVDV: Identifying immunomodulatory mechanisms. University of Calgary, Calgary, Alberta, Canada, September 6.
15) What is fetal protection? Novartis Animal Health Veterinary Excellence Series, Airdrie, Alberta, Canada, September 6.
16) Disspelling the BVDV vaccine myths--What is fetal protection? Novartis Cattle Veterinary Partnership Meeting, Kelowna, British Columbia, Canada, September 10.

17) IBR and its impact on reproduction. Novartis Cattle Veterinary Partnership Meeting, Kelowna, British Columbia, Canada, September 10; Novartis Animal health Veterinary Excellence Series, Everglade City, FL, October 12, 14, 18, 24; Eastern Iowa Veterinary Medical Association, Riverside, IA, October 31.
18) Calf immunity--Understanding the pros and cons of vaccinating the young calf. Novartis Cattle Veterinary Partnership Meeting, Kelowna, British Columbia, Canada, September 11; Novartis Animal Health Veterinary Excellence Seminar, Everglade City, FL, October 12.
19) Determining the right vaccine protocol: Is it possible? Pre-Conference Seminar, The Replacement Heifer, from Birth to Pre-Calving. 46th American Association of Bovine Practitioners, Milwaukee, WI, September 17.
20) The neonatal calf immune response "when should we vaccinate?" Pre-Conference Seminar, The Replacement Heifer, from Birth to Pre-Calving. 46th American Association of Bovine Practitioners, Milwaukee, WI, September 17.
21) 2013 SDSU annual progress report: NC-1192 an integrated approach to control of bovine respiratory disease. Technical Committee, American Association of Bovine Practitioners, Milwaukee, WI, September 18.
22) The immune response in newly arrived cattle: What should we expect from stress & diet? Eastern Iowa Veterinary Medical Association, Riverside, IA, October 31.
23) Immune systems functions. 2013 Vi-COR Ruminant Advisory Panel Meeting, Chicago, IL, November 5.
24) Immunology training, 10 seminars. Merck Technical Services Veterinarian Immunology Seminar, Desoto, KS, November 19-20.

CHRISTOPHER-HENNINGS, JANE

Presentations

1) PRRSV diagnostics in the U.S, present, past, future. International PRRSV Symposium, Beijing, China, May 20-22.
2) PRRSV diagnostics. Canadian Animal Health Laboratory Network Annual Meeting, S. Hyacinthe, Quebec, Canada, May 26-29

DALY, RUSSELL

Presentations

1) PQA plus certification training. South Dakota Pork Producers Annual Meeting, Sioux Falls, SD, January 9.
2) Health management strategies to maximize returns. Northern Plains Beef Conference, Watertown, SD, January 18.
3) Zoonotic diseases: Keeping visitors safe. Lennox High School Sophomore and Junior Vocational Agriculture Classes, Lennox, SD, May 9.
4) PRRS and its elimination from herds and regions. U.S. Soybean Export Council, China Pork Producers Tour, SDSU, Brookings, SD, June 13.
5) 2013 CDC/NASPHV compendium on animal contact in public settings. South Dakota One Health Working Group, Huron, SD, July 10.

6) Characterization of shiga-toxin producing *E. coli* infections and cryptosporidiosis in South Dakota with respect to animal exposures. SDSU Life Science Seminar Series, Brookings, SD, September 6.
7) Bovine respiratory disease in pre-weaned calves: Field investigations. American Association of Bovine Practitioners Annual Conference, Milwaukee, WI, September 21.
8) Disease investigation case study: Anthrax. Canton High School Anatomy Class Visit, Brookings, SD, November 9.
9) Animal health lessons from the October South Dakota blizzard. American Association of Bovine Practitioners Student Chapter, Iowa State University, Ames, IA, November 11.
10) Animal health effects of the October South Dakota blizzard: Observations. Range Beef Cow Symposium XXIII, Rapid City, SD, December 3.

Media

1) Late term cattle abortions. SDSU *iGrow* Radio, January 10.
2) Sheep and goat producers should keep Q fever in mind. *Farm Forum,* January 11.
3) Pinkeye: What's new and what we don't know yet. Cow-Calf Learning Community (via internet), Kimball, SD, January 23.
4) Dealing with frostbite in young calves. *Farm Forum,* January 25.
5) What's best for the animals? *Farm Forum,* February 8.
6) A shopping list for calving season. *Farm Forum,* February 22.
7) Trichomoniasis in bulls. KWAT Radio Ag Hour, March 1.
8) Supplies for the baby calf: Are you ready? *Farm Forum,* March 8.
9) Cryptosporidiosis can cause illness in calves and people too. *Farm Forum,* March 22.
10) Animal rabies on the increase. WNAX Radio Farm News, April 4.
11) Beef cows can get milk fever too! *Farm Forum,* April 5.
12) Equine vaccinations. SDSU Extension News Release, April 9; Brownfield Ag Network Radio, April 10.
13) Cow calf veterinarians as consultants. *Beef Vet,* April 15.
14) What to do when your calves get the scours. *Farm Forum,* April 19.
15) Calf scours, *Salmonella,* H_7N_9 influenza. KWAT Radio Ag Hour, April 26.
16) Be aware of *Salmonella* risk when handling baby chicks. *Farm Forum,* May 3.
17) Beef reproductive success means "stacking the deck" in all the right ways. *Farm Forum,* May 17.
18) Finding PED in swine herds. *Farm Forum,* May 31.
19) Solving the summer pneumonia mystery. *Beef Magazine,* June 10.
20) Anthrax: A real possibility in the cattle world. *Farm Forum,* June 14.
21) Hardware disease. *Beefmaster Cowman,* June 19.
22) Help kids enjoy – and stay healthy – around animals this summer. *Farm Forum,* June 28.
23) MLV vaccines during pregnancy. *Western Cowman,* June 28.
24) Rocky Mountain spotted fever – even out here on the prairie. *Farm Forum,* July 12.
25) How the ADRDL is responding to PEDV. KELO Radio Ag Hour, July 15.
26) Pinkeye. *Tri-State Livestock News,* July 16.
27) We're too fat. That includes you, Fido and Fluffy. *Farm Forum,* July 26.

28) Ergot poisoning. Food and Farm Show/America's Web Radio, August 9.
29) Pinkeye continues to plague cattle producers. *Farm Forum,* August 9.
30) Caring for the old horse. *Farm Forum,* August 23.
31) Heat stress in livestock. WNAX Radio Farm News, August 26.
32) Pre-veterinary students begin their journey at SDSU. *Farm Forum,* September 6.
33) Fenceline weaning: A stress-reducer for cattle and cattle producers. *Farm Forum,* September 20.
34) Calf preconditioning. KWAT Radio Ag Hour, September 30.
35) It's that Prussic acid time of year. *Farm Forum,* October 4.
36) Animal health following weekend weather events. SDSU Extension news release; Brownfield News, October 7.
37) Calf health after the blizzard. SDSU *iGrow* Radio, October 7.
38) October blizzard. Food and Farm Show/America's Web Radio; SD Public Broadcasting Radio Mid-day, October 8; KELO Radio Ag Hour, October 14.
39) Turning helplessness into helpfulness. *Farm Forum,* October 18.
40) Stress – the culprit in many illnesses. *Farm Forum,* November 1.
41) Summer pneumonia. *Bovine Veterinarian,* November 13.
42) October blizzard. *Beef Magazine* Webcast; *Beef Vet*, November 14.
43) Brucellosis – beyond the Bang's tags. *Farm Forum,* November 15.
44) Footrot in cattle. Land and Livestock post, November 15.
45) Health effects on cattle and public health following the October 2013 blizzard. Atlas Storm Case Workers Workshop (via DDN), Rapid City, SD, November 26.
46) Bridging the gap on antibiotic resistance. *Farm Forum,* November 29.
47) Blizzard effects. SDSU *iGrow* podcast; Beef Today webcast, December 4; SDSU *iGrow* Radio, December 9.
48) PED virus has the swine industry scrambling. *Farm Forum,* December 13.
49) A good time of year to think about calories. *Farm Forum,* December 27.
50) Cold stress, PEDV. WNAX Radio Farm News, December 31.

SEEMA DAS

Presentations

1) Using MALDI-TOF instrument for quick and accurate bacterial ID. 122nd South Dakota Veterinary Medical Association, Sioux Falls, SD, August 13.

Media

1) Identifying source of *Salmonella* in raw pet food. Medical Express News Website, 2014-02.

HILDRETH, MICHAEL

Presentations

1) Is resistance in cattle nematodes real? How to use egg counts effectively. Pfizer Deadwood Winter Veterinarian Retreat, Deadwood, SD, January 31.
2) Internal parasites and anthelmintic resistance in sheep and goats. James Bailey Herd Health Conference, Brookings, SD, February 16.

3) Parasite resistance in sheep: "Beware of drug-resistant *Haemonchus!!!!*" 2013 South Dakota Sheep Growers Association Annual Convention, Brookings, SD, September 28.
4) Limitations in using PCR for quantifying trichostrongyle eggs by genera. 2013 Annual Merial's Parasitology Advisory Board Meeting, New Orleans, LA, October 16.

HOLLER, LARRY

Presentations

1) Challenges in diagnosis, prevention and management of bovine pregnancy wastage. VMRCVM Special Seminar Series, College of Veterinary Medicine, Virginia Tech, Blacksburg, VA, February 7.
2) Reproductive diseases – Diagnosis, treatment, and management. James Bailey Herd Health Conference, Brookings, SD, February 16.
3) Ovine GM_1 gangliosidosis and Huntington's disease. Biotechnology Class, Brookings High School, Brookings, SD, April 11.
4) Current topics in sheep health. 1st North Dakota Lamb and Wool Expo, Jamestown, ND, August 2.
5) Current topics in flock health management. Interstate Veterinary Conference, South Sioux City, NE, October 10.
6) Ovine GM_1 gangliosidosis, mad cows, Huntington's disease and the U.S. sheep industry. Interstate Veterinary Conference, South Sioux City, NE, October 10.
7) Diagnosis and control measures of opportunistic infectious causes of reproductive failure in beef cattle. Applied Reproductive Strategies in Beef Cattle, Staunton, VA, October 16.

MISKIMINS, DALE

Presentations

1) Diarrhea in beef calves. Northwest Veterinary Supply, Parkston, SD, December 17.

LI, FENG

Presentations

1) High-resolution analysis of viral and cellular transcriptomes in novel influenza virus-infected cells. Virology Annual Meeting, University of Nebraska, Lincoln, NE, March.
2) Emerging influenza C-like virus in U.S. swine and cattle: Implications for public health. 1st Sanford Health-SDSU Biomedical Research Symposium, Sioux Falls, SD, November 19.
3) Influenza B virus drug resistance. Yangzhou University, China, December 11.
4) HIV maturation inhibitors. Wuhan University, China, December 12.
5) Novel bovine influenza. China Agricultural University, China, December 16.

NEIGER, REGG

Presentations

1) South Dakota wild goldfish die off due to cyprinid herpesvirus-2. Advanced Aquatic Veterinary Medicine, Fish Health and Disease, Aquaculture 2013, Nashville, TN, February 25.
2) Hemorrhagic diarrhea in heifers and steers: Mycotoxin's involvement. 122nd South Dakota Veterinary Medical Association, Sioux Falls, SD, August 13.

YOUNG, ALAN

Presentations

1) Commercializing innovation. South Dakota Biotechnology Summit, Sioux Falls, SD, September.
2) Research commercialization. SDSU-Avera Joint Symposium, Brookings, SD, September.
3) Leveraging agriculture: A tested formula for tech startups. Agri-Food and Health for Northern Ontario, Huntsville, Ontario, Canada. October.
4) SBIR success stories: Medgene Labs. NIH National SBIR Summit, Sioux Falls, SD, October 28-30.
5) Facilitating research collaboration. SDSU-Sanford Health Joint Symposium, Sioux Falls, SD, November.

RESEARCH PROJECTS

Animal Health

A-332-09 Role of fixed and migratory leukocytes in the pathogenesis of chronic disease—Young, Chase, Knudsen, Gonda (October 2009-September 2014)

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

Experiment Station

H-270-08 Anthelmintic resistance issues in South Dakota beef and sheep herds—Hildreth (October 2008-September 2013)

H-326-09 Role of innate immune responses and cells in the intestinal mucosal immunity of domestic animals—Kaushik (October 2009-September 2014)

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, Fang, Christopher-Hennings (March 2011-September 2016)

H-411-11 Bovine viral diarrhea virus infections in cattle: Implications on innate immunity and acquired immune development—Chase, Hoppe, Young (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)

R-378-10 Detection and control of porcine reproductive and respiratory syndrome virus and emerging viral diseases of swine (NC-229)—Nelson, Christopher-Hennings, Fang (January 2010-September 2014)

R-410-11 NC-1192: An integrated approach to control of bovine respiratory diseases (NC-1027)—Chase, Daly (October 2011-September 2016)

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

National Pork Board

- Generating swine influenza virus (SIV) oral fluid diagnostic reference standards for community use—Zimmerman, Fang, Nelson, Christopher-Hennings, Rowland, Opriessnig, Yoon (October 2011-September 2013)
- Development of PRRS virus-like particles containing nanoparticle vaccine and its evaluation in pigs—Gourapura, Fang, Jackwood (October 2012-September 2013)
- Sequencing and characterization of genes encoding capsid proteins VP4, VP6 and VP7 from field porcine rotavirus strains—Bai, Hesse, Nelson, Anderson (December 2012-December 2013)
- Development of a broadly protective PRRS vaccine candidate: Application of non-toxic enterotoxin and *E. coli* as the adjuvant-delivery system—Fang, Zhang, Knudsen (January 2013-December 2013)
- Assessment of a vaccine novel adjuvant for influenza in pigs—Khatri, Francis, Kaushik, Thomas (October 2013-December 2013)

- Duration and level of PEDV neutralizing antibodies for clinical protection using feedback protocols—Clement, Singrey, Lawson, Hennings, Nelson (December 2013-December 2014)
- PEDV diagnostic approaches to assess sow immunity and piglet protection—Nelson, Singrey, Lawson, Clement, Hennings (May 2014-April 2015)
- Determination of the sites of tissue localization, routes of viral shedding, duration of virus carriage, kinetics of antibody response, and potential of aerosol transmission of porcine deltacoronavirus (PDCoV) following inoculation of nursing pigs and their dams—Hesse, Kelling, Brodersen, Loy, Doster, Topliff, Nelson, Bai, Peddireddi, Hause (May 2014-December 2014)
- Development of reagents and serological assays for porcine deltacoronavirus (PDCoV)—Nelson, Lawson, Singrey, Clement, Hennings (June 2014-December 2014)

USDA/APHIS/Veterinary Services

- National Animal Health Laboratory Network: Swine surveillance (classical swine fever virus, pseudorabies virus, swine influenza virus, PEDV, TGEV, PDCoV)**—**Christopher-Hennings, Parmar, Daly, ADRDL/VBSD Staff (April 2007-Ongoing)
- 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, ADRDL/VBSD Staff (May 2014-March 2015)

USDA/International Borlaug Fellowship Training/Foreign Agricultural Service

- Influenza drug resistance—Li, Sood (September 2011-January 2014)

USDA/NIFA

- Innovative STEM instructional techniques to increase the number of diversity of students in food safety related majors—Hegerfeld-Baker, Anand, Ruesch (September 2011-August 2014)
- New approaches to bovine respiratory disease prevention, management, and diagnosis—VanEenennaam, Chase (October 2013-August 2014)
- Conference grant proposal for the 6th BVDV-Pestivirus meeting—Chase (April 2014-October 2014)

USDA/AFRI

- Innovative strategies to enhance PRRSV-specific innate and mucosal immunity—Fang, Gourapura, Nelson, Christopher-Hennings, Zhang (May 2012-April 2017)

USDA/Food Safety and Inspection Service

- Food Emergency Response Network (FERN)—Ruesch, Zeman, Daly, Parmar (September 2011-Ongoing)
- FERN: Enhancement of laboratory testing capability for microbiological threat agents at the SDSU ADRDL—Ruesch, Daly, Chapin, Braun, Aguiar (September 2012-September 2014)

USDA/National Research Initiative

- Identification and characterization of novel poxviral immunomodulatory proteins of ORF virus—Rock, Delhon, Young, Diel (April 2012-March 2015)

National Institute of Health

- HIV-1 maturation and its inhibition—Li (September 2008-July 2013)
- Stimulation of broadly neutralizing antibodies against influenza in a pig model—Francis, Kaushik, Li (August 2011-August 2015)

National Institute of Health/STTR

- 2nd generation HIV maturation inhibitor—Li (August 2013-July 2014)

Alltech, Inc.

- Impact of programmed nutrition on offspring health, growth, performance and meat quality—Weaver, Underwood, Gonda, Wright, Daly, Taylor (May 2012-April 2015)

Bayer Animal Health

- Measuring innate immunity following the use of an experimental agonist—Chase (November 2013-December 2014)

Egyptian and Educational and Cultural Bureau

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

Guangdong Academy of Agriculture Science, Guangdong, China

- PRRSV epidemiology in China—Song, Fang (September 2010-August 2013)
- Genetic characterization of PRRSV Chinese strains for development of vaccine candidates—Fang, Song, Wu (April 2012-March 2014)

North Dakota Department of Agriculture

- Laboratory ISO 17025 accreditation for ADRDL Food Safety Section—Daly, Ruesch, Parmar (October 2012-September 2017)
- Computational methodology to predict immunodominant regions on the spike (S) and nucleocapsid (N) antigens of PEDV—Ramamoorthy, Nelson (January 2014-January 2015)

Novartis Animal Health

- Analyzing vaccine and field strains of bovine herpesvirus 1 using rapid sequencing—Chase (January 2014-June 2014)

South Dakota Department of Health, Centers for Disease Control

- South Dakota West Nile virus surveillance and epidemiological project: Mosquito survey—Hildreth (June 2001-Ongoing)

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

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

South Dakota Beef Industry Council

- Food safety genetics: Genetic variation of response to an *Escherichia coli* 0157:H7 vaccine—Gonda, Daly, Holland, Perry, Wright (October 2011-September 2013)

South Dakota Soybean Research & Promotion Council

- Efficacy of soybean meal in reducing the effect of a PRRSV challenge in pigs—Thaler, Lavesque, Christopher-Hennings, Nelson, Clapper (April 2014-December 2014)

South Dakota Soybean Research & Promotion Council/South Dakota Department of Game, Fish & Parks

- Rainbow trout rearing performance, intestinal morphology, and immune response after long-term feeding of high levels of fermented soybean meal—Barnes, Brown, Bruce, Sindelar, Neiger (July 2013-March 2014)

South Dakota State University/Mark of Academic Excellence Fund

- Characterization of antibodies towards a novel influenza C virus in humans—Thiex, Li, Daly (April 2014-February 2015)

South Dakota State University/2010 Center for BCAAP/Research Support Fund

- Trafficking of BVDV proteins—Chase, Hoppe (October 2010-August 2014)
- Analysis of BVDV for autophagosome activity—Chase, Hoppe (September 2011-August 2013)
- Bovine viral diarrhea virus and effects on macrophages and dendritic cells: Dissecting effect of BVDV strains on effect on phagocytosis and antigen presentation—Chase, Hoppe (January 2012-December 2014)
- Study of novel influenza virus isolated from cattle and pigs in US farms—Li (September 2013-September 2014)

South Dakota State University/2010 Center for BCAPP/Research Support Fund

- Study influenza A virus assembly within living cells by fluorescence resonance energy transfer (FRET) microscopy—Li, Hoppe (September 2011-September 2013)

South Dakota Veterinary Medical Association

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

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—Das, Daly (September 2012-August 2017)
- Detection of *Salmonella* in mouse feces and raw pet food using ABI 7500 FAST real time PCR—Das, Daly, Ruesch, Aguiar (September 2013-August 2015)
- Cooperative agreement program to expand and validate testing methods for food contaminants in animal diagnostic specimens—Das, Daly, Ruesch (September 2013-September 2014)
- Evaluation of *Salmonella* in symptomatic and asymptomatic pets: Study for the Vet-LIRN program—Das, Daly, Zeman, Ruesch (September 2011-September 2014)

United States Department of Homeland Security/Kansas Bioscience Authority

- The Center of Excellence in Emerging Zoonoses and Animal Disease—Young (July 2010-June 2016)

Upper Midwest Agriculture Safety and Health Center (UMASH)/Pilot Project Program

- Characterization of shiga-toxin producing *E. coli* infections and cryptosporidia in South Dakota with respect to agricultural exposures and other risk factors—Daly (June 2012-September 2013)

Vi-Cor

- The effect of beta-glucans on immune response in lactating dairy cows—Chase (September 2013-May 2014)

Zoetis Animal Health/Pfizer Animal Health

- Bovine respiratory disease/swine respiratory disease antimicrobial susceptibility program—Holler, Murray (January 2006-Ongoing)
- A case-control study to determine herd-level risk factors for nursing calf bovine respiratory disease (BRD) on cow-calf operations—Woolums, Smith, Berghaus, Daly, White (November 2012-October 2014)
- Impact of pre-breeding vaccination with modified live or inactivated viral vaccines on subsequent reproductive indices and abortions—Perry, Daly (April 2013-March 2016)

COURSE OFFERINGS—DEPARTMENT OF VETERINARY AND BIOMEDICAL SCIENCES

VET 103-S01	Introduction to Veterinary Medicine, 1 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-S04	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. (Veterinary & Biomedical Sciences Faculty)
VET 494-S02	Internship, 1 cr. (Veterinary & Biomedical Services Faculty)
VET 496-S01	Field Experience, 1-12 cr. (Miskimins, Veterinary & Biomedical Sciences Faculty)
VET 497-S01	Cooperative Education, 1-12 cr. (Veterinary & Biomedical Sciences Faculty)
VET 498-S01	Undergraduate Research / Scholarship, 1-4 cr. (Chase, Veterinary & Biomedical Sciences Faculty)
VET 591-S02	Independent Study—Vaccinology, 2 cr. (Chase)
VET 788-S01	Master's Research Problems, 2-3 cr. (Veterinary & Biomedical Sciences Faculty)
VET 791-S01	Independent Study, 1-4 cr. (Chase, Young)
VET 791-S01	Independent Study—Cshl Proteomics, 3 cr. (Chase)
VET 791-S01, S03	Independent Study—Vaccinology, 1-4 cr. (Chase)

VET 791-S02	Independent Study—Poultry Health Concepts, 2 cr. (Chase)
VET 791-S02	Independent Study—QA Process Development, 1-4 cr. (Chase)
VET 791-S04	Independent Study—Faculty Seminar, 1 cr. (Wang)
VET 791-S04	Independent Study—Flow Cytometry, 2 cr. (Young)
VET 791-S05	Independent Study—CSH Proteomics, 1-4 cr. (Chase)
VET 792-S01	Topics—Molecular Diagnostics, 1-3 cr. (Hennings)
VET 792-S02	Topics—Ruminant Antibody Production, 1 cr. (Young)
VET 792-S01	Tp—Seminar, 1 cr. (Wang)
VET 793-S01	Workshop, 1-4 cr. (Veterinary & Biomedical Sciences Faculty)
MICR 231L-S01-S11	General Microbiology Lab, (Mediger)
MICR 233L-S01, S02, S04, S05	Introductory Microbiology Lab, (Mediger)
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 440L-S01	Infectious Disease Lab, 3 cr. (Mediger)
MICR 492-S01D/592-S02D	Tp—Immunology, 3 cr. (Chase)
MICR 492-S02D/592-S01D	Tp—Virology, 3 cr. (Chase)
MICR 494-S02	Internship, 1-4 cr. (Mediger)
MICR 494-S02	Internship, 1-12 cr. (Mediger)
MICR 498-S01	Undergraduate Research / Scholarship, 2 cr. (Li)
MICR 498-S02-S04, S07	Undergraduate Research / Scholarship, 1-12 cr. (Li, Fang, Kaushik, Mediger)
MICR 592-S01	Tp—Medical and Veterinary Immunology, 3 cr. (Kaushik)
MICR 792-S01	Topics—Biomedical Sciences, 1 cr. (Li)
MICR 798-S01, S05	Thesis—Research, 1-7 cr. (Li, Wang)

MICR 798-S02, S03, S05	Thesis, 1-7 cr. (Kaushik, Wang, Chase)
BIOS 662-S02D	Advanced Molecular and Cellular Biology, 6 cr. (Chase)
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 798-S02	Thesis—Biology / Microbiology, 1-10 cr. (Kaushik, Li)
BIOS 798-S24	Thesis—MS, 1-10 cr. (Chase)
BIOS 798-S04-S05, S24	Thesis—Veterinary Science, 1-10 cr. (Chase, Hennings)
BIOS 798-S04-S07, S10, S20-S24, S28, S31, S40, S44	Thesis, 1-10 cr. (Fang, Chase, Young, Wang, Hennings, Kaushik)
BIOS 898D-S04-S06, S11, S49	Dissertation—PhD-Biology / Microbiology, 1-7 cr. (Hildreth, Wang, Kaushik)
BIOS 898D-S11-S13, S24, S26, S29-S31, S35	Dissertation—PhD-Veterinary Science, 1-7 cr. (Chase, Li, Young, Fang, Nelson)
BIOS 898D-S16, S33, S36-38, S42, S44-S45, S48-S50	Dissertation—PhD, 1-7 cr. (Kaushik, Li, Holler, Nelson, Young)
BIOS 898D-S64	Dissertation—PhD-Veterinary Science, 5 cr. (Nelson)
BIOS 898D-S34	Dissertation—PhD-Veterinary Science, 1 cr. (Zhang)

South Dakota
Animal Disease Research and Diagnostic Laboratory

Analysis of Workload

July 1, 2013 - June 30, 2014

Requests for Laboratory Assistance

July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1,813	1,888	1,748	1,901	1,510	1,703	2,080	1,212	2,665	2,184	2,086	1,844	22,634

Laboratory Examinations

35,179	33,891	30,983	38,659	36,671	30,307	40,877	29,089	33,640	30,906	27,403	32,687	400,292

Work Load Comparison With Prior Years

Requests for Laboratory Assistance

FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13	FY14
24,187	25,923	25,551	25,281	23,753	22,149	19,188	19,975	20,707	21,752	22,634

Laboratory Examinations

477,987	448,569	440,519	426,569	414,223	367,937	314,091	442,630	591,014	425,873	400,292

South Dakota	
Animal Disease Research and Diagnostic Laboratory	
Total Laboratory Testing by Section -- FY14	
July 1, 2013 - June 30, 2014	
PATHOLOGY	
Necropsy Cases	2,413
PATHOLOGY TOTAL	**2,413**
CLINICAL PATHOLOGY	
Hematology	
Complete Blood Count	307
Coombs	4
Presurgical Evaluation	6
White Blood Cell Count	1,621
Urine and Fluids	
Cytology	149
Fluids Analysis	7
Rumen pH	17
Urinalysis	48
Clinical Chemistry	
Serum Chemistry Profile	
Dairy Management	20
Electrolyte (Anion Gap)	8
Equine	42
NSAIDS	5
Porcine	7
Ruminant	104
Small Animal	178
Small Animal Pre-surgical	80
Individual Tests	
Albumin	336
Alkaline Phosphatase	2
Alanine Transaminase (ALT, SGPT)	11
Anion Gap	2
Aspartate Transaminase (AST, SGOT)	11
Beta Hydroxybutyric Acid (BHA)	572
Bile Acids	4
Bilirubin, Direct	1
Bilirubin, Total	1
Blood Urea Nitrogen (BUN)	296
Calcium	138
Creatinine	6

Gamma Glutamyltransferase (GGT)	11
Glucose	612
Lipase	7
Magnesium	7
Non-esterified Fatty Acids (NEFA)	519
Other	1
Phenobarbital	1
Phosphate	29
Potassium	10
Protein, Total	449
Sodium	5
Triglyceride	1
Parasitology	
Cryptosporidia Exam	311
Fecal Flotation	758
Fecal Occult Blood	1
Parasite Identification	9
Tritrichomonas foetus Culture	27
Immunology	
Bovine IgG Assay	103
Cortisol	4
Fecal ELISA	
Coronavirus	428
Giardia	38
Parvovirus	25
Rotavirus	422
Thyroid Hormone	296
Heartworm Antigen	19
CLINICAL PATHOLOGY TOTAL	**8,076**
HISTOPATHOLOGY	
Immunohistochemistry	941
Tissue Sections - H&E	12,482
Tissue - Special Stains	225
HISTOPATHOLOGY TOTAL	**13,648**
BACTERIOLOGY	
Aerobic Culture	11,551
Anaerobic Culture	1,484
Antimicrobial Susceptibility	1,211
Aquatic Bacterial Screen	300
Bacterial Kidney Disease FA	60
Bovine Ocular Culture	138
Brachyspira Culture	27
Campylobacter Culture	283

Clostridium difficile Toxin A/B II	17
Clostridium Direct FA	40
Darkfield Screen	95
Dermatophilus congolensis	1
E. coli K99 IFA	296
Giemsa Anthrax Screen	25
Johne's Culture	174
Listeria Culture	36
Milk Bulk Tank Culture	18
Milk Sample Culture	149
Mycology Culture	453
Mycology Non-specific Fluorescence Test	56
Mycoplasma Culture	424
Mycoplasma Milk Screen	11
Salmonella Enrichment	507
Salmonella Serotyping	217
VLRN *Salmonella* Testing	68
BACTERIOLOGY TOTAL	**17,641**
FOOD SAFETY	
Campylobacter Direct	207
Canned Food Quantitative Testing	42
(APC, Coliforms, Yeast/Mold Count)	
E. coli O157:H7 PCR	210
E. coli Petrifilm	151
Kidney Inhibition Swab	56
Listeria monocytogenes	146
Listeria sp.	259
Non-O157 STEC Culture	4
Non-O157 STEC O Group PCR	7
Non-O157 STEC Screening PCR	89
Salmonella BAX PCR	167
Salmonella RTE BAX PCR	118
Salmonella VETLRN	153
FOOD SAFETY TOTAL	**1,609**
SEROLOGY	
Anaplasmosis	
Competative Enzyme-linked Immunoassay	3,136
Avian Influenza	
AGID (Game birds)	30
AGID (Egg products)	129
Bluetongue	
AGID	12
Enzyme-linked Immunoassay (ELISA)	14,985

Bovine Leukosis Virus	
AGID	215
ELISA	54,330
Bovine Pregnancy Test	135
Bovine Respiratory Syncytial Virus	
SN	342
Bovine Viral Diarrhea Virus	
ACE	11,494
Bovine Viral Diarrhea Virus I	
SN	778
Bovine Viral Diarrhea Virus II	
SN	770
Brucella	
BAPA	5,443
Card	3,964
Plate	463
Rivanol	107
Tube	16,087
Brucella - Canine	
IFA	77
Brucella - Small Ruminant	
Card	95
Brucella ovis	
ELISA	1,680
Caprine Arthritis Encephalitis	223
Epizootic Hemorrhagic Disease	
AGID	106
Equine Infectious Anemia	
AGID	7
ELISA	2,058
Feline Immunodeficiency Virus	
ELISA	18
Feline Infectious Peritonitis	
ELISA	31
Feline Leukemia Virus	
ELISA	18
Infectious Bovine Rhinotracheitis	
SN	796
Leptospira	
bratislava	702
canicola	701
grippotyphosa	703
hardjo	704
icterohemorrhagiae	702
pomona	704

Mycoplasma hyopneumoniae	
ELISA	12,802
ELISA DAKO	223
Neospora	
ELISA	3,238
Ovine Progressive Pneumonia	
AGID	297
Parainfluenza-3	
SN	134
Paratuberculosis (Johne's)	
ELISA	52,270
Porcine Epidemic Diarrhea Virus	
IFA	7,324
Porcine Respiratory and Reproductive Syndrome	
ELISA	41,854
Fluorescent Focus Neutralization (FFN)	644
IFA (European Strain)	91
IFA (North American Strain)	107
Oral Fluid (ELISA)	1,009
Pseudorabies	
gB ELISA	791
gB ELISA NAHLN	1,227
Pseudorabies Differential Test	
G1 ELISA	7
G1 ELISA NAHLN	19
Swine Influenza Virus	
H1	281
H3	281
Vesicular Stomatitis	
Indiana	56
New Jersey	56
SEROLOGY TOTAL	**244,456**
VIROLOGY	
Bovine	
Bovine Respiratory Syncytial Virus FA	527
Bovine Viral Diarrhea Virus FA	1,084
Coronavirus FA	366
Infectious Bovine Rhinotracheitis Virus FA	725
Parainfluenza-3 Virus FA	8
Rotavirus FA	356
Virus Isolation	1,476
Canine	
Adenovirus FA	2

Coronavirus FA	8
Distemper Virus FA	9
Herpesvirus FA	3
Parvovirus FA	21
Virus Isolation	1
Equine	
Herpesvirus FA	4
Virus Isolation	6
Feline	
Feline Infectious Peritonitis Virus FA	9
Feline Panleukopenia Virus FA	15
Viral Rhinotracheitis Virus FA	11
Virus Isolation	2
Fish	
Infectious Hematopoietic Necrosis Virus VI	84
Infectious Pancreatic Necrosis Virus VI	84
Large Mouth Bass Virus VI	101
Spring Viremia Carp Virus VI	269
Viral Hemorrhagic Septicemia Virus VI	364
Ovine	
Border Disease Virus FA	65
Coronavirus FA	7
Parainfluenza-3 Virus FA	13
Respiratory Syncytial Virus FA	14
Rotavirus FA	11
Toxoplasma IFA	44
Virus Isolation	8
Porcine	
Circovirus II FA	32
Parvovirus FA	1
Porcine Respiratory and Reproductive Syndrom Virus FA	178
Porcine Respiratory and Reproductive Syndrome Virus VI	63
Porcine Respiratory and Reproductive Syndrome Virus VI Titration	15
Pseudorabies Virus FA	2
Rotavirus FA	183
Swine Influenza Virus FA	181
Swine Influenza Virus VI	765
Swine Influenza Virus VI NAHLN	752
Transmissible Gastroenteritis Virus FA	183
Virus Isolation	57
Wild/Other Animal	
Bovine Viral Diarrhea Virus FA	12
Distemper Virus FA	20
Infectious Bovine Rhinotracheitis Virus FA	7
Parainfluenza-3 Virus FA	1

Respiratory Syncytial Virus FA	7
Rabies	461
VIROLOGY TOTAL	**8,617**
MOLECULAR DIAGNOSTICS	
Avian Influenza Screen	369
BCV (Multiplex with BRSV)	404
BHV-1 (Multiplex with BVDV)	406
BLV	80
BRSV (Multiplex with BCV)	401
BVD Detection	1,379
BVD Ear Notch	614
Circovirus II	510
Classical Swine Fever	150
Clostridium Genotype	83
Escherichia coli	56
Flavobacterium psychrophilum	16
Influenza A	12
Johne's	1,126
Lawsonia intracellularis	114
Leptospira sp.	287
Mycoplasma bovis	10
Mycoplasma hyopneumoniae	1,524
Porcine Epidemic Diarrhea Virus	14,139
Porcine Epidemic Diarrhea Virus Sequencing	35
Porcine Reproductive and Respiratory Syndrome	
Oral Fluids	11,431
Semen	2,206
Serum	34,866
Tissue	301
PRRS Sequencing	868
Porcine Rotavirus A	106
Porcine Rotavirus B	100
Porcine Rotavirus C	100
Swine Deltacoronavirus	2,384
Swine Influenza Virus	5,720
Swine Influenza Virus NAHLN	5,312
Swine Influenza Virus Sequencing (H, M, N gene)	275
Swine Influenza Virus Sequencing (H, M, N gene) NAHLN	276
Swine Influenza Virus Subtyping (H and N)	790
Swine Influenza Virus Subtyping (H and N) NAHLN	776
TGE	7,143
Tritrichomonas foetus	6,131
* From 2009-present, both NAHLN and non-NAHLN SIV tests are included.	
MOLECULAR DIAGNOSTICS TOTAL	**100,500**

CONTRACT TESTING	
Chronic Wasting Disease Antigen ELISA	146
CONTRACT TESTING CWD TOTAL	**146**
SPECIALIZED RESEARCH TESTING	
Porcine Epidemic Diarrhea Virus FFN	2,861
Porcine Epidemic Diarrhea Virus VI Titration	263
Porcine Respiratory and Reproductive Syndrome Virus VI Titration	62
SPECIALIZED RESEARCH TESTING TOTAL	**3,186**
TOTAL OF ALL LABORATORY SECTIONS	**400,292**

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
JULY 1, 2013 – JUNE 30, 2014

AVIAN

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	Bordetella avium			*Escherichia coli*			*Escherichia coli* hemolytic			*Gallibacterium anatis*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amoxicillin	1			15		6	1			6		
Ceftiofur	1			18		3	1			6		
Clindamycin			1			21			1			6
Enrofloxacin		1		20			1			6		
Erythromycin			1			21	1					6
Florfenicol	1			4		8			1	6		
Gentamycin	1			17		4	1			6		
Neomycin	1			15		6	1			6		
Novobiocin	1					21			1			6
Oxytetracycline	1			3		18	1					6
Penicillin			1			21			1			6
Spectinomycin	NI			NI			NI			NI		
Streptomycin			1	9		12	1			6		
Sulphadimethoxine	1			8		13			1	1		5
Sulphathiazole		1				10		1			2	
Tetracycline	1			3		18	1				5	
Trimethoprim/Sulphamethoxazole	1			18		3	1			6		
Tylosin Tartrate	NI					1	NI			NI		

AVIAN IN VITRO SENSITIVITY TESTS (CON'T)

	Pseudomonas			*Salmonella* sp.			*Staphylococcus chromogenes*			*Staphylococcus* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Amoxicillin			3	1		1	1			2		
Ceftiofur			3	1		1	1			2		
Clindamycin			3			2			1	1		1
Enrofloxacin	1	2				2	1			2		
Erythromycin			3			2			1	2		
Florfenicol			3		2			1		1	1	
Gentamycin	2		1	1		1			1	1		1
Neomycin	2	1		2			1			2		
Novobiocin			3			2	1			1		1
Oxytetracycline			3	2					1	1		1
Penicillin			3			2	1			1		1
Spectinomycin	NI			NI			NI			NI		
Streptomycin			3	1		1	1			2		
Sulphadimethoxine			3			2	1			1		1
Sulphathiazole			3		1	1		1		1		1
Tetracycline			3	2					1	1		1
Trimethoprim/Sulphamethoxazole			3	2					1	1		1
Tylosin Tartrate	NI			NI			NI			NI		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
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BOVINE

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	Bacillus cereus			*Bibersteinia trehalosi*			*Escherichia coli*			*Escherichia coli K99*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin		1		19		5	8		11			5
Ceftiofur			1	23	1		8		11	3		2
Cephalothin												
Chlortetracycline	1			15	7	2	5		14			5
Clindamycin	1				5	19			19			5
Danofloxacin	1			18		6	17		2	4		1
Enrofloxacin	1			18		6	17	1	1	4		1
Florfenicol	1			20		4		8	11		1	4
Gentamycin	1			23		1	18	1		3		2
Neomycin	1			21		3	8		11	3		2
Oxytetracycline	1			1		23	5		14			5
Penicillin			1	1		23			19			5
Spectinomycin	NI			NI			NI			NI		
Sulphadimethoxine	1			16		8	6		13	1		4
Tetracycline												
Tiamulin			1	10		14			19			5
Tilmicosin	1			18		6			19			5
Trimethoprim/Sulphamethoxazole	1			21		3	9		10	3		2
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	NI			NI			NI			NI		

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Gallibacterium anatis			Gram-Negative Bacteria			Hemolytic *Escherichia coli*			*Haemophilus* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	2		3			1			1	1		
Ceftiofur	5					1			1	1		
Cephalothin												
Chlortetracycline	1	1	3			1			1	1		
Clindamycin			5			1			1			1
Danofloxacin	1		4	1			1			1		
Enrofloxacin	1		4	1			1			1		
Florfenicol	3		2			1			1	1		
Gentamycin	3		2	1			1				1	
Neomycin			5	1			1					1
Oxytetracycline			5			1			1	1		
Penicillin			5			1			1			1
Spectinomycin	NI			NI			NI			NI		
Sulphadimethoxine			5			1			1			1
Tetracycline												
Tiamulin	1		4			1			1	1		
Tilmicosin	1	2	2			1			1	1		
Trimethoprim/Sulphamethoxazole			5	1			1			1		
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	NI			NI			NI			NI		

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Histophilus somni			*Klebsiella pneumonia*			*Mannheimia haemolytica*			*Mannheimia* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	83		3			1	105	2	16	1		
Ceftiofur	85		1	1			122	1		1		
Cephalothin												
Chlortetracycline	79	5	2	1			109	10	4	1		
Clindamycin	50	29	7			1			123			1
Danofloxacin	81		5	1			101			1		
Enrofloxacin	81	5		1			102	6	15	1		
Florfenicol	82	3	1		1		111		12	1		
Gentamycin	39	22	25	1			103	3	17			1
Neomycin	20		66	1			97		26	1		
Oxytetracycline	48	3	35	1			89	3	31		1	
Penicillin	79	3	4			1	35	70	18			1
Spectinomycin	75	1	10	NI			104	1	18	NI		
Sulphadimethoxine	41		45	1			88		35	1		
Tetracycline												
Tiamulin	85		1			1	27		96	1		
Tilmicosin	83		3			1	100	6	17		1	
Trimethoprim/Sulphamethoxazole	85		1	1				122	1	1		
Tulathromycin	75	7	4	NI			105	3	15	NI		
Tylosin Tartrate	61	13	12	NI					123	NI		

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Moraxella bovis			*Moraxella (Brahnamella) ovis*			*Moraxella* sp.			*Pasteurella multocida*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1			2			2		4	102		
Ceftiofur	1			2			6			102		
Cephalothin												
Chlortetracycline	1			2			6			99	3	
Clindamycin		1			2		1	5		1	1	100
Danofloxacin	1			2			6			92		10
Enrofloxacin	1			2			6			100		2
Florfenicol	1			2			6			96	2	4
Gentamycin	1			2			6			90	5	7
Neomycin	1			2			6			45		57
Oxytetracycline	1			2			5	1		72	3	27
Penicillin	1			2			3	1	2	90		12
Spectinomycin	NI			NI			NI			NI		
Sulphadimethoxine	1			2			6			43		59
Tetracycline												
Tiamulin	1			2			6			34		68
Tilmicosin	1			2			6			79	3	20
Trimethoprim/Sulphamethoxazole	1			2			6			101		1
Tulathromycin	NI			2			NI			91	3	8
Tylosin Tartrate	NI			NI			NI			8	11	83

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Pasteurella sp.			*Salmonella* sp.			*Staphylococcus chromogenes*			*Staphylococcus* coagulase -		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	3		3	20		40	1			2		
Ceftiofur	5		1	23	1	36	1			2		
Cephalothin												
Chlortetracycline				10		50	1			1		1
Clindamycin		1	5	60			1			1		1
Danofloxacin	3		3	57		3	1			2		
Enrofloxacin	3		3	58		2	1			2		
Florfenicol	5		1	3	17	40	1				2	
Gentamycin	4		2	50		10	1			2		
Neomycin	3		3	41		19	1			2		
Oxytetracycline	2		4	10		50	1			1		1
Penicillin	1		5			60			1	2		
Spectinomycin	NI			NI			NI			NI		
Sulphadimethoxine	3		3	3		57	1			2		
Tetracycline												
Tiamulin	3		3			60	1			2		
Tilmicosin	4		2			60	1			1		1
Trimethoprim/Sulphamethoxazole	4		2	54		6	1			2		
Tulathromycin	NI			NI			NI			NI		
Tylosin Tartrate	NI			NI			NI			NI		

BOVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Staphylococcus coagulase +			*Streptococcus uberis*			*Streptococcus* sp.			*Yersinnia pseudotuberculosis*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1			1			1			1		
Ceftiofur	1			1			1			1		
Cephalothin	1											
Chlortetracycline					1		1			1		
Clindamycin				1			1					1
Danofloxacin						1	1			1		
Enrofloxacin				1			1			1		
Florfenicol				1								
Gentamycin					1		1			1		
Neomycin						1	1			1		
Oxytetracycline						1		1		1		
Penicillin	1			1			1					1
Spectinomycin				NI			NI			NI		
Sulphadimethoxine	1					1			1	1		
Tetracycline	1											
Tiamulin				1			1					1
Tilmicosin				1			1					1
Trimethoprim/Sulphamethoxazole				1			1			1		
Tulathromycin				NI			NI			NI		
Tylosin Tartrate				NI			NI					1

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
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MILK SAMPLES

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	Citrobacter sp.			*Enterococcus* sp.			*Escherichia coli*			*Histophilus somni*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin			1	1					1	1		
Ceftiofur	1					1	1			1		
Cephalothin	1					1	1			1		
Erythromycin			1			1			1	1		
Oxacillin+2%Nacl			1			1			1	1		
Penicillin			1			1			1	1		
Penicillin / Novobiocin			1	1					1	1		1
Pirlimycin			1			1			1			1
Sulphadimethoxine			1			1			1			
Tetracycline	1					1	1			1		

	Klebsiella oxytoca			*Micrococcus luteus*			*Paenibacillus* sp.			*Pseudomonas* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin			1	1				1				1
Ceftiofur	1			1					1			1
Cephalothin	1			1								1
Erythromycin			1	1			1					1
Oxacillin+2%Nacl			1	1					1			1
Penicillin			1	1					1			1
Penicillin / Novobiocin			1	1			1					1
Pirlimycin			1	1			1					1
Sulphadimethoxine			1	1			1					1
Tetracycline	1			1			1			1		

MILK SAMPLE IN VITRO SENSITIVITY TESTS (CON'T)

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

	Staphylococcus haemolyticus			*Staphylococcus hyicus*			*Staphylococcus simulans*			*Staphylococcus xylosus*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1			1			1			2		
Ceftiofur	1			1					1	2		
Cephalothin	1			1			1			2		
Erythromycin	1			1			1			2		
Oxacillin+2%Nacl	NI			NI			NI			NI		
Penicillin			1	1			1			2		
Penicillin / Novobiocin	1			1			1			2		
Pirlimycin	1			1			1			2		
Sulphadimethoxine	1			1			1			2		
Tetracycline	1					1	1			2		

MILK SAMPLE IN VITRO SENSITIVITY TESTS (CON'T)

	Streptococcus dysgalactiae			*Streptococcus* sp.			*Streptococcus uberis*		
	S	I	R	S	I	R	S	I	R
Ampicillin	4			2			5	1	
Ceftiofur	4			2			6		
Cephalothin	4			2			6		
Erythromycin	4			2			4		2
Oxacillin+2%Nacl	4			2			5		1
Penicillin	4			2			4	2	
Penicillin / Novobiocin	4			2			4	2	
Pirlimycin	4			2			4		2
Sulphadimethoxine	3		1			2			6
Tetracycline	3		1			2	1		5

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
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OVINE

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

OVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Mannheimia haemolytica			*Pasteurella multocida*			*Salmonella* sp.			*Streptococcus uberis*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	15			7			3			1		
Ceftiofur	15			7			3			1		
Chlortetracycline	14	1		7			3			1		
Clindamycin			15			7			3	1		
Danofloxacin	15			7			3					1
Enrofloxacin	15			7			3				1	
Florfenicol	15			7			3			1		
Gentamycin	15			7			3				1	
Neomycin	15			7			3					1
Oxytetracycline	14		1	7			3			1		
Penicillin	3	12		7					3	1		
Spectinomycin	14	1		NI			NI			NI		
Sulphadimethoxine	12		3	3		4			3			1
Tiamulin	4		11	3		4			3	1		
Tilmicosin	14	1		7					3	1		
Trimethoprim / Sulphamethoxazole		15		7					3	1		
Tulathromycin	15			7			NI			NI		
Tylosin Tartrate			15	1	1	5	NI			NI		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
JULY 1, 2013 – JUNE 30, 2014

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 pleuropneumonia*			*Actinobacillus suis*			*Actinobacillus* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1			1		2	10		1	2		
Cefazolin												
Cefovecin												
Cefoxitin												
Cefpodoxime												
Ceftiofur	1			3			11			2		
Cephalothin												
Chloramphenicol												
Chlortetracycline	1				1	2	10	1		1	1	
Clindamycin		1			2	1			11	1		1
Danofloxacin	1				2	1	11			1		1
Doxycycline												
Enrofloxacin	1			3			11			1		1
Erythromycin												
Florfenicol	1			3			11			2		
Gentamycin	1			1	2		11			1		1
Imipenem												
Marbofloxacin												
Neomycin	1					3	11					2
Oxacillin+2%NaCl												
Oxytetracycline			1			3	4		7		1	1
Penicillin			1	1	1	1	2		9	1		1
Rifampin												
Spectinomycin	NI			2	1		NI			NI		
Sulphadimethoxine	1			1		2	10		1			2
Tiamulin	1			2		1	5		6	1		1
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Tilmicosin	1			3			9	2		1		1
Trimethoprim/Sulphamethoxazole	1				3		11			2		
Tulathromycin	NI			3			NI			NI		
Tylosin (Tartrate/Base)	NI					3	NI			NI		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Beta hemolytic streptococcus group			*Bordetella bronchiseptica*			*Erysipelothrix rhusiopathiae*			*Escherichia coli*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin				6		8	1			23	1	60
Cefazolin												
Cefovecin												
Cefoxitin												
Cefpodoxime												
Ceftiofur	1					29	1			55		29
Cephalothin												
Chloramphenicol												
Chlortetracycline			1	28	1		1			6		78
Clindamycin			1			29	1					84
Danofloxacin			1	6		23	1			60		24
Doxycycline												
Enrofloxacin	1			29			1			57		25
Erythromycin												
Florfenicol	1			27	2			1		5	35	44
Gentamycin	1			29			1			56	4	24
Imipenem												
Marbofloxacin												
Neomycin	1			29					1	58		26
Oxacillin+2%Nacl												
Oxytetracycline			1	27		2	1			6		78
Penicillin	1					29			1			84
Rifampin												
Spectinomycin	NI			NI			NI			NI		
Sulphadimethoxine	1			1		28			1	23		61
Tiamulin	1					29	1					84
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Tilmicosin			1	11	14	4	1					84
Trimethoprim/Sulphamethoxazole	1			8		21	1			57		27
Tulathromycin	NI			28		1	NI			NI		
Tylosin (Tartrate/Base)	NI			NI			NI			NI		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Gram-Negative Bacteria			*Haemophilus parasuis*			*Histophilus somni*			Hemolytic *Escherichia coli*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin			1	27		1	1			14		68
Cefazolin										1		
Cefovecin												
Cefoxitin												1
Cefpodoxime												1
Ceftiofur	1			28			1			72	1	9
Cephalothin												1
Chloramphenicol												1
Chlortetracycline			1	25	1	2	1			1	2	79
Clindamycin			1	5	13	10	1					82
Danofloxacin	1			28			1			63	4	17
Doxycycline												1
Enrofloxacin	1			28			1			60	3	19
Erythromycin												1
Florfenicol			1	28			1			8	38	36
Gentamycin	1			26		2	1			55	3	24
Imipenem										1		
Marbofloxacin										1		
Neomycin	1			28		4			1	49		33
Oxacillin+2%Nacl												1
Oxytetracycline			1	20	3	5			1	1		81
Penicillin			1	10		18	1					82
Rifampin										NI		
Spectinomycin	NI			NI			NI			NI		
Sulphadimethoxine			1	23		5	1			21		61
Tiamulin	NI			23		5	1					82
Ticarcillin											1	
Ticarcillin / Clavulanic Acid											1	
Tilmicosin			1	26		2	1					82
Trimethoprim/Sulphamethoxazole	1			28			1			64		18
Tulathromycin	NI			NI			NI			NI		
Tylosin (Tartrate/Base)	NI			NI			1			NI		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Klebsiella pneumoniae			*Pasteurella multocida*			*Salmonella* sp.			*Staphylococcus aureus*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin			1	37			26		27			6
Cefazolin												
Cefovecin												
Cefoxitin												
Cefpodoxime												
Ceftiofur	1			37			42	1	11	3	3	
Cephalothin												
Chloramphenicol												
Chlortetracycline			1	36		1	12		42	1	1	4
Clindamycin			1			37			54	3		3
Danofloxacin	1			37			49		5	3		3
Doxycycline												
Enrofloxacin	1			37			51	3		5		1
Erythromycin												
Florfenicol		1		36	1		5	29	20		5	1
Gentamycin	1			37			40	1	13	3		3
Imipenem												
Marbofloxacin												
Neomycin	1			37			40		14	3		3
Oxacillin+2%Nacl												
Oxytetracycline			1	22	1	14	12		42	1	1	4
Penicillin	1			34		3		2	52			5
Rifampin												
Spectinomycin	NI			NI			NI			NI		
Sulphadimethoxine	1			27		10	6		48	3		3
Tiamulin			1	5		32	1		53	2		4
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Tilmicosin			1	34	3		1		53	5	1	
Trimethoprim/Sulphamethoxazole	1			37			49		5	5		1
Tulathromycin	NI			NI			NI			NI		
Tylosin (Tartrate/Base)	NI			2	5	30	NI			NI		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Staphylococcus hyicus			*Streptococcus dysgalactiae*			*Streptococcus suis*		
	S	I	R	S	I	R	S	I	R
Ampicillin	3		1	5			104		
Cefazolin									
Cefovecin									
Cefoxitin									
Cefpodoxime									
Ceftiofur	4			5			109	2	
Cephalothin									
Chloramphenicol									
Chlortetracycline			4			5	31	19	61
Clindamycin	1		3		1	4	12	3	96
Danofloxacin	4			1		4	60		51
Doxycycline									
Enrofloxacin	4			5			106	3	2
Erythromycin									
Florfenicol		4		5			110	1	
Gentamycin	4			5			106		5
Imipenem									
Marbofloxacin									
Neomycin	4			4		1	100		11
Oxacillin+2%Nacl									
Oxytetracycline	4			1		4	22	12	77
Penicillin	2		2	5			96	34	8
Rifampin									
Spectinomycin	1		3	NI			NI		
Sulphadimethoxine	4			5			32		79
Tiamulin	1		3			5	68		43
Ticarcillin									
Ticarcillin / Clavulanic Acid									
Tilmicosin	2		2	1		4	19	1	91
Trimethoprim/Sulphamethoxazole	4			5			100		11
Tulathromycin	NI			NI			NI		
Tylosin (Tartrate/Base)	NI			NI			NI		

South Dakota
Animal Disease Research and Diagnostic Laboratory

Salmonella Isolations
July 1, 2013 - June 30, 2014

	TOTAL	Bovine	Porcine	Poultry	Avian, Misc.	Ovine	Canine	Environ-mental	Mink
4,12: i-	3	1	2						
4,5,12:i-	5	1	4						
6,7:-:1,5	1							1	
III 61:-:1,5,7	7					7			
agona	5		5						
alachua	1		1						
anatum	2	1	1						
berta	3	1	2						
braenderup	1		1						
bredeney	1		1						
cerro	2	2							
cholerasuis kunzendorf	1		1						
derby	10		10						
dublin	38	37	1						
enteritidis	5		1		1		2		1
hadar	1		1						
heidelberg	3	3							
infantis	3		3						
kentucky	1	1							
krefeld	1		1						
london	3	1	2						

SALMONELLA ISOLATIONS (CON'T)

	TOTAL	Bovine	Porcine	Poultry	Avian, Misc.	Ovine	Canine	Environ-mental	Mink
mbandaka	33	33							
montevideo	2	1	1						
muenster	3	3							
newport	4	3	1						
ohio	3		3						
rissen	7		7						
rough O:-:1,5	9		1					8	
senftenberg	6		5	1					
typhimurium	3	1	2						
typhimurium var 5-	8	3	5						
worthington	5		5						
TOTAL	180	92	67	1	1	7	2	9	1

South Dakota
Animal Disease Research and Diagnostic Laboratory

Serology

July 1, 2013 - June 30, 2014

Disease	Positive	Negative	Other	Total
Anaplasmosis				
Competative Enzyme-Linked Immunoassay	80	3,056	0	3,136
Avian Influenza				
AGID (Game birds)	0	30	0	30
AGID (Egg products)	0	129	0	129
Bluetongue				
AGID	5	0	7	12
Enzyme-Linked Immunoassay (ELISA)	2,204	12,773	8	14,985
Bovine Leukosis Virus				
AGID	26	189	0	215
ELISA	4,679	49,639	12	54,330
Bovine Pregnancy Test	86	49	0	135
Bovine Respiratory Syncytial Virus				
SN	105	234	3	342
Bovine Viral Diarrhea Virus				
ACE	136	11,343	15	11,494
Bovine Viral Diarrhea Virus I				
SN	677	100	1	778
Bovine Viral Diarrhea Virus II				
SN	684	85	1	770
Brucella				
BAPA	0	5,442	1	5,443
Card	21	3,871	72	3,964
Plate	0	459	4	463
Rivanol	0	104	3	107
Tube	0	16,068	19	16,087
Brucella - Canine				
IFA	0	76	1	77
Brucella - Small Ruminant				
Card	0	95	0	95
Brucella ovis				
ELISA	16	1,664	0	1,680
Caprine Arthritis Encephalitis	71	152	0	223
Epizootic Hemorrhagic Disease				
AGID	50	56	0	106
Equine Infectious Anemia				
AGID	0	7	0	7
ELISA	0	2,052	6	2,058
Feline Immunodeficiency Virus				
ELISA	0	18	0	18
Feline Infectious Peritonitis				

Disease	Positive	Negative	Other	Total
ELISA	27	3	1	31
Feline Leukemia Virus				
ELISA	6	12	0	18
Infectious Bovine Rhinotracheitis				
SN	706	89	1	796
Leptospira				
bratislava	5	697	0	702
canicola	56	645	0	701
grippotyphosa	73	630	0	703
hardjo	122	582	0	704
icterohemorrhagiae	50	652	0	702
pomona	135	569	0	704
Mycoplasma hyopneumoniae				
ELISA	3,606	9,187	9	12,802
DAKO	64	159	0	223
Neospora				
ELISA	214	3,023	1	3,238
Ovine Progressive Pneumonia				
AGID	8	289	0	297
Parainfluenza-3				
SN	105	27	2	134
Paratuberculosis (Johne's)				
ELISA	3,376	48,828	66	52,270
Porcine Respiratory and Reproductive Syndrome				
ELISA	1,017	6,270	37	7,324
Fluorescent Focus Neutralization (FFN)	368	276	0	644
IFA (European Strain)	1	90	0	91
IFA (North American Strain)	15	92	0	107
Oral Fluids (ELISA)	122	876	11	1,009
Pseudorabies				
g B ELISA	6	784	1	791
g B ELISA NAHLN	10	1,203	14	1,227
Pseudorabies Differential Test				
G1 ELISA	0	7	0	7
G1 ELISA NAHLN	0	19	0	19
Swine Influenza Virus				
H1	65	214	2	281
H3	103	176	2	281
Vesicular Stomatitis				
Indiana	0	0	56	56
New Jersey	0	0	56	56
TOTAL	**23,405**	**220,632**	**419**	**244,456**

South Dakota
Animal Disease Research and Diagnostic Laboratory

Rabies Examinations

July 1, 2013 - June 30, 2014

	Positive		Negative			
	Human Exposure	No Human Exposure	Human Exposure	No Human Exposure	Untestable	Total Specimens
Bat	2	1	103	16	2	124
Bovine	1	1	49	29	13	93
Canine	0	0	39	3	1	43
Caprine	0	0	1	2	1	4
Coyote	0	0	1	0	0	1
Deer	0	0	0	7	0	7
Elk	0	0	0	1	0	1
Equine	1	0	6	2	0	9
Feline	0	0	99	16	2	117
Fox	0	0	0	1	0	1
Gopher	0	0	1	0	0	1
Mouse	0	0	1	0	0	1
Opossum	0	0	3	0	0	3
Ovine	0	0	1	1	0	2
Porcine	0	0	0	0	1	1
Rabbit	0	0	1	0	0	1
Raccoon	0	0	17	9	1	27
Rat	0	0	1	0	0	1
Skunk	1	6	5	7	2	21
Squirrel	0	0	1	0	0	1
Woodchuck	0	0	2	1	0	3
Total	5	8	331	95	23	462

South Dakota
Animal Disease Research and Diagnostic Laboratory

Positive Rabies Cases

July 1, 2013 - June 30, 2014

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	Total
BAT	0	1	0	0	0	0	0	0	0	0	1	0	2
BOVINE	0	0	1	0	0	1	0	0	0	0	0	0	2
EQUINE	0	0	0	1	0	0	0	0	0	0	0	0	1
SKUNK	3	0	0	0	0	0	1	1	0	1	1	0	7
TOTAL	3	1	1	1	0	1	1	1	0	1	2	0	12

South Dakota
Animal Disease Research and Diagnostic Laboratory

Molecular Diagnostics

July 1, 2013 - June 30, 2014

BOVINE

Disease	Positive	Negative	Other	Total
Bovine Coronavirus	38	366	0	404
Bovine Herpes Virus 1	14	392	0	406
Bovine Leukosis Virus	12	68	0	80
Bovine Respiratory Syndrome Virus	34	367	0	401
Bovine Viral Diarrhea Detection	27	1,351	1	1,379
Bovine Viral Diarrhea Ear Notch	21	592	1	614
Leptospira sp.	19	266	2	287
Mycobacterium paratuberculosis (Johne's)	119	982	25	1,126
Mycoplasma bovis	2	7	0	9
Tritrichomonas foetus	3	6,119	9	6,131

PORCINE

Disease				
Circovirus II	136	374	0	510
Classical Swine Fever	0	150	0	150
Lawsonia intracellularis	29	84	1	114
Mycoplasma hyopneumoniae	95	1,424	5	1,524
Porcine Epidemic Diarrhea Virus	3,196	10,894	49	14,139
Porcine Epidemic Diarrhea Virus Sequencing	0	0	35	35
Porcine Respiratory and Reproductive Syndrome				
North American-like				
Oral Fluids	927	10,289	215	11,431
Semen	8	2,198	0	2,206
Serum	3,774	31,049	43	34,866
Tissue	136	134	31	301
European-like				
Oral Fluids	21	11,319	91	11,431
Semen	0	2,206	0	2,206
Serum	173	34,655	38	34,866
Tissue	40	261	0	301
PRRS Sequencing	0	0	868	868
Porcine Rotavirus A	40	66	0	106
Porcine Rotavirus B	36	64	0	100
Porcine Rotavirus C	35	67	0	101
Swine Deltacoronavirus	250	2,120	14	2,384
Swine Influenza Virus	1,370	4,321	29	5,720
Swine Influenza Virus NAHLN	1,279	4,017	16	5,312
Swine Influenza Virus Sequencing (H, M, N gene)	3	0	272	275
Swine Influenza Virus Sequencing (H, M, N gene) NAHLN	270	0	6	276
Swine Influenza Virus Subtyping (H and N)	0	0	790	790
Swine Influenza Virus Subtyping (H and N) NAHLN	0	0	776	776

Disease	Positive	Negative	Other	Total
Transmissible Gastroenteritis	10	7,102	31	7,143
AVIAN				
Disease				
Avian Influenza Screen	0	368	1	369
FISH				
Disease				
Flavobacterium psychrophilium	4	12	0	16
MISCELLANEOUS				
Disease				
Clostridium Genotype	0	1	82	83
Escherichia coli	0	56	0	56
Influenza A	0	12	0	12

South Dakota
Animal Disease Research and Diagnostic Laboratory

Molecular Diagnostic-Clostridium Genotyping

July 1, 2013 - June 30, 2014

Species	Genotype A	Genotype A/ Beta 2 Toxin	Genotype C	Genotype D/ Enterotoxin	Genotype E
BOVINE	57	11	1	0	1
CAPRINE	2	1	0	0	0
DEER	1	0	0	0	0
ELK	1	0	0	0	0
OVINE	3	2	0	1	0
PORCINE	1	3	0	0	0
RABBIT	1	0	0	0	0
TOTAL	66	17	1	1	1

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, 2013 - June 30, 2014

AVIAN, MISCELLANEOUS

	TOTAL
BODY AS A WHOLE	
Normal tissue	3
Septicemia, *Escherichia coli*	1
Septicemia, *Salmonella*	1
Trauma	1
West Nile virus infection	1
West Nile virus PCR positive	1
CARDIOVASCULAR	
Heart endocarditis	1
Myocarditis	1
DIGESTIVE	
Avian proventriculitis	1
Coccidiosis	1
MUSCULOSKELETAL	
Myopathy	1
Vertebral fracture	1
NERVOUS	
Brain encephalitis, nonsuppurative	1
RESPIRATORY	
Airsacculitis	1
Rhinitis	1
UROGENITAL	
Neoplasm ovary germ cell tumor	1

CHICKEN

BODY AS A WHOLE	
Adenocarcinoma	1
Emaciation	1
Gout	1
No diagnosis	1
Peritonitis	1
Septicemia, bacterial, miscellaneous	1
Septicemia, *Escherichia coli*	2
DIGESTIVE	
Esophagus, dilation	1
Intestine enteritis, coccidia	2

HEMIC AND LYMPHATIC
Lymphoproliferative, Marek's, herpes 1

INTEGUMENTARY
Parasitic dermatitis 1

MUSCULOSKELETAL
Myopathy 1
Myositis 1

RESPIRATORY
Bacterial pneumonia 1

SPECIAL SENSES
Conjunctivitis 1

PHEASANT

BODY AS A WHOLE
Dehydration 1
Septicemia, *Escherichia coli* 3

DIGESTIVE
Gastric impaction 1

TURKEY

BODY AS A WHOLE
Septicemia, *Salmonella* 1

DIGESTIVE
Enteritis, *Campylobacter* 1
Enteritis, idiopathic 1
Intestine enteritis, coccidia 1

MUSCULOSKELETAL
Arthritis 1

RESPIRATORY
Airsacculitis 2
Lung pneumonia, *Escherichia coli* 1

ANTELOPE

BODY AS A WHOLE
Bluetongue 2

BAT

NERVOUS

Rabies	2

BISON (AMERICAN)

BODY AS A WHOLE

Herpesvirus DN599 infection, virus isolation	1
Trauma	1

DIGESTIVE

Hepatic lipidosis	1
Telangiectasis	1

RESPIRATORY

Lung pneumonia, *Mannheimia haemolytica*	2

BOVINE

BODY AS A WHOLE

Abscess	4
Adenovirus infection (virus isolation)	2
Anthrax	1
Autolysis	16
BLV PCR positive	3
BVD infection	3
BVD type II	1
BVD virus infection (virus isolation)	17
BVD virus PCR positive	19
Copper deficiency	5
Copper higher than normal	2
Dehydration	1
Emaciation	2
Epizootic hemorrhagic disease	10
Hemorrhage	3
Herpesvirus DN599 infection, virus isolation	1
Hypomagnesemia	1
IBR, viremia	1
Infectious bovine rhinotracheitis, virus isolation	3
Lead toxicosis	9
Leptospirosis	2
Mineralization, metastatic	1
Mycoplasma sp. isolation	8
No diagnosis	50
Normal tissue	10
Omphalitis (navel ill)	7
Peritonitis	10

Salmonellosis	42
Sarcocystosis	5
Seleniuim toxicosis	2
Septicemia	2
Septicemia, bacterial, miscellaneous	8
Septicemia, *Escherichia coli*	13
Septicemia, mycotic	1
Septicemia, *Trueperella pyogenes*	11
Serositis	3
Starvation / inanition	1
Trauma	3
CARDIOVASCULAR	
Acute heart failure	1
Artery aneurysm	1
Bacterial pericarditis	5
Blood vessels thrombosis	1
Cardiomyopathy	1
Edema	2
Heart anomaly	1
Left side congestive heart failure	1
Myocardial necrosis	5
Myocarditis	17
Right sided congestive heart failure	1
Valvular endocarditis, bacterial	3
Vasculitis	1
DIGESTIVE	
Abomasum abomasitis	15
Abomasum abomasitis, *Clostridium* sp.	10
Abomasum abomasitis, mycotic	9
Abomasum dilatation	1
Abomasum displacement	1
Abomasum perforation	2
Abomasum rupture	2
Abomasum ulceration	1
Atrophic enteritis	2
Bacterial enteritis	20
Bovine papular stomatitis	1
Cryptosporidiosis	163
Enteritis due to BVD	25
Enteritis, colitis	6
Enteritis, idiopathic	55
Enteritis, Johne's disease	76
Enteritis, older bovine total cases	188
Enteritis, *Yersinia pseudotuberculosis*	1
Enteritis, young calf total cases	333
Eosinophilic enteritis	1
Feces, rotavirus (EM)	6
Hepatic lipidosis	2
Hepatitis	11

Hepatitis, likely toxic	1
Hepatopathy	4
Intestinal torsion	1
Intestine displacement	1
Intestine enteritis, *Clostridium perfringens*	101
Intestine enteritis, *Clostridium perfringens* Type A beta 2	2
Intestine enteritis, *Clostridium perfringens* Type C	1
Intestine enteritis, *Clostridium perfringens* Type E	1
Intestine enteritis, coccidia	62
Intestine enteritis, coronavirus	40
Intestine enteritis, *Escherichia coli*	7
Intestine enteritis, *Escherichia coli* (AEEC)	1
Intestine enteritis, hemorrhagic bowel syndrome	2
Intestine enteritis, necrotic	2
Intestine enteritis, rotavirus	94
Intestine enteritis, *Salmonella*	24
Intestine enteritis, typhlitis	1
Intestine hemorrhage	2
Intestine, jejunal hemorrhagic syndrome	1
Intestine obstruction	1
Intestine parasitism, *Nematodirus*	1
Intestine parasitism, strongyles	9
Liver abscess	3
Liver congestive heart failure (right)	1
Liver hepatitis, necrotic	2
Liver passive congestion	1
Mesenteric torsion	2
Omasitis	3
Parasitic colitis, *Trichuris*	2
Parasitic enteritis	1
Reticulum reticulitis, traumatic	4
Rumen acidosis / grain overload	1
Rumen rumenitis	20
Rumen tympany, bloat	7
Typhlitis	1
HEMIC AND LYMPHATIC	
Anaplasmosis	1
Anemia	2
Lymphadenitis	2
Lymphosarcoma	4
Spleen splenitis	3
INTEGUMENTARY	
Bacterial dermatitis	2
Cellulitis	3
Dermatitis, non-specific	2
Fibrosarcoma	1
Foreign body granuloma	1
Hoof trauma	1
Malignant melanoma	1

Mastitis (*Staphylococcus aureus)*	2
Milk sample mastitis, bulk tank	6
Milk sample mastitis, clinical	17
Milk sample mastitis, subclinical	1
Neoplasm, squamous cell carcinoma	1
MUSCULOSKELETAL	
Arthritis	1
Clostridial myositis, blackleg	2
Joint arthritis, *Mycoplasma* sp.	2
Muscle myopathy, nutritional	3
Muscle myositis, *Clostridium*	1
Myopathy, Monensin toxicosis	1
Myositis	2
Umbilical hernia	1
NERVOUS	
Brain encephalitis, bacterial, miscellaneous	4
Brain encephalitis, *Histophilus somni*	4
Brain encephalitis, nonsuppurative	2
Brain encephalitis, suppurative	2
Brain encephalomalacia, polio	10
Brain hemorrhage	2
Brain meningitis, suppurative	4
Brain meningoencephalitis	2
Hydrocephalus	1
Listeria monocytogenes encephalitis	6
Meningitis	3
Rabies	2
Thromboembolic meningoencephalitis	6
RESPIRATORY	
Asphyxiation	1
Aspiration pneumonia	9
Bacterial pneumonia	9
Bronchointerstitial pneumonia	22
Bronchopneumonia	17
Bronchopneumonia compatible with BRSV	1
Granulomatous pneumonia	1
Infarct pulmonary	2
Interstitial pneumonia	19
Laryngitis	3
Lung edema	11
Lung hemorrhage	3
Lung pleuritis	5
Lung pneumonia, abscess	2
Lung pneumonia, acute, atypical interstitial	10
Lung pneumonia, *Bibersteinia trehalosi*	17
Lung pneumonia, bovine respiratory coronavirus	12
Lung pneumonia, BRSV	21
Lung pneumonia, BVD virus	12

Lung pneumonia, *Escherichia coli*	2
Lung pneumonia, foreign body aspiration	3
Lung pneumonia, *Histophilus somni*	74
Lung pneumonia, *Mannheimia haemolytica*	106
Lung pneumonia, *Mycoplasma* sp.	105
Lung pneumonia, *Pasteurella multocida*	79
Lung pneumonia, *Pasteurella* sp.	1
Lung pneumonia, *Salmonella* sp.	6
Lung pneumonia, *Trueperella pyogenes*	38
Lung pulmonary, atelectasis	1
Lung pulmonary, congestion	12
Lung pulmonary, ephysema	5
Meconium aspiration syndrome (aspiration pneumonia)	2
Pneumonitis	1
Tracheitis	3
SPECIAL SENSES	
Conjunctivitis	1
Eye keratoconjunctivitis, *Moraxella*	26
Otitis externa	1
Otitis, *Mycoplasma*	1
UROGENITAL	
Abortion associated with *Neospora* -like organisms	2
Abortion due to BVD	2
Abortion due to IBR	5
Abortion due to *Listeria monocytogenes*	3
Abortion with congenital anomaly	5
Abortion, *Bacillus* sp.	1
Abortion, hepatitis	3
Abortion, leptospirosis	2
Abortion, myocarditis	4
Abortion, placentitis	62
Abortion, pneumonia	11
Abortion, pneumonia, peribronchiolar lymphoid hyperplasia	4
Abortion, *Salmonella* sp.	3
Abortion, *Trueperella pyogenes*	12
Bacterial abortion	10
Chronic tubulointerstitial nephritis	4
Idiopathic abortion	118
Kidney cyst	1
Kidney nephrosis	2
Metritis	1
Milk, *Mycoplasma* sp. isolated	1
Mycotic abortion	4
Nephritis	5
Prepuce bacteriological examination	33
Pyelonephritis	1
Stillbirth	1

CANINE

BODY AS A WHOLE	
Abscess	1
Adenocarcinoma	1
Adenoma, undifferentiated	1
Adenomatous polyp	1
Anaplastic undifferentiated carcinoma	1
Anaplastic sarcoma	3
Congenital anomaly	2
Ethylene glycol toxicosis	2
Giant cell tumor, soft parts	1
Granulation tissue	1
Hamartoma	2
Hemorrhage	1
Inflammatory mass	4
Liposarcoma	1
Mineralization, metastatic	1
Neoplasm, adenoma, site not specified	1
Neoplasma, carcinoma, miscellaneous	1
Neoplasm, infiltrating lipoma	1
Neoplasm, lipoma	27
Neoplasm, round cell tumor, site not specified	1
No diagnosis	10
Normal tissue	6
Polyp	1
Polyp, inflammatory	2
CARDIOVASCULAR	
Edema	1
Right sided congestive heart failure	1
DIGESTIVE	
Acanthomatous epulis	3
Ameloblastoma	2
Bile duct carcinoma	1
Cirrhosis	1
Colitis	2
Colorectal polyp	2
Cryptosporidiosis	7
Epulis	18
Gastrointestinal intussusception	1
Gastrointestinal parasitism	1
Giardiasis	1
Gingival hyperplasia	8
Gingivitis	2
Glossitis	2
Hepatic lipidosis	1
Hepatitis	1
Intestine enteritis, *Clostridium perfringens*	2
Intestine enteritis, *Escherichia coli*	5

Intestine enteritis, necrotic	1
Intestine enteritis, parvovirus	10
Intestine enteritis, *Salmonella*	1
Intestine parasitism, ascarids	1
Liver hepatitis, necrotic	1
Liver, hepatic shunt	1
Neoplasm, fibromatous epulis of periodon	8
Oral neoplasm, melanoma	2
Oral neoplasm, squamous cell carcinoma	5
Oral ulcer	1
Pancreas pancreatitis, acute necrotizing	3
Pancreatic adenocarcinoma	1
Salivary gland sialadenitis	1
Stomach, gastric dilatation	1
Stomatitis	1
Ulcerative enteritis	1
ENDOCRINE	
Adrenocortical carcinoma	1
Thyroid carcinoma	1
HEMIC AND LYMPHATIC	
Hemangioma	7
Hemangiopericytoma	17
Hemangiosarcoma	7
Hematoma	3
Lymphosarcoma	8
Plasma cell neoplasm, plasmacytoma	1
Splenic hematoma	1
Splenosis	1
Tonsillitis	1
INTEGUMENTARY	
Actinic keratosis	1
Apocrine gland adenocarcinoma	1
Bacterial dermatitis	1
Basal cell carcinoma	2
Basal cell tumor	12
Cellulitis	5
Chronic hyperplastic dermatitis	2
Dermal fibrosis (collagen nevus)	3
Dermal hair follicle cyst	2
Dermal melanocytosis (melanoma)	1
Dermatitis, flea bite (hypersensitivity)	1
Dermatitis, focal	3
Dermatitis, immune mediated	2
Dermatitis, lick granuloma	4
Dermatitis, mycotic (fungal)	1
Dermatitis, nonspecific	9
Dermatitis, pemphigus foliaceous	3
Dermatitis, pemphigus vulgaris	2

Dermatitis, physical irritant	2
Dermatitis, scar	1
Dermatitis, seborrhea	1
Dermatitis, *Staphylococcus* sp.	2
Dermatophytosis ringworm	11
Endocrine dermatopathy	1
Eosinophilic granuloma	1
Epidermal cyst	16
Fibroadenomatous mammary hyperplasia, BE	1
Fibroma	15
Fibrosarcoma	7
Focal adnexal dysplasia	2
Folliculitis	1
Foreign body granuloma	7
Furunculosis	8
Histiocytoma	39
Keratoacanthoma	1
Malignant melanoma	7
Mammary adenoma	8
Mammary carcinoma	2
Mammary carcinoma adenocarcinoma	10
Mammary gland neoplasm, malignant mixed	4
Mammary, hyperplasia	2
Mast cell tumor	14
Mast cell tumor, grade I, well differentiated	35
Mast cell tumor, grade II, differentiated	12
Mast cell tumor, grade III, poorly differentiated	6
Meibomian gland adenoma	7
Melanoma	12
Mixed mammary tumor, malignant	3
Myxoma	1
Neoplasm, carcinoma (undifferentiated)	1
Neoplasm, cutaneous lymphoma	5
Neoplasm, intracutaneous cornifying epithelioma	1
Neoplasm, perianal gland adenoma	18
Neoplasm, perianal gland epithelioma	2
Neoplasm, pilomatrixoma	10
Neoplasm, sebaceous gland adenoma	19
Neoplasm, squamous cell carcinoma	6
Neoplasm, trichoblastoma	2
Neoplasm, trichoepithelioma	10
Panniculitis	3
Papilloma	6
Perianal gland carcinoma	1
Pyoderma	3
Pyogranuloma	2
Round cell tumor	1
Sebaceous epithelioma	5
Sebaceous gland carcinoma	3
Sebaceous gland cyst	2
Sebaceous gland hyperplasia	6

Sweat gland adenoma	1
Sweat gland cyst	7
MUSCULOSKELETAL	
Chondrosarcoma	2
Osteoma	1
Osteosarcoma	1
Rhabdomyosarcoma	1
Tenosynovitis	1
NERVOUS	
Brain encephalopathy	1
Brain, meningoencephalitis	1
Nerve neoplasm, schwannoma	2
RESPIRATORY	
Bacterial pneumonia	1
Bronchointerstitial pneumonia	1
Lung edema	2
Lung hemorrhage	1
Lung pulmonary congestion	2
Nasal carcinoma	1
Rhinitis	1
SPECIAL SENSES	
Ceruminous gland adenoma	1
Ear isolation, *Malassezia pachydermatis*	1
Ear isolation, *Staphylococcus* sp.	1
Otitis externa	5
UROGENITAL	
Cystic endometrial hyperplasia	1
Cystitis	2
Granulosa cell tumor	1
Hydronephrosis	1
Idiopathic abortion	1
Membranous glomerulonephrosis	1
Papilloma squamous	2
Pyometra	1
Seminoma	2
Testis neoplasm, interstitial cell	1
Transitional cell carcinoma	1

CAPRINE

BODY AS A WHOLE	
Abscess, *Corynebacterium pseudotuberculosis*	1
Autolysis	2
Copper deficiency	1
Emaciation	1

No diagnosis	1
Normal tissue	1
Septicemia, *Mannheimia haemolytica*	1
CARDIOVASCULAR	
Myocardial necrosis	1
DIGESTIVE	
Cryptosporidiosis	1
Enteritis, Johne's disease	1
Gastrointestinal parasitism	1
Intestine, enteritis, *Clostridium perfringens*	3
Intestine enteritis, coccidia	11
Intestine enteritis, *Escherichia coli*	2
Inestine parasitism, *Nematodirus*	1
Intestine parasitism, strongyles	6
Parasitic colitis, *Trichuris*	1
HEMIC AND LYMPHATIC	
Lymph node lymphadenitis, caseous	5
NERVOUS	
Brain encephalitis, suppurative	1
Brain encephalomalacia, polio	1
Listeria monocytogenes encephalitis	1
RESPIRATORY	
Bronchopneumonia	1
Lung pneumonia, *Mannheimia haemolytica*	2
UROGENITAL	
Abortion due to *Coxiella*	1
Abortion, goiter	1
Abortion, *Toxoplasma gondii*	2
Abortion, *Trueperella pyogenes*	1
Abortion, placentitis	2
Bacterial abortion	1
Idiopathic abortion	6
Metritis	1

COYOTE

BODY AS A WHOLE	
Trauma	1

DEER

BODY AS A WHOLE		
	Autolysis	2
	Bluetongue	7
	Copper deficiency	1
	Emaciation	2
	Epizootic hemorrhagic disease	11
	No diagnosis	3
	Normal tissue	1
	Starvation / inanition	2
	Toxicosis, Prussic acid, cyanide	1
	Trauma	4
CARDIOVASCULAR		
	Heart, epicarditis	1
DIGESTIVE		
	Bacterial enteritis	1
	Coccidiosis	1
	Intestine enteritis, *Clostridium perfringens*	2
INTEGUMENTARY		
	Cellulitis	2
	Endocrine dermatopathy	1
MUSCULOSKELETAL		
	Myopathy	1
NERVOUS		
	Bacterial encephalitis	1
	Brain encephalitis, abscess	1
	Brain meningitis, *Trueperella pyogenes*	1
	Brain vasculitis	1
RESPIRATORY		
	Bronchopneumonia	1
	Lung pneumonia, *Bibersteinia trehalosi*	1
	Lung pneumonia, *Mycoplasma* sp.	1
	Lung pneumonia, *Pasteurella multocida*	1
	Lung pneumonia, *Trueperella pyogenes*	2
	Parasitic pneumonia	1
	Pleuritis	1
UROGENITAL		
	Kidney, nephrosis	1

ELK

BODY AS A WHOLE		
	Autolysis	2
	Epizootic hemorrhagic disease	2
	Normal tissue	1
DIGESTIVE		
	Intestine enteritis, *Clostridium perfringens*	1
NERVOUS		
	Brain vasculitis	1

EQUINE

BODY AS A WHOLE		
	Abscess	1
	Normal tissue	1
	Selenium higher than normal	1
	Septicemia, bacterial, miscellaneous	1
	Septicemia, *Escherichia coli*	1
DIGESTIVE		
	Gastrointestinal intussusception	1
	Intestine enteritis, *Clostridium perfringens*	1
HEMIC AND LYMPHATIC		
	Anemia	1
	Seroma	1
	Strangles	1
INTEGUMENTARY		
	Alopecia	1
	Basal cell tumor	1
	Foreign body granuloma	1
	Linear granuloma (eosinophilic granuloma)	1
	Neoplasm, squamous cell carcinoma	4
	Pyogranuloma	1
	Sarcoid	2
	Squamous cell carcinoma, ocular	1
MUSCULOSKELETAL		
	Myopathy	1
NERVOUS		
	Parasitic meningitis / myelitis	1
	Rabies	1

RESPIRATORY

Bronchointerstitial pneumonia	1
Lung pneumonia, *Rhodococcus equi*	1
Lung pulmonary, emphysema	1
Nasal isolation, bacterial, miscellaneous	1

UROGENITAL

Idiopathic abortion	2

FELINE

BODY AS A WHOLE

Adenoma, undifferentiated	1
Anaplastic sarcoma	1
Autolysis	1
Emaciation	1
Granulation tissue	1
Inflammatory mass	1
Neoplasm, squamous cell carcinoma (site not specified)	1
No diagnosis	3
Normal tissue	4
Septicemia, *Francisella tularensis*	2

CARDIOVASCULAR

Cardiomyopathy	1

DIGESTIVE

Feline infectious peritonitis	2
Gingivitis	1
Hepatitis	2
Hepatoma	1
Intestinal adenocarcinoma	1
Intestine parasitism, ascarids	2
Liver hepatitis, necrotic	1
Oral neoplasm, squamous cell carcinoma	2
Pancreatic adenocarcinoma	2
Parvovirus enteritis	4
Salivary gland adenoma	1
Stomatitis	3

ENDOCRINE

Diabetes mellitus	1

HEMIC AND LYMPHATIC

Lymphosarcoma	4
Spleen necrosis	1

INTEGUMENTARY

Alopecia	1
Apocrine gland adenocarcinoma	1
Basal cell carcinoma	2
Basal cell tumor, feline	6

Cellulitis	1
Dermatitis, non-specific	1
Dermatitis, pemphigus vulgaris	1
Dermatitis, *Staphylococcus* sp.	1
Eosinophilic plaque	2
Epidermal cyst	1
Fibroma	1
Fibrosarcoma	3
Granuloma	1
Hypersensitivity (allergic) dermatitis	1
Mammary adenoma	1
Mammary carcinoma	1
Mast cell tumor	5
Mast cell tumor, grade I, well differentiated	1
Melanoma	2
Mixed mammary tumor	1
Neoplasm, sebaceous gland adenoma	3
Neoplasm, trichoblastoma	2
Neoplasm, trichoepithelioma	1
Round cell tumor	1
MUSCULOSKELETAL	
Nodular fascitis	1
NERVOUS	
Brain encephalitis, nonsuppurative	1
Brain encephalitis, *Toxoplasma*	1
Brain meningitis, suppurative	2
Brain meningoencephalitis	2
Nerve neoplasm, schwannoma	1
RESPIRATORY	
Bacterial pneumonia	1
Bronchitis	1
Lung pneumonia, *Bordetella* sp.	1
Lung pneumonia, *Pasteurella multocida*	1
Nasal isolation, *Bordetella* sp.	1
Pyothorax	1
SPECIAL SENSES	
Otitis media	1
UROGENITAL	
Chronic tubulointerstitial nephritis	2
Glomerulonephritis	1
Hydronephrosis	1
Kidney nephrosis	2
Renal tubular carcinoma	1

FERRET

BODY AS A WHOLE	
Fat necrosis	1
MUSCULOSKELETAL	
Chondrosarcoma	2

FISH

BODY AS A WHOLE	
Cold water disease	1
Septicemia, bacterial, miscellaneous	1
CARDIOVASCULAR	
Myocarditis	1
INTEGUMENTARY	
Bacterial dermatitis	1
Dermatitis, non-specific	1

GUINEA PIG

BODY AS A WHOLE	
Abscess	1
Normal tissue	4
INTEGUMENTARY	
Bacterial dermatitis	1
Cellulitis	3
RESPIRATORY	
Pneumonia, embolic bacterial	1

HAMSTER

BODY AS A WHOLE	
Congenital anomaly	1

MILK REPLACER

BODY AS A WHOLE	
BVD virus PCR+	1

MILK SAMPLE

BODY AS A WHOLE	
BLV PCR+	3
BVD virus PCR+	3
INTEGUMENTARY	
Milk sample mastitis, bulk tank	1
Milk sample mastitis, clinical	1

MINK

BODY AS A WHOLE	
Aleutian disease	1
Salt toxicosis	1
Septicemia, *Escherichia coli*	6
CARDIOVASCULAR	
Myocarditis	1
DIGESTIVE	
Hepatic lipidosis	2
RESPIRATORY	
Bacterial pneumonia	1
Interstitial pneumonia	1
Lung pneumonia, *Escherichia coli*	2
Pleuritis	1
UROGENITAL	
Cystitis	3
Pyelonephritis	2

MOUSE

BODY AS A WHOLE	
Autolysis	1
Hemorrhage	1
No diagnosis	1
Normal tissue	1
INTEGUMENTARY	
Fibroma	1
SPECIAL SENSES	
Otitis media	1

OVINE

BODY AS A WHOLE	
Abscess, *Corynebacterium pseudotuberculosis*	1
Copper higher than normal	1
Copper marginal	1
Emaciation	1
Hypocalcemia	1
No diagnosis	5
Normal tissue	1
Peritonitis	2
Septicemia, bacterial, miscellaneous	1
Septicemia, *Mannheimia haemolytica*	3
Septicemia, *Salmonella*	1
Serositis	1
Starvation / inanition	4
Toxicosis copper	2
Toxoplasmosis	1
CARDIOVASCULAR	
Myocardial necrosis	1
DIGESTIVE	
Abomasum abomasitis	1
Abomasum abomasitis, *Clostridium* sp.	1
Abomasum rupture	1
Bacterial enteritis	1
Clostridium perfringens Type D	1
Colitis	1
Cryptosporidiosis	1
Enteritis, Johne's disease	1
Gastrointestinal parasitism	1
Hepatitis	1
Hepatopathy	1
Intestine enteritis, *Clostridium perfringens*	9
Intestine enteritis, *Clostridium perfringens* Type A beta 2	2
Intestine enteritis, coccidia	6
Intestine enteritis, *Escherichia coli*	2
Intestine enteritis, granulomatous	1
Intestine enteritis, *Salmonella*	1
Intestine parasitism, strongyles	1
Rumen rumenitis	2
ENDOCRINE	
Goiter	1
HEMIC AND LYMPHATIC	
Lymph node lymphadenitis, caseous	3
INTEGUMENTARY	
Contagious ecthyma (ORF)	1

MUSCULOSKELETAL

Muscle myopathy, nutritional	2
Myositis	1

NERVOUS

Brain encephalopathy	1
Listeria monocytogenes encephalitis	1

RESPIRATORY

Bacterial pneumonia	2
Lung pneumonia, *Bibersteinia trehalosi*	2
Lung pneumonia, *Mannheimia haemolytica*	10
Lung pneumonia, *Pasteurella multocida*	3
Lung pneumonia, *Pasteurella* sp.	1
Lung pneumonia, *Trueperella pyogenes*	2

UROGENITAL

Abortion, *Campylobacter jejuni*	5
Abortion, placentitis	5
Abortion, *Salmonella* sp.	1
Abortion with congenital anomaly	1
Bacterial abortion	1
Idiopathic abortion	21
Kidney, nephrosis	1
Metritis	1

PORCINE

BODY AS A WHOLE

Abscess	1
Autolysis	1
Circovirus identified -- no disease	5
Hemorrhage	3
No diagnosis	5
Normal tissue	4
PCV2 disease multi-systemic	2
Polyserositis	2
PRRS infection	2
Salt toxicosis	1
Septicemia, *Actinobacillus suis*	3
Septicemia, bacterial, miscellaneous	2
Septicemia, *Escherichia coli*	2
Septicemia, *Haemophilus parasuis*	3
Septicemia, *Salmonella*	13
Septicemia, *Streptococcus* sp.	1
Septicemia, *Streptococcus suis*	9
Septicemia, *Trueperella pyogenes*	2
Septicemic *Pasteurella multocida*	2
Serositis	1

CARDIOVASCULAR		
	Bacterial pericarditis	1
	Heart endocarditis, *Erysipelothrix*	1
	Mulberry heart disease	3
	Myocarditis	1
	Valvular endocarditis (bacterial)	1
DIGESTIVE		
	Atrophic enteritis	13
	Colitis	13
	Colitis, *Clostridium difficile*	2
	Cryptosporidiosis	2
	Enteritis due to TGE	3
	Enteritis, idiopathic	10
	Fracture of hepatic lobe	1
	Gastric ulcer	3
	Hepatitis	1
	Intestinal accident	1
	Intestinal torsion	4
	Intestine emphysema	1
	Intestine enteritis, calicivirus	1
	Intestine enteritis, *Clostridium perfringens*	20
	Intestine enteritis, *Clostridium perfringens* Type A beta 2	2
	Intestine enteritis, coccidia	2
	Intestine enteritis, coronavirus	1
	Intestine enteritis, enterovirus	1
	Intestine enteritis, *Escherichia coli*	66
	Intestine enteritis, porcine epidemic diarrhea virus	65
	Intestine enteritis, porcine proliferative	4
	Intestine enteritis, rotavirus	42
	Intestine enteritis, rotavirus A	5
	Intestine enteritis, rotavirus B	3
	Intestine enteritis, rotavirus C	4
	Intestine enteritis, *Salmonella*	32
	Liver hepatitis, necrotic	1
	Mesenteric torsion	4
	Parasitis hepatitis	1
	Rectal stricture	1
	Typhlitis	1
HEMIC AND LYMPHATIC		
	Anemia	2
	Lymphadenopathy	1
	Lymphosarcoma	1
	Spleen splenitis	1
	Spleen torsion	1
INTEGUMENTARY		
	Dermatitis, poxvirus	2
	Dermatitis, *Staphylococcus aureus*	1
	Dermatitis, *Staphylococcus hyicus*	1

MUSCULOSKELETAL	
Arthritis	1
Joint arthritis, *Staphylococcus aureus*	1
Joint arthritis, *Staphylococcus* sp.	1
Joint arthritis, *Streptococcus suis*	3
NERVOUS	
Brain encephalitis, *Streptococcus suis*	1
Brain encephalomalacia, focal	1
Brain meningitis, *Streptococcus suis*	9
Brain meningitis, suppurative	2
RESPIRATORY	
Bacterial pneumonia	4
Bronchitis	1
Bronchointerstitial pneumonia	2
Bronchopneumonia	1
Interstitial pneumonia	13
Lung pleuritis	2
Lung pneumonia, *Actinobacillus pleuropneumoniae*	2
Lung pneumonia, *Actinobacillus suis*	3
Lung pneumonia, *Bordetella bronchiseptica*	4
Lung pneumonia, *Bordetella* sp.	13
Lung pneumonia, *Haemophilus parasuis*	26
Lung pneumonia, *Mycoplasma hyopneumoniae*	11
Lung pneumonia, *Pasteurella multocida*	23
Lung pneumonia, PRRS	36
Lung pneumonia, *Salmonella* sp.	3
Lung pneumonia, *Streptococcus suis*	51
Lung pneumonia, *Trueperella pyogenes*	10
Lung pneumonia, swine influenza virus	26
Lung pulmonary, congestion	1
Nasal isolation, bacterial, miscellaneous	1
Nasal isolation, *Bordetella* sp.	2
Nasal isolation, *Pasteurella multocida*	2
Nasal isolation, *Streptococcus suis*	2
PCV2 disease pneumonia	16
Pleuritis	1
Rhinitis	7
Tracheitis	3
UROGENITAL	
Abortion associated with PRRS	1
Abortion, leptospirosis	1
Abortion, placentitis	1
Abortion, pneumonia	1
Bacterial abortion	4
Idiopathic abortion	11
Metritis	2
PRRS virus positive by PCR	1032

RABBIT

BODY AS A WHOLE		
	Congenital anomaly	1
	Trauma	1
DIGESTIVE		
	Bacterial enteritis	1
	Gastrointestinal intussusception	1
	Intestine enteritis, *Clostridium perfringens* A	1
	Intestine enteritis, necrotic	1
INTEGUMENTARY		
	Cystic mammary gland ducts	1
MUSCULOSKELETAL		
	Vertebral fracture	2
SPECIAL SENSES		
	Otitis media	1

RACCOON

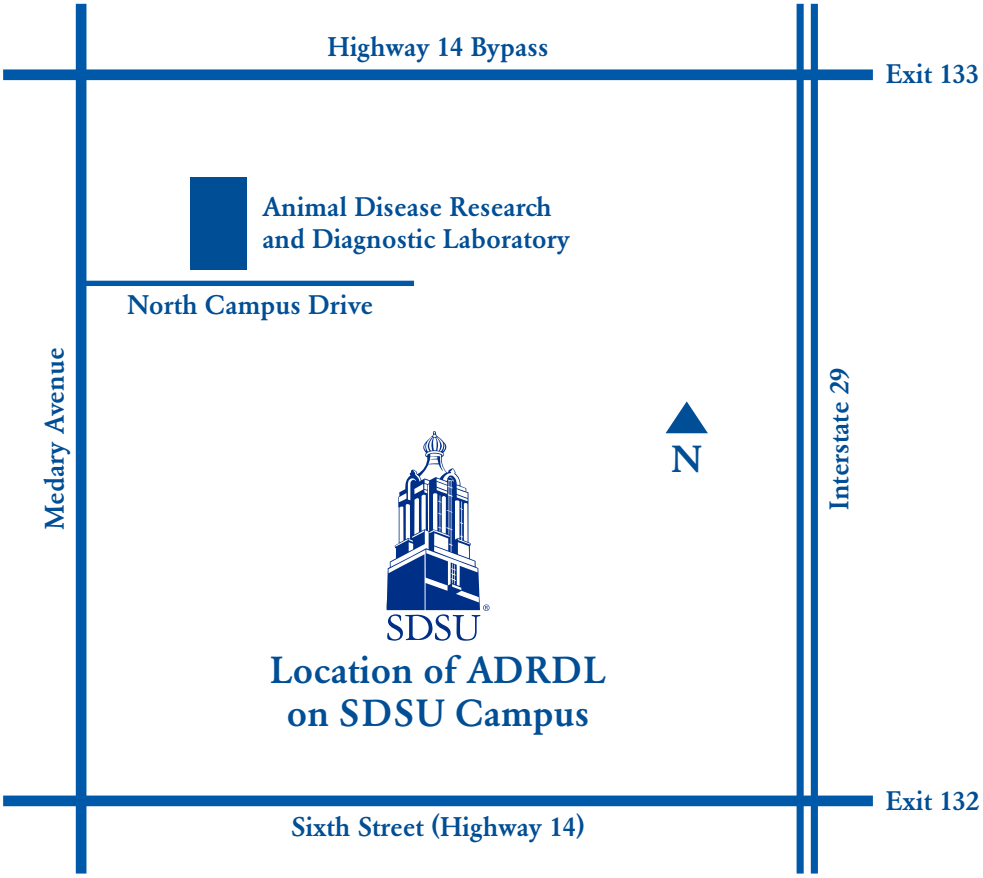
BODY AS A WHOLE		
	Canine distemper	1
	Normal tissue	1
NERVOUS		
	Brain encephalitis, nonsuppurative	1
RESPIRATORY		
	Bronchointerstitial pneumonia	1

RAT

BODY AS A WHOLE		
	Septicemia, bacterial, miscellaneous	1

SKUNK

NERVOUS		
	Rabies	7


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)

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