

Investigation of Chocolate Surface Combining LV SEM, Profilometry and Raman Imaging

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The aim of this work is to investigate surface modification and hence fat bloom development on chocolate and chocolate pralines, upon storage at 20 °C and at 15-26 °C. Using different techniques for surface analysis and combining the results can make us understand even more regarding fat bloom and its mechanisms in chocolate. Profilometry is a technique that enables the monitoring of bloom in form of surface roughness. It is an easy to apply technique for determining fat bloom development at already early stages on the chocolate surface. Profilometry data was recorded from the same spot in repetitions on each sample and show that the degree of surface roughness changes with time over weeks in terms of peak numbers. Profilometry maps of unevenness show in addition to crystalline material also circular pores. LV SEM confirms a complex surface with numerous imperfections as well as inclusions. Some of these imperfections, observed as “air inclusions” suggest a structure as if they should be hollow or have a shell, consisting of crystallised fat and/or other chocolate particles. Further, the areas around those heterogeneities seem changed from the rest of the surface and they could also be correlated to the circular pores from the profilometry results. Interconnectivity of such pores is not hypothesized. Further, analysis with Confocal Raman Microscopy envisaged that some heterogeneities are most likely voids that continue inside the chocolate surface for at least 20 µm, where the detection limit lies. We speculate that this is where filling oil could be transported to the air oil interface especially in pralines. From this study we can see and speculate what the chocolate looks like on the surface and roughly 20 µm deep under the surface. Further, it would be interesting to see what happens underneath the surface throughout the whole praline and how the surface is influenced by it.