

IOWA STATE  
UNIVERSITY

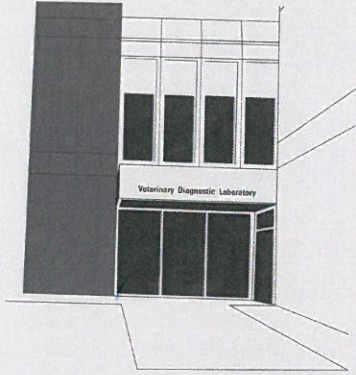


IOWA STATE UNIVERSITY  
Veterinary Diagnostic Laboratory

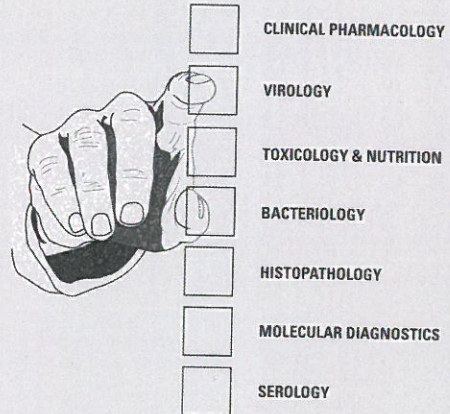


# MODEL OF SERVICE, TEACHING, AND RESEARCH

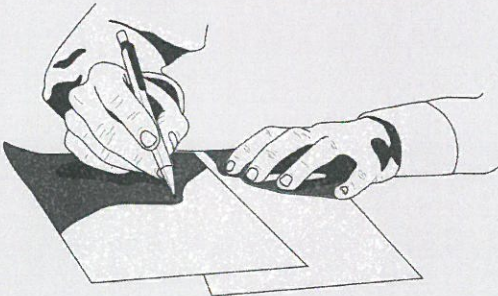
**1. ISU VDL RECEIVES CASES FROM PRACTICING VETERINARIANS**



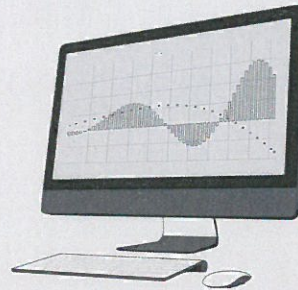
**2. ISU VDL DIAGNOSTICIAN SELECTS TESTS BASED ON HISTORY**



**3. RESULTS COORDINATED TO ARRIVE AT DIAGNOSIS**

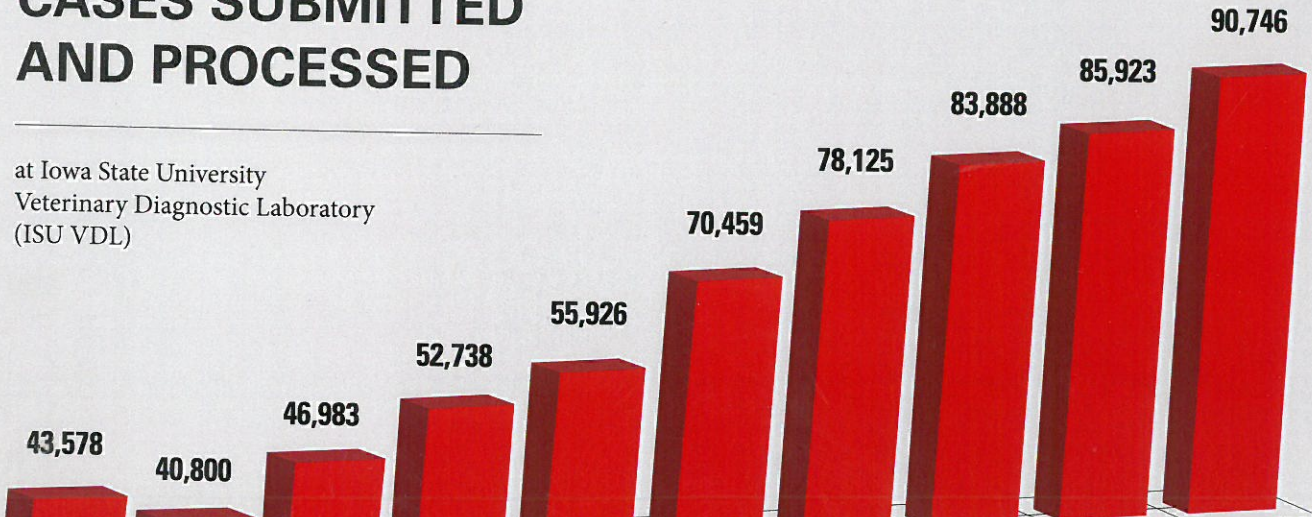


**4. RESULTS AND DIAGNOSIS TRANSMITTED TO ASSIST PRACTICING VETERINARIANS AND ANIMAL OWNERS**



## CASES SUBMITTED AND PROCESSED

at Iowa State University  
Veterinary Diagnostic Laboratory  
(ISU VDL)



## Economic impact of university veterinary diagnostic laboratories: A case study

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### ARTICLE INFO

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Economic contribution  
Economic impact  
Return on investment  
Veterinary diagnostic laboratories

### ABSTRACT

Veterinary diagnostic laboratories (VDLs) play a significant role in the prevention and mitigation of endemic animal diseases and serve an important role in surveillance of, and the response to, outbreaks of transboundary and emerging animal diseases. They also allow for business continuity in livestock operations and help improve VDLs. We present a case study on the economic impact of the Iowa State University Veterinary Diagnostic Laboratory (ISUVDL). We use economic contribution analysis coupled with a stakeholder survey to estimate the impact. Results suggest that the ISUVDL is responsible for \$2,162.46 million in direct output, \$2,832.45 million in total output, \$1,158.19 million in total value added, and \$31.79 million in state taxes in normal years. In an animal health emergency this increases to \$8,446.21 million in direct output, \$11,063.06 million in total output, \$4,523.70 million in total value added, and \$124.15 million in state taxes. The ISUVDL receives \$4 million annually as a direct state government appropriation for operating purposes. The \$31.79 million in state taxes in normal years and the \$124.15 million in state taxes in an animal health emergency equates to a 795% and 3104% return on investment, respectively. Estimates of the economic impact of the ISUVDL provide information to scientists, administrators, and policymakers regarding the efficacy and return on investment of VDLs.

### 1. Introduction

Much of the work done by veterinary diagnostic laboratories (VDLs) is routine and contributes to animal agriculture by allowing for the movement of animals, diagnosis of disease, prevention and treatment of disease, and ongoing monitoring of the health status of animals. The work of VDLs becomes much more crucial when trade-limiting diseases occur. Under these circumstances, it might be impossible to send samples to other states for testing, and the presence of a VDL that rapidly identifies, helps control, and treats a disease is critical to the financial performance of the animal agriculture industry.

Funding to support VDL operations is typically derived from the diagnostic service fees and contracts and government appropriations. Whether these appropriations, or tax dollars, provide a sufficient return on investment depends on the contribution of VDLs to the productivity, growth, and ultimately size of an animal agriculture industry, which subsequently generates taxes that offset spending. The aim of this study is to provide a simple and transparent method to estimate the economic impact of VDLs, something currently absent in the literature. The Iowa State University Veterinary Diagnostic Laboratory (ISUVDL) is used as a

case study. The ISUVDL was selected as a case study because it is located in one of the most intensively populated animal agriculture regions in the nation. As a result, the Iowa economy is highly dependent on the animal agriculture industry, which implies the importance of the economic impact of disease outbreaks.

### 2. The role and activities of the ISUVDL

Animal agriculture includes raising of livestock to provide meat, milk, fiber, and other products to consumers. Iowa is a major producer and net exporter of beef, pork, poultry, dairy, and egg products. Iowa hog and pig production totaled 12.511 million pounds (5,674,732 metric tons) in 2015 (USDA-NASS, 2016a). Iowa cattle and calf production totaled 1904 million pounds (863,708 metric tons) in 2015 (USDA-NASS, 2016a). In 2015, Iowa raised 9.1 million turkeys or 354 million pounds (160,567 metric tons) of turkey production (USDA-NASS, 2016b). Iowa sold for slaughter 11.3 million chickens, or 37 million pounds (16,904 metric tons) of chicken production, in 2015 (USDA-NASS, 2016b). Iowa egg production totaled 12,463 million eggs in 2015 (USDA-NASS, 2016b). Iowa produced 4841 million pounds

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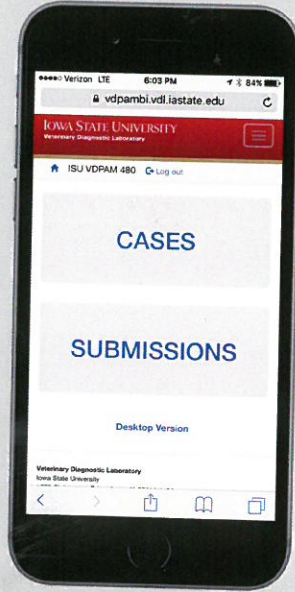
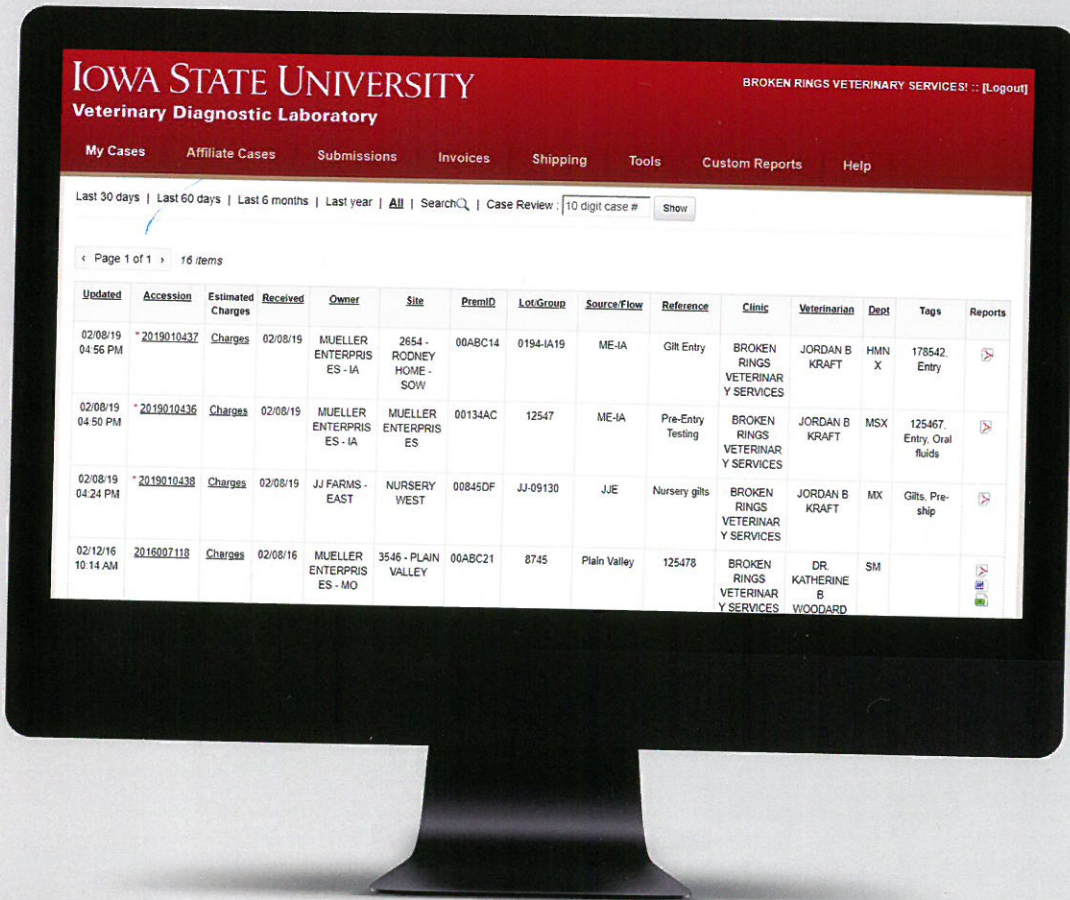
by as-  
collections are  
second step, these conti-  
stakeholder survey estimates of non-  
the overall economic value of the animal pro-

The ISUVDL receives \$4 million annually as a direct state government appropriation for operating purposes. The \$31.79 million in state taxes in normal years and the \$124.15 million in state taxes in an animal health emergency equates to a 795% and 3104% return on investment, respectively. Estimates of the economic impact of the ISUVDL provides information to scientists, administrators, and policymakers regarding the efficacy and return on investment of VDLs.

# MODEL OF SERVICE, TEACHING, AND RESEARCH

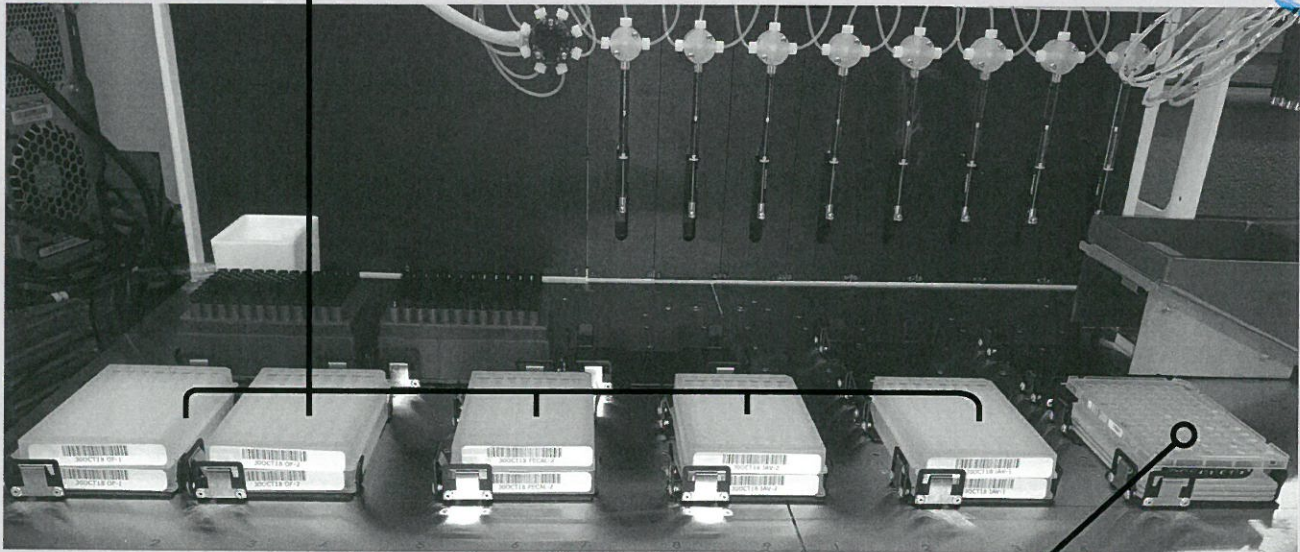
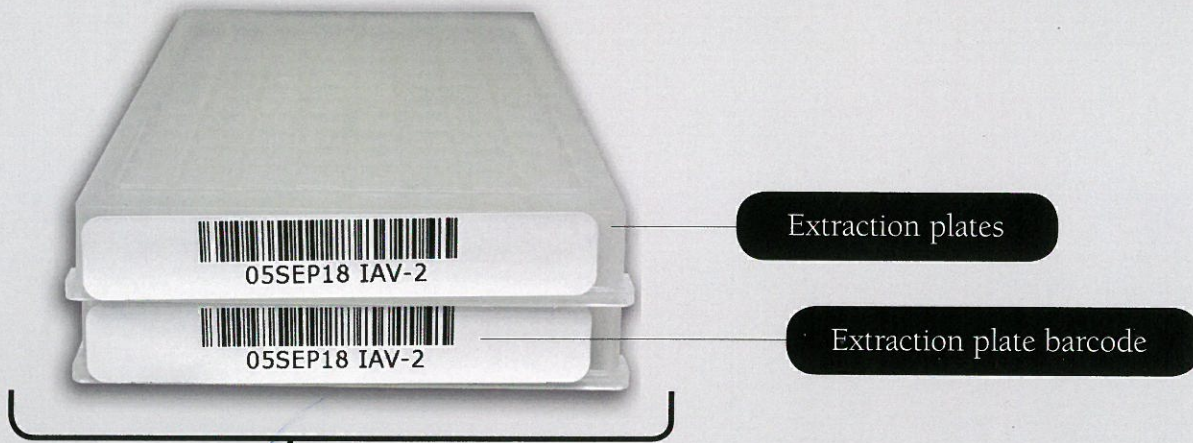
## INFORMATION TECHNOLOGIES

Suite of Web-based Applications for Submissions and Results

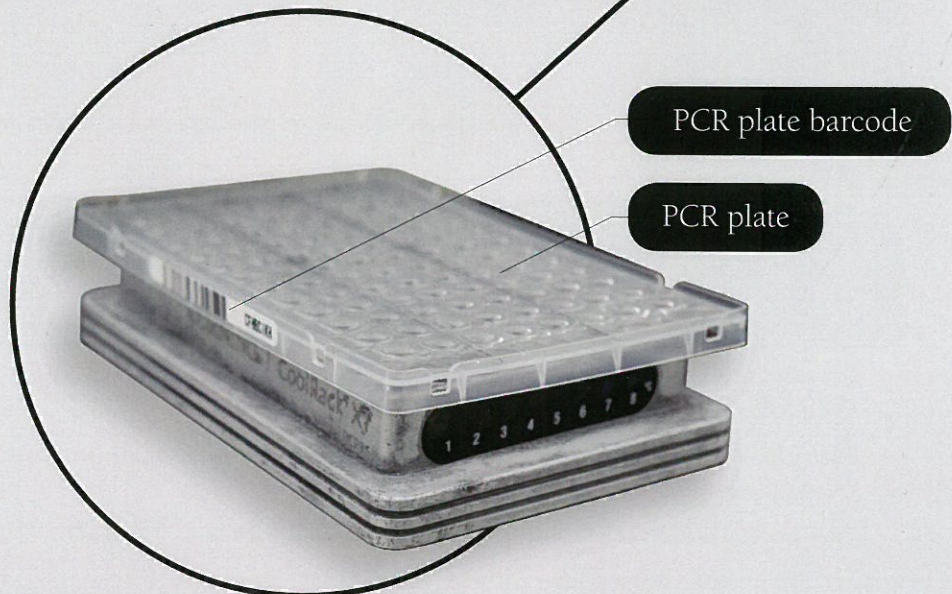


Percentage of Cases Submitted Electronically

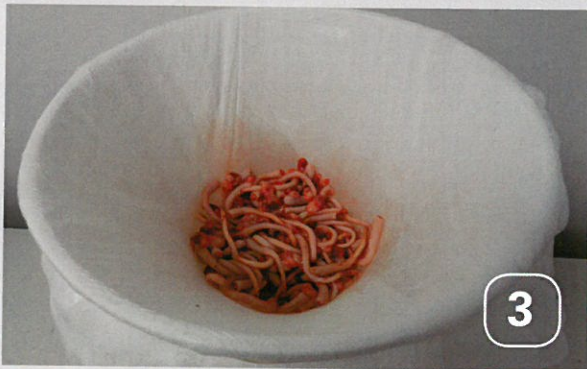




The Iowa State University Veterinary Diagnostic Laboratory has the **1st fully integrated molecular diagnostic workflow in the United States.**



SWINE



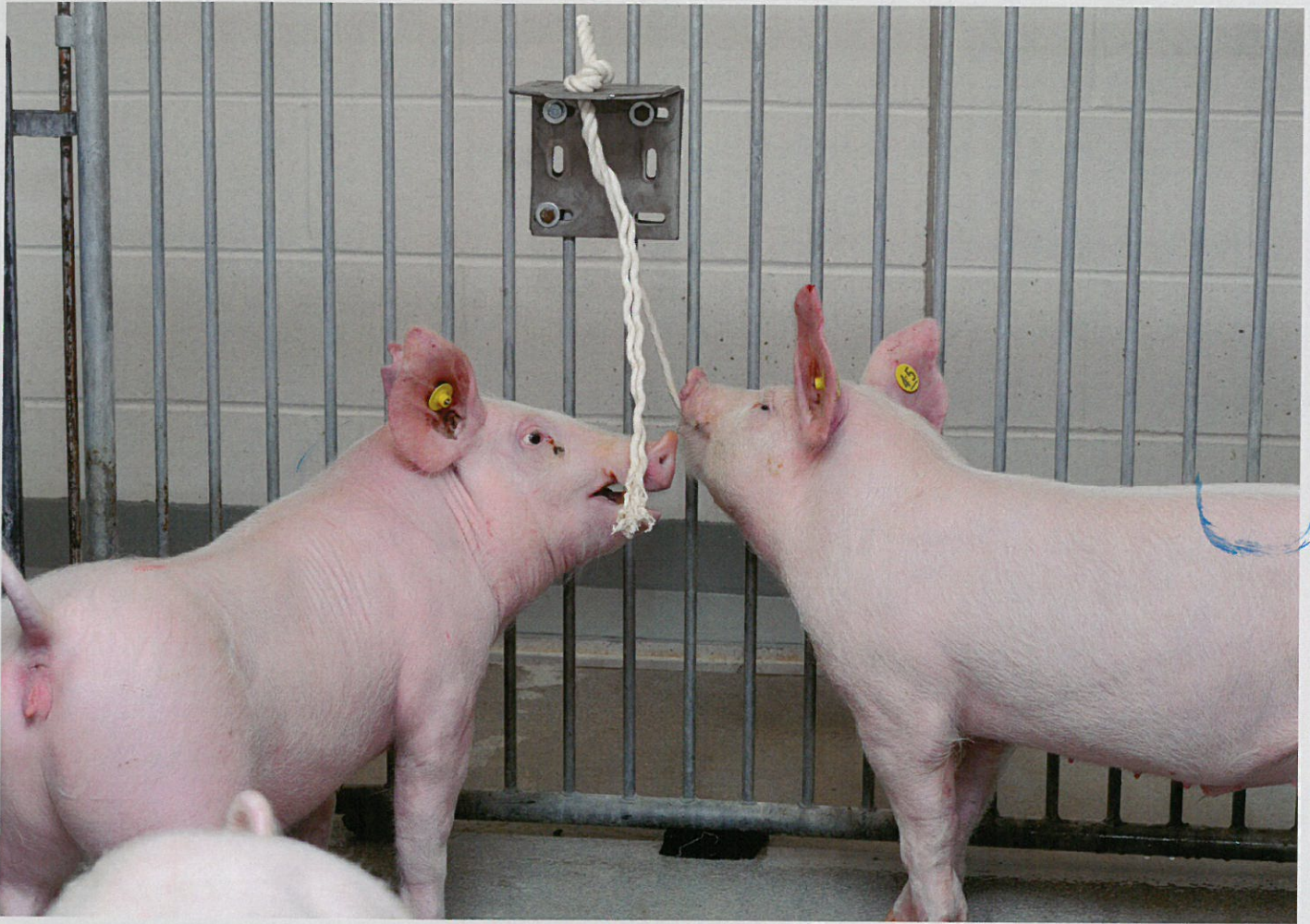
PROCESSING FLUIDS

Linhares et al, ISU CVM

Exudate (fluid) from testicles and tails collected from young piglets is now being used as a highly sensitive sample type for determining the health status of breeding herds.

2017 — 1,000 tests

2018 — 19,341 tests

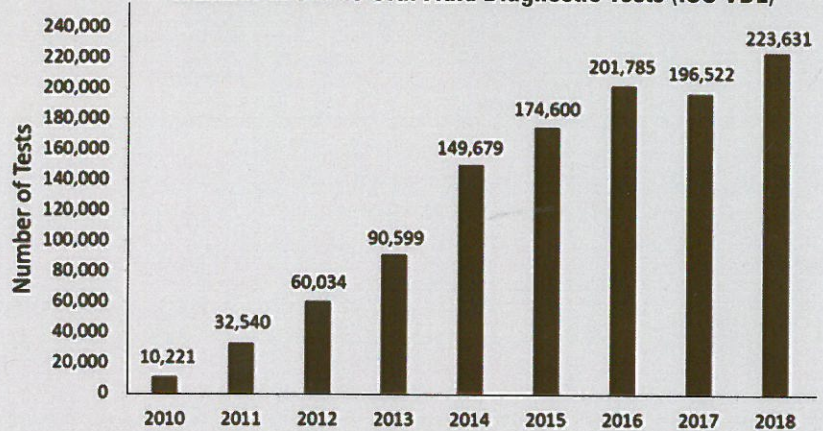


**SWINE ORAL FLUIDS**

Zimmerman et al, ISU CVM

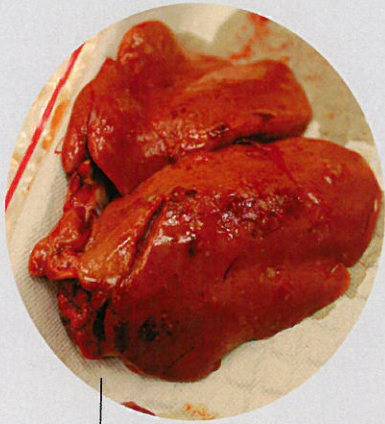
Saliva (oral fluid) collected from cotton ropes hung in swine pens has become the primary sample type used to detect the presence or absence of diseases in growing pigs.

**Number of Swine Oral Fluid Diagnostic Tests (ISU VDL)**



# MODEL OF SERVICE TEACHING AND RESEARCH

## POULTRY



Liver lesions present



Campylobacter jejuni colonies grown on Blood agar



Campylobacter jejuni organism



### SPOTTY LIVER DISEASE

(*Campylobacter hepaticus*)

First diagnosed in the United States in 2017

Liver lesions present

Increases mortality

Decreases egg production

More frequently diagnosed in floor raised birds

Iowa State University researchers are investigating ways to develop rapid diagnostic tools and effective vaccines against Spotty Liver Disease (SLD)





Restricted antibiotic use exacerbates impact



Causes necrotic enteritis and diarrhea

## COCCIDIOSIS

Protozoal disease

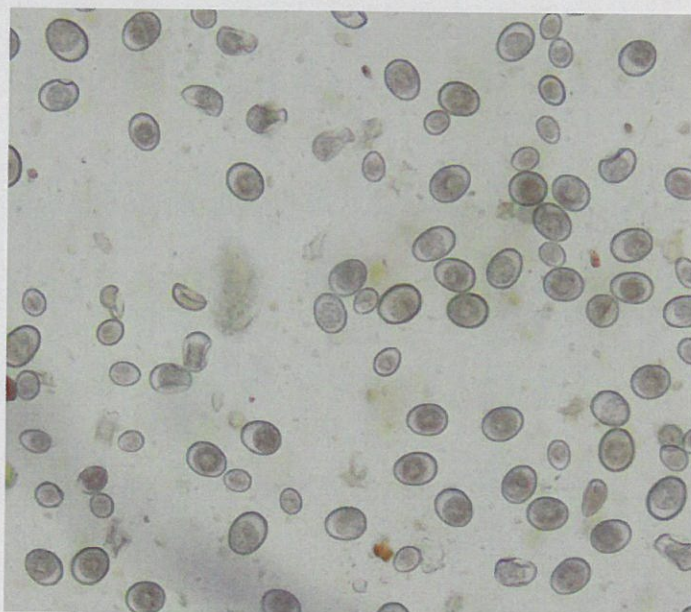
Diarrhea

High morbidity

Low growth  
 Low feed efficiency

Fecal - Oral

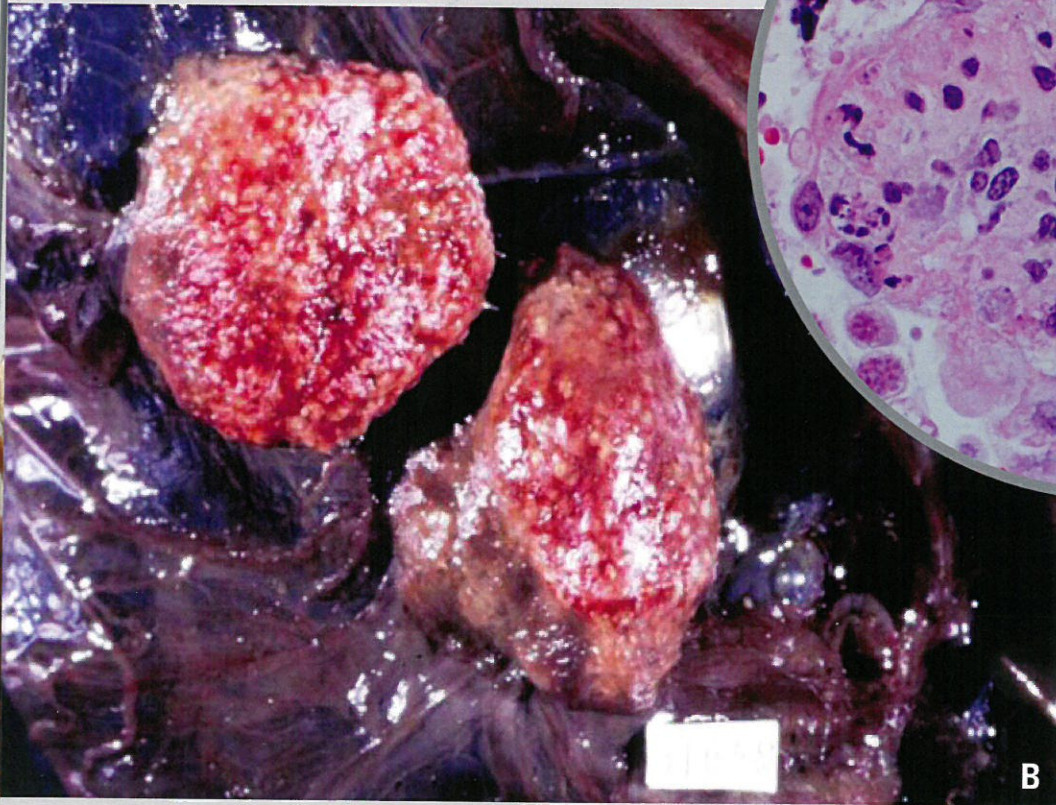
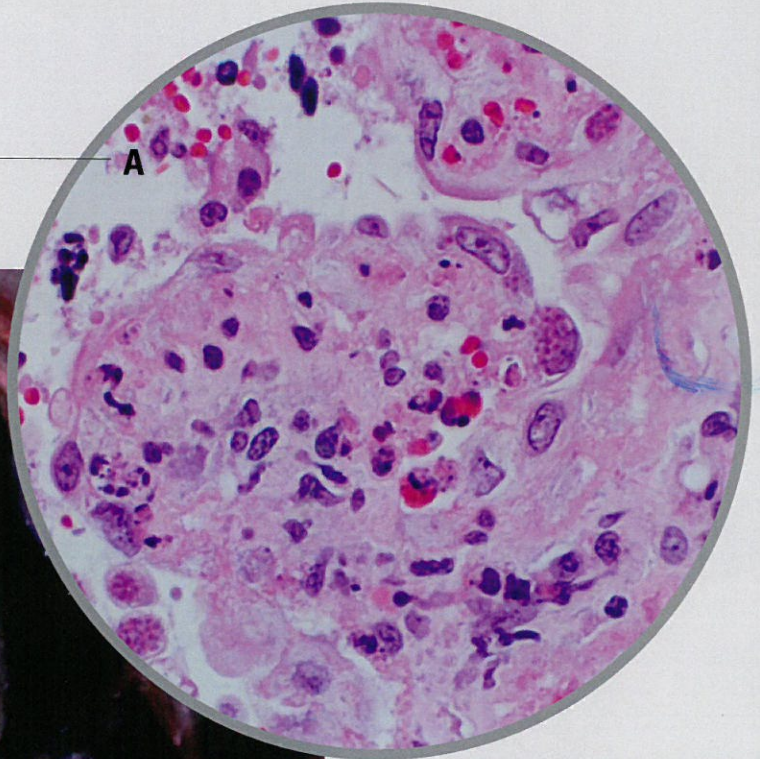
#1 disease impacting growing birds



Microscopic image of cocci

RUMINANT

A – Ewe placenta  
microscopic lesion



B – Placenta  
gross lesion

**TOXOPLASMA**

Abortion in Sheep

3 fetuses & 1 placenta submitted

Toxoplasma PCR+

Impact

Prevention (Cats)

Human Health (Zoonotic)

Initiate Treatment

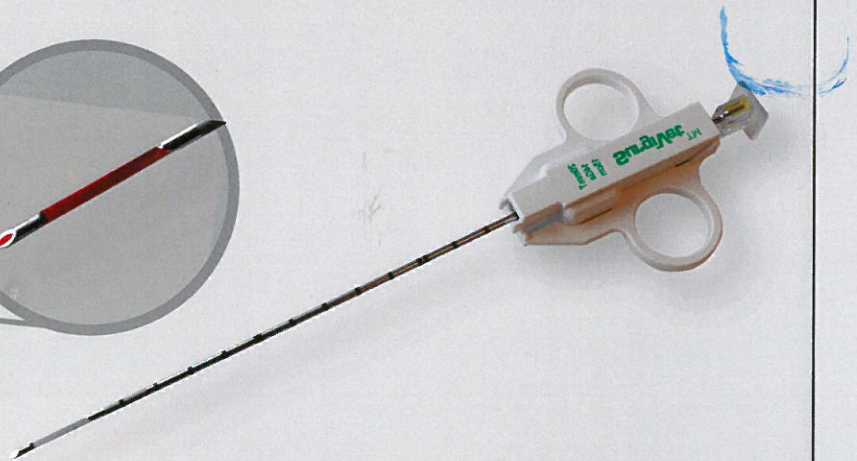
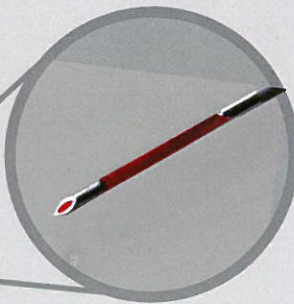
## TRACE MINERALS

Important for Health & Immune System

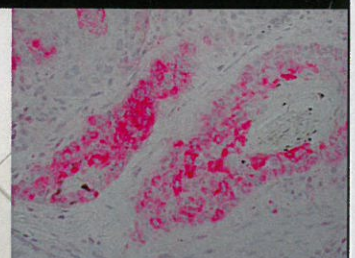
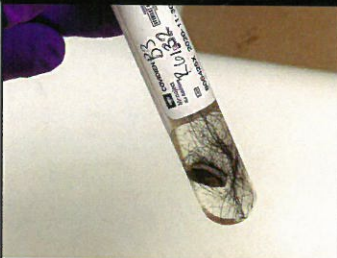
Liver biopsy

Determines status

Deficient  
 Adequate  
 Toxicities



## BOVINE VIRAL DIARRHEA (BVD)



Ear notch

Paraffin wax

Stained slide

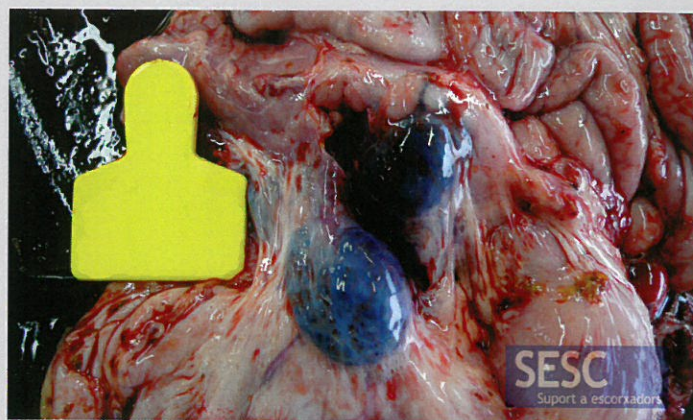
IHC slide

\*Pink Stain is BUO+

Screening for Persistently Infected (PIs)

Introduction into feedlot > \$100/head

# AFRICAN SWINE FEVER



## AFRICAN SWINE FEVER

(Emerging Animal Health Crisis in Europe & Asia)

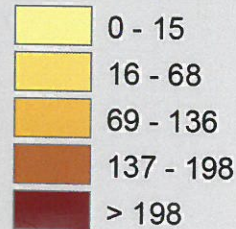
Highly resistant virus	High morbidity	High mortality
Depopulation of affected sites	 <b>TRADE IMPACTING DISEASE</b>	
Not a human health concern		



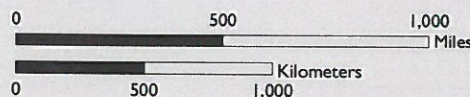
### OIE Confirmed ASF Detections in China \*1

- Confirmed ASF Detections in Domestic Pigs (n=106)
- ▲ Confirmed ASF Detection in Wild Boar (n=2)

### ( ) Number of All Confirmed ASF Detections Swine / sq km \*3



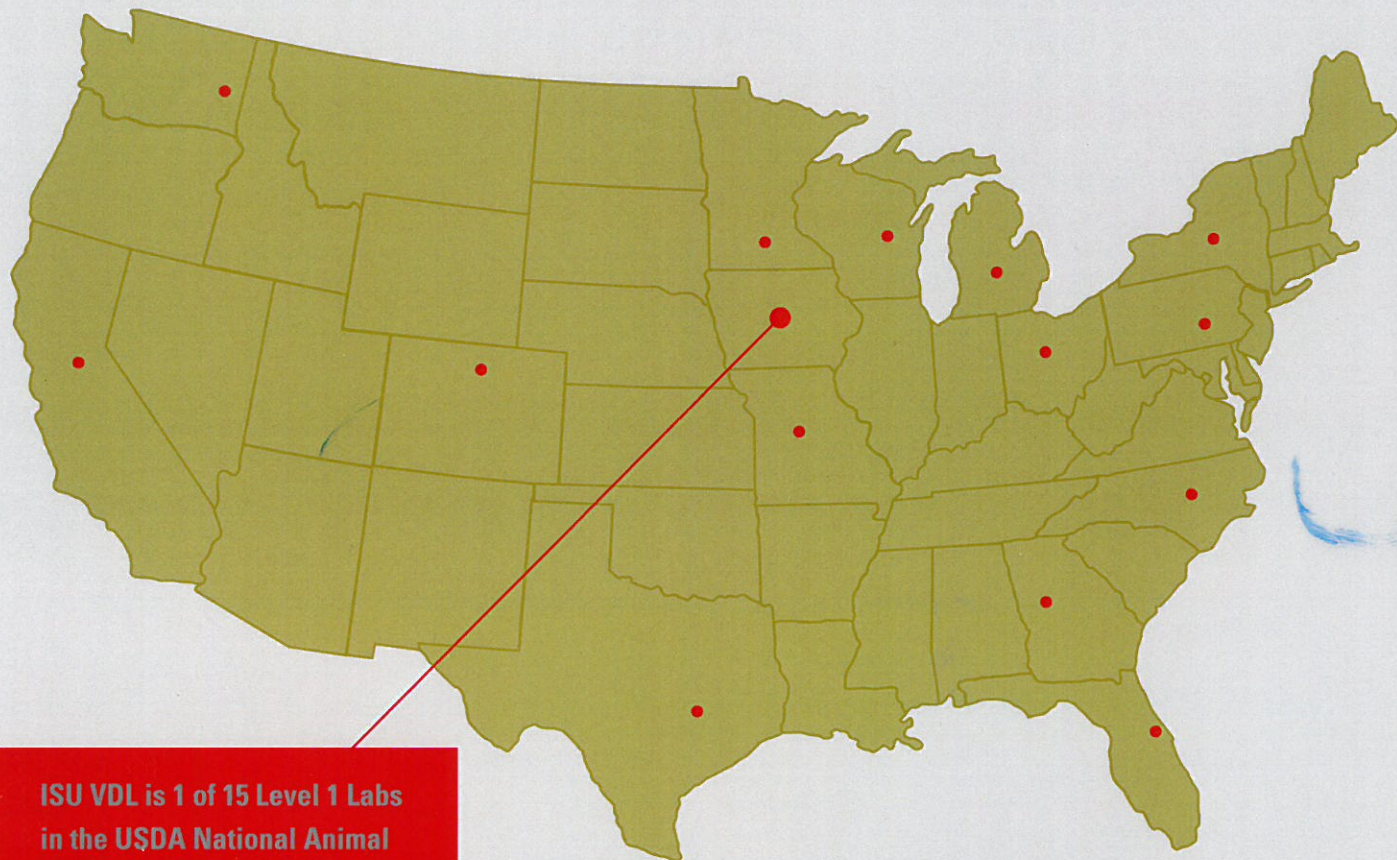
Data Source:  
 \*1 World Organisation for Animal Health (OIE)  
 \*3 Statistics on China's live pig stocks: 2016, Zhiyan Consulting



USDA, APHIS, VS  
 Center for Epidemiology and Animal Health  
 2150 Centre Ave  
 Fort Collins, CO 80526

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# NAHLN LEVEL 1 LABS



ISU VDL is 1 of 15 Level 1 Labs in the USDA National Animal Health Lab Network

## FRONTLINES OF FOREIGN ANIMAL DISEASE

Surveillance and Response

	African Swine Fever (ASF)
	Classical Swine Fever (CSF)
	High-Path Avian Influenza Virus (HP- AIV)
	Foot and Mouth Disease (FMD)
	Exotic Newcastle Disease (END)

