

Use of Whole Genome Sequence (WSG) Analysis to Improve Food Safety and Public Health

Industry Perspectives and Priorities: Meat Production

27 October 2017

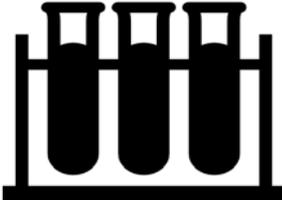
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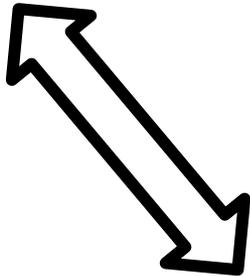
Overview

- **Stakeholder roles: Food Safety System**
- **What is working in meat production**
- **Concerns in meat production**
- **Application of Next Generation Sequencing (NGS)**

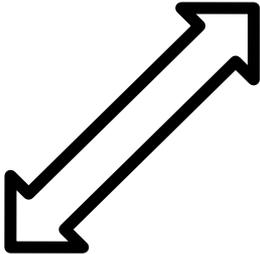
Stakeholder Roles



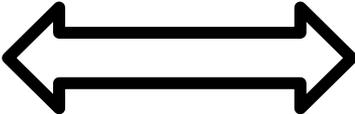
Innovations & Technologies



Food Safety System

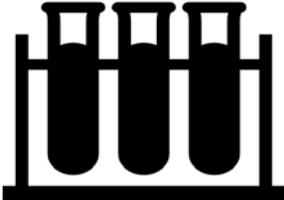


Application to produce safe food

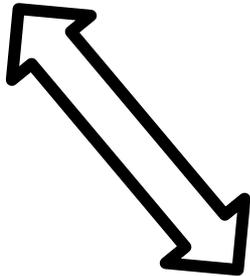


Laws, Regulations & Compliance

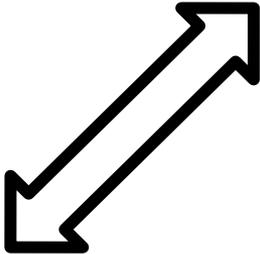
Stakeholder Roles



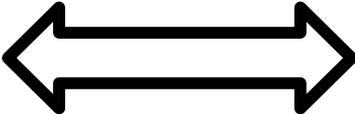
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Food Safety System



Application to produce safe food



Laws, Regulations & Compliance

What is working in meat production

New Generation Sequencing (NGS) is being applied as a tool within current relevant FSIS food safety system policies

Prerequisite programs as part of pathogen control policies

- Listeria environmental
- STEC
- Salmonella

Foodborne Illness Investigation

- FSIS Directive 8080.3
- Epidemiology!
- PFGE, MLST & NGS tools

Compliance

- Based on current policies



Concerns in meat production

Lack of international quality standards

Early samples

- Sequences and data informatics conducted and contributed to databases without proficiency checks
- Inconsistency in metadata quality
- What is a match?

Initiatives to close gap

- GMI proficiency
- ISO standard development



Concerns in meat production

Agencies will approach pathogens the same

Core genome variation

- Listeria – conserved core
- STEC & Salmonella

Ubiquity & supply chain variation

- Traceback impact
- Harborages
- Common live animal and raw material supplies
- Do we have enough non-clinical samples?

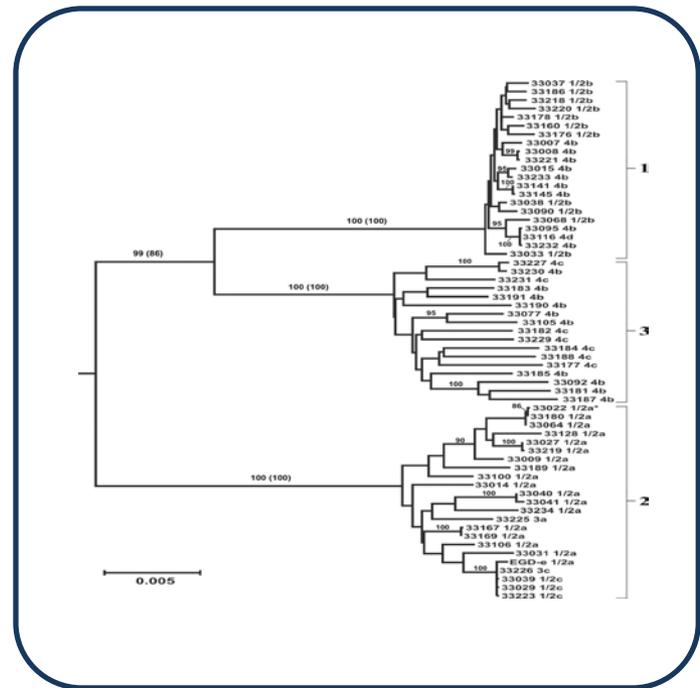


Concerns in meat production

Directive 5000.2 Review of Establishment Data by Inspection Personnel

...the results of any testing that is performed by the establishment that may have an impact on the establishment's hazard analysis, whether or not such testing is incorporated into an actual HACCP plan, referenced in a review and are to be available to FSIS personnel.

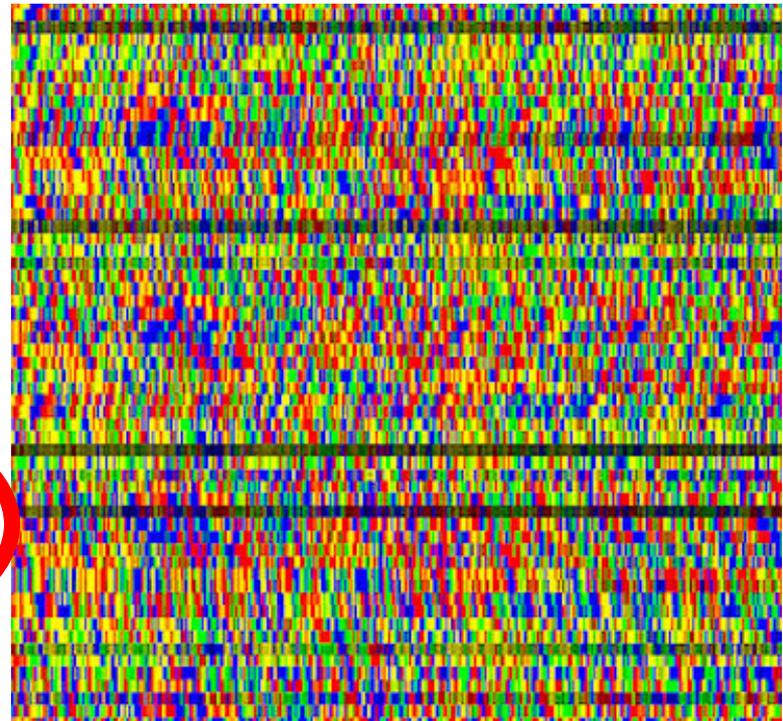
- Research trial results
- Lack of FSIS personnel training
- Compliance status of industry generated data
- Lack of enforcement consistency between establishments that collect data compared to those that do not



NGS Application in Industry

Genomic Testing Capabilities Applications Vary

- WGS
- TAS
- AMR
- GMO Testing
- 16S metagenomics
- Microbiome
- Shotgun meta



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Summary

- **All stakeholders support the Food Safety System**
- **Key is to have sound Food Safety System policies that accommodate new technologies / tools like NGS**
 - **Do not develop technology / tool specific “policies”**
 - **Develop use protocols and SOPs**
 - **Train and apply consistently**

Summary, cont.

- **Most FSIS Food Safety System policies accommodate WGS results**
 - Pathogen control programs
 - Foodborne illness investigations
- **Opportunities**
 - Lack of internal quality standards
 - Understanding pathogen differences
 - Data sharing policies: Freedom to create / use
- **Application of NGS capabilities will vary**
 - Industry may not be as excited as other stakeholders about WGS for industry applications
 - There are other exciting NGS capabilities that can apply