

FATTY ACIDS PROFILE OF MUFFINS AVAILABLE IN THE PORTUGUESE MARKET

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Muffins are **baked goods** usually manufactured with **flour, sugar and eggs**, among other ingredients like fat, leavening agents and/or flavours.

These are **sweet bakery products** highly appreciated due to their **organoleptic features**, but also for their convenience.

However, besides some industry efforts to increase their nutritional quality, they are still perceived as a **source of fat and sugar**.

The aim of this study was to **evaluate the fatty acids profile of muffins** from bakery stores and supermarkets, to **deepen knowledge** of the current situation of the Portuguese market and to **identify future needs**.

Sample collection
 Between June and August 2022, several types of muffins from the major supermarkets and bakery stores available in Lisbon were collected. In total, 8 composite samples of muffins were analysed (Figure 1).

Homogeneization
 Samples were homogenised in a blender (5000 rpm for 1 min). Samples were kept in appropriate containers, maintained in the dark, and refrigerated until analysis.

FATTY ACIDS EXTRACTION
 10 g of sample + 120 mL of petroleum ether 40 – 60 °C
 Stirred for 1 h and evaporated until dryness
 0.2 g of extracted fat + 2.5 mL of n-heptane + 0.25 mL of methanolic potassium hydroxide (2% w/v)
 Mixed using a vortex (1 min) and then rest for 30 min
 Injection of the upper phase into the gas chromatograph

GAS CHROMATOGRAPHIC CONDITIONS

Equipment	Agilent 6890 N
Column	SP-2560 (100 m x 0.25 mm i.d., 0.20 µm)
Injection mode	Split (50:1)
Injection volume	1 µL
Ramp	60 °C (1 min) ↑ 17 °C/min to 168 °C (28 min); ↑ 4 °C/min to 230 °C (15 min)
Injector temp.	240 °C
Detector temp.	240 °C
Carrier gas	Helium

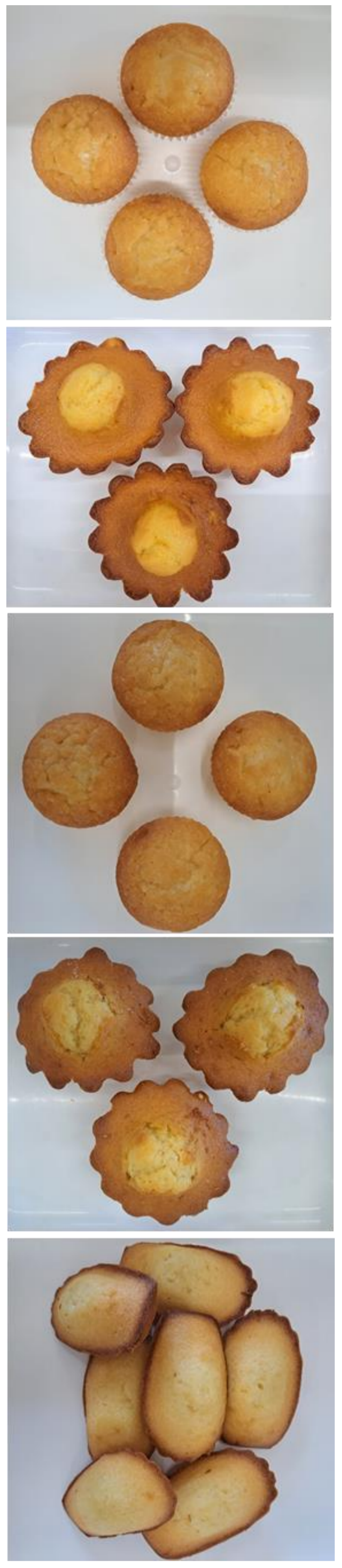


Figure 1. Examples of the analysed muffins.

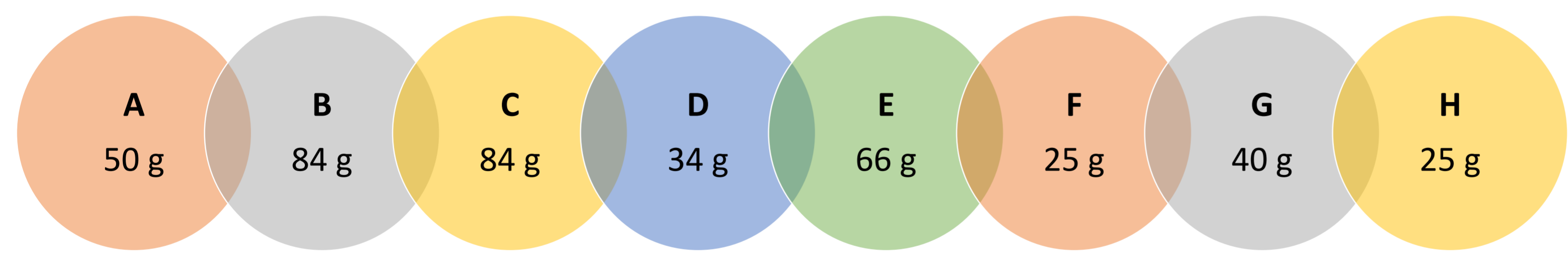


Figure 2. Mean portion size of the analysed muffins.

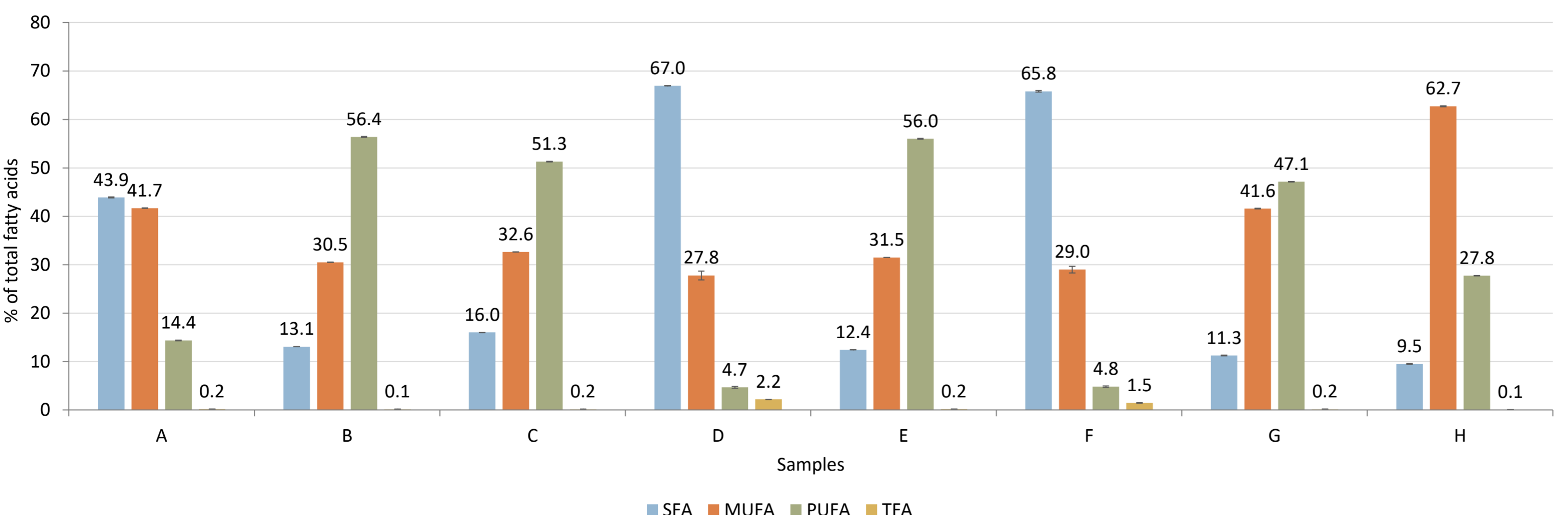


Figure 3. Fatty acids profile of the analysed muffins.

- Our findings suggest that there are still muffins available with **high amounts of saturated fat**, whose high intake can be a concern for public health.
- Moreover, the fact that muffins have a nutrition declaration (prepacked foods from supermarkets) does not mean that these are healthier than the ones from bakery stores (without nutrition declaration).
- Therefore, it is important to continue to investigate these products, to contribute with scientific evidence that can be further used to enhance their nutritional quality, for example by replacing the fat source.

- The mean portion size varied between 25 and 84 g (Figure 2).
- Polyunsaturated fatty acids were the major ones for 50% of the analysed samples (Figure 3). Saturated fatty acids content varied between 9.5 and 67% of total fatty acids. Only 1 sample had monounsaturated fatty acids as the most abundant (63%).
- There were no considerable differences found with respect to the fatty acids profile among the muffins of bakery stores and supermarket chains.