

## COMPOSITION AND CONTENTS OF CLASSES OF NEUTRAL LIPIDS IN FREE, BOUND AND STARCH LIPID EXTRACTS OF FLOUR, SOURDOUGH AND *BROA* (PORTUGUESE SOURDOUGH BREAD)

Rocha, J.M. (1,2), Kalo, P.J. (1) & Malcata, F.X. (2). University of Helsinki, Department of Applied Chemistry and Microbiology (1), Universidade Católica Portuguesa, Escola Superior de Biotecnologia (2).

*Broa* is traditional Portuguese bread. Milled freeze-dried samples of maize and rye flours, sourdough and *broa* were extracted consecutively to yield free (*FL*), bound (*BL*) and starch (*SL*) lipids. Lipid extracts were washed according to the *Blight & Dyer* procedure. Neutral lipids (*NL*) were fractionated by flash chromatography grade silica gel column chromatography using two different stepwise elution schemes. The fractions were transesterified or esterified to fatty acid methyl esters and analysed by *GLC*. The method of internal standardisation was used in the quantification of lipids, and principal component analysis to reveal differences in the lipid compositions.

In the total lipids, (*i. e.* *FL+BL+SL* extracts), the sterol ester (*SE*) content was essentially at the same level in the flour mixture and *broa*. The total content of triacylglycerols (*TAG*) decreased during dough fermentation, so those of di- and monoacylglycerols (*DAG*, *MAG*) and free fatty acids (*FFA*) concomitantly increased. Release of *FFAs* during baking was apparent in the lower value for the sum of lipid classes of *broa* than for that of flour and sourdough. The fatty acid (*FA*) composition of *SE* class differs distinctly from that of *TAG*, *DAG*, *MAG* and *FFA* in flour, sourdough and *broa*. The *FA* compositions of *DAGs* are similar to those of *TAGs* in *FL*, *BL* and *SL* of sourdough and *broa*. The total neutral lipid content was 28.6, 29.1 and 24.0 mg<sub>totalNL</sub>/g<sub>sample</sub> in the flour, sourdough and bread, respectively.

The high nutritional value of *broa* lipids is expressed in the high proportions of *SE* (4.4%) and *DAG* (8.8%), coupled with the high concentration of linoleic acid (*ca.* 50% in *SE*, *TAG*, *FFA* and *DAG*, in every extract).