The Abundance of *Escherichia* coli in Local, Organic Poultry vs Commercially Produced Brand

Emileann Quick and Paul Deeble
Dept. of Biology, Mary Baldwin University, Staunton, VA

Introduction

- Poultry can transmit foodborne pathogens. 48 million cases of foodborne illness are diagnosed each year in the United States[1].
- There are around 3,000 deaths from foodborne illness every year[2].
- The most common mode of *E.coli* contamination is by consuming food of animal origin.
- *E. coli* it is a good indicator of broader contaminants, while also maintaining a relatively safe laboratory testing environment[3]
- Large chicken suppliers and processors are required to follow FDA and USDA guide lines and regulations. While, the small locally owned businesses are exempt.

Hypothesis

- There is currently a lack of data that compares the microbial abundance in samples affected by different sanitation processes such as the comparison of a large, commercial brand to a small, local supplier.
- I hypothesized that there will be fewer colonies of *E.coli* in the commercially produced poultry than in the local, organic poultry.

References

1. "Burden of Foodborne Illness: Overview." *Centers for Disease Control and Prevention*, Centers for Disease Control and Prevention, 5 Nov. 2018.

2. "Food Safety ." *FoodSafety.gov*, 2018.

3. Zhao, Cuiwei, et al. "Prevalence of Campylobacter Spp., Escherichia Coli, and SalmonellaSerovars in Retail Chicken, Turkey, Pork, and Beef from the Greater Washington, D.C., Area." *Applied and Environmental Microbiology*, vol. 67, no 12, Dec 2001, pp. 5431-5436

Experimental Design

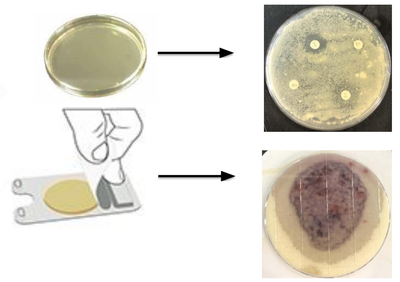
Samples from local, organic (Sunrise Farms) and commercially produced (Martins) suppliers

10 g sample and 20 mL PBS added

Homogenized for 2 minutes

1 mL pipetted on NA plate and Charm Peel plate

Kirby Bauer antibiotics resistance test



E.coli (purple) and Coliforms (red) test

Results

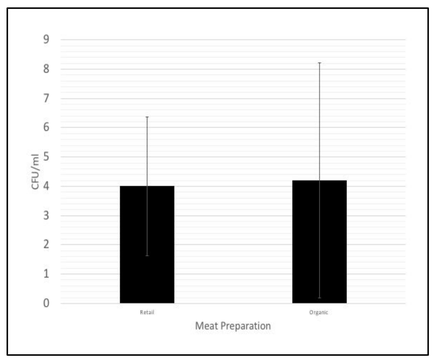


Figure 1: Comparison of Coliforms in Meat Source. Paired T-test used, the p-value is 0.310. n=10

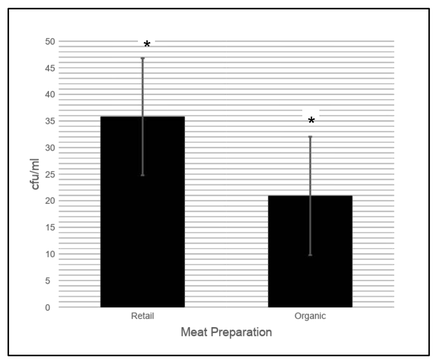


Figure 2: Comparison of *E.coli* in Meat Source. Paired T-test used, the p-value is 0.0133. n=10

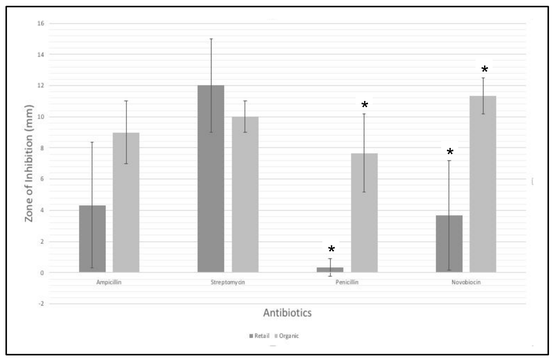


Figure 3: Comparison in Zone of Inhibition. Paired T-test used, the p-value; Ampicillin (0.280), Streptomycin (0.321), Penicillin (0.053), Novobiocin (0.034) . n=3

Conclusion

1. **Coliforms**
   - The trend between local, organic and commercially produced poultry, displayed that they contained similar counts
   - The data was not statistically significant when comparing the two sample groups
2. ***E.coli***
   - The commercially produced brand contained more *E.coli*
   - The data was statistically significant when comparing the brands
3. **Antibiotic Resistance**
   - Resistance standards: Ampicillin ≤ 13, Penicillin ≤ 14, Streptomycin ≤11, and Novobiocin ≤ 17.
   - Penicillin and Novobiocin data were statistically significant.
   - Streptomycin and Ampicillin data were not statistically significant.
   - Penicillin shows more resistance in the commercial brand
   - Novobiocin shows more resistance in the commercial brand

Future Research

Identify the bacteria present in both meat sources and compare

- Which meat source contained more harmful bacteria?

Find a common bacteria present in both sources of meat to repeat the antibiotic resistance test

- Most effective antibiotic treatment per chosen bacteria
- More accurate and beneficial results

Acknowledgments

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