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Method development and validation of tribological measurements for differentiation of food in a rheometer

Kenneth Kieserling, Sebastian Schalow, Stephan Drusch



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## 1     **Method development and validation of tribological measurements** 2     **for differentiation of food in a rheometer**

3             Kenneth Kieserling<sup>a\*</sup>, Sebastian Schalow<sup>a</sup>, Stephan Drusch<sup>a</sup>

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5     <sup>a</sup> Technische Universität Berlin, Food Technology and Food Material Science,  
6     Königin-Luise-Strasse 22, 14195 Berlin, Germany

7  
8     \*Corresponding author, E-Mail address: kenneth.kieserling@campus.tu-berlin.de

### 9 10    Abstract

11    Sensory perception of food is very important when it comes to consumer acceptance.

12    The sensory impression in the oral cavity plays a key role. Especially the haptic  
13    properties are dominated by friction when the food is strained between the tongue  
14    and the palate.

15    Tribology enables friction measurements by determining the  
16    coefficient of friction as the ratio between friction force and normal force. The aim of  
17    this study was to develop a method for tribological measurement of food within a  
18    simulated tongue-palate contact using varying surface combinations (tribopairs) in a  
19    rheometer set-up. The impact of surface handling and sampling procedures on the  
20    coefficient of friction was investigated in order to establish suitable conditions for the  
21    tribological characterisation of food samples with varying composition.

22    Tribological measurements were carried out in a rheometer equipped with a tribology  
23    module. Additionally, the characterisation of the used counter and ground surfaces  
24    was conducted by AFM and SEM analyses.

25    The reliability and reproducibility of the developed method is highly affected by the  
26    handling of the surfaces and the sampling of the foods, passing the run-in-period and  
27    the number of compressions between ground and counter surface. A tribopair  
28    consisting of a glass sphere on PDMS pins demonstrates the best usability with  
29    respect to low standard deviation, good reproducibility and distinct differentiation of  
30    all four sections of the Stribeck curve. The content of water in food systems has a  
31    substantial influence on these parameters, which is related to varying adhesive  
32    effects of the respective tribopair.

33    Keywords: Food tribology, **Stribeck curve**, Run-in-period, Rheometer set-up

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