One Health, Traceability, and Emerging Technologies

Thomas A Burke, Food Traceability Scientist
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“War is ninety percent information.”

—Napoleon Bonaparte
Outline

One Health
Talk about the promises and shortcomings of One Health.

Traceability
Discuss how traceability may accomplish the outputs of One Health.

Emerging Technologies
Innovations accomplishing One Health objectives through traceability.
One Health

The interplay between animal health, human health, and the environment.
Promises of One Health

- Increased cooperation between public health entities in the three disciplines
- Information sharing and research collaboration
- The ability to root out novel exposures and vulnerabilities
High Path Avian Influenza

- Devastating outbreak in 2014-2015
- Loss of production and trade issues
- One Health approach paramount to understanding outbreak
# Pitfalls of One Health

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<thead>
<tr>
<th>Lack of Methods</th>
<th>Broad Purview</th>
<th>Not Enough Data</th>
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<td>Methodology for One Health objectives are still siloed in their individual disciplines (e.g. human medicine, veterinary medicine, environmental science)</td>
<td>Because the breadth of the goals, One Health related research has difficulties coming together for conclusions</td>
<td>From the previous two points, there is either too much or too little operational data to make meaningful conclusions.</td>
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Traceability and One Health
What Traceability offers One Health

**New Methods**

Methods used in traceability improvement efforts can be applied to One Health research.

**Holistic Data**

The breadth of traceability will continue to expand, allowing data from multiple disciplines to be linked.

**More Data**

Automated data collection processes in traceability methods could enhance One Health research.
Traceability Data to One Health

- Applicable traceability data types
  - Geo-location
  - Date/Time
  - Environmental Antecedents
  - Transition Events (CTEs)
- Automated and Digitized
- Precision
Methodology Enhancements to One Health

- Interoperability
- Technology solutions to current issues
- Data collection
- Analytics and machine learning
Emerging Technologies
Technologies on the horizon

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<tr>
<td>Blockchain</td>
<td>Data Analytics</td>
<td>Internet of Things</td>
<td>Embedded sensors</td>
<td>LEO satellites</td>
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Promises of Blockchain

- Constantly updated distributed ledger, immutable to change
- Speed up recall procedures
- Ability to connect disparate parts of supply chain

Walmart/IBM collaboration
- Provenance
- Ripe.io
Example from OwlTing

Product Owner | Nice Garden Industrial Co., Ltd
Producer      | Nice Garden Industrial Co., Ltd
Product Name  | Choice Pig Pork upper-back
2016/10/19
Vaccination
**Swine Enzootic Pneumonia**

2016/10/26
Vaccination
**Porcine Reproductive & Respiratory Syndrome**

2016/11/4
**Starter Feed**
Feed contains OVN™ concentrate for suckling piglets, including high-performance Vitamin D3 and organic minerals that can activate physiological functions and strengthen bone formation.
*Feed (raw materials): corn, soybean meal, etc.*
*Concentrate: vitamins, minerals, organic minerals, amino acids, enzymes, probiotics, organic acids, calcium, phosphorous, salt, etc.*

2016/12/10
Vaccination
**CSF**
**Classical Swine Fever**

2016/12/15
Vaccination
**PR**
**Pseudorabies**

2016/12/29
Vaccination
**FMD**
**Foot And Mouth Disease**
Low Earth Orbit Satellite Internet

- SpaceX announced LEO network to be deployed by 2024
- Low latency
- Higher bandwidth
- Global reach
- Applications
  - Seafood
  - Rural areas
Internet of things

- Integration of data collection devices
- Consolidation of data silos
- Dynamic communication between entities

Embedded sensors

- Inexpensive, yet sophisticated
- Potentially reusable
- Takes various types of data
Traceability and One Health

One Health needs better data coordination and methods clarification

Traceability initiatives can enable One Health

Emerging technologies in traceability will help accomplish One Health initiatives

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