

Effect of Milk Processing on the MFGM Proteins and Phospholipids

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The MFGM phospholipids (PLs) and proteins have been ascribed antimicrobial and antiviral properties as well as anticancer and antihypercholesterolemic activities. Nevertheless, few studies have highlighted the effects of processing on the MFGM constituents and the repercussion it may have on their functionality. In this study, we have applied HPLC and proteomics to milk throughout collection, refrigeration, commercial pasteurization, and included a potential pasteurization method: pulsed light treatment. Milk was collected before reaching the storage unit at 37 °C. Samples were processed at storage temperature 4 °C, batch, high temperature short time (HTST) and ultra high temperature (UHT) pasteurizations, and by pulsed light treatment. The cream was separated, and the MFGM was extracted consecutively. MFGM proteins were analyzed using 1D and 2D-PAGE and LC-MS. Over 117 proteins were identified using HPLC-MS, and relative amounts at different motilities in the SDS gel were analyzed using Scaffold 3 and Delta2D. As the heat treatment increased, more protein aggregates were observed, especially in the UHT milk where caseins, lactoferrin, and guanine nucleotide-binding proteins were detected in the high molecular weight region (>150 kDa). The protein profile varied in each treatment, but of interest was the presence of a peptide identified as major allergen of β -lactoglobulin in all the samples with the exception of fresh milk. Low heat at a prolonged time (63 °C, 30min) results in more MFGM proteins being released into the serum. In contrast, variation in the phospholipid composition of the membrane throughout milk processing was not statistically significant ($p > 0.05$).