

Environmental Health and One Health

Dr. Randy Singer
University of Minnesota

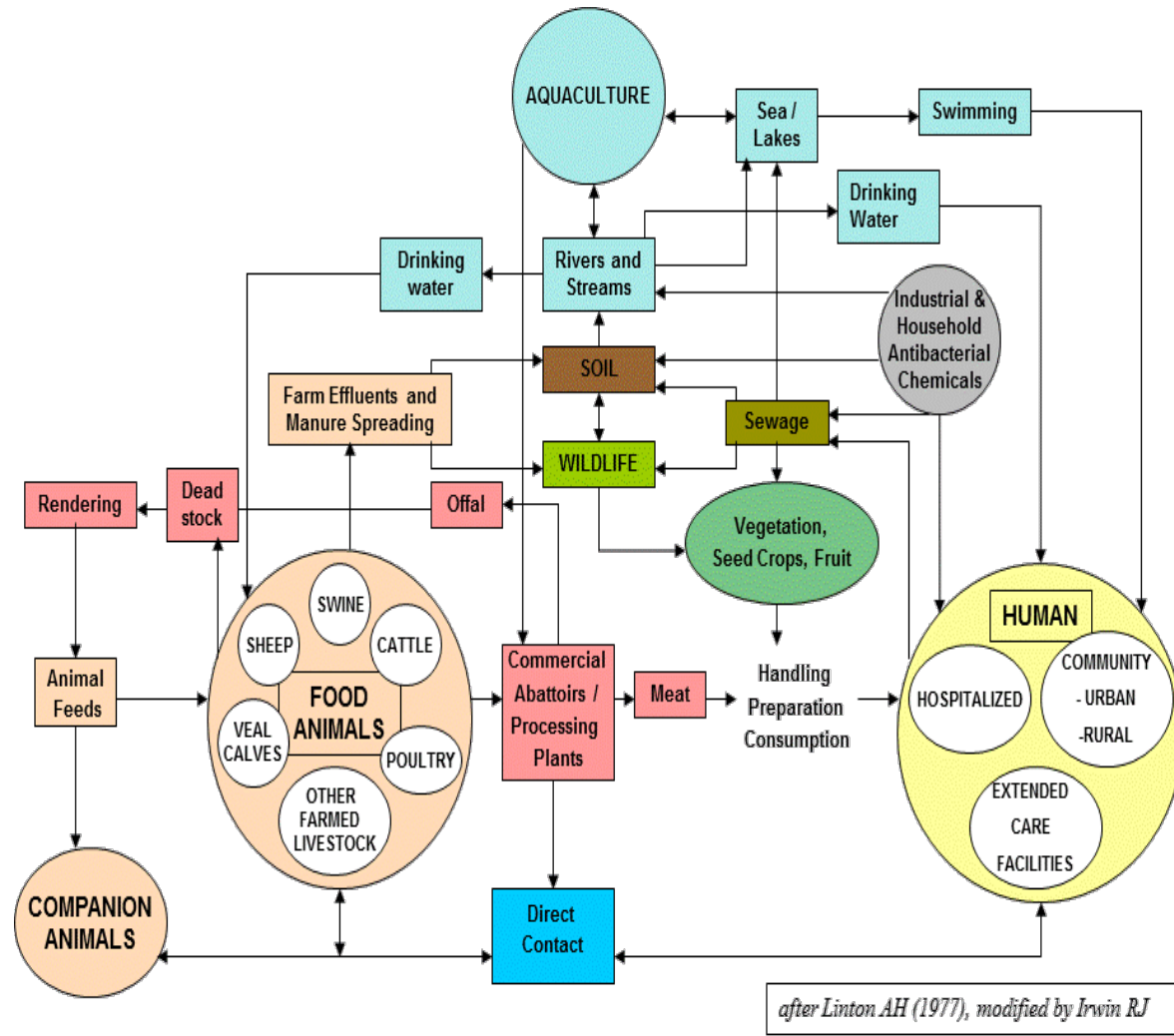
Why is the concept of One Health necessary to the future success of CARB/NAP?



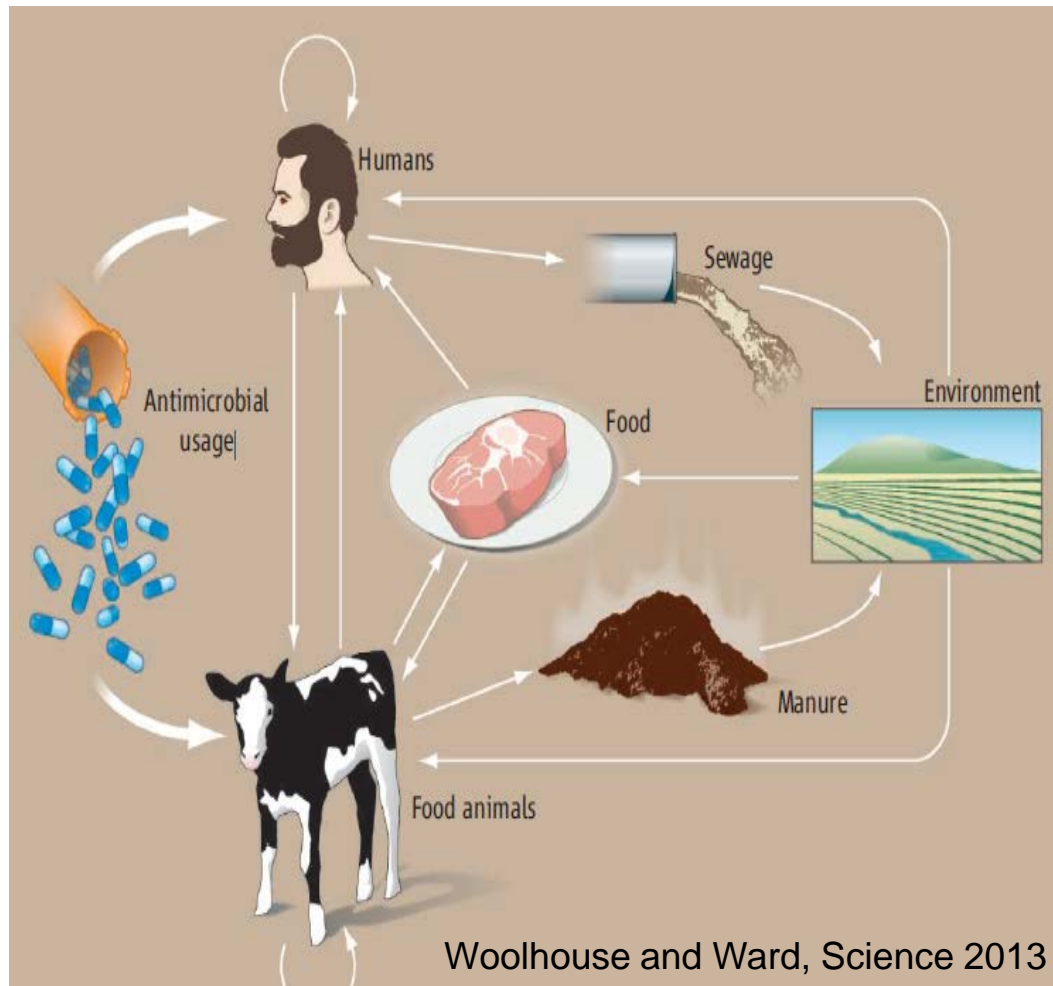
Antibiotic Resistant Bacteria (ARB)
Antibiotic Resistance Genes (ARG)
Antibiotics and Metabolites



Concept of One Health



Concept of One Health



What are the barriers to adopting One Health as part of the NAP and how would you suggest we could address these?



Antibiotic Resistant Bacteria (ARB)
Antibiotic Resistance Genes (ARG)
Antibiotics and Metabolites




Negative Health Outcomes

Systematic Review

- Objective: To summarize the evidence of studies assessing the dissemination of antibiotic resistant bacteria (ARB) and antibiotic resistance genes (ARG) from anthropogenic sources into the environment
- Question: “Are **environmental** levels of **ARB** and **ARG** higher in close proximity to, or downstream from, known or suspected **sources** compared to areas more distant from or upstream from these sources?”

Systematic Review – Risk of Bias

Bias / Rubric	Selection bias	Information bias	Confounding	Overall
Low	 An aerial photograph of a wide river winding through a green, rural landscape. In the foreground, there are agricultural fields and a large paved area. Two inset images are overlaid on the scene: a black and white cow standing in a field of yellow flowers on the left, and a circular inset showing a wastewater treatment plant with several large circular tanks on the right. Both insets have yellow borders.			
Unclear				
High				

Data Gaps and Concerns

- Quantities of antibiotics used and excreted
- Fate and transport of ARB, ARG and antibiotic metabolites
- Efficacy of waste management systems
- Environmental selection of resistance and role of horizontal gene transfer

What will it take to adopt a One Health strategy?

- Clear definition of objectives to guide research and interventions
- Attention to the design of a monitoring system
- Interdisciplinary teams
- Funding