

Project Leader (PI): Dr. Sam Chang

Objective(s): Optimization of silver carp (*Hypophthalmichthys molitrix*) utilization by surimi, and fish sauce production.

Milestones for FY 2016-17:.

1. Determine the best application amount of tapioca modified starch in silver carp surimi in regard with the quality of texture, color and water holding capacity/Fully met.
2. Determine the best application amount of hydrogen peroxide in silver carp surimi in regard with the quality of texture, water-holding capacity, color and flavor/Substantially met.
3. Combine the best conditions in Objective 1-2 to produce the surimi gel and compare its quality in of texture, water holding capacity, color, and flavor with market surimi and surimi made from catfish and an ocean fish/Substantially met.
4. Determine the effect of hydrogen peroxide on protein by electrophoresis and lipid oxidation by gas chromatograph using a GC-Olfactory-MS instrument and sensory evaluation/ Not met, hydrogen peroxide did not improve the color of surimi.
5. Produce fish sauce with different protein concentrations and determine its quality, including taste, color and aroma using instrumental and sensory techniques/Partially met, fermentation process need more 6 months.

Progress Report:

Application of hydrogen peroxide on silver carp did not result in significant improvement of the meat color. Pale meat of wild silver carp was chosen to develop the formula of surimi gel because its whiteness and elastic characteristic (storage modulus, G') is higher than dark meat. Tapioca-derivative starch were successfully used to replace surimi paste with 0, 3 and 6% w/w. Starch gelatinization profiles, dynamic rheological measurements, measurement of texture properties, color and cooking loss were performed. After filleting the silver carp, the flame and offal were used for fish sauce production.

Accomplishments

The gel strength of cooked surimi gel with 6% native starch significantly lower than control (0%) while no significant differences were found when starch acetate and distarch phosphate were added ($P>0.05$). The use of native starch and starch acetate significantly raised the whiteness ($P<0.05$). The cooking loss of surimi gel was significantly lower than the control when either kind of starches was applied ($P<0.05$). Fish sauce was successfully produced from the flame and offal of silver carp. The preliminary assessment shows the aroma and flavor meet the criteria of fish sauce.

Publications:

Yuwei Wu, Barakat S.M. Mahmoud, Haoran Gao , Yuan-Lin Liu , Sam Chang. (manuscript).
Effect of modified tapioca starch on the textural, rheological, and color properties of surimi gel
from meat of wild silver carp (*Hypophthalmichthys molitrix*)

Presentations: Please use the following format

Yuwei Wu, Sam Chang, Haoran Gao, Yuan-Lin Liu, Barakat S.M. Mahmoud, Peter J Bechtel.
(2017, March). Full utilization of wild Silver Carp (*Hypophthalmichthys molitrix*) by production
of high quality surimi, fish sauce and dried fish floss Poster presented at the Commodity
Advisory Council, Biloxi, MS.

Attach photo: Fish sauce was successfully produced from the flame and offal of silver carp with
fermentation method.



Project Leader (PI): Dr. Sam Chang

Objective(s): Study of Inactivation Mechanism of X-ray Irradiation against a Human Norovirus Surrogate (Murine Norovirus 1, MNV-1)

Milestones for FY 2016-17:.

6. Transmission electron microscopy (TEM)/ Not met, need to have the capacity to purify virus.
7. Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE)/ Not met, need to have the capacity to purify virus.
8. Reverse transcriptase polymerase chain reaction (RT-PCR)/ Partially met, need to have the capacity to purify virus.

Progress Report:

We accomplished the experiments to evaluate the impact of X-ray to the color, mesophilic bacterial counts, and psychrotrophic bacterial counts of salmon fillet. And we evaluated the effects of refrigerator storing condition to the color, inherent bacterial, weight loss, TVB-N and inoculated MNV-1 of whole shell oyster and salmon fillet for 20 days. After model the risk of norovirus contamination by the mathematics model, we found X-ray and refrigerator storing condition could reduce the risk of disease but can not completely eliminated it. Further research is needed for better risk reduction by irradiation. For the study of irradiation mechanism, we still need the centrifuge and X-ray machine for further irradiation mechanism study.

Accomplishments

The rotor special for virus separation has been acquired. The chemicals for PCR analysis have been purchased. Related training has been accomplished. Because the present X-ray machine was out of order, the maintenance work was done. It was proven that this machine could not work. Quotation for new machine was ready for approval.

Publications: Please use the following format, examples

Wu, Y., Chang, S., Nannapaneni, R., Zhang, Y., Coker, R., & Mahmoud, B. S. (2017). The effects of X-ray treatments on bioaccumulated murine norovirus-1 (MNV-1) and survivability, inherent microbiota, color, and firmness of Atlantic oysters (*Crassostrea virginica*) during storage at 5° C for 20 days. *Food Control*, 73, 1189-1194.

Presentations: Please use the following format

Yuwei Wu, Sam Chang, Ramakrishna Nannapaneni Yin Zhang, Randy Coker, Barakat S.M. Mahmoud. (2017, March). Reduction of bioaccumulated human norovirus (HuNoV) surrogate Murine norovirus (MNV-1) in Atlantic oysters (*Crassostrea virginica*) Poster presented at the Commodity Advisory Council, Biloxi, MS.

5.2 Possible infection risks associated with human norovirus contaminated oysters after treatment with various X-ray doses.

X-ray dose	Infection risk ^b for consuming oysters ^c with various levels of NoV contamination				
	10 ⁵ PFU	10 ⁴ PFU	10 ³ PFU	10 ² PFU	10 ¹ PFU
0	4.38 × 10 ⁻⁰¹	3.84 × 10 ⁻⁰¹	3.25 × 10 ⁻⁰¹	2.59 × 10 ⁻⁰¹	1.88 × 10 ⁻⁰¹
1	4.16 × 10 ⁻⁰¹	3.60 × 10 ⁻⁰¹	2.98 × 10 ⁻⁰¹	2.30 × 10 ⁻⁰¹	1.57 × 10 ⁻⁰¹
2	3.93 × 10 ⁻⁰¹	3.35 × 10 ⁻⁰¹	2.71 × 10 ⁻⁰¹	2.00 × 10 ⁻⁰¹	1.24 × 10 ⁻⁰¹
3	3.70 × 10 ⁻⁰¹	3.09 × 10 ⁻⁰¹	2.42 × 10 ⁻⁰¹	1.69 × 10 ⁻⁰¹	9.22 × 10 ⁻⁰²
4	3.45 × 10 ⁻⁰¹	2.82 × 10 ⁻⁰¹	2.13 × 10 ⁻⁰¹	1.37 × 10 ⁻⁰¹	6.17 × 10 ⁻⁰²
5	3.19 × 10 ⁻⁰¹	2.54 × 10 ⁻⁰¹	1.82 × 10 ⁻⁰¹	1.05 × 10 ⁻⁰¹	3.60 × 10 ⁻⁰²

a Virus reduction at specified E-beam doses.

b Probability of infection.

c Serving size of 12 oysters containing 13.68 g meat per oyster.