

# OPTIMIZATION OF THERMOCALCIC AGGREGATION PROCEDURE FOR BUTTERMILK POLAR LIPID CONCENTRATION

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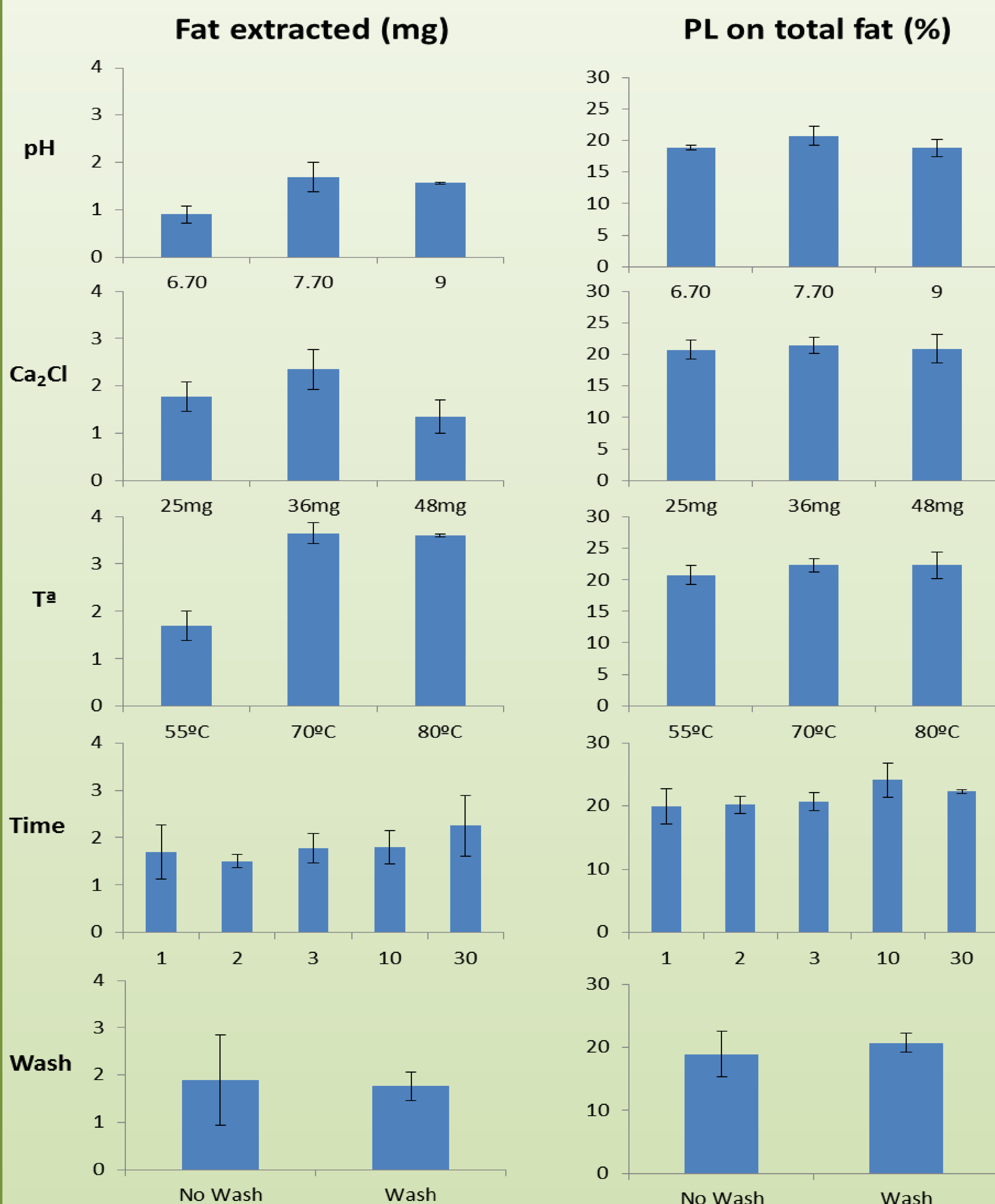
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**Background:** Milk contains a range of bioactive compounds as the polar lipids (PL) phospho- and sphingolipids found in high concentration in buttermilk (BM). Due to the improvement in age-related diseases or the anticarcinogenic effects reported for PL, several methods, such as thermocalcic aggregation (TA), have been developed to concentrate PL without using organic solvents. Although the TA has been successfully assayed in cheese whey, there is not available data regarding BM.

**Objectives:** Optimization of the TA procedure parameters to obtain a concentrate enriched in PL from milk fat globule membrane.

**Methods:** Four parameters were tested: pH (6.7, 7.7 and 9) using NaOH solution (6%), CaCl<sub>2</sub> addition (25, 36 and 48 mg/10g BM), heating temperature (55, 70 and 80°C) and heating time (1, 2, 3, 10 and 30 min.). The effect of washing the aggregate was also assessed. Lipid fraction from aggregates were isolated and analyzed by HPLC-ELSD.

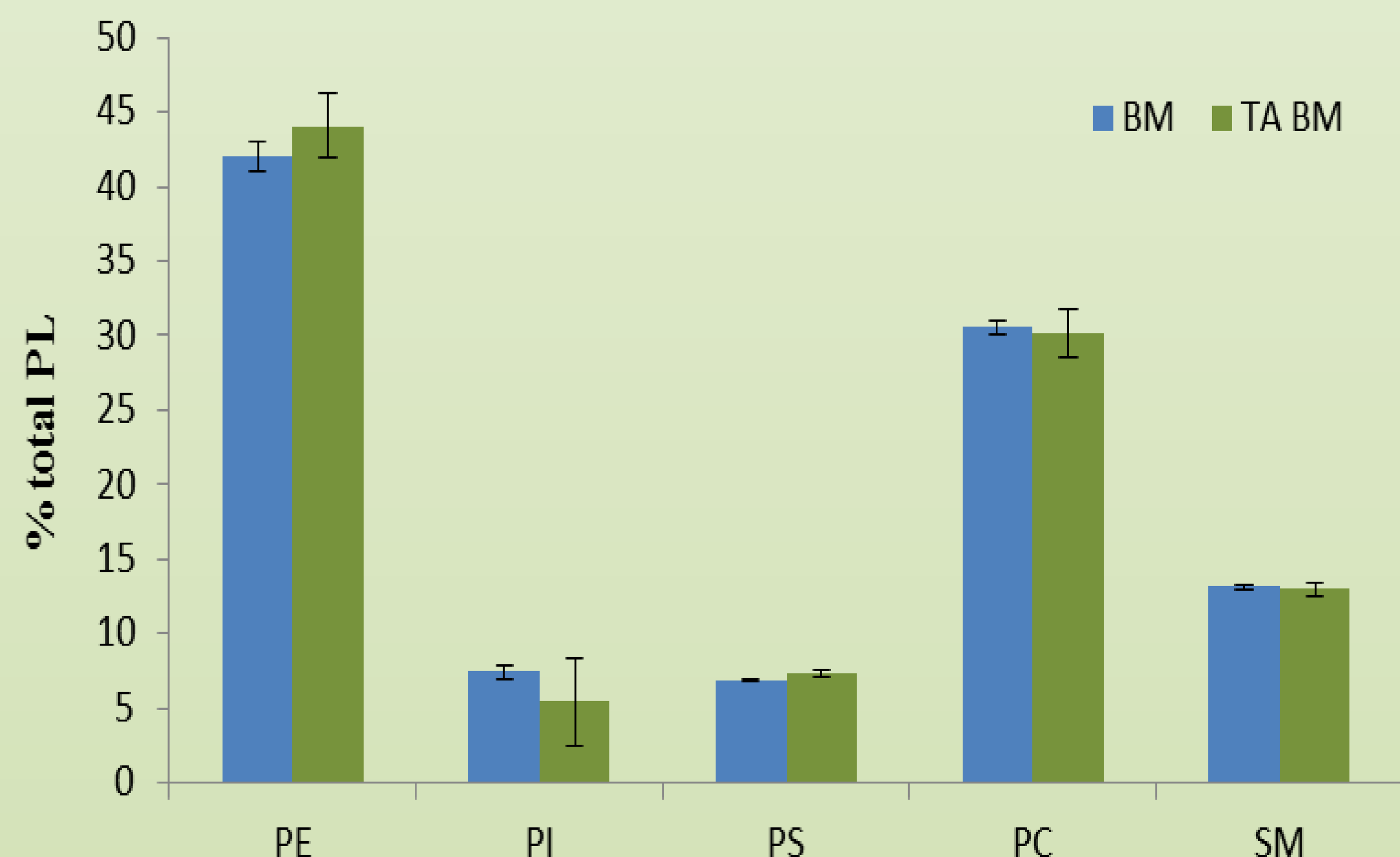
Figure 1: Fat yield (mg/10 g BM) and PL content (g/100g fat) of the aggregates obtained.



BM: buttermilk; PL: polar lipids

**Results:** All the assayed parameters are showed in figure 1. According to the higher yield of fat (mg fat/10 g BM) and PL content (g PL/100 g fat), the optimized conditions were: pH 7.7, 36 mg of Ca<sub>2</sub>Cl, 70°C during 10 minutes and one wash cycle. These conditions, enabled the obtainment of a higher fat yield from the aggregate than BM (1064 mg fat/100 g aggregate vs. 298 mg fat/100 g BM respectively). Likewise, the PL concentration was 4 times more in the aggregate (243.6 mg PL/100 g) than in BM (53.64 mg PL/100 g). These results represent an increase of 26.9 g PL/100 g BM when sample is submitted to optimized TA process. It is important to indicate that the PL species distribution did not change due to the new conditions (figure 2).

Figure 2. Phospho- and sphingolipids species distribution (g/100 PL) in BM and the aggregate obtained with the optimized parameters procedure.



PE: phosphatidylethanolamine; PI: phosphatidylinositol; PS: phosphatidylserine; PC: phosphatidylcholine; SM: sphingomyelin; TA: thermocalcic aggregation; BM: buttermilk ; PL: polar lipids

**Conclusions:** Under the optimized conditions described in the present work, it is possible to obtain a high phospho- and sphingolipids enriched fraction from BM without using organic solvents, that allows further developments of functional food.