Local Farmers Market Fresh Produce Sampling for the Presence of E. coli and Salmonella

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Introduction

Foodborne disease in humans is an ever present problem and recently fresh produce, in particular lettuce and tomatoes, have been linked to several significant outbreaks.

- In Washington State, vendors selling fresh whole unprocessed produce directly to consumers at local farmers markets are not mandated to obtain a license from the health department or have their goods inspected by the state, whereas farmers selling to grocery stores or other conventional retailers are required to complete these additional steps.
- This project looked at a total of fifty-five samples of fresh produce, including both heads of lettuce and tomatoes, which were collected weekly from five local farmers markets in the greater Seattle-Metro area to estimate the presence of Escherichia coli and Salmonella.

Materials and Methods

- When possible the produce samples were not excessively handled and remained unwashed prior to running each respective assay. Produce was stored at 4°C from time of purchase until assayed (usually <24hrs).
- Samples designated for E. coli testing were first eluted in PBS and then assayed using the Colilert system and IDEXX QuantTray 2000 to check for color change and fluorescence. Salmonella was seen through elution in Universal Pre-Enrichment broth followed by overnight incubation in Tryptonebroth, and later streaked on XLD agar plates.

Salmonella – Day 1
- Weigh out, bag, add 150ml UP broth, massage 5mins
- Stand 1hr, adjust pH, Incubate overnight

Salmonella – Day 2
- Add 1ml of each sample to 10ml of TT broth
- Vortex and incubate overnight

Salmonella – Day 3
- Vortex, streak with 3mm loop on XLD agar plates
- Incubate 24hrs.

Salmonella – Day 4
- Examine plates for black colonies

E. coli – Day 1
- Weigh out, bag, 150ml PBS, massage 5mins
- Add Colilert, pour into IDEXX tray, seal, incubate overnight

E. coli – Day 2
- Read results based on color change and UV fluorescence

E. coli – Day 3
- Incubate 24hrs.

E. coli – Day 4
- Examine plates for black colonies

Results

- Twenty-three of the thirty-five lettuce samples had enumerable E. coli, ranging from 1 to 756 CFU/100ml, while only one tomato had enumerable E. coli.
- For Salmonella twenty-three percent of the fifty-three samples grew up with one or more black colonies, indicating presumptive positives for Salmonella (seven lettuce and one tomato sample).
- The reproducibility between duplicate samples was fair, of fifteen sets of duplicates, thirteen had less than 3 CFU/100ml difference between E. coli samples, though the Salmonella results did not show the same reliability.

Conclusion and Discussion

Lettuce samples were generally found to have a greater presence of both E. coli and Salmonella when compared to the tomatoes. However, PCR analysis will be completed to confirm these suspected Salmonella colonies.

An overwhelming majority of the E. coli samples showed evidence of total fecal coliforms based on their change in IDEXX tray color. This could be due to varying types of environmental contamination, though the stage at which this occurs is unknown. Contamination could possibly happen during planting, farming, harvesting, processing, or even shipping of the produce. Other routes could include the irrigation water, type of manure, type of vendor, as possibly happen during planting, farming, harvesting, processing, or even shipping of the produce. Other routes could include the irrigation water, type of manure, type of vendor, as seen with organic farmers, and even infected workers handling the food.

Results of this study indicate that both E. coli and Salmonella are present in farmers market produce samples, which could encourage a push for stricter standards for vendors selling in these markets.

Acknowledgments and References

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