**XVII[th] World Congress of the International Commission of Agricultural and Biosystems Engineering (CIGR)**

Hosted by the Canadian Society for Bioengineering (CSBE/SCGAB)
Québec City, Canada June 13-17, 2010

# PULSED ELECTRIC FIELDS AND MICROFILTRATION HURDLE TREATMENT FOR THE IMPLEMENTATION OF MICROBIAL SAFETY IN MILK

M. WALKLING-RIBEIRO[1], O. RODRÍGUEZ-GONZÁLEZ[1], S. JAYARAM[2], M.W. GRIFFITH[1]

[1]M. WALKLING-RIBEIRO, Canadian Research Institute for Food Safety, Department of Food Science, University of Guelph, Guelph, ON, Canada N1G 2W1, markuswr@uoguelph.ca.
[1]O. RODRÍGUEZ-GONZÁLEZ, orodrigu@uoguelph.ca.
[1]M.W. GRIFFITH, mgriffit@uoguelph.ca.
[2] S. JAYARAM, Faculty of Engineering, Department of Electrical and Computer Engineering, University of Waterloo, Waterloo, ON, Canada N2L 3G1, jayaram@ecemail.uwaterloo.ca.

**CSBE100463 – Presented at Section VI: Postharvest Technology, Food and Process Engineering Conference**

**ABSTRACT** Pulsed electric fields (PEF) and microfiltration (MF), both emerging non-thermal processing technologies, enable 'cold pasteurization' of liquid foods, thus, allowing gentle processing without product quality loss due to lower thermal impact compared to conventional pasteurization (CP). Raw skim milk inoculated with native microbiota was PEF-treated at electric field strengths of 16, 20, 30 and 42 kV/cm for treatment times of 2105, 1454, 983, and 612 μs, and energy densities of 407, 632, 668, and 815 kJ/l, respectively. MF of milk was carried out with a 1.4 μm pore-size membrane at retentate and permeate flow rates of 120 and 12 l/h, respectively, while CP was applied at 75 °C for 24 s. In a comparison of PEF, MF, and CP reductions of native microorganisms in milk a 4.6 $\log_{10}$ was obtained with CP, which was comparable to 3.7 $\log_{10}$ achieved by MF ($P \geq 0.05$), and more efficient than PEF inactivating up to 2.5 $\log_{10}$ (at 815 kJ/l ($P<0.05$)). Hurdle treatment with MF followed by PEF (MF/PEF) led to reductions of 4.1 (at 407 and 632 kJ/l), 4.4 (at 668 kJ/l) and 4.8 (at 815 kJ/l) $\log_{10}$ of the native microbes in milk similar to that of CP ($P \geq 0.05$). Changing the processing sequence (PEF/MF) produced comparable microbial reductions of 4.8, 5.3 and 5.7 $\log_{10}$ (at 407, 632 and 668 kJ/l, respectively ($P \geq 0.05$)) and a greater inactivation of 7.1 $\log_{10}$ (at 815 kJ/ml ($P<0.05$)) in milk than for CP. Overall, combining MF and PEF proved to be a considerable milk processing alternative to CP.

**Keywords:** Milk, Native microorganisms, Non-thermal hurdle processing, MF, PEF.