# VOLATILE COMPOUNDS PROFILE OF ONION-GARLIC-BASED FILMS AND COATED BEEF BURGERS

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## I. INTRODUCTION

Burgers are usually packaged individually in sealed plastic bags, with a secondary cardboard packaging that combines the burgers into one unit for sale. Films composed of onion and garlic pulp may be appropriate to replace individual plastic packaging bags (primary packaging) and can be prepared together with the burger instead of being discarded; the heating process would solubilize the films, which would be incorporated into the burger, acting as a condiment, which would be another anticipated application [1]. The head-space solid phase microextraction (HS-SPME) technique and identification by gas chromatography and mass spectrometry (GC-MS) of volatile compounds are recommended for verifying the influence on the flavor formation of coated burgers. This study aimed to evaluate the profile of volatile compounds in onion and garlic films and the film's impact on the formation of flavor compounds in coated burgers.

## II. MATERIALS AND METHODS

In this experiment, film samples produced with onion (*Allium cepa* L.) and garlic (*Allium sativum* L.) pulp were used in a 4:1 ratio. Commercial beef burgers without salt or spices were purchased. The burgers were wrapped in edible film and kept frozen for seven days, three samples were used.The samples were cooked in an electric grill until an internal temperature of 71°C, then after cooling, they were ground in a food processor. In a glass flask with a capacity of 60 mL, 1 g of the ground sample was weighed and the extraction of volatile compounds was performed by the technique of microextraction in solid phase (SPME) using a carboxen/polydimethylsiloxane (CAR/PDMS) fiber as stationary phase. Gas chromatography coupled to mass spectrometry (GC-MS) was used to separate and identify volatile compounds in the samples, using a DB-5 MS column (5% phenyl, 95% dimethylpolysiloxane) 60 m x 0.25 mm internal diameter and one µm stationary phase thickness. The oven temperature started at 40 °C, increasing 4 °C min-1 to 180 °C, 10 °C min-1 to 280 °C, remaining at this temperature for 5.3 min. Helium (He) was used as carrier gas. The compounds were identified through their spectra and compared with those of the NIST library database. For volatile compounds identification confirmation, an n-alkane (C7-C30) solution (Supelco, Bellefonte, PA) was injected into the equipment under the same conditions as the samples to obtain the programmed linear retention temperature index (LTPRI) of volatile compounds. Experimental identification was performed by comparing the LTPRI and mass spectra with literature reports, with a minimum similarity of 85%. A qualitative analysis was applied to analyze the obtained data.

## III. RESULTS AND DISCUSSION

Fifty-nine volatile compounds were identified in the films, and 96 compounds in the coated beef burger samples from different chemical classes, mainly aldehydes, ketones, esters and sulfur

compounds (Figure 1). Volatile compounds that contain sulfur, such as sulfides and disulfides, contribute to the flavor and pungency of garlic and onions [2] [3]. Seven compounds in common were found between the film and burger samples: allyl mercaptan, a major metabolite of garlic compounds; allyl methyl sulfide (odour garlic); 4-dimethylthiophene; dimethyl disulfide and dimethyl trisulfide are compounds reported in analyses of volatile compounds in meat [4] and are associated with meat flavor and sulfurous odor; allyl sulfide and diallyl disulphide have an onion and garlic odor.

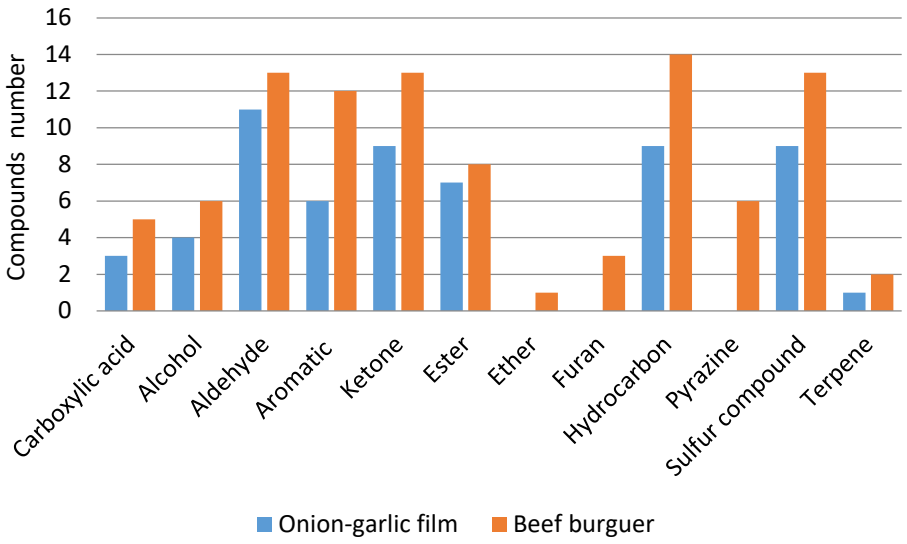


Figure 1. Chemical class found in onion/garlic films and coated beef burgers

## IV. CONCLUSION

Applying onion and garlic-based films to beef burgers influenced the formation of aroma in the product, increasing the amount of sulfur-containing compounds which are found mainly in garlic and onion.

## ACKNOWLEDGEMENTS

The current research was funded by the São Paulo Research Foundation (FAPESP – grants 2023/03583-9 and 2023/11177-0) and financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – Finance Code 001.

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