



Global Energy Partners, LLC

An Employee-Owned Company

Ozone Applications in Fish and Seafood Processing – Equipment Suppliers Perspective



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Presentation Objectives

- This presentation is a continuation of a study, *Ozone Applications in Catfish Processing* by Charles D. Sopher, George T. Battles, and Edward A. Knueve presented at the recent Arlington, TX IOA, September 2006 meeting and in publication by the IOA
- Results of the original study are briefly reviewed
- Based on the experience of the authors, future studies and areas requiring additional investigation in the fish and seafood industry are discussed and needed research and demonstrations are suggested

Original Project Sponsors



Superior Catfish Products

C&S AgriSystems, Inc.
Agricultural Research & Food Production

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Goals of the Original Demonstration

- Measure the effects of ozone as an oxidizing agent to reduce the microbiological load from live catfish being delivered to the processing plant
- Determine if an ozonated water rinse could significantly reduce microbial load in filets from the fillet machines
- Determine if ozonated water washes could reduce the microbial load in finished fillets
- Determine if an ozonated wash could improve BMP's
- Qualitatively evaluate the use of gaseous ozone to improve air quality in the offal room

Analyses and Interpretations

General

- The Laboratory portion of the study was conducted utilizing five replications on both treated and untreated samples. A two factor analysis of variance that included the replication sum of squares in the error term (completely randomized design) was utilized to determine the F-values. Measures taken were total plate counts
- The test on the air quality in the offal room was olfactory and consisted of the opinions of the staff personnel present during the test

Materials and Methods (cont.) – Equipment Utilized

Ozone Generation ClearWater Tech HDO₃ Unit



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Analyses and Interpretations

- Aqueous ozone at 4.5 ppm was very effective in statistically reducing microbial loads on live catfish entering the plant.
- Finished catfish fillets washed in 4.5 ppm ozonated water showed significant reductions in total plate counts
- Ozonation at the fillet machine could be beneficial if delivery points are refined
- Utilizing aqueous ozone at 5.0 ppm as a final wash after using soap and a chlorine sanitizer was of no benefit and actually removed the residual chlorine and led to increased plate counts.
- Gaseous ozone reduced odors in the offal room rapidly and effectively. Utilization of ozone for odor reductions will require ozone monitoring equipment that ensures employee safety



General Conclusions - Original Study

- Ozonated water rinses and washes can provide statistically significant reductions in microbe levels in catfish processing plants
- Gaseous ozone can be employed to reduce odors and create a more pleasant work-place environment
- Ozone rinses utilized in conjunction with sanitizers and soaps containing chlorine can actually remove the chlorine and reduce the residual effect of soaps and sanitizers

Where to From Here?

- Based on the study conducted in Macon, MS, and experience of the authors, several recommendations were developed for further areas of testing and introduction of ozone in catfish processing and other seafood processes
 - Ozonation of fish in transport and holding tanks
 - Equipment washing
 - Ozonation of ice machines
 - Ozonation of IQF equipment
 - Temporary cleaning during breaks, shift changes and lunch periods
 - Air quality in freezers and storage rooms

Where to From Here? (cont.)

- Air Quality in processing and waste treatment facilities
 - Ozone laundry technologies for uniforms and towels
 - Ozone production facilities
 - Ozonation in sales facilities
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- Ozonation in seafood processing facilities can almost be contagious – When ozone can be utilized to provide lower microbial counts in processed products, the same equipment can often be utilized for other uses at only operating cost

Ozonation of Fish Transport and Holding Tanks

Ozonation during hauling, holding and truck cleaning could be beneficial



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Ozone washing of Equipment could be Very Beneficial

Seafood processing facilities utilize totes and cutting boards that could be rinsed throughout the day with aqueous ozone



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Ozonation of Ice Machines and IQF Equipment Will be Beneficial

Ozonation of ice machines and IQF equipment can be handled with the same ozone generation equipment



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Ozone Washes during Breaks and Shift Changes can Lower Microbial Counts

Ozone rinses utilizing a portable washer during this break period could reduce microbial levels



QuickTime™ and a
TIFF (Uncompressed) decompressor
are needed to see this picture.

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Air Quality in Processing Facilities can be Problematic

Air quality in this processing facility is above average but can become a problem if air handling equipment is not running at peak capacity



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Ozone Laundry Technologies can be Utilized to Wash Smocks, Uniforms and Gloves

Laundry operations often can be scheduled for periods when ozone demand is low and one ozone generator can be utilized for several uses



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Ozone in Production Facilities

Can ozone be used in these production ponds? It is routinely used in Aquaculture facilities to reduce foam and clean the water



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Ozone in Sales Facilities

Odors in sales facilities and stores can be a great problem in both large stores or individual fish houses with iced fish. Ozone properly handled can help alleviate this problem



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Summary Comments

- This presentation was developed after a comprehensive study to investigate the use of ozone in a catfish processing facility in Macon, MS
- From the MS study and a number of other visits to seafood production and processing facilities, it has been determined that ozone has many uses in the seafood industry
- These uses range from reductions in microbial levels, to laundries, to indoor air quality, ice and IQF facilities and severe odor control in waste collection and transport
- Most installations need to be customized but the return on investment and pay back should be very high due to multiple uses of the ozone equipment



Thank You

Your attention was appreciated

Your questions are welcome

Cameron and Chuck