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Assessment of acoustic-mechanical measurements for crispness of wafer products

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## 1 **Assessment of acoustic-mechanical measurements for crispness of wafer products**

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### 8 **Abstract**

9 The objective of this work was to investigate instrumental tests regarding the capacity to  
10 differentiate crispy wafer products of different quality and regarding to correlations  
11 between instrumental parameters and sensory descriptors. Therefore two fracturing  
12 methods, a 3-point bending and a cutting test with simultaneously recorded sound  
13 emissions and a descriptive sensory analysis were carried out with nine different brands of  
14 wafers representing different qualities.

15 The results showed that both instrumental methods are capable to differentiate products of  
16 different quality, but in different ways. Only the maximum sound pressure ( $r=0.89$ ) and the  
17 number of force peaks ( $r=0.83$ ) of both tests correlate. The sensory descriptor “crispness”  
18 was mainly correlated with the area under sound-displacement curve ( $r=0.76$ ) and mean  
19 sound value ( $r=0.59$ ) of the cutting test, and weakly related to the number of force peaks  
20 ( $r=0.42$ ), the maximum sound pressure ( $r=0.50$ ) and the area under sound-displacement  
21 curve ( $r=0.42$ ) of the 3-point bending test.

22 **Keywords:** Acoustic, Crispness, Texture, Wafer.

### 23 **1. Introduction**

24 The food attribute “crispness” related to sound emission is commonly referred as quality  
25 description of food during biting or chewing (Duizer, 2001; Duizer, 2004; Mallikarjunan,  
26 2004; Vickers, 1983) meaning freshness and wholesomeness and one of the important  
27 texture characteristics appreciated by customers (Piazza et al., 2007; Saeleaw and Schleining,  
28 2011; Tunick et al., 2013). Crispy foods are generally appealing and enjoyable (Szczeniak  
29 and Kahn, 1971), due to the fact that the sounds when biting or eating have positive affect  
30 on the customer perception (Spence and Shankar, 2010).

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