# Animal Diseases Diagnostic Laboratory Poultry Services

Advanced Poultry Medicine Workshop
June 20, 2019
Dr. Craig Sarver
Ohio Department of Agriculture
Animal Disease Diagnostic Laboratory
Reynoldsburg, Ohio

ADDL Ohio Department of Agriculture

## Ohio's Unique Multi-Agency Laboratory Complex

Ohio Department of Agriculture
Animal Disease Diagnostic Laboratory

Ohio Department of Health Laboratory

Ohio Department of Agriculture
Consumer Protection Laboratory

## ADDL
## What We Do and Who We Are

Kyagr.com

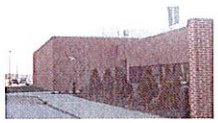
## ADDL Facilities

Ohio Department of Agriculture
Division of Animal Health
Animal Disease Diagnostic Laboratory

- Animal Health Building 29,000 sq ft
- Lab Space 13,200 sq ft
- Pathology Suite 4,900 sq ft
- BL3 Suite/Alkaline Hydrolysis 5,300 sq ft
  - Commissioned in 2006



## Biosafety Level 3 Suite

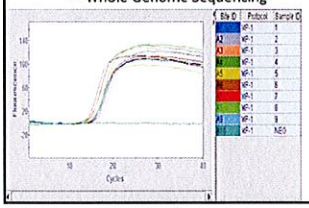



## State-of-the-Art Assays

- MALDI
  - Matrix-assisted laser desorption ionization
  - Bacterial, Fungal ID
    - UV Laser beam
    - Ionized plum-Mass Spectrometry
  - Results in seconds
    - 16S ribosomal proteins
  - Cost Effective (< .50/test)

## State-of-the-Art Assays

- Molecular Methods
  - Conventional and RT PCR
  - Nucleic Acid Sequencing
  - Whole Genome Sequencing



## Animal Disease Diagnostic Laboratory Mission

To provide diagnostic veterinary medical testing to assist veterinarians and public officials in identifying and controlling disease conditions affecting animals and public health.

## ADDL Mission Scope

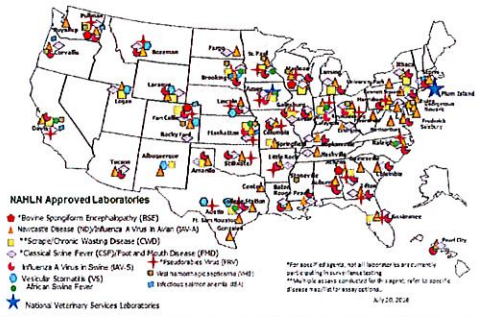
- Expedient, quality diagnostic service
- Disease diagnosis and surveillance
- Food safety/public health initiatives
- Disease prevention/quality assurance
- Bioterrorism preparedness
  - FADD trained personnel
  - National Animal Health Laboratory Network
    - Tier 1 Laboratory

## AAVLD Accreditation

- **American Association of Veterinary Laboratory Diagnosticians**
  - ISO 17025 Standards
  - Nationally Recognized
  - Quality Diagnostics
  - Client Service
  - Full accreditation in 2015

AAVLD The American Association of Veterinary Laboratory Diagnosticians

## National Animal Health Laboratory Network (NAHLN)




## Ohio Animal Disease Diagnostic Lab

Mutually Supportive Disciplines

**Professional Specialties**

- Pathology
- Avian Serology
- Bacteriology
- Molecular Diagnostics
- Parasitology
- Serology
- Virology

**Referral Labs** - Nutrition
- Toxicology

## ADDL Work Load Summary

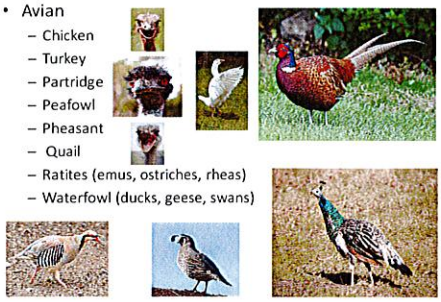
- 40,000 accessions /year
- > 400 test methods
- 450,000 tests/year
- 1,200 pathology cases/year
  - Necropsy, histopathology accessions





## All Species

- Avian
  - Chicken
  - Turkey
  - Partridge
  - Peafowl
  - Pheasant
  - Quail
  - Ratites (emus, ostriches, rheas)
  - Waterfowl (ducks, geese, swans)



## ADDL
## What We Offer - Poultry Diagnostics


## Pathology Services

| Service | Price |
|---|---|
| Necropsy – (Backyard poultry) | $90 ($15) |
| Histopathology | $11.25/ slide |
| Cytology | $15 |
| Fecal Examination<br>• Flotation<br>• Centrifugation<br>• Smear | $16-21 |
| Nutrition | Ref Lab |
| Toxicology | Ref Lab |

## Services provided by the Pathology Section

- Accession Fee → $8
- Necropsy fee → $90 (Backyard Poultry $15)

- Complete Necropsy
- Histopathology
- Surgical pathology
- Special stains
- Fecal exams
  - Smear, Float, Centrifugation

- Necropsy accessions are performed on a consignment basis:
  - 1-6 poultry (chicken, turkey, duck, gamebirds)
  - 1-5 aborted fetuses,
  - 1-3 neonates, any species,
  - 1-3 weanlings




## Pathology Section Reports and Services

- Gross necropsy
  - Preliminary
  - Interim
  - Final
  - Addended
- Photographs
- Histopathology
- Cause of death
  - Trauma
  - Toxicosis
  - Infectious disease → Zoonotic disease
- Documentation of animal health status

## Avian Serology Services


| Test | Price per sample |
|---|---|
| AGID<br>• Avian influenza | $3.00 - $6.00 |
| ELISA<br>• Avian Encephalomyelitis Virus<br>• Avian Influenza<br>• Avian Reovirus<br>• Bordetella avium<br>• Hemorrhagic Enteritis Virus<br>• Infectious Bronchitis Virus<br>• Infectious Bursal Disease Virus<br>• Mycoplasma spp. (M. gallisepticum, M. meleagridis, M. synoviae) | $1.75 - $3.00 |
| HI<br>• Paramyxovirus (Newcastle Disease) Type 1, 2, 3, 7 | $3.00 |
| MAT<br>• Salmonella | $1.00 |

## Bacteriology Services

Matrix Assisted Laser Desorption Ionization – Time Of Flight Mass Spectroscopy

| Test | Price |
|---|---|
| Aerobic | $20 |
| Anaerobic | $23 |
| Campylobacter | $13.75 |
| Mycoplasma | $18.50 |
| (+$40-75 for identification) | |
| Salmonella | $22 |
| Susceptibility | $15 |
| Stains | Acid Fast $6<br>Gram $5.50 |

## Bacteriology: Poultry Pathogens

- *Avibacterium (Haemophilus) paragallinarum*
- *Bordetella avium*
- *E.coli*
- *Enterococcus species*
- *Erysipelothrix rhusiopathiae*
- *Gallibacterium anatis ss haemolyticum*
- *Mycoplasma sp.*
- *Ornithobacterium rhinotracheale*
- *Pasteurella multocida*
- *Pseudomonas* sp.
- *Salmonella* species
- *Staphylococcus aureus*
- *Streptococcus* species

## Molecular Diagnostics Services

| Test | Price per sample |
|---|---|
| **Conventional PCR/RT-PCR**<br>• Avian Encephalomyelitis Virus<br>• Avian Pneumovirus<br>• Chlamydia<br>• Infectious Bursal Disease<br>• Infectious Laryngotracheitis | $25.00-$40.00 |
| **Real-time PCR/RT-PCR with high-throughput capacity**<br>• Avian influenza (w/ sub-typing)<br>• Avian paramyxovirus (Newcastle)<br>• Mycoplasma species (M. gallisepticum, M. iowae, M. meleagridis, M. synoviae) | $30.00-$50.00 |
| **Next Generation Sequencing**<br>• Whole genome | $300.00 |
| **Sanger Sequencing**<br>• Gene target | $75.00 |



## Virology Services

| Test | Price per sample |
|---|---|
| Fluorescent Antibody (FA) test<br>• Influenza A | $12.00 - $15.00 |
| Electron Microscopy | $25.00 |
| Virus isolation | $38.50 |

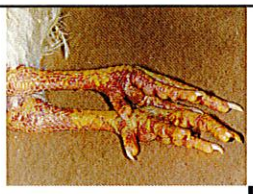

A = Fluorescent microscope used for FA/FA tests
B = Light microscope used for virus isolation studies
C = Electron microscope
D = Rotavirus, visualized using ADDL electron microscope (magnification unknown)

## ADDL Poultry Diagnostics and Regulatory Veterinary Medicine

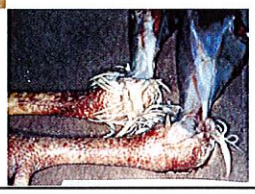
americanpoultryauctions.com

## Highly pathogenic avian influenza: Clinical Signs

- Sudden onset and rapid spread
- Moderate/high morbidity & mortality
- Sudden death
- Severe depression
- Drop in feed/water consumption
- Cough, sneeze, nasal discharge
- Ataxia, tremors, torticollis
- Decrease egg production and abnormal eggs



HPAI - Chicken
Hemorrhages on shanks



HPAI - Chicken
Discolored and swollen combs and wattles.

HPAI - Chicken
Hemorrhage, edema in comb.

HPAI - Chicken
Edema in intermandibular area.

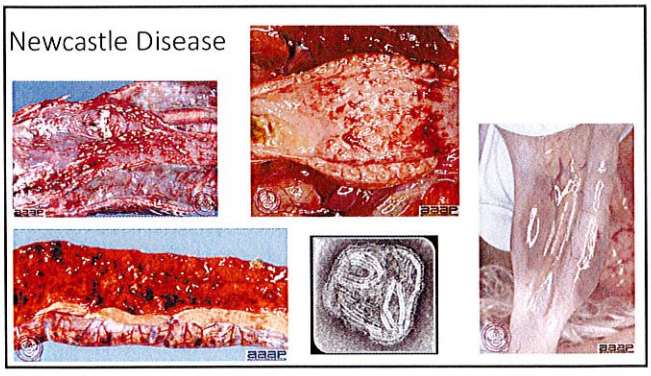
## Velogenic viscerotropic Newcastle Disease

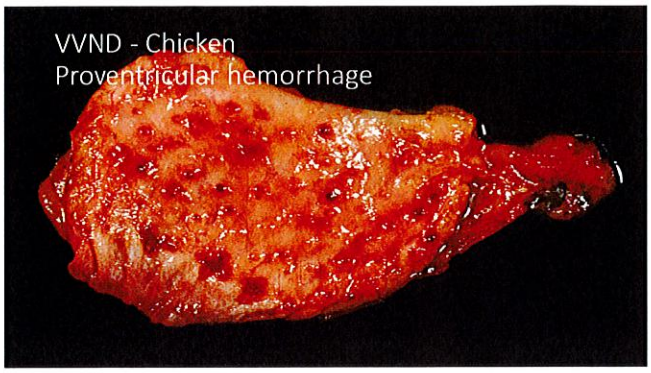
- Definition: A highly virulent multisystemic virus disease of many bird species, characterized by edema, hemorrhage, necrosis and ulceration.
- Etiology: Genus Avulavirus, Family Paramyxoviridae
- Hosts: Domestic poultry, exotic/pet birds, waterfowl
- Transmission: Direct and indirect contact (fomites, flies, mice)
- Morbidity/mortality: High / high (up to 100/90%)
- Clinical signs: Sudden death, diarrhea, respiratory distress, drop in egg production, CNS signs.

## Velogenic viscerotropic Newcastle Disease

- Genus Avulavirus, family Paramyxoviridae).
- Based on the disease produced in chickens, NDVs have been classified into five pathotypes:
  - Viscerotropic velogenic (most pathogenic),
  - Neurotropic velogenic,
  - Mesogenic (moderate pathogenic),
  - Lentogenic (low pathogenic)
  - Asymptamatic

## Newcastle Disease






## Ohio Reportable Disease List Includes Avian Diseases: OAC 901: 1-21-02

- Highly Pathogenic Avian Influenza (HPAI);
- Fowl Typhoid;
- Infectious laryngotracheitis (NOT vaccine induced);
- Avian encephalomyelitis (poultry);
- Mycoplasma gallisepticum, turkeys;
- Newcastle disease;
- Chlamydiosis/ornithosis;
- Avian paramyxovirus (other than Newcastle);
- Salmonella pullorum.

- If a flock is experiencing high death loss, report it!
- We need to rule out HPAI as soon as possible!

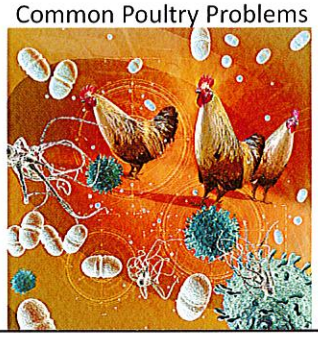
## Reportable Disease- Regulatory Reminder

- If you add a reportable disease to your differential list, it is your obligation to report it:
- Call SAHO: Dr Forshey 614-728-6220
- Call APHIS AD: Dr Skorupski 614-856-4735

ADDL

ADDL

Common Poultry Problems



merckvetmanual.com

Marek's Disease Virus (MDV)

- LEG PARALYSIS
- TORTICOLLIS

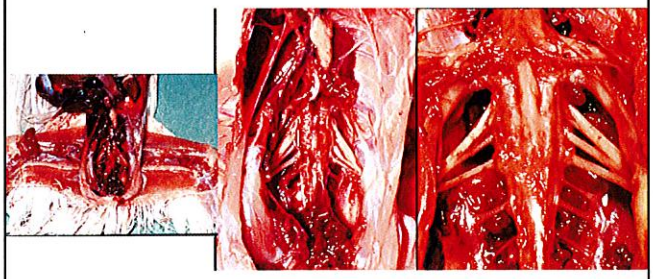
- NOAH'S ARKIVE Purdue University - HARRINGTON

## Marek's Disease Virus

- Alphaherpesvirus
- T-cell lymphomas in peripheral nerves, CNS, viscera, skin, gonads, muscles
- Usually seen in young chickens (5-25 weeks), but can occur in any chicken > 3 weeks old → Progressive ascending paralysis
- Four forms of MD infection:
  Neurologic (classic),
  Visceral (acute)
  Ocular
  Cutaneous
- PNS infiltrates characterized as Type A or Type B
  Type A → Numerous lymphoblasts (neoplastic), some medium and small lymphocytes , scattered large basophilic mononuclear cells (MDV cells)

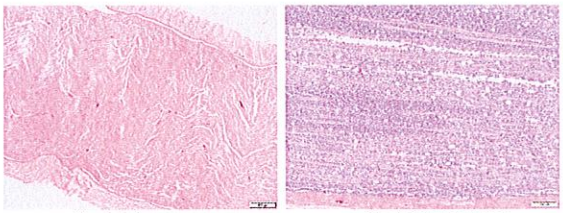
  Type B → Inflammatory lesion – small lymphocytes and plasma cells and some lymphoblasts separate nerve fibers (edema)

## Marek's Disease Virus



NOAH'S ARKIVE Purdue University - HARRINGTON

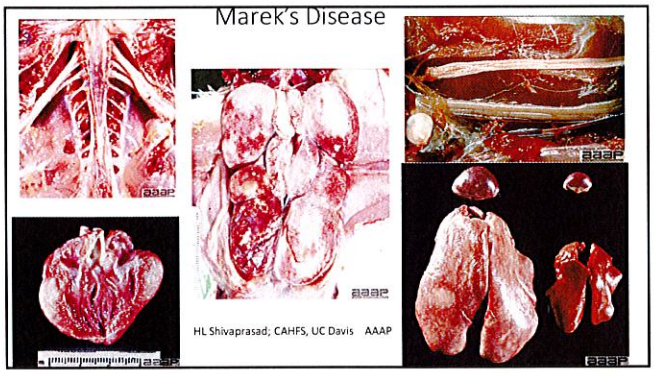
## Marek's Disease Virus



Normal sciatic nerve

Marek's Disease sciatic nerve

## Marek's Disease

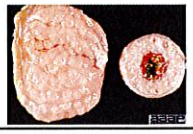


HL Shivaprasad; CAHFS, UC Davis AAAP

## Marek's Disease Virus

Iris lymphocytic infiltrates

Feather follicle infiltrate = Cornell



Proventriculus
lymphocytic infiltrates

AAAP Avian Disease Manual – NCSU – HJ Barnes

poultryworld.net

## Infectious Laryngotracheitis (ILT)

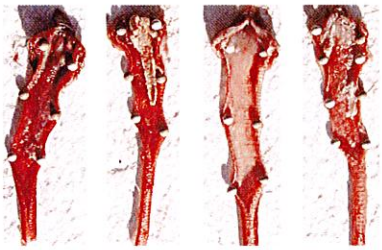
## Infectious Laryngotracheitis (ILT)

- Herpesvirus
- Incubation: 5-12 days after exposure
- Marked dyspnea, coughing and bloody exudate
- High morbidity (50-70%) and variable mortality (can be up to 50%)
- Signs up to two weeks - coughing for up to a month
- Birds may become latent carriers
- Reactivation of the virus under stressful conditions

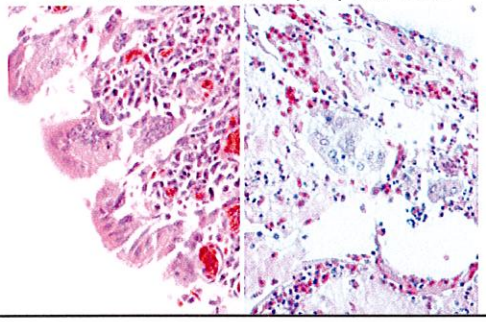
## Infectious Laryngotracheitis (ILT)

- Diphtheritic
- Necrotizing
- Mucohemorrhagic
- Reportable in Ohio
- OAC 901:1-21-02
  - 16th on the list!
  - Call SAHO office

## ILT - Gross Lesions

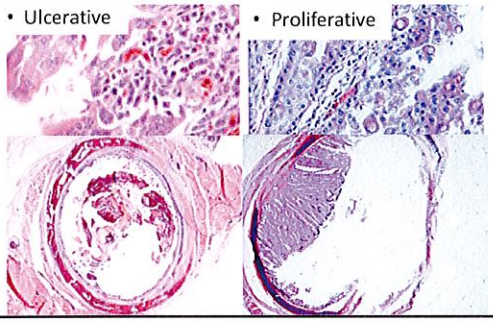


## ILT – Inclusions and Syncytial Cells

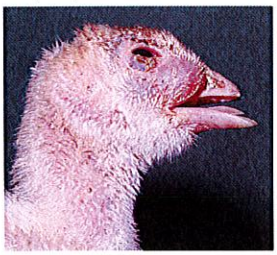


## ILT and Avian Pox – Viral Inclusions

- Ulcerative
- Proliferative



## Mycoplasma



- Mycoplasma gallisepticum
- Primarily in chickens and turkeys, also in partridge, pheasants, peafowl, quail, guinea fowl, ducks, geese, and pigeons
- Chronic respiratory disease
- Infectious sinusitis (turkey)
- Transmission: aerosol and egg (transovarian)
- Cough, sneezing, snicks, rales, ocular/nasal discharge
- Swelling of infraorbital sinuses (turkeys)

NOAH'S ARKIVE - NADC - Cheville

## Mycoplasma

msdvetmanual.com

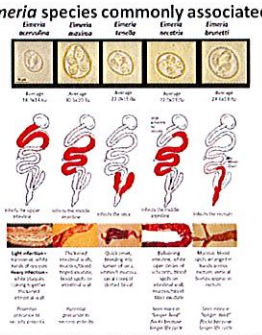
- Mycoplasma synoviae
- Chickens and turkeys
- Upper respiratory infection (subclinical)
- Systemic infection
- Synovial infection

## Mycoplasma

Merckveterinarymanual.com

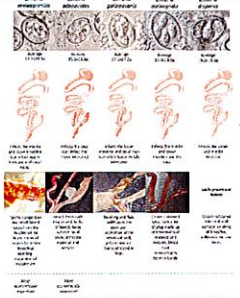
- Mycoplasma meleagridis
- Turkey
- Airsacculitis
- Transmission: Egg and aerosol
- Bursa of Fabricius – immunosuppression

**Five chicken *Eimeria* species commonly associated with disease**



http://www.uoguelph.ca/omafra_partnership/kti/en/johnbarta/Characteristics-of-Eimeria-species.asp?_mid_=26492

**Five turkey *Eimeria* species commonly associated with disease.**



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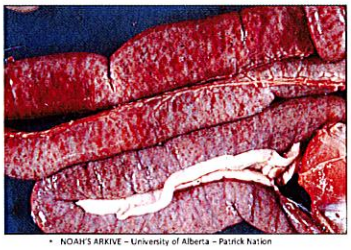
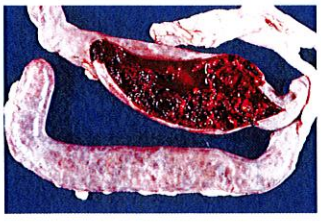
## Intestinal parasites



- NOAH'S ARKIVE – University of Alberta – Patrick Nation

- ORGAN
  - INTESTINE CHICKEN
- DIAGNOSIS
  - INTESTINAL COCCIDIOSIS
- CAUSE
  - EIMERIA SP.

## Intestinal parasites



- ORGAN
  - INTESTINE-CECUM
- DIAGNOSIS
  - CECUM(OPENED) COCCIDIOSIS CHICKEN
- CAUSE: *Eimeria tenella*
- CONTRIBUTOR
  - Patrick Nation
- INSTITUTION
  - University of Alberta, Canada

AAAP - 2006 Manual 6th edition - NCSU - Barnes

## Intestinal parasites

- CAPILLARIA
- Capillary or Threadworms
- *Capillaria contorta* and *Capillaria annulata*
- Chickens, turkeys, game birds, many others
- Esophagus, crop, duodenum
- Direct life cycle


Avian Disease Manual, 7th edition - AAAP

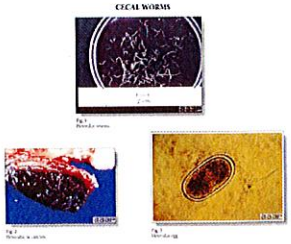
## Intestinal parasites

- ASCARIDS
- *Ascaridia galli*
- Large intestinal roundworm
- Chickens and turkeys
- Simple direct life cycle


Avian Disease Manual, 7th edition - AAAP

## Intestinal parasites

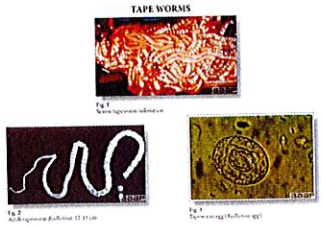
- CECAL WORMS
- *Heterakis gallinae*
- Chickens and turkeys, other birds
- Simple direct life cycle
- Major vector of *Histomonas meleagridis*




Avian Disease Manual, 7th edition - AAAP

## Intestinal parasites

- CESTODES
- Many – acquired through ingesting insects
  - Snails, slugs, beetles, ants, grasshoppers, earthworms, houseflies, etc.
- Most common:
  - Raillietina cesticillus
  - Choanotenia infundibulum
- Indirect life cycle – ingest intermediate host




Avian Disease Manual, 7th edition - AAAP

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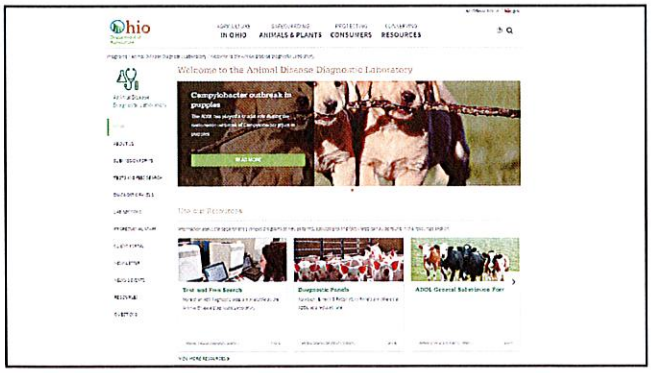

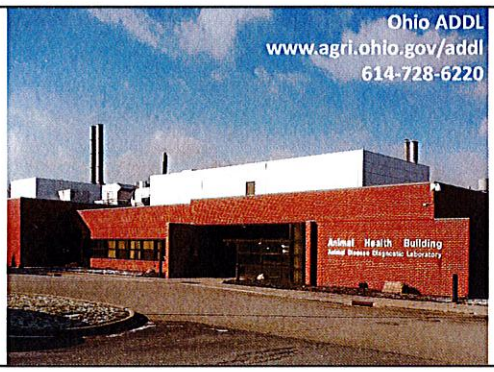
Ohio ADDL
www.agri.ohio.gov/addl
614-728-6220
Animal Health Building

Questions?