

4th IMEKO FOODS Soy protein hydrolysates in bakery products

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INTRODUCTION

Soy protein is an important food protein source owing to its nutritional benefits and functional properties.

The nutritional composition of soy proteins includes essential amino acids, calcium, iron, magnesium, fiber, polyunsaturated fats etc.

Soy Protein Hydrolysates (SPHs) were obtained from soy protein concentrate by enzymatic hydrolysis with proteases:

- ✓ **Neutrase** (from *Bacillus amyloliquefaciens*, EC 3.4.24.28, ≥ 0.8 U/g) + **Flavorzyme** (from *Aspergillus oryzae*, EC 3.4.11.1, ≥ 500 U/g) (**NeuFla**)
- ✓ **Papain** (from *Papaya latex*, EC 3.4.22.2, 1.5 - 10 U/mg) (**Pap**)
- ✓ **Umamizyme** (from *Aspergillus oryzae*, 74.3 U/g) (**Uma**)

Aim: to develop soy protein based products using as ingredient SPHs.

RESULTS

Pasta formulation

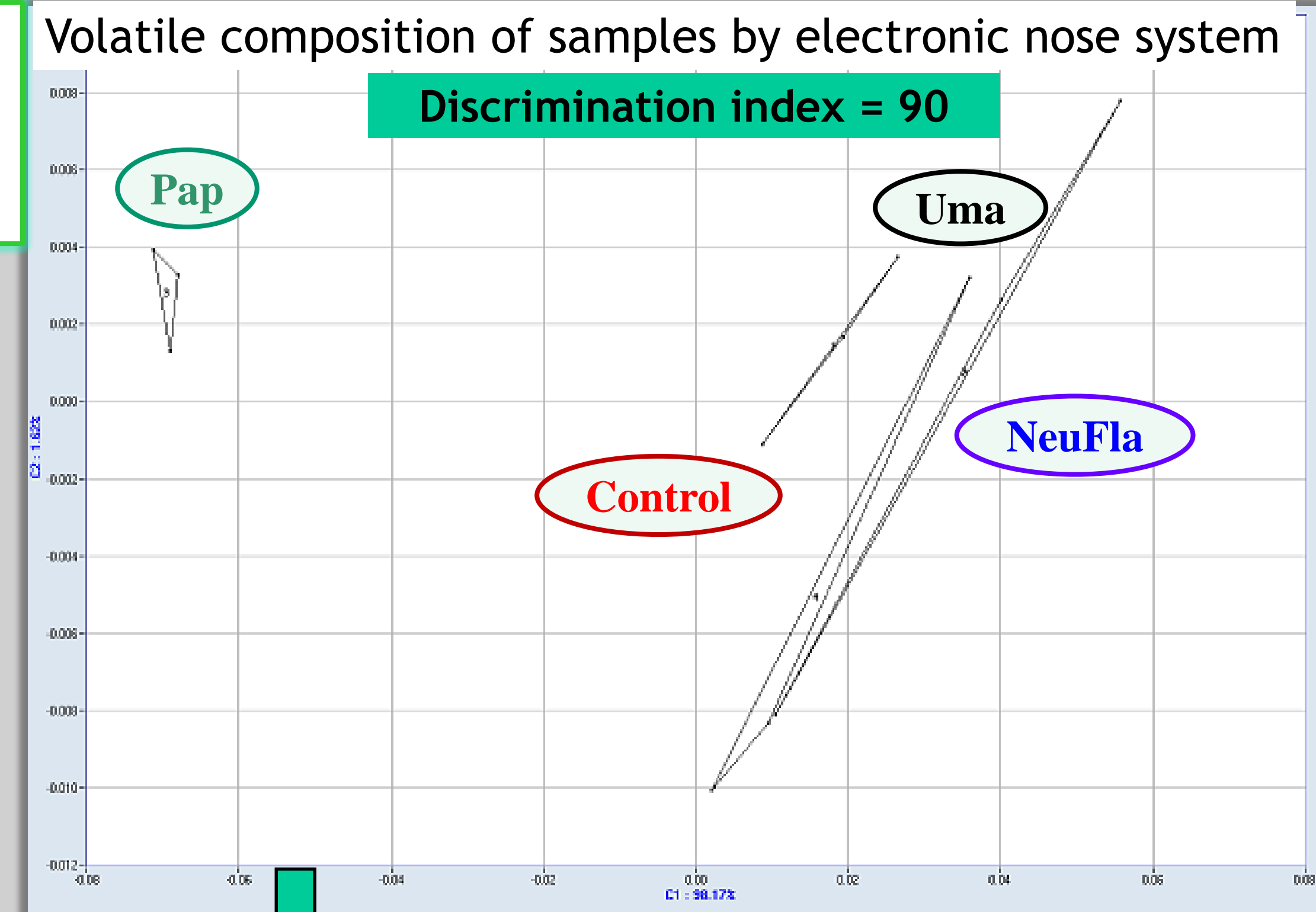
- wheat flour as base ingredient
- wheat flour was substituted by 5% SPH
- 100% wheat flour = control



Control NeuFla Pap Uma

Pasta sample	Protein content (%)	Volume increase of pasta on cooking (%)	Observations after pasta cooking
Control	10.6	357	Slightly sticky
NeuFla	13.3	300	Slightly sticky
Pap	13.7	285	Highly sticky
Uma	13.4	257	Highly sticky

PCA plot (Principal Component Analysis)



✓ Color variation of the pasta: from darkness → to whiteness: Uma > NeuFla > Pap > Control

✓ There were positive correlations between L* (lightness parameter) of pasta and the corresponding SPHs ($r = 0.91$)

- ✓ very distinct odor of samples
- ✓ NeuFla and Uma cookies were more alike in volatile composition being situated in the opposite side of the PCA plot compared to Pap cookie.

✓ Pasta samples with SPH addition had almost 1.3-fold higher protein content than control pasta.

✓ The dough with Papain and Umamizyme, respectively, were sticky.

✓ The pasta made with Neutrase + Flavorzyme, maintains its shape better than the others pasta with hydrolysates.

Cookie formulation

Cookie samples	Ingredients					
	Wheat flour (g)	SPH (g)	Sugar (g)	Oil (mL)	Eggs (pc)	Ammonia powder (g)
Control	1000	-	475	775	8	4
SPH	950	50	475	775	8	4

Cookie sample	Protein content (%)
Control	7.5
NeuFla	8.9
Pap	8.6
Uma	8.9

Cookie samples with SPH had almost 1.2-fold higher protein content than control.

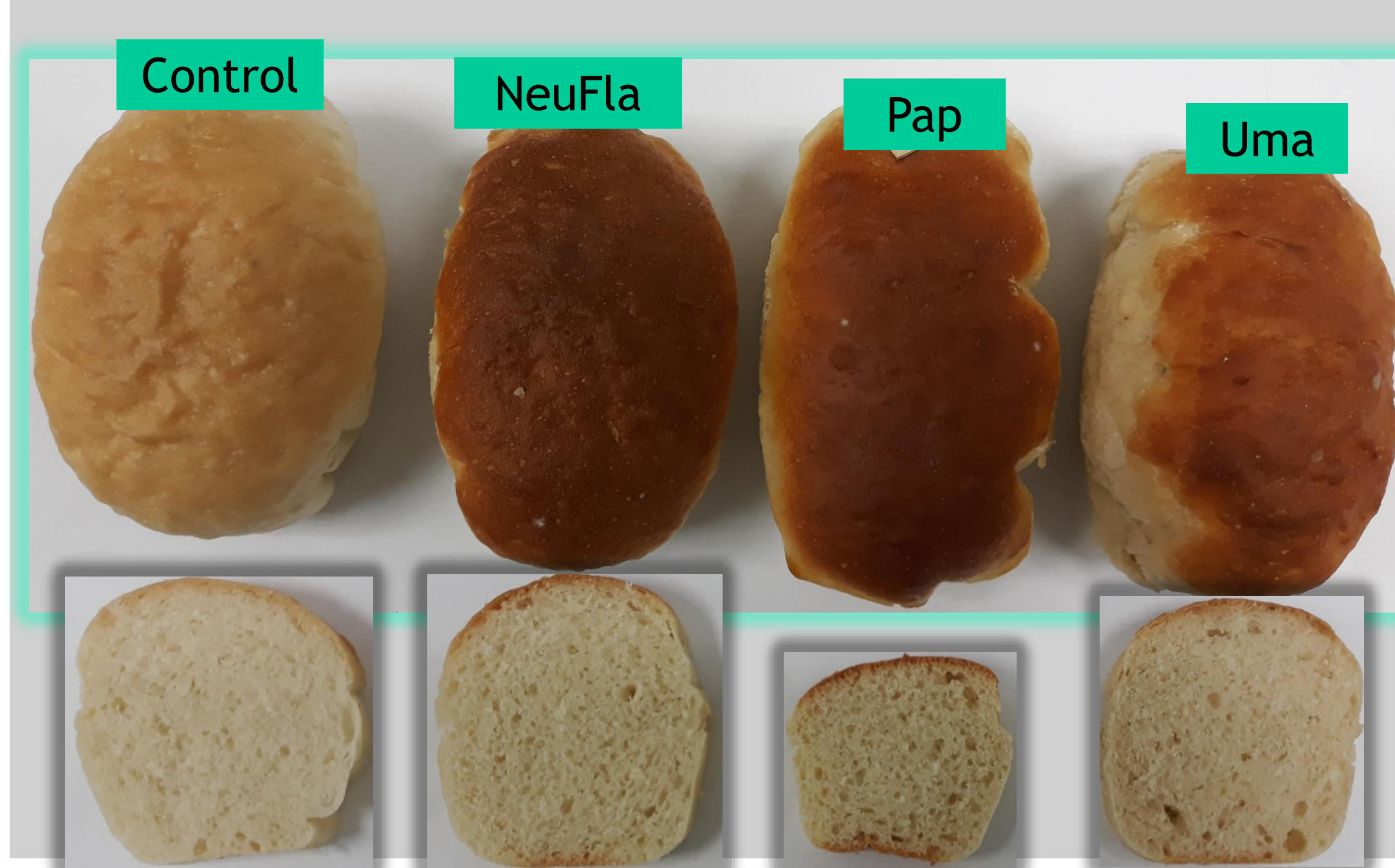


Control NeuFla Pap Uma

• Regarding the taste, cookies containing NeuFla and Pap had lower bitterness intensity than Uma (sensory analysis test).

• NeuFla and Uma cookies were more alike in volatile composition being situated in the opposite side of the PCA plot compared to Pap cookie.

Bread formulation



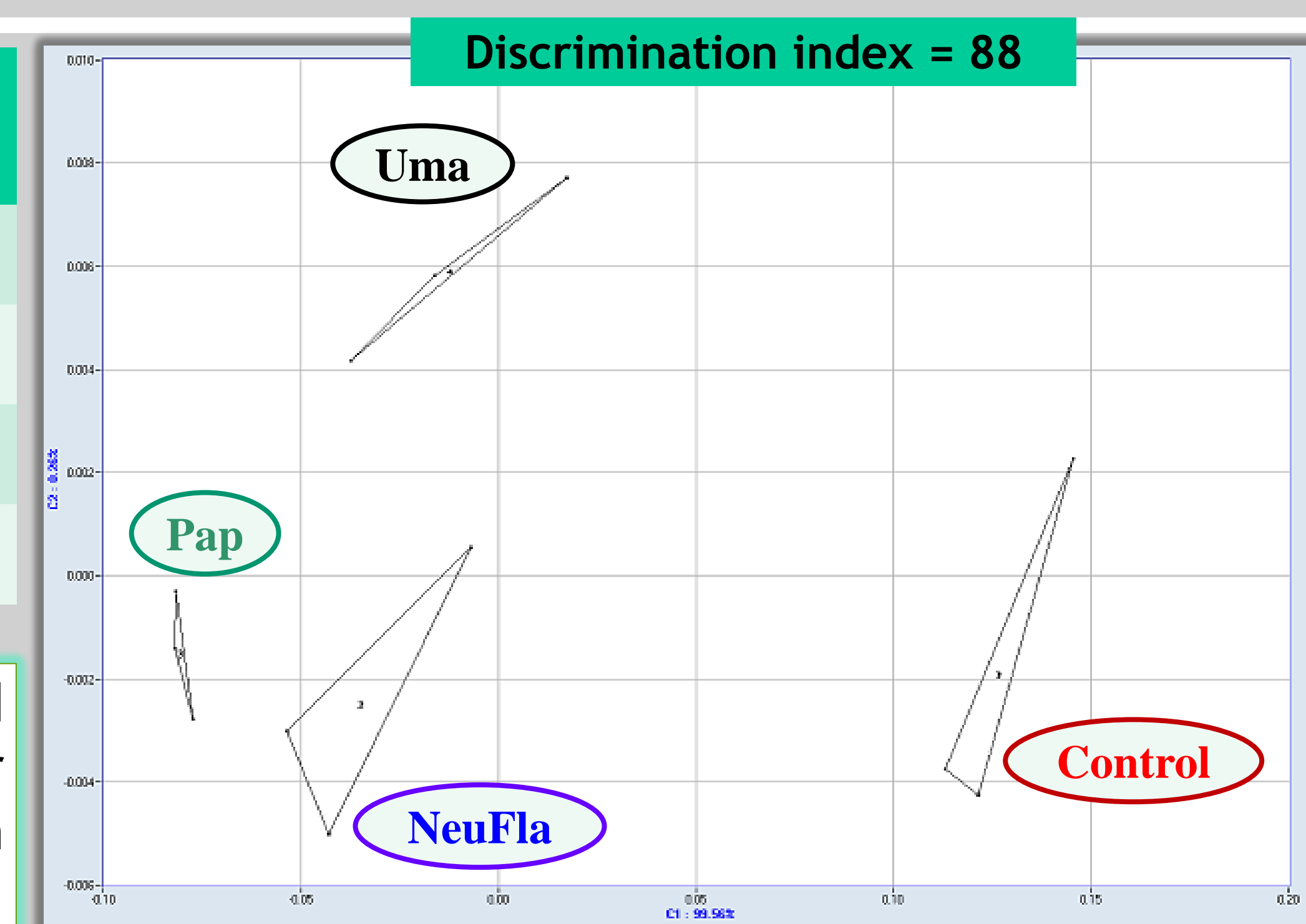
Ingredients:

- wheat flour
- yeast
- salt

- wheat flour was substituted by 5% SPH
- 100% wheat flour = control

Bread sample	Protein content (%)
Control	12.5
NeuFla	15.1
Pap	15.4
Uma	15.6

Bread samples with SPH had almost 1.2-fold higher protein content than control.



The enzymatic hydrolysis:

- ✓ increased the antioxidant capacity of the hydrolysates
- ✓ improved content of amino acids (especially, lysine → deficient in most cereal grains)
- ✓ improved the oil binding capacities of the SPHs

CONCLUSIONS

Soy protein hydrolysates obtained from SPC using the combination between Neutrase and Flavorzyme enzymes can be used as supplements in wheat flour to enhance the nutritional value of pasta cookie and bread products.

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