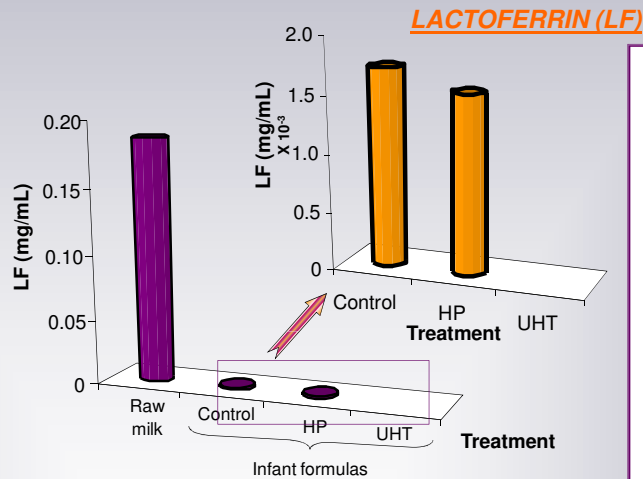


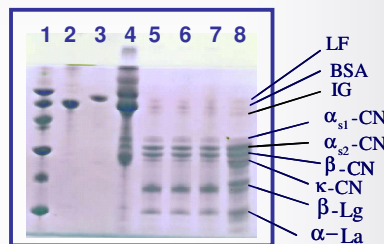
INTRODUCTION

Lactoferrin (LF) and secretory immunoglobulin A (sIgA) are among the major components of the whey protein fraction of human milk; both account for 30-40 % of total breast milk proteins (Chierici and Vigi, 1994). LF plays an important role in iron absorption, immune response and cell proliferation (Lönnerdal, 2009) and sIgA in the gastrointestinal defence mechanisms (Bakker-Zierikzee et al., 2006). Thus, they are frequently used to enrich infant formulas. However their contents and activities are highly affected by processing during the formulation of infant formulas. Non-thermal processing might solve this problem, therefore our objective was the study of the effects of high pressure on the content of LF and sIgA levels in infant formulas.

RESULTS

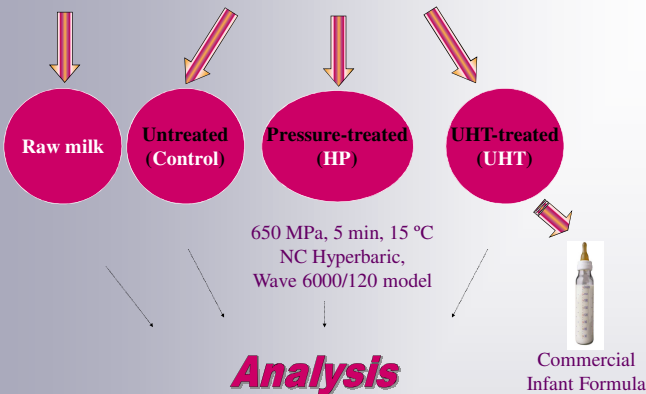


Lf levels, measured by ELISA, were 0.17 and 0.16 ng/mL in the control and pressurized samples, respectively. It represents a decrease in the content of approximately 100 times compared to whole bovine milk; However in the UHT-treated infant formula was not possible to determine the amount of LF present in the sample possibly because heat-treatment produce significant distortion in the structure of LF and the antibody did not recognize the binding sites, while the high-pressure treatment does not affect the structure or at least the binding sites with the antibody LF, and the binding is as effective as in the formula that has not undergone any treatment. Furthermore, when the milk has been heated, the LF states via intermolecular disulfide bonds with casein and other serum proteins (Brisson et al., 2007) which could explain the lower detection LF treated by UHT milk by SDS PAGE.



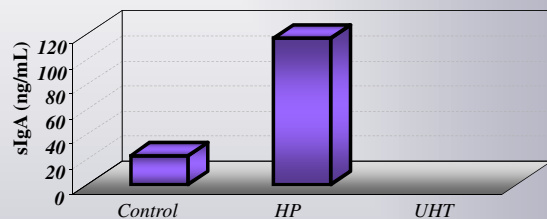
SDS-PAGE. Line 1. Molecular weight kit, 2. Bovine Serum Albumin (BSA), 3. LF, 4. Ig enriched whey, 5. Control, 6. HP, 7. UHT, 8. Raw milk

MATERIALS AND METHODS

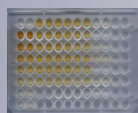


SECRETORY IMMUNOGLOBULIN A (sIgA)

The content of sIgA in infant formulas decreased drastically in the control and pressurized formulations respectively in comparison with whole bovine milk (237 µg/mL). The IgA content could not be detected in infant formula UHT treated with the method used. Viazis et al., 2007 show that human milk treated with high pressure retains activity IgA levels significantly higher (P < 0.05) than pasteurized human milk, although this increase in IgA content in milk pressurized regarding control formula is striking. The non-detection of IgA in the UHT-treated formula is probably due to protein denaturation or alteration sufficient binding sites with the antibody.



LF and sIgA



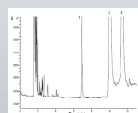
Bovine LF or sIgA ELISA Quantification Kits (Bethyl Laboratories, Montgomery, TX, USA)

SDS-PAGE



With 2-β-mercaptoethanol According to manual instructions

Lactulose and Furosine



Montilla et al, 2005
 Moreno et al, 2002

	Lu (mg/L)	Fu (ng/mL)
Control	27.13 ± 2.13	66.56 ± 0.15
HP	36.19 ± 3.41	66.94 ± 0.16
UHT	616.53 ± 44.07	128.92 ± 0.13

The levels of lactulose (Lu) and furosine (Fu) were measured to illustrate the effect of heat treatment and progress of the Maillard reaction, showing that these levels are very high in the UHT formula, while in the pressurized formula, are similar to those of the control infant formula.

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CONCLUSIONS

High pressure-treated infant formulas might be a good alternative to obtain LF and sIgA enriched formulas with higher activities than commercial ones.

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