

Introduction

Packaging integrity is critical for the purpose of food quality, food safety and consumer trust. In 58% of the cases, seal contamination is the main reason for defective packaging (Dudbridge, M.; Turner, R. (2009): Seal integrity and the impact on food waste. WRAP.). In this research the effect of a channel leak in the seal area on the preservation of ham sausage is studied.

Materials and methods

- Commercial food packaging film: PET/PE-EVOH-PE 12/50
- Sealed with heated tools into 40 three-sided seal pouches (15 x 20 cm)
 - A channel leak ($d \approx 50 \mu\text{m}$) is induced with the use of a human hair (hair is removed after sealing)
 - Half of the packages (20) has one channel leak The other half has no channel leak
 - All pouches are packed with sliced ham sausage and are sealed under modified atmosphere
- Stored at 4°C with an alternating 12 hours of light and 12 hours of darkness
- Each day of analysis three samples of each package (with and without channel leak) are tested on:
 - physicochemical parameters (gas mixture in the head space, pH and water activity)
 - Microbial growth
 - Chemical parameters (peroxide value, free fatty acid content)
- After 29 days the oxygen transmission rate (OTR) of two flat films are tested to calculate the OTR of the pouches

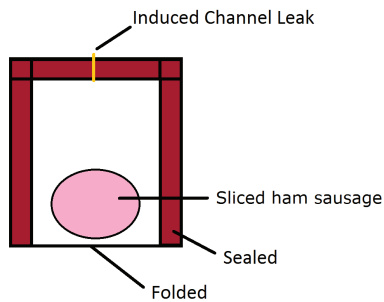


Figure 1: three-sided sealed pouch (after filling with sliced ham sausage) with induced channel leak

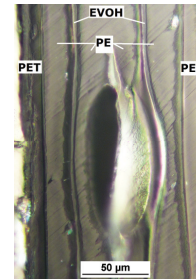


Figure 2: Reflection microscopic image of induced channel leak

Results and conclusions

- $\text{OTR}_{\text{pouches} + \text{channel leak}} = \pm 6 \times \text{OTR}_{\text{intact film}}$
- Day 4: $\text{O}_2\text{-conc. (pouches with channel leak)} = 0,50\%$ and $\text{O}_2\text{-conc. (pouches without channel leak)} = 0,10\%$
Throughout 29 days: $\text{O}_2\text{-conc.} \leq 1\%$
- No effects on pH, water activity, microbial growth, peroxide value and free fatty acid content between pouches with and without channel leak
- BUT discoloration of the ham sausage in the pouches with channel leak, possibly due to higher $\text{O}_2\text{-conc.}$ and light exposure
→ Possible rejection by consumers

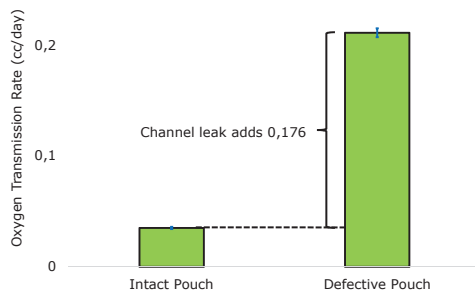


Figure 3: OTR of pouches



Figure 4: Discoloration in defective pouches (above) and preservation of colour in intact pouches (below) of sliced ham sausage (day 20)

This research is financed by IWT-VIS 100942 and coordinated by Pack4Food