Final Report
Fishery Resource Grants Program

Project Title: Development of clear plastic containers for pasteurizing crab meat

Project Investigator: Mr. Johnny Graham

Team Members:
Michael Jahncke – Virginia Tech, Director, Seafood Specialist
Bob Lane – Virginia Tech, Extension Specialist, Seafood
Tom Rippen – University of Maryland, Seafood Technology Specialist
Ken Guhse – Honeywell, Application Development Engineer
Wil Vines – PBM Plastics, Product Development Manager

Abstract

Two containers with two different thicknesses (60 and 90 mil) were developed and seven lid stock materials with five different sealants were evaluated. In addition, two trays and three different film types were also tested and evaluated for this project. All containers and combinations were not successful. All containers leaked as a result of the pasteurization process. The microbiological tests (aerobic plate counts) and Gram stain test data indicated spoilage bacteria present in the meat samples in each container following refrigerated storage.

The 307 cups were often overfilled, perhaps stressing the lidding seal. The 404 cups were under filled which may have led to paneling. The 90 mil containers performed better than the 60 mil containers.

It appears that a glued on lid stock will not work for a pasteurized product. A retort pouch may be the best alternative.

Background and Introduction

Through the Virginia Fisheries Resources Grant, Graham and Rollins Inc., Virginia Tech, PBM Plastics, University of Maryland Eastern Shore, Honeywell and other partners worked to develop an all-plastic package for pasteurized crabmeat. Currently, pasteurized crabmeat is packed in metal cans, which cost $0.50 - $0.70 though there are new cans being developed that are in the $0.30-$0.50 cost range. A major competitor has an injection-molded plastic container, an aluminum lid and a plastic overcap. The cost is approximately $.50 per container. A perceived problem is the ability of the plastic to metal seal to remain intact during the rigors of pasteurization, storage and shipment. Leaking containers or "leakers" result when seal integrity is broken. One remedy to reduce the number of leakers is to pasteurize the containers at lower temperatures. The reduction in temperature results in less pressure buildup inside the container, less softening of the plastic to metal seal and an increase in pasteurization processing time. Increasing the processing time can negatively affect the crabmeat quality. The increase in processing time also results in restricting the volume production of crabmeat necessary to maintain profitability in the crabmeat industry.

Project Goals

The goals of the grant were to develop an all-plastic pasteurized crabmeat container that:

1. Is competitive in price with existing containers,
2. Has a less than one percent failure rate,
3. Can be pasteurized at the existing higher temperatures to allow for continued product quality and volume production throughput as required in the crabmeat processing industry.

Specific Goals

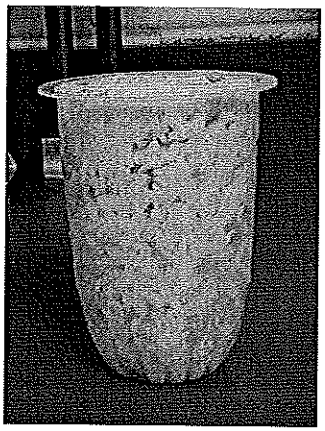
1) Development of two experimental cups for crab meat.

2) Evaluation of lidding stock and adhesive material that can withstand pasteurization times and temperatures.

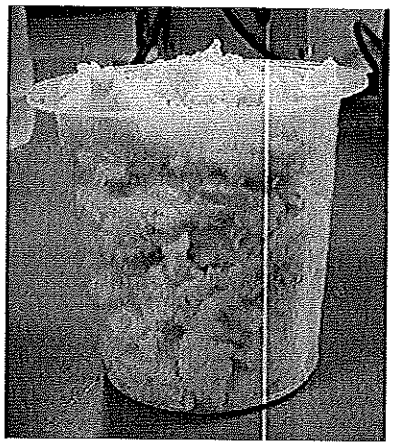
Project Industry Partners

We worked with Printpak and used their Autoprod lab sealer for the project. PBM Plastics designed two different barrier containers; each made from two different thickness billets. Honeywell, Inc. developed seven different laminated lid stocks and six different sealant layers. Graham and Rollins provided the crabmeat, and the pasteurization trials and microbiological evaluations were conducted at the VSAREC. The crabmeat was packed by hand into each container. There were four to six replicates of each sample in each pasteurization trial. Later in the project, Ross Industries, Inc. located in Midland, Virginia was used to test two different trays and three different film materials. Ross Industries produces equipment and materials for packaging food products. At Ross Industries, we worked with Mr. Jeff Ray, Director of Packaging Sales and Marketing.

***Experimental Containers*:**



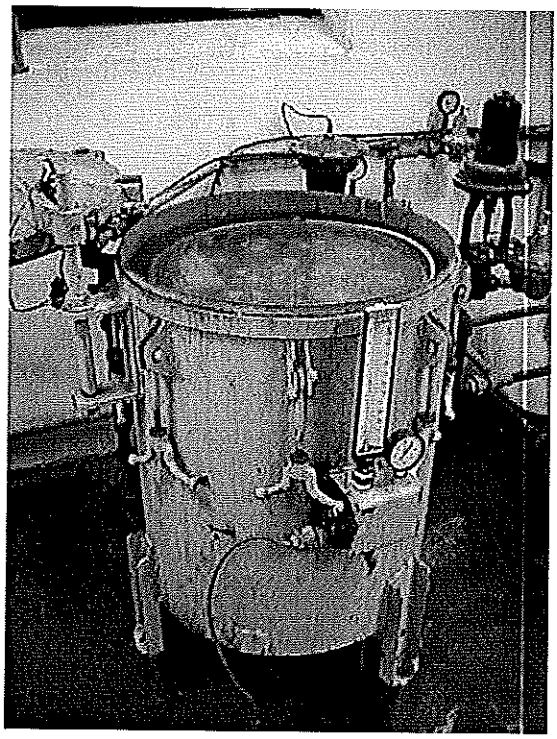
307mm cup



404mm cup

Two experimental containers were designed and developed.

Pasteurization Tank:

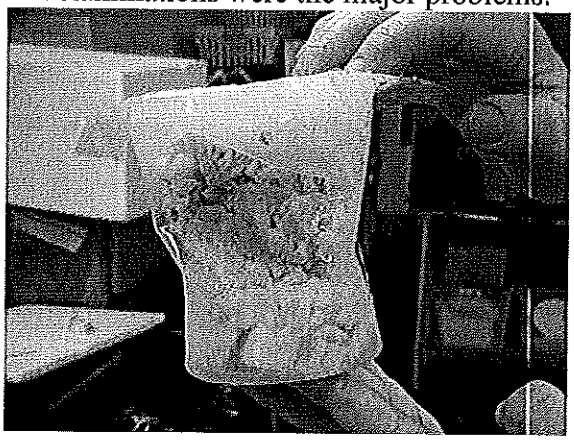


All pasteurization trials were conducted at the Virginia Seafood Agricultural Research and Extension Center (VSAREC), Hampton, VA.

The sealed containers with crab meat were pasteurized in a hot water bath at 189°F (87°C) for 2½ hours and then cooled for 1½ hours in an ice water bath. The containers of crab meat were taken out and examined. The temperature of the crab meat was 38-40°F (3-4°C) after cooling. Samples were then refrigerated at 40°F (4°C) for shelf life determination.

Results

Paneling, seal failure and lid delaminations were the major problems.



The containers paneled. The container sidewalls sucked in but did not return to the original shape. The bottom of the crab meat container did not expand during heating and did not contract during cooling. The seal area was frequently the point where the delaminating occurred.

Temperature and pressure data loggers showed interesting results. Data shows the pressure inside the container increased to 10 psi, and the pressure readings did not drop below the starting levels during the sealing process.

Conclusions

Two containers were developed and seven lid stock materials with six different sealants were evaluated. In addition, two trays and three different film types were also tested and evaluated for this project. All containers leaked as a result of the pasteurization process. The microbiological tests (aerobic plate counts) and Gram stain test data indicated that spoilage bacteria were present in the meat samples in each container after refrigerated storage.

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Recommendations

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Signature of Principal Investigator

4/5/04
Date