

Inhomogeneous consistency of crystallized fat samples

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Highlights

- This study demonstrates **differences in hardness between top and bottom positions** of crystallized fats.
- The extent of the observed difference was **depending on the TAG- composition** of the fat.
- The inhomogeneous consistency was **not related to solid fat content variation**

Background

- Fat crystallization plays an important role for the texture of many food products such as chocolates, confectionary and butter.
- Inhomogeneity in crystallized fat might occur due to sedimentation processes or microstructural variations but the extent of such process has not been elucidated
- The presences of inhomogeneity in crystallized fat could influence results from texture analysis or solid fat content measurements

Aim

Study the degree of inhomogeneity in crystallized fats as function of position in the fat

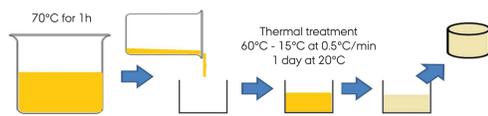
Fat systems

Fats used as cocoa butter alternatives:

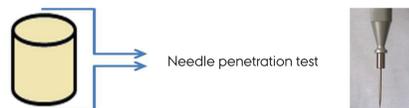
- POP-rich fat
- SOS-rich fat
- PPO-rich fat
- SSO-rich fat

Hardness

Sample preparation

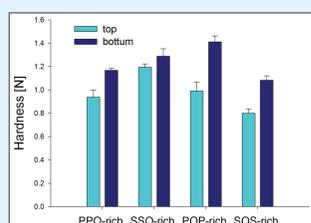


Analysis



Needle penetration test performed on top and bottom of crystallized fat samples

Results

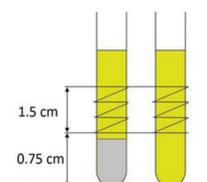


For all studied fats: $\text{Hardness}_{\text{top}} > \text{hardness}_{\text{bottom}}$

Solid fat content

Princip

Application of normal pNMR tubes and pNMR tubes with an elevate bottom allowed for measurements of solid fat content in two different sections.



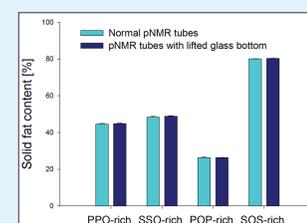
Sample preparation

60°C → 15°C (0.5°C/min)
Isothermal crystallization for 30 min

Analysis

Solid fat content was determined by pNMR

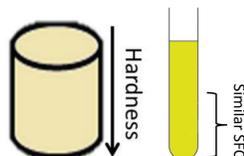
Results



For all studied fats: $\text{SFC}_{\text{upper section}} \approx \text{SFC}_{\text{lower section}}$

Results

Differences in hardness between top and bottom were observed for all studied fats but the extent was **depending on the TAG-composition**. pNMR analysis showed no differences in solid fat content between different sections for all studied fats.



Conclusion

Inhomogeneous consistency of crystallized fat samples was observed in this work. Since **no variation in solid fat content** was observed between top and bottom, it is most likely a consequence of **microstructural variation** and **not sedimentation processes**. TAG-composition analysis could contribute with an improved understanding of the observed inhomogeneous consistency.

Acknowledgments

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