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# How foam stability against drainage is affected by conditions of prior whey protein powder storage and dry-heating: a multidimensional experimental approach

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## Abstract

In the present work, we investigated the effects of powder dry-heating parameters on whey protein foams stability, especially against drainage.

To this aim, whey protein isolate solutions were prepared at various pH (3.5, 5.0, 6.5), with or without a prior dialysis step to reduce the lactose content, freeze-dried, adjusted to various levels (0.12, 0.23, 0.52) of powder water activity  $a_w$  and dry-heated at 70 °C for up to 125 h. Protein solutions were then reconstituted at pH 7.0 and foams prepared by air bubbling.

An original approach was followed to study the foam stability against drainage, involving monitoring of the liquid fraction as a function of both height in the foam column and time, and analysing the whole set of time and height liquid fraction profiles using multivariate statistics.

The effects of dry-heating parameters were markedly interdependent, resulting in complex effects on foam stability. However, the results suggest that dry-heating at pH 3.5 increased foam stability. Moreover, the  $a_w$  adjustment step, though consisting in a two-week pre-conditioning at room temperature, also had a significant effect on the foam stability, of the same order of magnitude as dry-heating effects.

## Keywords

Dry-heating; Whey protein powder; Foam stability; Water activity; pH; Lactose

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