Amphibian Disease Research at the University of Tennessee

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Institute of Agriculture

Amphibian Disease Program
Interactions of Cattle and Amphibians

Goal: Determine if amphibians can function as reservoirs of foodborne pathogens.
Justification: Amphibians may increase prevalence of foodborne pathogens in beef products.

Goal: Determine if cattle use of farm wetlands increases pathogen prevalence in amphibians.
Justification: Cattle may negatively influence amphibians, which are declining globally.

Collaborator: University of Georgia Veterinary Diagnostic and Investigational Lab

Amphibian Disease Program
Food Safety and Public Health

Current Research: An Untested Hypothesis

Foodborne Pathogens

Infected Individual

\* E. coli O157:H7
\* Salmonella
\* M. paratuberculosis
\* C. parvum
\* L. monocytogenes

\*35 Billion

\*76 Million Cases

Food Safety
Amphibian Conservation

'Spill-over' Reservoirs

USDA NVH

NIH

Food Safety and Public Health

Current Research: An Untested Hypothesis
Amphibian Disease Program

NSF
Amphibian Conservation
Current Research: An Untested Hypothesis
NIH

Goal
Establish a link between human land use and recent increases in emerging infectious diseases

Hypothesized
Anthropogenic environmental stressors increase pathogen prevalence in wildlife populations by compromising immunity

Decrease Water Quality
Aeromonas hydrophila

Decreases in Lymphocytes
Immunocompromised
FV3 Type
Ranavirus

Pilot Study Results: Land-use Effect
8 Ponds
(4 per land use)
Plateau
REC

Access Ponds
Necropsy

Microbial & Viral Analysis
Non-access Ponds

First Documentation of an Association between a Human Land Use and Increased Pathogen Prevalence in a Wildlife Species

Plateau REC
8 Ponds
(4 per land use)
Plateau
REC

0.36
0.4
0.3
0.15
0
0.1
0.2
0.3
0.4
0.5

Bullfrog Green Frog

FV3 Prevalence
Access
Non-access

Cattle Land Use

Metamorph capture
4X Lower

3.9X More Likely!
Amphibian Disease Program
Amphibian Conservation
Pilot Study Results: Season Effect

<table>
<thead>
<tr>
<th>Season</th>
<th>Bullfrog</th>
<th>Green Frog</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter</td>
<td>0.15</td>
<td>0.15</td>
</tr>
<tr>
<td>Fall</td>
<td>0.24</td>
<td>0.24</td>
</tr>
<tr>
<td>Summer</td>
<td>0.45</td>
<td>0.45</td>
</tr>
</tbody>
</table>

First Documentation of Seasonal Trends in FV3 Prevalence

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- Tennessee Wildlife Resources Agency
- UTIA Start-up Funds
- UGA In-kind Contributions

Funding Pursuits
2005–2006
1) National Science Foundation: $1,573,583
Epidemiology of pathogens in amphibian populations inhabiting agricultural landscapes.
Location: Plateau REC, UT and UGA Campuses
2) USDA, National Research Initiative: $667,314
Examining the role of amphibians inhabiting farm ponds as reservoirs of foodborne pathogens.
Location: Plateau, Dairy and Middle TN RECs; UT and UGA Campuses
co-PIs: UT = Dr. Graham Hickling
UGA = Drs. Debra Miller, Sreekumari Rajeev, and Charles Baldwin

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