Chris Thompson, Milk Coordinator, Regulatory Services
University of Kentucky, College of Agriculture
Homeland Security Project

- National Institute for Hometown Security
  - Non-profit R & D organization

- Kentucky Homeland Security Consortium
  - Kentucky’s public and private universities
Project Objective

- Develop a Milk Transport Security System that will provide assurance that the milk, milk samples and security data are securely transported between the dairy farm and milk plant.

- Demonstrate a wireless electronic security system at two milk plants and multiple dairy farms.

- Deliver the technology to the national community through collaborations, technical conferences, publications and standards.
Functional Requirements

• Provide “Secure Transport” of milk
• Operate with the current U.S. milk transport infrastructure
• Physically store the milk data and security data with the milk transport tank
• Provide redundant milk data and security data storage
• Adaptable to “differences” in bulk milk marketing and transportation systems
A Wireless Electronic System for Securing Milk from Farm to Processor

Security Protocol’s attributes

– Who
– Why
– When
– Where
– What
A Wireless Electronic System for Securing Milk from Farm to Processor

System components
- Security
- Accountability
- Data gathering
- Data management
- Traceability
Terminology

• **Security**: something not only *is secure* but that it *has been secured*. Includes measures that prevent or deter unauthorized individuals from accessing a facility, resource or vessel.

• **Accountability**: the traceability of actions performed on a system i.e. the use of unique identifiers and authentications supports accountability.

• **Surveillance**: the monitoring of activities or behavior… verification, identification…
Security System Challenges

• Adaptable
  • Tanker designs
  • Farm and plant systems
  • Environmental stress

• Compliant with current requirements

• User friendly

• Cost effective
A Wireless Electronic System for Securing Milk from Farm to Processor

• Industry input
  – A. Wilson Trucking
  – Bluegrass Tank and Equipment
  – Dairy Farmers of America Mideast Council
  – KY Dept. Public Health
  – Slayback Milk Transport
  – Southern Belle Dairy
  – Starr Stainless
  – Winchester Farms Dairy
System Development

Cell phone vs. Land line upload

Biometrics

Barcode

User ID

RFID

CORE SYSTEM

REVISE CORE?

NEW IDEA
Approach has been broad...

- Success means
  - Enhanced security
  - Adoption
- Business rationale for adoption
  - Deter pushback
  - Added value
  - Provide means to measure value
  - Provide enhanced value, time savings, cost avoidance
  - Provide all users with more information
The Public has a great deal of interest!
Will there be more stringent security requirements in the future?

HHS Deputy Secretary Tevi Troy; FDA Commissioner Andrew C. von Eschenbach & FDA Assistant Commissioner for Food Protection, David Acheson, M.D. announce FDA's integrated strategy for protecting the food supply.
Our vision of the system operations.
Milk Transport Security System Design
Three Processors (computers)

- DRIVER
- SECURITY MONITORING SYSTEM (SMS)
- LOCKS, GPS, TEMPERATURE, USER INTERFACE
- HAND HELD DEVICE
- PRINTER
- WIRELESS BLUETOOTH
- WIRELESS
- WIFI
- CELLULAR
- DATA SERVER
- DATA USERS:
  - MARKETING AGENCIES
  - TRANSPORTATION CO.
  - MILK PLANTS

DATA:
- DRIVERS
- DAIRY FARMS
- MILK PLANTS
- WASH STATIONS
Security Monitoring System (SMS)

- **Electronic Lock, GPS Receiver**
- **Sample Temperature Sensor**
- **Tank Temperature Sensor**
- **Electronic Lock, Microprocessor, User Interface, Wireless Antenna, Power Supply**

Diagram:

- **Tractor/Truck**
- **Milk Transport Tank**
- **Dome**
- **Rear Door**
- **Sample Temperature Sensor**
- **Tank Temperature Sensor**
- **Electronic Lock, GPS Receiver**
- **Power Supply**
Handheld Device and Printer

Intermec CN3

Zebra QL 220
MILK TRANSPORT SECURITY SYSTEM DESIGN

HAND HELD DEVICE

WIRELESS (Bluetooth) COMMUNICATION

CELL PHONE COMMUNICATION

BARCODE READER

DATA SERVER

PRINTERS FOR SAMPLE LABELS AND MILK TICKET

WIRELESS (WiFi)

MANUAL ENTRY OF MILK DATA

BARCODE

MILK HAULER/SAMPLER

BARCODE

SECURITY MONITORING SYSTEM

BARCODE

TRACTOR/TRUCK

MILK TRANSPORT TANK

FARM BULK MILK TANK
Dome Lock

- Latch Dog
- Wing Nut
- Lock
- Electronics
- GPS
Handheld Device Screens

User friendly and intuitive...
Handheld Device Screens

Scan Farm Tank

Current farm information:
Agency Route:
Name:
Cargo:
Address:

Choose a tank from the list, or leave the box empty

Accept  Cancel

Load Information

Tank  Temperature

Dipstick  Final Stick

Pickup  Leave Behind  Truck Total

Vol  Wt

Partial Pickup
Sample

Accept  Reject  Cancel
### Bulk Milk Ticket

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<th>Transport Company</th>
<th>Cargo</th>
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### Load Summary for Load ———, K209

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<th>Scale Weight</th>
<th>Accumulated Milk Weight</th>
<th>Difference</th>
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<td>37.70</td>
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| Pickup Date | 11-16-2007 |
| Delivery Date | 11-16-2007 |
| Arrival Time | 13:11:21 |
| Departure Time | 15:03:25 |

| Delivery Location | Winchester Farms Dairy (WFD) |
| Hauler ID | Brian Luck |
| Hauler 1 Permit No. | H21-999-6 |
| Hauler 1 License No. | 9968 |
| Signature Image here. | |

| Transport Driver Name | Signature Image here. |
| Receiver Name | John Smith |
| Receiver Permit No. | 521-399-7 |
| Signature Image here. | |
Additional uses

• Quality control
  – Tanker cleaning
  – Sample care

• Communications
  – Potential to enhance compliance
  – Field Services
  – Special precautions

• If data is collected, it can be tracked, utilized…
TANK WASH CYCLE MONITORING

- 70F RINSE FOR 6 min
- 145F HOT WASH FOR 15 min
- 70F POST RINSE FOR 5 min
- 70F SANITIZE FOR 2 min

TEMPERATURE, F

TIME, min

0
10
20
30
40
50
60

20
40
60
80
100
120
140
160
Project Schedule

- Collaborators Meeting, January 26, 2006
- Collaborators Meeting, September 9, 2006
- System Defined, January 1, 2007
- Bench Scale System, May 26, 2007
- Prototype Installed August 4, 2007
- Prototype Demonstration, September 12-13, 2007
- Field Test 1 October/November 2007
- Field Test 2 February/May 2008
- Testing Complete June/July 2008
- *The Demonstration Meeting October 9, 2008*
- Project Completion December 31, 2008
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