

Native Habitat and Wildlife Pose Little Risk: Working From the Science We Know

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Outline of Presentation: What Can Science Tell Us?

- Background: *E. coli* O157:H7 Outbreaks
- Sources of *E. coli* O157:H7 Contamination
 - Soil
 - Water
 - Animals
- The Role of Vegetation
- Survey Results

E. coli O157:H7 Outbreaks

- Each year reported to the CDC:
73, 480 illnesses,
2,170 hospitalizations,
3 deaths
- 41% from beef and 21% from produce (Rangel 2005)
- Produce incidents are rising - why?
 - Increases in consumption, changes in agricultural practices, changes in processing (Beuchat 1996 & 2002)

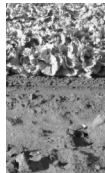


Sources of Field Level *E. coli* O157:H7 Contamination

- Animals are reservoirs of pathogen
- Crops contamination - contact with feces
- Contamination can occur through:
 - Soil
 - Water
 - Direct contact with animals

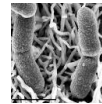
Possible Contamination from Soil

- Crop exposure to manure
- Survival on surface for extended periods (Islam et al. 2005, Beuchat 1999)
- Improper composting (Hess et al. 2004)
- Dust can carry pathogens (Lee et al. 2006, Chang et al. 2001, Whyte et al. 2001)



Maintaining Diverse Soil Microbes Reduces Risks

- Competition and the antagonistic capacity of resident microbial flora (Johannessen et al. 2005)
- Diverse soils can suppress pathogenic *E. coli* (e.g. *Pseudomonas fluorescens*)
- More organic matter fosters microbial diversity (Gunapala et al. 1998, Lundquist et al. 1999, Bulluck et al. 2002)
- Implications for organic farming (Van Bruggen 1995)



Possible Contamination from Water

- Flood water - contaminated creeks, rivers
- Run-off from cattle operations
(Vinton et al. 2004, Koelsch et al. 2006)
- Contaminated irrigation water
sprinkler irrigation vs. surface water
(Solomon et al. 2002)
- Absorbed through roots?
(Solomon et al. 2002, Wachtel et al. 2002a, Wachtel et al. 2002b)



Contamination from Domesticated Animals

- Cattle are the top known reservoir
- From 2 - 50% of herd carry *E. coli* O157:H7
(Chapman et al. 1997, Khalisa et al. 2006, Hancock et al. 1998)
- Cattle diet may be a factor, but still debated
(Diez-Gonzalez 1998, Franz et al. 2005, Hancock and Besser 2006)
- Sheep, goats, and pigs can be carriers
(Ogden 2005, Orden et al. 2008, Cornick and Helgerson 2004)



Contamination from Wild Animals?

- Wild deer: Kansas and Florida (0 - 2%)
(Sargeant et al. 1999, Fischer et al. 2001)
- Birds: gulls (0 -12%), other wild birds (0- 1%)
(Wallace et al. 1997, Palmgren et al. 1997, Brittingham et al. 1988, Hancock et al. 1998)
- Rodents - (0%) (Hancock et al. 1998)
- Feral pigs in CA (15 %) (Jay et al. 2007)



The Role of Vegetation: Attracting Animals?

- Certain food safety guidelines recommend removing possible wildlife habitat
- Those attracted: birds & rodents (low risk)
- Feral pigs not attracted to vegetation for habitat, mobile and attracted to food

The Role of Vegetation: Reducing Risks of Contamination

- Vegetation can reduce overland flow of contaminated water
- Tate et al. 2006
 - Vegetated buffers used to reduce pathogen transport from fecal matter
 - Relatively small grass buffers - 99% reduction
- Vegetation may also serve as barriers to contamination from dust

Vegetation In Waterways Reduces Pathogen Presence

- Review of 40 field trials: vegetated treatment systems reduce pathogens (Koelsch et al. 2006)
- Constructed wetlands (Greenway et al. 2005)
 - 95 - 97% decrease in pathogens
 - Microbial competition and predation
 - UV light disinfection
- Waterways with more vegetation remove more pathogens (Nokes et al. 2003)



In Summary

- Current studies indicate domesticated animals pose greatest threat to food safety
- Based on scientific studies in other regions, wildlife pose little to no risk
- Removal of vegetation aimed to deter wildlife may increase chances of contamination

What We Know About Current Activities In the Central Coast

Mail Survey - Monterey County RCD

- Spring 2007
- 600 growers of row crops
- 6 counties in Central Coast
- 30% response rate (~ 200 returned surveys)

Growers Face Pressure To Address Vegetation and Wildlife

- Told to Remove Vegetation:
 - 32 % of leafy greens growers
 - 2.3 % of other growers
- Told to Eliminate Wildlife:
 - 48 % of leafy greens growers
 - 28 % of other growers

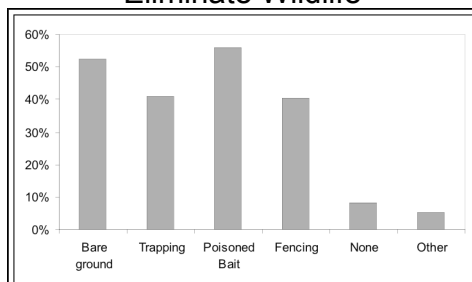
Actions of Respondents

Over 30% removed non-crop vegetation

Over 15% of growers removed conservation practices used to reduce water pollution (22% of leafy greens growers)

89% adopted at least one practice to deter or eliminate wildlife

Percent of Respondents Adopting Measures to Deter or Eliminate Wildlife



Potential Widespread Impacts



- Respondents manage > 140,000 acres
- Removed conservation practices manage ~ 30,000 acres
- Wildlife determent/elimination manage ~ 133,000 acres
- Impacts may be greater now than in 2007

For More Information:
<http://www.rcdmonterey.org/>