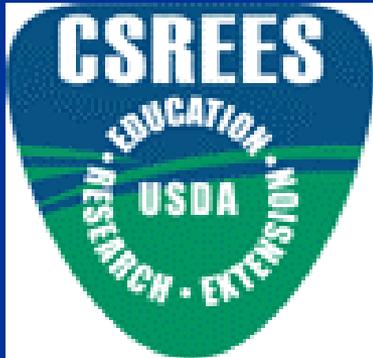
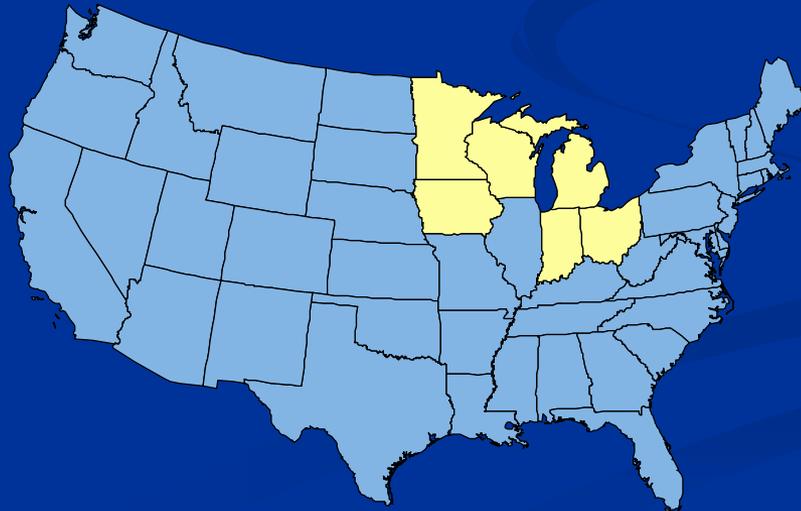


Volunteer Monitoring of *E. coli* in Upper Midwest Streams: A Comparison of Methods and Preferences

2006 USDA-CSREES National Water
Conference
February 7, 2006



Project Partners



Funding

- Source: CSREES, Section 406 Integrated Research, Extension, Education Project
- \$275,000 to 6 states
- October 1, 2003 – September 30, 2006



Cooperative State
Research, Education, and Extension Service



Project Goals

- Build the capacity of Volunteer Monitoring programs to understand and use the most appropriate E.coli testing protocols (test kits) and develop watershed based sampling strategies.
- Develop a comprehensive training program for volunteers on E. coli testing in targeted watersheds in six states.

Project Goals (cont.)

- Develop & disseminate educational materials about E. coli and its associated health risks, sources and reasons for monitoring.
- Increase awareness and acceptance of the use of volunteer collected data in various watershed program assessments and TMDL development.

Projects Goals (cont.)

- Share results of our work with other states across the country, primarily via. the National Volunteer Monitoring Facilitation Project.
- Demonstrate how to set up an appropriate watershed – based E. coli sampling strategy utilizing volunteer networks and data.

Project Overview

■ Year 1

- Pilot testing 5 kits in 2 states (Iowa and Indiana) ? recommendation
- Develop training and supporting materials

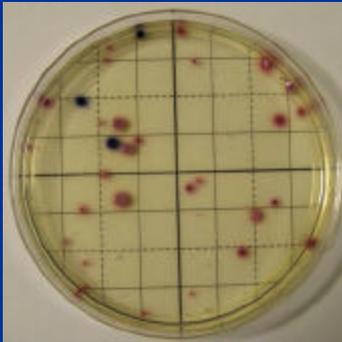
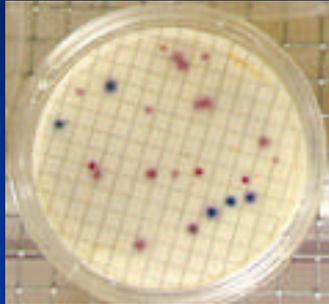
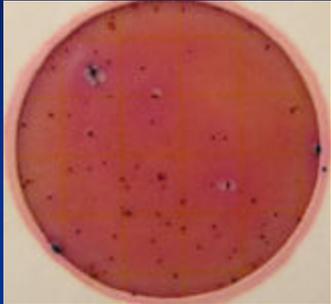
■ Year 2

- All six states sample using selected test kits selected from Iowa & Indiana year 1 results
- Evaluate data and training methods

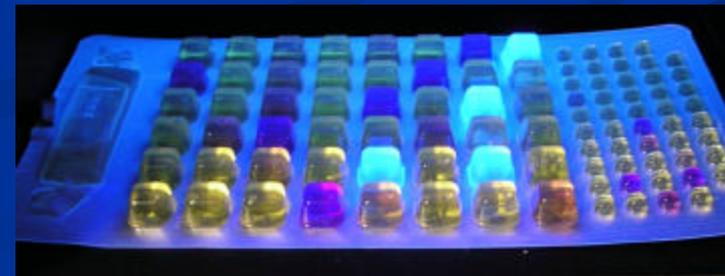
■ Year 3

- Continue sampling and watershed monitoring support
- Share results and materials

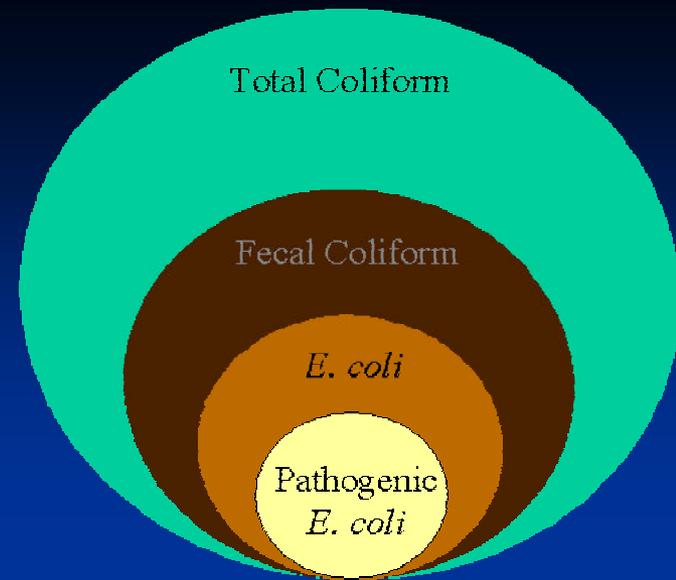
Why research *E. coli* test kits?



- Waters impaired by bacteria across U.S.
- Many different kits being used
- No comparative, independent study of how well kits work



Indicator Bacteria



- Bacteria from feces of warm-blooded animals
- Easy to collect and analyze, relatively safe to handle and are usually present when pathogens are present
- Generally harmless
- Present in higher number than pathogens



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Washington State Department of Ecology

Sources of fecal matter

- *Human* – dirty diapers, swimming “accidents,” malfunctioning septic systems, sewage treatment plant discharges, leaking sewage lagoons
- *Animals* – (warm blooded animals) direct contribution, overflowing lagoons, runoff from fields after manure application, manure spills, storm water runoff from lands with wildlife or pet droppings

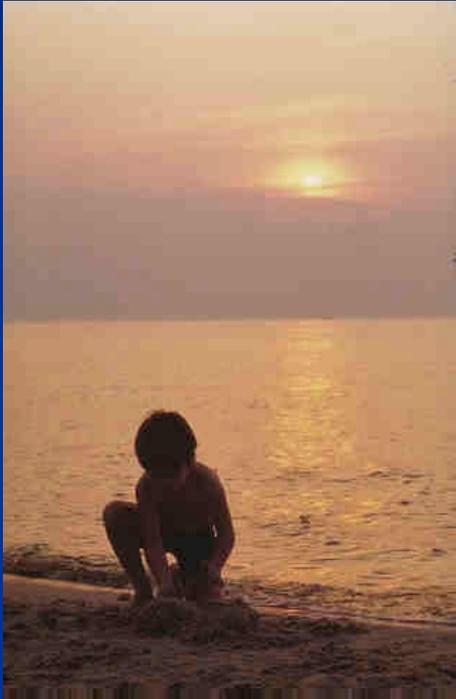


NOAA Coastal Services Center



UNI Environmental Programs

Body contact standard

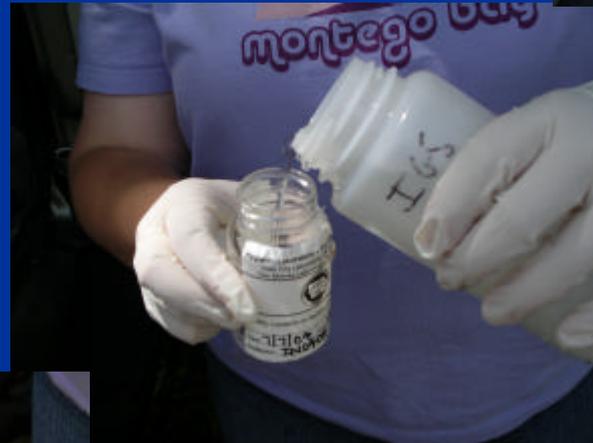


- Indicator of potential health risks from primary contact (swimming, kayaking, water skiing) or partial contact (boating, fishing)
- Used for recreational waters, TMDLs, beach closings
- Not used to assess drinking water supplies
 - 126 cfu per 100 ml calculated as a geometric mean of 5 samples over 30 days
 - 235 cfu per 100ml (primary contact 1 sample)

Why Volunteer Monitoring?

- Monitoring provides educational opportunities for interested local residents and students.
- Citizen research data is needed to help the watershed project prioritize decisions.
- Volunteers extend limited agency resources
- Cost of lab analysis is high & access to certified labs is problematic.
- Citizens need an easy, reliable, inexpensive test.

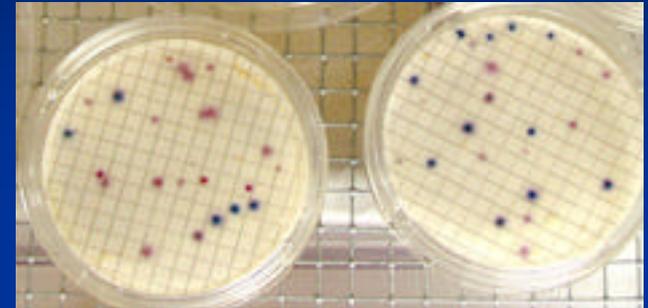
Collection of Water Samples



Testing 6 methods – Iowa & Indiana

■ 6 Kits:

- Coliscan[®] Easy Gel (incubated)
- Coliscan[®] Easy Gel (not incubated)
- 3M[™] Petrifilm[™]
- Coliscan[®] MF Method Kit (*IN only*)
- Colisure[®] Method with IDEXX Quanti-Tray/2000[™] (*IA only*)
- Colilert[®] Method with IDEXX Quanti-Tray/2000[™] (*IA only*)

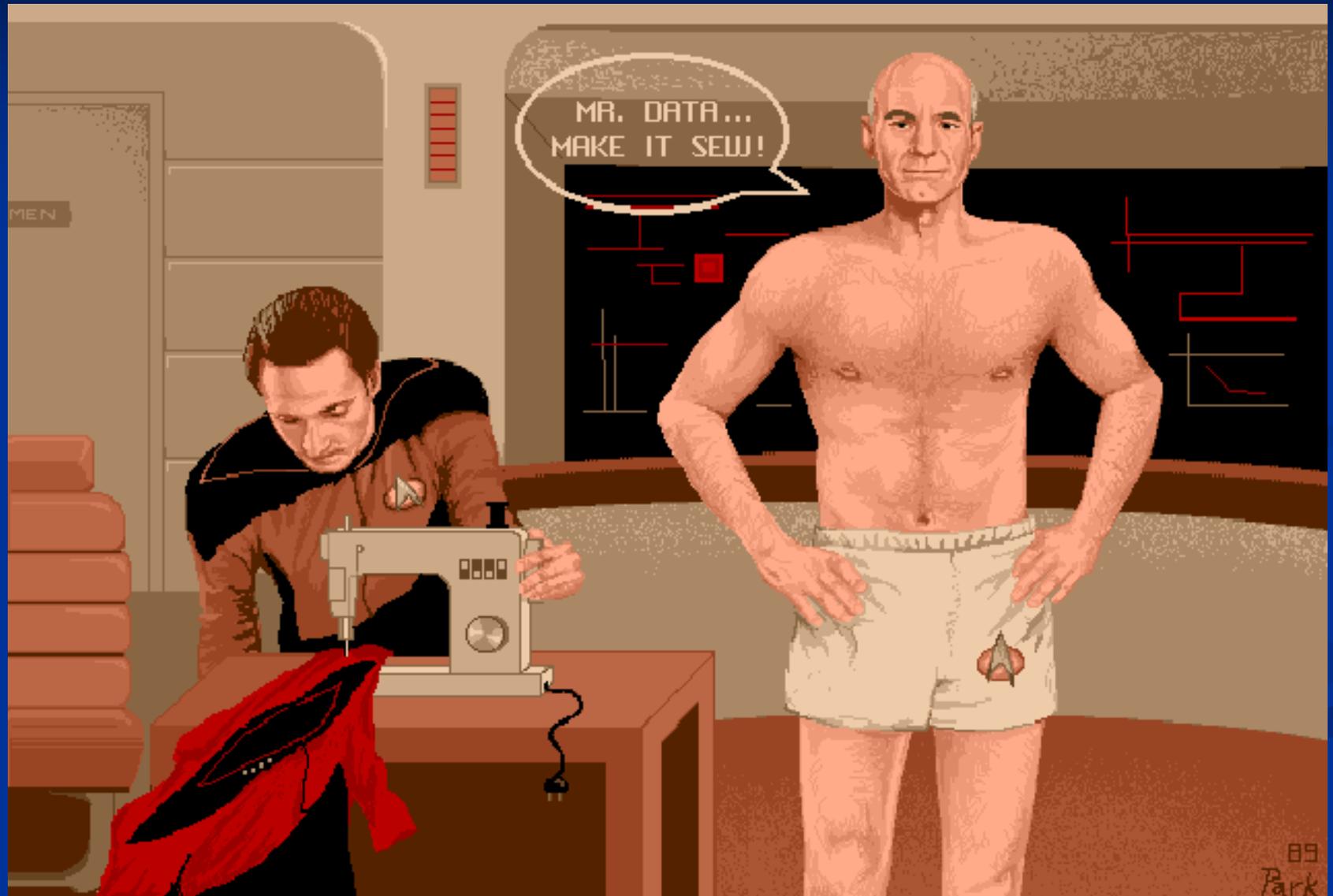


- Testing spring, summer, & fall 2004 & 2005
- Water sample sent to lab for analysis
- Recommended the 'best' kit for volunteers
- Based on accuracy, reliability, cost, ease of use

Coliscan® Easy Gel (incubated and not incubated)



Data?...Oh No! Not Data!



2005 Citizens Monitoring Bacteria Volunteer Participation Summary

	Indiana	Iowa	Michigan	Minnesota	Ohio	Wisconsin
Number of volunteers monitoring	6	4	6	7	7	8
Number of training workshops held	1	1	1	4	2	3
Number of volunteers trained in 2005	6	1	7	12	7	12
Hours per sampling (Min)	3	3.5	2	1.5	1.5	2
Hours per sampling (Max)	6	9.5	4	4	4	4
Average hours per sampling event	4.50	5.25	3	2.3	2.7	3
Average number of site visits in 2005	9.4	12.5	6.2	20.1	5.7	5
Average hours per volunteer in 2005	41.4	60.25	24.7	47.6	22.8	18.375

2005 Citizens Monitoring Bacteria Volunteer Participation Summary (cont.)

	Indiana	Iowa	Michigan	Minnesota	Ohio	Wisconsin
Number of sampling days in 2005	47	50	37	69	40	38
Sum of volunteer hours for 2005	207	241	148	333	159.5	147
Other <i>E.coli</i> workshops held	5	5	2	0	0	0
Other volunteers trained in <i>E.coli</i>	89	53	32	0	0	0
Number of samples collected in 2005	110	153	47	145	63	40
Number of replicates analyzed in 2005	440	765	282	870	378	252
Number of sites sampled in 2005	12	13	8	13	8	5

Ohio, Michigan, Wisconsin & Minnesota 2005

Results

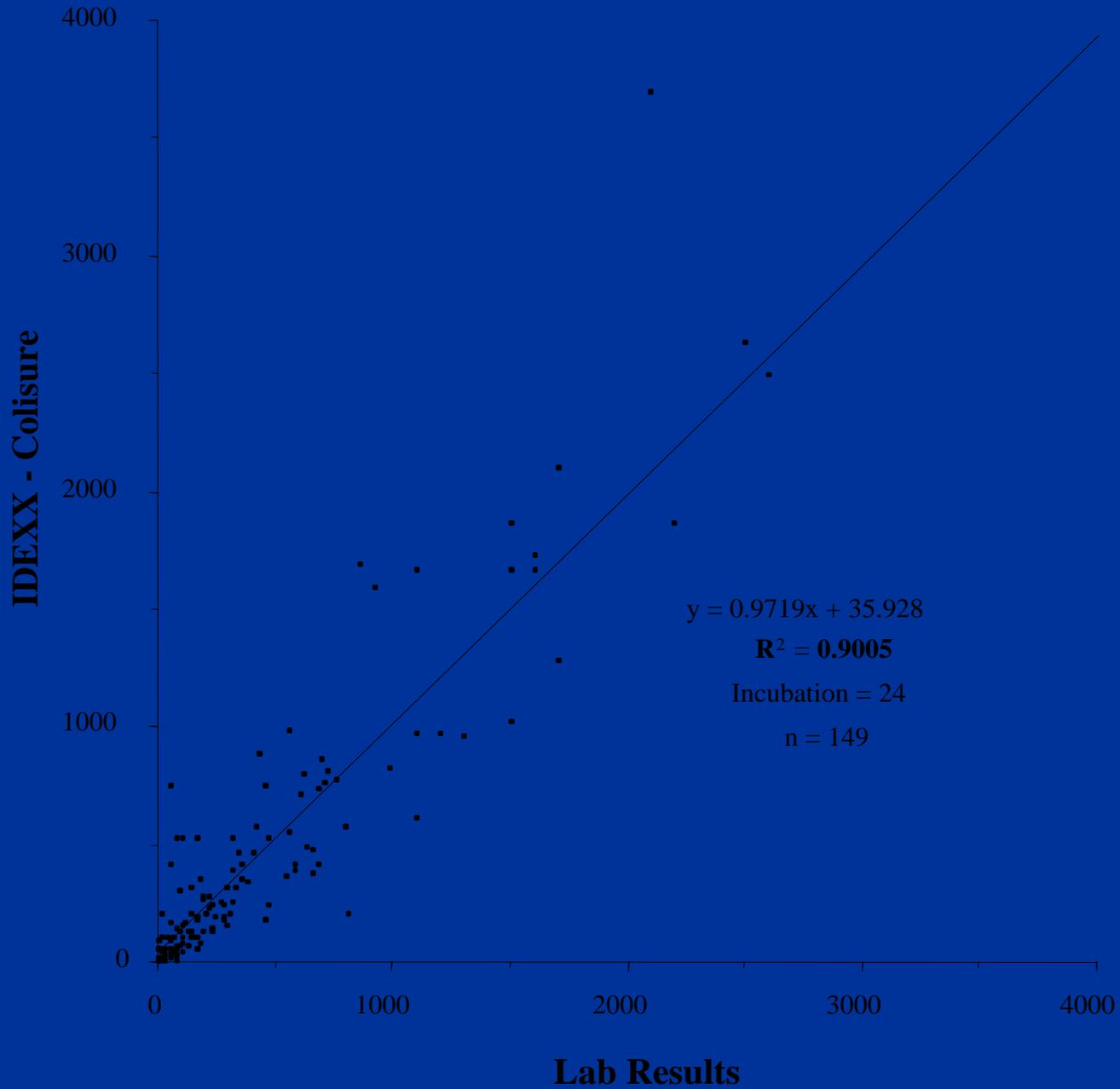
Ranking of the % of time the test kit & lab values were both either above or below the 235 cfu value:

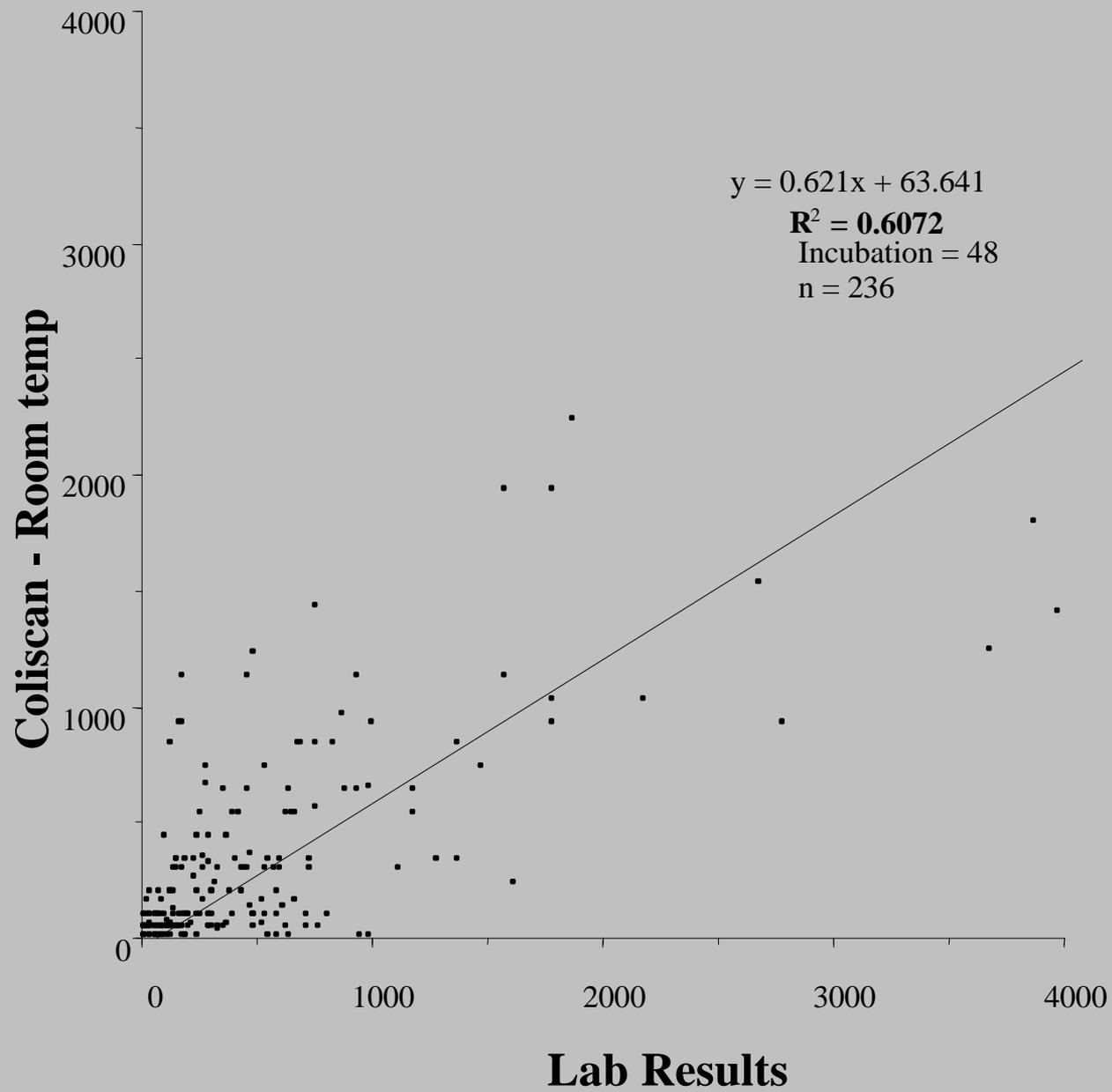
Overall	Agree	Disagree	N	Agree %
Petrifilm 24	254	37	291	87.29
Easygel 24	240	49	289	83.04
Pertifilm 48	161	42	203	79.31
Easygel 48	158	46	204	77.45

2005 INDIANA AND IOWA COMBINED

Ranking of the % of time the test kit & lab values were both either above or below the 235 cfu. value:

Test	Incubation Time	n	Match	Non-match	% Agreement
Colisure (IDEXX)	24	171	151	20	88.3%
	48	175	154	21	88.0%
Petrifilm (3M)	24	268	229	39	85.4%
	48	221	193	28	87.3%
Colilert (IDEXX)	24	161	136	25	84.5%
Coliscan - 35°C (E Gel.)	24	245	196	49	80.0%
	48	262	217	45	82.8%
Coliscan MF	24	94	75	19	79.8%
	48	92	75	17	81.5%
Coliscan - Room Temp	24	241	143	98	59.3%
	48	261	181	80	69.3%





Volunteer Perceptions & Attitudes

- Indiana and Iowa volunteers were asked to rank their confidence in the test methods they had used during the 2005 sampling season.

- Indiana volunteers chose :
 - (1) Coliscan Easygel ® - Incubated
 - (2) 3M Petrifilm

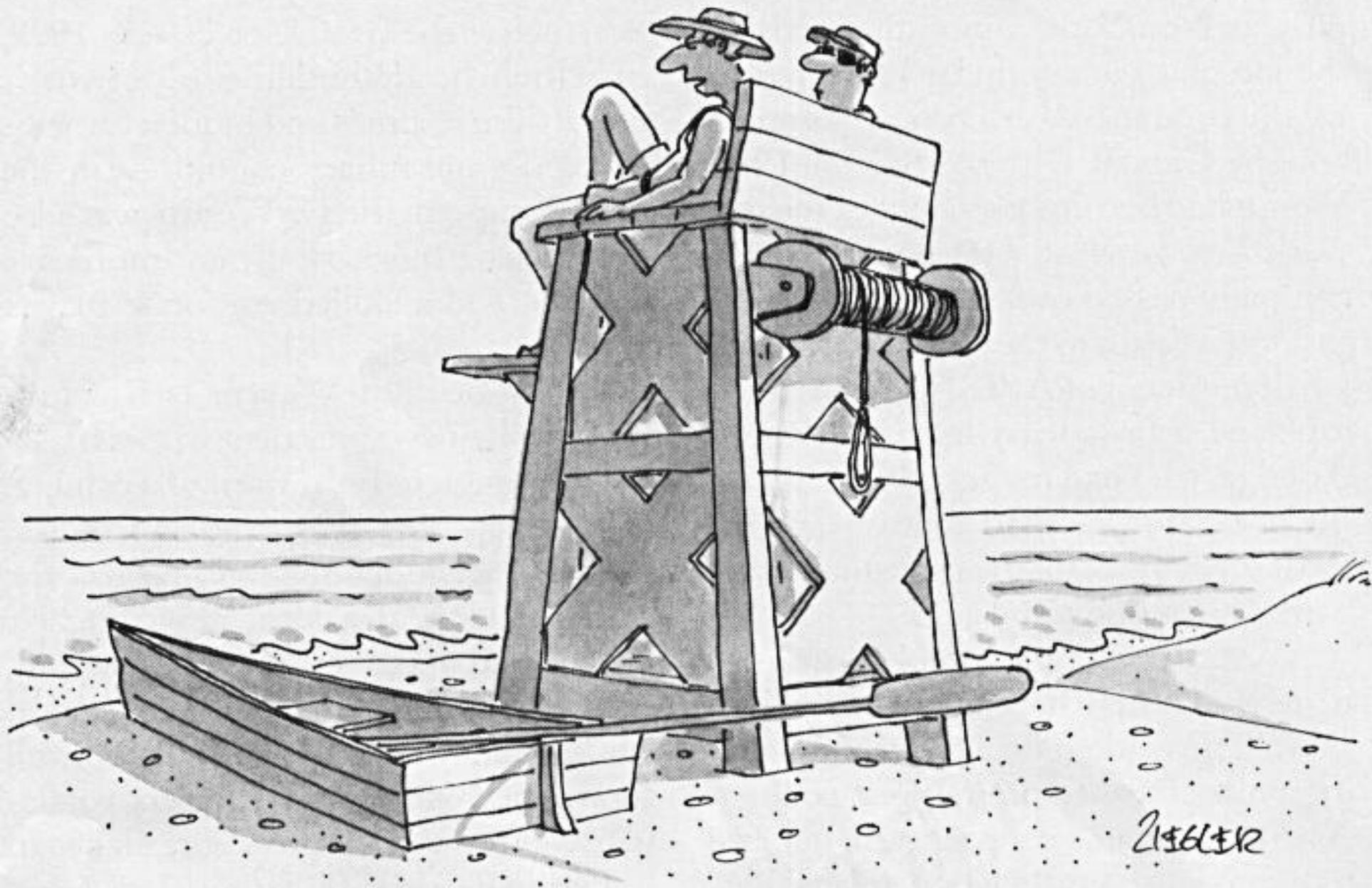
- Iowa volunteers chose:
 - (1) Colisure® with IDEXX Quanti-Tray /2000
 - (2) 3M Petrifilm
 - (3) Colilert® with IDEXX Quanti-Tray /2000

Volunteer Perceptions (cont.)

- Minnesota, Michigan, Ohio and Wisconsin volunteers were asked to rank how easy it was to learn each of the two test kits.
- Immediately following “spring training” 16 volunteers indicated a preference for using 3M Petrifilm and 6 indicated a preference for using Coliscan Easygel
- End of season confidence rankings showed a nearly equal split with 13 volunteers having the most confidence in Coliscan Easygel while 16 volunteers showed more confidence in 3M Petrifilm.

What Will Year 3 Yield?

- We need more data! Season 3 results will help clarify trends, reliability etc.
- Additional surveys of volunteers concerning trainings, kit usability and perceptions.
- Can volunteers accurately interpret data?
- Are test kits reliable?
- Are test kits easy to use?
- Will the project yield “mixed” findings?
- Very important study!



"I adore the beauty and tranquillity of these raw-sewage days."

Thank You!

Contact Information

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