UFPA 2021 Background calculations to estimate the number of samples needed to detect a positive (and reject the "lot")
for an outbreak affecting 62 people (confirmed) associated with a 45 acre growing area

| | Approach #1 | Approach #2 | Comments | Trial consensus |
|---|---|---|---|---|
| Reported cases | 62 | 62 | Given input | 62 |
| Multiplier (Mead) | | 22 | CDC multiplier | |
| Multiplier (Scallan) | 26.1 | | Alternate CDC multiplier | 26 |
| | | | #1 used Scallan; #2 used | |
| Actual cases | 1618.2 | 1364 | Mead | 1618 |
| | | | | |
| Acres | 45 | 45 | Given input | 45 |
| | | | Romaine lettuce is about 1.5 | |
| Heads per acre | 26,000 | 25333.33 | pounds per head, | |
| Pounds per acre | 39,000 | 38000 | | 38000 |
| | | | | |
| Servings per head | 4 | | | |
| | | | | |
| Servings implicated | 4,680,000 | | | |
| | | | | |
| Assumed conc per serving | 1 CFU | | | |
| Dose response alpha | 0.267 | | | |
| Dose response beta | 229.2928 | | | |
| | | | | |
| Prob of illness | 0.12% percent | | | |
| Servings to cause 1 illness | | | | |
| | 861 | | | |
| infectious dose | | 100-1000 cfu | | 861 |
| Servings to cause actual cases | | | Total CFU and servings to cause outbreak are simiar | |
| | 1,393,506 | | numbers | |
| total cfu | | 1364000 | | 1387932 |
| | | | | |
| Average CFU/pound | | | | 0.811656 |

Assume 150 grams samples for perfect testing

| Number of tests | Percent detection |
|---|---|
| 0 | 0 |
| 1 | 0.235221 |
| 2 | 0.415113 |
| 3 | 0.552691 |
| 4 | 0.657907 |
| 5 | 0.738375 |
| 6 | 0.799914 |
| 7 | 0.846979 |
| 8 | 0.882973 |
| 9 | 0.9105 |
| 10 | 0.931552 |
| 11 | 0.947653 |
| 12 | 0.959966 |
| 13 | 0.969383 |
| 14 | 0.976584 |
| 15 | 0.982092 |
| 16 | 0.986305 |
| 17 | 0.989526 |
| 18 | 0.99199 |
| 19 | 0.993874 |
| 20 | 0.995315 |

perfect testing of nine 150 g samples will give a 91% chance of detecting this outbreak with an estimated level of contamination of less than 1 cell per pound of romaine