

Role of Protein and Lactose Interactions in the Age Gelation of Ultra-High Temperature Processed Concentrated Skim Milk

N. Venkatachalam¹, D. J. McMahon¹, and P. A. Savello¹

¹ Department of Nutrition and Food Sciences, Utah State University, Logan 84322-8700

Skim milk was pasteurized, diafiltered, and concentrated three times by UF. Lactose or sucrose was then added at 3 or 6%. The five samples containing <.05% lactose, 3 and 6% lactose, and 3 and 6% sucrose were UHT processed at 140° C for 4 s using indirect heating, collected aseptically in presterilized containers, and stored at 4, 20, and 35° C. All samples stored at 4 and 20° C gelled after 21 wk of storage. Samples stored at 35° C did not gel. Browning occurred only in samples containing lactose stored at 35° C. Proteolysis in gelled samples was shown by SDS-PAGE. Bands were due to proteolysis, protein crosslinking, and a streaking pattern in ungelled samples. Electron micrographs of gelled samples showed that various casein particles were connected by hairlike protrusions, but the micelles in ungelled samples were not connected and had few protrusions. The Maillard reaction neither promoted nor deferred age gelation. Protein modifications prevented gelation in samples stored at 35° C. Age gelation was probably a two-step process in which dissociated proteins from the casein micelles reformed on micelles as hairlike protrusions. This process was followed by aggregation of the protein particles.

Key Words: age gelation • ultra-high • temperature • lactose • native milk proteinase

Submitted on August 31, 1992

Accepted on January 8, 1993

This Article

- ▶ [Full Text \(PDF\)](#)
- ▶ [Alert me when this article is cited](#)
- ▶ [Alert me if a correction is posted](#)

Services

- ▶ [Similar articles in this journal](#)
- ▶ [Similar articles in PubMed](#)
- ▶ [Alert me to new issues of the journal](#)
- ▶ [Download to citation manager](#)
- ▶ [Get Permissions](#)

Citing Articles

- ▶ [Citing Articles via HighWire](#)
- ▶ [Citing Articles via Google Scholar](#)

Google Scholar

- ▶ [Articles by Venkatachalam, N.](#)
- ▶ [Articles by Savello, P. A.](#)
- ▶ [Search for Related Content](#)

PubMed

- ▶ [PubMed Citation](#)
- ▶ [Articles by Venkatachalam, N.](#)
- ▶ [Articles by Savello, P. A.](#)

This article has been cited by other articles:



Food Science and Technology International

▶ HOME

R. Lopez-Fandino and A. Olano

Review: Selected indicators of the quality of thermal processed milk / Revision: Indicadores seleccionados para el control de calidad de la leche tratada termicamente

Food Science and Technology International, January 1, 1999; 5(2): 121 - 137.

[\[Abstract\]](#) [\[PDF\]](#)

[HOME](#) [HELP](#) [FEEDBACK](#) [SUBSCRIPTIONS](#) [ARCHIVE](#) [SEARCH](#) [TABLE OF CONTENTS](#)

[Copyright © 1993 by the American Dairy Science Association ®.](#)