United States Department of Agriculture
Food Safety and Inspection Service

FSIS Data Infrastructure Improvements: Public Health Information System (PHIS)

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Data Infrastructure Improvement

- Actively strengthening our public health data infrastructure to improve food safety and food defense.
- OIG December 2007 audit identified a number of areas for improvement in FSIS' data infrastructure.
  - OIG has agreed to all 35 of FSIS' responses to its recommendations.

Public Health Information System (PHIS)

- Improved information infrastructure will:
  - Integrate FSIS data streams
  - Support a data driven approach to FSIS inspection, auditing, and scheduling
  - Facilitate greater information sharing among external agencies

PHIS Modules

- Predictive Analytics
- Domestic Inspection
- Import
- Export

Predictive Analytics

- Will allow analysts to carry out ad hoc data analyses using multiple FSIS data sources in order to identify trends and anomalies
  - Example: Relationship between *Salmonella* test results and inspection findings
- Will monitor establishment data in real time and will have built-in alerts for anomalies

  Examples:
  - High rates of noncompliance for SRM in an establishment
  - Positive pathogen test result in an establishment (e.g., *E.coli* in ground beef, *Listeria monocytogenes* in ready-to-eat products)
  - Large number of inspection activities not completed in an establishment

Predictive Analytics

- Will have automated algorithms for consistent reporting and scheduling of inspection activities

  Examples:

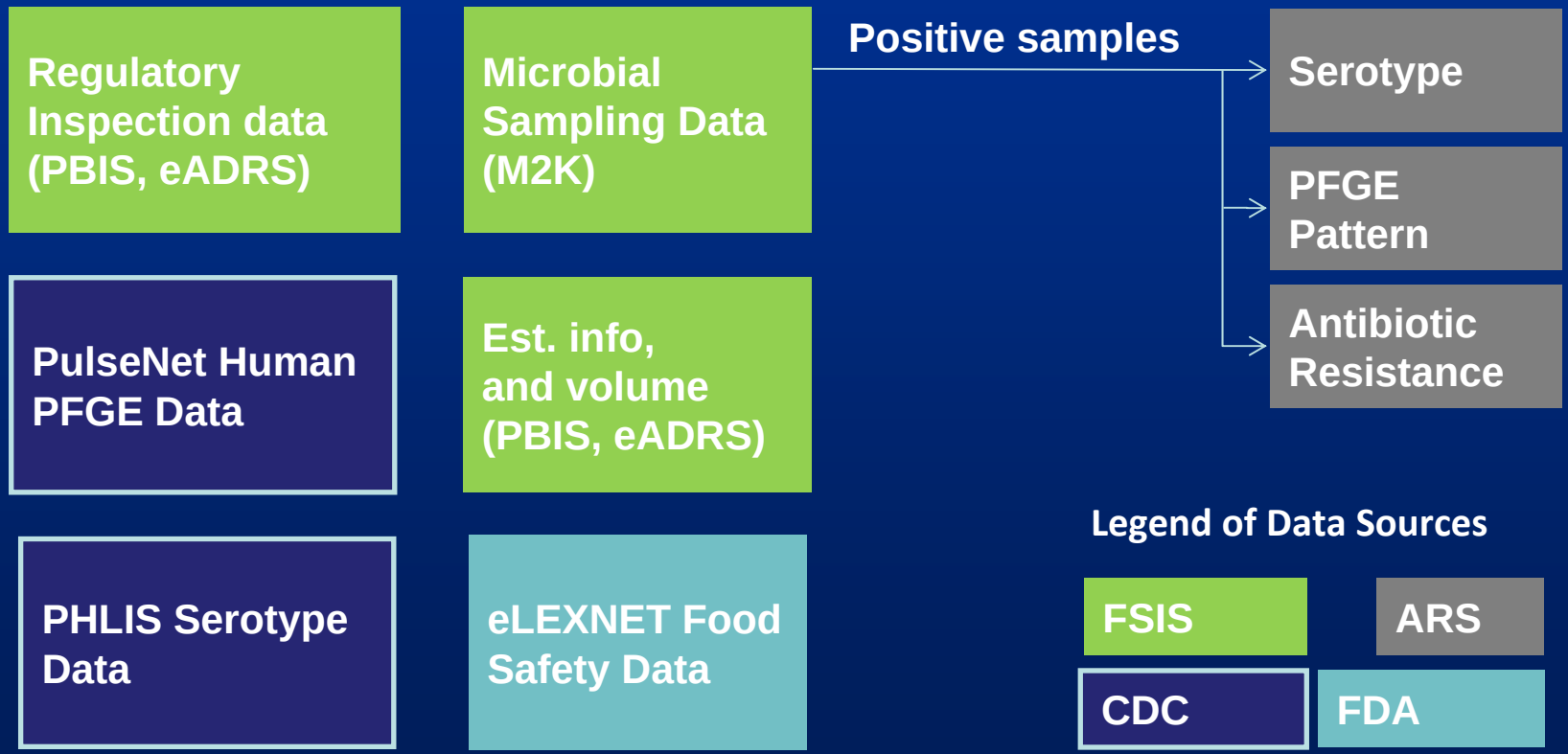
  - Performance measure calculation
  - Risk-based sampling algorithms (*Salmonella*, *E. coli*, and *Listeria*)
  - Scheduling of Food Safety Assessments based on indicators of process control
  - District Activity Reports
  - Foreign establishment audit ranking

- Will have automated self-learning algorithms developed by Carnegie Mellon University that analyze data and create models to detect patterns in disparate data
  - Example: Analysis of relationship between pulsetype information from CDC's PulseNet data on human illnesses and FSIS' VetNet data on product sampling

Predictive Analytics Methods Development

- Question One
  - Can we use our methods, data, and tools to identify establishment risk factors that can be used to allocate resources based on public health impact?
- Question Two
  - Can we use our methods, data, and tools to discover new patterns in our data that might indicate problems?
- Question Three
  - Can we use our methods, data, and tools to support recall investigations and trace back?

Salmonella Data Sources



Question 1: Can we use our methods, data, and tools to identify establishment risk factors that can be used to allocate resources based on public health impact?

Analysis: Cross over FSIS/ARS Serotype data with CDC PHLIS serotype data to determine:

- Which serotypes in FSIS products cause the greatest amount of human illness.
- What percentage of *Salmonella* positives in FSIS regulated establishments are resistant to antibiotics.

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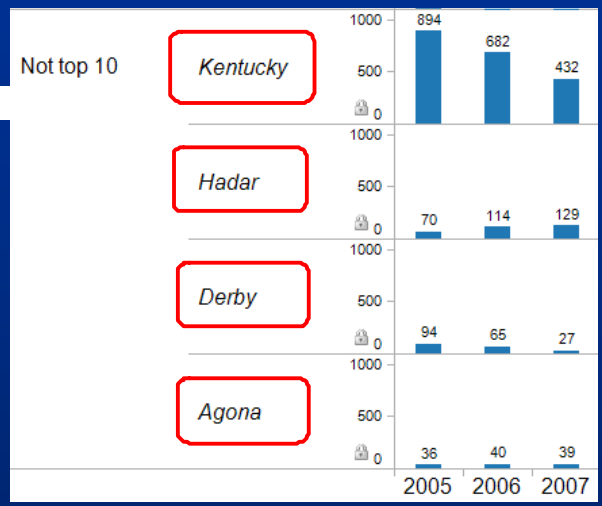
Analysis 1: Serotypes causing the greatest amount of human illness.

CDC Top 10

FSIS Top – Not in CDC List



The top serotypes of *Salmonella* causing human illness are not the same as those found most frequently in our establishments.

Analysis 2: What percent of *Salmonella* positives in FSIS regulated establishments are resistant to antibiotics.

This establishment has the highest count of positives

But this one has a much greater fraction of resistant isolates

Having the most positive samples may not make an establishment the riskiest to human health.

Question 1 Summary

We have identified refined risk measures that can be incorporated into the public health risk ranking algorithm:

-- serotypes of public health concern

-- resistance to antibiotics

A similar approach can be used to refine other variables of the public health risk ranking algorithm.

Predictive Analytics Methods Development

- **Question Two:** Can we use our methods, data, and tools to discover new patterns in our data that might indicate problems?
  - Analysis: Examined geographic and temporal trends in *Salmonella* antibiotic resistance using FSIS/ARS serotype data and CDC PHLIS serotype data .
- **Question Three:** Can we use our methods, data, and tools to support recall investigations and trace back?
  - Analysis: Combined FSIS/ARS data and CDC data to evaluate temporal and geographic relationships between *Salmonella* pulsetypes in FSIS products and those known to have caused human illness.

PHIS Component Status Update

- Currently in Design Phase
- System full production readiness Fall 2009

Domestic Inspection

- Automated capability to capture and report information on FSAs
- Ability to collect detailed information re: verifications, compliance, and other inspection-related activities
- Automated laboratory sample scheduling
- Secure data entry via internet
- Ability to pull information into our system from the inspection force, and from other internal and external sources

Imports

- More secure and timely transmission of foreign health certificates
  - Ability to receive electronic certificates from top three trading partners, provide advance notice and foreign government certification verification of US-destined product
- Integration with Customs & Border Protection's ACE/ITDS
- Ability to schedule, track, and store results of foreign audits

Exports

- Automates manual processes (going from printed/handwritten forms to electronic)
- Automates edit checks to verify compliance with foreign import requirements
- Standardizes product descriptions and coding for products certified for export
- Provides ability for exporters to electronically pay fees