



# South Dakota State University

## Department of Veterinary and Biomedical Sciences

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Animal Disease Research and Diagnostic Laboratory

South Dakota State University

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<http://www.sdstate.edu/vs/>

# SDSU VSBD/ADRDL



# SDSU VSBD/ADRD Animal Research Wing



# Historical perspective

- 1887-Veterinary Science Department was established.
- 1967- Animal Disease Research and Diagnostic Lab (ADRDL).
- 1970- ADRDL was accredited by AAVLD (American Association of Veterinary Laboratory Diagnosticians).

# Department of Veterinary and Biomedical Sciences

- Home department for the:-
  - South Dakota ADRDL
  - SDSU Olson Agricultural Analytical Services Laboratory
  - Center for Infectious Disease Research and Vaccinology (CIDRV)

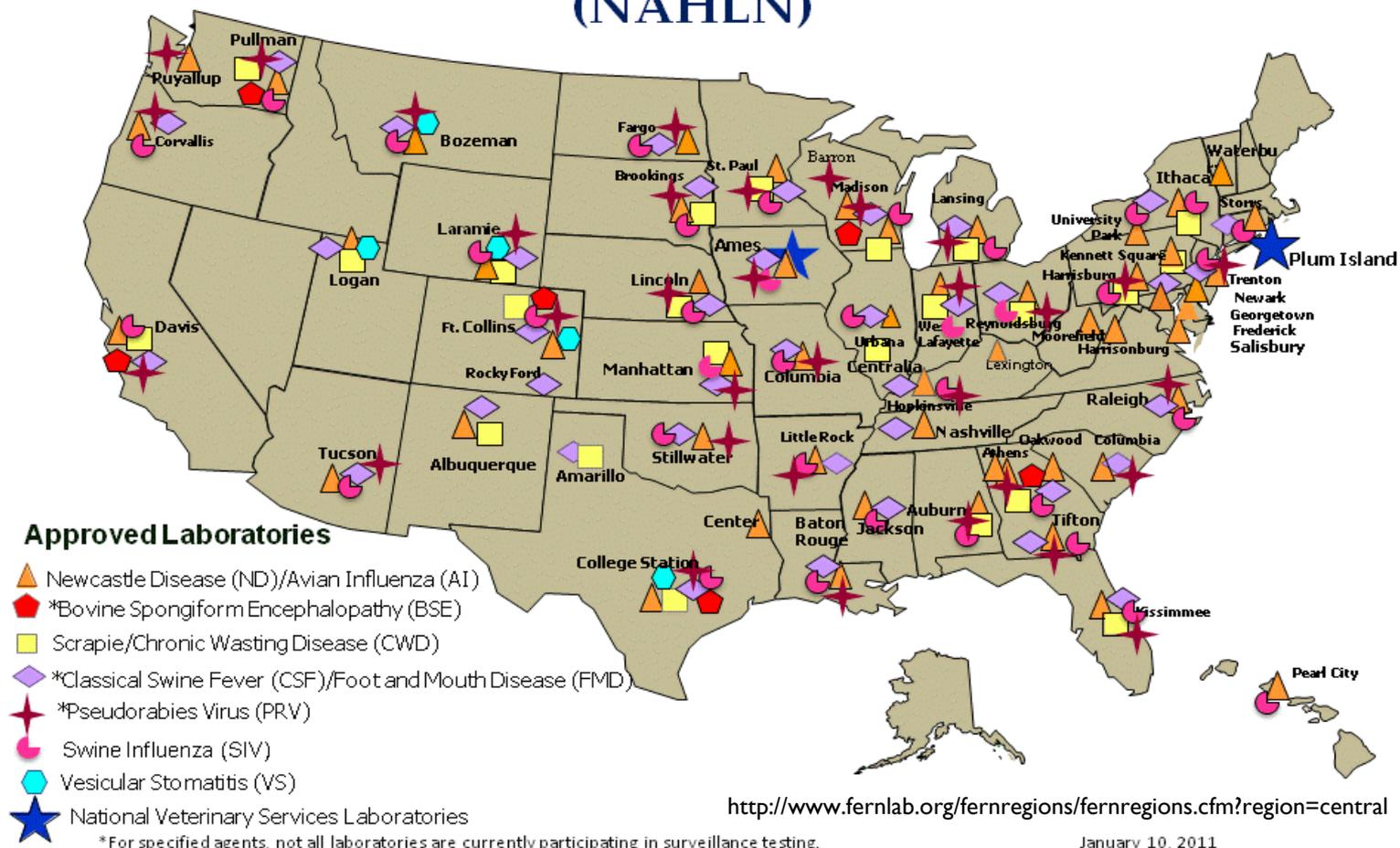
# Department of Veterinary and Biomedical Sciences

- Undergraduate Program (Pre-Vet major)
- Graduate Program (Veterinary Microbiology)
  - Masters
  - PhD
- Research
  - Emphasis on infectious diseases



# Animal Disease Research and Diagnostic Laboratory (ADRDL)

## National Animal Health Laboratory Network (NAHLN)



# ADRDL – Involvement with NAHLN

## List of NAHLN tests we run:

- Avian influenza Real time PCR
- Classical swine fever Real time PCR
- Chronic wasting disease Immunohistochemistry (IHC)
- Foot and mouth disease Real time PCR
- Newcastle disease Real time PCR
- Pseudorabies virus Serology
- Scrapie Immunohistochemistry (IHC)
- Swine influenza virus Real time PCR
- Virus Isolation
- Sequencing

# ADRDL- Involvement with FERN

- The ADRDL joined FERN in 2004.
- USDA/FSIS FERN CAP (Cooperative Agreement Program) began in 2005.
- SDSU ADRDL was selected as one of original 18 CAP labs, currently 25 labs are funded.
- The ADRDL is the only strictly veterinary diagnostic laboratory that receives funds through the USDA/FSIS/FERN Cooperative Agreement Program.

# ADRDL- Involvement with FERN

- The Projects involves-
  - Method validation/development projects involving wide range of pathogens
    - *E. coli* O157:H7
    - Staphylococcal enterotoxin
    - *Shigella*
    - *Bacillus anthracis*
    - *Francisella tularensis*
    - *Clostridium botulinum* neurotoxin
    - Rotavirus
    - *Brucella spp.*
- Have added the Olson Ag Analytical Services Lab (OAASL) to 2010-2011 FERN CAP project to detect high nitrogen adulterants (melamine-like compounds) in foods.

# ADRD + OAASL- Work load

- The lab performed 314,091 test procedures in FY10.
  - Pathology.....24,085
  - Microbiology.....18,065
  - Serology.....203,526
  - Virology.....6,790
  - Molecular Diagnostic.....51,233
  - Contract Testing for NAHLN....1,079
  - Toxicology/Chemistry.....9,313

# Veterinary & Biomedical Sciences Department - Labor force

- Total 90 Full Time Equivalent (FTE)
  - ADRDL – 59 FTE
  - OAASL – 13 FTE
  - Teaching – 1.7 FTE
  - Extension – 1.4 FTE
  - Research including CIDRV – 15 FTE (includes 15 GRAs @ .5 FTE each)
  - 40 part time preveterinarian student workers

# ADRDL Loading Dock

## On call Pathologists - 24/7 cooler access



# ADRDL-Receiving



# Necropsy Floor



# Research Laboratory



# Clinical Pathology

- Hematology:
  - Complete Blood Count
- Clinical Chemistry:
  - Ruminant Diagnostic Profile
- Special Chemistry:
  - Thyroid Hormone (Total T4)
- Urine/Fluids/Cytology
  - Bone Marrow Cytology
- Immunology:
- Parasitology:
- Other tests



# Bacteriology

- Aerobic and Anaerobic culture
- Antimicrobial susceptibility
- Campylobacter culture
- Johne's culture
- Milk Bulk Tank & milk culture
- Mycology
- Mycoplasma culture
- Select agents-Anthrax Screening, Tularemia, Brucellosis and *Yersinia pestis*.
- Feed & environmental sample- *Listeria*, *Salmonella* and *E. coli*
- Other tests



# Media preparation room



# Food Safety

- FERN Projects
- Pathogen Screening
  - *Salmonella*,  
Generic *E. coli*, *E. coli* O157:H7,  
Genus *Listeria*,  
*Listeria monocytogenes*
  - Ground beef,  
Ready-to-Eat Meats, Beef trim,  
Carcass Sponges
- Residue Testing
  - Kidney Inhibition Swab –  
antimicrobial residues
  - Bovine, porcine,  
and bison kidneys



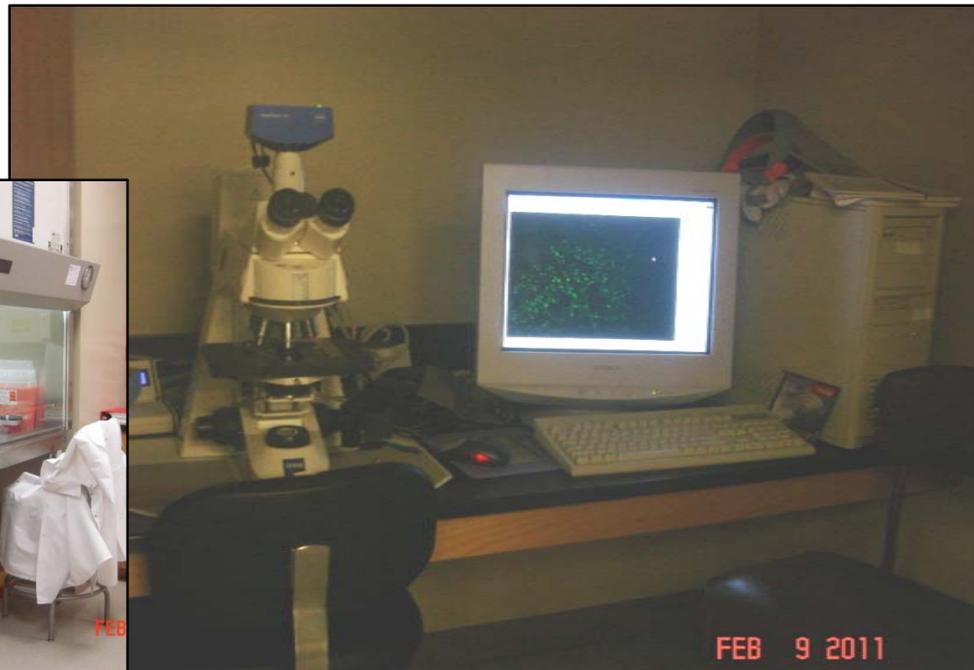
# Serology

- Anaplasmosis
- Avian Influenza
- Brucella
- Equine Infectious Anemia
- Mycoplasma hyopneumoniae
- Porcine reproductive & respiratory syndrome
- Swine influenza virus
- Other tests



# Virology

- Virus isolation
  - Bovine
  - Canine
  - Feline
  - Fish
  - Ovine
  - Porcine
  - Wild/other animal
- Rabies
- FA Testing
- Other tests



# Molecular Diagnostics

18 major instruments:-

- Thermo KingFisher 96 Instruments – Magnetic Extraction
- Biomek NXP Instrument – Liquid Handler
- ABI7500 Instruments – 96 well format real-time PCR
- Cepheid SmartCycler Instruments – real-time PCR
- BioRad Bioplex 200 Instrument - System for analysis of multiple proteins, peptides, and nucleic acids in a single well.

Some tests:-

- Avian Influenza
- BVD
- Johne's
- PRRSV
- PRRS Sequencing
- *Tritrichomonas foetus*
- Other tests



# Histology

- Routine Histology
- Special Stains
- Immunohistochemistry
- Biopsy Service



# Olson Agricultural Analytical Services Laboratory

- Analytical services offers the following test and analysis services,
  - Animal Tissue
  - Dairy Products
  - Distillers Products
  - Feed and Feed Ingredients
  - Fertilizers
  - Manures/Composts and Feces
  - Meat Products
  - Miscellaneous
  - NIRS
  - Oilseeds, Oils and Fats
  - Pesticides
  - Soil
  - Water
  - Wheat



# Feed and Feed Ingredients

- Different tests for Feed and feed ingredients
  - Amino Acids
  - Minerals
  - Drugs in Feeds and Animal Remedies
    - Monensin (Coban, Rumensin)
  - Energy values, calculated
  - Mycotoxins (based on volume-Aflatoxins, Fumonisin, ELISA)
  - Selenium
  - Mercury
  - Vitamins/Provitalamins
  - And the list continues



# Center for Infectious Disease Research and Vaccinology (CIDRV)

- One of South Dakota's 2010 Centers of Excellence, supports many of the researchers in their quest for healthier animals and people.
- This center focuses on development of novel therapeutic and diagnostic technologies and products for infectious disease in humans and domestic animals.

# Quality Matters

- ADRDL Quality System
  - Compliant with the American Association of Veterinary Laboratory Diagnosticians (AAVLD) standards
- Our quality system has a simple rule:  
**“SAY WHAT YOU DO. DO WHAT YOU SAY. PROVE IT.”**
  - Quality Manual, Policies, and SOPs
  - Audits
  - Documentation
  - Proficiency testing
  - Validation
  - And much more....



# SDSU VBSD and the VetLRN

- How can the VBSD strengthen the VetLRN?
  - The VBSD has expertise in chemical and microbiological analysis of many complex matrices
  - We are willing to cooperate with method development and validation
- What would we need to achieve these goals?
  - Training
  - Funding for personnel, equipment

# Acknowledgment

- Dr. David Zeman
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- Ms. Laura Ruesch

Questions???

Thank you

