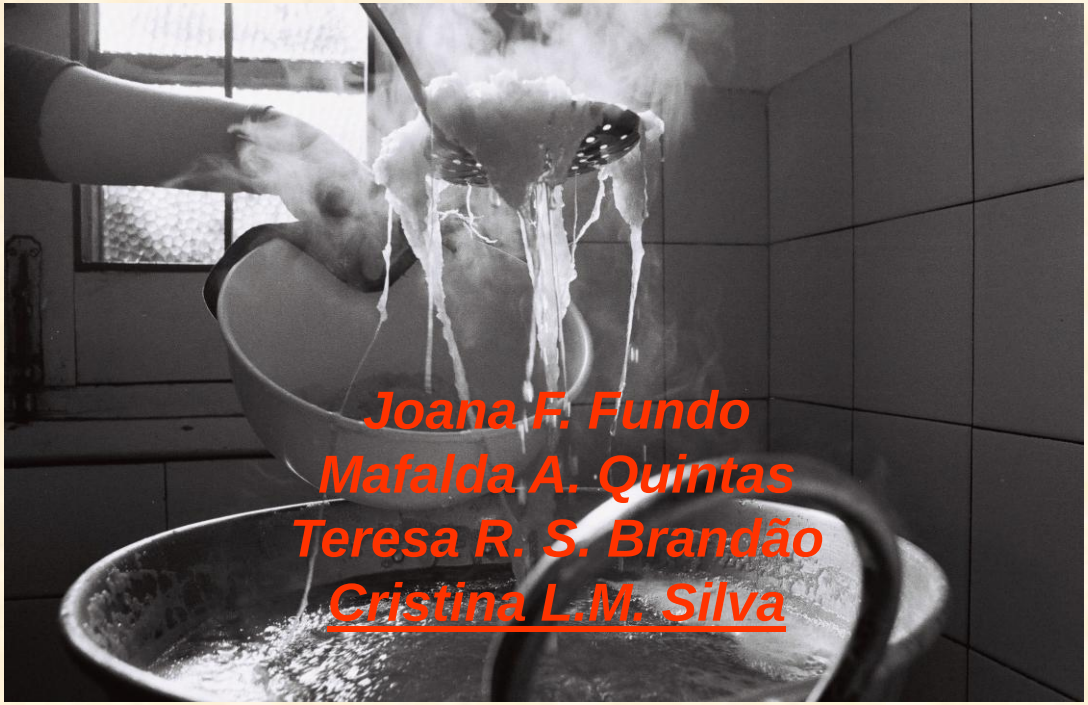
Innovating Portuguese Traditional Pastry – on the use of pasteurised egg yolk in "*ovos moles*"



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INTRODUCTION

Importance of traditional food valorisation:

- Consumer society
- Global market
- Promotion of products' diversity and development of small traders and industries

INTRODUCTION

How to do this:

- Keep and respect traditions and traditional products
- Maintenance of products' primary characteristics
- Innovate

  improving products' safety

  extending products' shelf-life
- Greater advancements in technical know-how can be provided by inter-linking with research centres

INTRODUCTION

Ovos moles characteristics:

- Renowned traditional Portuguese sweet
- Obtained through the mixture of

  uncooked egg yolk + a syrup of fine white sugar

  submitted to soft heating for a few minutes
- Can be presented in several forms

  filling other cakes

  wooden or porcelain containers

  involved in *hóstia* (a mass of flour, water and vegetal fat)

OBJECTIVE

Substitution of intact shell eggs used in traditional *ovos*

***moles* production by a safer and easier to manipulate raw**

material – pasteurized liquid egg yolk

EXPERIMENTAL SET UP

- **Shell eggs** were acquired in a local market
- **Pasteurised egg yolk** and **white** were bought in a food company
- *Ovos moles* samples were produced following the traditional recipe
- Samples were prepared by an experienced cooker
- For each case

↓

two batches were prepared and analysed

EXPERIMENTAL SET UP

Normal pasteurisation procedures

produce at least six log reductions in

Salmonella spp

Less than 1000 organisms per gram

Alterations in the sensorial and nutritional characteristics, namely:

colour
viscosity
protein content

EXPERIMENTAL SET UP

Changes caused by heat treatments alter the final product's characteristics

In order to develop a **safer** formulation with **minimized differences** from the traditional product

Study of adding **white part** as a **bulking agent**

EXPERIMENTAL SET UP

Chemical Determinations

- characterise all different formulations

Microstructure Analysis

- functional, nutritional, and sensory properties are derived from food underlying microstructure

- a basic comprehension between processing and microstructure is important for the control of products' quality

Rheological Measurements

- understand some aspects associated with food texture

Sensorial Validation

- evaluate the consumer's acceptance

EXPERIMENTAL SET UP

Four different formulations of this recipe were elaborated

white part added as a bulking agent

Characteristics	Formulation category			
	Traditional	Pasteurised egg yolk	Pasteurised egg yolk + 10% white	Pasteurised egg yolk + 20% white
	(TF)	**(PY)**	**(PY10%W)**	**(PY20%W)**
Type of product	intact	pasteurised	pasteurised	pasteurised
Volume of egg yolk (ml)	220	220	198	176
Volume of white part (ml)	0	0	22	44

Note: sugar syrup was prepared using 240g of commercial sucrose and 125 ml of water

Chemical Determinations

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Rheological Measurements

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Sensorial Validation

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- pH

measured directly

three replicates for each batch

- Colour

colour space ***Hunter*** scale

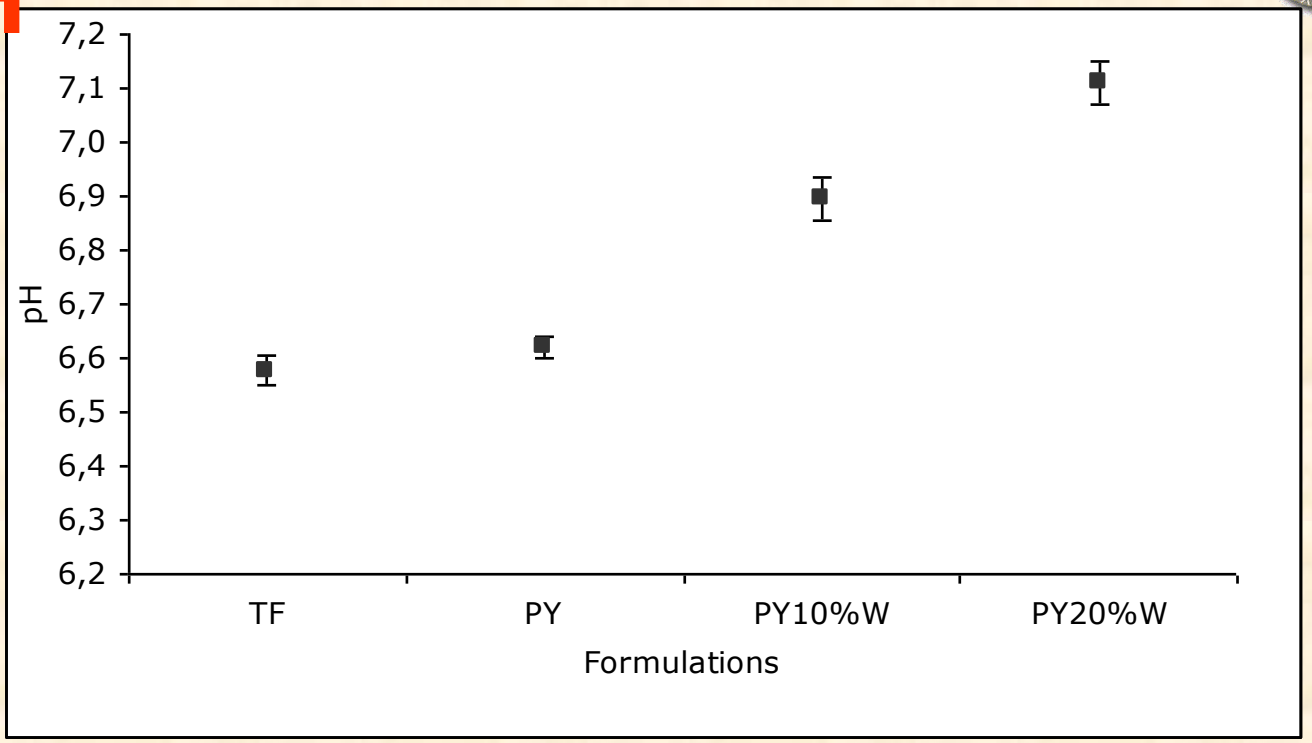
three replicates for each batch

- a_w

Testing temperature: 25 ± 1ºC

average of four readings for each sample

pH



pH values are significantly different for different formulations

egg white part addition increases pH

ANOVA (STATISTICA© 6.0; StatSoft, Tulsa, OK, USA)

colour

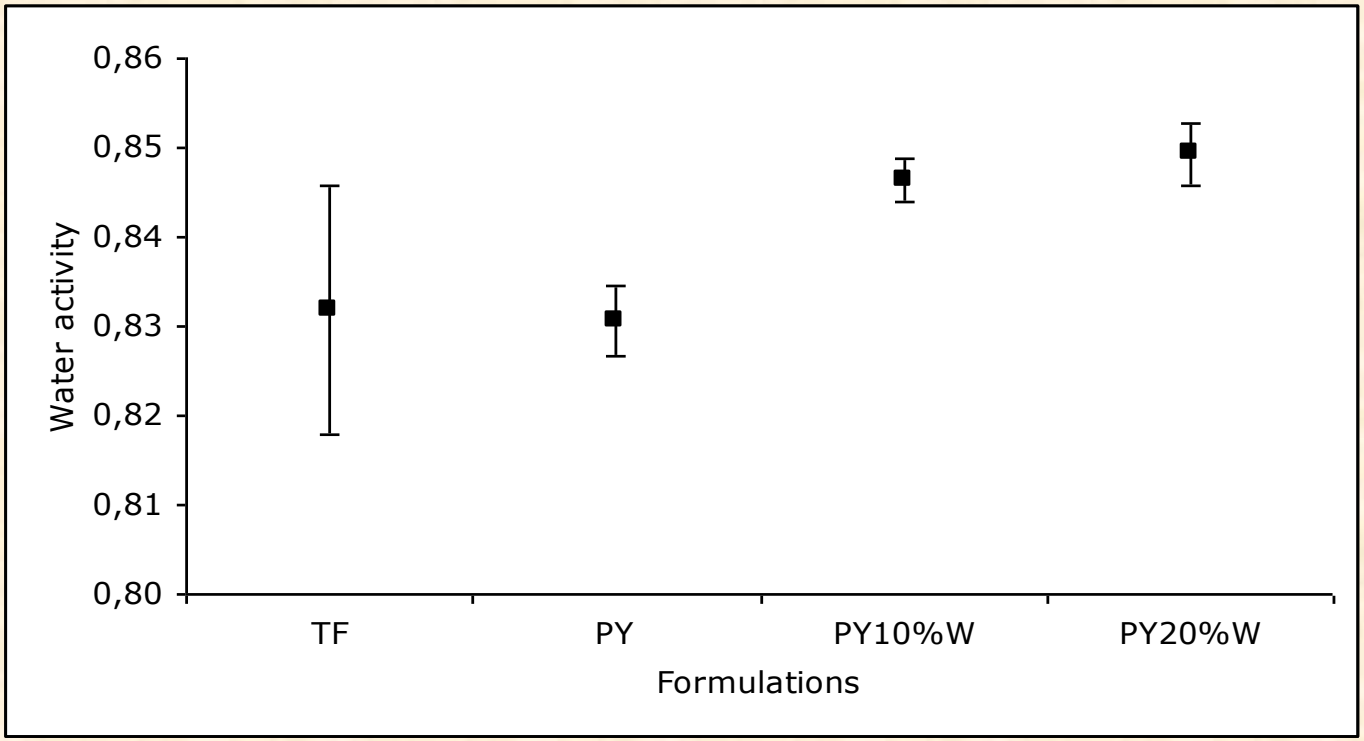
colour space → ***Hunter* scale**

results were not conclusive

heterogeneity of intact raw materials

typically, consumers are tolerant to changes in intensity of yellow colour in eggs or egg products

a_w



no differences were observed → high variation in a_w of *ovos moles* produced according to the traditional formulation

Chemical Determinations

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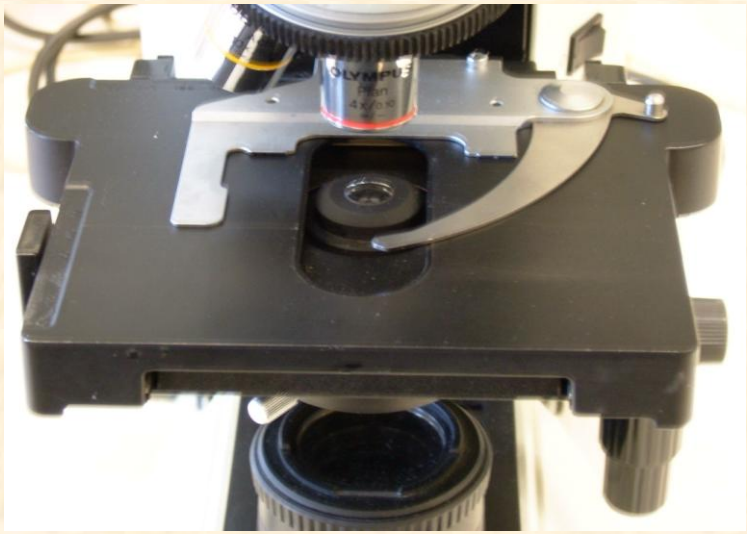
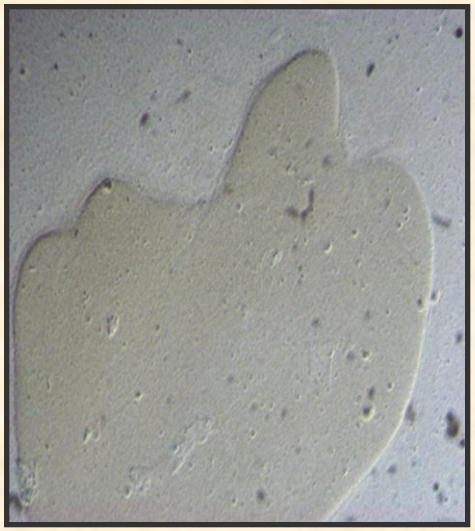
Sensorial Validation

- evaluate the consumer's acceptance

- No previous preparation was necessary
- A small amount of sample was placed directly on a slide without any dilution or any kind of chemical treatment
- Images were observed using phase contrast, and recorded using a digital camera



traditional formulations



pasteurized yolk formulations

pasteurized yolk and white formulations

Apparent differences in surface interaction of different constituents

Chemical Determinations

- characterise all different formulations

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Rheological Measurements

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Sensorial Validation

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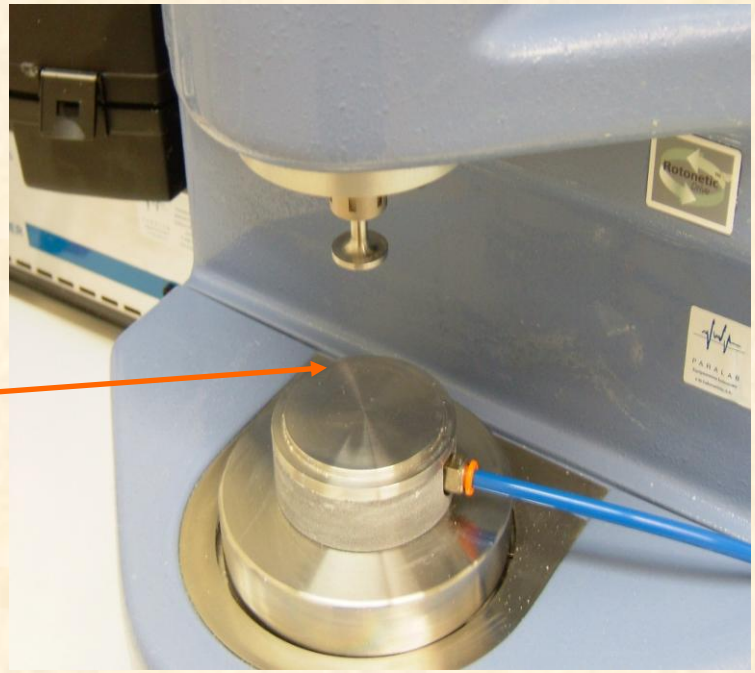
Controlled stress rheometer

(Bohlin VOR)

parallel plates (ϕ2.0cm)

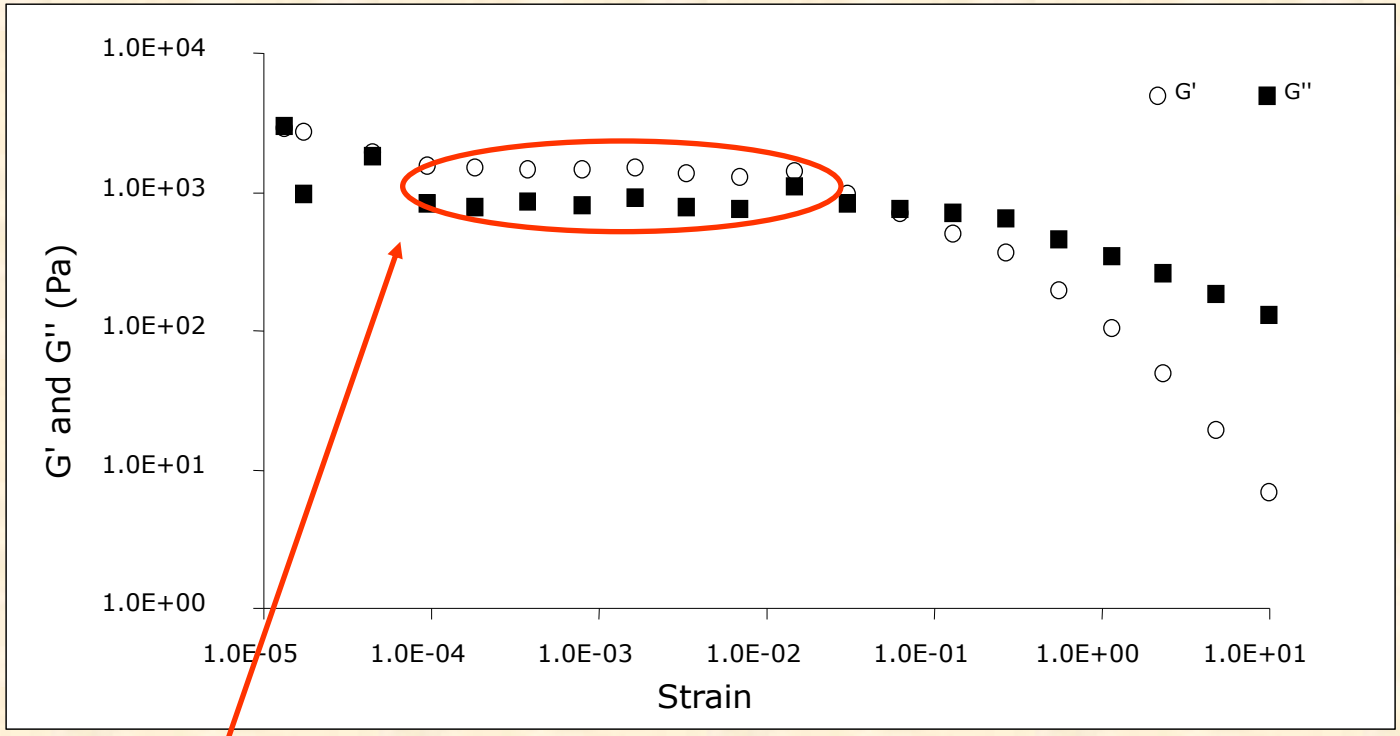
testing temperature: 25ºC



Six replicates of each formulation

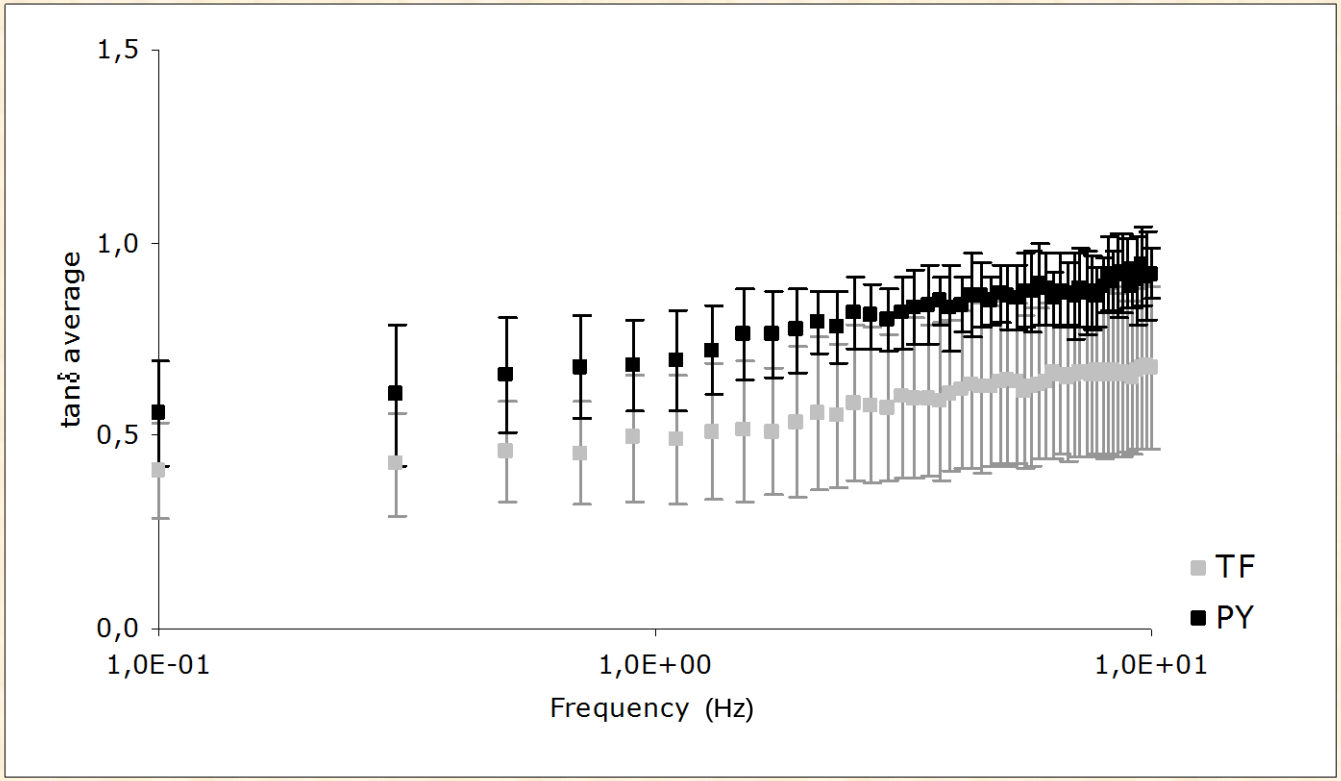
Evaluation of the linear visco-elastic region Determination of the strain	Dynamic strain sweep test frequency: 1Hz
Evaluation of frequency dependence behaviour	Dynamic frequency sweep test (strain: 1.0×10^{-3})

Typical dynamic strain sweep test in "*ovos moles*" samples



linear viscoelastic region

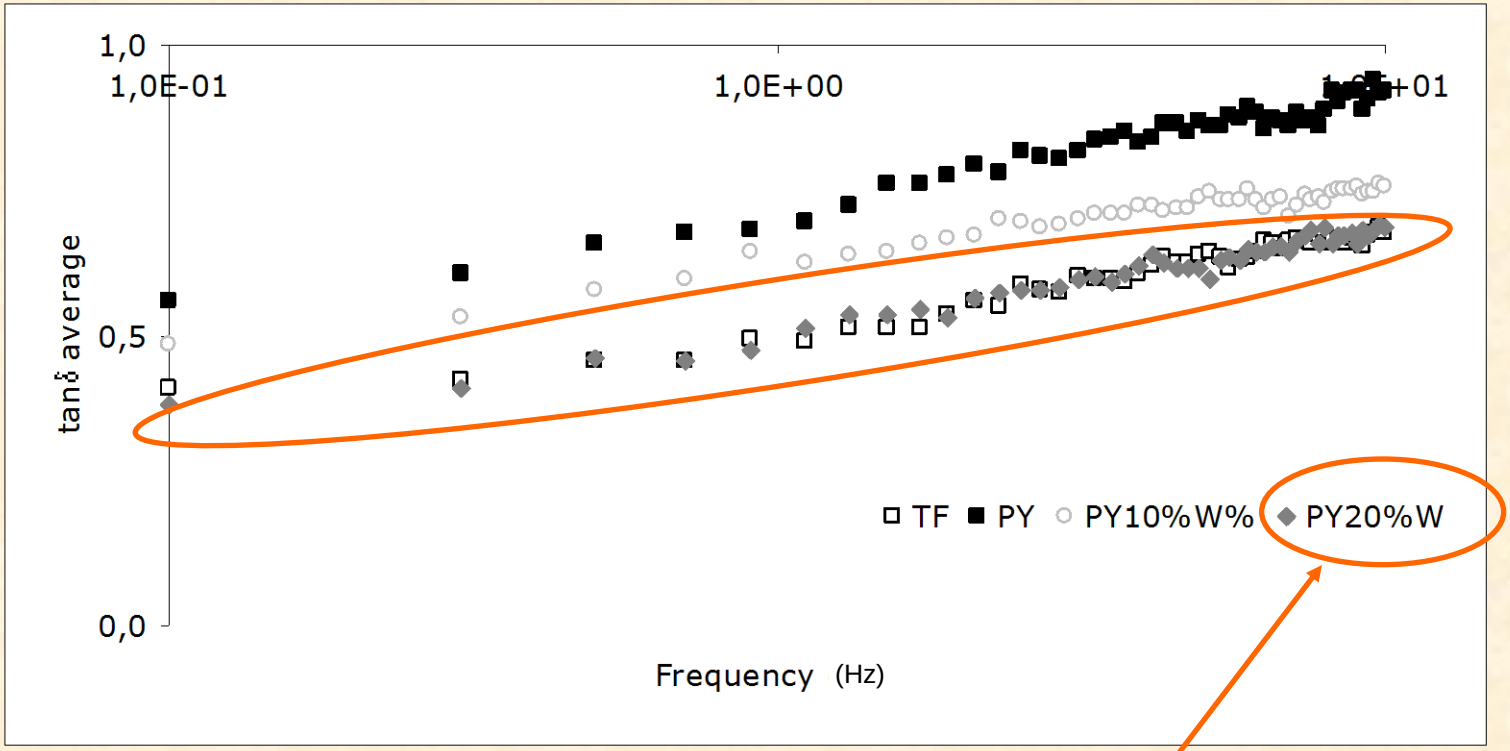
Dynamic behaviour of the TF and PY formulations



Ovos moles produced with pasteurised egg yolk present an higher tan δ

more “liquid like” behaviour

Dynamic behaviour of different *ovos moles* formulations



selected formulation

Chemical Determinations

- characterise all different formulations

Microstructure Analysis

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- a basic comprehension between processing and microstructure is important for the control of products' quality

Rheological Measurements

- understand some aspects associated with food texture

Sensorial Validation

- evaluate the consumer's acceptance

Selected formulation was tested against:

- Traditional formulation
- A commercial formulation (DEROVO, Pombal)

A preference/ acceptability test was performed:

- Comparison of the selected, traditional and commercial formulations
- Evaluation of the selected formulation without any kind of associations

- Panel of 60 non trained judges
- Semi-structure scales: score placed between one (lowest) to nine (highest)
- Samples were coded and presented in white plastic cups

Comparison of selected, traditional and commercial formulations

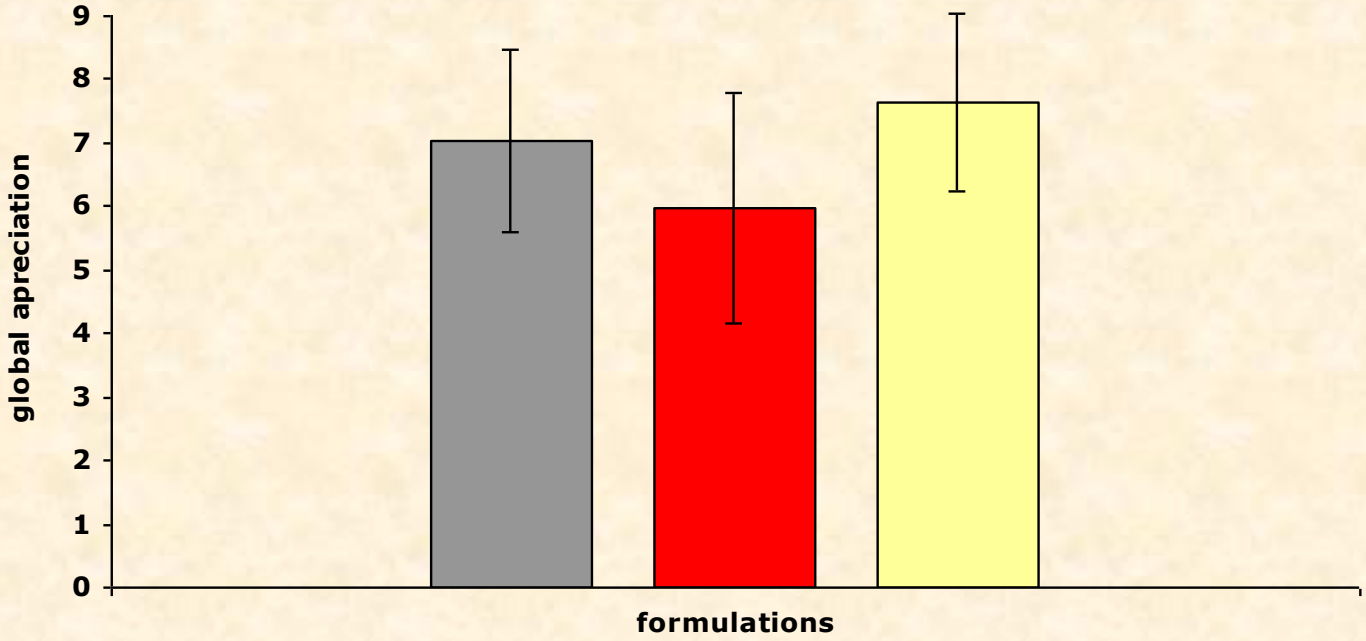
ANOVA

Variation Source	*SS*	*dof*	*MSS*	*F*	*P value*	*F critic*
Judges	195,090909	65	3,0013986	1,3639831	0,068453	1,4096047
Formulations	93,9393939	2	46,969697	21,345339	9,63E-09	3,0658391
Error	286,060606	130	2,2004662			
Total	575,090909	197				

formulations are significantly different

ANOVA (Excel 2000, Microsoft®, USA)

Comparison of selected, traditional and commercial formulations



commercial formulation was given the best classification

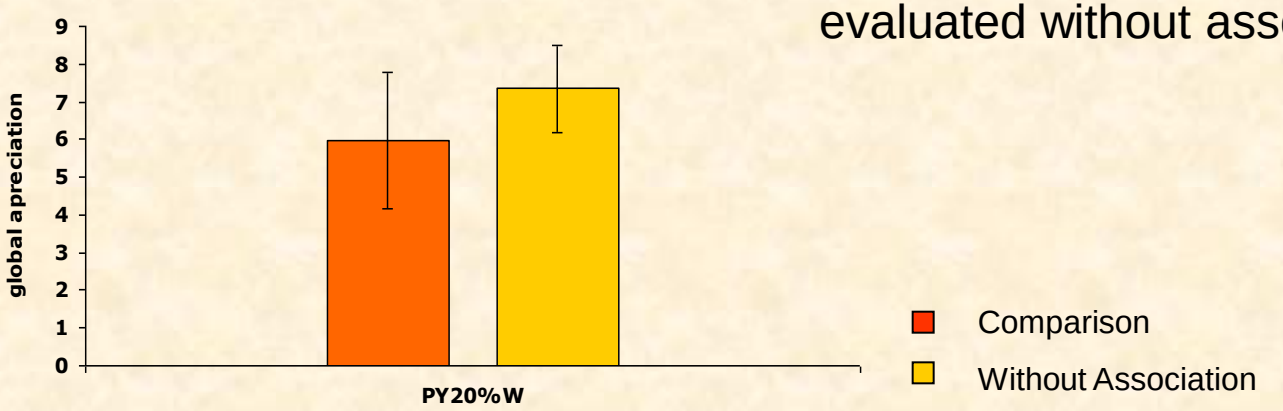
Evaluation of the selected formulation without association

T Student test

$H_1: \mu_{comparison} - \mu_{without\ association} < 0$

p value < 0,05 ($1{,}10815 \times 10^{-6}$)

selected formulation classification is significantly higher when evaluated without association



T Student test (Excel 2000, Microsoft®, USA)

Evaluation of the selected formulation without association

against → traditional formulation

→ commercial formulation

ANOVA

Variation source	*SS*	*dof*	*MSS*	*F*	*P value*	*F crític*
Judges	116,3051	58	2,005260082	1,104814	0,321104	1,437545
Formulations	9,457627	2	4,728813559	2,605378	0,078195	3,074447
Error	210,5424	116	1,815020456			
Total	336,3051	176				

there are no significant differences between formulations

ANOVA (Excel 2000, Microsoft®, USA)

CONCLUSIONS

Properties of traditional *ovos moles* and tested formulations were characterized

A new formulation of *ovos moles* was developed

This formulation is safer and sensorialy identical to traditional and commercial formulations

Results shall be validated using shelf-life studies

Thank you for your attention!

The authors acknowledge the financial support through Fundação para a Ciência e a Tecnologia, Ministério da Ciência e do Ensino Superior – Project FCT Sapiens, POCTI/49194/EQU/2002

Development of a computational tool to predict the composition of new “sugar free” sweet formulations for traditional Portuguese pastry industry

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