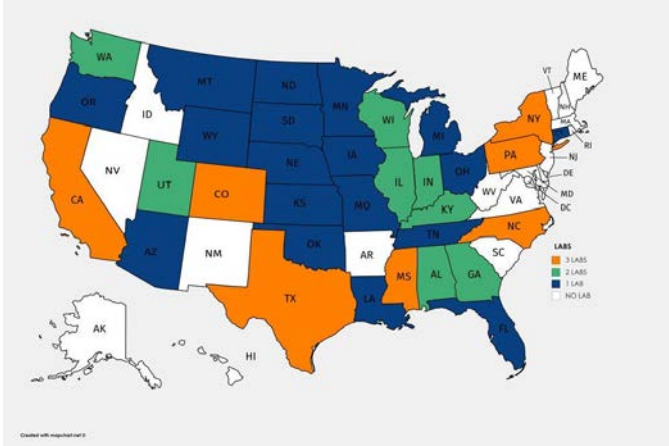

ANTIMICROBIAL SUSCEPTIBILITY
TESTING IN STATE VETERINARY
DIAGNOSTIC LABORATORIES IN THE
UNITED STATES

D. TEWARI BVSC PHD DACVM
PENNSYLVANIA DEPT AGRICULTURE
PENNSYLVANIA VETERINARY LAB

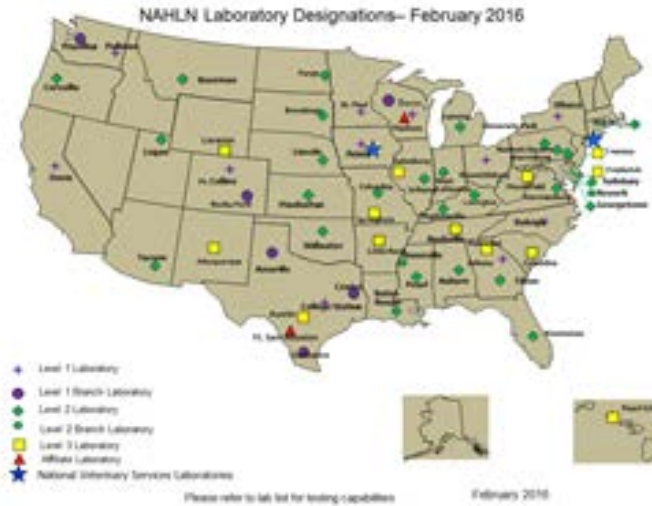




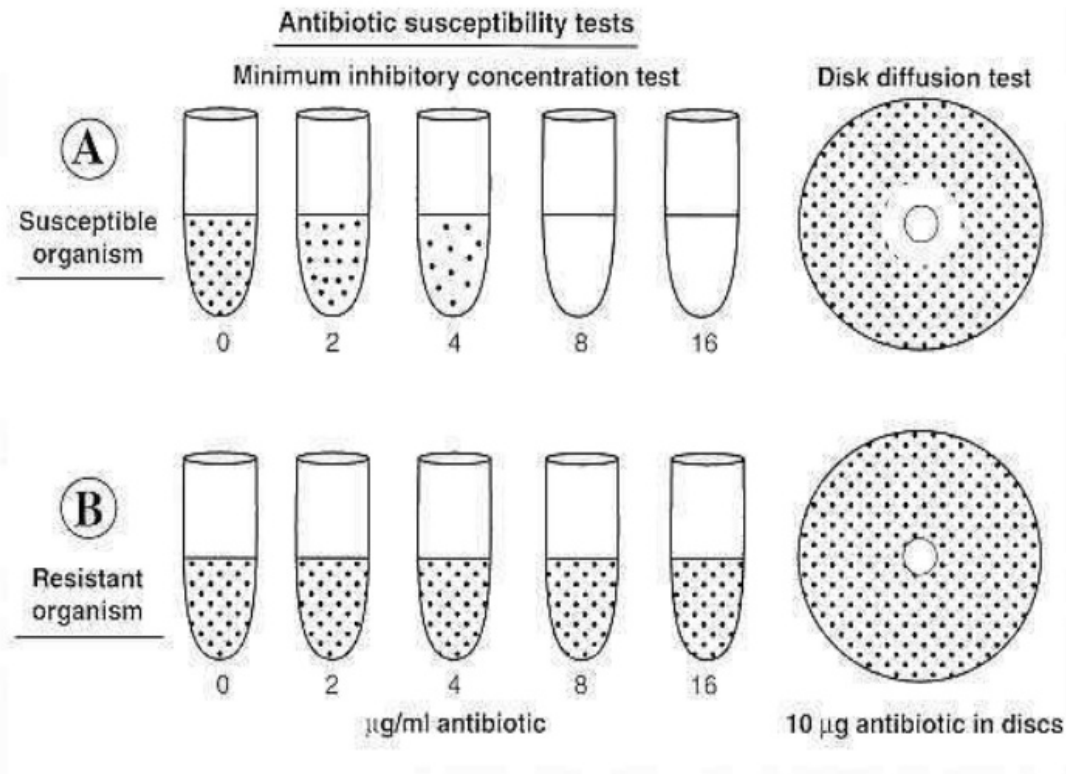
-AAVLD Labs

-NAHLN Labs

-LIRN and University/Research/Clinic



Primary Lab methods for AST

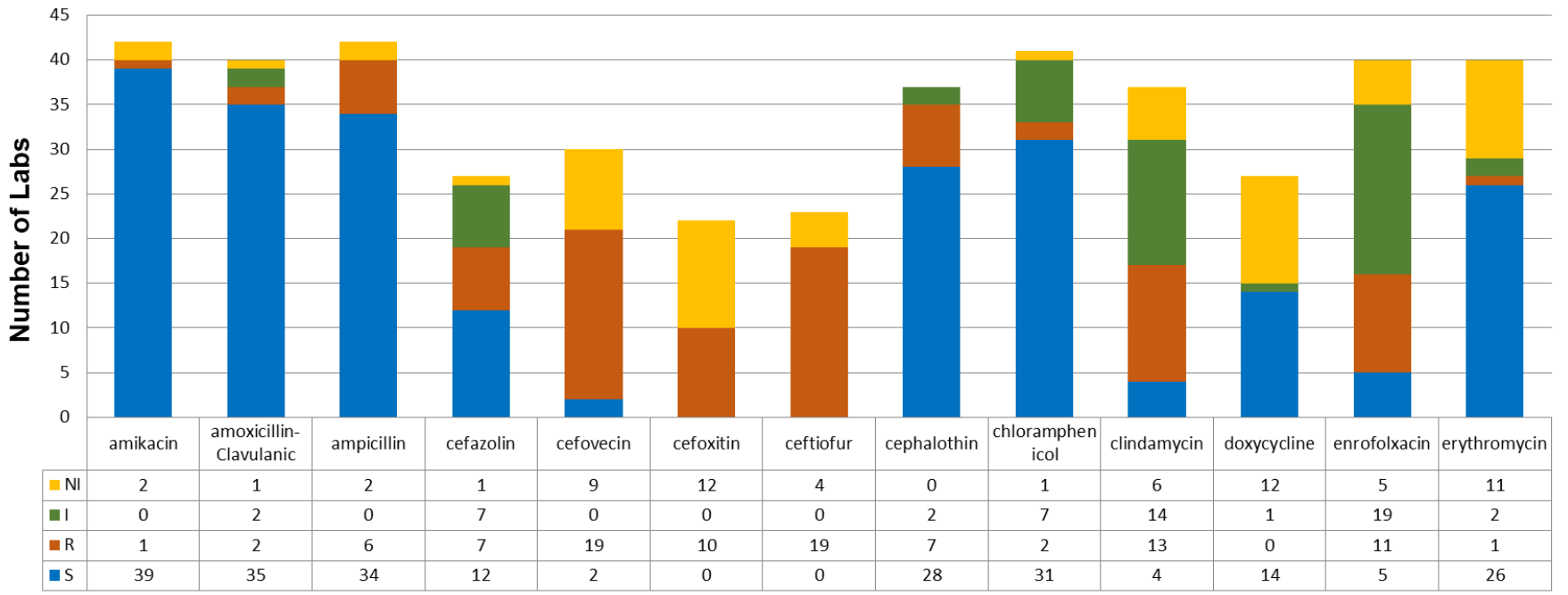


What do labs report-not



- **Antibiograms**
- **Disclaimer-Efficacy/Residue issues**
 - **Drugs tested**
 - **Results: Susceptible, Resistant, Intermediate or NI**
 - **MIC**
- **Trends**

Summary: ABST Results



AAVLD Working Group with NAHLN

Joint working group; AAVLD, FDA, CLSI and APHIS-VS.

- Overall charge; develop recommendations for standardized surveillance of AMR in animal pathogens

Survey developed in collaboration with the WG

AAVLD Bacteriology Committee,

NAHMS group at CEAH and NVSL



Survey

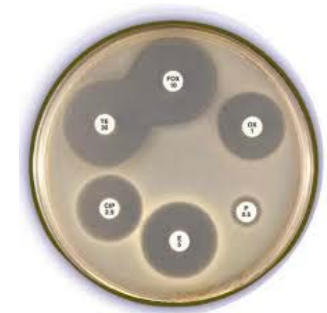
- 52/132 responses received (39.3% **Dargatz et al 2017**)
- AAVLD/NAHLN/VetLIRN diagnostic laboratories, clinics, commercial entities
- 21 questions covering antibiotic susceptibility testing; current practices, testing volume based on animal and bacterial species, molecular dx capabilities
- **>50%** of all labs use CLSI Vet-01 (formerly M31) *Performance standards for Antimicrobial Disk and Dilution Susceptibility Tests for Bacteria Isolated from Animals*



Antimicrobial Susceptibility Test (AST) Methods

Methods most commonly used by labs:

- 71.4% - Disk diffusion
- 61.2% - Commercial broth microdilution
 - Top three systems – Sensititre[®], Vitek[®], BioMic[®]
- 42.9% - Both disk diffusion + microdilution



94% of labs use standardized methods and QC procedures for interpreting AST data

61.2% - Automatically interpreted by commercial system



Sources of Bacterial Isolates

94.2% – clinical cases

- research projects
- monitoring/surveillance programs
 - Collaborations with public health
 - Environmental testing
 - Clinical studies

Animal Sources

98,788 tests

51.3% – Dogs

14.4% – Cattle

8.6% – Swine

8.5% – Horses

7.9% – Cats

Remaining categories (in order):

- Poultry, Sheep/Goat, Wildlife, Zoo/Exotic Animal Species, Aquatic, Other Companion Animal



Bacteria Most Frequently Tested (all animal species)-Top 6

1. *Escherichia coli*
2. *Pseudomonas aeruginosa*
3. *Staphylococcus spp* (including coag neg Staph)
4. *Pasteurella multocida*
5. *Salmonella spp*
6. *Staphylococcus aureus*



Sharing AST Information

77.6% - do not share AST data with other entities

- 46% - have not been asked
- 32% - against confidentiality policy
- 14% - against QA policy
- 8% - LIMS system incompatible
- 8% - Other
 - Lack of personnel/too labor intensive



NAHLN and LIRN Objectives

- DEVELOP PROCESS FOR TRACKING AMR DATA
- STANDARDIZED METHODOLOGY, INTERPRETATION, & REPORTING MECHANISMS.
- DEPLOY ACROSS MULTIPLE LABORATORIES
- IDENTIFY INFO IMPORTANT TO VETERINARY D LAB COMMUNITY REGARDING TRENDS IN AMR
- FACILITATE ANTIMICROBIAL STEWARDSHIP.

NAHLN: 19 LABORATORIES SELECTED

LIRN- 4 LABS WITH 5 SOURCE LABS



Pathogen/animal species-NAHLN

Bacterial pathogen	Animal Species
<i>Escherichia coli</i>	cattle, swine, poultry, horses, dogs, cats
<i>Salmonella enterica</i>	cattle, swine, poultry, horses, dogs, cats
<i>Mannheimia haemolytica</i>	cattle
<i>Staphylococcus intermedius</i> group*	dogs, cats

*Includes *S. intermedius*, *S. pseudintermedius* and *S. delphini*.

Pennsylvania integrated surveillance for antimicrobial resistance in foodborne pathogens

- PA DEPT OF HEALTH
- UNIVERSITY OF PENNSYLVANIA
- PENN STATE UNIVERSITY
- PA DEPT AGRICULTURE
- GETTYSBURG COLLEGE

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Prevalence of *Salmonella* Cerro in Laboratory-Based Submissions of Cattle and Comparison with Human Infections in Pennsylvania, 2005–2010

Deepanker Tewari,¹ Carol H. Sandt,² Dawn M. Miller,³ Bhushan M. Jayarao,³ and Nkuchia M. Mikanatha⁴


Abstract
The aim of this study was to identify *Salmonella* serotypes infecting cattle in Pennsylvania, to compare infection rates for the predominant serotype, *Salmonella enterica* serotype Cerro, with the infection rates for the same serotype in humans, and to study the clonal diversity and antimicrobial resistance for this serotype in cattle from 2005 to 2010. Clonal diversity among the selected isolates was studied using pulsed-field gel electrophoresis (PFGE) and repetitive (rep)-polymerase chain reaction (PCR). *Salmonella* Cerro showed the single largest increase as a cause of cattle infections over the study period. The proportional distribution of *Salmonella* Cerro serotype among laboratory-submitted *Salmonella* positive cases in cattle was 36.1% in the year 2010 compared to 14.3% in 2005. A simultaneous decrease in serotype Newport infections was also observed in cattle (25% in 2005, 10.1% in 2010). Studies of clonal diversity for cattle and human isolates revealed a predominant PFGE type but showed some variability. All tested isolates ($n = 60$) were susceptible to sulfamethoxazole-trimethoprim, but 2% of cattle isolates ($n = 1/50$) and 20% of human isolates ($n = 2/10$) showed resistance to tetracycline and sulfisoxazole. One human isolate showed additional resistance to ampicillin and gentamicin. This study suggests an increase in *Salmonella* Cerro infections in the cattle population and a decrease in *Salmonella* Newport infections. The increase in Cerro infections appears to be restricted to the cattle population, but occasional human infections occur.

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RESEARCH ARTICLE

A Comparison of Non-Typhoidal *Salmonella* from Humans and Food Animals Using Pulsed-Field Gel Electrophoresis and Antimicrobial Susceptibility Patterns

Carol H. Sandt  Paula J. Fedorka-Cray, Deepanker Tewari, Stephen Ostroff, Kevin Joyce, Nkuchia M. Mikanatha

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