

**DESIGNING OF A PROPER PACKAGE TO
MINIMIZE TRADE-NON VACUUM CONDITION
IN VACUUM PACKED SAUSAGES**

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ABSTRACT

Vacuum packed pre cooked sausages get non vacuum condition in different stages from packing to consumption due to poor mechanical shock resistance of the packaging materials that cause damage during loading, unloading, poor handling, packing and storage. The objective of the study was to design a proper package to minimize the trade non vacuum condition in vacuum packed sausages and minimize the market returns. 4M (Man, Material, Method and Machine) Analysis was conducted to identify the possible root causes for the non vacuuming of the products. There were five types of coextruded, three layer lamination pouches, varying in thickness as Nylon(15 μ)/LLDPE(60 μ), Nylon(15 μ)/LLDPE(70 μ), Nylon(25 μ)/LLDPE(60 μ), both side metalized: PET(10 μ)/MPET(10 μ)/LLDPE(100 μ) and back metalized and front transparent pouch: PET(20 μ)/LLDPE(100 μ). Then each pouch was filled with sausages and subjected to vacuuming process. Vacuum packaged pouches were stored at 18 °C. Treatments were examined for non vacuum condition by visual observation once per week for a month. Each material was analyzed for puncture resistance and tensile strength of films before and after freezing conditions. The design of the experiment was Complete Randomized Design. Experiment results and material test results were subjected to ANOVA, using MINITAB 14 statistical software at 5% level of significance. Differences between each investigated samples were determined using tukey test. From obtained results of 4M analysis it can be concluded that Man and Material had a greater impact on this defect than other two causes. Non vacuum condition will mainly occur due to mechanical damages. Both side metalized pouch and front transparent and back metalized pouch showed higher performance over other materials throughout the study period. Non vacuum count remained stable until end of the month. It was zero. And non vacuum count was always less in Nylon (25 μ) than that of Nylon (15 μ) plastic films. The thickness of the plasticizer significantly affected the non vacuuming of the products. Barrier properties (reduce gas permeability) and mechanical shock resistance increased as the thickness of the plasticizer increased, thus decreased the non vacuuming of the products. From the obtained results it can be concluded that metalized films which have the highest puncture resistance and tensile strength value was the film that best protected against the mechanical damages.