

ANALYSIS OF TEXTURAL PROPERTIES OF GLUTEN FREE BREADS

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Abstract

Bread is one of the most important gluten-free foods, and it is usually connected with crumbling texture, poor colour, low volume, unsatisfactory taste and a short shelf-life, probably due to the lack of the viscosity network formed by gluten. Thus, some defects of gluten-free bread are related with inefficient gas retention and expansion during dough leavening, which results in a reduced volume and low crumb softness of the breads. The current challenge is for the industry to overcome these limitations. Furthermore, the texture is a characteristic that depends on the structure of the food, but also on the complex oral manipulation that aims to grind the food. In the present work the textural properties were analysed in breads made with special flours without gluten produced industrially, and the reproducibility of the results between breads from different batches was also evaluated.

Two formulations of gluten-free flour were tested, provided by Germen (Portugal) (designated as A) and Credin (Denmark) (designated as B), and were also produced samples of bread with wheat flour type 65 (sample called Control), produced by CEREALIS (Portugal) - designated as A, B and Control samples, respectively. For analysis of the textural characteristics, a texturometer was used and perforation and compression tests were performed. The properties measured by the perforation test were: crust firmness, crumb firmness, adhesiveness, and stickiness. In the compression test, the characteristics evaluated were: hardness, elasticity, cohesiveness, resilience and chewiness. To evaluate the reproducibility, the breads were produced in four different batches, for each type of bread (A, B and Control), to assess whether the characteristics were maintained on the different days of manufacture.

The results obtained for the perforation test showed that the loaves produced with gluten-free flours are less firm (in the crust and in the crumbs) and less adhesives when compared to bread made with type 65 flour (with gluten). Regarding stickiness, it can be said that there are not many apparent differences between the breads analysed, however bread B is more similar to Control bread. Bread A has a greater discrepancy between the top and the bottom in terms of stickiness, being more intense on the top of the bread. The compression tests showed that in the crumb the values are identical in all studied samples, including the control sample. However, when analysing the complete slice, it appears that samples A and B are considerably less hard than the Control, due to the crust contribution. The gluten-free breads presented lower resilience than the Control sample, with Sample B showing the highest concordance between the crumb and the complete slice. Moreover, the results showed both gluten-free breads had similar elasticity and chewiness values, both for the crumb and for the whole slices, and higher than the wheat bread. Regarding the reproducibility of the results, it was possible to observe that the perforation tests are preferable to those of compression, and that on the other hand the samples made with the flour without gluten type B are more uniform between batches.

The results obtained in this study showed that the type of flour, its composition and the presence or absence of gluten significantly influence the texture of the breads produced. Breads made with gluten-free flours were less firm on the crust and crumbs when compared to wheat bread. On the other hand, gluten-free breads tend to be less sticky and slimy. Moreover, the two tests to evaluate the texture proved to be complementary, since they allow to evaluate different characteristics, and thus obtain a more complete profile of textural characteristics of the breads. The reproducibility of the results was higher for perforation tests compared to compression tests, and on the other hand the samples manufactured with type B gluten-free flour showed to be more constant in their texture characteristics, when different batches of bread were compared.

Key words: *Flour, Gluten free, Bread, Texture analysis, Compression test, Perforation test.*