ANN modelling to optimize the production of goat milk hydrolysates.

Short title: ANN modelling of the hydrolysis of goat milk protein

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SUMMARY

The enzymatic hydrolysis of milk proteins yields final products with improved properties and reduced allergenicity. The degree of hydrolysis (DH) is a key parameter which influences both the technological properties (e.g. solubility, water binding capacity) and the biological potencies (e.g. ACE inhibitory, antioxidative) of the resulting hydrolysate. Phenomenological models lack to reproduce the complexity of enzymatic reactions in dairy systems. In contrast, empirical approaches offer high predictability and can be easily transposed to different substrates and enzymes. In this work, the DH of the hydrolysis of goat milk protein by subtilisin and trypsin was modeled by feedforward artificial neural networks (ANN). A set of protein hydrolysates was produced under different levels of reaction temperature and enzyme/substrate ratio varied according to an experimental design. The time evolution of DH was monitored and processed to generate the ANN models. An extensive hydrolysis is desirable since high DH favors some bioactivities in the final hydrolysate such as antioxidant or antihypertensive. The optimization of both ANN models led to a maximal DH (23.47%) at 56.4ºC and enzyme-substrate ratio of 5% for trypsin, while hydrolysis with trypsin reached a maximum of 21.3% at 35ºC and enzyme-substrate ratio of 4%.

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