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Can high-pressure homogenization cause thermal degradation to nutrients?

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1 Can high-pressure homogenization cause thermal degradation to nutrients?

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7 8 **Abstract**

9 Although originally developed for fat globule disruption in dairy applications, high-pressure
10 homogenizers are extensively used in other food processing applications. Two newer
11 applications are in forming nanoemulsion for delivering supplemented nutrients and as a
12 preservation technique, both using higher pressures than traditional applications. This has
13 raised concern that friction heat created in the homogenizer causes thermal degradation to
14 temperature sensitive molecules such as nutrients. This contribution uses a numerical model
15 to give insight into temperature profiles for drops in a homogenizer valve and investigates
16 when homogenization at elevated pressures is expected to cause thermal degradation. A fast
17 method for estimating the extent of degradation for a given application is also proposed. It is
18 concluded that no thermal degradation is expected inside the valve, almost regardless of
19 operating conditions, due to the short residence time. Provided that cooling is applied after the
20 homogenizer, degradation downstream of the valve can also be avoided.

21 22 **Keywords**

23 High-pressure homogenization; Emulsion; Emulsification; Nutrients; Thermal degradation.

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