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Modifying gluten-free bread structure by different baking conditions: impact on oral processing and sensory perception

Patricia Puerta *(Institute of Agrochemistry and Food Technology (IATA-CSIC), Valencia, Spain.), Raquel Garzón (Institute of Agrochemistry and Food Technology (IATA-CSIC), Valencia, Spain.), Cristina M Rosell (Institute of Agrochemistry and Food Technology (IATA-CSIC), Valencia, Spain.), Susana Fiszman (Institute of Agrochemistry and Food Technology (IATA-CSIC), Valencia, Spain.), Amparo Tárrega (Institute of Agrochemistry and Food Technology (IATA-CSIC), Valencia, Spain.)*

Gluten plays a key role in the structure of breads, responsible for their particular characteristics during consumption. It is usual to modify the composition of gluten-free breads for modulating the structure, but other aspects like the processing should be taken into account. The aim of this study was to evaluate how the changes in the structure of gluten-free breads derived from different baking conditions affect oral activity, properties of the bolus and sensory profile. On this basis, four types of bread were prepared maintaining the same composition and modifying the amount of water and the time of fermentation. The behaviour of breads in mouth was studied by different parameters such as oral activity, fragmentation pattern (particle characterization of bolus after 3 chewing cycles) and bolus characteristics at swallowing (moisture content, consistency and adhesiveness). Perceived sensations during consumption were assessed using TDS technique. Results showed that oral activity, bolus properties and sensations perceived during eating breads were mainly affected by the differences in structure due to the fermentation duration. Long fermentation breads resulted in a shorter and easier oral processing, requiring less chews and swallows in the case of long fermentation. The fragmentation pattern of these breads was also different: they broke down in more particles of smaller and homogeneous size. Breads with lower initial moisture need higher incorporation of saliva for reaching similar water content at swallowing which suggests that a certain moisture level is needed for triggering swallowing. Boli at swallowing were also different in consistency: they were softer and less adhesive with long fermentation. Regarding sensory perception, TDS curves showed different perceptions according to the duration of fermentation. The overall results showed that the structure of gluten-free breads can be modified to tailor its processing behaviour, mechanical features and sensory properties by only varying baking conditions.