

Results from testing at a Fortune Fifty Pork Processing Plant 4/29/02

The Effectiveness of Ozonated Water as a Sanitizer on the Kill Floor – Microbial Kill Results

PURPOSE:

The goal of this analysis was to determine the effectiveness of ozonated water as a sanitizer for equipment and knife dips. These tests used 3M petrifilm to acquire data on microbial load reduction. This media is non-selective and allows for enumeration of all aerobic viable microorganisms present. Samples were analyzed following a spray or dip washing. The testing was performed from 8/21/01 through 3/13/02.

MATERIALS AND METHODS:

Materials:

Aqua Clean Mobile Sanitizer	Hach Test Kit
Sterile Latex Gloves	Cutting Knives
3M Aerobic Plate Count Petri Film	Air Knife
Automatic Pipetter	Wizard Knife
Permanent Marking Pen	Hock Cutter
Micro 90 Cleaner	Split Saw
Incubator, 34°C	Brisket Saw
Sterile 2ml Pipettes	180°F Water
Sterile Transport Swabs with 10ml Lethen Broth	Tap Water

Methods:

All experiments were conducted during production on the kill floor. Samples were categorized as cutting knives, and cutting equipment (air knife, wizard knife, hock cutter, split saw, brisket saw). Samples were sprayed with ozonated water for approximately five seconds with an ozone concentration of 1.1 ppm to 1.4 ppm. Comparisons of microbial counts were performed on samples:

- 1.) Before and after ozonation
- 2.) Ozone vs. 180°F water
- 3.) Ozone vs. 180°F water and cold water

Swabbing was performed on all sample materials and transported to the microbiology laboratory. All samples were aseptically transferred to APC petrifilm and incubated for 48 hours. Counts were determined using a 10^{-1} dilution factor. Microbial counts 100 and greater were considered unacceptable.

RESULTS:

Cutting Knives – All cutting knives showed a significant microbial reduction compared to before and after ozonation. For ozone vs. 180°F water, both tests showed acceptable microbial reductions (Tables 1,2).

Cutting Equipment - For comparison of ozone vs. 180°F water, ozone performed as good as or better in reducing microbial load than 180°F water. Microbial reduction was not observed for hock cutters for 180°F water but significant reductions were observed for ozone (Tables 3,4,5).

DISCUSSION

All areas, equipment, and samples tested for this evaluation were chosen based on the criteria of heavy microbial load. An overall trend of reduction was observed. The aqua clean mobile sanitizer did have a significant effect on reducing the microorganism load of all areas tested and sterilization of some areas was achieved. From these results ozone can be used as a substitution of 180°F water. Further experimentation will continue and the utilization of a permanent commercial ozone system enabling higher concentrations of ozone up to 3ppm will be used. Prediction of greater microbial reductions from higher ozone concentrations will be expected.

Table 1

Ozone Knife Testing	11/8/2001			
Samples		Cold Water	Hot Water	Ozone
1. Cutting Knife		230	<10	10
2. Cutting Knife		130	<10	<10
3. Cutting Knife		TNTC	<10	<10
4. Cutting Knife		120	<10	TNTC
5. Cutting Knife		TNTC	20	10
6. Cutting Knife		110	<10	130
7. Cutting Knife		30	20	90
8. Cutting Knife		<10	<10	<10
9. Cutting Knife		TNTC	<10	<10
10. Cutting Knife		250	<10	20
Score		20%	100%	80%

Table 2

Ozone Knife Testing	11/12/2001			
Samples		Cold Water	Hot Water	Ozone
1. Cutting Knife		<10	20	<10
2. Cutting Knife		TNTC	<10	TNTC
3. Cutting Knife		30	<10	<10
4. Cutting Knife		TNTC	30	<10
5. Cutting Knife		30	<10	<10
6. Cutting Knife		30	<10	<10
7. Cutting Knife		TNTC	<10	<10
8. Cutting Knife		50	<10	30
9. Cutting Knife		180	40	<10
10. Cutting Knife		110	<10	20
Score		50%	100%	90%

Table 3

Ozone Knife Testing	11/14/2001		
Samples		Hot Water	Ozone
1. Air Knife		<10	10
2. Air Knife		30	40
3. Air Knife		<10	<10
4. Air Knife		50	<10
5. Air Knife		60	90
6. Wizard Knife		<10	110
7. Wizard Knife		10	10
8. Wizard Knife		110	20
9. Wizard Knife		40	30
10. Wizard Knife		<10	60
Score		90%	90%

Table 4

Ozone Knife Testing	11/15/2001		
Samples		Hot Water	Ozone
1. Hock Cutter		TNTC	130
2. Hock Cutter		TNTC	230
3. Hock Cutter		560	90
4. Hock Cutter		720	<10
5. Hock Cutter		TNTC	150
6. Steel Glove		TNTC	<10
7. Steel Glove		30	10
8. Steel Glove		TNTC	<10
9. Steel Glove		170	10
10. Steel Glove		210	290
Score		10%	60%

Table 5

Ozone Knife Testing	11/15/2001		
Samples		Before	Ozone
1. Split Saw		TNTC	<10
2. Split Saw		330	<10
3. Brisket Saw		210	<10
4. Brisket Saw		470	<10