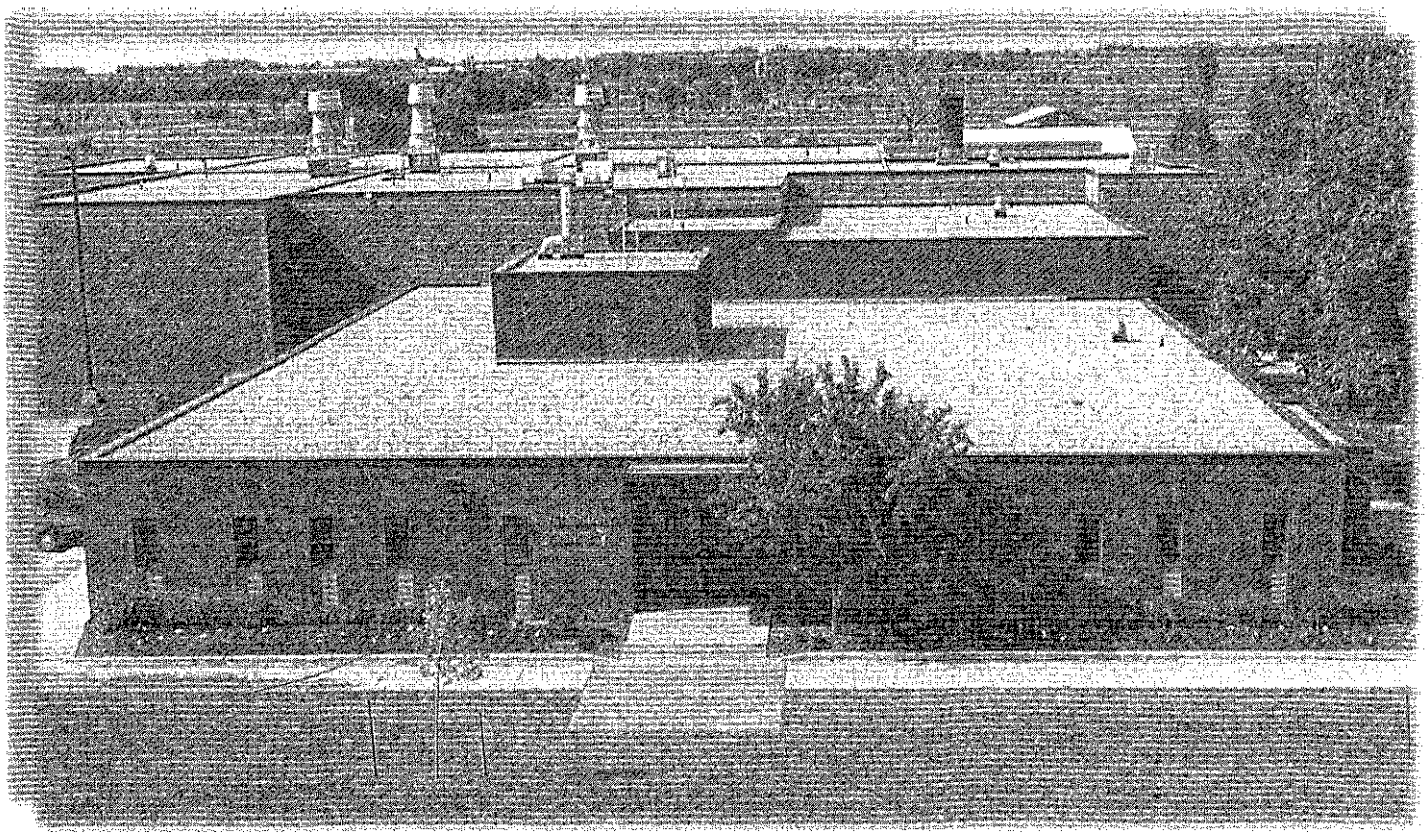
2013

South Dakota Animal Disease Research & Diagnostic Laboratory: Annual Report 2013

Animal Disease Research and Diagnostic Laboratory, South Dakota State University

South Dakota
Animal Disease Research & Diagnostic Laboratory



Annual Report 2013

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South Dakota
Animal Disease Research and Diagnostic Laboratory

Annual Report—Fiscal Year 2013

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INTRODUCTION – DIRECTOR'S REPORT

The South Dakota Veterinary and Biomedical Science Department/Animal Disease Research and Diagnostic Laboratory has gone through multiple changes in 2013, including the diagnosis of a new disease in the U.S., the addition of new technologies, and a new director at the laboratory. However, the commitment to the mission of the department remains, which is "to protect and improve the health of animals, the viability of the South Dakota livestock industry and the welfare of society through high quality diagnostic, research, extension and teaching activities". In addition, the Animal Disease Research and Diagnostic Laboratory (ADRDL) which is considered the "State Veterinary Laboratory" within the department, "aims to provide high quality veterinary diagnostic services as a means to promptly and accurately establish causes of animal health problems—such diagnosis will aid attending veterinarians and health officials in the treatment, control, prevention, and surveillance of animal diseases to the benefit of the South Dakota livestock industry, other animal owners and society at large."

To fulfill this mission, the department was again fully accredited in 2013 after the 5-year review by the American Association of Veterinary Laboratory Diagnosticians (AAVLD). It, therefore, continues being one of 42 laboratories that are accredited within the U.S. The laboratory also continues as a member of the National Animal Health Laboratory Network (NAHLN) which is a "USDA consortium of laboratories that provide laboratory support of routine and emergency animal disease diagnosis, including bioterrorism events; and contributes to societal goals for protecting human health by decreasing the risk of zoonotic diseases." Being a member of NAHLN, the laboratory "protects animal health to decrease environmental risk and negative economic impact to producers, protects the health of domestic and wild animals by lessening the risk of disease transmission between wildlife and livestock, increases consumer confidence in the Nation's food supply, and maintains confidence and positive relationships among global trading partners." http://nvap.aphis.usda.gov/animal_health/nahln/about_nahln.shtml. Specifically, the laboratory is prepared to test for foreign animal diseases including classical swine fever, foot and mouth disease, rinderpest, African swine fever and exotic Newcastle disease, and provides surveillance for chronic wasting disease, pseudorabies, and avian and swine influenza.

We also continue with funding as a member of the USDA/FDA Food Emergency Response Network (FERN) which is "a network of laboratories designed quickly to respond to biological, chemical, and radiological contamination of food, which has helped federal and state health officials investigate foodborne illness outbreaks and other food safety concerns". In addition, as a member of the CDC Veterinary Laboratory Investigation Response Network (VLIRN), we also document, investigate, and diagnose animal feed or drug related illnesses which contribute to overall food safety, since animal feed events could signal potential issues in the human food system. http://www.fda.gov/AnimalVeterinary/ScienceResearch/ucm247334.htm.

In 2013, we saw the emergence of a new disease in the U.S., porcine epidemic diarrhea virus (PEDV) which is considered a "transboundary" disease that had not been previously seen in the U.S. The laboratory responded quickly by developing a PCR based test for same day diagnosis, serologic tests (IFA and ELISA) and monoclonal antibodies for the detection of this new virus. These reagents and testing procedures are currently being distributed and/or commercialized for

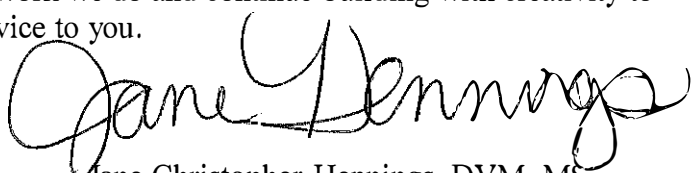
use in many other laboratories. This new disease is a reminder of the vulnerabilities of livestock to new infectious diseases, the need for "surge capacity" within the laboratory when new tests are put "on-line" and the need to retain excellent scientists and microbiologists that are able to adapt quickly. Because of this new disease, the Molecular Diagnostic Section experienced a significant growth in numbers of tests (from 62,769 in FY 2012 to 76, 229 in FY 2013). This number is expected to continue to climb since PEDV was just diagnosed in the U.S. a month prior to obtaining these test numbers and a new test for "swine deltacoronavirus" was also added.

Technology within the laboratory is also changing including the addition of a "MALDI TOF" instrument which is the acronym for "matrix-assisted laser desorption ionization-time of flight mass spectrometry". This instrument is now used in the Bacteriology Section for high throughput identification of bacteria and yeast. Culture of the organism is still needed, but quicker identification of the specific genus and species is achieved.

Several faculty also contributed to various publications and book chapters including, the book "Diseases of Swine" which is the definitive text on this topic (*Chase, C.C.L.* J.K. Lunney, Chapter 16: Immune system: In: Diseases of Swine 10th Edition pgs. 227-250 and *Christopher-Hennings, J.,* G. Erickson, R. Hesse, S. Olivera, *E. Nelson* on "Diagnostic tests, test performance and considerations for interpretation. In: Diseases of Swine 10th Edition, pp. 77-93). Other significant publications are described in this annual report discussing the development of new diagnostic tests, the immune system response to various viruses, vaccine design and abstracts relating to presentations given to producers, veterinarians and/or research scientists.

The department continues to educate undergraduate students through research training and hiring within the various sections of the department. Over 50 students worked within the laboratory during the fiscal year.

Finally, I would like to thank the clients (producers, veterinarians, scientists, public) that use and contribute to our laboratory. You are very important people and I hope you will contact me at any time with your concerns, questions, and ideas. Secondly, I would like to thank Dr. Russ Daly, our State Public Health Veterinarian and Extension Specialist for the department, who did a phenomenal job as the Interim Director from January through the end of August, 2013. Finally, I would also like to thank our previous director, Dr. David Zeman, for his 16 years of service as our Head and Director. He, along with those in the laboratory, set a high bar for an excellent quality control system as the basis for operating the laboratory. We hope to continue with this standard as the basis for the work we do and continue building with creativity to achieve the department mission in service to you.



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

Highlights from Veterinary and Biomedical Sciences Department, Animal Disease Research and Diagnostic Laboratory

2012-2013

- Acquisition of a MALDI TOF" ("matrix-assisted laser desorption ionization-time of flight mass spectrometry") instrument for use in the Bacteriology Section for quicker identification of bacterial genus and species.
- Identification and development of new tests for Porcine Epidemic Diarrhea Virus (PEDV) which was discovered for the first time in the U.S. in May 2013.
- There were 43 refereed publications and 103 presentations/abstracts
- There were 53 undergraduate students that worked in the laboratory
- There were 59 grants funded or continued
- Two book chapters were published in "Diseases of Swine" via SDSU Faculty
- Retirement of Dr. David Zeman (Head and Director for 16 years). A new Interim Director, Dr. Russ Daly from January through August, 2013 and a new Director was appointed via a national search, Dr. Jane Christopher-Hennings as of August 22, 2013.

FACULTY AND STAFF
July 1, 2012 – June 30, 2013

ADMINISTRATION
Russell Daly, DVM, MS, Associate Professor, Interim Head and Director
David Zeman, DVM, PhD, Head and Director, Diplomate ACVP (1-17-13)
Tanya Graham, DVM, Associate Director, Diplomate ACVP

PATHOLOGY
David Zeman, DVM, PhD, Professor, Diplomate ACVP – Section Leader (1-17-13)
Larry Holler, DVM, PhD, Professor
David E. B. Knudsen, DVM, MS, Diplomate, ACLAM, Professor
Regg Neiger, DVM, PhD, Professor
Dale Miskimins, DVM, MS, Professor
Tanya Graham, DVM, Professor, Diplomate ACVP
Anwar J. Sarah, BVM, MS, Post Doctoral Research Associate

BACTERIOLOGY
Larry Holler, DVM, PhD, Professor – Section Leader
Seema Das, BS, MS, Senior Microbiologist
Debra Murray, CLT, Senior Microbiologist
Lucinda Bloker, BS, Microbiologist
Colleen Smith, BS, Microbiologist (11-2-12)
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
Ann Hegerfeld, BS, ASCP, Microbiologist (4-3-13)

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

FOOD SAFETY
David Zeman, DVM, PhD, Professor, Diplomate ACVP – Section Leader (1-17-13)
Laura Ruesch, MS, Senior Microbiologist
Mariecil Aguiar, BS, Laboratory Technician

HISTOPATHOLOGY/ELECTRON MICROSCOPY/IHC
Tanya Graham, DVM, Professor, Diplomate ACVP – Section Leader
Margaret Perry, MS, Senior Microbiologist (5-21-13)
Frank Qin, MS, Senior Microbiologist
Karen Belau, Laboratory Technician

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

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
Ying Fang, PhD, Associate Professor
Weiping Zhang, PhD, Associate Professor
Steven Dilberger-Lawson, PhD, Research Associate I
Xiaosai Raun, PhD, Post-Doctoral Research Associate
Zhi Sun, PhD, Post-Doctoral Research Associate
Lyle Braun, MS, Senior Microbiologist
Diane Baker, MS, Agriculture Research Manager Specialist
Mahmoud Darweesh, MS, Visiting Scientist
Longchao Zhu, MS, Visiting Scientist

TOXICOLOGY
Regg Neiger, DVM, PhD, ADRDL Toxicology Coordinator

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

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
Kelly Schmit, 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
Jennifer Lemon, BS, Senior Microbiologist
Stacey Wessels, BS, Senior Microbiologist

CLERICAL STAFF
Rita Miller, Office Supervisor
Gerri Murphy, Word Processor
Evonne Freyberg, Secretary
Margaret Janssen, Secretary
Janice Kampmann, Secretary
Nan Nesbit, Secretary
Kim Hyland, Staff Assistant

INFORMATION SYSTEMS
Jon Greseth, Computer Support Analyst

ACCOUNTING/PURCHASING/HUMAN RESOURCES
Russell Lokken, MBA, Program Assistant II
Shirley Wiener, Senior Secretary
Sandra Gustafson, Senior Claims Clerk (10-19-12)

MAINTENANCE
Jerry Anderson, Senior Building Maintenance Worker

NECROPSY
Myron Olson, Laboratory Tecl mician

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

Benjamin Hause, Newport Laboratories, PhD, South Dakota State University, 2013 Biological Sciences

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

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

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

Sambasivarao Tadepalli, Novartis Health, BVSC, PhD, Kansas State University, 2007 Molecular Biology, Bacteriology

GRADUATE STUDENTS

Christopher Chase, DVM, PhD, Professor, Diplomate ACVM, Virology and Immunology
Graduate Coordinator
Chengxian Zhang, MS, Graduate Research Assistant
Qiji Deng, BS, Graduate Research Assistant
Emad Hashish, BS, Graduate Research Assistant
Robert Langenhorst, BS, Graduate Research Assistant
Maxim Lebedev, BS, Graduate Research Assistant
Yanhua Li, BS, Graduate Research Assistant
Jessica Mediger, BS, Graduate Research Assistant
Mrigendra Rajput, BS, Graduate Research Assistant
Russell Ransburgh, BS, Graduate Research Assistant
Dana Rausch, BS, Graduate Research Assistant

SOUTH DAKOTA

ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

HOURLY ASSISTANTS

JULY 1, 2012 – JUNE 30, 2013

Lindy Artz, Amanda Baumgarn, Hillery Baysinger, Lacy Bobb, Nathanael Braselton, Marlene Braun, Amanda Brock, Hannah Brockshus, Kendra Brooks, Jazmine DeBruin, Amy Dietsch, Brody Edman, Hannah Ellsworth, Casey Finnicum, Lisa Friedrich, Kaitlin Gordon, Jenna Guthmiller, Caitlin Hupp, Lisa Hagemann, Kelsey Huber, Ryan Hymens, Tomislav Ivica, Brita Johnson, Erin Johnson, Robert Juenemann, Olivia Kendall, Evan Koep, Katherine Kondratuk, Troy Kopp, Pavan Kulkarni, Michelle Lenertz, Shuang Li, Xiaodong Liu, Melissa Long, Jessica Luke, Jodilyn Moore, Tracy Moore, Ashley Peterson, Jenetta Porter, LeShea Quade, Lacey Quail, Kenzie Rathburn, Serena Riecken, Keith Schornack, Cassandra Steinle, Kaitlyn Stoltenburg, Alyssa Umbreit, Megan Violand, Alexander Vos, Nathan Wilen, Zachary Williams, Vanessa Yovetich, Jeff Zhang

SOUTH DAKOTA

ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY

AWARDS AND RECOGNITION

July 1, 2012 – June 30, 2013

Pins were awarded to the following individuals for years of service:

Jerry Anderson	10 years
Russell Daly	10 years
Matthew Dammen	10 years
Jennifer Lemon	10 years
Weiping Zhang	10 years
Ying Fang	15 years
Jon Greseth	15 years
Myron Olson	15 years
Tracy Irion	20 years
Lyle Braun	25 years
Regg Neiger	25 years
Linda Fawcett	30 years
Margaret Perry	30 years
David Francis	35 years
Pam Leslie-Steen	40 years

SOUTH DAKOTA
ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
ADVISORY COMMITTEE

JULY 1, 2012 – JUNE 30, 2013

Animal Disease Research and Diagnostic Laboratory
Russell Daly, DVM, MS, Interim Head and Director (started January, 2013)
David H. Zeman, DVM, PhD, Head and Director (January, 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
Robert 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 (started January, 2013)
Darwin Britzman, PhD (January, 2013)

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

South Dakota Veterinary Medical Association
Jennifer Stalley, DVM, Executive Director
Cynthia Franklin, DVM, President (2012-2013)
Kevin Klozenbucher, DVM (Food Animal Representative)
Steve Smith, DVM (Member-at-large)
Jill Hyland Ayers, DVM (Companion Animal Representative)

Updated July 01, 2013

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 fetus venerealis)	X	
Caprine Arthritis/Encephalitis	X	
Canine Ehrlichiosis	X	
Caseous Lymphadenitis	X	
Chronic Wasting Disease (Cervids)	X	X
Contagious Agalactia (*Mycoplasma* spp.)	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 synoviae (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 Epidemic Diarrhea Virus (PEDV)	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 (*S. abortus ovis*)	X	
Salmonellosis (*Salmonella enteriditis*)	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 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 Stomititis	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, 2012 – JUNE 30, 2013

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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Olsen, C., L. Karriker, C. Wang, B. Binjawadagi, J. Christopher-Hennings, K. Doolittle, K. Harmon, S. Jones, A. Kittawornrat, A. Kurtz, E. Kurtz, S. Lizano, J. Coetzee, R. Main, A. Meiszberg, E. Nelson, T. Otterson, Y. Panyasing, C. Rademacher, R. Rauh, G. Renukaradhya, R. Shah, J. Zimmerman. Swine oral fluid diagnostics update. Proceedings, 20th Annual Swine Disease Conference for Swine Practitioners (p 89 and presented)

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Petersen, A., M. Lebedev, A. Young. *In vitro* and *in vivo* techniques to measure B cell responses in sheep. Compendium, Autumn Immunology Conference (abstract, poster, presented).

Petersen, A., A. deLeon, M. Lebedev, L. Foil, F. Guerrero, A. Young. Immunological response to a novel anti-tick vaccine candidate in deer. Compendium, Autumn Immunology Conference (abstract, poster, presented).

Rajput, M.K.S., L.J. Braun, J.F. Ridpath, W. Mwangi, A.J. Young, M.W. Darweesh, C.C.L. Chase. Bovine viral diarrhea virus (BVDV) replication in monocyte-derived dendritic cells and significance of breed difference in its generation. 97th Annual South Dakota Academy of Science 91:250 (presented).

Rajput, M.K.S., L.J. Braun, M.W. Darweesh, J.F. Ridpath, W. Mwangi, A.J. Young, C.C.L. Chase. Non-adherent CD14 negative bovine monocyte-derived dendritic cells lose their capability to produce infectious bovine viral diarrhea virus (BVDV) during its development. Proceedings, 93rd Annual Conference of Research Workers in Animal Disease (abstract 103P and presented).

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Rausch, D.J., C. Zhang, X. Ruan, E. Hashish, W. Zhang. A genetic fusion of enterotoxins of enterotoxigenic *Escherichia coli* (ETEC) induced broadly antitoxin immunity against ETEC associated diarrhea. Proceedings, 93rd Conference of Research Workers in Animal Diseases (abstract 105 and presented).

Rausch, D., C. Zhang, X. Ruan, E. Hashish, W. Zhang. A universal antitoxin vaccine candidate against ETEC-associated diarrhea in animals. Proceedings, 72nd Annual Meeting of North Central Branch of the American Society for Microbiology, (abstract and presented).

Reicks, D.L., J. Christopher-Hennings, E. Nelson, K. Rossow, J. Zimmerman. The effect of PRRS ATP vaccine given by exposure to vaccine saturated ropes. Proceedings, 43rd Annual Meeting of American Association of Swine Veterinarians p. 47-50 (abstract and presented).

Ruan, X., C. Zhang, W. Zhang. A modified live vaccine strain against PWD caused by ETEC. Proceedings, 72nd Annual Meeting of the North Central Branch of the American Society for Microbiology (abstract and presented).

Ruan, X., W. Zhang. Development of a modified live vaccine against enterotoxigenic *Escherichia coli*-associated porcine post-weaning diarrhea. Proceedings, 93rd Conference of Research Workers in Animal Diseases (abstract 107 and presented).

Sarah, A.J. Brain abscess in a white-tailed deer. Proceedings, 55th Annual Conference of the American Association of Veterinary Laboratory Diagnosticians, p. 167 (abstract and presented).

Smith, S., A. Eljaki, J. Acharya, R. Daly, M. Hildreth. Effect of Safe-Guard® free-choice protein blocks on Trichostrongyle nematodes in pastured cattle from eastern South Dakota. Proceedings, South Dakota Academy of Science (in press).

Sun, Z., S. Lawson, R. Langenhorst, K.L. McCormick, C. Brunick, T. Opriessnig, R. Baker, K-J. Yoon, W. Zhang, V.C. Huber, Y. Fang. Development of an epitope-based vaccine against swine influenza A virus using *Escherichia coli* heat-labile toxin B subunit as a carrier-adjuvant. Proceedings, American Society of Virology; Proceedings, 93rd Conference of Research Workers in Animal Disease.

Sun, Z., Y. Li, R. Ransburgh, E.J. Snijder, Y. Fang. Nonstructural protein 2 of porcine reproductive and respiratory syndrome virus inhibits the antiviral function of interferon-stimulated gene 15. Proceedings, 2012 International PRRS Symposium, Kansas City, KS; Proceedings, American Society of Virology; Nebraska Virology Center Annual Retreat.

Walker, K.M., L.D. Holler, J.E. Beever. Ovine GM1 gangliosidosis is caused by a mutation in GLB1. Proceedings, Animal and Plant Genome Conference.

Wang, X., H. Zhang, X. Guo, E. Nelson, J. Christopher-Hennings. Porcine reproductive and respiratory syndrome virus activates the transcription of interferon alpha/beta in monocyte-derived dendritic cells. Proceedings, American Society for Virology, P13-22.

Whitlock, R.A., A. young, T.Carpenter, A. Petersen, R.c. Bott. Characterization of B cell phenotype in horses. Compendium, Autumn Immunology Conference (abstract, poster, presented).

Zeman, D.H. Director's message: Feeding the world & growing the SD ecomony. Animal Health Matters 15(1):2.

Zeman, D.H. Directors' message: One last time...thanks for the memories. Animal Health Matters 15(3):2.

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Zhang, C., M. Liu, D. Knudsen, S. Lawson, D. Robertson, W. Zhang. Safety and immunogenicity of 3xSTaA14Q-tmLT of enterotoxigenic *E. coli* in a murine model. Proceedings, 72nd Annual Meeting of the North Central Branch of the American Society for Microbiology (abstract and presented).

Zhang, C., M. Liu, D. Knudsen, S. Lawson, D. Robertson, W. Zhang. Safety and immunogenicity studies of a modified heat-labile toxin (LT) and heat-stable toxin (ST) fusion protein ($LT_{S63K/R192G/L211A}$-$3xSTa_{A14Q}$) in a murine model. Proceedings, 93rd Conference of Research Workers in Animal Diseases (abstract 106 and presented).

Zhang, H. G. Xueshui, E. Nelson, J. Christopher-Hennings, X. Wang. Porcine reproductive and respiratory syndrome virus activates the transcription of interferon alpha/beta (IFN-α/β) in monocyte-derived dendritic cells. Proceedings, American Society of Virology.

Zhang, W. Broadly protective vaccine against enterotoxigenic *Escherichia coli*-associated porcine post-weaning diarrhea. Proceedings, 6th International Veterinary Vaccines and Diagnostics Conference (abstract and presented).

PRESENTATIONS—2012

CHASE, CHRISTOPHER C. L.

Presentations

1) The immune response in newly arrived cattle: What can we do to insure it "works"? 2012 Plains Nutrition Council Spring Conference, San Antonio, TX, April 12.
2) Development of the immune system. 23rd Discover Conference on Food Animal Agriculture-Bovine Immunology: The intersection of innate and acquired immunity, Itasca, IL, May 30.
3) Bovine respiratory disease complex: What's new? Symposium on Infectious Diseases, Madison, WI, June 23.
4) Annual report of the South Dakota Experiment Station, NC-1192 Animal Integrated Approach to Control of Bovine Respiratory Disease Technical Committee Meeting, Kansas City, MO, August 1.
5) BVDV persistent infection dynamics, 121st South Dakota Veterinary Medical Association Annual Meeting, Rapid City, SD, August 17.
6) Mutation in noncytopatic BVDV persistently infected animal to generate cytopathic pair is a rare event where one animal developed a cytopathic virus that hit all the animals within one herd. 12th Annual Symposium in Virology, Lincoln, NE, October 5.
7) Bovine viral diarrhea virus—Understanding more about a persistent problem. BCAAP Seminar, Brookings, SD, October 12.
8) Innate response to ODN-CpG in ruminants. Bayer Animal Health Immunology Expert Meeting, Atlanta, GA, November 27.
9) How to get the most out of your vaccination program. Applied Reproductive Strategies in Beef Cattle Conference, Sioux Falls, SD, December 4.

CHRISTOPHER-HENNINGS, JANE

Presentations

1) Boehringer-Ingelheim PRRSV Research Meeting of Experts in PRRSV, Colorado Springs, CO.
2) IMV Technologies Expert Panel Meeting, Minneapolis, MN, March.
3) Sampling and testing for PRRSV. Southeast SD Area Regional PRRS Control Meeting, Lennox, SD, June 19; Mitchell, SD, June 20.
4) Johne's disease diagnostics. 121st South Dakota Veterinary Medical Association Annual Meeting, Rapid City, SD, August 17.

5) Considerations for performing Luminex® multiplex assays in veterinary diagnostic laboratories. 55th Annual Conference of American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, October 18-24.

DALY, RUSSELL

Presentations

1) PQA plus certification training. South Dakota Pork Producers Annual Meeting, Sioux Falls, SD, January 12.
2) Making the right decisions about cow health during winter. Dakotaland Feeds / SD Wheat Growers Producer Meeting, Lebanon, SD, February 7; Ipswich, SD, February 9; Java, SD, February 22.
3) Making the right decisions about cow health during early spring. Dakotaland Feeds / SD Wheat Growers Producer Meeting, Pollock, SD, March 19.
4) Calving time health issues. Beginning Farmer Rancher Course, Kyle, SD, March 20.
5) PQA plus advisor training. Christensen Farms Staff, Sleepy Eye, MN, March 28; Brookings, SD, May 22.
6) Basic first aid and health care for cattle and horses. Beginning Farmer Rancher Course, Kyle, SD, May 2.
7) Best practices to recruit and guide pre-veterinary students. Iowa State University Regional Veterinary Medical Education Conference, Ames, IA, June 12.
8) PRRS and its elimination from herds and regions. U.S. Soybean Export Council China Pork Producers Tour, Brookings, SD, June 15; U.S. Grains Taiwan Swine Nutrition Delegation to U.S., Brookings, SD, October 18.
9) Digestive disease in the nursery and the role of biosecurity. Vietnamese Swine Nutrition Delegation to U.S., Brookings, SD, July 23.
10) Designing a herd health program: The role of biosecurity and vaccination. Beef SD Workshop, Pierre, SD, November 6.
11) Management considerations for reducing infectious reproductive diseases. Applied Reproductive Strategies in Beef Cattle Symposium, Sioux Falls, SD, December 4.
12) Activities of the AABP Committee on rural veterinary practice sustainability. National Food Animal Veterinary Institute "Strengthening the Rural Veterinary Infrastructure" Conference, Kansas City, MO, December 12.

Media

1) Tightened cephalosporin rules still leave some questions. *Farm Forum,* January 13.
2) Cephalosporin rules. SDSU *iGrow* Radio, January 19.
3) Surviving a difficult calving. *Farm Forum,* January 27.
4) Supplies for calving time. *Drover's Cattle Network*, January 28.
5) Companion animal health. *605 Magazine,* February 8.
6) Colostrum in the beef calf: What makes it work for the calf? *Drover's Cattle Network*, February 9.
7) Frostbite in calves. *Drover's Cattle Network*, February 9.
8) What to do with your newly purchased bull. *Farm Forum,* February 10.
9) Baby calf issues. *Drover's Journal,* February 17.

10) Colostrum in the beef calf: When should we give colostrum and what should we use? *Drover's Cattle Network*, February 21.
11) Can calf scours organisms make people sick? *Farm Forum,* February 24.
12) Foster calves in the beef herd. SDSU *iGrow* Radio, February 24; *Drover's Cattle Network*, February 27.
13) Cold weather effects on calves. WNAX Radio, February 29.
14) Preparing calves for spring sales. *Western Cowman*, February 29.
15) Foster calves in the beef herd. SDSU *iGrow* Press Release, March 1.
16) Calf scours. SDSU *iGrow* Radio, March 7.
17) Animal health is always a good investment. *Farm Forum,* March 9.
18) Rabies: Time to protect your animals. *Farm Forum,* March 23.
19) Rabies in West River. KEVN Radio, April 3
20) *Salmonella* in beef cow herds. *Bovine Veterinarian*, April 3.
21) It's allergy season for animals, too. *Farm Forum,* April 6.
22) Lead poisoning: Be aware of the possibility for grazing cattle. *Farm Forum,* April 20.
23) Bovine spongiform encephalopathy. SDSU *iGrow* Press Release, April 25.
24) Parasite predictions. *Cattle Business Weekly*, May 3.
25) BSE case is atypical – but some responses are not. *Farm Forum,* May 4.
26) Anthrax vaccination reminder. SDSU *iGrow* Press Release, May 8.
27) Preventing dog bites. *Farm Forum,* May 18.
28) Fertility testing bulls: A sound insurance policy. *Farm Forum,* June 1.
29) Pinkeye treatment. SDSU *iGrow* Radio, June 1.
30) Is it foot rot or something else? *Drover's Cattle Network*, June 9.
31) Sorting out foot rot. *Farm Forum,* June 15.
32) Getting live calves. *Angus Journal,* June 20.
33) Killed vs. modified live vaccines. *Angus Journal,* June 20.
34) Rabies in people not exactly a thing of the past. *Farm Forum,* June 29.
35) Be aware of high nitrates in forages this summer. *Farm Forum,* July 13.
36) Fair biosecurity. *Drover's Cattle Network,* July 17.
37) Heat effects on livestock. WNAX Radio, July 24.
38) Be on the lookout for blue-green algae blooms this summer. *Farm Forum,* July 27.
39) Pneumonia in pre-weaned calves. *Drover's Cattle Network*, July 30.
40) H_3N_{2v} at the fair. *Aberdeen American News,* August 10.
41) Pigs, people, and flu--again. *Farm Forum,* August 10.
42) Vaccinating early weaned calves. *Drover's Cattle Network*, August 13.
43) H_3N_{2v}, drought. KJJQ Radio, August 21.
44) H_3N_{2v} at fairs. WNAX Radio Farm News, August 22.
45) Early weaning calves. KWAT Radio Ag Hour, August 23.
46) Early weaning: Effects on vaccination programs. *Farm Forum,* August 24.
47) Both ends of the veterinary education spectrum. *Farm Forum,* September 7.
48) Detecting bovine respiratory disease. *Drover's Cattle Network*, September 20.
49) EHD pops up in southeast South Dakota cattle? *Farm Forum,* September 21.
50) Bovine respiratory disease antemortem diagnosis. *Drover's Cattle Network*, September 25.
51) Livestock production. KELO Radio Town and Country Show, September 25.
52) Epizootic hemorrhagic disease in cattle. *Bovine Veterinarian,* October 2.

53) Dust and cattle. *Farm Forum,* October 5.
54) Epizootic hemorrhagic disease in cattle Q and A. *Cattle Business Weekly,* October 10.
55) Cornstalk grazing. *Drover's Cattle Network*, October 17.
56) Worn tire feeders can cause hardware disease. *Farm Forum,* October 19.
57) Scours vaccinations. *Drover's Cattle Network*, October 20.
58) Reproductive vaccinations. *Drover's Cattle Network*, October 22.
59) Vaccinating pregnant cows. SDSU *iGrow* Radio, October 25.
60) Veterinary school an expensive but rewarding proposition. *Farm Forum,* November 2.
61) Sorting out the causes of pneumonia in a live calf. *Farm Forum,* November 16.
62) Grazing cornstalks. *Successful Farming,* November 19.
63) State public health vet. *Growing SD,* November 19.
64) Veterinary public health. KELO Radio Town and Country Show, November 27.
65) Winter weather brings adjustments in feeding. *Farm Forum,* November 30.
66) Role of management in infectious reproductive diseases. Applied Strategies in Beef Cattle Reproduction web, December 3; *Progressive Cattlemen* e-newsletter, December 4.
67) Snowstorm effects on animals. WNAX Radio, December 10.
68) Pets and Christmas chocolate not a good mix. *Farm Forum,* December 14.
69) Banding bulls and tetanus. *Farm Forum,* December 28.

FANG, YING

Presentations

1) PRRSV vaccine and diagnostic assay development: From basic to applied sciences. 2012 International PRRS Symposium, Kansas City, KS; Beijing, China.
2) Suppression of host gene expression by nsp1β protein of porcine reproductive and respiratory syndrome virus. 93rd Annual Meeting of the Conference of Research Workers in Animal Disease, Chicago, IL, December 2-4.
3) The PRRSV replicase: Exploring the multifunctionality of an intriguing set of nonstructural proteins. Kansas State University, Manhattan, KS, 2012.

GRAHAM, TANYA

Presentations

1) Histology services at SDSU. 4th Annual Avera Health/South Dakota State University Research Symposium, Sioux Falls, SD, September 12.

HOLLER, LARRY

Presentations

1) GM_1 ganglioside and Huntingtons disease. Huntingtons Disease Society of America, Sioux Valley Chapter, Sioux Falls, SD, October.

LI, FENG

Presentations

1) Influenza matrix protein. South Dakota State University, Department of Pharmaceutical Sciences, Brookings, SD, February.
2) Influenza B virus in pigs. South China Agricultural University, China, June.
3) Influenza A, B, and C in swine. Shanghai Veterinary Research Institute, China Academy of Agricultural Sciences, China, July.

KNUDSEN, DAVID

Presentations

1) Diagnostic perspective on mesocolon edema syndrome of neonatal pigs: Laboratory case incidence in the north central United States (2002-2011). 4th European symposium of Porcine Health Management, Bruges BE, April.
2) Mesocolon edema syndrome of neonatal pigs: Diagnostic perspectives and case incidence. 121st South Dakota Veterinary Medical Association Annual Meeting, Rapid City, SD, August 17.

MISKIMINS, DALE

Presentations

1) *Clostridium perfringens* gastroenteritis in calves & rabies diagnostic update. James Bailey Herd Health Conference, Brookings, SD, February 11.
2) Transport tetany in beef cows & fireworks toxicity in a dog. 121st Annual Meeting of the South Dakota Veterinary Medical Association, Rapid City, SD, August 17.
3) *Halicephalobus gingivalis* nephritis is a mare. Western Conference of Veterinary Diagnostic Pathologists, Calgary, Alberta, Canada, October 12-13, 2012.

Media

1) Japanese yew toxicity in whitetail deer, *What's Up Doc?* SDSU Extension Veterinary & Biomedical Sciences Case Reports, January 31.
2) Listeriosis in a jackrabbit, *What's Up Doc?* SDSU Extension Veterinary and Biomedical Sciences Case Reports, January 31.
3) Transport tetany in beef cows, *What's Up Doc?* SDSU Extension Veterinary and Biomedical Sciences Case Reports, January 31.
4) Vetebral fracture in a steer, *What's Up Doc?* SDSU Extension Veterinary and Biomedical Sciences Case Reports, January 31.

NEIGER, REGG

Presentations

1) Calf scours diagnostics. James Bailey Herd Health Conference, Brookings, SD, February 11.
2) Bacterial cold water disease salmonids. Aquaculture American 2012 Joint Special Session, Las Vegas, NV, March.

3) Fish health and ADRDL. South Dakota Game, Fish and Parks Bait and Private Aquaculture Meeting, Watertown, SD, March 8.
4) Herpes virus in wild goldfish in South Dakota. Veterinarians on Fish Regulatory Medicine Workshop, LaCrosse, WI, July 31.
5) Herpes virus in wild goldfish in South Dakota. 121st Annual Meeting of the South Dakota Veterinary Medical Association, Rapid City, SD, August 17.

NELSON, ERIC A.

Presentations

1) Ring test evaluation for the detection of PRRSV antibody in oral fluid specimens using a commercial PRRSV serum antibody ELISA. 55th Annual Conference of American Association of Veterinary Laboratory Diagnosticians, Greensboro, NC, October 18-24, 2012.

YOUNG, ALAN

Presentations

1) Steering Committee Annual Report. 2012 Center of Excellence for Emerging and Zoonotic Animal Diseases, Nebraska City, NE, May 2.

RESEARCH PROJECTS

Animal Health

A-157-06 Bovine viral diarrhea virus infections in cattle: An emphasis on pathogenesis and diagnostics—Chase, Daly, Graham, Holler (October 2006-September 2011)

A-161-06 Identification of antibacterial, antiadhesive and antidiarrheal compounds from native plants—Francis (October 2006-September 2011)

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-203-07 Influenza A virus RNA polymerase complex assembly—Li (July 2007-June 2013)

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

H-317-09 Analysis of pesticides and related compounds—Matthees (October 2009-October 2011)

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)

R-159-06 An integrated approach to the control of bovine respiratory diseases (NC-1027)—Chase, Daly, Graham (October 2006-September 2011)

R-227-07 Enteric diseases of swine and cattle: Prevention, control and food safety (NC-1041)—Francis (October 2007-September 2012)

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)

S-996 Analytical Services—Olson Agricultural Analytical Services Laboratory (January 1984-October 2011)

National Pork Board

- Development of an epitope-based vaccine against swine influenza A virus using a non-toxic enterotoxin as a carrier-adjuvant—Fang, Baker, Zhang, Christopher-Hennings, Nelson (December 2009-July 2011)

- Novel multiplex diagnostic assays development for diagnosis of porcine respiratory disease complex—Fang, Rowland, Zimmerman, Irwin, Christopher-Hennings, Nelson (January 2011-December 2012)
- Generating swine influenza virus oral fluid diagnostic reference standards for community use—Zimmerman, Fang, Nelson, Christopher-Hennings, Rowland, Opriessnig, Yoon (October 2011-September 2012)
- Multi-institutional development and validation of a multiplex fluorescent microsphere immunoassay for the diagnosis of multiple agents in serum and oral fluid—Rowland, Fang, Zimmerman, Opriessnig, Green (October 2011-September 2012)

USDA/APHIS/Veterinary Services

- National Animal Health Laboratory Network: Classical swine fever surveillance—Zeman, Graham, Christopher-Hennings, ADRDL/VBSD Staff (April 2007-Ongoing)
- National Animal Health Laboratory Network: Swine influenza virus surveillance—Zeman, Christopher-Hennings, Leslie-Steen, ADRDL/VBSD Staff (July 2009-Ongoing)
- National Animal Health Laboratory Network: Pseudorabies surveillance—Zeman, Graham, Nelson, ADRDL/VBSD Staff (September 2010-March 2012)
- Viral hemorrhagic septicemia (VHS) surveillance—Brown, Neiger (September 2010-August 2011)
- Borlaug Fellowship studying influenza—Li (September 2011-July 2013)
- Fourth International Rushmore Conference on Enteric Disease: Methods for protection from infection—Francis (September 2011-August 2012)

USDA/NIFA

- Higher Education Challenge: Recruitment and retention of a diverse population of food safety students using market research for enhanced programs—Hegerfeld-Baker, Wolf-Hall, Anand, Krishnan, Muthukumarappan, Daly, Burrows, Garcia, Wilson (October 2008-September 2011)
- National Animal Health Laboratory Network: SD (NAHLN:SD) For the Food and Agriculture Defense Initiative—Zeman, Graham (September 2007-Ongoing)
- National Animal Health Laboratory Network: South Dakota—Zeman, Graham, Greseth, Parmar (July 2011-June 2012)

USDA/NIFA/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): Enhancement of laboratory testing capability for microbiological and chemical threat agents at the SDSU ADRDL—Ruesch, Zeman (September 2010-September 2011)
- Food Emergency Response Network (FERN)—Ruesch, Zeman (September 2011-September 2012)

USDA/National Research Initiative

- The role of PRRSV non-structural proteins 1 and 2 in host immunity—Fang, Lunney, Christopher-Hennings, Nelson, Young (October 2007-October 2011)

- Infection of White-tailed deer and their risk to domestic bovine viral diarrhea virus persistent cattle—Chase, Ridpath (September 2008-August 2011)
- Identification and characterization of novel poxviral immunomodulatory proteins of ORF virus—Rock, Delhon, Young (April 2012-March 2015)

USDA/PRRSV/CAP2

- Immunologic consequences of PRRSV diversity—Laegreid, Osorio, Goldberg, Christopher-Hennings, Nelson (January 2009-January 2013)

National Institute of Health

- HIV-1 maturation and its inhibition—Li (September 2008-July 2013)
- Influenza A virus polymerase assembly and inhibition—Li, Geiss (September 2008-August 2011)
- The significance of enteroaggregative heat-stable enterotoxin 1 (EAST1) in *Escherichia coli*-associated diarrhea—Zhang, Francis, Shultz, Robertson, Christopher-Hennings (September 2008-August 2011)
- Determining vaccine candidacy of LT and STa toxoid fusions against enterotoxigenic *Escherichia coli*-associated (ETEC) diarrhea in a pig model—Zhang, Robertson, Francis (June 2009-May 2012)
- Thiol specific fluorogenic agents for laser scanning confocal microscopy—Guan, Lu, Fang (May 2010-April 2013)
- Construct novel influenza A (H1N1) virus HA antigen for development of broadly-protective vaccine candidates—Fang, Huber, Zhang (July 2010-June 2013)
- Supplemental ARRA project on influenza A polymerase complex assembly and inhibition—Li (August 2010-August 2012)
- Stimulation of broadly neutralizing antibodies against influenza in a pig model—Francis, Kaushik, Li (August 2011-July 2014)

National Institute of Health/IBCST

- An integrated system for the epidemiological application of Earth observation technologies—Wimberly, Henebry, Senay, Hildreth (September 2008-August 2012)

National Institute of Health/Department of Human Health Services/National Children's Study, Formative Research

- Cytokine and protein biomarker multiplex analysis—Chase, Young (September 2010-August 2012)

Alltech, Inc.

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

Alpharma/Pfizer Animal Health

- Bacitracin's possible effect on multiple antibiotic resistance in bacteria—Francis, Garcia, Zhao (July 2010-December 2011)

Boehringer-Ingelheim Animal Health

- The effect of PRRSV MLV vaccine given by exposure to vaccine saturated ropes—Reicks, Christopher-Hennings, Nelson (March 2011-February 2012)

Egyptian and Educational and Cultural Bureau

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

Gates Foundation/PATH/Norway Research Council

- STa toxoid vaccine development against ETEC diarrhea—Nataro, Barry, Zhang, Clements, Summerfelt, Puntervoll (February 2010-May 2013)

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 (April 2012-March 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* O157:H7 vaccine—Gonda, Daly, Holland, Perry, Wright (October 2011-September 2012)

South Dakota Poultry Industries Association

- Poultry education and travel—Zeman, Graham (July 2009-June 2012)

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

- Analysis of BVDV for autophagosome activity—Chase, Hoppe (September 2011-August 2013)

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—Zeman, Miller, Kampmann (December 2006-December 2016)

United States Department of Defense, Office of the Navy/Research

- Development and execution of a survey instrument designed to assess biosecurity in select agent veterinary diagnostic laboratories and development and validation of a prototype biolab screen automation tool—Graham, Zeman, Greseth (October 2010-September 2012)

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

- Evaluation of *Salmonella* in symptomatic and asymptomatic pets: Study for the Vet-LRN program—Das, Zeman, Daly, Ruesch (September 2011-September 2012)

United States Department of Homeland Security/Kansas Bioscience Authority

- Center of excellence in emerging zoonoses and animal disease: Rift Valley fever—Young, Richt (July 2011-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-July 2013)

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 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 492-S02	Tp—Basic Infectious Disease Research, 3 cr. (Nelson)
VET 493-S01	Workshop, 1-4 cr. (Veterinary & Biomedical Sciences Faculty)
VET 494-S01	Internship, 1-12 cr. (Veterinary & Biomedical Sciences Faculty)
VET 494-S01	Internship—Veterinary Anatomy II, 3 cr. (Erickson)
VET 494-S02	Internship, 1 cr. (Veterinary & Biomedical Services Faculty)
VET 496-S01	Field Experience, 1-12 cr. (Chase, 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-S01	Independent Study—Pathogenesis of Infectious Diseases, 2 cr. (Chase)
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)

VET 791-S01	Independent Study—Cshl Proteomics, 3 cr. (Chase)
VET 791-S01	Independent Study—Virology, 3 cr. (Chase)
VET 791-S02	Independent Study, 2 cr. (Young)
VET 791-S02	Independent Study—Poultry Health Concepts, 2 cr. (Chase)
VET 791-S02	Independent Study—Viral Pathogenesis, 2 cr. (Chase)
VET 791-S03	Independent Study—Cshl Proteomics, 1-4 cr. (Chase)
VET 791-S03	Independent Study—Vaccinology, 2 cr. (Chase)
VET 791-S04	Independent Study—Flow Cytometry, 2 cr. (Young)
VET 792-S01	Topics, 1-3 cr. (Veterinary & Biomedical Sciences Faculty)
VET 792-S01	Topics—Flow Cytometry, 2 cr. (Young)
VET 792-S01	Topics—Molecular Diagnostics, 1-3 cr. (Hennings)
VET 792-S02	Topics—Faculty Seminar, 1 cr. (Wang)
VET 792-S02	Topics—Ruminant Antibody Production, 1 cr. (Young)
VET 792-S02	Topics—Ruminant Immunology, 1 cr. (Young)
VET 793-S01	Workshop, 1-4 cr. (Veterinary & Biomedical Sciences Faculty)
MICR 231L-S01, S03-S12, S14	General Microbiology Lab, (Mediger)
MICR 233L-S01, S06, S10, S12, S14	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, S02	Infectious Disease Lab, 3 cr. (Park)
MICR 491-S01	Independent Study—Influenza C Virus, 1 cr. (Li)
MICR 492-S01D/592-S02D	Tp—Immunology, 3 cr. (Chase)
MICR 492-S02D/592-S01D	Tp—Virology, 3 cr. (Chase)

MICR 494-S01	Internship, 1-4 cr. (Mediger)
MCR 494-S02	Internship, 1-12 cr. (Mediger)
MICR 498-S01-S03, S05, S06	Undergraduate Research / Scholarship, 1-4 cr. (Li, Fang, Chase, Wang, Kaushik)
MICR 592-S01	Topics—Medical and Veterinary Immunology, 3 cr. (Kaushik)
MICR 592-S01D	Topics—Virology, 3cr. (Chase)
MICR 592-S02D	Topics—Immunology, 3 cr. (Chase)
MICR 792-S0l	Topics—Biomedical Sciences, 1 cr. (Kaushik, Li)
MICR 798-S01	Thesis—Research, 1-7 cr. (Li)
MICR 798-S02, S03, S05	Thesis, 1-7 cr. (Kaushik, Wang)
BIOS 663-S01	Advanced Concepts Infectious Disease, 6 cr. (Young)
BIOS 788-S01, S02	Master's Research Problems, 1-3 cr. (Chase)
BIOS 790-S01	Seminar, 1 cr. (Wang)
BIOS 798-S07 S10, S12	Thesis—Veterinary Science, 1-10 cr. (Fang, Hennings, Li)
BIOS 798-S09, S12	Thesis—Biology / Microbiology, 1-10 cr. (Kaushik)
BIOS 798-S19, S39, S40	Thesis, 1-10 cr. (Fang, Chase)
BIOS 798-S24	Thesis—Veterinary Science, 1-5 cr. (Zhang)
BIOS 798-S26	Thesis, 2-5 cr. (Zhang)
BIOS 798-S27	Thesis—Biology / Microbiology, 1-10 cr. (Hildreth)
BIOS 898D-S05-S07, S11, S12	Dissertation—PhD-Biology / Microbiology, 1-7 cr. (Chase, Hildreth, Wang, Li)
BIOS 898D-S20-S23, S26, S28-S36	Dissertation—PhD-Veterinary Science, 1-7 cr. (Young, Chase, Fang, Francis, Li, Young, Zhang, Nelson, Hennings)
BIOS 898D-S48, S49, S51, S52	Dissertation—PhD, 1-7 cr. (Hildreth, Kaushik, Nelson, Young)

South Dakota
Animal Disease Research and Diagnostic Laboratory

Analysis of Workload

July 1, 2012 - June 30, 2013

Requests for Laboratory Assistance

July	August	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June	Total
1,706	1,770	1,734	1,891	1,750	1,514	1,837	1,757	1,879	2,050	2,073	1,791	21,752

Laboratory Examinations

43,449	27,487	40,655	35,523	40,554	27,331	29,558	28,303	31,558	39,752	39,512	42,191	425,873

Work Load Comparison With Prior Years

Requests for Laboratory Assistance

FY03	FY04	FY05	FY06	FY07	FY08	FY09	FY10	FY11	FY12	FY13
26,919	24,187	25,923	25,551	25,281	23,753	22,149	19,188	19,975	20,707	21,752

Laboratory Examinations

530,407	477,987	448,569	440,519	426,569	414,223	367,937	314,091	442,630	591,014	425,873

South Dakota
Animal Disease Research and Diagnostic Laboratory

Total Laboratory Procedures Conducted--FY13

July 1, 2012 - June 30, 2013

Pathology		
Necropsy Cases		3,439
	Pathology Subtotal	3,439
Clinical Pathology / Histopathology		
Clinical Pathology		
Hematology		
Blood Count		10
Complete Blood Count		413
Coombs		4
Hematocrit		4
Hemoglobin		60
Presurgical Evaluation		8
Urine and Fluids		
Cytology		115
Fluids Analysis		2
Rumen pH		12
Urinalysis		60
Clinical Chemistry		
Serum Chemistry Profile		
Dairy Management		105
Electrolyte (Anion Gap)		10
Equine		41
Porcine		11
Ruminant		110
Small Animal		179
Small Animal Pre-surgical		83
Individual Tests		
Albumin		3
Alkaline Phosphorus		2
Alanine Transaminase (ALT)		1
Beta Hydroxybutyrate		70
Bilirubin, Direct		1

Bilirubin, Total	5
BUN	3
Calcium	54
Cholesterol	2
Creatinine	4
Creatinine Phosphokinase	3
Gamma Glutamyltransferase (GGT)	1
Glucose	15
Lipase	8
Magnesium	4
Myxobolus Digest	48
Non-esterified Fatty (NEFA)	54
Phosphate	2
Potassium	3
Protein, Total	15
Sodium	1
Triglyceride	1
Parasitology	
Cryptosporidia Exam	661
Fecal Egg Count	16
Fecal Flotation	877
Fecal Occult Blood	1
Parasite Identification	15
Tritrichomonas Culture	27
Immunology	
Bovine IgG Assay	12
Cortisol	17
Fecal ELISA	
Coronavirus	663
Giardia	46
Parvovirus	36
Rotavirus	643
Thyroid Hormone	362
Heartworm Antigen	13
Histopathology	
Immunohistochemistry	1,289
Tissue Sections - H&E	12,225
Tissue - Special Stains	201
Clinical Pathology / Histopathology Subtotal	18,841

Microbiology

Bacteriology

Aerobic Culture	11,838
Anaerobic Culture	1,604
Antimicrobial Susceptibility	1,090
Aquatic Bacterial Screen	320
Bacterial Kidney Disease	64
Bovine Ocular Culture	132
Brachyspira Culture	5
Campylobacter Culture	272
Clostridium difficile Toxin A/B II	28
Clostridium Direct FA	30
Darkfield Screen	86
E. coli K99 IFA	492
Giemsa Anthrax Screen	34
Gram Stain	1
Johne's Culture	215
Leptospira FA	79
Listeria Culture	34
Milk Bulk Tank Culture	51
Milk Sample Culture	237
Mycology Culture	524
Mycology Non-specific Fluorescence Test	56
Mycoplasma Culture	506
Mycoplasma Milk Screen	57
Salmonella Enrichment	302
Salmonella Serotyping	128
VLRN *Salmonella* Testing	383

Food Safety		
Aerobic Plate Count		25
Campylobacter Direct		262
E. coli Petrifilm		118
E. coli Petrifilm Count		21
E. coli 0157:H7 PCR		219
E. coli 0157:H7 PCR-Trim		0
Kidney Inhibition Swab		42
Listeria monocytogenes		146
Listeria sp.		263
Salmonella BAX PCR		194
Salmonella RTE		139
Salmonella VETLRN		161
Yeast and Mold Count		21
	Microbiology Subtotal	20,179
Serology		
Anaplasmosis		
Competative Enzyme-linked Immunoassay		5,267
Avian Influenza		
AGID		398
Bluetongue		
AGID		63
Enzyme-linked Immunoassay (ELISA)		25,951
Bovine Leukosis Virus		
AGID		159
ELISA		71,411
Bovine Pregnancy Test		353
Bovine Respiratory Syncytial Virus		
SN		91
Bovine Viral Diarrhea Virus		
ACE		11,677
Bovine Viral Diarrhea Virus I		
SN		412
Bovine Viral Diarrhea Virus II		
SN		409
Brucella		
BAPA		5,109
Card		10,456
Plate		1,517
Rivanol		178
Tube		25,800

Brucella - Canine	
IFA	97
Brucella ovis	
ELISA	2,405
Caprine Arthritis Encephalitis	180
Chronic Wasting Disease (BioRad ELISA)	209
Epizootic Hemorrhagic Disease	
AGID	275
Equine Infectious Anemia	
AGID	153
ELISA	1,754
Feline Immunodeficiency Virus	
ELISA	26
Feline Infectious Peritonitis	
ELISA	24
Feline Leukemia Virus	
ELISA	26
Infectious Bovine Rhinotracheitis	
SN	232
Leptospira	
bratislava	611
canicola	611
grippotyphosa	611
hardjo	611
icterohemorrhagiae	611
pomona	611
Mycoplasma hyopneumoniae	
ELISA	6,981
ELISA DAKO	110
Neospora	
ELISA	3,269
Ovine Progressive Pneumonia	
AGID	1,491
Parainfluenza-3	
SN	83
Paratuberculosis (Johne's)	
ELISA	60,094
Porcine Respiratory and Reproductive Syndrome	
ELISA	49,083
Fluorescent Focus Neutralization (FFN)	278
IFA (European Strain)	156
IFA (North American Strain)	179

Pseudorabies		
gB ELISA		788
gB ELISA NAHLN		1,108
Pseudorabies Differential Test		
G1 ELISA		7
G1 ELISA NAHLN		4
Swine Influenza Virus		
H1N1		690
H3N2		690
Vesicular Stomatitis		
Indiana		2,392
New Jersey		2,392
	Serology Subtotal	298,093
Virology		
Bovine		
Bovine Respiratory Syncytial Virus FA		509
Bovine Viral Diarrhea Virus FA		1,268
Coronavirus FA		437
Infectious Bovine Rhinotracheitis Virus FA		796
Parainfluenza-3 Virus FA		9
Rotavirus FA		424
Virus Isolation		1,639
Canine		
Adenovirus FA		5
Coronavirus FA		12
Distemper Virus FA		35
Herpesvirus FA		7
Parvovirus FA		19
Virus Isolation		10
Equine		
Herpesvirus FA		4
Virus Isolation		8
Feline		
Feline Infectious Peritonitis Virus FA		8
Feline Panleukopenia Virus FA		16
Viral Rhinotracheitis Virus FA		14
Virus Isolation		5

Fish	
Infectious Hematopoietic Necrosis Virus VI	84
Infectious Pancreatic Necrosis Virus VI	84
Spring Viremia Carp Virus VI	120
Viral Hemorrhagic Septicemia Virus VI	315
Virus Isolation	166
Ovine	
Border Disease Virus FA	50
Coronavirus FA	13
Infectious Bovine Rhinotracheitis Virus FA	1
Parainfluenza-3 Virus FA	20
Respiratory Syncytial Virus FA	26
Rotavirus FA	18
Toxoplasma IFA	49
Virus Isolation	14
Porcine	
Circovirus II FA	137
Parvovirus FA	3
Porcine Respiratory and Reproductive Syndrom Virus FA	286
Porcine Respiratory and Reproductive Syndrome Virus VI	148
Porcine Respiratory and Reproductive Syndrome Virus VI Titration	10
Pseudorabies Virus FA	2
Rotavirus FA	149
Swine Influenza Virus FA	252
Swine Influenza Virus VI	648
Swine Influenza Virus VI NAHLN	655
Transmissible Gastroenteritis Virus FA	156
Virus Isolation	33
Wild/Other Animal	
Bovine Viral Diarrhea Virus FA	31
Coronavirus FA	3
Distemper Virus FA	16
Infectious Bovine Rhinotracheitis Virus FA	4
Parainfluenza-3 Virus FA	4
Respiratory Syncytial Virus FA	6
Rotavirus FA	2
Virus Isolation	51
Rabies	521
Virology Subtotal	9,302

Molecular Diagnostics		
Avian Influenza		432
BCV (Multiplex with BRSV)		134
BHV-1 (Multiplex with BVDV)		199
BLV		83
BRSV (Multiplex with BCV)		187
BVD		2,654
Circovirus II		601
Classical Swine Fever (NAHLN)		468
Clostridium Genotype		121
Escherichia coli		54
Flavobacterium psychrophilum		4
Influenza A		5
Johne's		1,151
Lawsonia intracellularis		40
Leptospira sp.		248
Mycoplasma bovis		10
Mycoplasma hyopneumoniae		1,547
Porcine Epidemic Diarrhea Virus		70
PRRS		
Oral		11,349
Semen		2,511
Serum		33,160
Tissue		266
PRRS Sequencing		1,113
Swine Influenza		6,651
Swine Influenza Sequencing		408
Swine Influenza NAHLN		6,237
Swine Influenza NAHLN Sequencing		381
TGE		11
Tritrichomonas foetus		6,134
	Molecular Diagnostics Subtotal	76,229

Summary of Laboratory Procedures

Pathology	3,439
Clinical Pathology / Histopathology	18,841
Microbiology	20,179
Serology	298,093
Virology	9,302
Molecular Diagnostics	76,229
Total Laboratory Procedures	425,873

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
JULY 1, 2012 – JUNE 30, 2013

AVIAN

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; N/A = Not Applicable

	Bordetella avium			*Erysipelothrix rhusiopathiae*			*Escherichia coli*			*Gallibacterium anatis*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amikacin							2					
Amoxicillin	3			1			19	1	14	1		
Amoxicillin/Clavulanic Acid							1		1			
Ampicillin									2			
Cefazolin							1		1			
Cefovecin								2				
Cefoxitin							1		1			
Cefpodoxime							1		1			
Ceftiofur		2	1	1			31		4	1		
Clindamycin			3	1					36			1
Enrofloxacin	2	1		1			34		2	1		
Erythromycin		2	1	1					36			1
Florfenicol			3		1		4	21	9	1		
Gentamicin	3					1	31	1	3	1		
Imipenem							2					
Marbofloxacin							2					
Neomycin	3					1	24		9	1		
Novobiocin			3			1			34			1
Oxacillin+2%Nacl									2			
Oxytetracycline	3			1			13		21			1
Pemcillin			3	1					36			1
Rifampin								2				
Spectinomycin	N/A			N/A			N/A			N/A		
Streptomycin			3			1	20		14	1		
Sulphadimethoxime			3			1	15		19	1		
Sulphathiazole		1	2			1	16		18		1	
Tetracycline	3			1			13		21		1	
Ticarcillin								1	1			
Ticarcillin / Clavulanic Acid							1		1			
Trimethoprim/Sulphamethoxazole	3					1	32		4	1		
Tulathromycin	N/A			N/A			N/A			N/A		

AVIAN IN VITRO SENSITIVITY TESTS (CON'T)

	Gram-Negative Bacteria			*Haemophilus* sp.			*Ornithobacterium Rhinotracheale*			*Pasteurella multocida*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amikacin												
Amoxicillin			1			1	1			1		
Amoxicillin/Clavulanic Acid												
Ampicillin												
Cefazolin												
Cefovecin												
Cefoxitin												
Cefpodoxime												
Ceftiofur			1	1					1	1		
Clindamycin			1			1	1					1
Enrofloxacin	1			1					1	1		
Erythromycin			1			1	1				1	
Florfenicol			1			1	1			1		
Gentamicin			1		1				1	1		
Imipenem												
Marbofloxacin												
Neomycin			1			1			1	1		
Novobiocin			1			1	1			1		
Oxacillin+2%Nacl												
Oxytetracycline			1			1			1	1		
Penicillin			1			1			1	1		
Rifampin												
Spectinomycin	N/A			N/A			N/A			N/A		
Streptomycin			1			1			1			1
Sulphadimethoxine			1			1	1			1		
Sulphathiazole			1			1			1			1
Tetracycline			1			1			1	1		
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Trimethoprim/Sulphamethoxazole	1			1			1			1		
Tulathromycin	N/A			N/A			N/A			N/A		

AVIAN IN VITRO SENSITIVITY TESTS (CON'T)

	Pasteurella sp.			*Pseudomonas* sp.			*Salmonella* sp.			*Staphylococcus aureus*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amikacin												
Amoxicillin	8		1	1			7		2	1		
Amoxicillin/Clavulanic Acid												
Ampicillin												
Cefazolin												
Cefovecin												
Cefoxatin												
Cefpodoxime												
Ceftiofur	9					1	7		2	1		
Clindamycin			9			1			9	1		
Enrofloxacin	8		1	1			9			1		
Erythromycin		6	3			1			9	1		
Florfenicol	8	1		1			3	4	2		1	
Gentamicin	9			1			9			1		
Imipenem												
Marbofloxacin												
Neomycin	9			1			8		1	1		
Novobiocin	2		7			1			9	1		
Oxacillin+2% Nacl												
Oxytetracycline	4		5			1	6		3	1		
Penicillin	2		7			1			9	1		
Rifampin												
Spectinomycin	N/A			N/A			N/A			N/A		
Streptomycin	8		1	1			2		7	1		
Sulphadimethoxime	8		1			1	6		3	1		
Sulphathiazole		7	2			1		6	3		1	
Tetracycline	4	1	4			1	6		3	1		
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Trimethoprim/Sulphamethoxazole	9			1			8		1	1		
Tulathromycin	N/A			N/A						N/A		

AVIAN IN VITRO SENSITIVITY TESTS (CON'T)

	Staphylococcus coagulase –			*Staphylococcus* coagulase +		
	S	I	R	S	I	R
Amikacin						
Amoxicillin	1				1	
Amoxicillin/Clavulanic Acid						
Ampicillin						
Cefazolin						
Cefovecin						
Cefoxitin						
Cefpodoxime						
Ceftiofur	1			1		
Clindamycin			1	1		
Enrofloxacin	1					1
Erythromycin			1	1		
Florfenicol		1		1		
Gentamicin	1			1		
Imipenem						
Marbofloxacin						
Neomycin	1			1		
Novobiocin			1	1		
Oxacillin + 2%NaCl						
Oxytetracycline			1			1
Penicillin	1					1
Rifampin						
Spectinomycin	N/A			N/A		
Streptomycin	1			1		
Sulphadimethoxime	1			1		
Sulphathiazole		1			1	
Tetracycline			1			1
Ticarcillin						
Ticarcillin / Clavulanic Acid						
Trimethoprim/Sulphamethoxazole	1			1		
Tulathromycin	N/A			N/A		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
JULY 1, 2012 – JUNE 30, 2013

BOVINE

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.

Enrofloxacin is NOT to be used in cattle intended for dairy production and NOT to be used in calves to be processed for veal.

S = Susceptible; I = Intermediate; R = Resistant; N/A = Not Applicable

	Actinomyces pyogenes			*Campylobacter foetus*			*Enterococcus* sp.			*Erysipelothrix rhusiopathiae*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1			1			2			1		
Ceftiofur	1			1					2	1		
Chlortetracycline	1					1		1	1	1		
Clindamycin	1				1				2	1		
Danofloxacin			1			1	2			1		
Enrofloxacin		1		1				1	1	1		
Florfenicol	1			1			2				1	
Gentamicin	1			1					2			1
Neomycin	1			1					2			1
Oxytetracycline	1				1			1	1	1		
Penicillin	1					1			2	1		
Sulphadimethoxime			1			1	1		1			1
Spectinomycin	N/A			N/A			N/A			N/A		
Streptomycin												
Sulphathiazole												
Tetracycline												
Tiamulin	1			1					2	1		
Tilmicosin	1			1			1		1	1		
Trimethoprim/Sulphamethoxazole	1					1			2			1
Tulathromycin	N/A			N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A			N/A		

BOVINE IN VITRO SENSITIVITY TEST (CON'T)

	Escherichia coli			*Escherichia coli K99*			Gram-Negative Bacteria			Gram-Positive Bacteria		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	5		23	2		4	3		2	1		
Ceftiofur	16	1	11	2	1	3	3		2	5		1
Chlortetracycline	4		24			6	3		2	1		
Clindamycin			28			6			5	6		
Danofloxacin	21		7	4		2	3		2			1
Enrofloxacin	21		7	4		2	4		1	5	1	
Florfenicol	1	9	18		1	5	3		2	6		
Gentamicin	22		6	4		2	4		1	5	1	
Neomycin	14		14	1		4	1		4	5		1
Oxytetracycline	4		24			6	1		4	6		
Penicillin	28					6			5	5		1
Sulphadimethoxime	5		23	1		5	1		4	5		1
Spectinomycin	N/A			N/A			N/A			N/A		
Streptomycin										5		
Sulphathiazole											5	
Tetracycline										5		
Tiamulin			28			6			5	1		
Tilmicosin			28			6	2		3	1		
Trimethoprim/Sulphamethoxazole	19		9	4		2	4		1	6		
Tulathromycin	N/A			N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A			N/A		

BOVINE IN VITRO SENSITIVITY TEST (CON'T)

	Hemolytic Escherichia coli			*Histophilus somni*			*Klebsiella* sp.			*Mannheimia haemolytica*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	2			72					1	99	2	16
Ceftiofur	2			72			1			116	1	
Chlortetracycline	1	1		68	4		1			114	3	
Clindamycin			2	48	23	1			1	117		
Danofloxacin	2			65		7	1			104		
Enrofloxacin	2			65	6	1	1			104	4	9
Florfenicol		1	1	70	1	1	1			107	-	10
Gentamicin	2			39	14	19	1			107		10
Neomycin	2			13		59	1			94		23
Oxytetracycline	1		1	43		29	1			83	5	29
Penicillin			2	67	4	1			1	25	73	19
Sulphadimethoxime	2			45		27	1			83		34
Spectinomycin	N/A			68	1	3	N/A			106	1	10
Streptomycin												
Sulphathiazole												
Tetracycline												
Tiamulin			2	72					1	39		78
Tilmicosin			2	71		1			1	99	8	10
Trimethoprim/Sulphamethoxazole	2			70		2	1				113	4
Tulathromycin	N/A			68	1	3	N/A			106	1	10
Tylosin (Tartrate/Base)	N/A			49	14	9	N/A					117

BOVINE IN VITRO SENSITIVITY TEST (CON'T)

	Moraxella bovis			*Moraxella ovis*			*Pasteurella multocida*			*Pasteurella* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1		1	5			87			31	2	19
Ceftiofur	2			5			87			41	1	10
Chlortetracycline	1		1	5			86		1	28	4	20
Clindamycin		1	1		5			1	86	1	3	48
Danofloxacin	1		1	4		1	84		3	28		24
Enrofloxacin	1		1	5			86		1	28		24
Florfenicol	2			5			83		3	37	1	14
Gentamicin	2			5			80	6	1	29	2	21
Neomycin	1		1	5			30		57	28		24
Oxytetracycline	1		1	5			64	4	19	17		35
Penicillin	1		1	3		2	81		6	10		42
Sulphadimethoxime	1		1	3		2	33		54	20		32
Spectinomycin	N/A			N/A			N/A			N/A		
Streptomycin												
Sulphathiazole												
Tetracycline												
Tiamulin	2			5			25		62	12		40
Tilmicosin	1		1	4		1	77	2	8	36	7	9
Trimethoprim/Sulphamethoxazole	1		1	3		2	84		3	32		20
Tulathromycin	N/A			N/A			82	2	3	N/A		
Tylosin (Tartrate/Base)	N/A			N/A			6	6	75	N/A		

BOVINE IN VITRO SENSITIVITY TEST (CON'T)

	Pasteurella trehalosi			*Salmonella* sp.			*Staphylococcus aureus*			*Staphylococcus* coagulase -		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1			42		53	1			6		1
Ceftiofur	1			48	2	45	1			7		
Chlortetracycline			1	28		67	1			4		3
Clindamycin			1			95	1			6		1
Danofloxacin			1	88		7	1			6		1
Enrofloxacin			1	93	2		1			7		
Florfenicol	1			2	36	57		1		4	3	
Gentamicin			1	81		14	1			7		
Neomycin			1	69		26	1			7		
Oxytetracycline			1	28		67	1			4		3
Penicillin			1			95	1			5		2
Sulphadimethoxime	1			6		89	1			6		1
Spectinomycin	N/A			N/A			N/A			N/A		
Streptomycin												
Sulphathiazole												
Tetracycline												
Tiamulin	1					95	1			7		
Tilmicosin	1					95	1			6		1
Trimethoprim/Sulphamethoxazole			1	84		11	1			7		
Tulathromycin	N/A			N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A			N/A		

BOVINE IN VITRO SENSITIVITY TEST (CON'T)

	Staphylococcus coagulase +			*Streptococcus dysgalactiae*			*Streptococcus suis*		
	S	I	R	S	I	R	S	I	R
Ampicillin	1			1			1		
Ceftiofur	1			1			1		
Chlortetracycline			1		1		1		
Clindamycin	1			1			1		
Danofloxacin	1					1	1		
Enrofloxacin	1			1					
Florfenicol			1	1			1		
Gentamicin	1			1			1		
Neomycin	1			1			1		
Oxytetracycline			1			1	1		
Penicillin	1			1			1		
Sulphadimethoxime	1			1					1
Spectinomycin	N/A			N/A			N/A		
Streptomycin									
Sulphathiazole									
Tetracycline									
Tiamulin	1			1			1		
Tilmicosin	1			1			1		
Trimethoprim/Sulphamethoxazole	1			1			1		
Tulathromycin	N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
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MILK SAMPLES

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	Environmental											
	Enterobacter sp.			*Enterococcus* sp.			*Streptococcus*			*Escherichia coli*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin			1	7			6			4		
Ceftiofur	1					7	6			4		
Cephalothin	1			7			6			4		
Erythromycin	1			6	1		6					4
Oxacillin+2%Nacl	1			6		1	6					4
Penicillin	1			7			6					4
Penicillin / Novobiocin	1			7			6					4
Pirlimycin	1			5		2	6					4
Sulphadimethoxime	1			1		6	2		4	3		1
Tetracycline	1			5		2	5		1	3		1

MILK SAMPLE IN VITRO SENSITIVITY TEST (CON'T)

	Hemolytic *Escherichia coli*			*Klebsiella pneumonia*			*Klebsiella* sp.			*Staphylococcus* coagulase -		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	1					1			1	8		2
Ceftiofur	1			1			1			10		
Cephalothin	1			1			1			10		
Erythromycin			1			1			1	10		
Oxacillin+2%Nacl			1			1			1	N/A		
Penicillin			1			1			1	8		2
Penicillin / Novobiocin			1			1			1	10		
Pirlimycin			1			1			1	10		
Sulphadimethoxime			1			1	1			10		
Tetracycline			1			1			1	9		1

	Staphylococcus coagulase +			*Staphylococcus intermedius*		
	S	I	R	S	I	R
Ampicillin	6			1		
Ceftiofur	6			1		
Cephalothin	6			1		
Erythromycin	6			1		
Oxacillin+2%Nacl	N/A			1		
Penicillin	6			1		
Penicillin / Novobiocin	6			1		
Pirlimycin	6			1		
Sulphadimethoxime	6					1
Tetracycline	5		1	1		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
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OVINE

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	Campylobacter foetus			*Campylobacter* sp.			*Escherichia coli*			Gram-Negative Bacteria		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	6			2			2		1	4		
Ceftiofur			6			2	3			4		
Chlortetracycline	1		5			2			3	4		
Clindamycin	1		5	2					3	1		3
Danofloxacin	5		1			2	3			4		
Enrofloxin	6					2	3			4		
Florfenicol	5	1		2				3		4		
Gentamycin	6			2			3			4		
Neomycin	6			2			2		1	3		1
Oxytetracycline	1		5			2			3	4		
Penicillin			6			2			3	1		3
Spectinomycin												
Sulphadimethoxine	2		4			2	2		1	2		2
Tiamulin	5		1	2					3	1		3
Tilmicosin	6			2					3	1		3
Trimethoprim / Sulphamethoxazole	3		3			2	3			4		
Tulathromycin	N/A			N/A			N/A			N/A		
Tylosin Tartrate	N/A			N/A			N/A			N/A		

OVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Mannheimia haemolytica			*Moraxella ovis*			*Pasteurella multocida*			*Pasteurella sp.*		
	S	I	R	S	I	R	S	I	R	S	I	R
Ampicillin	7			1			6			3		
Ceftiofur	7			1			6			3		
Chlortetracycline	7			1			6			2		1
Clindamycin			7			1			6			3
Danofloxacin	7			1			6			3		
Enrofloxin	7			1			6			3		
Florfenicol	7			1			6			3		
Gentamycin	7			1			6			3		
Neomycin	7			1			6			3		
Oxytetracycline	7					1	6			2	1	
Penicillin	3		1			1	6			1		2
Spectinomycin	7											
Sulphadimethoxine	5		2	1			3		3	3		
Tiamulin	6		1	1					6			3
Tilmicosin	7			1			6			3		
Trimethoprim / Sulphamethoxazole		7		1			6			3		
Tulathromycin	7			N/A			6			N/A		
Tylosin Tartrate			7	N/A				1	5	N/A		

OVINE IN VITRO SENSITIVITY TESTS (CON'T)

	Salmonella sp.		
	S	I	R
Ampicillin	2		
Ceftiofur	2		
Chlortetracycline	2		
Clindamycin			2
Danofloxacin	2		
Enrofloxin	2		
Florfenicol	1	1	
Gentamycin	2		
Neomycin	2		
Oxytetracycline	2		
Penicillin			2
Spectinomycin			
Sulphadimethoxine	1		1
Tiamulin			2
Tilmicosin			2
Trimethoprim / Sulphamethoxazole	2		
Tylathromycin	N/A		
Tylosin Tartrate	N/A		

SOUTH DAKOTA ANIMAL DISEASE RESEARCH AND DIAGNOSTIC LABORATORY
IN VITRO ANTIMICROBIAL DRUG SENSITIVITY TESTS
JULY 1, 2012 – JUNE 30, 2013

PORCINE

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	Actinobacillus pleuropneumoniae			*Actinobacillus suis*			*Actinobacillus* sp.			Beta *Streptococcus* sp.		
	S	I	R	S	I	R	S	I	R	S	I	R
Amikacin												
Ampicillin	1			6			5		6	4		
Azithromycin												
Cefazolin												
Ceftazidime												
Ceftiofur	1			6			10		1	4		
Chloramphenicol												
Chlortetracycline	1			6			2	1	8	1		3
Clarithromycin												
Clindamycin		1				6			11	2		2
Danofloxacin	1			6			11					4
Doxycycline												
Enrofloxacin	1			6			11			4		
Erythromycin												
Florfenicol			1	6			11			4		
Gentamicin		1		6			8		3	4		
Imipenem												
Neomycin		1		5		1	7		4	4		
Oxacillin+2%NaCl												
Oxytetracycline		1		4		2	1		10		1	3
Penicillin		1				6	1		10	4		
Rifampin												
Spectinomycin		1		N/A			N/A			N/A		
Sulphadimethoxime	1			6			5		6	3		1
Tetracycline												
Tiamulin	1			6			8	1	2	2		2
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Tilmicosin										2		2
Trimethoprim/Sulphamethoxazole		1		6			11			4		
Tulathromycin	1			N/A			N/A			N/A		
Tylosin (Tartrate/Base)			1	N/A			N/A			N/A		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Bordetella bronchiseptica			*Campylobacter* sp.			*Erysipelothrix rhusiopathiae*			*Escherichia coli*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amikacin										1		
Ampicillin		18	20	1			1			19		44
Azithromycin										N/A		
Cefazolin										1		
Ceftazidime										1		
Ceftiofur			38			1	1			39		24
Chloramphenicol										1		
Chlortetracycline	38					1			1	1		61
Clarithromycin										N/A		
Clindamycin	38				1		1					63
Danofloxacin	5		33	1			1			40		22
Doxycycline										1		
Enrofloxacin	37	1		1			1			45	2	16
Erythromycin												1
Florfenicol	31	6	1	1				1			26	36
Gentamicin	36		1	1					1	28		35
Imipenem										1		
Neomycin	35		3			1			1	40		22
Oxacillin + 2% NaCl												1
Oxytetracycline	38					1			1	2		60
Penicillin			38			1	1					63
Rifampin										N/A		
Spectinomycin	N/A			N/A			N/A			N/A		
Sulphadimethoxime	3		35	1					1	13		49
Tetracycline										1		
Tiamulin			38	1			1					62
Ticarcillin										1		
Ticarcillin / Clavulanic Acid										1		
Tilmicosin	10	23	5	1			1					62
Trimethoprim/Sulphamethoxazole	9		29	1					1	35		28
Tulathromycin	37		1	N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A			N/A		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Gram-Negative Bacteria			*Haemophilus parasuis*			Hemolytic *Escherichia coli*			*Pasteurella multocida*		
	S	I	R	S	I	R	S	I	R	S	I	R
Amikacin												
Ampicillin	1		1	39	1	3	6		27	50		
Azithromycin												
Cefazolin												
Ceftazidime												
Ceftiofur	1		1	43		1	24		9	50		
Chloramphenicol												
Chlortetracycline			2	37	1	6	1		32	49	1	
Clarithromycin												50
Clindamycin			2	4	18	22			33	50		
Danofloxacin	1		1	43		1	23		10			
Doxycycline												
Enrofloxacin	2			43		1	25	2	6	50		
Erythromycin												
Florfenicol		1	1	43		1	1	21	12	50		
Gentamicin	1		1	41	2	1	23		10	50		
Imipenem												
Neomycin	1		1	34		10	18		15	49		1
Oxacillin+2%NaCl												
Oxytetracycline			2	34	2	8	1		32	37	1	12
Penicillin			2	11		35	1		32	47		3
Rifampin												
Spectinomycin	N/A			N/A			N/A			N/A		
Sulphadimethoxime	1		1	32		12	7		26	28		22
Tetracycline												
Tiamulin			2	24		20			33	3		47
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Tilmicosin			2	37	2	5			33	49		1
Trimethoprim/Sulphamethoxazole	2			41		3	19		14	50		
Tulathromycin	N/A			N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A		1			50

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Pasteurella sp.			*Salmonella* sp.			*Staphylococcus aureus*			*Staphylococcus* coagulase -		
	S	I	R	S	I	R	S	I	R	S	I	R
Amikacin												
Ampicillin	1		1	13		19	1		6	5		5
Azithromycin												
Cefazolin												
Ceftazidime												
Ceftiofur	2			24		8	7			6	1	3
Chloramphenicol												
Chlortetracycline			2	4		28			7	1		9
Clarithromycin												
Clindamycin			2			32	1		6	1	2	7
Danofloxacin	2			31		1	5		2	6		4
Doxycycline												
Enrofloxacin	2			31	1		5		2	8		2
Erythromycin												
Florfenicol	1	1		2	13	17		5	2	4	5	1
Gentamicin	2			25		7	6	1		6	4	
Imipenem												
Neomycin	1		1	24		8	7			9		1
Oxacillin+2%Nacl												
Oxytetracycline			2	4		28			7	1		9
Penicillin			2			32	1		6	3		7
Rifampin												
Spectinomycin	N/A			N/A			N/A			N/A		
Sulphadimethoxime			2	2		30	6		1	7		3
Tetracycline												
Tiamulin			2			32	6		2	2		8
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Tilmicosin	1		1			32	2		6	2		8
Trimethoprim/Sulphamethoxazole	1		1	27		5	8			10		
Tulathromycin	N/A			N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A			N/A		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Staphylococcus epidermidis			*Staphylococcus hyicus*			*Staphylococcus intermidius*			*Staphylococcus* sp.		
	S	I	R	S	1	R	S	I	R	S	I	R
Amikacin												
Ampicillin	1		1	5		3	1		4	3	2	
Azithromycin												
Cefazolin												
Ceftazidime												
Ceftiofur	2			8			4	1		3	2	
Chloramphenicol												
Chlortetracycline			2	1	1	6	1		4	1		4
Clarithromycin												
Clindamycin	1		1	3		5	1		4	1		4
Danofloxacin	2			7		1	4		1	2		3
Doxycycline												
Enrofloxacin	2			7		1	4		1	4	1	
Erythromycin												
Florfenicol	1	1		4	4		1		4	5		
Gentamicin	1	1		8			4		1	5		
Imipenem												
Neomycin	2			8			4		1	4		1
Oxacillin +2%Nacl												
Oxytetracycline			2	1		7	1		4	1		4
Penicillin			2	4		4	1		4	2	2	1
Rifampin												
Spectinomycin	N/A			N/A			N/A			N/A		
Sulphadimethoxime			2	6		2	5			2		3
Tetracycline												
Tiamulin	1		1	5		3	2		3	2		3
Ticarcillin												
Ticarcillin / Clavulanic Acid												
Tilmicosin	1		1	4		4	1		4	1		4
Trimethoprim/Sulphamethoxazole	2			8			5			5		
Tulathromycin	N/A			N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A			N/A		

PORCINE IN VITRO SENSITIVITY TESTS (CON'T)

	Streptococcus dysgalactiae ssp. *equisimilis*			*Streptococcus* Equine			*Streptococcus suis*		
	S	I	R	S	I	R	S	I	R
Amikacin									
Ampicillin	2			4			105	1	
Azithromycin									
Cefazolin									
Ceftazidime									
Ceftiofur	2			4			106		
Chloramphenicol									
Chlortetracycline			2			4	33	15	58
Clarithromycin									
Clindamycin	1		1			4	14		92
Danofloxacin			2	1		3	51		55
Doxycycline									
Enrofloxacin	1		1	3		1	98	7	1
Erythromycin									
Florfenicol	2			4			105	1	
Gentamicin	2			4			103	1	2
Imipenem									
Neomycin	2			3		1	99		7
Oxacillin+2%NaCl									
Oxytetracycline			2			4	25	11	70
Penicillin	2			4			78	24	4
Rifampin									
Spectinomycin	N/A			N/A			N/A		
Sulphadimethoxime	1		1	3		1	33		73
Tetracycline									
Tiamulin	1		1	1		3	80		26
Ticarcillin									
Ticarcillin / Clavulanic Acid									
Tilmicosin	1		1	1		3	19		87
Trimethoprim/Sulphamethoxazole	2			4			103		3
Tulathromycin	N/A			N/A			N/A		
Tylosin (Tartrate/Base)	N/A			N/A			N/A		

South Dakota
Animal Disease Research and Diagnostic Laboratory

Salmonella Isolations
July 1, 2012 - June 30, 2013

	TOTAL	Bovine	Porcine	Poultry	Ovine	Canine	Avian Misc	Enviro-mental	Other/Wildlife
agona	4	1	3	0	0	0	0	0	0
alachua	1	0	0	1	0	0	0	0	0
anatum	6	6	0	0	0	0	0	0	0
bovis-morbificans	2	2	0	0	0	0	0	0	0
cerro	2	1	0	0	0	1	0	0	0
cholerasuis kunzendorf	1	0	0	0	0	0	0	1	0
derby	3	0	3	0	0	0	0	0	0
dublin	37	37	0	0	0	0	0	0	0
4,5,12:I-monophasic	2	2	0	0	0	0	0	0	0
4,12: i-	5	2	2	0	1	0	0	0	0
heidelberg	4	1	2	0	0	0	0	0	1
infantis	3	0	3	0	0	0	0	0	0
johannesburg	2	0	2	0	0	0	0	0	0
kentucky	1	0	0	1	0	0	0	0	0
lille	2	2	0	0	0	0	0	0	0
meleagridis	1	1	0	0	0	0	0	0	0
montevideo	2	2	0	0	0	0	0	0	0
muenster	3	3	0	0	0	0	0	0	0
newport	1	1	0	0	0	0	0	0	0
9,12: nonmotile	2	1	0	0	0	0	0	0	1
ohio	2	1	1	0	0	0	0	0	0

SALMONELLA ISOLATIONS (CON'T)

	TOTAL	Bovine	Porcine	Poultry	Ovine	Canine	Avian Misc	Enviro-mental	Other/Wildlife
reading	8	8	0	0	0	0	0	0	0
rissen	3	0	3	0	0	0	0	0	0
rough O:c1,5	2	0	0	0	0	0	0	2	0
schwarzengrund	1	0	1	0	0	0	0	0	0
senftenberg	2	0	2	0	0	0	0	0	0
6,7:c:-	1	0	1	0	0	0	0	0	0
III 61:-:1,5,7	4	0	0	0	4	0	0	0	0
typhimurium	5	1	0	4	0	0	0	0	0
typhimurium var 5-	26	14	9	0	0	1	2	0	0
uganda	1	0	1	0	0	0	0	0	0
TOTAL	139	86	33	6	5	2	2	3	2

South Dakota
Animal Disease Research and Diagnostic Laboratory

Serology

July 1, 2012 - June 30, 2013

Disease	Positive	Negative	Other*	Total
Anaplasmosis				
Competative Enzyme-Linked Immunoassay	431	4,836	0	5,267
Avian Influenza				
AGID	0	398	0	398
Bluetongue				
AGID	39	24	0	63
Enzyme-Linked Immunoassay (ELISA)	2,409	23,518	24	25,951
Bovine Leukosis Virus				
AGID	54	105	0	159
ELISA	6,035	65,270	106	71,411
Bovine Pregnancy Test	313	39	1	353
Bovine Respiratory Syncytial Virus				
SN	65	25	1	91
Bovine Viral Diarrhea Virus				
ACE	214	11,449	14	11,677
Bovine Viral Diarrhea Virus I				
SN	266	138	8	412
Bovine Viral Diarrhea Virus II				
SN	256	143	10	409
Brucella				
BAPA	13	5,090	6	5,109
Card	34	10,319	103	10,456
Plate	1	1,440	76	1,517
Rivanol	3	175	0	178
Tube	0	25,734	66	25,800
Brucella - Canine				
IFA	7	88	2	97
Brucella ovis				
ELISA	46	2,353	6	2,405
Caprine Arthritis Encephalitis	25	155	0	180
Chronic Wasting Disease (BioRad ELISA)	12	197	0	209
Epizootic Hemorrhagic Disease				
AGID	102	169	4	275
Equine Infectious Anemia				
AGID	0	153	0	153
ELISA	2	1,752	0	1,754
Feline Immunodeficiency Virus				
ELISA	2	24	0	26

Disease	Positive	Negative	Other*	Total
Feline Infectious Peritonitis				
ELISA	18	6	0	24
Feline Leukemia Virus				
ELISA	3	23	0	26
Infectious Bovine Rhinotracheitis				
SN	199	32	1	232
Leptospira				
Bratislava	19	587	5	611
Canicola	31	575	5	611
Grippotyphosa	51	555	5	611
Hardjo	69	537	5	611
Icterohemorrhagiae	55	551	5	611
Pomona	48	558	5	611
Mycoplasma hyopneumoniae				
DAKO	15	95	0	110
ELISA	2,038	4,938	5	6,981
Neospora				
ELISA	183	3,084	2	3,269
Ovine Progressive Pneumonia				
AGID	372	1,119	0	1,491
Parainfluenza-3				
SN	80	2	1	83
Paratuberculosis (Johne's)				
ELISA	2,758	57,251	85	60,094
Porcine Respiratory and Reproductive Syndrome				
ELISA	8,013	40,943	127	49,083
Fluorescent Focus Neutralization (FFN)	36	242	0	278
IFA				
European	1	155	0	156
North American	24	155	0	179
Pseudorabies				
g B ELISA	4	781	3	788
g B ELISA NAHLN	0	1,104	4	1,108
Pseudorabies Differential Test				
G1 ELISA	0	7	0	7
G1 ELISA NAHLN	0	4	0	4
Swine Influenza Virus				
H1N1	127	563	0	690
H3N2	220	470	0	690
Vesicular Stomatitis				
Indiana	4	0	2,388	2,392
New Jersey	16	0	2,376	2,392
TOTAL	24,713	267,931	5,449	298,093

South Dakota
Animal Disease Research and Diagnostic Laboratory

Rabies Examinations

July 1, 2012 - June 30, 2013

	Positive		Negative			
	Human Exposure	No Human Exposure	Human Exposure	No Human Exposure	Untestable	Total Specimens
Bat	2	0	105	13	7	127
Bison	0	0	1	0	0	1
Bovine	3	2	51	30	13	99
Canine	0	0	46	8	2	56
Coyote	0	0	1	1	0	2
Deer	0	0	1	8	0	9
Elk	0	0	0	1	0	1
Equine	0	0	3	6	0	9
Feline	0	1	97	25	0	123
Ferret	0	0	0	1	0	1
Fox	0	0	0	1	0	1
Goat	0	0	2	1	0	3
Mink	0	0	1	1	0	2
Mountain Lion	0	0	1	0	0	1
Muskrat	0	0	1	1	0	2
Opossum	0	0	1	1	0	2
Ovine	0	0	2	3	2	7
Porcine	0	0	0	0	0	0
Rabbit	0	0	1	0	0	1
Raccoon	0	0	12	16	0	28
Shrew	0	0	0	1	0	1
Skunk	3	18	6	13	3	43
Weasel	0	0	0	1	0	1
Woodchuck	0	0	0	1	0	1
Total	8	21	332	133	27	521

South Dakota
Animal Disease Research and Diagnostic Laboratory

Positive Rabies Cases

July 1, 2012 - June 30, 2013

	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	April	May	June	Total
BAT	0	0	1	0	0	0	0	0	0	0	1	0	2
BOVINE	0	2	0	0	1	1	0	0	0	0	0	1	5
FELINE	0	0	0	0	1	0	0	0	0	0	0	0	1
SKUNK	2	0	4	1	1	2	0	1	2	4	2	2	21
TOTAL	2	2	5	1	3	3	0	1	2	4	3	3	29

South Dakota
Animal Disease Research and Diagnostic Laboratory

Molecular Diagnostics

July 1, 2012 - June 30, 2013

Bovine Disease	Positive	Negative	Other	Total
Bovine Coronavirus	18	116	0	134
Bovine Herpes Virus 1	45	152	2	199
Bovine Leukosis Virus	5	78	0	83
Bovine Respiratory Syndrome Virus	110	77	0	187
Bovine Viral Diarrhea Virus				
Whole Blood/Serum/Milk	52	2034	3	2,089
Ear Notch	12	552	0	564
Leptospira sp.	0	248	0	248
Mycobacterium paratuberculosis (Johne's)	174	944	10	1,128
Mycoplasma bovis	1	9	0	10
Tritrichomonas foetus	12	6100	22	6,134
Porcine				
Disease				
Circovirus	91	503	6	600
Classic Swine Fever	0	468	0	468
Lawsonia intracellularis	17	23	0	40
Mycoplasma hyopneumoniae	146	1399	2	1,547
Porcine Epidemic Diarrhea Virus	19	51	0	70
Porcine Respiratory and Reproductive				
Syndrome (PRRS)				
Oral fluid	1041	10226	80	11,347
Semen	5	2506	0	2,511
Serum	4790	28292	80	33,162
Tissue	108	158	0	266
Swine Influenza	1180	4811	28	6,019
Swine Influenza NAHLN	1088	4496	22	5,606
Transmissible Gastroenteritis	0	11	0	11
Other Species				
Disease				
Mycobacterium paratuberculosis (Johne's)				
Camel	0	5	0	5
Caprine	1	1	0	2
Colostrum Powder	0	14	0	14
Deer	1	0	0	1

Disease	Positive	Negative	Other	Total
Ovine	1	0	0	1

Avian

Disease				
Avian Influenza	2	429	1	432

Fish

Disease				
Flavobacterium psychrophilium	0	4	0	4

South Dakota
Animal Disease Research and Diagnostic Laboratory

Molecular Diagnostic-Clostridium Genotyping

July 1, 2012 - June 30, 2013

Species	Genotype A	Genotype A/ Beta 2 Toxin	Genotype A/ Enterotoxin	Genotype C	Genotype E/ Beta 2 Toxin/ Enterotoxin
BISON	1	0	0	0	0
BOVINE	71	14	1	2	4
CANINE	1	0	0	0	0
CAPRINE	0	1	0	0	0
ELK	1	0	0	0	0
MINK	0	0	0	1	0
OVINE	1	0	0	0	0
PORCINE	9	14	0	0	0
TOTAL	84	29	1	3	4

SOUTH DAKOTA

ANIMAL 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, 2012 - June 30, 2013

AVIAN, MISCELLANEOUS

	TOTAL
BODY AS A WHOLE	
Anaplastic sarcoma	1
Botulism	1
Emaciation	1
Malnutrition	1
Neoplasm, lipoma	1
No diagnosis	2
Normal tissue	1
Peritonitis	2
Salmonellosis	1
Septicemia	1
Septicemia, bacteria, miscellaneous	1
Septicemia, *Escherichia coli*	1
Septicemia, *Streptococcus suis*	1
Toxicosis, prussic acid, cyanide	1
West Nile virus infection	2
CARDIOVASCULAR	
Bacterial Pericarditis	1
DIGESTIVE	
Avian ingluvitis	3
Avian proventriculitis	2
Avian ventriculitis	1
Gastrointestinal parasitism	1
Hepatitis	1
Intestine enteritis, coccidia	1
Intestine parasitism, ascarids	1
Intestine perforation	2
Liver bile duct hyperplasia	1
Liver hepatitis, necrotic	1
HEMIC AND LYMPHATIC	
Spleen necrosis	1
INTEGUMENTARY	
Hypersensitivity (allergic) dermatitis	1

NERVOUS

Mononuclear meningitis / myelitis	1

RESPIRATORY

Airsacculitis	1
Aspiration pneumonia	1
Lung pneumonia, *Escherichia coli*	1

UROGENITAL

Renal tubular carcinoma	1

CHICKEN

BODY AS A WHOLE

Abscess	1
No diagnosis	2
Normal tissue	3
Peritonitis	2
Salmonellosis	4
Septicemia, *Escherichia coli*	5

CARDIOVASCULAR

Edema	1

DIGESTIVE

Bacterial enteritis	1
Hepatic lipidosis	1
Hepatitis	2
Intestine enteritis, *Clostridium perfringens*	1
Intestine enteritis, necrotic	1
Parasitis enteritis	1

MUSCULOSKELETAL

Arthritis	2
Joint arthritis, *Staphylococcus aureus*	1
Joint arthritis, suppurative	1

RESPIRATORY

Bacterial pneumonia	1
Lung pneumonia, *Salmonella* sp.	1

PHEASANT

BODY AS A WHOLE	
Fat serous atrophy	1
Septicemia, *Escherichia coli*	3
Septicemia, *Salmonella*	2
Serous atrophy of fat	1
Trauma	1
West Nile virus infection	1
CARDIOVASCULAR	
Myocarditis	1
DIGESTIVE	
Avian ingluvitis	1
Bacterial enteritis	2
Intestine enteritis, coccidia	3
Intestine enteritis, *Salmonella*	2
Intestine enteritis, typhlitis	2

TURKEY

BODY AS A WHOLE	
No diagnosis	1
Peritonitis	1
Polyserositis	1
Septicemia, *Escherichia coli*	1
Septicemia, *Pasteurella multocida*	1
Septicemia, *Salmonella*	1
CARDIOVASCULAR	
Bacterial pericarditis	1
DIGESTIVE	
Feces, rotavirus (EM)	1
Hepatitis	1
Intestine enteritis, *Salmonella*	1
INTEGUMENTARY	
Dermatitis, *Staphylococcus aureus*	1
MUSCULOSKELETAL	
Bone osteodystrophy, rickets	1

RESPIRATORY

Airsacculitis	1
Avian influenza virus PCR positive	1
Bronchopneumonia	1
Lung pneumonia, *Escherichia coli*	1
Lung pneumonia, mycotic	1
Lung pneumonia, *Pasteurella multocida*	1
Lung pneumonia, *Pasteurella* sp.	1
Pneumonia, *Ornithobacterium rhinotracheale*	79

BAT

NERVOUS

Rabies	2

BIGHORN SHEEP

BODY AS A WHOLE

Copper deficiency	1
Septicemia	1

DIGESTIVE

Enteritis colitis	1
Gastrointestinal parasitism	1

HEMIC AND LYMPHATIC

Spleen splenitis	1

RESPIRATORY

Interstitial pneumonia	1
Pneumonic pasteurellosis	1

BISON (AMERICAN)

BODY AS A WHOLE

Copper marginal	1
Epizootic hemorrhagic disease	3
No diagnosis	1
Sarcocystosis	1

DIGESTIVE

Intestine enteritis, *Clostridium perfringens*	1
Intestine enteritis, coccidia	1
Intestine hemorrhage	2
Omasitis	1

RESPIRATORY

Aspiration pneumonia	1
Bronchopneumonia	1
Granulomatous pneumonia	1
Lung pneumonia, *Arcanobacterium pyogenes*	1
Lung pneumonia, *Mycoplasma* sp.	1

UROGENITAL

Abortion, placentitis	2
Nephropathy	1

BOVINE

BODY AS A WHOLE

Abscess	8
Anaphylaxis (type 1 hypersensitivity)	1
Autolysis	19
BLV PCR positive	1
BVD virus infection (virus isolation)	15
BVD virus PCR positive	26
Congenital anomaly	2
Copper deficiency	2
Copper higher than normal	3
Copper marginal	5
Emaciation	1
Epizootic hemorrhagic disease	24
Hemorrhage	1
Herpesvirus DN599 infection, virus isolation	8
IBR, viremia	3
Infectious bovine rhinotracheitis	10
Infectious bovine rhinotracheitis, virus isolation	3
Lead toxicosis	9
Mycoplasma sp. isolation	28
Nitrate / Nitrite	1
No diagnosis	70
Normal tissue	31
Omphalitis (navel ill)	11
Organophosphate toxicosis	1

Peritonitis	19
Polyserositis	2
Salmonellosis	50
Salt toxicosis	1
Sarcocystosis	2
Seleniuim higher than normal	1
Septicemia	15
Septicemia, *Arcanobacterium pyogenes*	9
Septicemia, bacterial, miscellaneous	11
Septicemia, *Erysipelothrix rhusiopathiae*	1
Septicemia, *Escherichia coli*	15
Septicemia, *Histophilus somni*	4
Septicemia, *Mannheimia haemolytica*	5
Serositis	5
Sudden death	1
Tetanus	1
Toxicosis, algae	2
Toxicosis, copper	2
Toxicosis, oak	1
Toxicosis, zinc	1
Trauma	3
Zinc higher than normal	3
CARDIOVASCULAR	
Bacterial pericarditis	4
Blood vessels vasculitis	1
Cardiomyopathy	1
Congenital, patent ductus arteriosis	1
Edema	1
Heart anomaly	1
Heart cardiomyopathy, nutritional	2
Heart failure, congestive	1
Heart, epicarditis	2
Myocardial necrosis	4
Myocarditis	7
Right sided congestive heart failure	2
Valvular endocarditis, bacterial	3
CHEMISTRY	
Nitrate level, toxic	1
Water, toxic algae	1
DIGESTIVE	
Abomasum abomasitis	8
Abomasum abomasitis, BVD	1
Abomasum abomasitis, *Clostridium* sp.	14

Abomasum abomasitis, mycotic	13
Abomasum dilatation	3
Abomasum perforation	2
Abomasum rupture	2
Abomasum ulceration	4
Atrophic enteritis	1
Bovine fatty liver syndrome	1
Clostridium perfringens / feces	6
Clostridium perfringens / intestine	6
Colitis	36
Colitis, *Clostridium difficille*	1
Cryptosporidiosis	112
Enteritis due to BVD	5
Enteritis, idiopathic	109
Enteritis, Johne's disease	79
Enteritis, older bovine total cases	196
Enteritis, young calf total cases	428
Esophagitis enteritis	4
Feces, rotavirus (EM)	14
Gastrointestinal parasitism	1
Glossitis	1
Hepatitis	18
Hepatitis, likely toxic	1
Hepatopathy	5
Intestine enteritis, *Clostridium perfringens*	111
Intestine enteritis, *Clostridium perfringens* Type A	1
Intestine enteritis, *Clostridium perfringens* Type A beta 2	5
Intestine enteritis, *Clostridium perfringens* Type A enterocolitis	1
Intestine enteritis, *Clostridium perfringens* Type C	1
Intestine enteritis, *Clostridium perfringens* Type E	1
Intestine enteritis, coccidia	37
Intestine enteritis, coronavirus	100
Intestine enteritis, *Escherichia coli*	6
Intestine enteritis, *Escherichia coli* (AEEC)	5
Intestine enteritis, hemorrhagic bowel syndrome	1
Intestine enteritis, necrotic	4
Intestine enteritis, rotavirus	161
Intestine enteritis, *Salmonella*	49
Intestine enteritis, typhlitis	2
Intestine hemorrhage	2
Intestine, jejunal hemorrhagic syndrome	3
Intestine obstruction	1
Intestine parasitism, *Nematodirus*	2
Intestine parasitism, strongyles	5
Intestine perforation	1

Liver abscess	1
Liver hepatitis, necrotic	2
Parasitic enteritis	3
Reticulum reticulitis, traumatic	1
Rumen rumenitis	7
Rumen rumenitis, mycotic	1
Rumen tympany, bloat	10
Traumatic reticulitis / peritonitis	2
ENDOCRINE	
Chemodectoma	1
HEMIC AND LYMPHATIC	
Anemia, hemolytic	1
Disseminated intravascular coagulation	1
Icterus	1
Lymphadenitis	8
Lymphadenitis, bacterial	1
Lymphosarcoma	2
Spleen splenitis	6
INTEGUMENTARY	
Cellulitis	2
Chronic hyperplastic dermatitis	1
Dermatitis, non-specific	2
Mastitis (*Staphylococcus aureus)*	7
Milk sample mastitis, bulk tank	8
Milk sample mastitis, clinical	16
MUSCULOSKELETAL	
Arthritis	2
Fractured bone	1
Joint arthritis, *Arcanobacterium pyogenes*	3
Joint arthritis, *Mycoplasma* sp.	6
Joint arthritis, *Staphylococcus* sp.	1
Myopathy	1
Myopathy, Monensin toxicosis	1
Myositis	2
NERVOUS	
Bacterial encephalitis	4
Brain encephalitis, abscess	3
Brain encephalitis, *Histophilus somni*	6
Brain encephalitis, nonsuppurative	4
Brain encephalitis, suppurative	1

Brain encephalomalacia, polio	4
Brain encephalopathy	1
Brain hemorrhage	2
Brain meningitis, *Arcanobacterium pyogenes*	7
Brain meningitis, suppurative	8
Brain meningoencephalitis	4
Brain vasculitis	1
Hydrocephalus	2
Listeria monocytogenes encephalitis	6
Meningitis	5
Rabies	4

RESPIRATORY

Bacterial pneumonia	15
Bronchitis	1
Bronchointerstitial pneumonia	44
Bronchopneumonia	50
Fibrinous pneumonia	1
Granulomatous pneumonia	3
Interstitial pneumonia	25
Lung edema	3
Lung hemorrhage	2
Lung pleuritis	18
Lung pneumonia, abscess	4
Lung pneumonia, acute, atypical interstitial	5
Lung pneumonia, *Arcanobacterium pyogenes*	31
Lung pneumonia, bovine respiratory coronavirus	1
Lung pneumonia, BRSV	27
Lung pneumonia, BVD virus	13
Lung pneumonia, *Escherichia coli*	1
Lung pneumonia, foreign body aspiration	16
Lung pneumonia, *Histophilus somni*	57
Lung pneumonia, IBR virus	5
Lung pneumonia, *Mannheimia haemolytica*	95
Lung pneumonia, *Mycoplasma* sp.	75
Lung pneumonia, *Pasteurella multocida*	61
Lung pneumonia, *Pasteurella* sp.	14
Lung pneumonia, *Salmonella* sp.	16
Lung pulmonary, atelectasis	1
Lung pulmonary, congestion	5
Lung pulmonary, ephysema	2
Meconium aspiration syndrome (aspiration pneumonia)	9
Mycoplasma hyopneumoniae	1
Nasal isolation, bacterial, miscellaneous	1
Nasal isolation, BRSV	3

Nasal isolation, IBR	1
Nasal isolation, *Mannheimia haemolytica*	4
Nasal isolation, *Pasteurella multocida*	3
Pleuritis	13
Pneumonia, *Mycoplasma bovis*	2
Pneumoniac pasteurellosis	1
Tracheitis	5
Viral pneumonia	1
SPECIAL SENSES	
Conjunctivitis	4
Eye keratoconjunctivitis, *Moraxella*	23
UROGENITAL	
Abortion associated with *Neospora* -like organisms	1
Abortion due to *Campylobacter*	1
Abortion due to IBR	5
Abortion, *Arcanobacterium pyogenes*	13
Abortion, encephalitis	2
Abortion, hepatitis	3
Abortion, mycotic	8
Abortion, myocarditis	3
Abortion, *Mannheimia haemolytica*	2
Abortion, placentitis	81
Abortion, pneumonia	26
Abortion, pneumonia, peribronchiolar lymphoid hyperplasia	2
Abortion, *Salmonella* sp.	2
Abortion toxicosis	1
Bacterial abortion	1
Chronic tubulointerstitial nephritis	4
Dystocia	1
Endometritis, bacterial	2
Idiopathic abortion	150
Kidney nephrosis	3
Metritis	1
Neoplasm ovary, carcinoma	1
Nephritis	10
Penis neoplasm, fibropapilloma	1
Prepuce bacteriological examination	46
Pyelonephritis	1
Renal infarction	1
Urethral calculi	1
Vas deferens	1

CANINE

BODY AS A WHOLE

Abscess	1
Adenoma, undifferentiated	1
Anaplastic undifferentiated carcinoma	2
Anaplastic sarcoma	4
Anticoagulant type toxicosis	1
Blastomycosis	1
Congenital anomaly	1
Copper higher than normal	1
Fistula	2
Giant cell tumor, soft parts	2
Granulation tissue	3
Hamartoma	12
Hemorrhage	2
Herpesvirus infection, canine	1
Inflammatory mass	2
Leiomyosarcoma	1
Lipoma, infiltrative	1
Liposarcoma	2
Neoplasm, adenoma, site not specified	1
Neoplasm, infiltrating lipoma	1
Neoplasm, lipoma	14
Neoplasm, mast cell tumor, metastatic	2
Neoplasm, osteosarcoma, site not specified	1
No diagnosis	5
Normal tissue	17
Peritonitis	2
Pleural cavity, hemothorax	1
Polyp	1
Polyp, inflammatory	2
Septicemia	2
Septicemia, bacterial, miscellaneous	1
Septicemia, *Streptococcus* sp.	2
Teratoma`	1
Trauma	1
West Nile virus infection	1

CARDIOVASCULAR

Acute heart failure	1
Blood vessels neoplasm, hemanioma, site unspecified	2
Blood vessels neoplasm, hemangiosarcoma	2
Cardiopathy	3
Left sided congestive heart failure	1

Myocardial necrosis	1
Myocarditis	2
DIGESTIVE	
Acanthomatous epulis	1
Ameloblastoma	1
Anal gland carcinoma	1
Bacterial enteritis	1
Cirrhosis	1
Clostridium perfringens / feces	2
Clostridiuim perfringens / intestine	2
Cryptosporidiosis	1
Enteritis, idiopathic	3
Epulis	21
Gastritis	2
Gastrointestinal parasitism	3
Giardiasis	3
Gingival hyperplasia	6
Gingivitis	10
Hepatic lipidosis	1
Hepatitis	2
Hepatocellular carcinoma	1
Hepatopathy	2
Intestinal accident	1
Intestinal adenocarcinoma	1
Intestine enteritis, *Escherichia coli*	4
Intestine enteritis, parvovirus	14
Intestine enteritis, *Salmonella*	1
Liver passive congestion	1
Odontoma	1
Oral neoplasm, fibrosarcoma	2
Oral neoplasm, melanoma	3
Oral neoplasm, squamous cell carcinoma	3
Pancreatitis, acute necrotizing	2
Salivary gland carcinoma	1
Squamous cell carcinoma, oral cavity	2
Stomatitis	1
ENDOCRINE	
Thyroid neoplasm, carcinoma	1
Thyroid carcinoma	1
HEMIC AND LYMPHATIC	
Hemangioma	6
Hemangiopericytoma	6

Hemangiosarcoma	8
Lymphadenitis	2
Lymphangiectasia	1
Lymphosarcoma	4
Splenic hematoma	1
Splenitis	2
Splenosis	1
Thymus, hemorrhage	1
INTEGUMENTARY	
Actinic keratosis	1
Apocrine gland adenocarcinoma	4
Basal cell tumor	6
Calcinosis circumscripta	1
Cellulitis	14
Chronic hyperplastic dermatitis	3
Collagen hyperplasia	4
Dermal fibrosis (collagen nevus)	4
Dermal hair follicle cyst	27
Dermatitis, focal	2
Dermatitis, granulomatous	3
Dermatitis, immune mediated	2
Dermatitis, lick granuloma	3
Dermatitis, nonspecific	6
Dermatitis, physical irritant	1
Dermatitis, scar	1
Dermatitis, *Staphylococcus* sp.	1
Dermatomyositis	1
Dermatophytosis ringworm	2
Endocrine dermatopathy	1
Epidermal cyst	8
Fibroadenomatous mammary hyperplasia, BE	2
Fibroma	9
Fibrosarcoma	7
Focal adnexal dysplasia	1
Folliculitis	6
Foreign body granuloma	1
Furunculosis	6
Histiocytic sarcoma	1
Histiocytoma	25
Hypersensitivity (allergic) dermatitis	2
Keratoacanthoma	2
Malignant melanoma	3
Mammary adenoma	9
Mammary carcinoma	4

Mammary carcinoma adenocarcinoma	14
Mast cell tumor	5
Mast cell tumor, grade I, well differentiated	22
Mast cell tumor, grade II, differentiated	26
Mast cell tumor, grade III, poorly differentiated	7
Mastitis	1
Meibomian gland adenoma	6
Melanoma	14
Mixed mammary tumor	9
Myxosarcoma	1
Neoplasm, cutaneous lymphoma	8
Neoplasm, intracutaneous cornifying epithelioma	1
Neoplasm, neuroendocrine (Merkel)	2
Neoplasm, perianal gland adenoma	9
Neoplasm, pilomatrixoma	10
Neoplasm, sebaceous gland adenoma	20
Neoplasm, squamous cell carcinoma	3
Neoplasm, sweat gland adenoma	2
Neoplasm, trichoblastoma	4
Neoplasm, trichoepithelioma	2
Panniculitis	4
Papilloma	4
Perianal gland carcinoma	1
Pododermatitis	2
Pyoderma	1
Pyogranuloma	1
Sebaceous gland carcinoma	5
Sebaceous gland hyperplasia	6
Sebaceous gland inflammation	10
Seborrheic dermatosis (idiopathic)	1
Squamous cell carcinoma - ocular	1
Sweat gland adenoma	5
Sweat gland cyst	1
MUSCULOSKELETAL	
Myositis	2
Osteosarcoma	5
Rhabdomyosarcoma	1
Umbilical hernia	1
NERVOUS	
Brain encephalitis, nonsuppurative	1
Brain meningitis, nonsuppurative	1
Hydrocephalus	1

Nerve neoplasm, schwannoma	13
Neuropathy	1
RESPIRATORY	
Bronchopneumonia	1
Granulomatous pneumonia	1
Lung pneumonia, *Bordetella* sp.	1
Lung pneumonia, *Escherichia coli*	1
Lung pulmonary congestion	1
SPECIAL SENSES	
Ceruminous gland adenoma	1
Otitis externa	4
UROGENITAL	
Chronic tubulo interstitial nephritis	2
Idiopathic abortion	1
Interstitial cell tumor	1
Kidney nephrosis	1
Kidney renal dysplasia	1
Neoplasm ovary, adenoma	2
Nephritis	2
Ovarian stromal tumor	1
Seminoma	2
Transitional cell carcinoma	1
Vaginitis	1

CAPRINE

BODY AS A WHOLE	
Copper deficiency	2
Copper higher than normal	1
Corynebacterium pseudotuberculosis	2
Emaciation	1
Granulation tissue	1
No diagnosis	5
Omphalitis (navel ill)	1
Septicemia, bacterial, miscellaneous	1
Septicemia, *Escherichia coli*	1
DIGESTIVE	
Atrophic enteritis	1
Colitis	1

Enteritis, idiopathic	1
Enteritis, Johne's disease	2
Gastrointestinal parasitism	3
Hepatitis	1
Intestine, enteritis, *Clostridium perfringens*	3
Intestine, enteritis, *Clostridium perfringens* A beta 2	1
Intestine enteritis, coccidia	3
Intestine parasitism, strongyles	1
Marked diffuse hepatic lipidosis	1
Parasitic colitis, *Trichuris*	1
Parasitis enteritis	1
Rumen, tympany, bloat	1
HEMIC AND LYMPHATIC	
Lymph node lymhadenitis, caseous	3
INTEGUMENTARY	
Milk sample mastitis, clinical	1
MUSCULOSKELETAL	
Clostridial myositis, blackleg	1
Muscle myopathy, nutritional	1
Nutritional myopathy	1
NERVOUS	
Brain encephalitis, nonsuppurative	1
Brain encaphlomalacia, polio	1
RESPIRATORY	
Bacterial pneumonia	1
Bronchointersitial pneumonia	1
Interstitial pneumonia	1
Lung pneumonia, *Mannheimia haemolytica*	3
UROGENITAL	
Abortion due to *Coxiella*	1
Abortion, *Campylobacter jejuni*	1
Abortion, goiter	1
Abortion, placentitis	2
Idiopathic abortion	3

CHINCHILLA

DIGESTIVE

Intestine enteritis, *Escherichia coli*	1

COYOTE

BODY AS A WHOLE

Normal tissue	1

DEER

BODY AS A WHOLE

Abscess	1
Autolysis	4
Bluetongue	2
Emaciation	1
Epizootic hemorrhagic disease	13
Neoplasm, squamous cell carcinoma (site not specified)	1
No diagnosis	4
Normal tissue	4
Peritonitis	1
Septicemia, *Arcanobacterium pyogenes*	1
Septicemia, bacterial, miscellaneous	2
Starvation / inanition	2
Trauma	1

DIGESTIVE

Abomasum abomasitis	1
Coccidiosis	1
Enteritis, Johne's disease	1
Gastrointestinal parasitism	1
Hepatitis	2
Intestine enteritis, *Clostridium perfringens*	7
Intestine parasitism, strongyles	1
Intestine perforation	1
Liver hepatitis, necrotic	1
Rumen acidosis / grain overload	4

INTEGUMENTARY

Hoof footrot / pododermatitis	1

NERVOUS

Brain encephalitis, abscess	1
Brain meningitis, *Arcanobacterium pyogenes*	2
Meningitis	1

RESPIRATORY

Bacterial pneumonia	2
Bronchopneumonia	1
Lung hemorrhage	1
Lung pneumonia, abscess	1
Lung pneumonia, *Arcanobacterium pyogenes*	3
Lung pneumonia, parasitic, *Metastrongylus*	1
Lung pneumonia, parasitic, miscellaneous	2
Lung pneumonia, *Pasteurella* sp.	1
Pleuritis	2
Pneumonitis	1

UROGENITAL

Idiopathic abortion	1
Nephritis	1

ELK

BODY AS A WHOLE

Bluetongue	1
Epizootic hemorrhagic disease	2
Sarcocystosis	1

DIGESTIVE

Intestine enteritis, *Clostridium perfringens*	1

NERVOUS

Meningitis	1

EQUINE

BODY AS A WHOLE

Abscess	1
Granulation tissue	1
Neoplasm, adenoma (site not specified)	1
No diagnosis	4

Peritonitis	4
Salmonellosis	1
Selenium toxicosis	1
West Nile virus infection	2
CARDIOVASCULAR	
Edema	1
DIGESTIVE	
Colitis	1
Enteritis, idiopathic	1
Gastrointestinal parasitism	1
Giardiasis	1
Intestine enteritis, *Escherichia coli*	1
Intestine enteritis, rotavirus	1
Intestine parasitism, strongyles	1
HEMIC AND LYMPHATIC	
Thymus, aplasia	1
INTEGUMENTARY	
Fibroma	1
Mast cell tumor	1
Neoplasma, squamous cell carcinoma	1
Sarcoid	3
NERVOUS	
Brain encephalitis, nonsuppurative	2
Brain encepahlitis, WNV	1
RESPIRATORY	
Bacterial pneumonia	1
Bronchointerstitial pneumonia	1
Interstitial pneumonia	1
Lung pneumonia, *Rhodococcus equi*	1
UROGENITAL	
Idiopathic abortion	2

FELINE

BODY AS A WHOLE	
Abscess	1
Anaplastic sarcoma	1
Anaplastic (undifferentiated) carcinoma	1
Ethylene glycol toxicosis	1
Feline fatty liver syndrome	1
Inflammatory mass	2
Neoplasm, adenoma (site not specified)	2
Neoplasm, lipoma	4
Neoplasm, squamous cell carcinoma (site not specified)	1
No diagnosis	5
Normal tissue	10
Peritonitis	1
Polyp	1
Polyp, inflammatory	1
Septicemia	1
Septicemia, *Francisella tularensis*	1
Septicemia, *Streptococcus* sp.	1
Trauma	2
CARDIOVASCULAR	
Blood vessels thrombosis	1
Cardiomyopathy	1
Left sided congestive heart failure	1
DIGESTIVE	
Cholangitis	1
Coccidiosis	1
Enteritis colitis	1
Enteritis, idiopathic	1
Feline infectious peritonitis	2
Gingival hyperplasia	1
Gingivitis	3
Hepatic lipidosis	2
Hepatitis	1
Hepatopathy	2
Intestine enteritis, *Escherichia coli*	2
Intestine enteritis, feline panleukopenia	1
Intestine parasitism, *Nematodirus*	1
Intestine parasitism, strongyles	1
Lymphocytic plasmacytic enteritis	1
Oral neoplasm, fibrosarcoma	1
Oral neoplasm, squamous cell carcinoma	3

Pancreatitis, acute necrotizing	2
Parvovirus enteritis	1
Sialocele	1
Squamous cell carcinoma, oral cavity	2
Stomatitis	1
HEMIC AND LYMPHATIC	
Feline leukemia virus	1
Hemangioma	1
Lymphadenitis, bacterial	1
Lymphosarcoma	1
Neoplasm, leukemia	1
INTEGUMENTARY	
Alopecia	1
Basal cell carcinoma	1
Basal cell tumor, feline	3
Cellulitis	1
Dermal hair follicle cyst	1
Dermatitis, *Staphylococcus* sp.	1
Dermatophytosis ringworm	2
Eosinophilic plaque	3
Fibroma	1
Fibrosarcoma, feline	3
Fibrosarcoma, feline, vaccine induced	3
Histiocytoma	1
Linear granuloma (eosinophilic granuloma)	1
Malignant melanoma	1
Mammary carcinoma	4
Mammary carcinoma, adenocarcinoma	1
Mast cell tumor	2
Neoplasm, cutaneous lymphoma	1
Neoplasm, sebaceous gland adenoma	3
Neoplasm, squamous cell carcinoma	4
Neoplasm, sweat gland adenoma	1
Neoplasm, trichoblastoma	4
Panniculitis	1
Pyogranuloma	1
Sebaceous gland carcinoma	2
Sweat gland adenoma	1
MUSCULOSKELETAL	
Rhabdomyosarcoma	1

NERVOUS

Bacterial encephalitis	1
Brain encephalitis, *Cryptococcus neoformans*	1
Brain encephalitis, *Toxoplasma*	1
Brain meningitis, suppurative	1
Meningitis	1
Rabies	1

RESPIRATORY

Aspiration pneumonia	1
Bronchopneumonia	3
Feline calicivirus	1
Granulomatous pneumonia	2
Lung edema	1

SPECIAL SENSES

Ceruminous gland adenoma	1
Ceruminous gland carcinoma	1

UROGENITAL

Chronic tubulointerstitial nephritis	3
Cystitis	2
Feline urolithiasis syndrome (FUS)	1
Kidney nephrosis	1
Nephritis	2
Nephropathy (end stage renal disease)	1
Salpingitis, inflammation of oviduct	1

FERRET

ENDOCRINE

Adrenocortical adenoma	1

HEMIC AND LYMPHATIC

Hemangioma	1

FISH

BODY AS A WHOLE

Normal tissue	1
Septicemia, bacterial, miscellaneous	3

INTEGUMENTARY

Dermatitis, mycotic (fungal)	1

GUINEA PIG

HEMIC AND LYMPHATIC

Hematoma	1

INTEGUMENTARY

Bacterial dermatitis	1
Dermatitis, focal	2
Mammary adenoma	1

LLAMA

BODY AS A WHOLE

Malignant hyperthermia	1

MILK SAMPLE

BODY AS A WHOLE

BLV PCR+	1
BVD virus PCR+	2

MINK

BODY AS A WHOLE

Canine distemper	2
No diagnosis	1
Septicemia, bacterial, miscellaneous	1

DIGESTIVE

Hepatitis	1
Intestine enteritis, *Clostridium perfringens* Type C	1

INTEGUMENTARY

Mastitis	2

RESPIRATORY

Interstitial pneumonia	1
Lung pneumonia, *Escherichia coli*	3

UROGENITAL

Cystitis	2
Metritis	1
Pyelonephritis	2

MOUNTAIN LION

DIGESTIVE

Bacterial enteritis	1

MOUSE

BODY AS A WHOLE

Autolysis	3
No diagnosis	3
Normal tissue	1
Septicemia, *Escherichia coli*	1

UROGENITAL

Dystocia	2
Pyelonephritis	1

OVINE

BODY AS A WHOLE

Autolysis	1
Congenital anomaly	1
Copper higher than normal	1
Copper marginal	1
Corynebacterium pseudotuberculosis	2
Hypocalcemia	2
Hypomagnesemia	1
No diagnosis	6
Pregnancy toxemia (ketosis)	1
Septicemia, *Escherichia coli*	1
Septicemia, *Mannheimia haemolytica*	1

Septicemia, *Pasteurella multocida*	1
Toxicosis copper	4
DIGESTIVE	
Abomasum abomasitis	1
Abomasum abomasitis, mycotic	1
Abomasum dilatation	1
Bacterial enteritis	1
Cryptosporidiosis	1
Enteritis, idiopathic	1
Enteritis, Johne's disease	1
Gastrointestinal parasitism	1
Hepatic lipidosis	1
Intestinal torsion	1
Intestine enteritis, *Clostridium perfringens*	7
Intestine enteritis, coccidia	7
Intestine enteritis, *Escherichia coli*	1
Intestine enteritis, *Salmonella*	1
Intestine parasitism, strongyles	2
Rumen rumenitis	3
HEMIC AND LYMPHATIC	
Lymph node lymphadenitis, caseous	2
Lymphosarcoma	1
INTEGUMENTARY	
Cellulitis	1
MUSCULOSKELETAL	
Myositis	1
Nutritional myopathy	2
NERVOUS	
Brain encephalitis, abscess	1
Brain encephalomalacia, polio	1
Brain meningitis, nonsuppurative	1
Brain, meningoencephalitis	1
Listeria monocytogenes encephalitis	1
Mononuclear meningitis / myelitis	1
Myelomalacia	1
RESPIRATORY	
Bronchopneumonia	2
Lung pneumonia, abscess	1
Lung pneumonia, *Arcanobacterium pyogenes*	1

Lung pneumonia, foreign body aspiration	1
Lung pneumonia, *Mannheimia haemolytica*	5
Lung pneumonia, *Pasteurella multocida*	1
Lung pneumonia, *Pasteurella* sp.	1
Nasal isolation, *Mannheimia haemolytica*	1
Nasal isolation, *Pasteurella multocida*	1
Pleuritis	1
SPECIAL SENSES	
Eye keratoconjunctivitis, *Moraxella*	1
UROGENITAL	
Abortion due to *Campylobacter*	7
Abortion due to *Chlamydophila abortus*	1
Abortion, *Arcanobacterium pyogenes*	3
Abortion, *Campylobacter jejuni*	5
Abortion, myocarditis	1
Abortion, placentitis	6
Abortion, *Salmonella* sp.	2
Bacterial abortion	1
Idiopathic abortion	7
Metritis	1

PORCINE

BODY AS A WHOLE	
Abscess	5
Ascites	1
Autolysis	1
Circovirus identified -- no disease	15
Hemorrhage	2
Mineralization, dystrophic	1
No diagnosis	13
No histologic diagnosis	1
Normal tissue	6
PCV2 disease multi-systemic	5
Peritonitis	3
Polyserositis	6
Polyserositis, (*Haemophilus parasuis* Glasser's)	1
Polyserositis, *Streptococcus suis*	2
PRRS infection	3
Salmonellosis	3
Septicemia	5

Septicemia, *Actinobacillus suis*	2
Septicemia, *Arcanobacterium pyogenes*	2
Septicemia, bacterial, miscellaneous	1
Septicemia, *Escherichia coli*	2
Septicemia, *Haemophilus parasuis*	2
Septicemia, *Salmonella*	5
Septicemia, *Streptococcus* sp.	2
Septicemia, *Streptococcus suis*	10
Septicemic *Pasteurella multocida*	1
Serositis	3
Specimen unsuitable	1
Trauma	2
Virus isolation, PRRS	14

CARDIOVASCULAR

Bacterial pericarditis	14
Blood vessels vasculitis	1
Edema	2
Heart endocarditis	1
Heart endocarditis, *Streptococcus suis*	1
Heart endocarditis, valvular	3
Heart, epicarditis	4
Mulberry heart disease	4
Myocardial necrosis	1
Myocarditis	3
Vasculitis	1

DIGESTIVE

Atrophic enteritis	3
Bacterial enteritis	9
Clostridium perfringens / intestine	1
Colitis	5
Colitis, *Clostridium difficile*	2
Cryptosporidiosis	2
Enteritis, colitis	20
Enteritis, idiopathic	10
Eosinophilis enteritis	1
Esophagitis	1
Gastric ulcer	1
Hepatitis	7
Heptopathy	1
Intestinal accident	1
Intestinal torsion	1
Intestine edema	2
Intestine enteritis, astrovirus	1

Intestine enteritis, calicivirus	1
Intestine enteritis, *Clostridium perfringens*	24
Intestine enteritis, *Clostridium perfringens* Type A	1
Intestine enteritis, *Clostridium perfringens* Type A beta 2	6
Intestine enteritis, *Escherichia coli*	42
Intestine enteritis, *Escherichia coli* (AEEC)	4
Intestine enteritis, necrotic	1
Intestine enteritis, porcine proliferative	3
Intestine enteritis, rotavirus	30
Intestine enteritis, *Salmonella*	22
Intestine enteritis, viral, miscellaneous	1
Intestine hemorrhage	1
Intestine parasitism, ascarids	1
Liver passive congestion	1
PCV2 disease enteritis	1
Virus enteritis	1
HEMIC AND LYMPHATIC	
Lymphadenitis	5
Spleen splenitis	2
Splenitis	4
INTEGUMENTARY	
Bacterial dermatitis	3
Cellulitis	1
Dermatitis, *Staphylococcus aureus*	1
Dermatitis, *Staphylococcus intermedius*	1
Exudative epidermitis, greasy pig disease	1
Furunculosis	1
MUSCULOSKELETAL	
Arthritis	8
Bone osteodystrophy, rickets	1
Fractured bone	1
Joint arthritis, bacterial, miscellaneous	2
Joint arthritis, *Haemophilus parasuis*	1
Joint arthritis, *Staphylococcus* sp.	1
Joint arthritis, *Streptococcus suis*	2
Myositis	1
Osteomyelitis, bacterial	1
Synovitis	1
Vertebral fracture	3
Vitamin D deficiency	1

NERVOUS

Brain encephalitis, abscess	1
Brain encephalitis, nonsuppurataive	1
Brain encephalitis, *Streptococcus suis*	1
Brain encephalitis, suppurative	1
Brain meningitis, *Arcanobacterium pyogenes*	1
Brain meningitis, *Escherichia coli*	1
Brain meningitis, *Haemophilus parasuis*	1
Brain meningitis, *Streptococcus suis*	13
Brain meningitis, suppurative	5
Brain, meningoencephalitis	3
Meningitis	3

RESPIRATORY

Bacterial pneumonia	3
Bronchointerstitial pneumonia	16
Bronchopneumonia	11
Hydrothorax	1
Inclusion body rhinitis	2
Interstitial pneumonia	25
Lung edema	2
Lung hemorrhage	2
Lung pneumonia, *Actinobacillus pleuropneumniae*	1
Lung pneumonia, *Actinobacillus suis*	3
Lung pneumonia, *Arcanobacterium pyogenes*	9
Lung pneumonia, BALT	1
Lung pneumonia, *Bordetella bronchiseptica*	1
Lung pneumonia, *Bordetella* sp.	17
Lung pneumonia, foreign body aspiration	1
Lung pneumonia, *Haemophilus parasuis*	30
Lung pneumonia, *Mycoplasma hyopneumoniae*	24
Lung pneumonia, *Pasteurella multocida*	40
Lung pneumonia, PRRS	51
Lung pneumonia, *Salmonella* sp.	5
Lung pneumonia, *Streptococcus* sp.	4
Lung pneumonia, *Streptococcus suis*	51
Lung pneumonia, swine influenza virus	28
Lung pulmonary, congestion	3
Nasal isolation, *Bordetella* sp.	1
Nasal isolation, *Pasteurella multocida*	1
PCV2 disease pneumonia	13
Pleuritis	3
Rhinitis	1

SPECIAL SENSES

Conjunctivitis	1
Otitis externa	1

UROGENITAL

Abortion associated with PRRS	5
Abortion, myocarditis	1
Abortion, parvovirus	1
Abortion, pneumonia	1
Abortion with congenital anomaly	2
Bacterial abortion	1
Idiopathic abortion	12
Nephritis	2
PRRS virus positive by PCR	59
Uremia	1

RABBIT

BODY AS A WHOLE

No diagnosis	1
Trauma related to predator / scavenger attack	1

DIGESTIVE

Intestine enteritis, *Escherichia coli*	1

RESPIRATORY

Bronchopneumonia	1

RACCOON

BODY AS A WHOLE

Normal tissue	2

NERVOUS

Brain encephalitis, canine distemper	6
Viral encephalitis	1

RESPIRATORY

Viral pneumonia	1

SKUNK

NERVOUS
Rabies 17

TIGER

UROGENITAL
Nephritis 1

TORTOISE

BODY AS A WHOLE
Autolysis 1

WATER

CHEMISTRY
Water, toxic algae 1

WEASEL

BODY AS A WHOLE
No diagnosis 1