

Food Safety in Childcare Centers

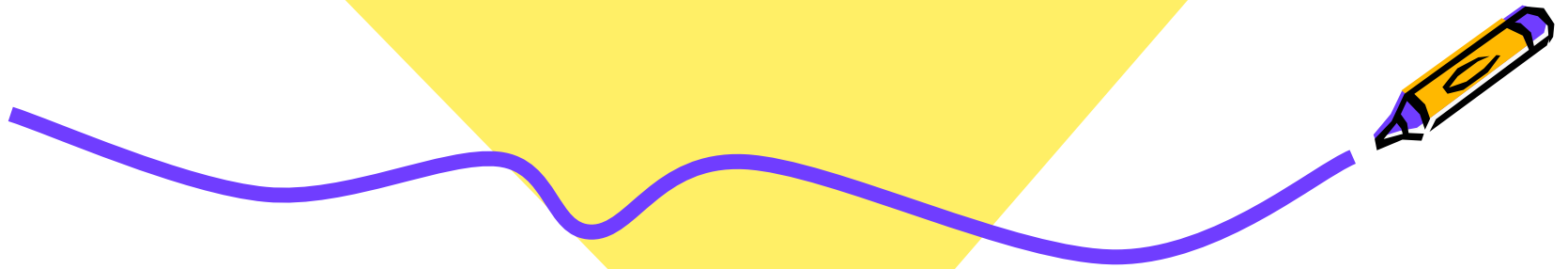
Maggie Ryan
UT Public Health Intern



Monica Kingsley, Mentor

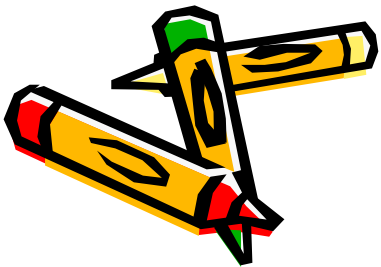


Introduction

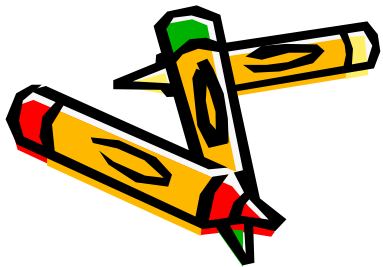
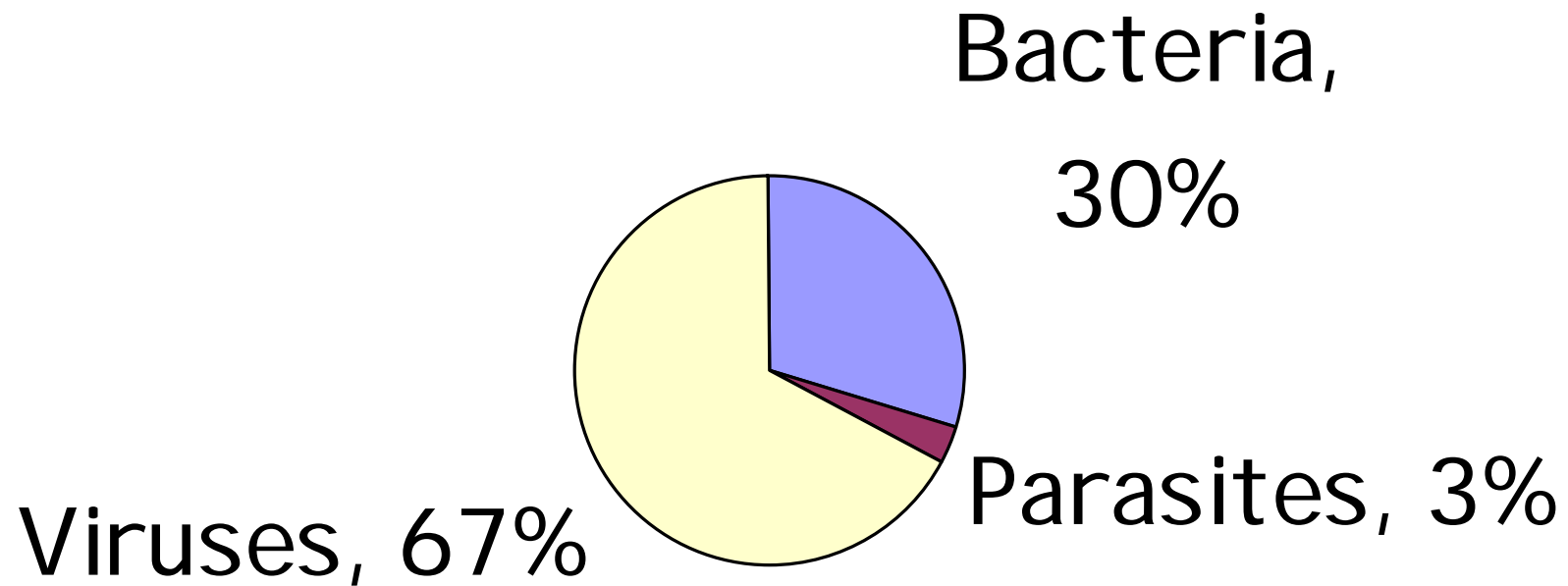


Foodborne Disease

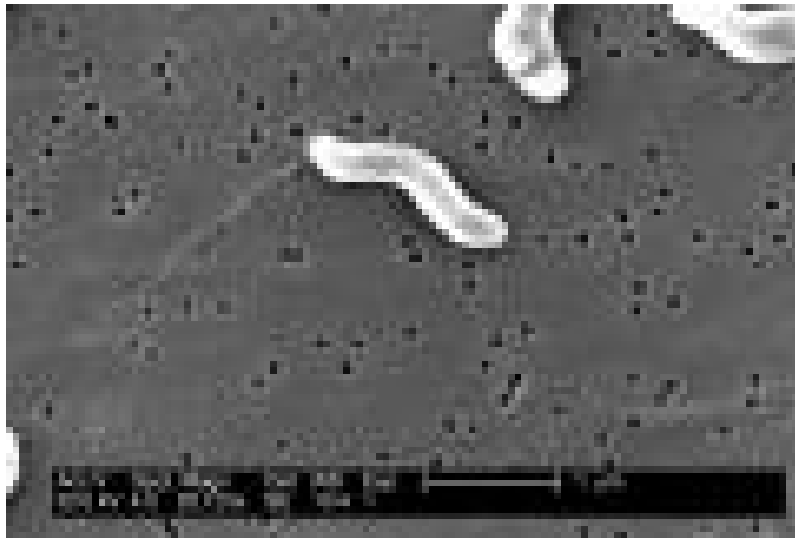
- U.S. Rates per Year:
 - 76 million illnesses
 - 325,000 hospitalizations
 - 5,000 deaths



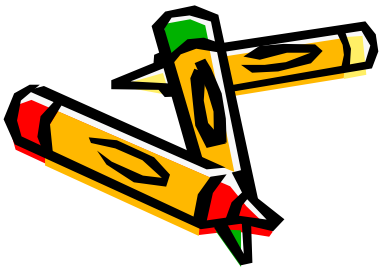
Etiology of Foodborne Illness in the United States



Campylobacter spp.

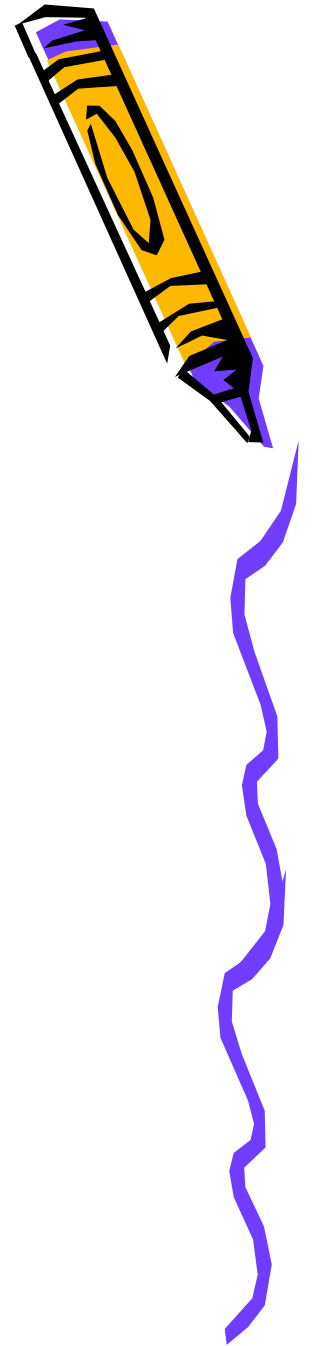


- 47% of Bacterial Foodborne illnesses
- Infectious dose of 100 microorganisms
- Spread via a fecal-oral route
- Inadequate cooking or cross-contamination



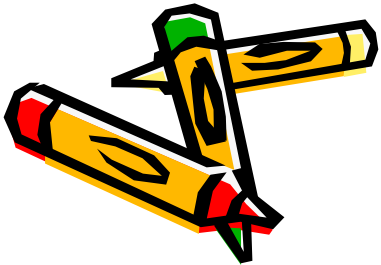
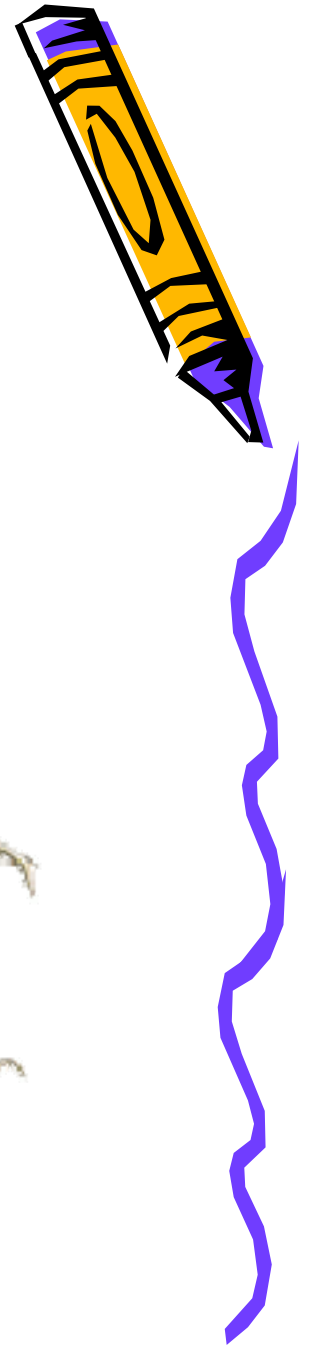
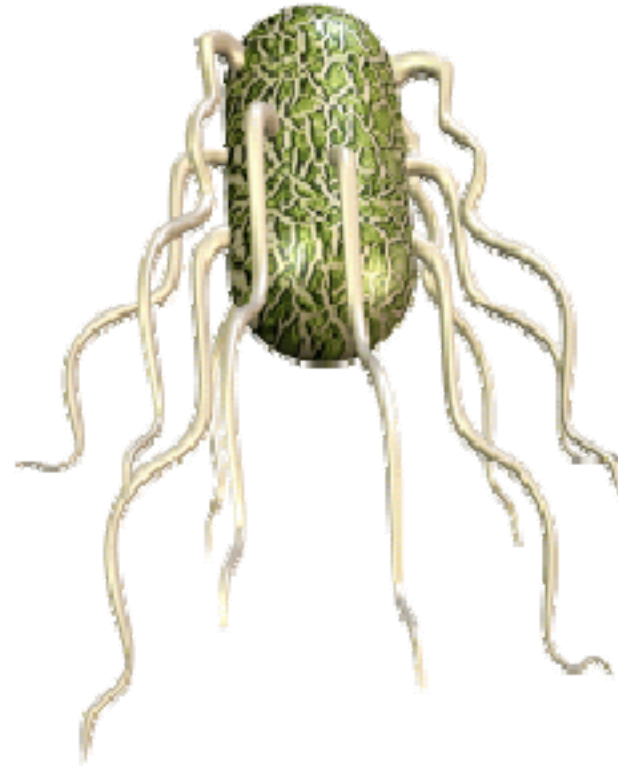
Enterobacteriaceae

- Cause 38.3% of bacterial foodborne illnesses each year
- Gram-Negative Bacilli
 - Ferment glucose
 - Oxidase negative
 - Reduce nitrate
- Frank Pathogens of this Family include:
 - *Salmonella, Shigella, Escherichia*



Salmonella spp.

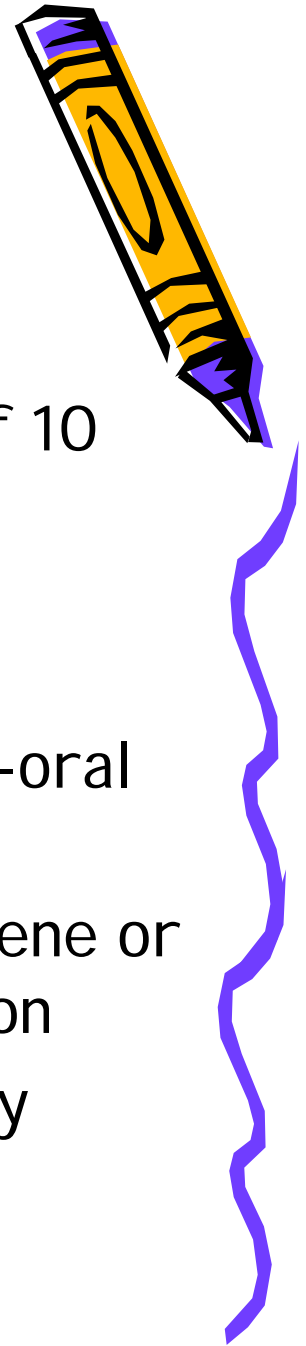
- Hardy bacteria
- Infectious dose of 10,000+
- Animal Reservoir except *S. typhi*
- Spread via a fecal-oral route
- Inadequate cooking or cross-contamination
- Mild to severe illness



Shigella spp.

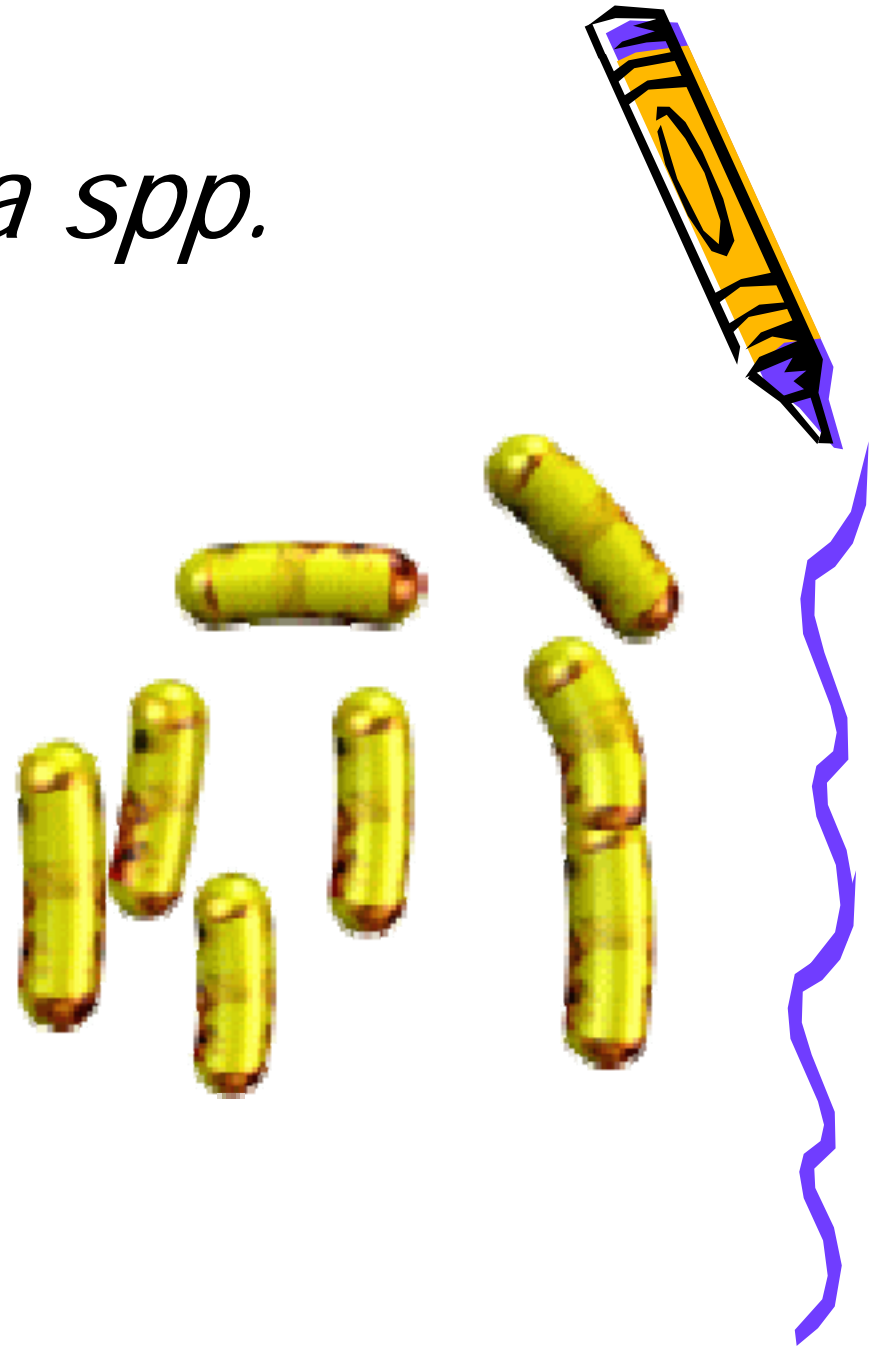


- Infectious dose of 10 microorganisms
- No known animal reservoir
- Spread via a fecal-oral route
- Poor personal hygiene or cross-contamination
- Bacillary dysentery



Escherichia spp.

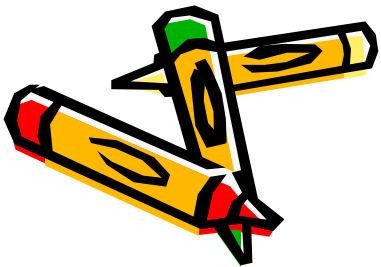
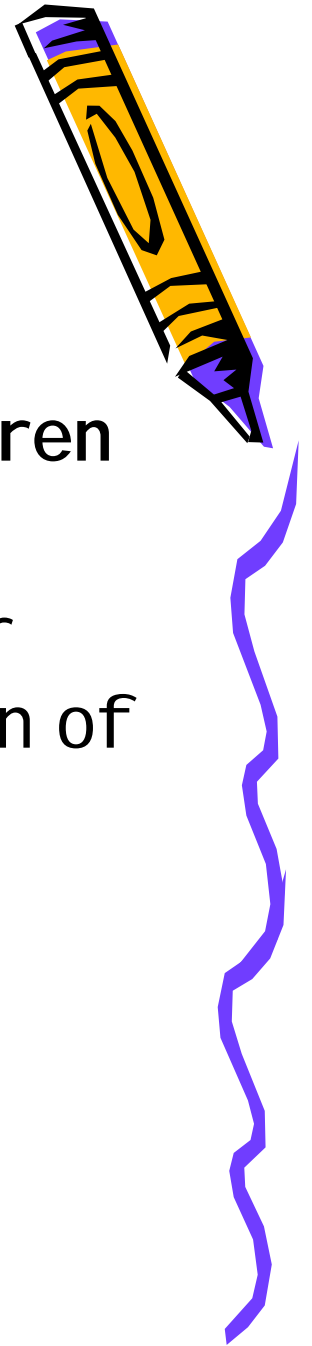
- *E. coli* O157:H7
- Infectious dose of less than 10 cells
- Cattle reservoir
- Spread via fecal-oral route
- Inadequate cooking or cross-contamination
- Bloody Diarrhea and H.U.S.



U.S. Childcare Centers

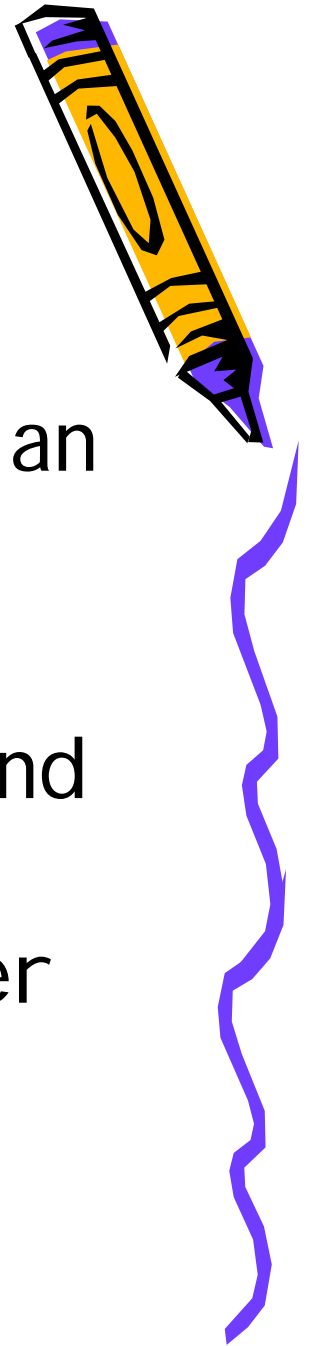
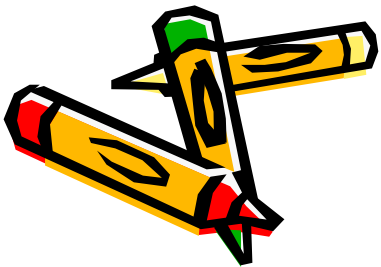


- 15 million children
- Provide an environment for multiple children of varying ages to interact



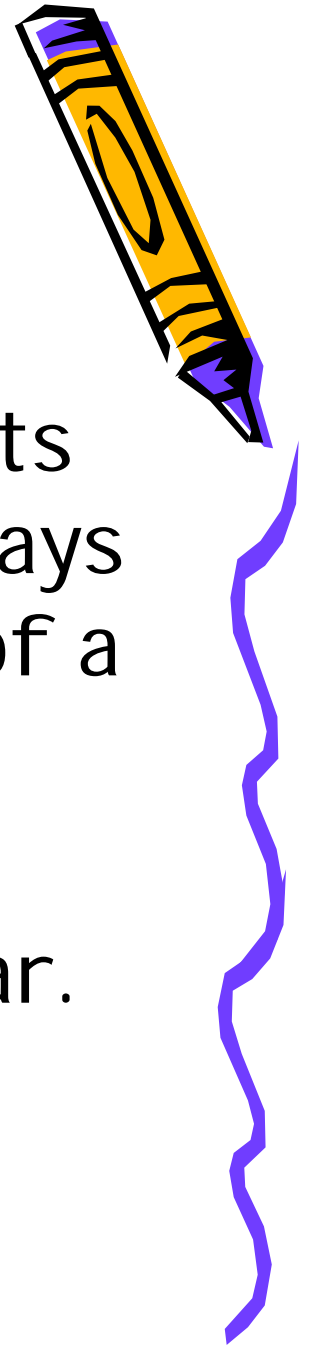
Risk in Childcare Centers

- Children in childcare centers have an **increased** risk of gastrointestinal illness.
- The rate of diarrhea has been found to vary between centers, with an average incidence of 0.44 cases per child per year.



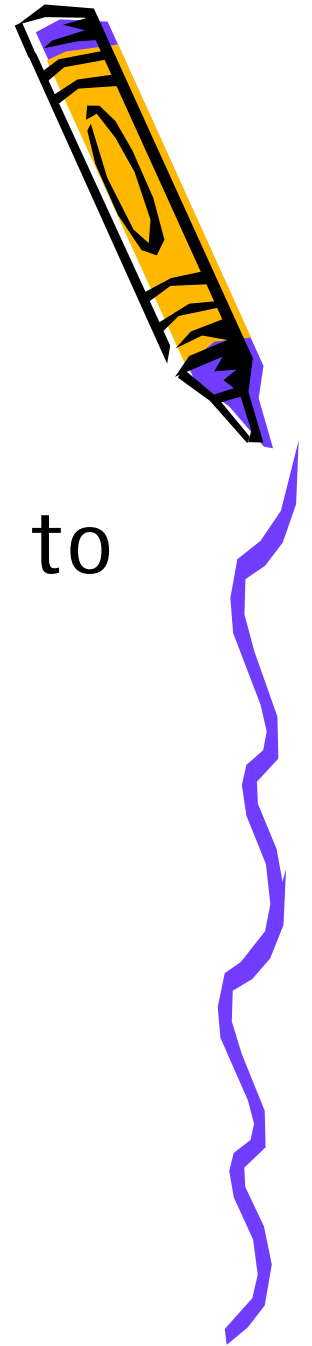
Economic Impact

- A Houston study found that parents lost an estimated average of 4.7 days of work per year due to diarrhea of a child that attended day care.
- The Harris County economy, therefore, lost \$33 million per year.



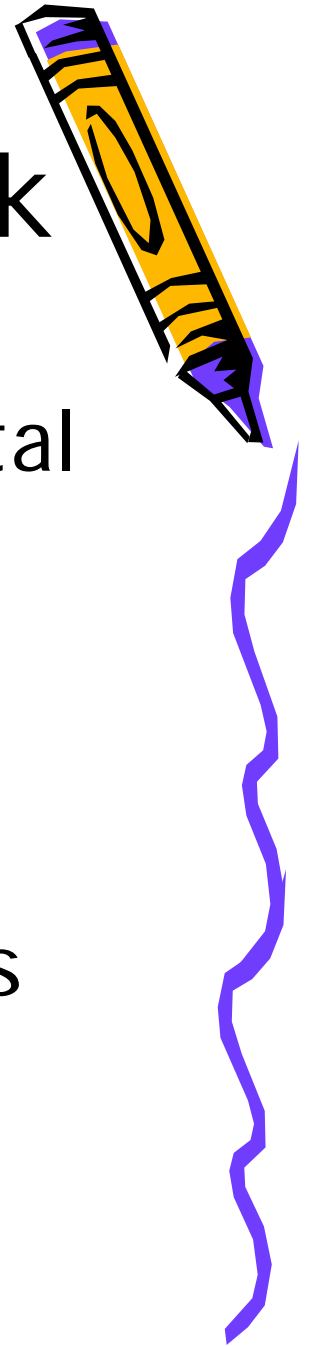
Implicated Organisms

- Outbreaks of diarrheal illness in childcare centers have been found to be caused by:
 - *Salmonella*
 - *Shigella*
 - *E. coli O157:H7*



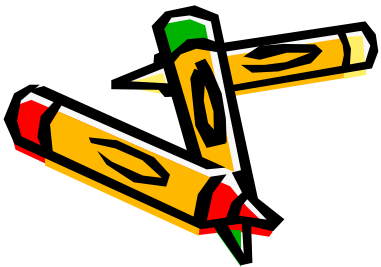
Accounting for increased risk

- Practices that lead to environmental contamination
 - Allowing staff to change diapers and prepare or serve food
- Improvement in infection control found to reduce diarrheal episodes by 50%.



Foodborne Disease in Childcare Centers

- Study of Childcare Centers in Texas and Iowa
- Dr. Margaret Briley and Ms. Deanna Staskel, Department of Human Ecology, University of Texas at Austin



Study Goal

- Assess the existing food handling practices in childcare centers
- Reassessment after training of food service workers in childcare centers by Registered Dietitians (RD) to assess the impact of education



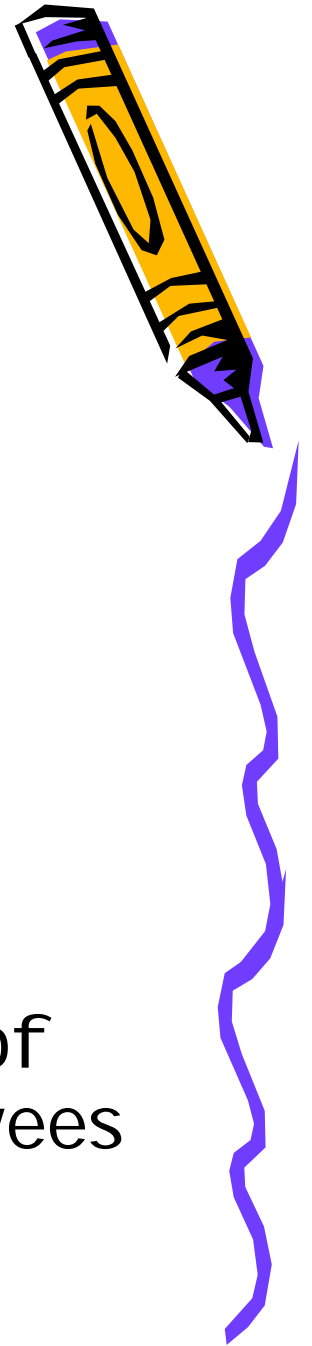
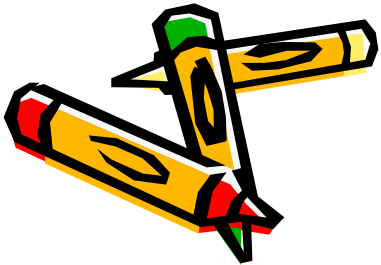
Two Year Study

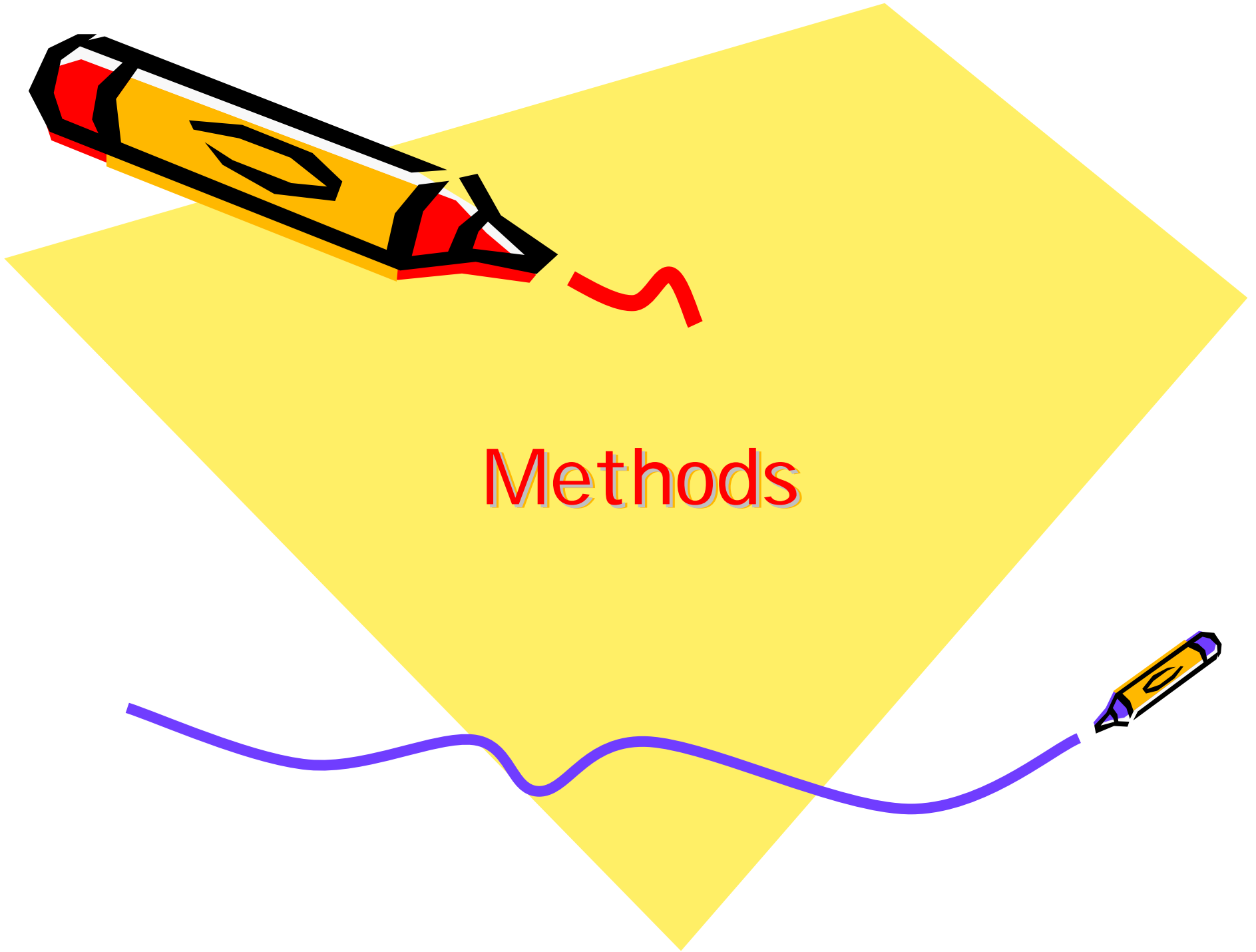
- First Year
 - 36 Childcare Centers
 - Bacteriological analysis of several food preparation and service areas in the Childcare Centers by Zahra Kazerani at TDSHS
 - Education of foodservice workers by a Registered Dietician (RD)



Two Year Study

- Second Year
 - 32 Childcare Centers
 - Second bacteriological analysis of several food preparation and service areas in the Childcare Centers at TDSHS
 - Direct comparison with first year results to assess the effectiveness of education on childcare center employees

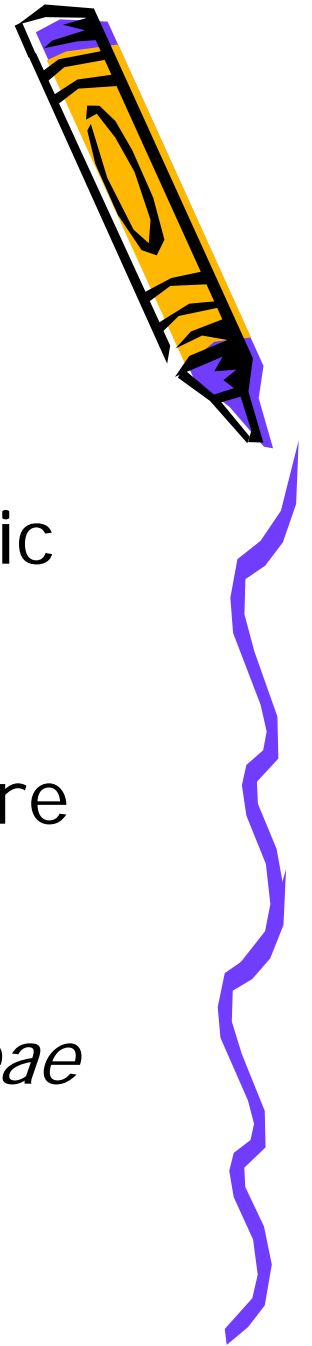
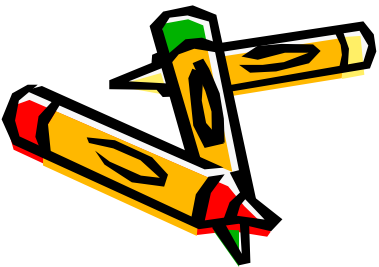




Methods

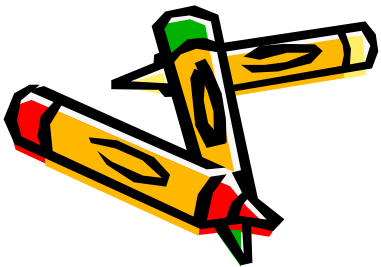
First Year Protocol

- 36 Childcare Centers
 - Initial microbiological analysis specific to *Shigella*, *Salmonella*, and *E. coli* O157:H7
 - Not recovered in the first 11 childcare centers
 - Protocol expanded to include all members of family *Enterobacteriaceae*

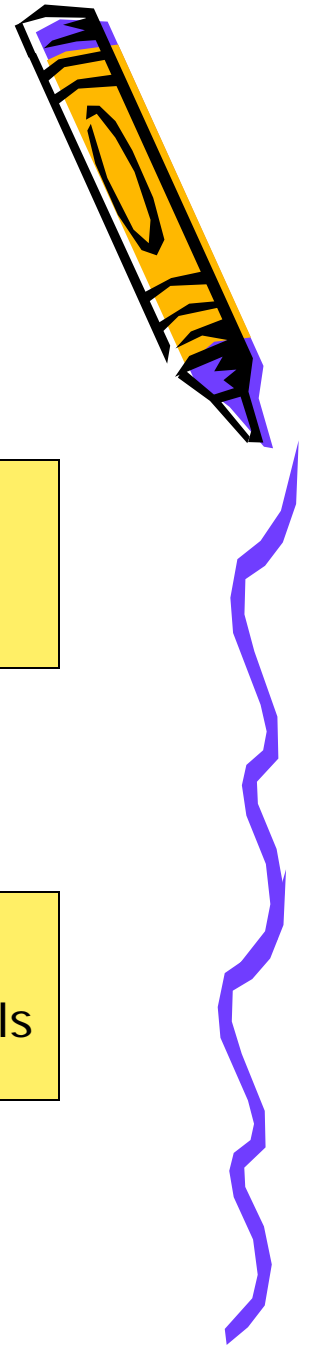
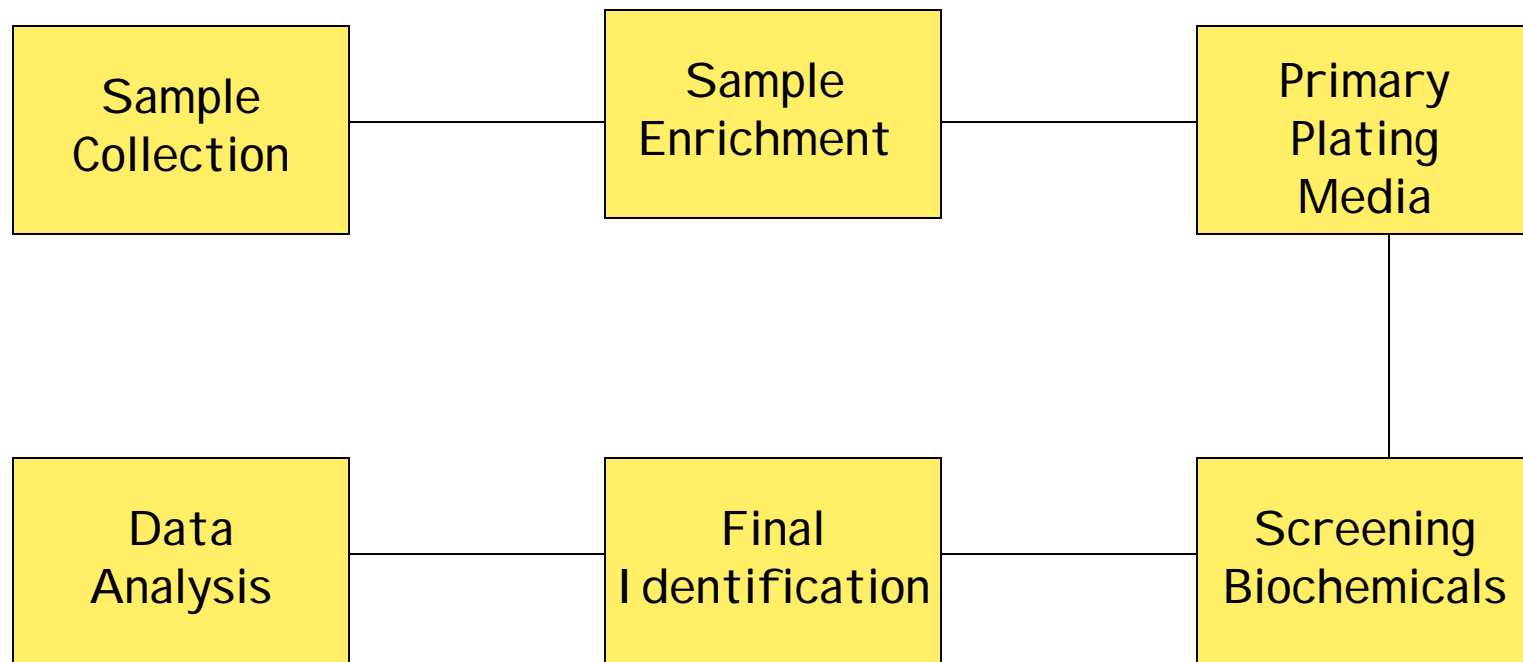


Second Year Protocol

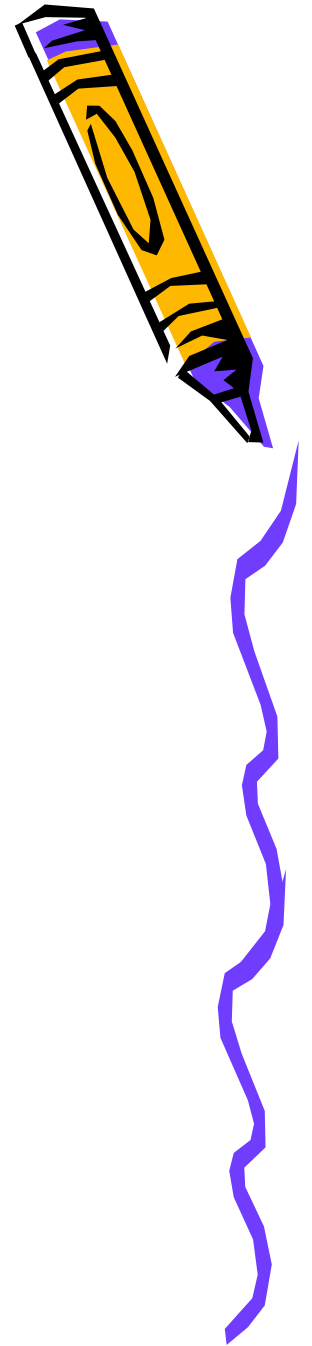
- 32 Childcare Centers
 - All Microbiological Analysis under the expanded protocol
 - 21 Centers Matched



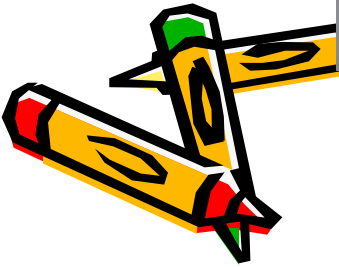
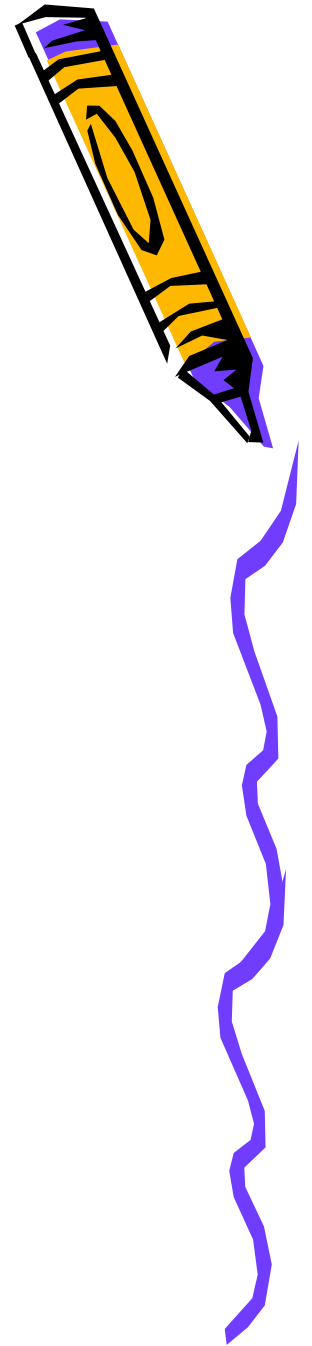
Project Protocol



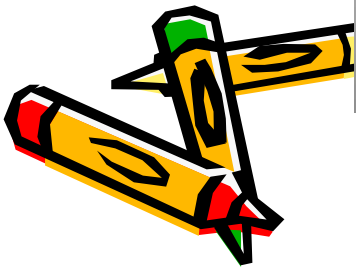
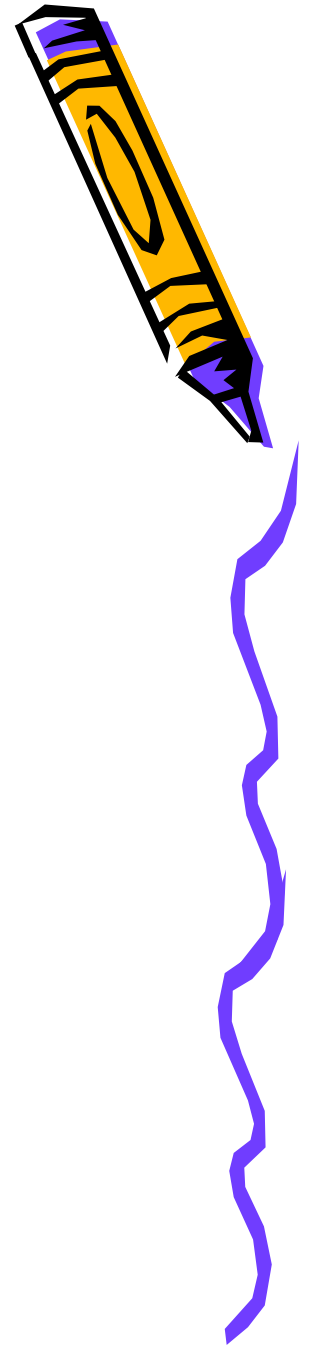
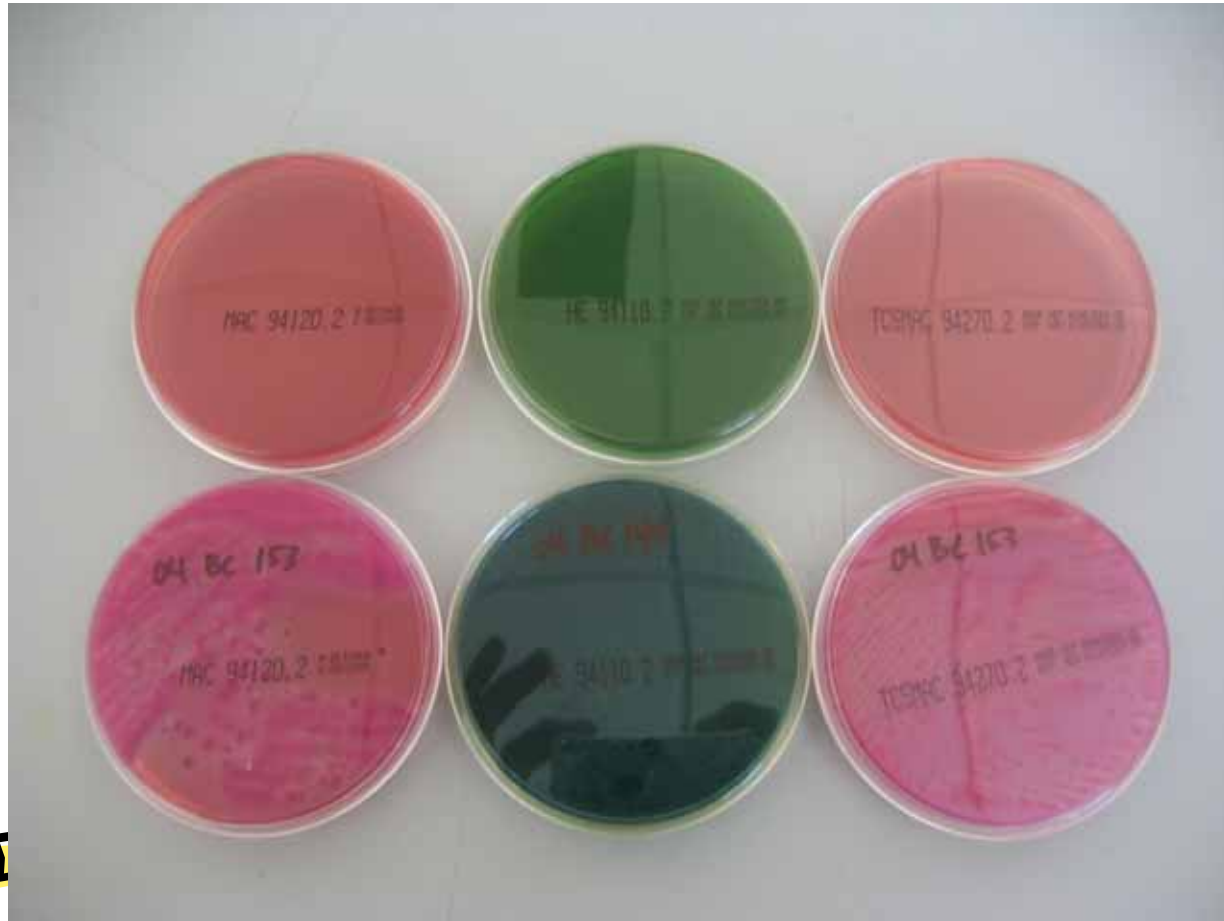
Sample Collection



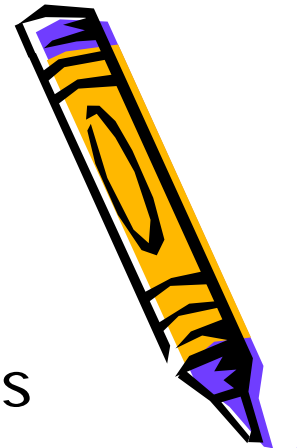
Sample Enrichment



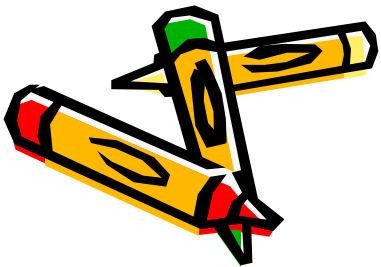
Primary Plating Media



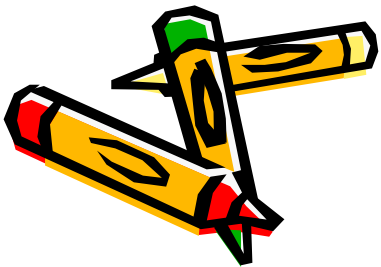
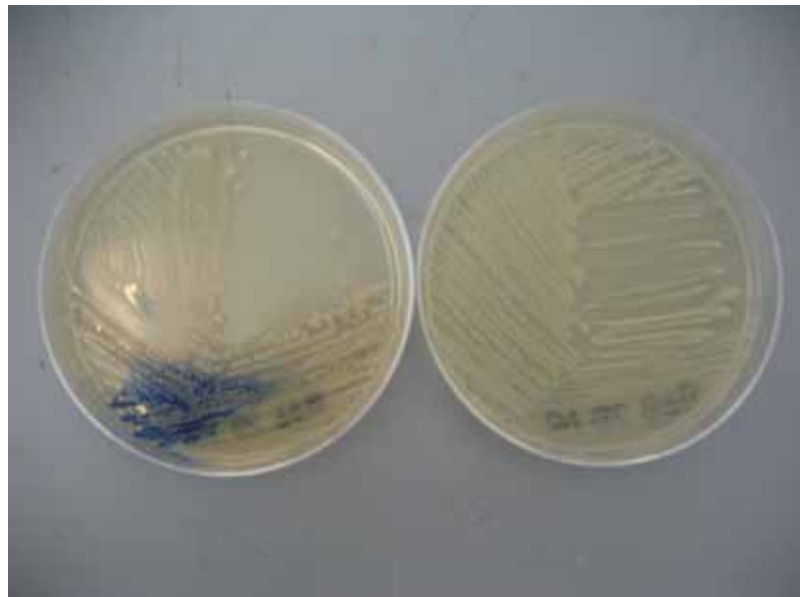
Screening Biochemicals

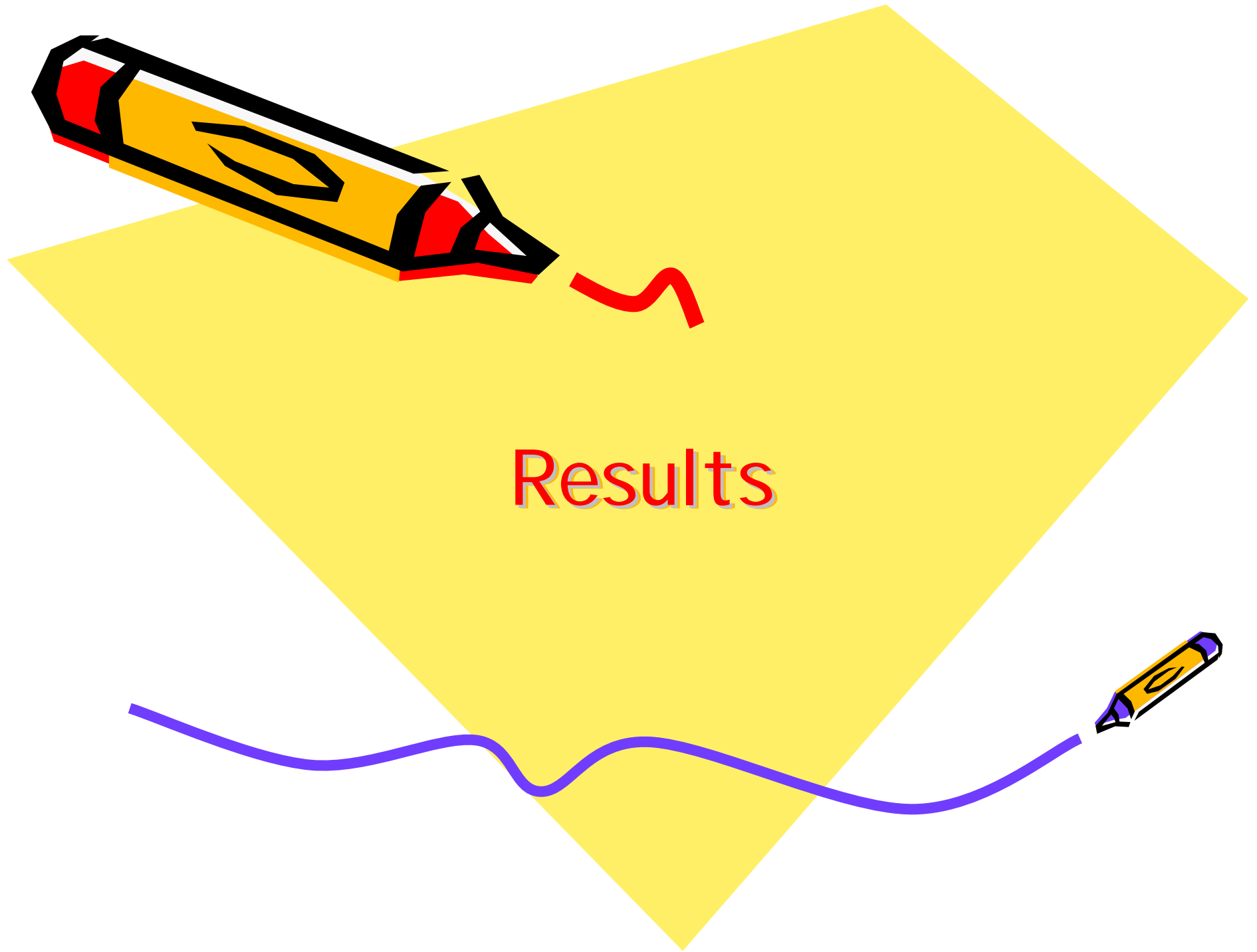


- Biochemical Tests used:
 - Triple Sugar Iron Agar (TSI)
 - Lysine Iron Agar (LIA)
 - Lysine Decarboxylase Broth (LDB)
 - Acetate Medium
 - Complex Test Medium (CTM)
 - Urea slant
 - Levine eosin methylene blue plate
 - EC with MUG broth



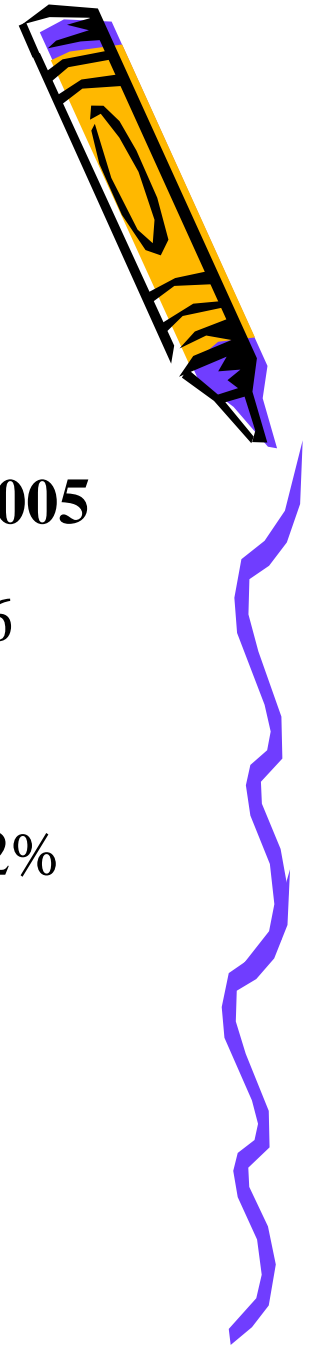
Final Identification



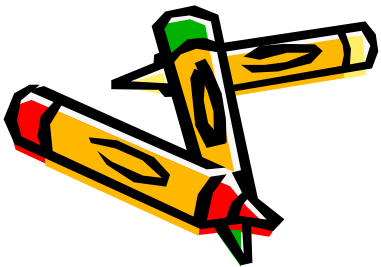


Results

Comparison of Positive Samples Collected from 21 Childcare Centers in 2004 and 2005



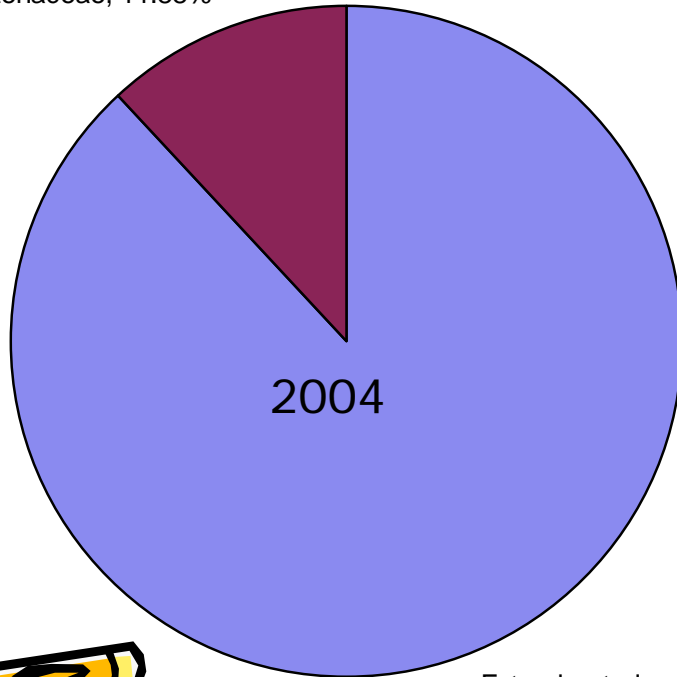
	Fall 2004	Fall 2005
Total Number of Samples	134	126
Number of Positive Samples	57	60
Percent Positive Samples	42.54%	47.62%
Total Genera Identified	12	13
Total Species Identified	59	85



Percent of Identified Organisms from Food Preparation and Service Areas within Childcare Centers Identified as *Enterobacteriaceae*, 2004 and 2005

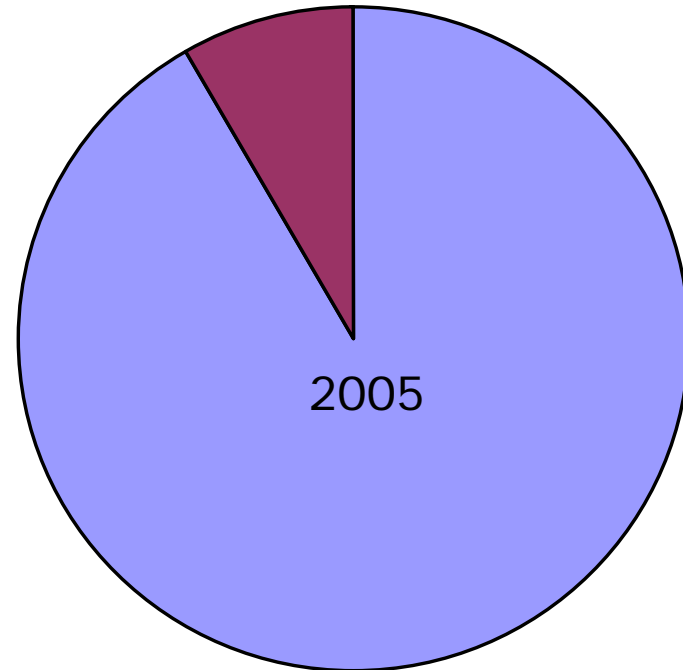


Non-Enterobacteriaceae, 11.88%

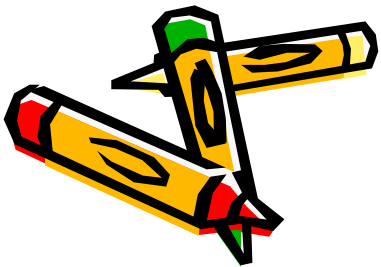


Enterobacteriaceae, 88.22%

Non-Enterobacteriaceae, 8.42%



Enterobacteriaceae, 91.50%



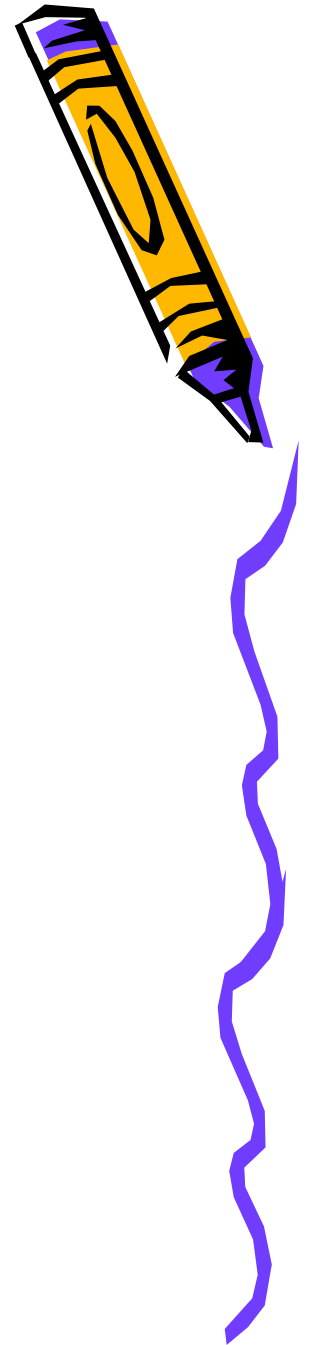
Frank Pathogens Identified from Food Preparation and Service Areas Within Childcare Centers in 2004 and 2005

- 2004

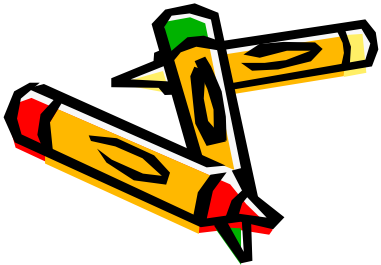
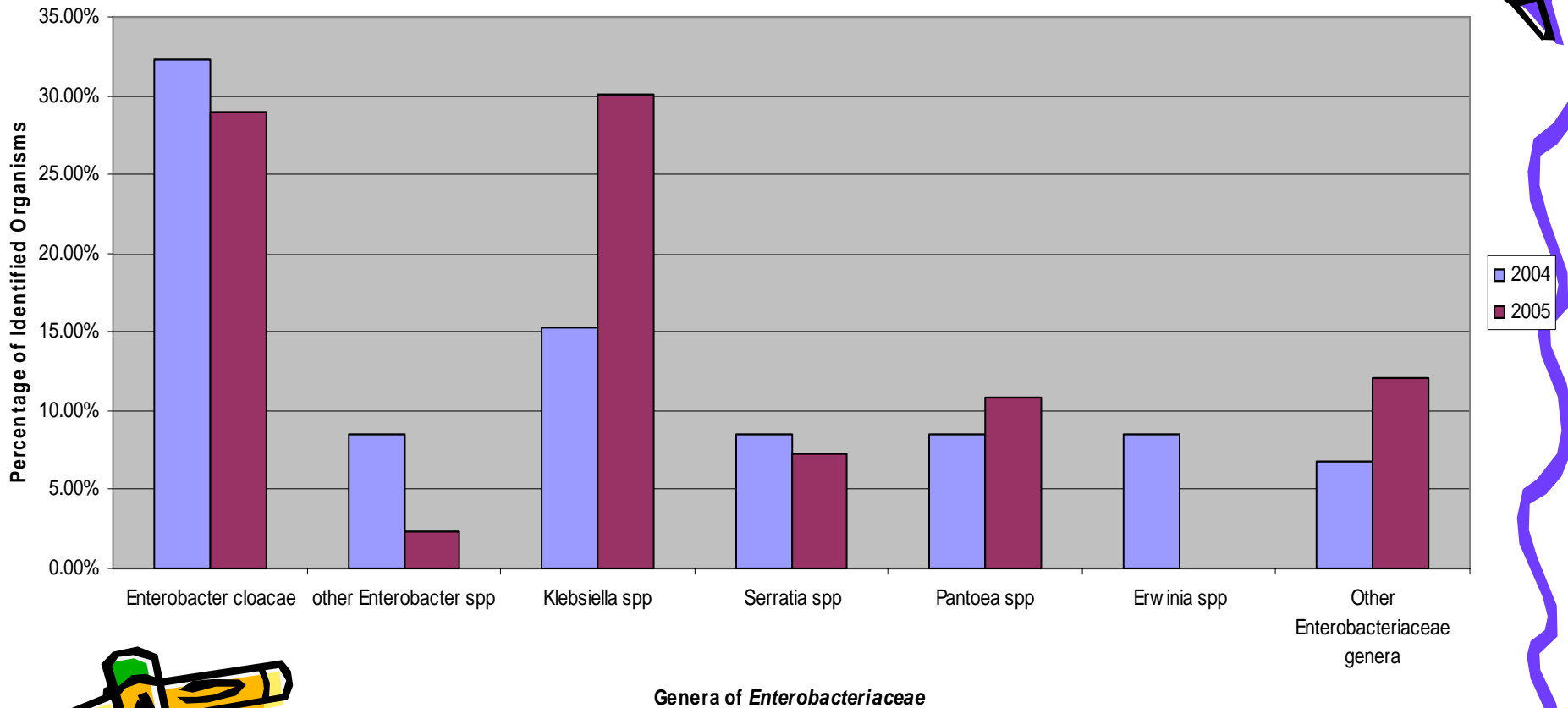
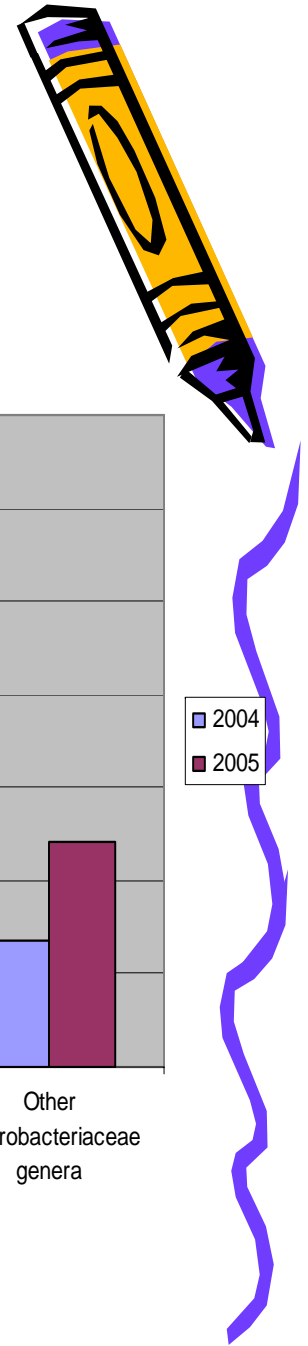
- 1 : *S. paratyphi A*
- 0 : *E. coli*
- 0 : *Shigella*

- 2005

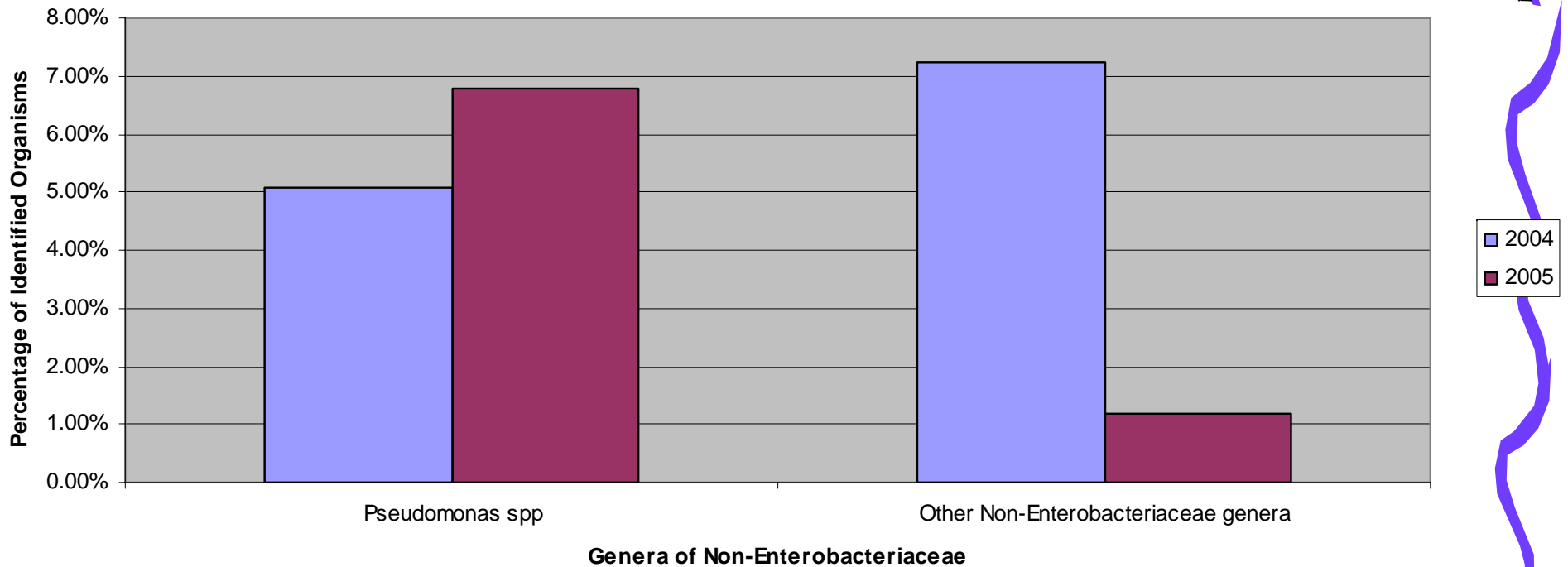
- 1 : *S. arizonae*
- 1 : *E. coli*
- 0 : *Shigella*



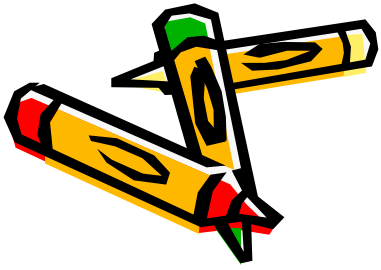
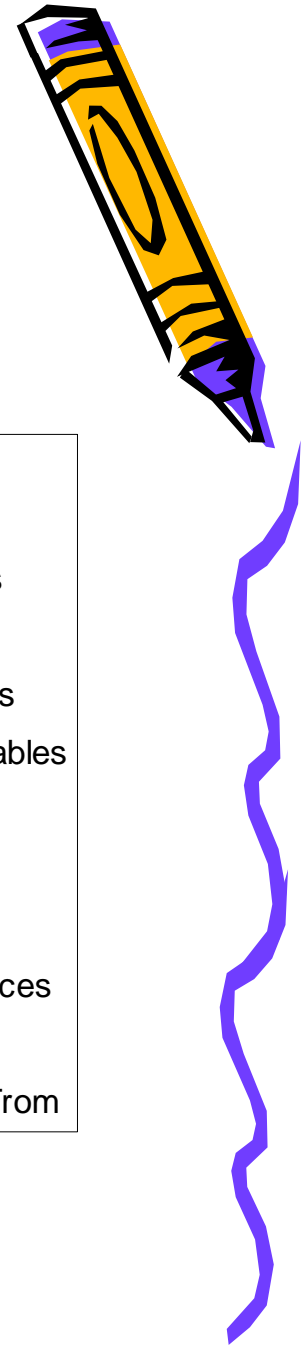
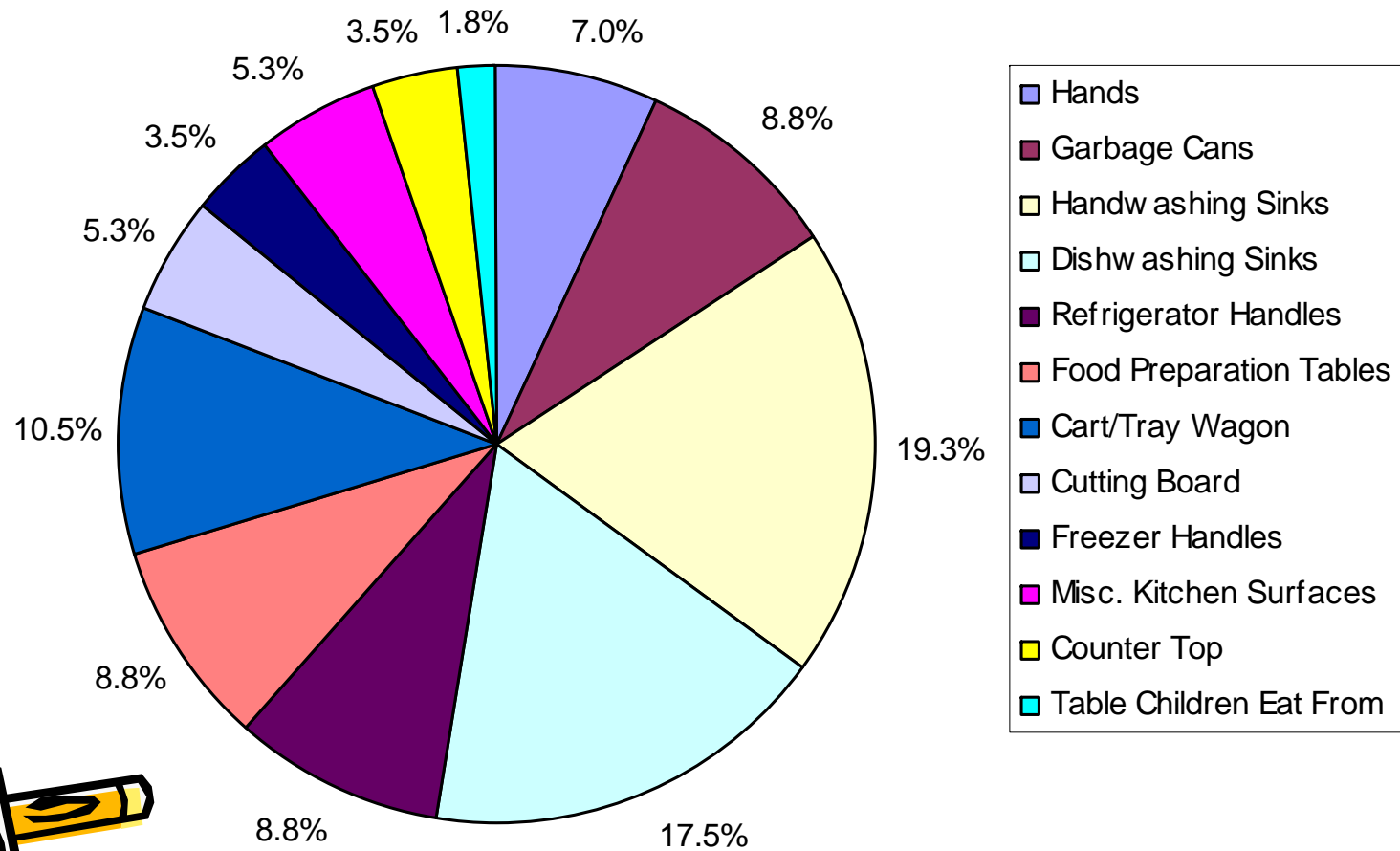
Other *Enterobacteriaceae* Identified from Food Preparation and Service Areas Within Childcare Centers in 2004 and 2005



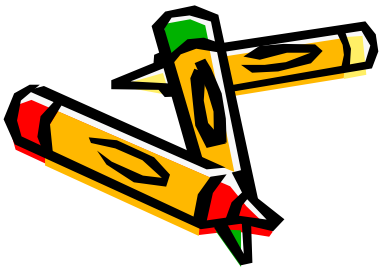
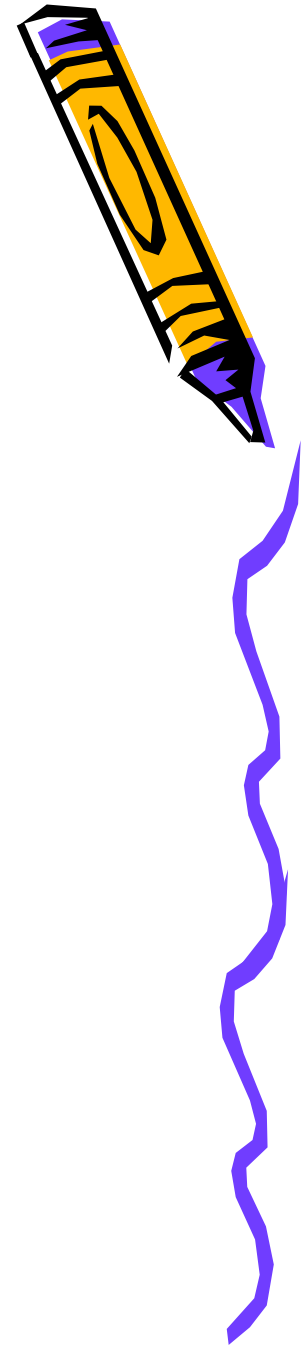
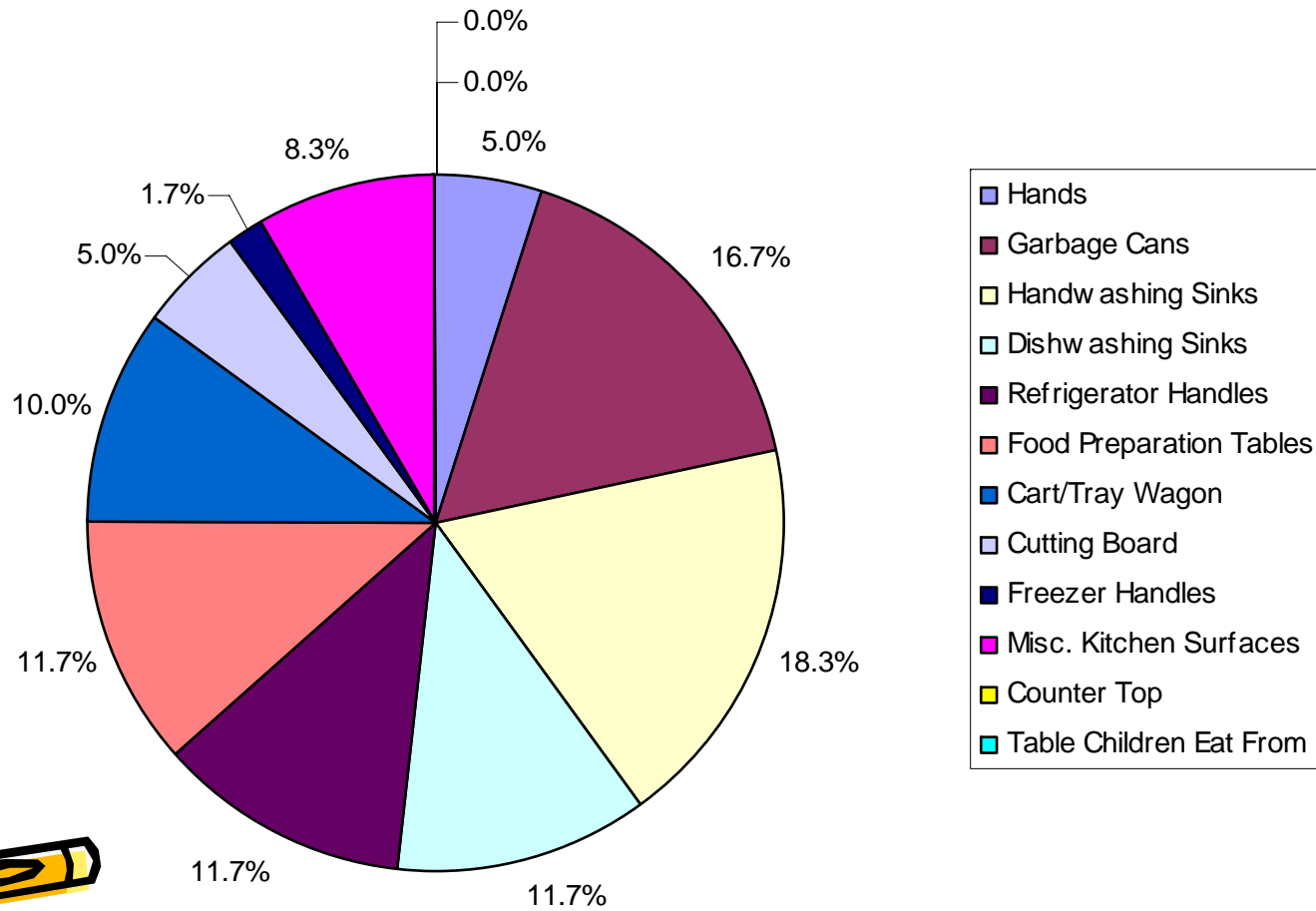
Non-*Enterobacteriaceae* Identified from Food Preparation and Service Areas Within Childcare Centers in 2004 and 2005



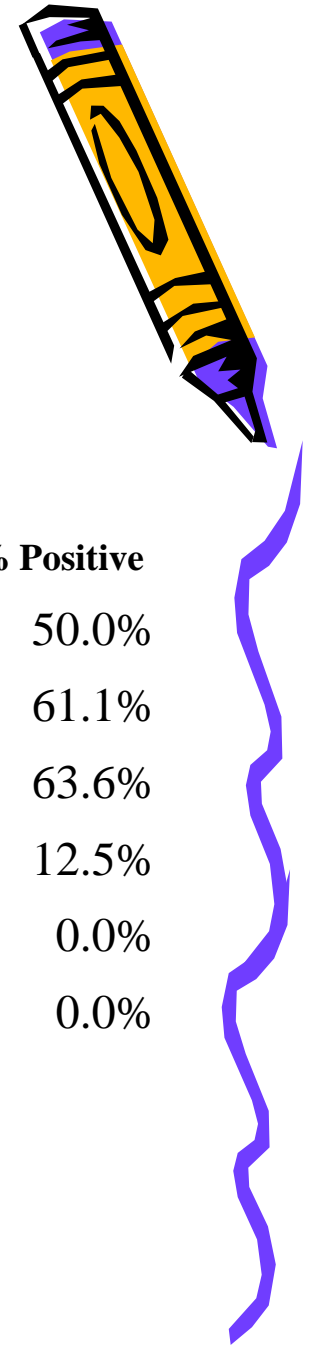
Percentage of Identified Organisms present in Food Preparation and Service Areas within 21 Childcare Centers, 2004



Percentage of Identified Organisms present in Food Preparation and Service Areas within 21 Childcare Centers, 2005



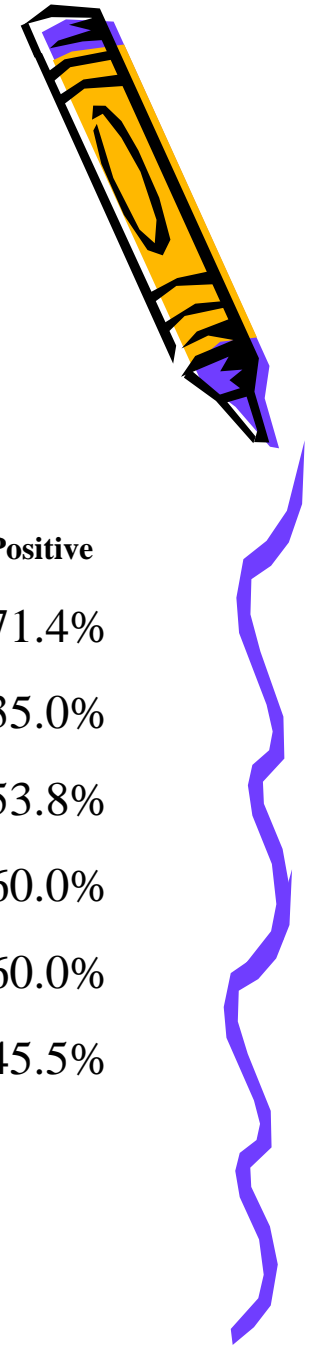
Comparison of Positive Rates at Sample Locations within 21 Childcare Centers (2004 and 2005)



Source	2004			2005		
	# Positive	# Sampled	% Positive	# Positive	# Sampled	% Positive
Hands	4	8	50.0%	3	6	50.0%
Handwashing Sinks	11	17	64.7%	11	18	61.1%
Dishwashing Sinks	10	15	66.7%	7	11	63.6%
Freezer Handles	2	9	22.2%	1	8	12.5%
Counter Top	2	7	28.6%	0	7	0.0%
Table Children Eat From	1	3	33.3%	0	3	0.0%



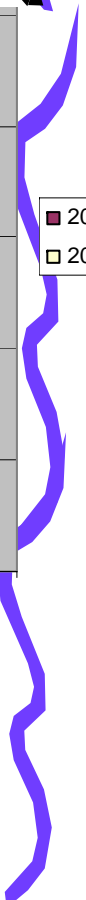
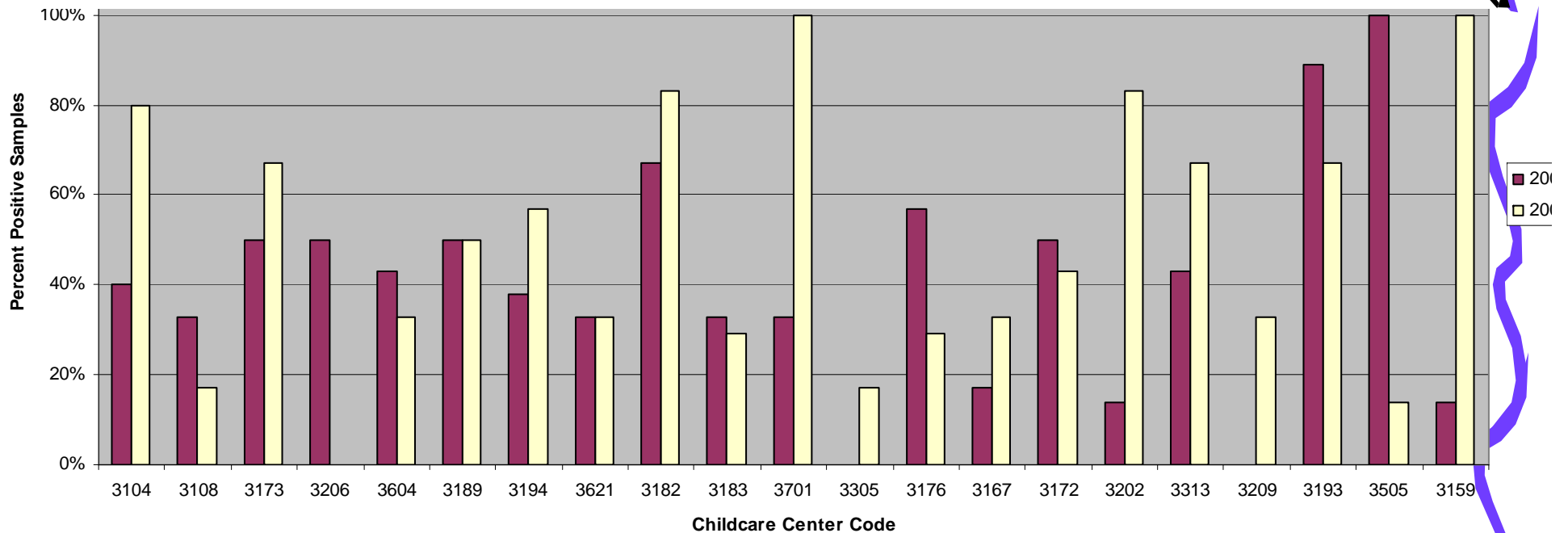
Comparison of Positive Rates at Sample Locations within 21 Childcare Centers (2004 and 2005)



Source	2004			2005		
	# Positive	# Sampled	% Positive	# Positive	# Sampled	% Positive
Garbage Cans	5	13	38.5%	10	14	71.4%
Refrigerator Handles	5	20	25.0%	7	20	35.0%
Food Preparation Tables	5	11	45.5%	7	13	53.8%
Cart/Tray Wagon	6	12	50.0%	6	10	60.0%
Cutting Board	3	6	50.0%	3	5	60.0%
Misc. Kitchen Surfaces	3	13	23.1%	5	11	45.5%

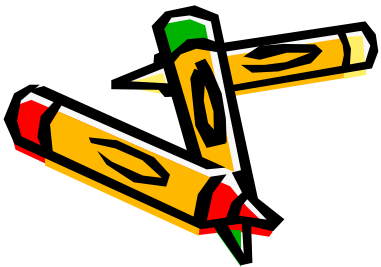


Percent Positive Samples from Food Preparation Areas within Childcare Centers, 2004 and 2005



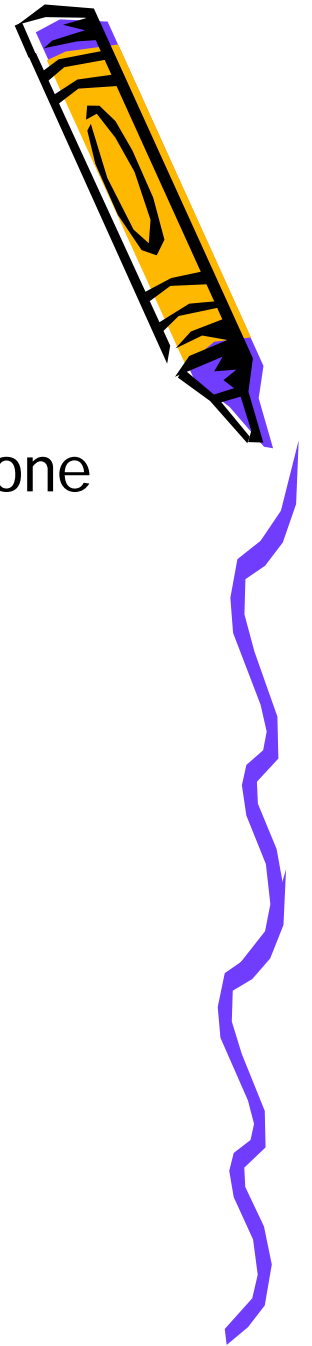
Data Analysis Complications

- Small number of centers
- Small number of samples
- Education was 1 date of extended training with follow-up newsletters for only 7 months
- Personnel turnover of food handlers



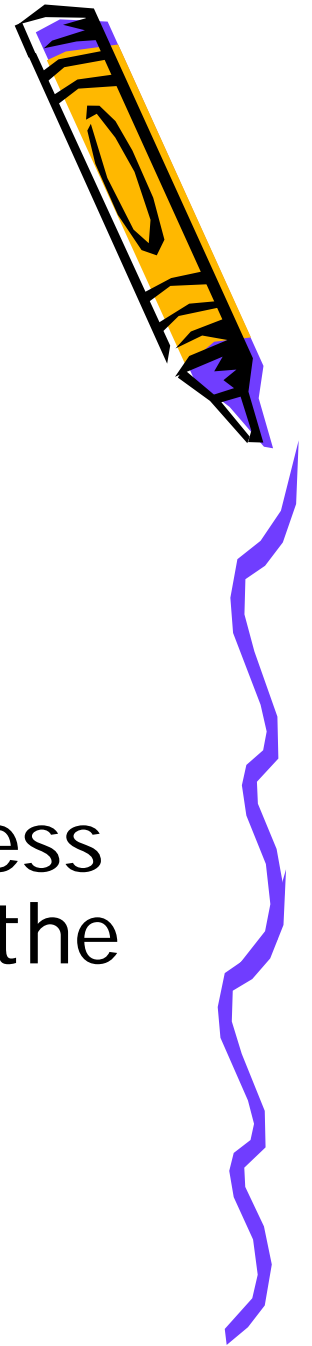
Study Complexity


- Limited to 2 Counties
 - “Better” counties with yearly inspections done by a County Health Department
- Centers agreed to participate
 - Centers thought they were doing well
 - Centers that were motivated to learn
- Centers represent Businesses
 - Budgets with limited Funds
 - High Personnel Turnover



Future Studies

- Collect more samples in areas this study identified as consistently contaminated
- More extensive education
- Investigate rates of diarrheal illness at the Childcare Centers in which the environmental samples are taken





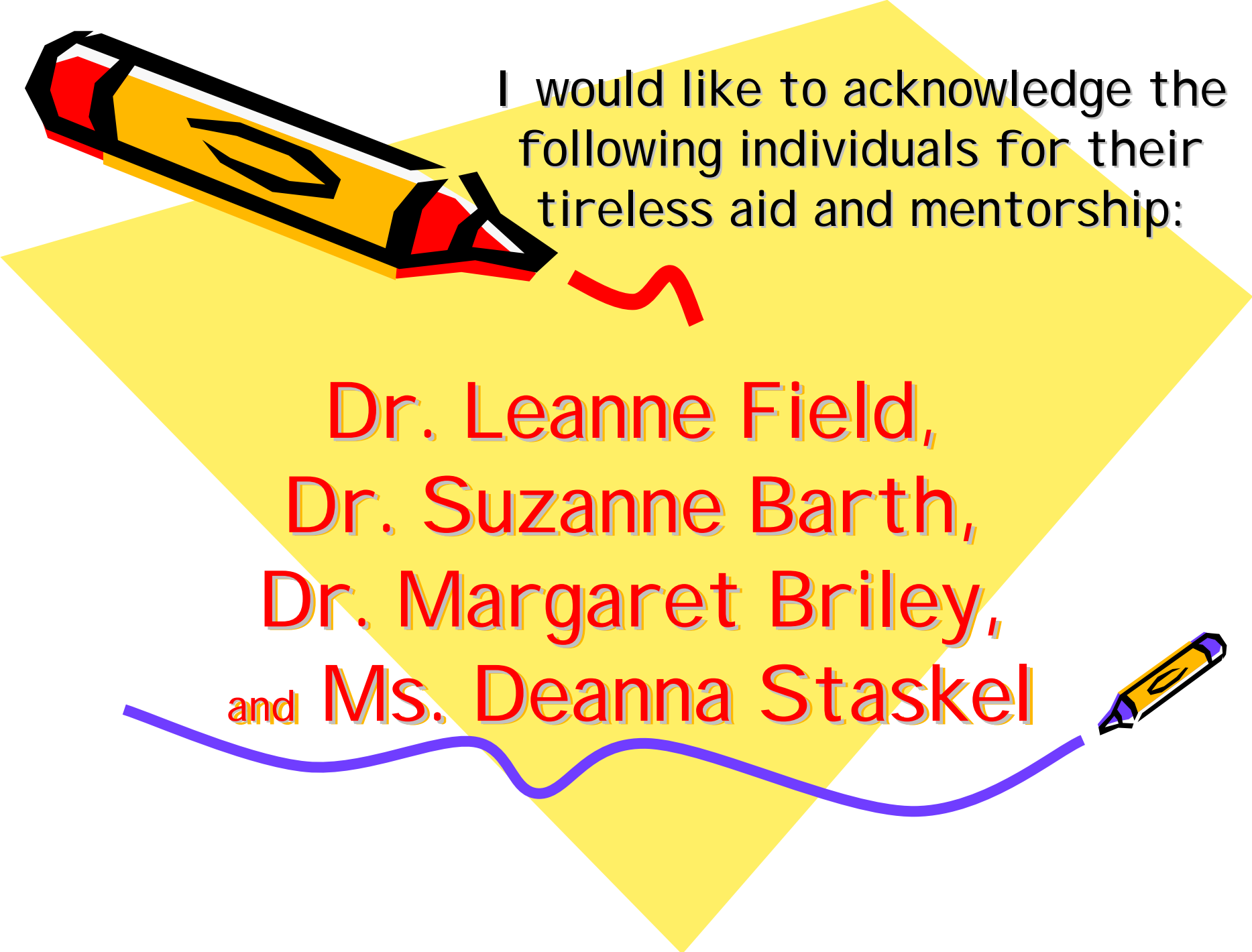
I would like to acknowledge the following individuals for their tireless aid and mentorship:

Consumer Microbiology Team

Monica Kingsley – Mentor

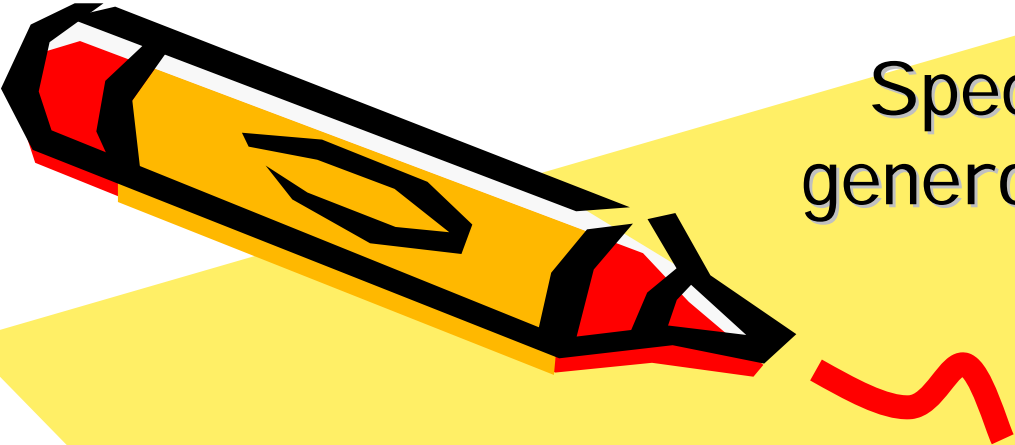
Terry Campbell, Natalie Perryman-Hale, Chris Malota, Crystal Van Cleave,
Tom Ridpath, Maile McCharen,
and Chris Melton





I would like to acknowledge the following individuals for their tireless aid and mentorship:

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Dr. Suzanne Barth,
Dr. Margaret Briley,
and Ms. Deanna Staskel



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