Study of the making of sponge cake

Application

Food

Objective

Study the various steps of the preparation of sponge cake

Device

TURBISCAN® Classic

INTRODUCTION

Sponge cake is a basic pastry used in many pudding recipes. The most widely used recipe consists of whisking the egg yolk with sugar until a mousse is obtained and add the flour. In order to get a good quality pastry, the mousse, obtained after whisking the eggs, has be to sufficiently stable so that the air bubbles remain during the cooking. Indeed, the spongy aspect of the cake is due to evaporation of water within the mousse during cooking.
The study of the stability of the sponge cake during its process is of prime importance for the quality of the final pudding. The kinetics of coalescence of the air bubbles needs to be monitored.

The Turbiscan Classic is an ideal tool to study the stability of foams in general and can be used for this kind of study (see also the application note on the “Stability of whipped egg”).

METHOD

In a first step, we follow the stability of the mousse obtained by whisking the egg yolk coming from various types of egg with sugar, using the Turbiscan Classic. For that, we use an industrial egg yolk that has been pasteurised and two brands of egg yolk separated in the lab.
In a second step, we follow the stability of the raw paste by varying the time of whisking and the amount of water in the recipe.

RESULTS

1. Stability of the mousse egg yolk + sugar

The various types of egg yolks are whisked with sugar until a white mousse is obtained. The coalescence of the air bubbles is followed and we get the following results (Figure 1).

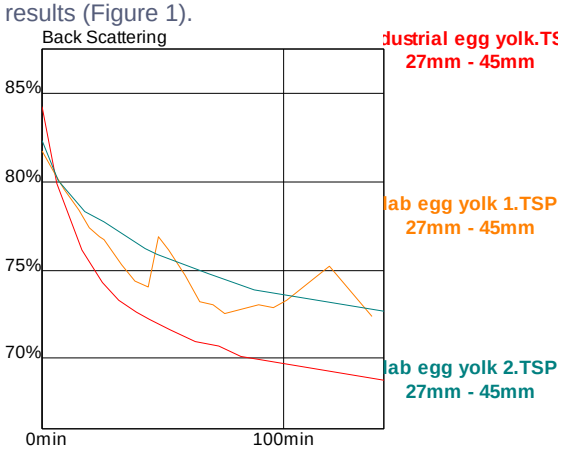

Figure 1. Kinetics of coalescence of the mousses

We can see that the egg yolks separated in the lab have similar stabilities, whereas the pasteurised egg yolk leads to a quicker coalescence of the air bubbles.

This can be explained by a denaturation of the egg proteins during pasteurisation, as they are usually sensible to temperature and are responsible for the stability of the mousse, acting as surfactant.

2. Stability of the raw paste

Firstly, we study the effect of whisking time on the stability of the sponge cake paste.

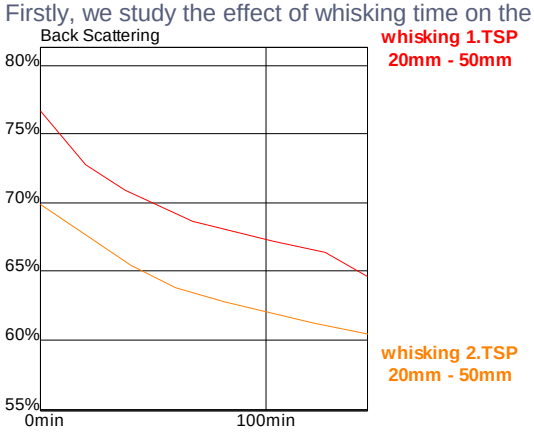

Figure 2. Kinetics of coalescence of raw paste. Effect of the whisking time.

We can see that the whipping time (five minutes difference between both) has a greater impact on the quantity of mousse created (increase of the backscattering level) than the stability of the mousse, as both kinetics of coalescence are similar.
By whipping the paste five minutes longer, we get a better mousse, that will leads to a better quality pastry after cooking

Secondly, we analyse to paste with different amount of water (*Figure 3*). Paste 2 contains more water.

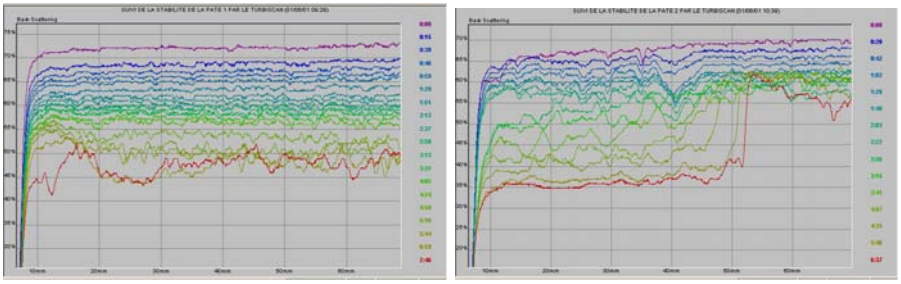

Figure 3. Raw backscattering profiles of pastes 1 and 2.

We can see from the raw data that for paste 2, that contains more water, the level of backscattering decreases suddenly at the bottom of the sample. The mousse is therefore not homogeneous anymore (small bubbles at the top and big ones at the bottom). This can be explained by a lower viscosity of paste 2 due to the presence of water. The rapid degassing of paste 2 will lead to a poor quality product.

SUMMARY

The Turbiscan Classic enables to study the stability of a mousse entering in the composition of food products. The stability level is often a critical parameter for the quality of the final product.