Quantification of vitamin B12 in milk processed by pulsed electric field (PEF), high hydrostatic pressure (HHP), and ultraviolet light (UV-C)

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The deficiency of vitamin B12 (B12) has been regularly pointed out as a public health problem, which affects mainly the elderly. Lack of B12 is associated with leading degenerative damage in the brain, being a risk factor for dementia. Cows' milk is an important source of B12, containing around 0.54 µg of B12/100 g of milk. No conclusive studies have shown the impact of non-thermal technologies such as pulsed electric field (PEF) or high hydrostatic pressure (HHP) on this vitamin, while ultraviolet light (UV-C) is expected to reduce its content.

The objective of this study was to investigate the impact of emerging processes such as PEF, HHP, and UV-C light on vitamin B12 retention in bovine milk.

Raw cows' milk was sourced from a local dairy farm and kept refrigerated prior to processing. Different processing conditions for PEF (16 kV/cm for 8-16 µs), HHP (300-600 MPa for 5 min), and UV-C light (2-18 mJ/cm2 for 2-18 min) were applied for the treatment of cow's milk. Determination of the B12 content was carried out with ultra-performance liquid chromatography-ultraviolet detection (UPLC-UV) at a wavelength of 360 nm.

No significant impact on B12 content in milk was observed for samples subjected to PEF and HHP treatments (P?0.05) applied at maximum intensity levels (16 kV/cm for 16 ?s, and 600 MPa for 5 min, respectively). By contrast, UV-C light showed a reduction in milk B12 levels when higher UV-C dosages were applied (P<0.05), reaching a 10% vitamin loss at 18mJ/cm2 for 16min.

Both HHP and PEF were shown to be appropriate for treating milk, allowing for high retention of vitamin B12 in cow's milk.