Continuous Animal Health Monitoring

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NetQuest Services
Mr. Cris Anderson

Dr. Agricola Odoi
Local News

May 13, 2008

Somerset-based NIHS at forefront of national security

Local News

By CHRIS HARRIS, CJ Staff Writer

Somerset is again thrust into the forefront of the nation’s effort to protect against the terrorist threat, with the announcement that a locally-based organization will be helping develop a number of key security projects.

The National Institute for Hometown Security (NIHS), which calls Somerset home, will be teaming with the U.S. Department of Homeland Security and a number of Kentucky educational institutions to develop what are being called “generation security solutions to help protect the country from disasters.”

Over $17 million in funding was approved for this latest round of projects, which focuses on food safety, disaster prevention and threat detection, response and recovery, and blast mitigation.

Congressman Harold “Hal” Rogers, a prominent figure in the nation’s homeland security plans due to his status as senior member of the House Appropriations Committee and ranking member on Homeland Security Subcommittee, announced a total of 15 projects — 11 new and four previously funded — designed to identify potential problems and present solutions.
The Proposed Product

A relatively non-invasive & inexpensive animal health monitoring & alerting system that can discriminate between sick and healthy animals with high sensitivity.

Initial application and market—
Cattle Feedlot Operations
The Eartag

1. Triple axis accelerometer
2. RF transmitter/receiver
3. Server data base
4. Millions of activity data points analyzed
5. Real-time health alerts
6. Medical intervention
Development Status

• Work completed
  – Two trials, 2010, 2011
• Planned work
  – Actual feedlot trial
• Additional R&D--
  – Eartag fine-tuning in progress
  – Health detection algorithm
• Practical problems targeted—
  – Earliest possible detection of unhealthy animals.
  – Lifetime medical record.
• Special advantage to solve this problem—
  – Electronic sensing of health via activity monitoring possibly more sensitive than human observation.
• Timeline--
  – One year.
Composite Graph of Activity Level of Healthy Animals vs Sick Animals Treated and Allowed to Recover

n = 98
IP Status of the System

Provisional Patent filed by the University of Kentucky January, 2013
<table>
<thead>
<tr>
<th>Product</th>
<th>Benefits</th>
<th>Considerations</th>
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<tbody>
<tr>
<td><strong>FeverTags®</strong>&lt;br&gt;High Plains Animal Health, Guymon, OK</td>
<td>Generates a color coded visual <strong>temperature</strong> status; commercially available, demonstrates market for electronic animal health monitoring is legitimate &amp; evolving; about $10 per animal (life of tag unknown)</td>
<td>No communication to central system; relies totally on temperature to assess health status; tympanic probe can result in ear infections; ambient temperature may affect accuracy</td>
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<td><strong>GrowSafe®</strong>&lt;br&gt;Grow Safe Systems, Ltd, Alberta, Canada</td>
<td>Wireless data collection, monitors <strong>feed consumption</strong> to make decision regarding health status, demonstrates market for electronic animal health monitoring is legitimate and evolving</td>
<td>Expensive to implement; Measures only feed intake, not sensitive to other factors related to animal activity and health status</td>
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<td><strong>ICE Tags</strong>&lt;br&gt;IceRobotics, Edinburgh, Scotland</td>
<td>RFID device mounts on leg of animal; Monitors <strong>movement</strong> well (walking, standing still); desktop software for data management</td>
<td>Primarily used in research projects only at this point, is available for purchase and use, system hasn’t been validated to provide health status</td>
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<td><strong>Temperature Boluses</strong>,&lt;br&gt;Phase IV Engineering, Boulder CO</td>
<td>Designed for dairy cattle, animal <strong>temperature</strong> can be detected within 20’ of reader; detects up to 80% ovulations</td>
<td>RFID only (20’ ranger); measures core body temperature; no analysis functions; unit cost high; dairy cattle only (see DVM Systems, LLC)</td>
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<td><strong>Bovine Mobile Observation Unit</strong>&lt;br&gt;Kansas State University</td>
<td>Designed for dairy operations; Includes GPS to monitor animal <strong>location</strong>; <strong>core temperature bolus</strong>; <strong>Pulse oximeter</strong>; <strong>Respiration monitor</strong></td>
<td>Strictly research applications; cost prohibitive for normal cattle operations.</td>
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</table>
Market

- There are roughly 100 million cattle in the US on 1 million farms/operations, with a retail value of over $70 billion USD.
- 28 million cattle in feedlots in the US representing over $20 billion USD.
- Bovine Respiratory Disease Complex (BRD) alone leads to a $120 million decline in carcass value.
- Death loss related to BRD in beef and dairy cattle is estimated at 1 million per year at a cost of $692 million annually.
- Early detection of health issues leads to improved outcomes.
Other Market Potential

- Cow/calf operations
- Dairies
- Sheep/Goats/Pigs
- Horses
- Animal traceability
- Lifetime animal health records
- Remote farming operations
Commercialization Plan

• Form a start-up data services company
  – Remote data collection
  – Hosting
  – Diagnostic analysis
  – Alerting/reporting
  – Medical consulting

• Market the system to feedlot, stocker, pre-conditioning/backgrounding operations.

• No known regulatory hurdles.
Next Steps

- Field test on 500 or more animals
- Commercial partner to build business plan
- Potential investors
## Milestones

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<th>Tasks</th>
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<td>Field trial farm ID and negotiations</td>
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<td>Order tags &amp; equipment</td>
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<td>Hire feedlot cowboys</td>
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<td>Establish SOPs for the trial</td>
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<td>Initial install &amp; test equipment</td>
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<td>Cattle received and tagged</td>
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<td>Verify data collect. &amp; reception</td>
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<td>30-day cattle monitoring/analysis</td>
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<td>Marketing assessment &amp; business plan</td>
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<td>Trial analysis &amp; final report</td>
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Project Team

Dr. Eric Vanzant. BS – Ohio State University, MS & PhD – Kansas State University.
PI of original AMATS development funding from NIH Project #3049023559. Dr. Vanzant is a recognized expert in cattle health and nutrition is a key team member for this project and the ultimate commercialization.

Dr. Jacqueline Smith. BS – Berea College, MS – University of Wisconsin-Madison, PhD – University of Kentucky.
Doctoral student on the project development funding from NIH Project #3049023559. Dr. Smith is the subject matter expert regarding the health monitoring algorithm referenced in this document and would oversee this proposed field trial and would lead the team to develop a data service center to support feedlot customers once commercialized.

Dr. Craig Carter. BS, DVM, MS, PhD – Texas A&M University.
Co-PI on the original AMATS development funding from NIH Project #3049023559. Has developed software-based clinical decision support systems.

Dr. Agricola Odoi. BVM – Makerere University, MS – University of Nairobi, PhD – University of Guelph.
Dr. Odoi has served as the statistical consultant for the development of this algorithm related to NIH Project #3049023559. His role will be refinement of statistical analysis and modeling for this project and ultimate commercialization of the algorithm.
Many thanks to the National Institute for Hometown Security, Somerset, KY for funding to complete this project!

Questions?