Improving Fish Quality with Ozone at Fresher Than Fresh

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Talk Outline

- Company Background
- Problem Description
- Plant Processing
- Ozone System
- Cost Benefits of Prepackaging
- Ozone Benefits
  - Shelf-Life Extensions
  - Product Quality Improvements
  - Other Ozone Benefits
- Health & Safety Issues
- Conclusions
Fresher Than Fresh Plant
Fresher Than Fresh – the Company

- Seafood processing and packaging
- Serves retail groceries & institutions
- Products: fresh fish, fish cakes, dips
- Wash products with ozone/water
- Package using Modified Atmosphere Packaging (MAP) with CO₂ + N₂
- Fresh-Check label added
- FTF guarantees 10-day shelf life
THE FRESH-CHECK® INDICATOR

Extra Check ✔ for freshness™

Fresh-Check®

USE
USE NOW
DO NOT USE

USE BEFORE CENTER IS DARKER THAN OVAL
Fresher Than Fresh Products
Problem Description

- Safety of fish, seafood products & plant
- Prior to ozone, packaged products did not always last 10-days
- Plant had to lower shelf-life guarantee to 6-7 days for some products
- Late ’90s – evaluated ozone
- 2003 – installed ozone full-scale
Plant Processing

- ALL plant processing water is ozonated
- Plant + equipment are washed repeatedly during the day
- All fish products are washed before packing
- Fish are packaged in 35% CO₂ + N₂
- Fresh Check label is added
Figure 1. Fresher Than Fresh Plant Processing Schematic

- Round fish
- De-icing
- Weighing
- Washing
- Cutting
- Distribution
- Packaging
- Fresh-Check labeling
Figure 2. Ozonated Water Uses

- ice maker
- bulk fish containers
- plant wash-downs
- doorway sprays
- washdown hoses
- table sprayers
- latex gloves
- processing machinery
- washing fish
- workers’ shoes
- trimming tables
- utensil sterilization
- floor drains
Prepackaging Saves Retailer –

- Labor to package fish in retail store
- Cleaning/sanitizing to allow meat processing in-store after fish handling
- Decreases fish shrinkage
- Allows retailer to display ALL products
- Saves retailer lots of $$ -- will explain later
Ozone System

- ClearWater Tech Model HDO3-II – 2003
- Oxygen concentrator
- Can deliver up to 150 gpm water containing 7 mg/L dissolved ozone
- ~ 100 gpm of ozonated water is available at all times in the plant
- Rosemount Ozone Controller – max of 2.5 mg/L dissolved ozone
CWT Ozone System – F-T-F
Ozone in Water @ F-T-F

- As long as ozone in process water is <1.5 mg/L,
- Ozone in plant atmosphere never exceeds OSHA permissible level = 0.1 ppm, time-weighted average/8 hrs/day
- Dedicated piping – ozone generation to ice maker
- Nozzles and sprayers deliver water to plant sites and fish products
Ozone Processing Benefits
PREPACKAGING - 1

- FTF packaging costs ~ $0.40 per pack less than at a retail store
- Retailers sell ~ 360 packages/week, thus one retailer saves ~ $144/week in packaging costs
- 30% greater “on-display” provides increased sales
- 20% less shrinkage of fish when prepackaged
Based on these 3 factors only, and extending to fish sold nationally in retail store chains, prepackaging savings =

- $935/week per store ($48,620/yr/store)
- For a chain of 300 stores – annual savings are close to $15 MILLION
SHELF-LIFE BENEFITS

- APC on ozone-washed fish products are consistently 36 hrs behind (= 1.5 days) products not ozone-washed
- Modified Atmosphere Packaging further extends shelf-life
- Maintain temperature < 39°F – extends further
- A combination of factors succeeds
Prior to ozone, some packages expired in 6-7 days, others in 10 days. Since installing ozone + MAP + < 39ºF storage -- all FTF products now are guaranteed 10 days. Products now meet 10-days (and more) consistently.
Croakers – Headed & Gutted
Additional Benefits of Ozone

- Microorganisms also are killed on floors, in drains, on latex gloves, on workers’ shoes, in ice-making machine, etc.
- Lower BOD and COD in wastewaters
- Ice machine is slime-free
- Plant cleanup is faster – less slime
Additional Benefits of Ozone -2

- Sanitizing wash-downs now conducted during daytime breaks without having to remove fish products from the area.
- Plant sanitary conditions are improved.
- Plant doesn’t smell like a fish plant now.
- Employees’ clothing doesn’t have that “fishy” smell.
Concluding Comments - 1

- Ozone is proven beneficial at F-T-F
- Constant control of aerobic bacteria
- Plant sanitation is greatly improved
- Fish washed in ozone/water, packaged in modified atmosphere and stored <39ºF consistently have >10-day lives
- Prior to ozone, some fish could only be guaranteed 6-7 days
Concluding Comments – 2

- Plant operations are essentially odor-free
- Lower wastewater BOD and COD levels
- Ice maker operates free of slime
- Plant cleanup is faster – due to less slime
“Anyone sneaking into our plant at night to steal our ozone equipment will have a big fight on his hands!!”
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