

**Efficacy of Gaseous Ozone Against
Generic *E.coli* in Ground Beef**

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Abstract: Raw, ground beef inoculated with generic *E.coli* was mixed in a closed chamber for 3 minutes while gaseous ozone was being injected into that chamber using varying ozone concentrations for the different trials. It was determined that approximately 95.8% of the *E.coli* in the ground beef was killed when the ozone concentration approached 200 ppm.



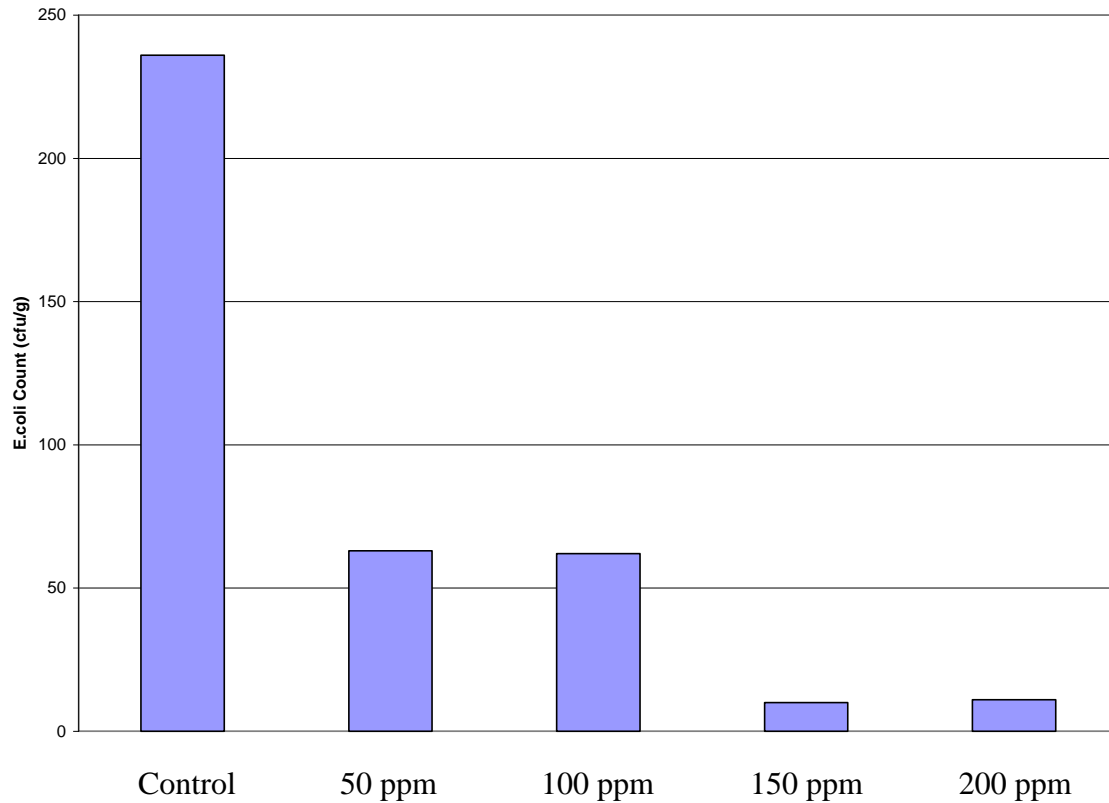
Methods: Generic *E.coli* was grown in a Tryp-Soy broth to a cell count measured to be approximately 620 cfu/ml just prior to inoculation. Ten pounds of ground beef were inoculated by first dividing the beef into five 2-pound batches. Then each batch was pressed into a clean and sanitary 5 gallon container one at a time spreading 20 ml of the *E.coli* potion between each batch. The resulting ten pounds of inoculated ground beef was then delivered to Ozone Solutions for mixing and ozone treatment (see their report). This resulted in the generation of 5 populations of ground beef (2 pounds each), each differing only in the concentration of ozone used. The 5 populations were then returned to the laboratory for *E.coli* quantification. To estimate the *E.coli* count of each population, three samples (approximately 10 to 20 grams each) were randomly collected from the population and using AOAC Official Method 998.08 each sample was quantified for *E.coli*. The average count of the 3 samples was calculated and used as an estimate of the actual count for that population.



Results: As can be seen in the table and graph below, approximately 73% of the E.coli was killed using 50 ppm ozone for 3 minutes and approximately 96% was killed using 150 ppm when compared to the control population ("C" = no exposure).

Sample Name	Sample Weight	Buffer Volume	Total Plate Count	Count of Sample (cfu/g)	Est. Pop. Count (cfu/g)
C-1	11.4	49 ml	42	181	
C-2	14.3	48 ml	93	312	
C-3	14.4	49ml	63	214	
					"Population C" = 236
50-1	8.7	49ml	14	79	
50-2	10.9	49ml	9	40	
50-3	12.7	49ml	18	69	
					"Population 50" = 63
100-1	19.3	49ml	18	46	
100-2	10.5	49ml	16	75	
100-3	12.3	49ml	16	64	
					"Population 100" = 62
150-1	18.9	49ml	3	8	
150-2	14.8	49ml	5	17	
150-3	18.8	49ml	2	5	
					"Population 150" = 10
200-1	15.1	49ml	3	10	
200-2	17.1	49ml	8	23	
200-3	10.4	49ml	0	0	
					"Population 200" = 11





Conclusions: This experiment showed that gaseous ozone caused a significant kill of generic *E.coli* in ground beef when the beef is mixed/grinded in a closed chamber filled with the gas. An approximate 73% of the *E.coli* was killed using a 50 ppm concentration of ozone with a 3 minute exposure time and an approximate 96% was killed using a 150 ppm concentration of ozone with the same exposure time.

