

Understanding to prevent Fouling

Investigation of the main factors influencing protein stability upon heat treatment

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Breast milk is the primary source of nutrition for infants and is recognized as the ideal nutritional source to ensure a good health. For infants not able to consume breast milk, infant formula (IF) can be given as a substitute to satisfy the nutritional requirements of infants during their first months.

The production of an IF is performed in many process stages, but the most important step to achieve bacteriological safety and high-quality product is the thermal treatment. During this step, fouling is created impacting the production capability and productivity and the quality of the product. To overcome this problem, the optimization of protein stability during heat treatment is key to minimizing fouling during the thermal treatment.

This report shows the influence of the main factors on the protein stability upon heat treatment at a lab scale approach. To investigate the impact of each factor simultaneously, a multifactorial study was performed and separated in two design of experiment to (i) screen the influence of five different factors and (ii) study in depth two and three different factors on the heat stability of a model IF, respectively. The heat stability of the matrix was defined by new methods created explicitly for the experiments performed in this study and the samples were analyzed by different methods and statistically.

As main outcomes, one of our investigated factors showed the most impact on the heat stability of the proteins in both DoE's and therefore this is the parameter to control to limit the destabilization. Other two parameters were found to be relevant for the study, but not as much as the before mentioned one. The methods used to define the stability were demonstrated to be functional and could be implemented in the future.

This work allows to give better guidance to the factories and decrease fouling in the production line. Further studies can be performed based on this report to understand better the influence of the investigated factors in a different environment.

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