



# Effect of Proteolytic and Lipolytic Enzymes Combination on Physicochemical Properties of Leftover Egg Yolk

Navidghasemizad, J. Temelli, F and Wu, J

## Background

Current methods for phospholipids extraction are based on using organic solvents. Demands for reducing organic solvents application due to the safety risks and environmental impacts require new technique for phospholipids extraction which has very limited consumption of organic solvents. Supercritical CO<sub>2</sub> (SC-CO<sub>2</sub>) along with small percentage of ethanol as a co-solvent is a suitable and economical potential for phospholipids extraction from yolk. However, due to the emulsion structure and high moisture content of leftover egg yolk, phospholipids extraction from yolk using SC-CO<sub>2</sub> demands a costly dehydration process.

## Objective

Enzymatic hydrolyses on leftover pellet may change the emulsion structure of pellet in a way that CO<sub>2</sub> can diffuse easily on cream derived after pellet digestion. However, whether all enzymes can form instable emulsions compared to leftover yolk pellet and can be a good potential for further studies need an extensive research. Enzyme digestion which forms less stable emulsion based on oil droplet size study and forms a cream containing highest lipid and lowest protein content is suitable as for SC-CO<sub>2</sub> extraction studies.

## Methodology

- Protease A, Protease M, Protease P, Protease II, Protex 51FP, Protex 7L and Lipase AY were provided from AMANO and Genecor companies.
- Pellet was digested with each proteolytic and lipolytic combination in three independent experiments.
- Emulsion stability was analysed by measuring oil droplet size. Larger oil droplet size indicates on less emulsion stability.

## Results

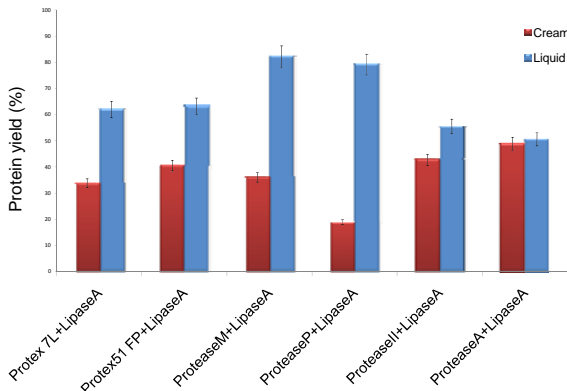


Figure 1: Effect of different proteases in combination with Lipase AY on protein yield in the different fractions obtained after enzymatic hydrolyses. Results are expressed as means of three independently prepared samples.

## Conclusions

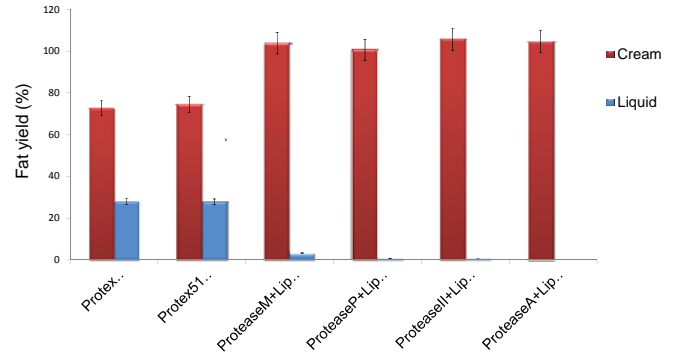


Figure 2: Effect of different proteases in combination with Lipase AY on lipid yield in the different fractions obtained after enzymatic hydrolyses. Results are expressed as means of three independently prepared samples.

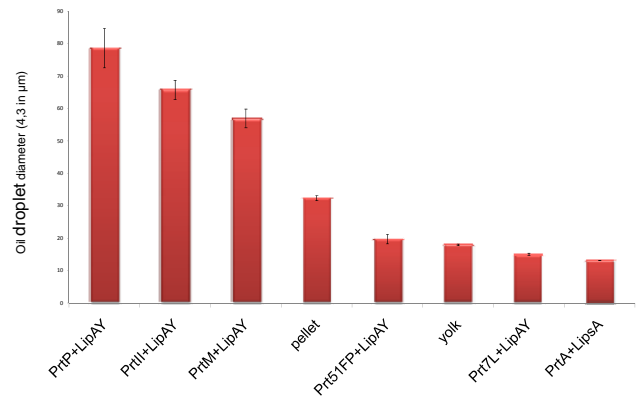


Figure 3: Enzymatic digestion impact on droplet size of hydrolysed leftover pellet. Results are expressed as means of three independent digestions.

## Conclusions

- ✓ Three proteases (Protease P, Protease M and Protease II) in combination with Lipase AY gave the highest lipid content in cream fraction.
- ✓ Emulsion studies showed Protease P and Lipase AY combination formed the least stable emulsion, which can be a suitable for further phospholipids extraction studies by supercritical CO<sub>2</sub>.

## Acknowledgement



S. Navidghasemizad is a recipient of PRC graduate scholarship.



This project supported by grants from Alberta Livestock and Meat Agency (ALMA) and Alberta Agriculture Research Institute (AARI).



IDEAS. INFORMATION. INVESTMENT.