



HAL
open science

The kinetics of gastric proteolysis is strongly influenced by the dietary proteins, with a remarkably high pepsin activity on dairy caseins for $\text{pH} \geq 4$ (i.e. early stages of gastric digestion)

Lea Salelles, Steven Le Feunteun, Juliane Floury

► **To cite this version:**

Lea Salelles, Steven Le Feunteun, Juliane Floury. The kinetics of gastric proteolysis is strongly influenced by the dietary proteins, with a remarkably high pepsin activity on dairy caseins for $\text{pH} \geq 4$ (i.e. early stages of gastric digestion). Journées Scientifiques de l'ED EGAAL 2021, Jun 2021, Rennes, France. , 2021. hal-03284196

HAL Id: hal-03284196

<https://hal.inrae.fr/hal-03284196>

Submitted on 12 Jul 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - ShareAlike 4.0 International License

The kinetics of gastric proteolysis is strongly influenced by the dietary proteins, with a remarkably high pepsin activity on dairy caseins for pH ≥ 4 (i.e. early stages of gastric digestion)

Pepsin, secreted by the stomach's parietal cells, is the first protease encountered during digestion. The stomach slowly acidifies the food intake and it is generally said that pepsin is active at acidic pH only (pH ≤ 4), with an optimum around pH 2¹. However, the impact of pH on gastric proteolysis has not been studied on complex mixes of alimentary proteins, only on few neat globular proteins. The goal of this study was to compare the kinetics of peptic hydrolysis of dairy caseins and egg white proteins as a function of both pH and *in-vitro* gastric digestion time.

Poteolysis kinetics by pepsin during gastric *in vitro* digestion at various pH.

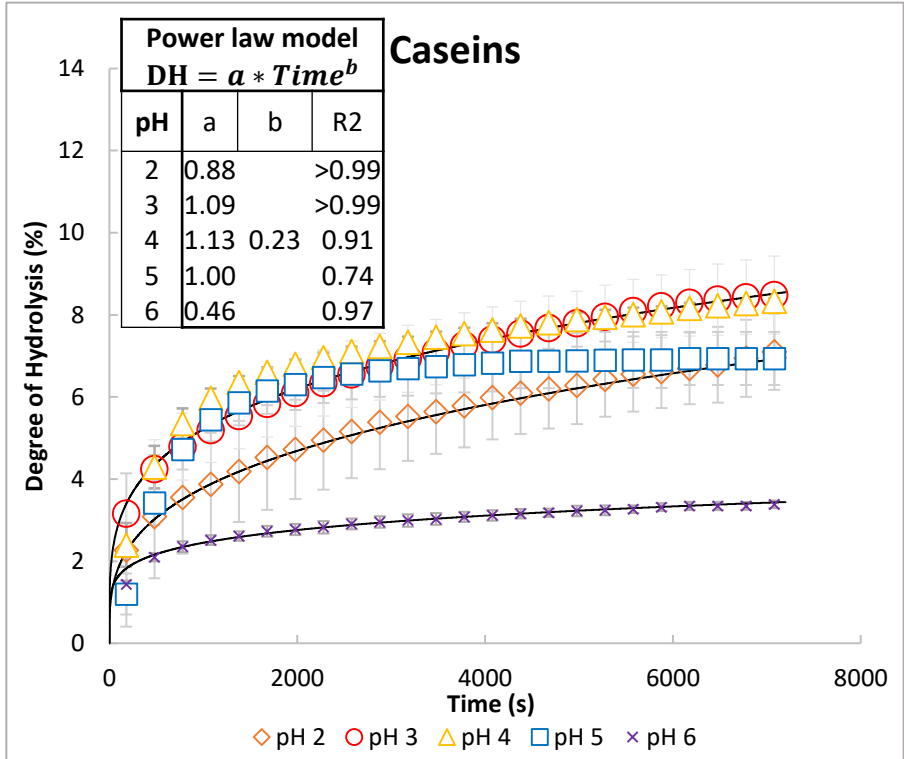
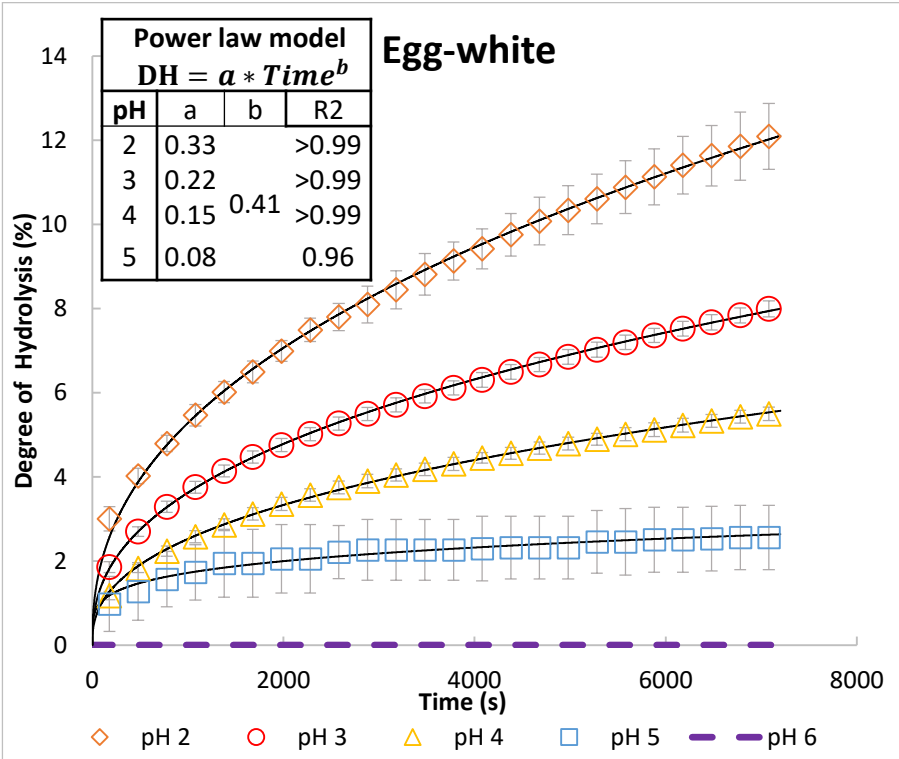


Fig.1 : Degree of hydrolysis of egg-white and caseins by pepsin as a function of time, measured by the pH-STAT method. Data represent means ± standard deviation on 3 replicates. Full lines represent the model fittings of experimental values.



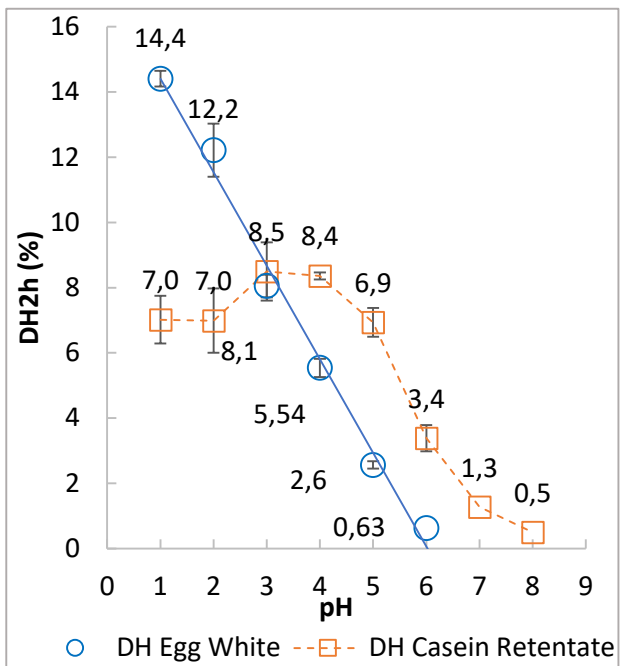


Fig. 2 : Degree of hydrolysis at 2 h of digestion

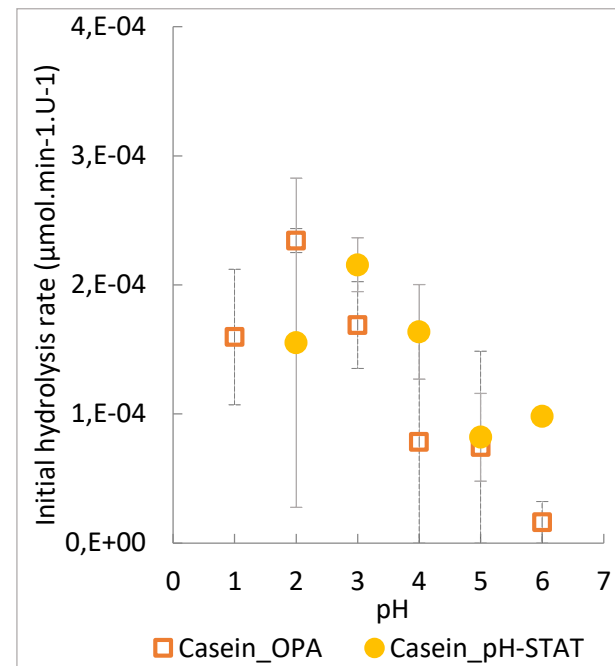
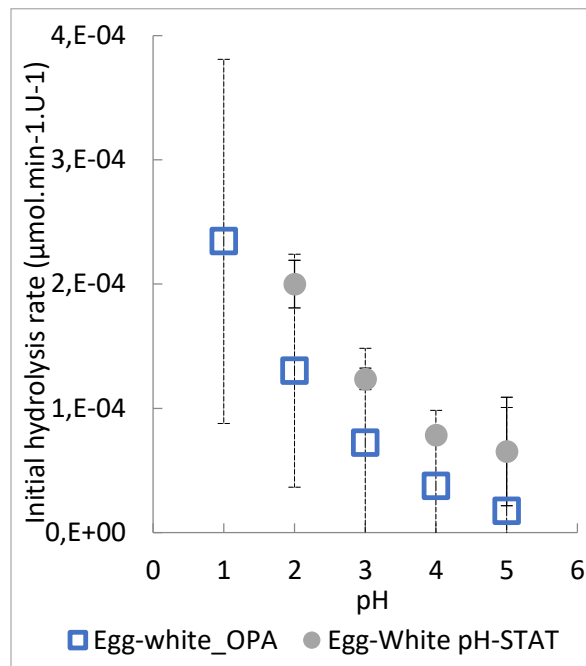


Fig.3 : Initial rates of hydrolysis (first 3 minutes), measured by OPA and pH-STAT methods

- The hydrolysis kinetics could be fairly modelled by power law, except for caseins pH 4 and 5 (Fig. 1).
- Final degrees of hydrolysis (at 2h) and initial rates of reaction both follow a similar trend as a function of pH (Fig. 2-3).
- Pepsin activity on egg white does not show a bell-shaped curve as a function of pH (Fig.2), contrarily to what is commonly stated from the results observed with haemoglobin.
- Pepsin shows an optimum pH at 3-4 and remain active up to pH 6-7 on caseins (Fig. 2-3), that is the initial pH of cow milk $\sim 6,7^3$ and of gastric digestion.