SUPPLEMENTARY DATA

Table S1 Overview of process-relevant characteristics of PepX, PepA and PepN (Stressler *et al.*[11,13]).

Characteristic	PepX	PepA	PepN
Organism	*Lactobacillus helveticus*	*Lactobacillus debrueckii*	*Lactobacillus helveticus*
His-tag	yes	no	yes
Cleavage	N-terminal X-Pro dipeptide	N-terminal Asp, Glu, Ser	N-terminal AA (unspecific) No hydrolysis before Pro
pH-maximum	6.5	6.0	6.5
Temperature-maximum	50 °C	60 °C	37 °C

Table S2 Peptidases included in Flavourzyme and their properties (according to Merz *et al.*[17]).

Peptidase	Abbr.	Max. pH [-]	Max. T [°C]	Size [kDa]	Preferred cleavage site	Specific substrate for determination
Leucin-aminopeptidase A	LAPA	9.0	65	32.5	Leu[1]	H-Ile-*p*NA
Leucin-aminopeptidase 2	LAP2	9.5	50	51.9	Broad specificity[2]	H-Pro-*p*NA
Dipeptidylpeptidase 4	DPP4	8.5	60	85.1	X–Pro[3]	H-Ala-Pro-*p*NA
Dipeptidylpeptidase 5	DPP5	6.0	65	78.6	n.a.	H-Lys-Ala-*p*NA
Neutrale protease 1	NP1	7.0	50	42.4	n.a.	Azocasein
Neutrale protease 2	NP2	5 – 5.5	60	19.0	Hydrophobic AA in P1`[4]	Azocasein
Alkaline protease 1	ALP1	7.0	50	29.0	Broad specificity[5]	Azocasein

n.a. = not available
1 MEROPS peptidase M28.006; 2 UniProt: Q2ULM2; 3 UniProt: Q2UH35; 4 UniProt: P46076; 5 UniProt: P12547

Table S3 Comparison of the casein hydrolysate and colloidal properties of the two hydrolysate batches (pre-hydrolysates, produced with Sternzym BP 25201) used for the further hydrolysis with single exopeptidases (PepN, PepX, PepA) or Exo-Flavourzyme.

	Pre-hydrolysate used for PepN, PepX and PepA		*Pre-hydrolysate used for Exo-Flavourzyme*	
Parameter	**Sodium caseinate**	**+Sternzym**	**Sodium caseinate**	**+Sternzym**
DH [%]	0^{a}	2.3 ± 0.1^{b}	0^{a}	2.4 ± 0.04^{b}
Protein particle size [µm]	1.3 ± 0.3^{a}	43.2 ± 3.3^{b}	1.1 ± 0.18^{a}	36.2 ± 1.9^{b}
Rel. hydrophobicity [%]	100 ± 1.8^{a}	92 ± 0.8^{b}	100 ± 2.4^{a}	91 ± 0.7^{b}
Foam				
Overrun [%]	273 ± 14^{a}	188 ± 4^{b}	292 ± 13^{a}	201 ± 13^{b}
Drainage [%]	83.4 ± 0.5^{a}	75.3 ± 0.2^{b}	85.3 ± 2.5^{a}	75 ± 1.1^{b}
$t_{1/2}$ (foam) [min]	22.4 ± 1.6^{a}	30.3 ± 1.4^{b}	21.6 ± 3.1^{a}	33.3 ± 3.0^{b}
Emulsion				
Oil droplet size [µm]	18.2 ± 1.8^{ab}	16.9 ± 1.0^{ab}	19.5 ± 1.1^{a}	17.0 ± 0.9^{b}
ζ-potential [mV]	-62.6 ± 2.9^{a}	-46.0 ± 0.6^{b}	-58 ± 4.0^{a}	-39 ± 3.7^{c}
$t_{1/2}$ (emulsion) [h]	0.8 ± 0.1^{a}	2.4 ± 0.1^{b}	0.8 ± 0.1^{a}	2.7 ± 0.3^{b}
Bitterness				
Relative bitterness	2.1 ± 2.1^{a}	9.1 ± 2.4^{b}	1.7 ± 1.3^{a}	8.8 ± 1.4^{b}

different superscripted letters indicate a significant difference ($p < 0.05$) between the samples in a row.

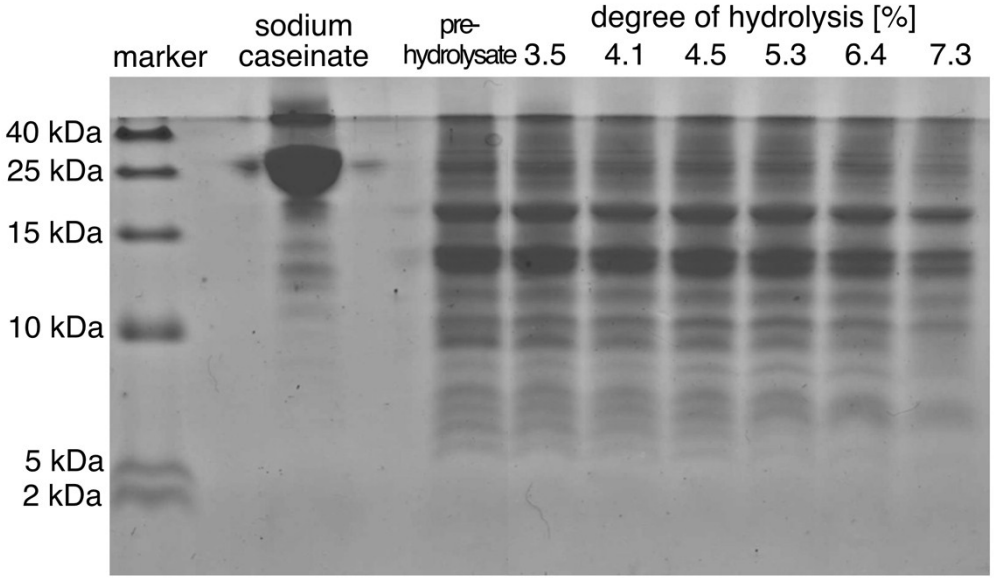

Fig. S1 Tricine-SDS-PAGE of the sequential hydrolysis of sodium caseinate with, firstly, Sternzym BP 25291 (pre-hydrolysate) and, subsequently, Exo-Flavourzyme (M = protein marker, 15 $\mu g_{protein}$ per lane loaded).

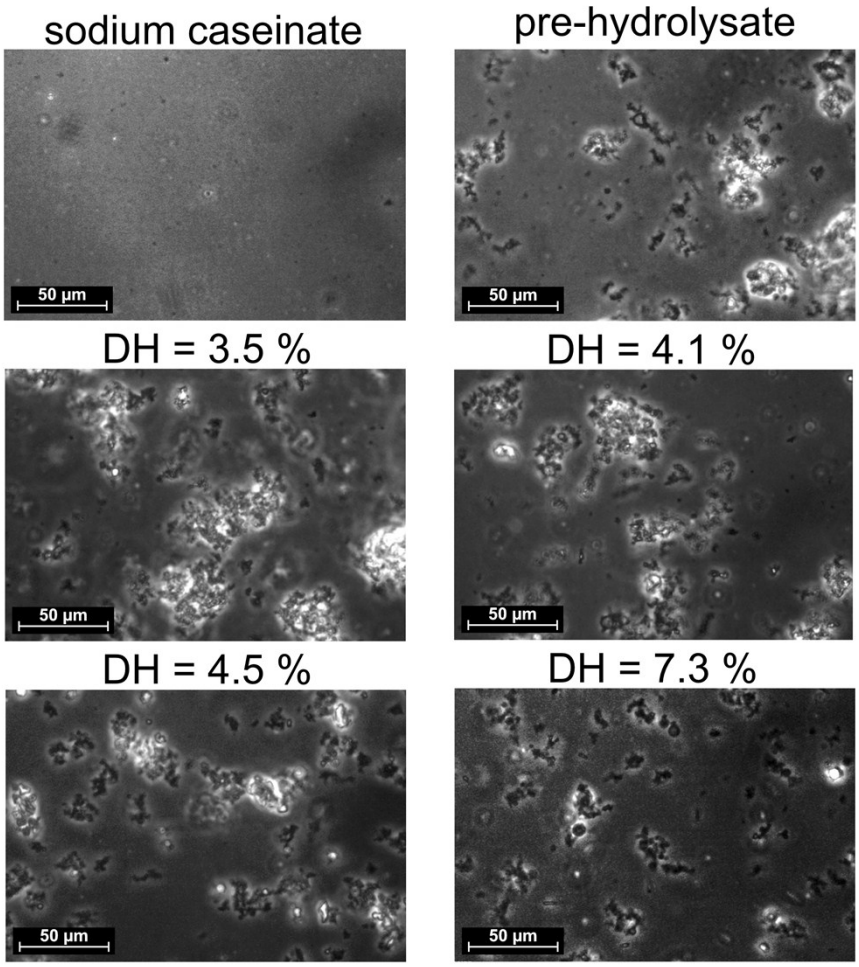

Fig. S2 Microscopic images of sodium caseinate, the pre-hydrolysate produced with Sternzym BP 25201, and the products of the further hydrolysis with Exo-Flavourzyme (DH 3.5 – 7.3 %). Microscopic images were taken at a 40x magnification.