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12 pages

September 27, 2004

Ms. Katherine Benham
USDA-AMS-TMP-NOP
1400 Independence Avenue, SW, Room 4008-So.
AG Stop 0268
Washington, D.C. 20250-0200

RE: October 13, 2004 Presentation

Dear Ms. Benham;

Attached you will find a 'thumbnail' version of the presentation I would like to provide for the NOSB. To insure that this information reaches you by your deadline, I am transmitting it by e-mail and by facsimile – in case either one should become lost in 'cyberspace.'

My daily work with people in agriculture and related businesses has proven to me that the one category of products that has hindered the organic efforts of users and regulators alike is the category of disinfecting and sanitizing. A versatile, effective and cost efficient cleaning, sanitizing and disinfecting product is long overdue and much in demand by the organic – as well as the safety and health conscious, world. Lack of such a product has forced many growers and processors to "cheat" on the "Organic" standards just so they can meet the requirements of the disinfecting and sanitizing standards.

Extensive university research and field trials have already been conducted into the product I wish to present to the NOSB, and I am currently undertaking new university research in an effort to help make being Organic easy enough to become the "norm."

The simplicity of the WRJ-Ag-ROX-02 equipment's Electrolyzing Oxidizing (EO) water seems astonishing: Water, Food Grade Salt + Proprietary Technology = Safe, cost effective sanitation and disinfection: Pathogenic yeast, fungi, mold and bacteria killed (most within seconds) and at least 17 virus inactivated.

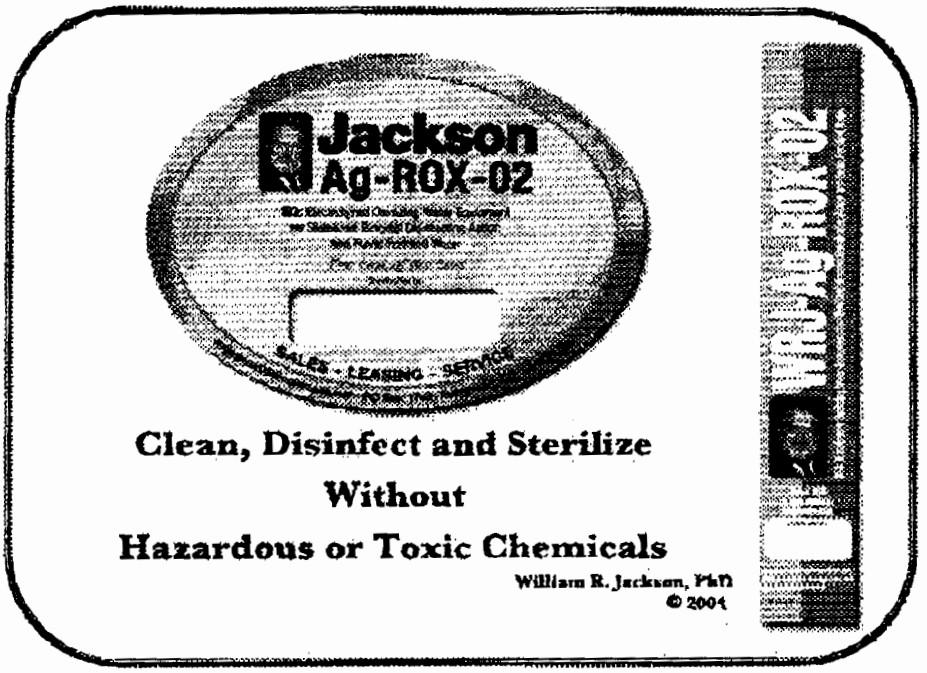
Approval or no contest ratings have already been received by USDA, EPA, FDA and State Agricultural Departments: My desire is to make this available for use by the Organic industry and I look forward to presenting it to the NOSB.

Very truly yours,

William R. Jackson PhD

William R. Jackson, PhD

WRJ:lmd
Enclosures: Slide Presentation



Clean, Disinfect and Sterilize

Without

Hazardous or Toxic Chemicals

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William R. Jackson, PhD, 25 September 2004©

QUESTION:ANSWER

- **QUESTION: Where can I find...**
  - A cleaning, sanitizing and disinfecting product that is versatile, effective and bottom line friendly?
  - A cleaning, sanitizing and disinfecting product that is easy and pleasant to use?
  - A cleaning, sanitizing and disinfecting product that meets Organic Standards?
- **ANSWER: WRJ-Ag-ROX-02 Electrolyzed Oxidizing Water**
  - Cleans, Sanitizes and Disinfects
  - Is Versatile, Effective and Bottom line friendly
  - Is Easy and Pleasant to use.
  - Approved by...
    - USDA
    - EPA
    - FDA
  - Meets State Departments of Agriculture standards as Approved or No contest

UNIVERSITY STUDIES and RESEARCH

University of Georgia:

Evaluation of acidic electrolyzed water for phytotoxic symptoms on foliage and flowers of bedding plants - June 7, 2002

Evaluation of electrolyzed oxidizing water for control of powdery mildew on Gerbera daisy - No date

In Vitro Fungicidal Activity of Acidic Electrolyzed Oxidizing Water - October 30, 2001

Effectiveness of electrolyzed oxidizing (EO) water as a sanitizer for treating non-food-contact surfaces - August 2001

Evaluation of Electrolyzed oxidizing water for inactivating food-borne pathogens on food and Kitchen cutting Boards - August 1999

KITCHEN CUTTING BOARDS, APPLE STUDY, LETTUCE STUDY

Roles of Oxidation-Reduction Potential in electrolyzed oxidizing and chemically Modified Water for the Inactivation of food-Related pathogens - August 13, 1999

Efficacy of electrolyzed Oxidizing Water for inactivating Escherichia coli 0157:H7, Salmonella enteritidis, and Listeria monocytogenes - June 18, 1999

Determination of chlorine germicidal equivalent concentration for Electrolyzed Oxidizing (EO) water generated by ROX-20TA - April 1, 1999

Inactivation of E.coli 0157:H7 and L. monocytogenes on kitchen cutting boards by electrolyzed oxidizing water - November 2, 1998

Auburn University:

Use of EO Water for Shrimp Washing to Improve Quality - March 12, 2003

Bactericidal Activity of electrolyzed oxidizing Water against E. coli 0157:H7, Listeria monocytogenes and Salomonella enteridis inoculated on Beef and chicken October 16, 2000

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UNIVERSITY STUDIES and RESEARCH

Penn State University:

Response Surface Modeling for Cleaning and Disinfecting Materials Used in Milking systems with Electrolyzed Oxidizing water - June 27, 2003

CIP Cleaning of a Pipeline Milking system Using Electrolyzed Oxidizing Water - July 27, 2003

Treatment of Escherichia coli 0157.H7 inoculated alfalfa seeds and sprouts with electrolyzed oxidizing water - November 26, 2002

Efficacy of Electrolyzed Oxidizing Water to Clean Milking system Materials - June 2002

Comparison of electrolyzed Oxidizing water with Various Antimicrobial interventions to reduce salmonella species on Poultry - May 31, 2002

Hokkaido University:

Decontaminative Effect of Frozen Acidic Electrolyzed Water on Lettuce - September 20, 2001

Effect of Nitrogen Gas packaging on the quality of Microbial Growth of Fresh-Cut Vegetables Under Low Temperatures - September 10, 2001

Prediction of Microbial Growth in Fresh-Cut Vegetables Treated with Acidic Electrolyzed Water during Storage under Various Temperature Conditions - June 17, 2001

Decontamination of Lettuce Using Acidic Electrolyzed Water - December 4, 2001

Other Studies and Findings:

The Use of Electrolyzed Water for Sanitation Control of Eggshells and GP Center - October 23, 2002

Electrolyzed Water as a Disinfectant for Fresh Cut Vegetables - 1999

Acceptable range of conductivity of water for ROX - No Date

Efficacy of electrolyzed water for kitchen disinfection - No date

Additional Articles:

Natural Borne Killers, Food Poisoning Can Make You Plenty Sick and Even Lead to Death-...- October 2002

<Sterilization mechanisms>

○Sterilization mechanisms (popular theory)

①Nucleic acid is broken down by hypochlorous acid (HOCl).

②Denaturation & degradation of membrane protein of bacteria

It is difficult to become resistant to HOCl because available chlorine diminish quite immediately. Then, it is thought that resistant bacteria hardly comes into being.

○Scanning microphotograph

Control

・Intact *E. coli* on agar block

Acidic electrolyzed water 10min

・Surfaces of *E. coli* become rough.

・Lysis is also observed.

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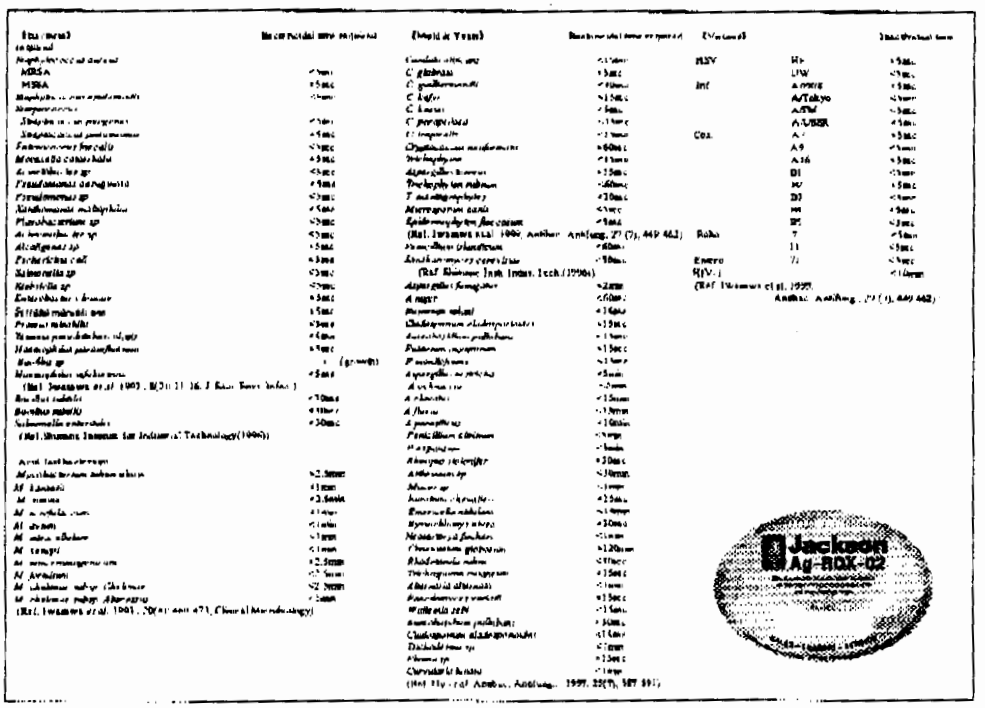
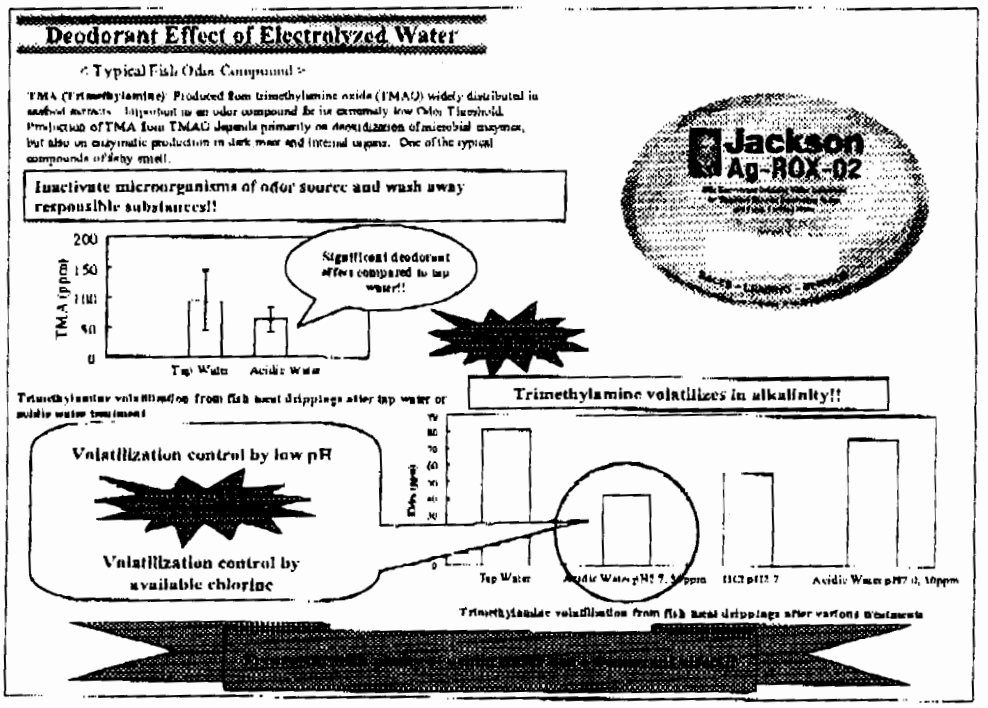
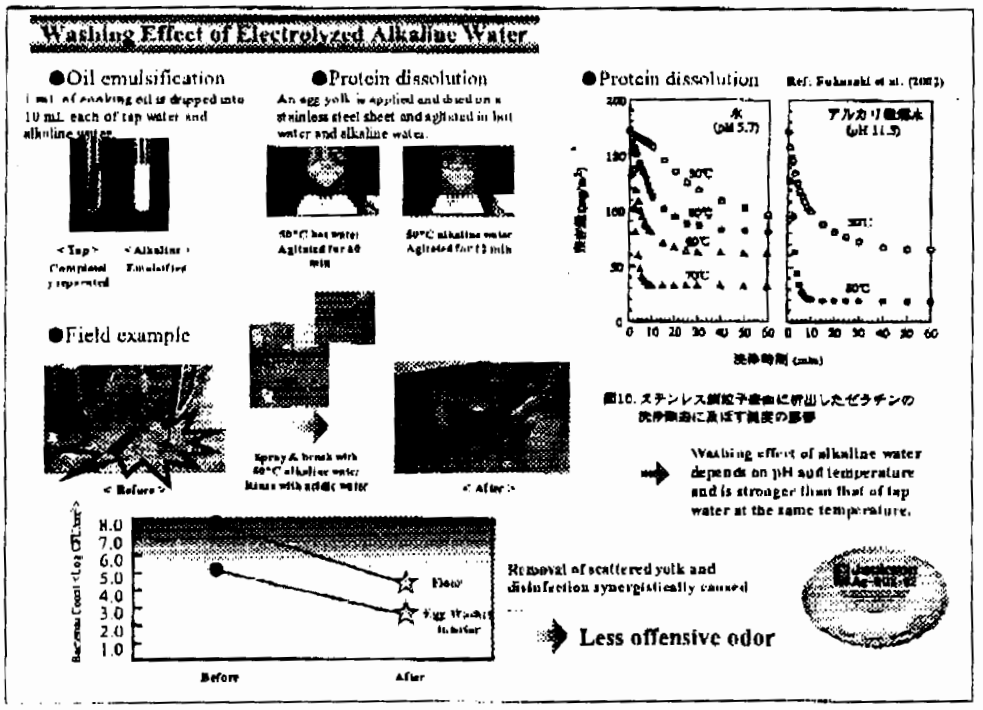
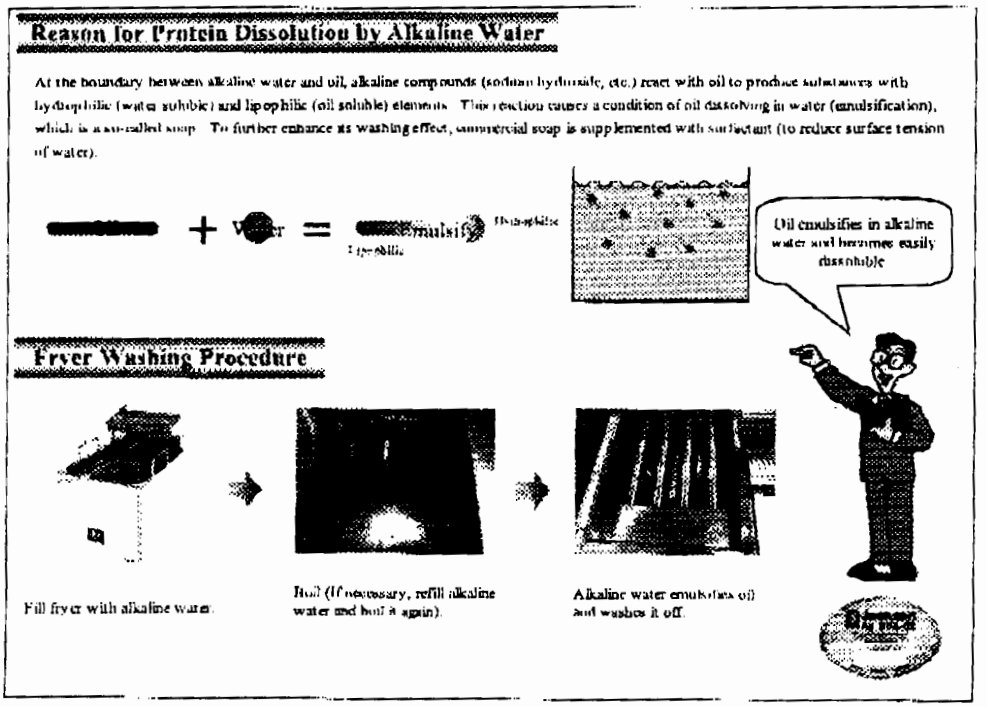





Washing Effect of Electrolyzed Alkaline Water
●Oil emulsification
●Protein dissolution
●Protein dissolution
Ref. Fukasaki et al. (2003)
●Field example
Washing effect of alkaline water depends on pH and temperature and is stronger than that of tap water at the same temperature.
Removal of scattered yolk and disinfection synergistically caused
Less offensive odor
Before
After


Reason for Protein Dissolution by Alkaline Water
At the boundary between alkaline water and oil, alkaline compounds (sodium hydroxide, etc.) react with oil to produce substances with hydrophilic (water soluble) and lipophilic (oil soluble) elements. This reaction causes a condition of oil dissolving in water (emulsification), which is so-called soap. To further enhance its washing effect, commercial soap is supplemented with surfactant (to reduce surface tension of water).
Oil emulsifies in alkaline water and becomes easily dissolvable
Fryer Washing Procedure
Fill fryer with alkaline water.
Boil (If necessary, refill alkaline water and boil it again).
Alkaline water emulsifies oil and washes it off.

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Electrolyzed Water for Egg Washing Equipment and Facilities

●Research as MAFF grant program

Program: New Technology Development Program for Agriculture, Forestry and Fisheries
Term: 1999 2001
Requester: Society for Techno Innovation of Agriculture, Forestry and Fisheries

●Application of electrolyzed water system

Farm: Hanai Poultry Farm (Obu, Aichi)
Species: Shaver
Number of eggs processed: Approx. 30,000

●Egg washing and sanitizing

Hot alkaline water shower to moisturize contaminants on eggshell surfaces and acidic water shower and brushing to wash and sanitize.

●Floor washing

The floor in the egg washing facilities was soiled with broken egg yolks and whites, providing an optimum environment for bacterial growth. The stuck yolks and whites were hard to remove even by brushing with hot water. Shower and brushing with hot alkaline water and acidic water successfully facilitated their removal.

●Hand washing

The conventional soap + tap water method was replaced by hot alkaline water + acidic water.

●Advantages of electrolyzed water application

●Workers' enhanced consciousness

Most of the workers are part-timers, but became conscious of the farm's sanitation control to wash their hands more frequently than before.

●Improved shipping rate and workability

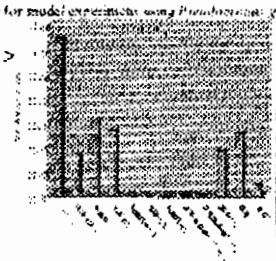
The number of soiled eggs reduced.
Soiled eggs had been sold to GP center at low price. Increase in the number of salable eggs improved the shipping rate and profit and significantly reduced the working hours for sorting eggs (this is actually more beneficial). The number of soiled eggs changed from 1000 to 400, approximately.

●Improved working environment (workers' comments)

The workers (and visitors) do not notice the familiar smells of normal eggs, broken and rotten eggs, and drains in the egg washing facilities any more. This is primarily because installation of two dispensing outlets of electrolyzed water facilitated washing with alkaline water and sanitizing with acidic water without imposing burdens.
Also, water drained by equipment washing at the end of daily work washes away yolks and whites staying in the drains, effectively removing bad smells.

<Electrolyzed water treatment on rice seed>

As for model experiments using *P. glumae* ...



Control

AcEW treatment

Extinction & lysis of *P. glumae*

Pesticide treatment

There is no difference in appearance because of low disinfection effect, in contrast there is a great deal of residual pesticide

Behaviors of *P. glumae* after various treatments

<Diseases of rice seed in late years>

- Rice blast (*Pyricularia oryzae*)
- (*P. glumae*)
- (*Aphelenchioides oryzae*)
- (*Gibberella fujikuroi*) etc.

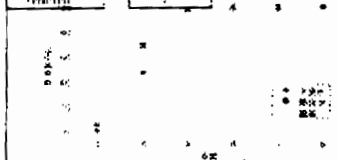
High disinfection effect
&
Low residual volume

<Data>

Seed selection with salt solution (20% saline solution) → Water washing (2~3min) → Disinfection → Drying in shade (24h) → Seed soaking (1~10days) → Seeding

e.g.) Disinfection : AcEW10min + Water washing + AcEW5h

Seed soaking : Weak electrolyzed acidic water (Hox)



Tap water

AcEW

Pesticide

Germination rate (left) and photographs (right) after various treatments

- Germination rate is up or an equal with tap water treatment.
- Germination condition is also good compared with pesticide treatment. (The root lengthen is poor in case of pesticide treatment.)
- Waste electrolyzed water does not have influence to environment.

EW is utilizable to agricultural materials as one of environmentally-friendly technologies!!

Electrolyzed Water Application in Supermarket Kitchen

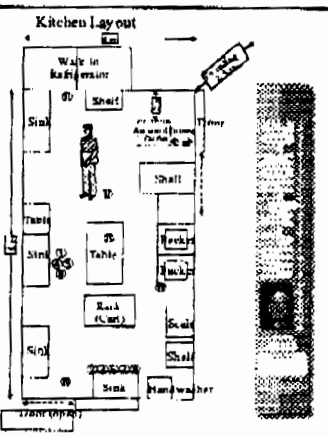
[Published in Japanese Society of Chemotherapy Journal Vol 48 (10/2000)]

Electrolyzed water (ROX 15SA) was compared with the conventional NaOCl or detergent at the new fish kitchen of a supermarket in Toyohashi, Aichi

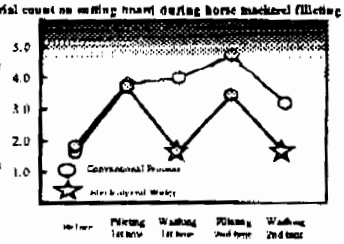
	Conventional (1 analyte)			Electrolyzed Water	
		During work	After work	During work	After work
1. Cutting Board 1 (prepare)	(100cm²)	6.4×10^4		< 10	10
2. Cutting Board 2 (slice)		3.8×10^4	3.0×10^3	20	30
3. Towel 2 (slice)			1.4×10^5	< 100	< 100
4. Knife (handle) 1 (prepare)	(whole)		4.4×10^4	6.1×10^3	3.6×10^3
5. Knife (blade) 1 (prepare)	(whole)		2.7×10^4	< 10	< 10
6. Knife (handle) 2 (slice)		1.7×10^5	2.8×10^3	2.0×10^3	9.2×10^3
7. Knife (blade) 2 (slice)		4.3×10^5	2.9×10^4	3.3×10^3	2.0×10^3
8. Hand 1 (prepare)	(one hand)	5.6×10^4	4.8×10^4	6.7×10^3	2.8×10^3
9. Hand 2 (slice)		5.3×10^5	2.0×10^4	< 10	< 10
10. Floor (inner)	(100cm²)				2.3×10^3
11. Refrigerator Handle	(1 piece)		3.6×10^4		1.9×10^3
12. Rubber Boots (toe)	(4×5cm square)				9.3×10^3
13. Aluminum Vat	(100cm²)				1.4×10^3
14. Scale	(100cm²)		1.0×10^3		< 10
15. Rack	(100cm²)		1.2×10^4		< 10

Total visible bacteria 10^3 or more Total visible bacteria 10^4 or more

Kitchen Layout



Bacterial count on cutting board during horse mackerel filleting



☆ Before the use of electrolyzed water, cutting boards and kitchen knives were sources of bacterial contamination. In some cases, they should be sanitized during work hours, which was actually not practical in busy hours.

☆ Towels are recommended to be sanitized just before use.

☆ Electrolyzed water is easily disposable from faucets and useful in busy times. It facilitated sanitization during working hours.

☆ Electrolyzed acidic water is used at 20 - 60mg/L in the day, while sodium hypochlorite is used at min 100mg/L. Electrolyzed water has less adverse effects on humans and environment.

Sanitization was not practical in busy hours.

Soaking was not effective for sanitization

Development of Vegetable Sanitizing Process by Combined Use of Electrolyzed Alkaline and Acidic Waters

Bactericidal Effects by Heating and Cooling

Objective

Identify advantages of hot alkaline water and cold acidic water treatments

↓

Hot alkaline water and cold acidic water treatments

↓

Develop effective sanitizing process

Table 1 Physicochemical Properties of Treatment Waters

	pH	ORP (mV)	ACC (ppm)
Electrolyzed Acidic Water (AcEW)	2.5	1150	40
Sodium Hypochlorite (NaOCl)	2.4	815	200
Distilled Water (DW)	6.6	412	–
Electrolyzed Alkaline Water (AlEW)	11.4	−870	–

ORP: Oxidation-reduction potential
ACC: Available Chlorine Concentration

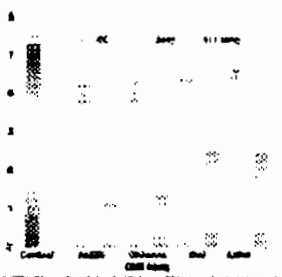


Fig. 1. Thermal Temperature and Bactericidal Effect

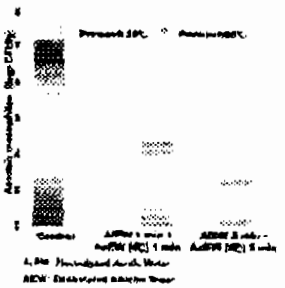


Fig. 2. Thermal Temperature and Recorrelated ORPs

Electrolyzed Acidic Water and Sodium Hypochlorite Treatments at 50°C

↓

4 $\log_{10}$ reduction

Heating treatment enhanced bactericidal effect

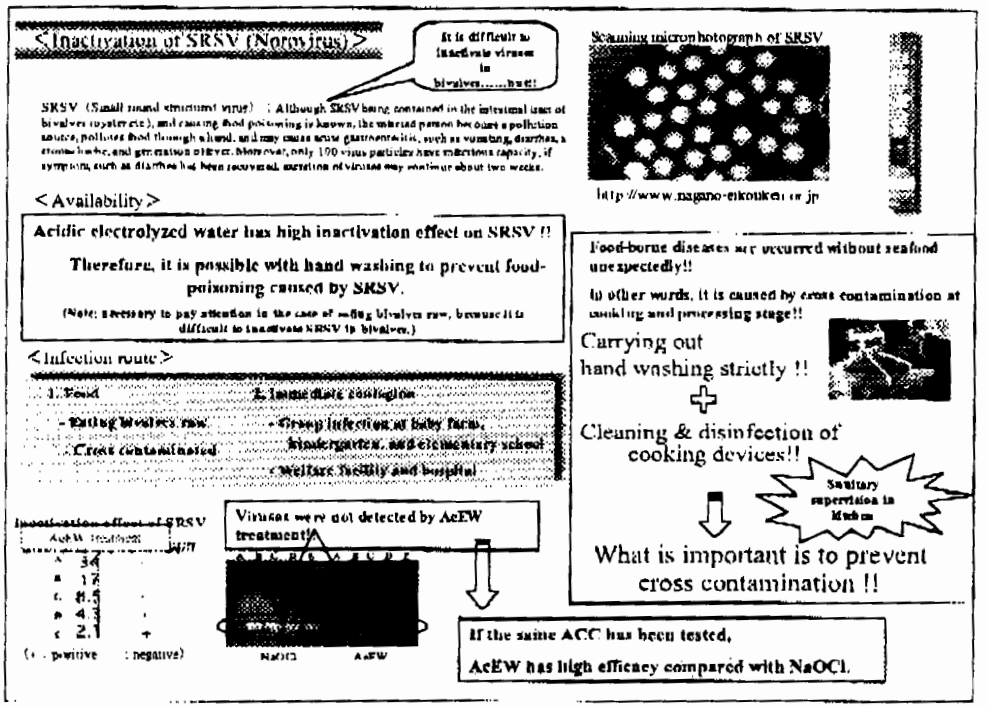
Summary

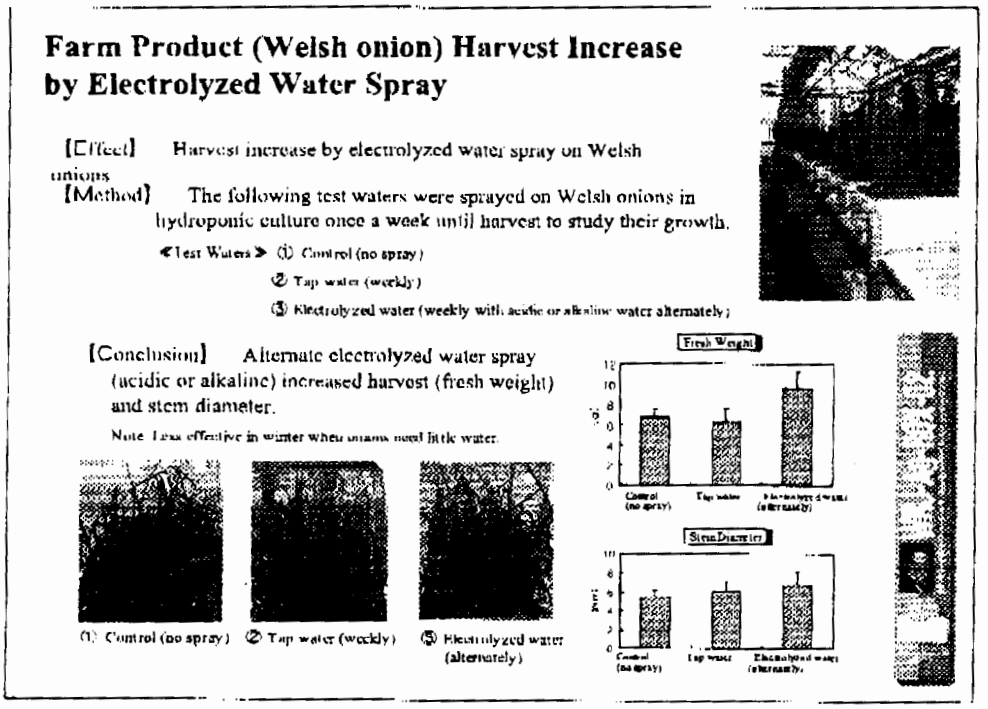
50°C Electrolyzed Alkaline Water + 20°C Electrolyzed Acidic Water

↓

4 $\log_{10}$ reduction

Effective low temperature disinfection available with electrolyzed acidic water


<Inactivation of SRSV (Norovirus)>
It is difficult to inactivate viruses in bivalves.....but!
Scanning micronhotograph of SRSV
http://www.nagano-eikouken.or.jp
<Availability>
Acidic electrolyzed water has high inactivation effect on SRSV !!
Therefore, it is possible with hand washing to prevent food-poisoning caused by SRSV.
(Note: necessary to pay attention in the case of eating bivalves raw, because it is difficult to inactivate SRSV in bivalves.)
Food-borne diseases are occurred without seafood unexpectedly!!
In other words, it is caused by cross contamination at cooking and processing stage!!
Carrying out hand washing strictly !!
Cleaning & disinfection of cooking devices!!
Sanitary supervision is lacks
What is important is to prevent cross contamination !!
<Infection route>
1. Food
- Eating bivalves raw
- Cross contaminated
2. Immediate contagion
- Group infection at baby farm, kindergarten, and elementary school
- welfare facility and hospital
Virusat were not detected by AcEW treatment!!
NaOCl
AcEW
If the same ACC has been tested,
AcEW has high efficacy compared with NaOCl.


Farm Product (Welsh onion) Harvest Increase by Electrolyzed Water Spray
[Effect] Harvest increase by electrolyzed water spray on Welsh unions
[Method] The following test waters were sprayed on Welsh onions in hydroponic culture once a week until harvest to study their growth.
<Test Waters> ① Control (no spray)
② Tap water (weekly)
③ Electrolyzed water (weekly with acidic or alkaline water alternately)
[Conclusion] Alternate electrolyzed water spray (acidic or alkaline) increased harvest (fresh weight) and stem diameter.
Note: Less effective in winter when onions need little water.
① Control (no spray)
② Tap water (weekly)
③ Electrolyzed water (alternately)
Fresh Weight
Stem Diameter

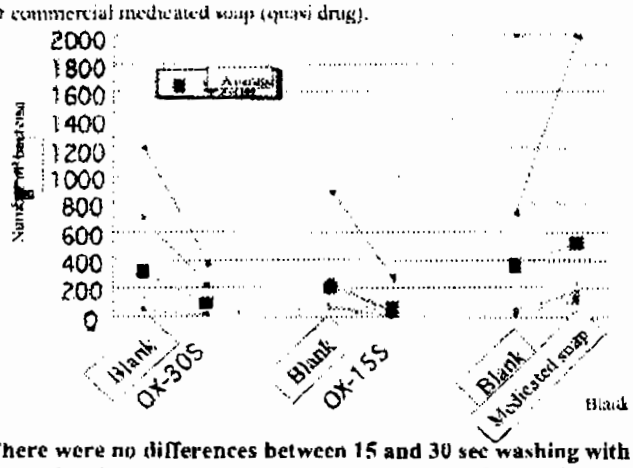
<Comparison EW and the other sterilizers>

	Acidic electrolyzed water (AcEW)	Sodium hypochlorite (NaOCl)	Chlorine dioxide (ClO_2)	Ozone (O_3)	UV
Main components	hypochlorous acid (HOCl) 30ppm at acidic condition	sodium hypochlorite 200ppm at pH9~10	chlorine dioxide	ozone	ultraviolet light (254nm)
Approval of food additive	○	○	× (in Japan)	○	
Sterilizing mechanisms	oxidation	oxidation	oxidation	oxidation	oxidation
Low residual rate (eco-friendly)	○	×	△	◎	◎
Recovery against organic matter (deactivation)	high	△	low	high	△
Generation of trihalomethane	○	×	○	○	○
Handling	○	△	△	○	○
Safety	○	△	×	○	○
Rust	△(necessity for rinse)	△	△	△	○
Cost	△	○	×	△	○

<Hand washing (medical care)>

(Consignment experiment by Kitasato Institute)

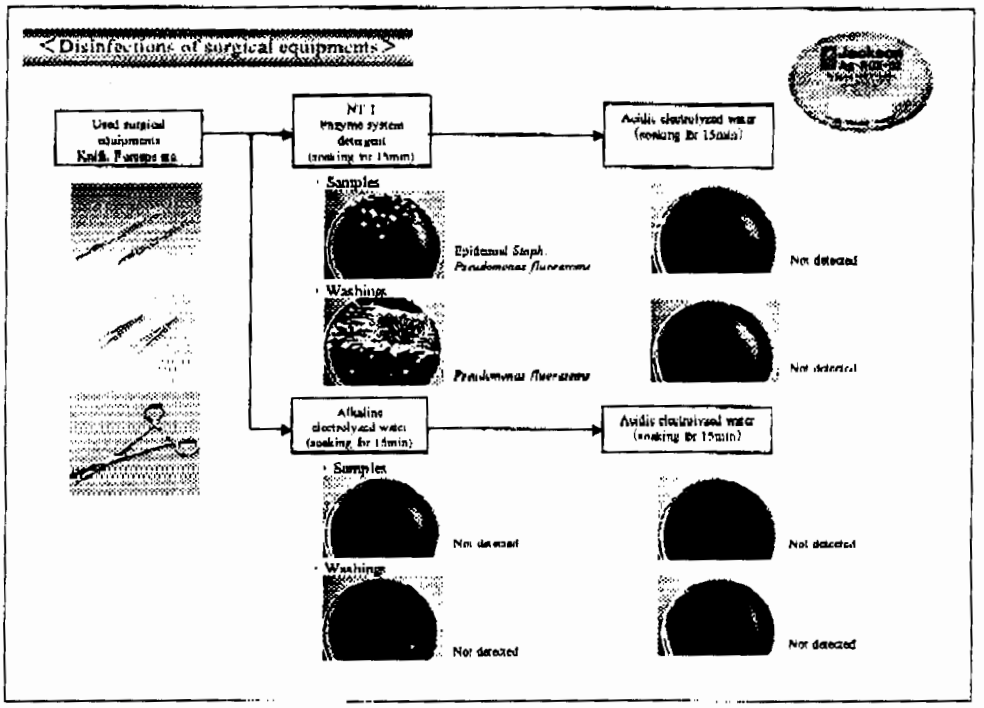
The difference of bacterial numbers on hand was measured before and after hand washing using acidic electrolyzed water (pH 2.5, ACC 20 mg/l; ROX-10A-M) or commercial medicated soap (quasi drug).

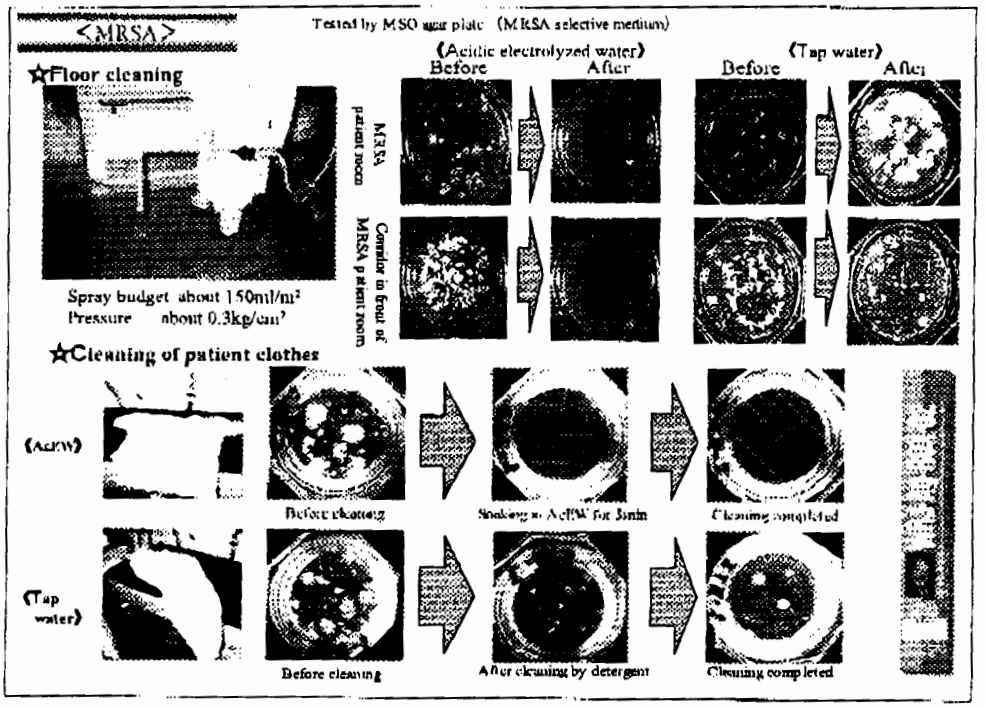


Blank : Base line

There were no differences between 15 and 30 sec washing with AcEW, both of their bactericidal effects were found at almost 80%.
In contrast, medicated soap has no bactericidal effect.

Reference: Suzuki et al. 1999, 1(1): 26-32, Clinical Studies of Hand Washing with Electrolyzed Acidic Water.


<Disinfections of surgical equipments>
Used surgical equipments
Knife, Forceps etc
NT I enzyme system detergent (soaking for 15min)
Acidic electrolyzed water (soaking for 15min)
Samples
Epidermal Staph.
Pseudomonas fluorescens
Not detected
Washings
Pseudomonas fluorescens
Not detected
Alkaline electrolyzed water (soaking for 15min)
Acidic electrolyzed water (soaking for 15min)
Samples
Not detected
Not detected
Washings
Not detected
Not detected


<MRSA>
Tested by MSO agar plate (MRSA selective medium)
(Acidic electrolyzed water)
Before
After
(Tap water)
Before
After
☆Floor cleaning
MRSA patient room
Corridor in front of MRSA patient room
Spray budget about 150ml/m²
Pressure about 0.3kg/cm²
☆Cleaning of patient clothes
(AcEW)
Before cleaning
Soaking in AcEW for 30min
Cleaning completed
(Tap water)
Before cleaning
After cleaning by detergent
Cleaning completed

Merits and Demerits of Each Non-thermal Processing

Non-thermal processings	Merits	Demerits
Radiation	Wide antibacterial spectrum High permeability (sterilized inside of food material) Dry system	Limited use High cost Large-scaled device Safety
High hydrostatic pressure	Minimal processing Energy-saving Food processing simultaneously	Selection of food material High cost Denaturation of food material Large-sized device
Ultraviolet light	Low cost Dry system Compact device Simple and easy way	Selection of food material Alternative antibacterial effect Low permeability Stability of effect
chemical disinfection (e.g. NaOCl)	Low cost Simple and easy way Many examples of usage	Residual toxicity Long processing time By-products Irritating odor
High electric field pulse	Dry system Simple and easy way Short processing time	Generation of heat Surface sanitation High cost Denaturation of food material
Ozone	Low residual toxicity Simple and easy way Low cost	Surface sanitation High antioxidant Irritating odor
Electrolyzed Oxidizing (EO) Water	Low residual toxicity simple and easy way Low cost	Surface sanitation Denaturation of food material Little examples of usage