Monitor Antimicrobial Resistance in Animal Health Pathogens through the National Animal Health Laboratory Network

Goal Leader(s):

Sarah Tomlinson, DVM, Senior Leader for Science and Information Technology, APHIS Veterinary Services (VS)
Elizabeth Lautner, DVM, MS, Associate Deputy Administrator, Diagnostics and Biologics, APHIS VS
**Goal Overview**

**Goal statement**

- Establish a surveillance program within the National Animal Health Laboratory Network (NAHLN) to monitor antimicrobial resistance (AMR) profiles in animal pathogens to enhance the Nation’s early detection of, response to, and recovery from animal health emergencies, identify new or emerging AMR profiles, and help monitor continued usefulness of antimicrobials over time. By September 2023, USDA will establish a long-term AMR surveillance program with at least 30 laboratories participating annually.

**Problem to Be Solved**

- Antimicrobial resistance poses a threat to disease control throughout the world and is a primary concern for human and animal health.
- There is a gap in understanding of AMR patterns in bacteria that cause disease in animals and having national-level information on AMR in animal health pathogens is an important component of addressing AMR at the Federal level.

**What Success Looks Like**

- Collecting and providing AMR data via public-facing reports and dashboards will provide transparency to USDA’s efforts to address AMR and support USDA’s goal of ensuring America’s agricultural system is equitable, resilient, and prosperous by addressing threats to animal health posed by AMR.
- AMR data collected through the NAHLN AMR surveillance program will be utilized as a part of a unified Federal response when AMR profiles of concern are detected by a One Health partner agency (USDA, Food and Drug Administration (FDA), or Centers for Disease Control and Prevention).
- Clinicians will use the AMR data in making the best treatment decisions.
Goal target(s)

In the table below, please repeat the key metrics included in the goal statement (previous slide) that will be used to track progress.

**Please update this column each quarter.**

<table>
<thead>
<tr>
<th>Achievement statement</th>
<th>Key indicator(s)</th>
<th>Quantify progress</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>12/31/2022</strong> Monitor trends in AMR in animal pathogens, identify new or emerging AMR profiles, and help monitor continued usefulness of antimicrobials over time</td>
<td><strong>Number of participating laboratories</strong> 30 laboratories participating in program</td>
<td>These values enable us (and you!) to calculate % complete for any type of target*</td>
<td>Annually, Q2 (FY)</td>
</tr>
<tr>
<td></td>
<td><strong>Number of isolates with antimicrobial susceptibility testing (AST) data</strong> 5,000/year</td>
<td></td>
<td>Quarterly</td>
</tr>
<tr>
<td></td>
<td><strong>Number of isolates with whole genome sequencing performed</strong> 500/year</td>
<td></td>
<td>Quarterly</td>
</tr>
</tbody>
</table>

* Even qualitative targets! If the target is to achieve a qualitative outcome, quantify progress this way: 1=“Yes, we achieved it”, 0=“No, not yet”

** As of 10/1/2021
## Goal Team

<table>
<thead>
<tr>
<th>VS Strategy &amp; Policy (S&amp;P)</th>
<th>VS Diagnostics &amp; Biologics (D&amp;B)</th>
<th>Program and Policy Development (PPD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Senior Lead:</strong> Sarah Tomlinson (Executive Champion)</td>
<td><strong>Senior Lead:</strong> Beth Lautner (D&amp;B Associate Deputy Administrator)</td>
<td><strong>Senior Lead:</strong> Eric Hoffman (Deputy Chief, Budget and Program Analysis, PPD)</td>
</tr>
<tr>
<td><strong>Team Lead:</strong> Chelsey Shivley (VS AMR Coordinator)</td>
<td><strong>Team Lead:</strong> Beth Harris (NAHLN Associate Coordinator)</td>
<td><strong>Team Leads:</strong> Allison Boehm (PPD Program Analyst), Shaun Luber (PPD Program Analyst)</td>
</tr>
</tbody>
</table>

**Agency Partners:** Participating NAHLN laboratories; FDA Center for Veterinary Medicine Veterinary Laboratory Investigation and Response Network (VetLIRN)
Goal Strategies

Strategies

- Laboratories will be provided the opportunity to enroll in this surveillance project annually during Q1 of each fiscal year, and they enroll for the upcoming calendar year. [There are 59 NAHLN laboratories; only 31 currently have the necessary equipment for AMR sampling. The NAHLN laboratories conduct testing for emergency programs including responding to outbreaks of highly pathogenic avian influenza; emergency needs may impact the number of participating laboratories, or the level AMR sampling conducted.]
- Participating laboratories will submit antimicrobial susceptibility data to the NAHLN program on a monthly basis. The NAHLN program will use this data to update our external dashboard every month, providing near-real time information to the public.
- Whole genome sequencing data will be submitted to the NAHLN BioProject hosted through the National Institutes of Health National Center for Biotechnology Information (NCBI) on a quarterly basis, with uploaded data being released immediately for public use.
Calendar year 2022 is the final year of the NAHLN AMR pilot surveillance program.
31 laboratories have been enrolled for Year 5 (January - December 2022).
Over the next year, APHIS will gather stakeholder input for the transition to the long-term program and continue developing a public-facing dashboard to communicate ongoing surveillance data.
Stakeholder meetings began February 15, 2022.

<table>
<thead>
<tr>
<th>Key Milestone</th>
<th>Milestone Due Date</th>
<th>Milestone Status</th>
<th>Change from last quarter</th>
<th>Owner</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Begin stakeholder meetings to gather input on modifications from pilot to full time program</td>
<td>By Mar 31, 2022</td>
<td>Complete</td>
<td></td>
<td></td>
<td>APHIS held stakeholder meetings between February and April, concluding them on April 19.</td>
</tr>
<tr>
<td>Stakeholder report developed to summarize input from meetings and long-term plan for surveillance program</td>
<td>By Sep 30, 2022</td>
<td>On track</td>
<td></td>
<td></td>
<td>Key APHIS personnel are deployed to HPAI outbreak through August 2022. Report is being prepared for internal review.</td>
</tr>
<tr>
<td>AMR surveillance pilot complete</td>
<td>Dec 31, 2022</td>
<td>On track</td>
<td></td>
<td></td>
<td>31 laboratories are enrolled for Year 5 of pilot.</td>
</tr>
<tr>
<td>Initiate long-term surveillance program</td>
<td>By Jan 31, 2023</td>
<td>On track</td>
<td></td>
<td></td>
<td>APHIS is incorporating stakeholder feedback into the planning for the transition to the long-term program.</td>
</tr>
<tr>
<td>Tableau dashboard updated to include AMR genes identified by sequencing</td>
<td>By Dec 31, 2023</td>
<td>On track</td>
<td></td>
<td></td>
<td>APHIS is developing a protocol for processing sequencing data prior to displaying in the Tableau dashboard.</td>
</tr>
</tbody>
</table>
31 laboratories have been enrolled for the final year of the pilot, which runs January - December 2022.

APHIS reported that samples were trending low for Quarters 1 and 2 due to several issues, including supply chain issues in Quarter 1 and the laboratories’ focus on outbreaks of highly pathogenic avian influenza (HPAI) in Quarter 2. Outbreaks of HPAI began in February and are expected to continue through the summer of 2022. Most of the laboratories participating in the AMR project—25 of the 31 laboratories—have been activated for HPAI testing through the NAHLN, meaning their personnel and resources are primarily focused on supporting diagnostic testing endeavors for HPAI.

In Quarter 3, some of the laboratories submitted additional AST samples that had been tested during Quarter 2. While they tested the samples during Quarter 2, the reporting was delayed due to the focus on HPAI.

The Quarter 3 sample total is larger than the previous 2 quarters as it includes the adjustment for the delays from Quarter 2. Cumulative AST samples are back on track for reaching 5,000 isolates in FY 2022.

APHIS is continuing to prepare the stakeholder report summarizing stakeholder input for the transition to the long-term surveillance plan.
Data accuracy & reliability

Data Sources:

- Participating laboratories provide monthly antimicrobial susceptibility testing (AST) data to APHIS Veterinary Services. APHIS’ National Veterinary Services Laboratories (NVSL) or participating laboratories generate whole genome sequencing data.

Verification and Validation:

- AST data: Veterinary Services reviews the data for accuracy and completeness prior to uploading it to an internal APHIS database. APHIS VS processes the data based on current Clinical and Laboratory Standards Institute (CLSI) performance standards for antimicrobial susceptibility tests and the data is inserted into the Tableau dashboard.
- Whole genome sequencing: Participating laboratories submit data and APHIS VS evaluates it for minimum quality standards prior to being uploaded to the National Institutes of Health’s National Center for Biotechnology Information (NCBI) BioProject.

Level of Accuracy Required for Intended Use:

- Data reported by laboratories allows APHIS to track trends in antimicrobial resistance over time.

Data Limitations:

- Not all bacteria have veterinary clinical breakpoints (used to determine whether an infection can be successfully treated with the antimicrobial) established for all antimicrobials.

How the Agency Compensates for Data Limitations:

- APHIS reports both the minimum inhibitory concentration value (the lowest concentration of an antimicrobial that will inhibit the growth of a bacteria) for all antimicrobials and the clinical breakpoints for those that are available.
**Contributing Programs**

Organizations:

- This program is supported by participating NAHLN laboratories from the following states: AL, CA, CO, FL, GA, IA, IL, IN, KS, KY, LA, MI, MN, MO, MS, NC, ND, NE, NY, OH, PA, SD, TN, TX, WA, WI, and WY.

**Program Activities:**

- This program directly contributes to the [2020-2025 National Action Plan for Combating Antibiotic-Resistant Bacteria](https://www.cdc.gov/ndph/amr/20202025nationalactionplan.html). It contributes to Goal 2 (Strengthen National One Health Surveillance Efforts to Combat Resistance), Objectives 1.1 (expand surveillance through existing systems to monitor antibiotic resistance from multiple sources across One Health) and Objective 1.2 (increase whole-genome sequencing and antibiotic resistance phenotypic and genotypic testing in laboratory networks for antibiotic-resistant pathogens listed in CDC’s 2019 AR Threats Report and upload sequenced data to the National Institutes of Health (NIH) National Center for Biotechnology Information (NCBI) at the National Library of Medicine or to another approved, secure, and widely accessible databases).

**Policies:**

- This program directly contributes to the [USDA AMR Action Plan](https://www.aphis.usda.gov/animal_health/downloads/amrs_plan_11-27-19.pdf). It contributes directly to Objective 2 (antibiotic drug susceptibility in food animals and meat and poultry) by providing national-level data on antibiotic susceptibility testing of selected animal pathogens.

**Other Federal Activities:**

- Data collected from companion animals as part of the NAHLN AMR surveillance program is also integrated with similar data collected by FDA VetLIRN AMR surveillance program, and combined data are reported through FDA’s NARMS (National Antimicrobial Resistance Monitoring System) website.

**Stakeholder / Congressional Consultations**

APHIS will host regularly scheduled meetings/webinars with participating NAHLN laboratories and other external stakeholders to obtain input on the structure and interface of this AMR surveillance program with other federal surveillance programs. APHIS will incorporate input and concerns identified during these meetings, where appropriate, to improve utility of data provided and to improve efficiency of the program for participating laboratories.