

Effect of Safe₂O[®]_{brand}RTE 01 Treatment on Shelf-Life of Roast Beef

Objective:

Determine if a 30 sec treatment with Safe₂O[®]_{brand}RTE 01 can effectively increase the shelf-life of Roast Beef incubated at 4°C.

Materials and Methods:

1. Roast beef obtained from the manufacturer was carefully unpacked and removed from the original package to a sterile surface. Fifty four pieces, approximately 1.2" X 1.2" X 0.3" were excised from the surface of the same piece of roast beef.
2. All pieces were divided into 2 groups (T & C), having 27 pieces each. Group T pieces were treated by dipping them into 1000 ml of Safe₂O[®]_{brand}RTE 01 (1:2 dilution) for 30 seconds. After the treatment, excess solution was allowed to drip off for 10 sec and all pieces were then individually sealed in a vacuum pouch.
3. Group C pieces were directly transferred and sealed in vacuum pouches without treatment.
4. All roast beef pieces were incubated at 4°C. Total plate counts of microbial organisms associated with roast beef pieces were carried out at one hour post-treatment and at weekly intervals thereafter for eight weeks.
5. Determination of aerobic bacteria were performed at each time interval as follows:
 - a. At each microbial test, 3 pieces from each group were unpacked
 - b. Five milliliters of peptone water was added into each pouch.
 - c. Bacteria from the surface of each roast beef piece were washed off by a two minute hand massage in the pouch.
 - d. Colony forming units (CFU) per piece of roast beef was determined by serial dilution of an aliquot from each rinsate and plating on Total Count Agar plates. After plating, all plates were incubated at 37°C for at least 48 hours before CFU determination.

Results:

The objective of the study was to determine if a 30 sec treatment with Safe₂O[®]_{brand}RTE 01 can effectively increase the shelf-life of Roast Beef incubated at 4°C. In a study carried out in parallel to this study (see Effect Of Treatment Of Roast Beef With Safe₂O[®]_{brand}RTE 01 On Replication of *Listeria monocytogenes*: Post-lethality and Growth Inhibitor) it was demonstrated that treatment with Safe₂O[®]_{brand}RTE 01 kills more than two logs of *Listeria monocytogenes* on contact and totally prevents outgrowth for at least eight weeks. However, if aerobic bacteria proliferate under identical conditions the treatment would be considered to have little value.

The study presented herein shows that a 30 sec treatment with Safe₂O[®]_{brand}RTE 01 effectively extend the shelf-life of roast beef incubated at 4^oC for more than eight weeks (see **Table 1**). At one hour post-treatment the total aerobic plate count (TPC) for the control is 2.56 logs and that of the treated pieces is 2.04 logs. Over the course of the eight week study period TPC outgrowth for the treated roast beef pieces was effectively totally prevented thereby extending the shelf-life.

Table 1: Effect of Safe₂O[®]_{brand}RTE 01 treatment of shelf-life of roast beef

Incubation Time (Weeks) at 4 ^o C	Treatment	CFU/piece	Average CFU/piece	Log Value	Log Reduction
0	Control	1.50E+01	3.67E+02	2.56	
		1.02E+03			
		6.67E+01			
	Safe ₂ O [®] _{Brand} RTE 01	2.75E+02	1.09E+02	2.04	0.52
		2.00E+01			
		3.33E+01			
1	Control	1.50E+01	2.10E+02	2.32	
		3.00E+01			
		5.85E+02			
	Safe ₂ O [®] _{Brand} RTE 01	5.00E+00	2.78E+01	1.44	0.88
		4.50E+01			
		3.33E+01			
2	Control	0.00E+00	3.67E+03	3.56	
		1.10E+04			
		5.00E+00			
	Safe ₂ O [®] _{Brand} RTE 01	0.00E+00	1.00E+01	1.00	2.56
		2.50E+01			
		5.00E+00			
3	Control	3.37E+04	1.13E+04	4.05	
		4.50E+01			
		5.00E+01			
	Safe ₂ O [®] _{Brand} RTE 01	0.00E+00	8.33E+00	0.92	3.13
		0.00E+00			
		2.50E+01			
4	Control	2.15E+02	1.68E+02	2.23	
		6.00E+01			
		2.30E+02			
	Safe ₂ O [®] _{Brand}	1.50E+01	5.00E+01	1.70	0.53

	RTE 01	1.20E+02			
		1.50E+01			

6	Control	2.85E+02	4.54E+05	5.66	
		1.36E+06			
		3.45E+02			
	Safe ₂ O [®] Brand RTE 01	6.53E+03	2.45E+03	3.39	2.27
		7.30E+02			
		7.50E+01			

7	Control	1.00E+01	2.19E+04	4.34	
		6.57E+04			
		0.00E+00			
	Safe ₂ O [®] Brand RTE 01	4.00E+01	3.33E+01	1.52	2.82
		3.50E+01			
		2.50E+01			

8	Control	2.00E+01	5.58E+02	2.75	
		1.20E+03			
		4.55E+02			
	Safe ₂ O [®] Brand RTE 01	4.00E+01	2.67E+01	1.43	1.32
		2.50E+01			
		1.50E+01			

Conclusions:

The study presented herein shows that a 30 sec treatment with Safe₂O[®]brand RTE 01 effectively extend the shelf-life of roast beef incubated at 4^oC for more than eight weeks. These results combined with the studies showing treatment with Safe₂O[®]brand RTE 01

kills more than two logs of *Listeria monocytogenes* on contact and totally prevents outgrowth for at least eight weeks extends a distinct advantage to a manufacturer with respect to the safety of roast beef products. Most roast beef products from the regulatory perspective are categorized as “Alternative 3” with respect to Listeria. However, the effect of treatment on Listeria, i.e., post-lethality and growth inhibitor (see Effect of Safe₂O[®]brand RTE 01 Treatment on Shelf-Life of Roast Beef) would allow the manufacturer to claim “Alternative 3” status for this product.