United States Department of Agriculture - Agricultural Research Service

Food Safety Research Information Office

FSRIO

FOOD SAFETY RESEARCH: A FOCUS ON

ANIMAL MANURE MANAGEMENT

Animal manure is a food safety concern because of the negative impact it can pose to the environment and public health. If not properly contained or treated, it can lead to waterborne and foodborne illnesses.

Waterborne illness may result when contaminated water reaches water municipal systems or is used for crop irrigation and produce washing. Foodborne illness can occur when improperly aged or treated manure is used as fertilizer on fresh fruits and vegetables.

Effective management strategies must be developed and tested to limit and prevent microbial risk from animal manure.

Pathogens targeted for immediate attention for animal manure are: *Cryptosporidium parvum, Salmonella spp.*, *Campylobacter jejuni/coli*, and *Escherichia coli O157:H7* and other strains.

The USDA Agricultural Research Service's mission is to develop manure management strategies and treatment technologies that effectively handle, store, and apply animal manure in agricultural production systems while preventing the microbial contamination of food and water.

Images: (Top) Manure applied as fertilizer on a field. (Bottom) Cattle feedlot is a source of manure. Image Credits: Iowa Manure Management Action Group (IMMAG)

FSRIO Website: A Resource for Animal Manure Management Research Projects

Detailed information on animal manure and the prevention of pathogen transmission to humans can be found on the FSRIO Research Project Database at: http://www.nal.usda.gov/fsrio/fsresearch.htm

The ARS National Program 108 Food Safety includes research on animal manure management and prevention of pathogen transmission to food and water.

ARS has also incorporated a pathogen research component into National Program 206 Manure and Byproduct Utilization.

ARS RESEARCH AREAS

Pathogen Detection

- Develop methods for sensitive detection and accurate quantitation of pathogens in manure and soil.
- Adapt existing techniques and develop new techniques for the detection of pathogens in manure and soil environments.
- Develop sensors for rapid detection and monitoring of pathogens.

Loading Rates and Survival:

- Monitor and track the prevalence of pathogens in manure, and the life cycle of pathogen transmission from manure to soil and manure to fruit and vegetable crops.
- Determine the survival and proliferation characteristics of pathogens in manure and crop environments to assess the extent of risk to human health.
- Determine the role of biofilm formation on plants and soil particles on survival of pathogens originating from fresh and treated manure.

Transport and Dissemination:

- Assess the capacity of agricultural management practices such as vegetative buffer strips, riparian zones, and wetlands to reduce pathogen transport to surfacewaters.
- Identify environmental parameters (soil type, topography, cover crop, tillage, rain fall) and wildlife/insect vectors that impact pathogen transport and dissemination.

Treatment Technologies:

- Determine how quickly and effectively existing treatment technologies reduce or destroy pathogens.
- Determine how environmental factors and manure types affect pathogen destruction rates of various treatments.
- Develop new methods to handle and treat animal manure during production to prevent transmission to soil and crops used for human food.

Risk Assessment:

- Establish quantitative and human health assessment endpoints that evaluate the effectiveness of treatment strategies.
- Evaluate manure management strategies using a risk assessment process to determine the potential exposure and harm to human health.

Manure Management Resources

Manure and Byproduct Utilization
Action Plan: Component III: Pathogens
USDA/ARS
http://www.nps.ars.usda.gov/programs/programs.htm?npnumber=206&docid=346

"Food Safety Begins on the Farm: A Grower's Guide Good Agricultural Practices for Fresh Fruits and Vegetables"
Cornell University
http://www.gaps.cornell.edu/pubs/Farm_Boo.pdf

"Prevention of Zoonotic Pathogen Transmission from Animal Manure to Human Food"
USDA/ARS
http://www.nps.ars.usda.gov/projects/projects.htm?accession=404805

"Treatment of Animal Manure to Prevent Pathogen Transmission"
USDA/ARS
http://www.nps.ars.usda.gov/projects/projects.htm?accession=402116

"The Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables In Brief"
U.S. Food and Drug Administration
Center for Food Safety and Applied Nutrition
http://vm.cfsan.fda.gov/~dms/prodglan.html

"A Summary of On-Farm Food Safety Programs or Guidelines For Fresh Fruits and Vegetables Worldwide"
http://www.foodsafetynetwork.ca/food/onfarm.htm

ManureNet Canada
http://res2.agr.ca/initiatives/manurenet/manurenet_en.html

Iowa Manure Management Action Group (IMMAG)
http://extension.agron.iastate.edu/immag/mac.html

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The National Agricultural Library (NAL), the largest agricultural library in the world, has been serving agriculture since 1862. NAL was established by Congress as the primary agricultural information resource of the United States of America. Visit the NAL web site at http://www.nal.usda.gov

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The Food Safety Research Information Office (FSRIO) publicly launched its web site, www.nal.usda.gov/fsrio, on July 2, 2001, in support of the National Food Safety Initiative.

A key component of the web site is a database of food safety research projects. The database is a resource for researchers and administrators to assess food safety research needs and priorities, thereby minimizing duplication of effort. FSRIO was established in accordance with H.R. 2534 Agricultural Research, Extension and Education Reauthorization Act of 1997, SEC. 503.

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