

## NUTRALYS® pea protein and NUTRALYS® S85 Plus: a range of high nutritional quality Pea Proteins with characteristic digestion profiles

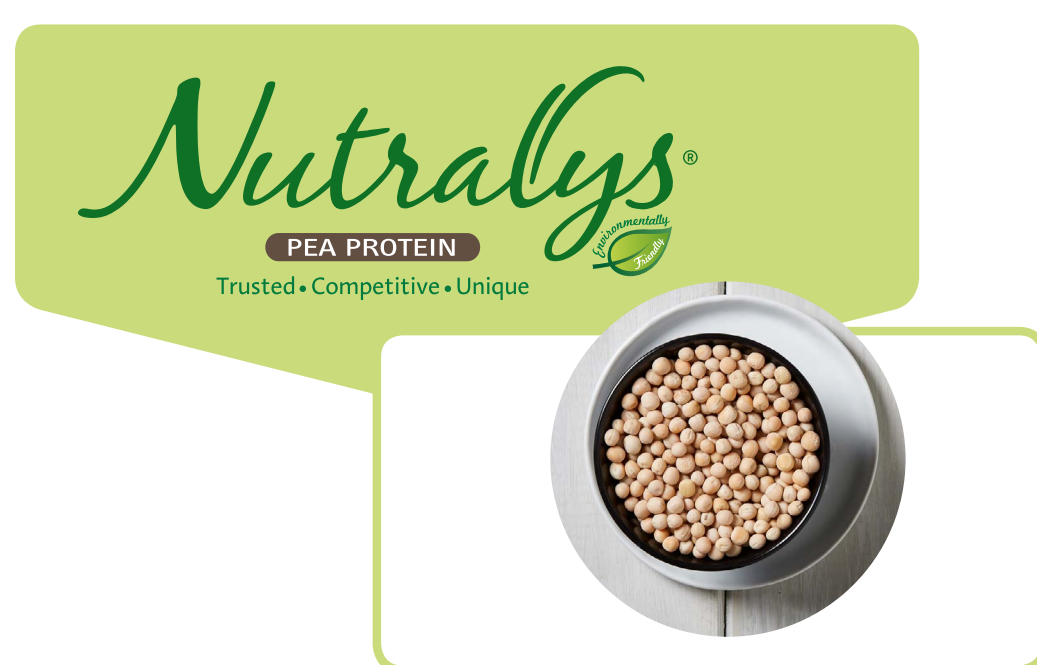
Guérin-Deremaux L<sup>1</sup>, Perreau C<sup>1</sup>, Lefranc-Millot C<sup>1</sup>, Sharma J<sup>1</sup>, de Jong S<sup>2</sup>  
<sup>1</sup>: ROQUETTE, France; <sup>2</sup>: NIZO Food Research, The Netherlands

### STUDY OBJECTIVES

ROQUETTE has developed a **range of vegetable proteins** produced from yellow pea. **NUTRALYS® pea protein** and the new grade **NUTRALYS® S85 Plus** are great sources of proteins (85%) both **qualitatively** and **quantitatively**, rich in Branched Chain Amino Acids and Arginine delivering different technical features.

The objectives of the present research were to investigate:

- ✓ their **nutritional quality** through the **protein digestibility** and the **Protein Digestibility-Corrected Amino Acid Score (PDCAAS)**,
- ✓ their **kinetic of digestion** under simulated *in-vitro* gastric conditions.



### METHODS

#### Protein digestibility

- Growing rats n=10/group**
  - Control period followed by a 5-day balance period**
  - Diet providing 10% of proteins or no protein**
  - Endpoints: Nitrogen intake & Fecal nitrogen**
- According to FAO/WHO (1991) methodology*

#### PDCAAS evaluation

$$D = \text{Digestibility} = \frac{\text{Nitrogen intake} - \text{Fecal nitrogen}}{\text{Nitrogen intake}} \times 100$$

$$\text{AAS} = \text{Amino Acid Score} = \frac{\text{mg of limiting amino acid in 1g of test protein}}{\text{mg of same amino acid in 1g of reference protein}} \times 100$$

$$\text{PDCAAS} = \text{Protein Digestibility Corrected Amino Acid Score} = \text{AAS} \times D$$

#### Kinetic of digestion

- ✓ « NIZO SIMPHYD model »
  - ✓ Static model simulating the gastric digestion combined with in-line viscosity measurements
- Acidification pH 2      Gastric enzymes (lipase, pepsin)
- 0      5      20      Minutes
- Viscosity measurements

### RESULTS

#### Protein digestibility & PDCAAS

##### ✓ Amino acids composition and Amino Acid Score calculation:

Amino acids (mg/g of protein)	NUTRALYS® range Amino acid profile	EUROPE & other regions				US	
		FAO/WHO 2007 Amino acid requirements		NUTRALYS® range Amino acid score		FAO/WHO 1991 Amino acid requirements	NUTRALYS® range Amino acid score
		Adult	Children (3-10y)	Adult	Children (3-10y)	Pre-school (2-5y) children	All age groups* (except infants)
Histidine	25	15	16	167	156	19	132
Isoleucine	47	30	31	157	152	28	168
Leucine	82	59	61	139	134	66	124
Valine	50	39	40	128	125	35	143
Lysine	71	45	48	158	148	58	122
<b>Meth+Cyst.</b>	21	22	24	<b>95</b>	<b>88</b>	25	<b>84</b>
Phenyl+Tyr.	93	38	41	245	227	63	148
Threonine	38	23	25	165	152	34	112
Tryptophane	10	6	6.6	167	152	11	91

\* : In the US, the FAO/WHO amino acid scoring pattern for preschool children (1991) is used to evaluate protein quality for all age groups except infants

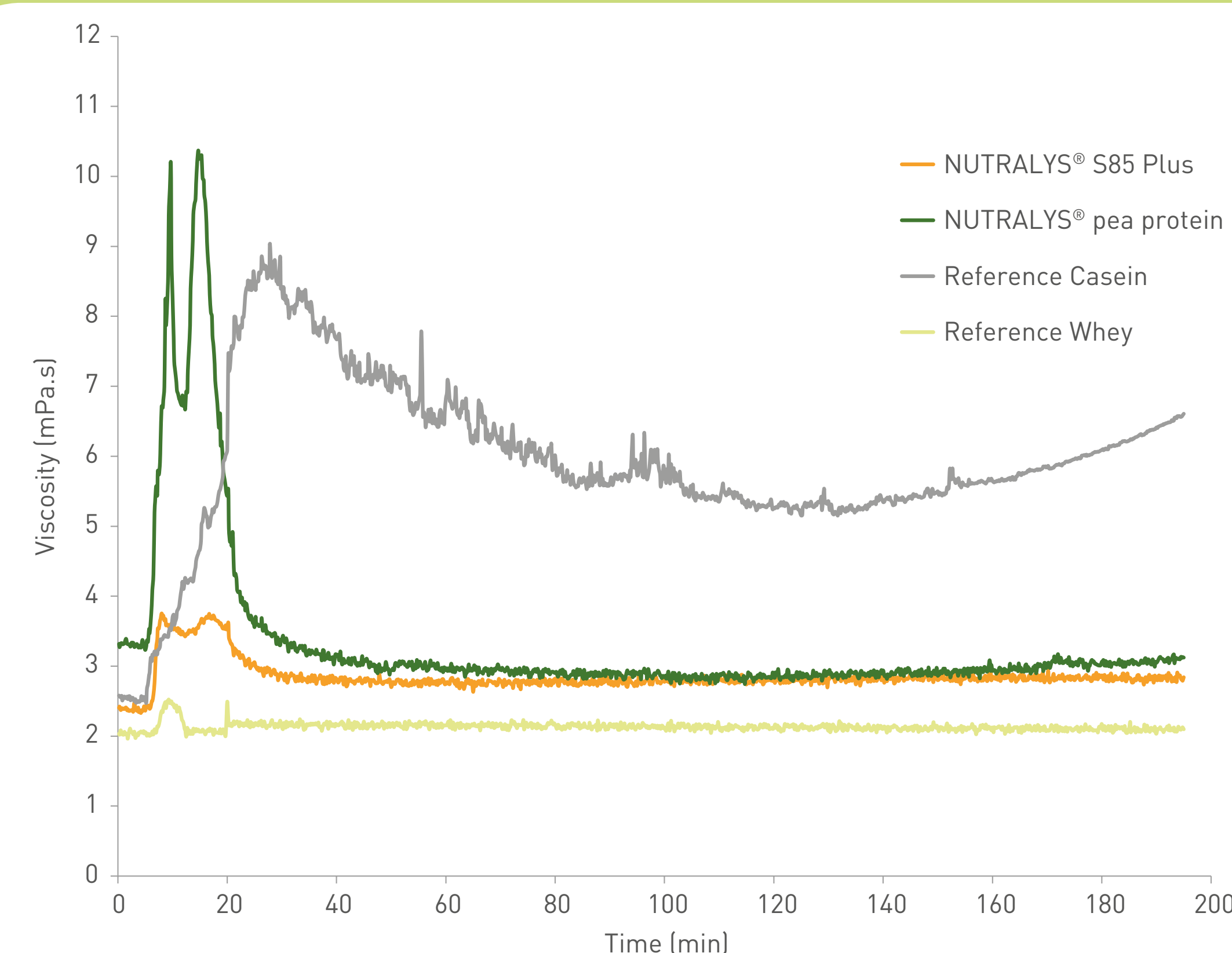
##### ✓ Protein digestibility & PDCAAS:

	NUTRALYS® pea protein	NUTRALYS® S85 Plus
Protein digestibility	<b>97% ± 2</b>	<b>96% ± 3</b>
PDCAAS Europe - Adult	<b>93</b>	<b>92</b>
PDCAAS Europe - Children	<b>85</b>	<b>84</b>
PDCAAS US - All age groups	<b>81</b>	<b>81</b>

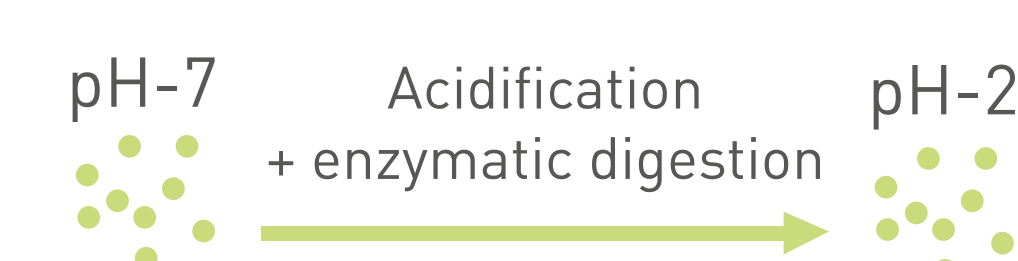


The NUTRALYS® range of pea proteins is a great source of **highly digestible proteins** with **almost full amino acid profile** opening the opportunity to good **synergies with cereal-based proteins**.

#### Kinetic of digestion



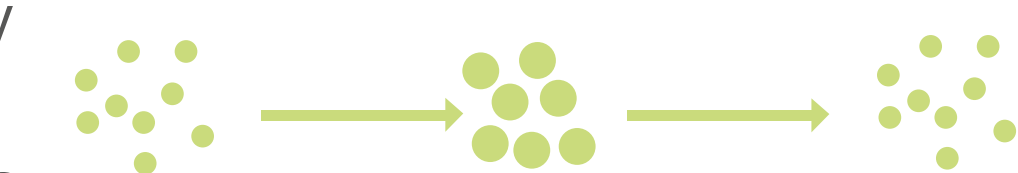
- ✓ **NUTRALYS® S85 Plus & Whey:** no evolution of viscosity



« Fast protein »

- ✓ **NUTRALYS® pea protein:**

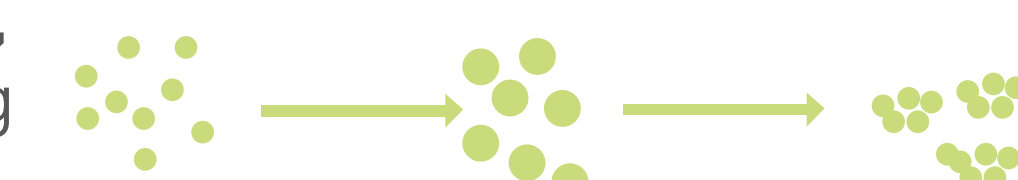
Increase in viscosity during the gastric acidification and sudden drop in viscosity after addition of the gastric enzymes, suggesting the aggregation into particles



« Intermediate-fast protein »

- ✓ **Casein:**

High and sustained increase in viscosity, suggesting the formation of an enduring protein network



« Slow Protein »



The fast or intermediate-fast proteins could facilitate rapid amino acid delivery to the bloodstream and may be of potential interest for muscle protein synthesis during the recovery phase.

### CONCLUSION

The 2 pea proteins isolates evaluated in these studies displayed a **high nutritional quality profile**. **NUTRALYS® pea protein** is an “**intermediate-fast protein**” and **NUTRALYS® S85 Plus** is a “**fast-digested protein**” making these ingredients adapted to specific nutritional needs. These results show that plant-based proteins, like those of the NUTRALYS® range, may allow designing high quality protein rich foods and beverages.