

## Microbial Pollutants, Grazing, and Rangeland Water Quality

Time to create knowledge from research

Presented to the California Cattlemen's Association  
Annual Conference  
Educational Forum  
Reno NV November 18, 2010

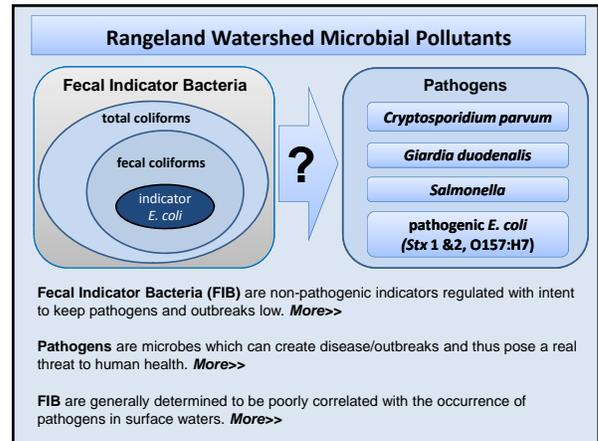
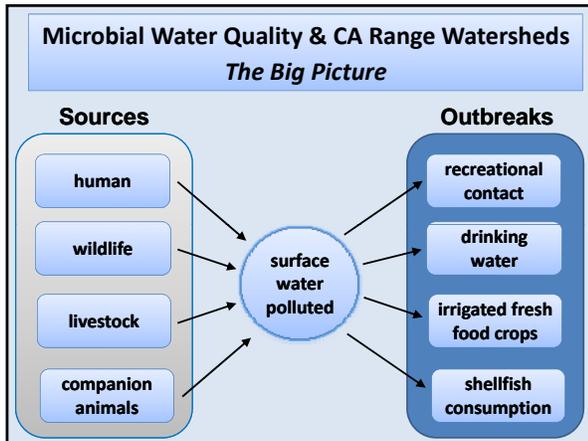
Ken Tate and Rob Atwill, UC Davis

**1995 vs. 2010** the issue is the same, cows and microbial water quality

**1995** a lack of research information to answer basic questions

**2010** translate a huge amount of research information to ranchers, regulators, and the public in a manner that is helpful

**We are working to get the science organized, translated, and available**



### Pathogen Correlation to FIB Water Quality Standards

100+ samples analyzed for pathogens and FIB at grazed and irrigated mountain meadow systems

EPA <i>E. coli</i> standard	→ "safe"	VS.	"danger"
<i>C. parvum</i> 8 positives	5/75		3/27
<i>Salmonella</i> 12 positives	9/75		3/27
<i>Campy</i> 0 positives	0/75		0/27
<i>E. coli</i> O157:H7 6 positives	4/95		2/21

### Microbial Water Quality & Cattle Grazing

#### Organize Knowledge

Factors that increase risk of water pollution with pathogens

<b>Herd infected</b> <ul style="list-style-type: none"> <li>• calves &lt; 4 mo</li> <li>• calving during rainy season</li> <li>• long calving season</li> </ul> <a href="#">more info &gt;&gt;</a>	<b>Distribution - space</b> <ul style="list-style-type: none"> <li>• cattle defecate in water</li> <li>• cattle defecate near water</li> <li>• cattle defecate in runoff areas</li> </ul> <a href="#">more info &gt;&gt;</a>	<b>Distribution - time</b> <ul style="list-style-type: none"> <li>• cattle defecate near water during rainy season</li> <li>• cattle defecate in runoff areas during runoff</li> </ul> <a href="#">more info &gt;&gt;</a>	<b>High stocking rates</b> <ul style="list-style-type: none"> <li>• more fecal load</li> <li>• more defecation in water, near water, and runoff areas</li> <li>• more runoff and pathogen transport</li> </ul> <a href="#">more info &gt;&gt;</a>
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Factors that reduce risk of water pollution with pathogens

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### Cryptosporidium dynamics in wildlife and livestock

Animal	% infected
range beef cow	6-8*
range beef calve < 4 mo	10-20*
back country pack stock	0
feral pig	4-13*
ground squirrel	7-15*

**\*C. parvum is rare**






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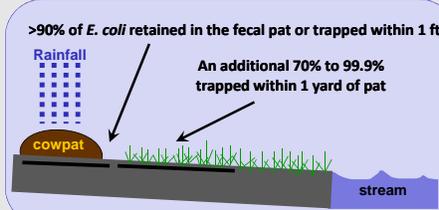
**Research Result** Over 60% of cattle fecal loading is near livestock attractants in summer

**Management Implication** We can position salt, feed, water to attract cattle and pathogens to "safe" areas – not near streams or runoff areas



**Research Result** >90% of E. coli retained in the fecal pat or trapped within 1 ft

An additional 70% to 99.9% trapped within 1 yard of pat



**Management Implications**

- Keep pats out of creeks.
- Move cattle, pats away from critical areas with distribution tools.
- Narrow buffer strips are effective.
- Maintain soil infiltration rates.
- Moderate stocking rates.

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### C. parvum survival in cow pats on range

	Days until >90% dead	Fecal Pat Temperature (F)
<b>Research Result</b>	72	50
	29	68
	5	86
	<1	104

**Translation** Once temperature in a cow fecal pat exceeds 104 °F all of the C. parvum in that pat die within a matter of hours. Fecal pats in direct sun achieve 104 °F once air temperature reaches 78 °F.

**Management Implication** We can use this fact to time grazing in critical runoff areas so that there are enough days above 78 °F to neutralize any C. parvum in cattle fecal pats prior to rainfall and runoff.

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### Grazing Intensity *E. coli*

No Grazing	310	← EPA Standard = 126
Moderate Grazing	425	
Heavy Grazing	1250	

Stocking rate increases WQ risk, background is not zero

### We are working to get the science organized, translated, and available

California Rangeland Watershed Laboratory  
<http://rangelandwatersheds.ucdavis.edu>

**Reality:** we manage for many goals, not just one, nor one at a time

- Forage and Livestock Production
- Weed Control – Diversity
- Wildlife and their Habitat
- Productive and Healthy Soils
- Water Quantity and Quality

### Grazing for Ecosystem Services

*which includes raising cattle*

K. Tate, L. Roche, B. Cutts, V. Eviner, J. Derner, T. O'Geen, M. Lubell, M. George

### Mail survey to 2000 CA and WY ranchers

- Your knowledge about grazing to achieve your agricultural and ecological goals
- Information you need to manage for your goals
- Best way to get information to you
- Make research and outreach relevant and available to you and the public

**We need your help**

**In collaboration with CCA**

*Mark Lubell, Tracy Schohr, Bethany Cutts*

Mailed from CCA

Confidential

Jan-Feb 2011

Please participate



Getting the answers...  
**Rangeland Decision-Making Survey**  
We invite California and Wyoming ranchers to participate in a confidential survey about their perceptions and use of conservation practices.

Participating in this survey is a chance to:  
- Share your experiences and perspectives on rangeland conservation practices  
- Help us understand the current state of rangeland conservation in California and Wyoming  
- Watch: <http://www.environmentalpolicy.ucdavis.edu/projects>

Mail survey to 2000 CA and WY ranchers about their perceptions, and use, of conservation practices

On ranch survey of conservation practice implementation and rangeland health



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Develop on-line support information



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<http://rangelandwatersheds.ucdavis.edu>

Center for Environmental Policy and Behavior  
<http://environmentalpolicy.ucdavis.edu>



Talk to Bethany Cutts, or myself during the convention

Watch your mail from CCA for updates, the survey, survey reminders, etc.

