State of Michigan

USAHerds Cattle Tracking
Protecting our Food Supply
NASCIO Category: Government to Business

New changes in Michigan Dept. of Agriculture (MDA) policies are taking steps to further hamper the spread of bovine tuberculosis (TB) across the state by monitoring more closely the movement of cattle.

All cattle and bison on 73 farms within the 10-mile circle of the positive herd were tested with 90 cattle destroyed.

This Emmet County herd is the fourth TB affected herd identified in Michigan in 2010.

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B. Executive Summary

Michigan's agriculture industry contributes over $71 billion annually to the state's economy, making it the second largest industry in Michigan. The sustained growth of agriculture is a key element in Michigan's economic recovery strategy.

Bovine tuberculosis (TB) is an infectious disease that is close to being eradicated in the United States, but still poses a significant risk to domestic livestock, wildlife, companion animals and humans throughout the world. Michigan has bovine TB in both cattle and wild free-ranging white tailed deer. Every time bovine TB is transferred from deer to cattle it sends shock-waves through the agriculture industry, putting the $71 billion industry at risk. Michigan leaders fear this will further exacerbate an economic recovery still reeling from the exodus of hundreds of thousands manufacturing jobs in the previous ten years.

The Michigan Department of Agriculture and Rural Development (MDARD) formed a multi-disciplined team of food experts, scientists, economic planners, animal experts and technologists to develop an aggressive strategy that includes information, communication and technology (ICT) solutions to help track down, contain, eradicate and prevent outbreaks of bovine TB in Michigan's cattle industry. This cross-boundary team includes scientists and technology experts from the U.S. Department of Agriculture, Michigan State University and the Michigan Department of Technology, Management and Budget (DTMB). The end product of this research was the implementation of a first-of-its-kind animal disease traceability solution (USAHerds). This ICT solution demonstrates the leadership of Michigan to provide a quick and agile response to a potential economic and public health catastrophe.

Implemented in January 2010, this innovative, mobile solution uses Radio Frequency Identification Devices (RFID) and electronic readers that track cattle movement from the farm through the market to slaughter. Instances of bovine TB can now be identified quickly, its occurrence traced to the source, and the disease eradicated with as little impact to surrounding herds as possible. The solution provides the following benefits enabled by innovative ICT practices:

- Improved disease tracking and response time by 80%
- Reduced reporting times of outbreaks from weeks to hours
- 50% cost reduction, and
- Agile technology that can be replicated across other state operations.

Michigan's mature ICT process was able to provide project governance across multiple partners to quickly implement this innovative RFID tracking solution. Michigan received a unique split-state status and is now in the process of getting TB-Free status from the Federal USDA in 57 of 83 counties. Recovery predicated on cross-boundary resolve and commitment, enabled by innovative technology. This solution expands on the agriculture related IT platform, represents a national caliber advance, and can be shared with other states and thus extended further.

C. Description

Business Problem: In 1998, the Michigan Departments of Agriculture and Rural Development (MDARD), Community Health and Natural Resources began collaborating to monitor and eradicate bovine Tuberculosis (TB) in both wildlife and commercial livestock. So important is this effort to Michigan's economy and citizen health, these efforts are monitored and measured as part of Michigan's "well-being" report card. Our sustained progress in food safety and our overall economic growth was put at risk with the discovery of bovine TB in a small segment of Northern Lower Michigan.

The significant barriers to reacting quickly to this problem were an aged technology infrastructure and manual processes for monitoring and responding to reported cases of bovine TB outbreak. During the initial years of the bovine TB eradication effort, MDARD relied on a number of disconnected software applications to support the TB Eradication and Electronic Identification program needs. Cattle in TB affected areas were assigned an electronic animal identification (EID) number, but the program's data needs were expanding and there was a need for on-line permitting. Intrastate and interstate movement permit requirements evolved as the volume of cattle increased. The model was inefficient and unsustainable for a variety of reasons including legacy, non-standard software, and lack of data centralization.

To address these risks and to provide a technology solution that could better respond to the immediate crisis, MDARD convened multiple stakeholders to determine a replacement for its legacy collection of software systems. The current processes and future needs of the bovine TB Eradication and Electronic Identification programs were analyzed. MDARD recognized a critical need to track cattle movement to prevent the spread of bovine TB using traceability and GIS capabilities not available in earlier technology solutions. Michigan also developed a strategy to implement radio frequency identification devices (RFID), making Michigan one of the first states using this technology. This effort was successful in that it relied upon a role-based project management governance structure that clearly defined outcomes and specific responsibilities of team members.

Solution: Michigan's goal was to expedite the expansion and deployment of a technology solution that was implemented in another state. Working with the Pennsylvania Department of Agriculture, Michigan selected the **USAHerds software platform**. This base solution, engineered with our innovative enhancements gleaned from Michigan focus groups, was the consensus choice of stakeholders. Michigan was able to re-engineer this base platform to provide additional enhanced functions to meet Michigan's disease eradication effort. The new USAHerds system includes:

- Traceability of herds and incidents via an electronic interface with the Federal Premises Allocator module of the National Animal Identification System (NAIS).
- Use of RFID to track the cattle EID number and integration with Bing Maps to display the instances of bovine TB on MDARD interactive radius maps.

- Enhanced intrastate and interstate movement permitting that included integrated data sharing to monitor cattle management from market to slaughter facilities.
- TB testing software and integration with Federal USDA databases to help pattern the impact of bovine TB across state jurisdictions.

Deployed in January 2010, Michigan now has a single integrated software solution providing the capability for animal traceability via RFID, premises traceability, veterinarian tracking, program management, license management, incident management, mapping and GIS integration. Michigan began outreach and training in early 2010 to educate the agriculture industry on how this solution works and the role every cattle grower has in the success of this solution. Solution and processes that are now being institutionalized across the industry include the following:

- The MDARD issues farmers with a premises number and RFID tags. The farmer's information is entered into USAHerds software with both premises and tag information. The RFID ear tags, containing the EID number, are attached to the cattle.
- There are four slaughter plants with electronic RFID readers; three plants are in Wisconsin and one is in Michigan. Movement certificates are required to transport cattle from the farm to the processing plant. All cows brought to the processing plant must have an RFID.

At the time the cattle enter the market place, the RFID tag is scanned. The reader activates the RFID tag which passes the cow's EID number to software. Once the meat is processed and packaged, the slaughter plant puts information on the bar code which indicates the plant and processing date of the meat.

Michigan's solution enables MDARD and USDA to capture and coordinate key demographic data associated with each animal, including re-location of each animal. This includes the ability to capture data remotely via mobile device input from veterinarians and output from electronic readers located in each of the State's livestock markets. This technology solution has revolutionized how Michigan monitors cattle herds. These innovative capabilities are enabled with the following **technology components**:

- Radio Frequency Identification Devices (RFID) and electronic readers to track cattle movement
- .Net 2.0 using SQL Server Reporting Services (SSRS) and a SQL2005 database and Bing Maps
- Michigan's Security Zone ensures sensitive data is protected from general public access by a series of well-positioned firewalls. Data is moved using HTTPS.

This solution, both business process and technology, has positioned Michigan as a leading state in tracking our cattle for disease purposes, providing food safety for

citizens, and ensuring this vital commercial resource continues. The integrity of processing enhances the commercial value of beef.

D. Significance

Michigan's $71 billion agriculture industry is a key element to Michigan's sustained economic recovery. The significance of engineering an ICT solution to protect these investments cannot be understated. Significant process improvements enabled by this technology has provided unprecedented operational efficiencies to both government and business.

Food safety is MDARD's Number One priority. The ability to trace an animal from farm to fork in a matter of minutes rather than weeks or months absolutely protects this state's and nation's food supply. Reports generated by USAHerds software provide immediate traceability. Real time information equates to real dollars saved, as producers could easily lose anywhere from $1,000 to over $10,000 per day depending on the situation related to a disease outbreak.

The new USAHerds tracking technology and processes developed in Michigan supports MDARDS's top priority for food safety by providing a sustainable, portable, mobile system that ensures a high degree of animal and disease traceability, for both Michigan livestock as well as tagged livestock imported into Michigan processing plants. Improvements realized since the January 2010 project implementation include:

- Reduced need for in-office processing resources
- Decreased human error due to electronic scanning of RFID tags versus costly data entry
- Decreased time and cost related to conducting herd tracing
- Decreased time required for herds to remain under quarantine
- Decreased need to conduct random TB tests on 750 herds statewide
- Provided the agriculture industry with a sustainable technology safety-net for preventing and minimizing the impact of bovine TB, thus protecting revenues from the inevitable quarantine that would result from an outbreak.
- Will enable 57 Lower Michigan counties to be declared TB-free this summer

The USAHerds solution also marks a significant step in the further evolution of GIS technology as a key ICT enabler. GIS features now include:

- Electronic animal identification (EID) number is used for tracking cattle movement.
- The new EID number is used in the bovine Tuberculosis (TB) high-risk/affected area in northeast Michigan to individually identify cattle and manually track/record cattle movement.
- The movement of all cattle is traceable and available for disease investigations from birth to final disposition using Bing Maps, including relocations of each

animal to other premises both within Michigan or premises and markets outside of Michigan.

Another significant success of this project has been the demonstration that government partnerships can effect and accelerate **positive outcomes** for the industry. This ICT unified solution engineered by multiple stakeholders, is unprecedented in Michigan history. Likewise, the public-private partnership among MDARD, herd owners, processing plant owners and veterinarians has successfully created an effective database and network capable of accurately tracing cattle from farm of origin through livestock markets to final destination inside Michigan and out.

These partnerships and the resulting ICT and process improvements for managing the bovine TB program in Michigan signal to businesses that properly focused and sustained government involvement can make a significant difference.

E. Benefit of the Project

The USAHerds project ensures the health and sustainability of the cattle industry in Michigan. Multiple benefits have been realized since 2010, including:

Benefits to beneficiary/stakeholder groups. There are about 14,000 cattle operations in Michigan and 2,162 dairy farms. At these Michigan operations, there are 23,780 premises with livestock including sheep, goats, swine, and cervids registered in the database; 13,144 are active. As of January 1, 2010, the Michigan cattle herd totaled 1.1 million. Since the mandatory RFID program began, over 2,321,280 RFID tags have been used by Michigan farmers.

Project outcomes measured. Since 2010, a total of 4,015 movement permits have been created. A related 111,847 animal records were entered/uploaded for those permits. During 2010, over 210,000 RFID tags were scanned at the 13 livestock markets and over 285,000 RFID tags were scanned at slaughter plants both in-state and out-state.

Solution transferability and operational savings. Michigan participates with a consortium of states nationwide to leverage additional enhancements to the USAHerds livestock application. Other states participating in the consortium include; Pennsylvania, Kentucky, Indiana, Montana, and Vermont. These innovator states benefit from the enhancements added by other states at no cost. All states in the US could be impacted by a TB outbreak and this solution is transferable to any and all states.

Financial Return on Investment

Annual Savings		Michigan (Current)	Total of Six Consortium States (Estimated)
Reduced turn-around time for processing reports and permits	12 – 20 FTE's	$700,000 - $1.2 million	$7.7 - $9.75 million
Improved accuracy by eliminating random TB testing	750 herds	$800,000	$6.5 million

Michigan represents 12% of cattle in the 6 consortium states

Non-Financial Return on Investment

Increased TB surveillance capabilities. There are from 1,000 to 1,200 herds briefly quarantined during testing every year. If there is a positive test, single animal traces could involve hundreds, even thousands, of cattle. Still further, trace-back may involve up to a 5-year period in multiple states. Without the RFID tags, movement permits and processing plant scanning, bovine TB tracing would be virtually impossible.

USAHerds software improves the ability of field customers (veterinarians, markets, agriculture officers, and producers) to input and review their data from Michigan database systems. Improving data sharing capabilities results in increased compliance by the industry and improves the MDARD's ability to regulate the bovine TB and EID programs.

The USAHerds ICT solution demonstrates the leadership of Michigan using state-of-the art technology, supplemented with cross-disciplined partnerships to provide a quick and agile response to a potential economic and public health catastrophe. Animal disease is not just something that could happen in Michigan or the five other partner states; disease can impact any state in the nation, and this solution could advance the nation in protecting our food supply.