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**EFFECTS OF ENVIRONMENTAL FACTORS ON
HEAT-INDUCED β -LACTOGLOBULIN FIBRIL
FORMATION**

**A THESIS PRESENTED IN PARTIAL FULFILMENT
OF THE REQUIREMENTS FOR THE DEGREE OF MASTER
IN FOOD TECHNOLOGY**

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ABSTRACT

The heat-induced fibrillar aggregation of β -lactoglobulin was studied under various environmental conditions. The formation of β -lactoglobulin fibrils was monitored by Thioflavin T (ThT) fluorescence and their morphology was studied using transmission electron microscopy (TEM). Amyloid-like fibrils were formed under standard conditions (pH 2.0, 80°C and low ionic strength). The β -lactoglobulin fibrillation kinetics exhibited sigmoidal behaviour, and the two-step autocatalytic reaction model fitted ThT fluorescence data well. The studies of the individual effect of pH, temperature, NaCl, CaCl₂ on β -lactoglobulin fibril formation showed that decreasing pH (2.4 - 1.6), increasing temperature (75 - 120°C) and increasing salt concentration (NaCl 0-100 mM; CaCl₂ 0-100 mM) accelerated the fibril formation process and altered the morphology of fibrils. The two-step autocatalytic reaction model did not fit the ThT fluorescence data well at higher temperature (>100°C) or at low pH (1.6). The effects of the four factors (pH, temperature, NaCl and CaCl₂) on β -lactoglobulin fibril formation were studied by using a central composition design (CCD) experiment. Results showed that the four main and some of the non-linear effects were significant (95%) on fibril formation, including fibrillation time and the fibril yield.

Taking all results together, it can be implied that β -lactoglobulin fibril formation can be promoted by choosing the external incubation conditions. This study is the first step towards the application of protein fibrils as texture-modifying ingredients in food systems.

Keywords: β -lactoglobulin, amyloid fibril, Thioflavin T fluorescence, TEM

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