

# Antioxidant fortification of yogurts using a wine distillation by-product

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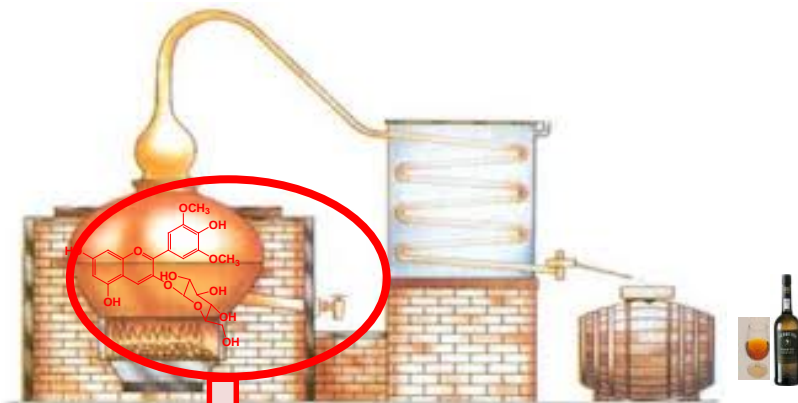
**Total Food 2017**

Exploitation of agri-food chain wastes

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A by-product rich in phenolic compounds with antioxidant activity

may be incorporated into novel food products with functional properties



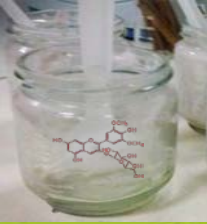
## Health benefits

- Against cancer, circulatory, neurodegenerative diseases
- Decrease of inflammatory processes and platelet aggregation
- Prevention of oxidation of human low-density lipoproteins
- Maintenance of oral health

- Yogurt is a fermented dairy product important for human diet.
- Fermented dairy foods have high consumer popularity and positive health benefits, due to ingested live microorganisms (probiotics).
- Contribute to the maintenance and balance of the intestinal flora, facilitating digestion, and helping prevent constipation or other gastrointestinal disorders.
- Health-promoting properties related to boosting the immune response and HDL-cholesterol increase.
- Antimutagenic and anticarcinogenic effects, protection against colorectal adenomas.

(O'Connel & Fox, 2001; Douaud, 2007; Stanton et al., 2005; Lankaputhra & Shah, 1998; Matsumoto & Benno, 2004; Wollowski et al., 2001; Senesse et al., 2002).

Yoghurts enhanced with value-added ingredients gain positive consumer perception (Allgeyer et al., 2010)

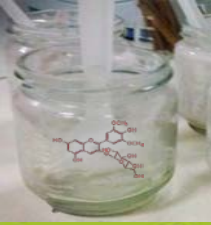


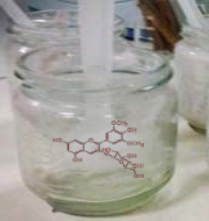
## General Objective

- The development of a new yogurt, attractive from the organoleptic point of view and with the advantage of being rich in phenolic compounds with antioxidant properties.

## Specific Objectives

- Perform a sensory evaluation;
- Determine acidity;
- Evaluate the antioxidant activity of yoghurts.





Red wine was dealcoholized



Phenolic solution

## Experimental

Phenolic solution  
(0, 5 or 10 mL)

Mixed fruit or  
Cinnamon aroma



Semi skimmed milk  
powdered milk  
Natural yogurt  
sugar



- Control Mixed Fruit
- Mixed Fruit with 5 or 10mL of phenolic solution
- Control Cinnamon
- Cinnamon with 5 or 10mL of phenolic solution

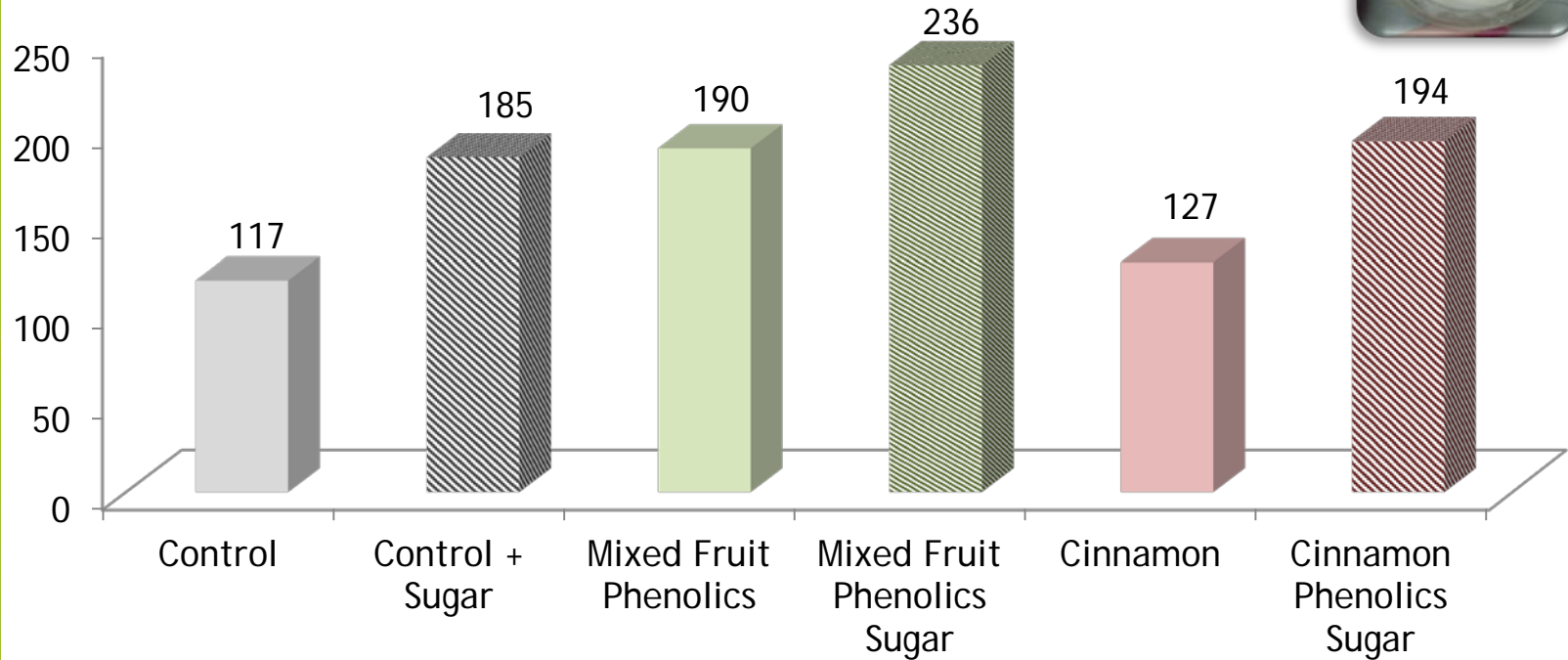
Sensorial evaluation  
Acidity  
Antioxidant activity



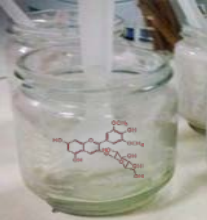
# Sensory Evaluation

- 54 untrained panelists
- Test of ordination (1-less liked to 6-most liked)
- Sugar effect

## Results



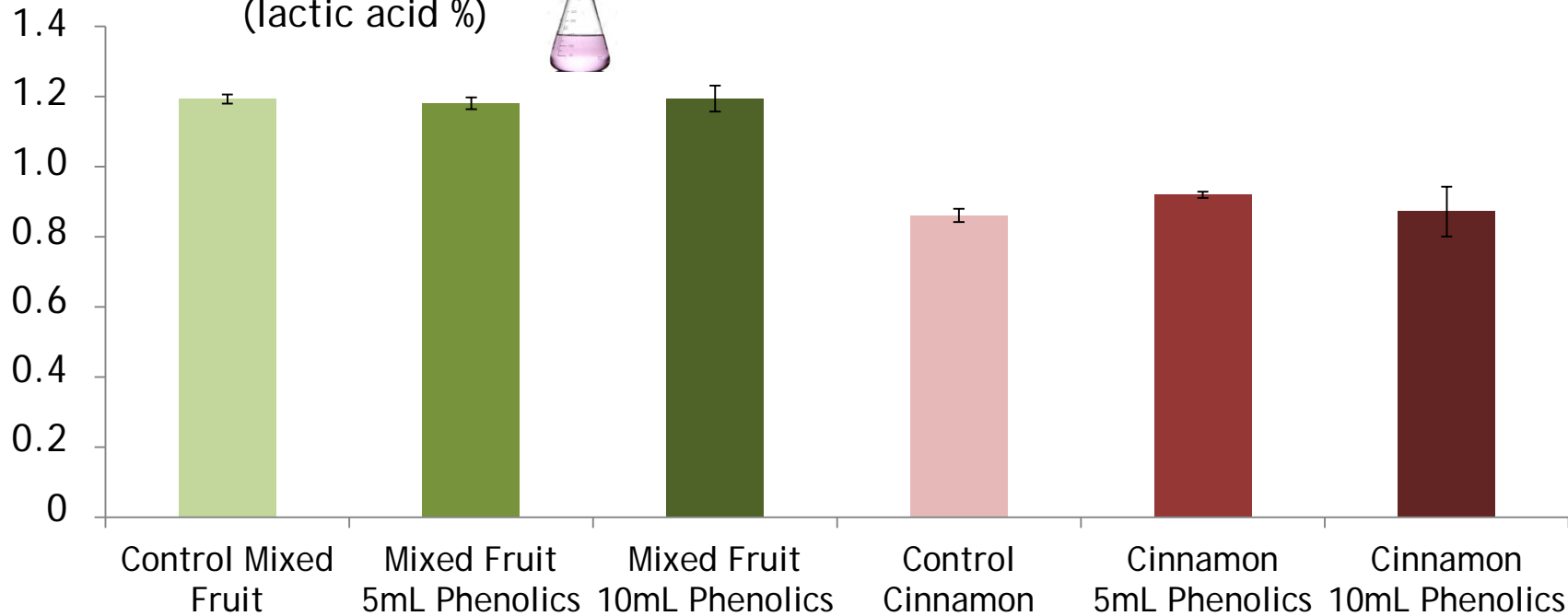
The addition of sugar produced better results and higher preference



Acidity  
(lactic acid %)

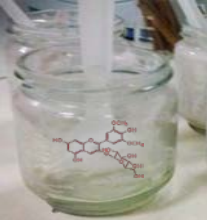


Results



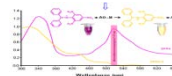
- Acidity does not vary depending on the amount of phenolic solutions added to the yogurt.
- The yogurt with mixed fruit aroma has a slightly higher acidity than that with cinnamon aroma.



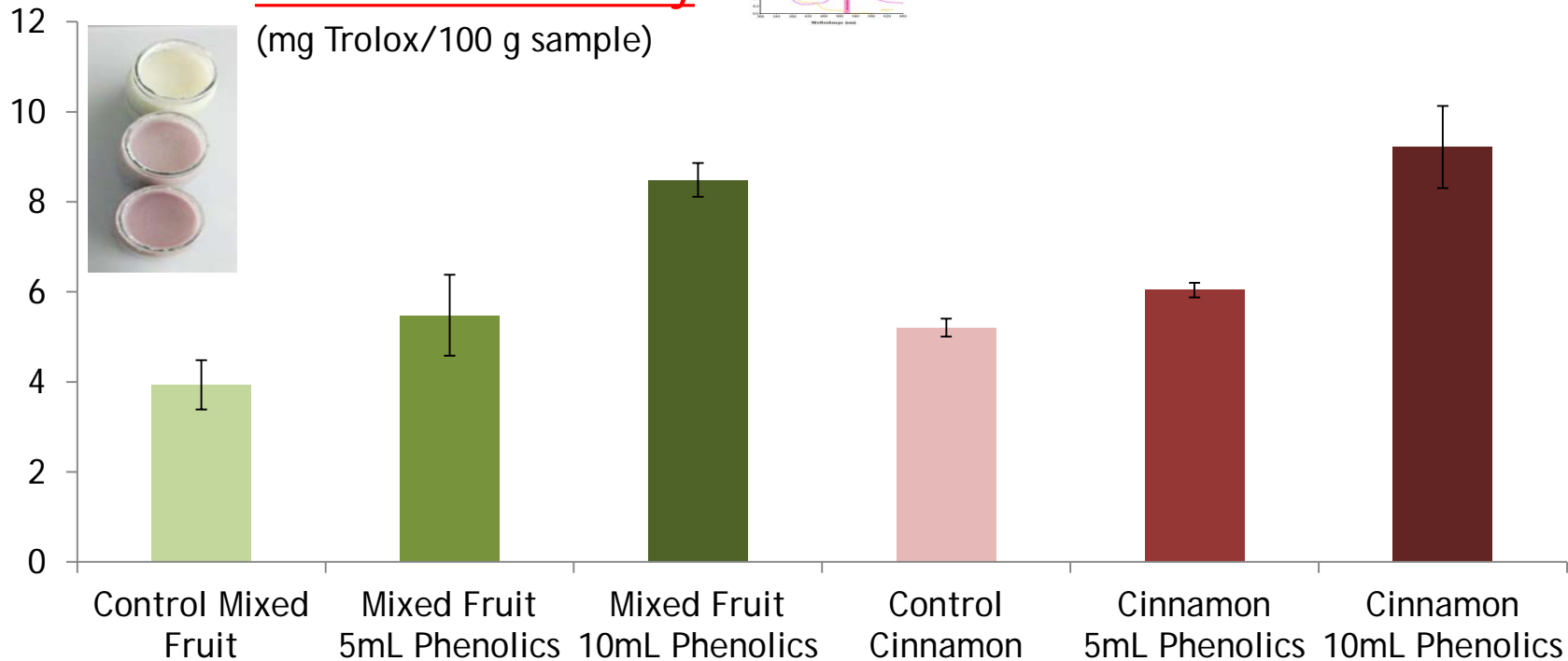


## Antioxidant activity

(mg Trolox/100 g sample)



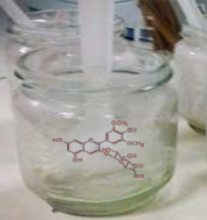
## Results



The antioxidant activity observed for the control yogurt due to bacterial metabolic activity associated with a reduction/modification of the non-phenolic compound (Everette et al., 2010).

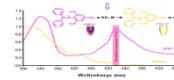




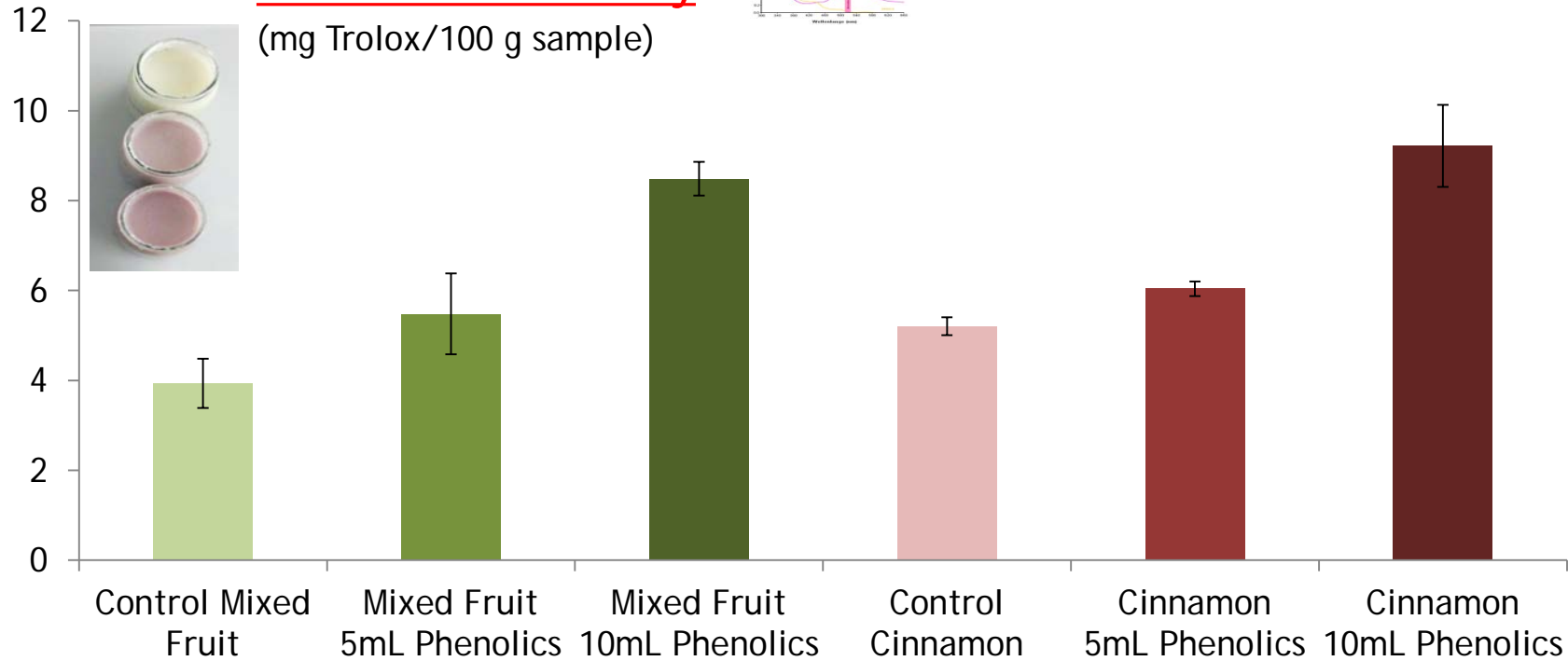


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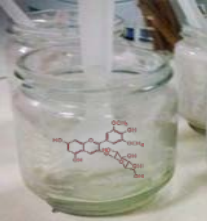


## Results



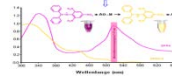
The addition of the phenolic-rich solution caused an increase in the content of antioxidants, which was proportional to the amount of added by-product.



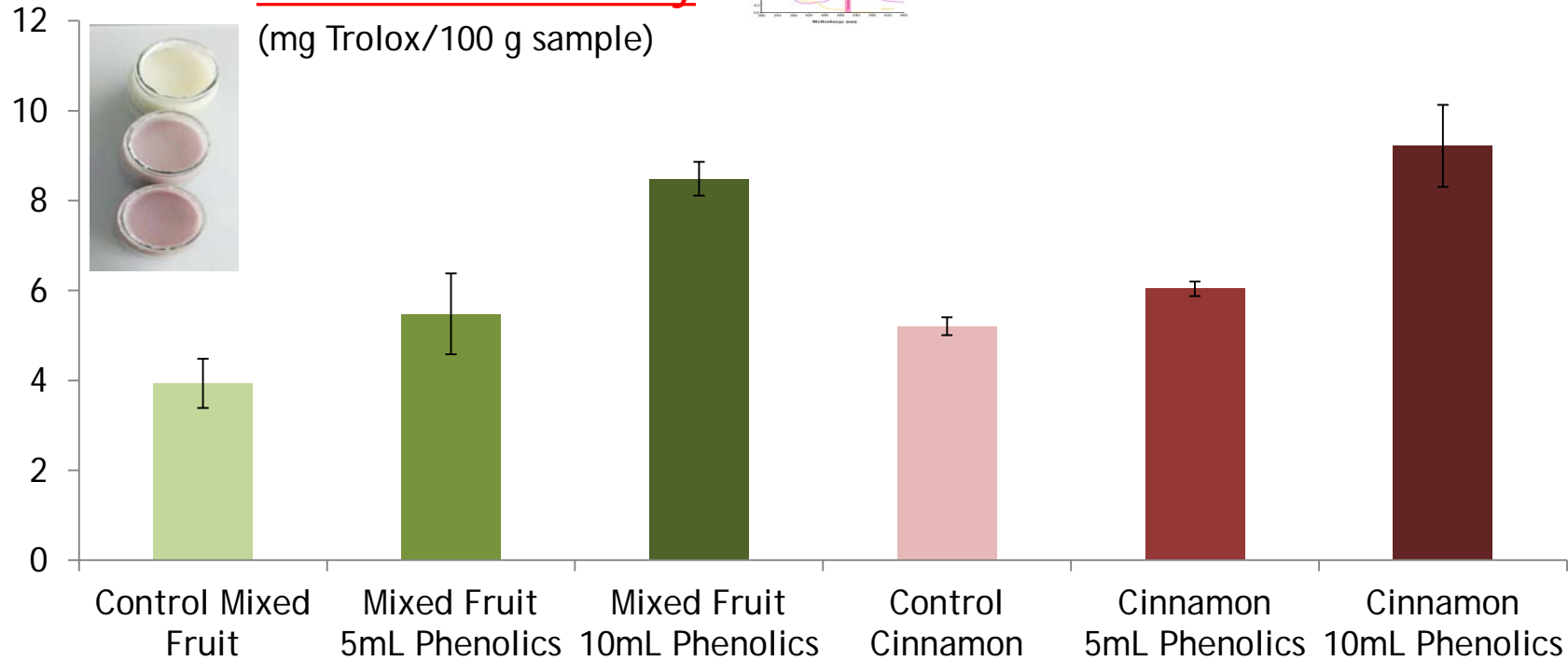


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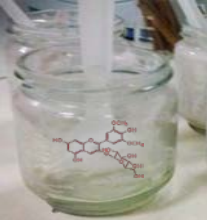


Results



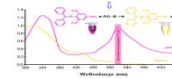
Furthermore, the yogurts with cinnamon presented slightly higher antioxidant activity than the corresponding with mixed fruits.



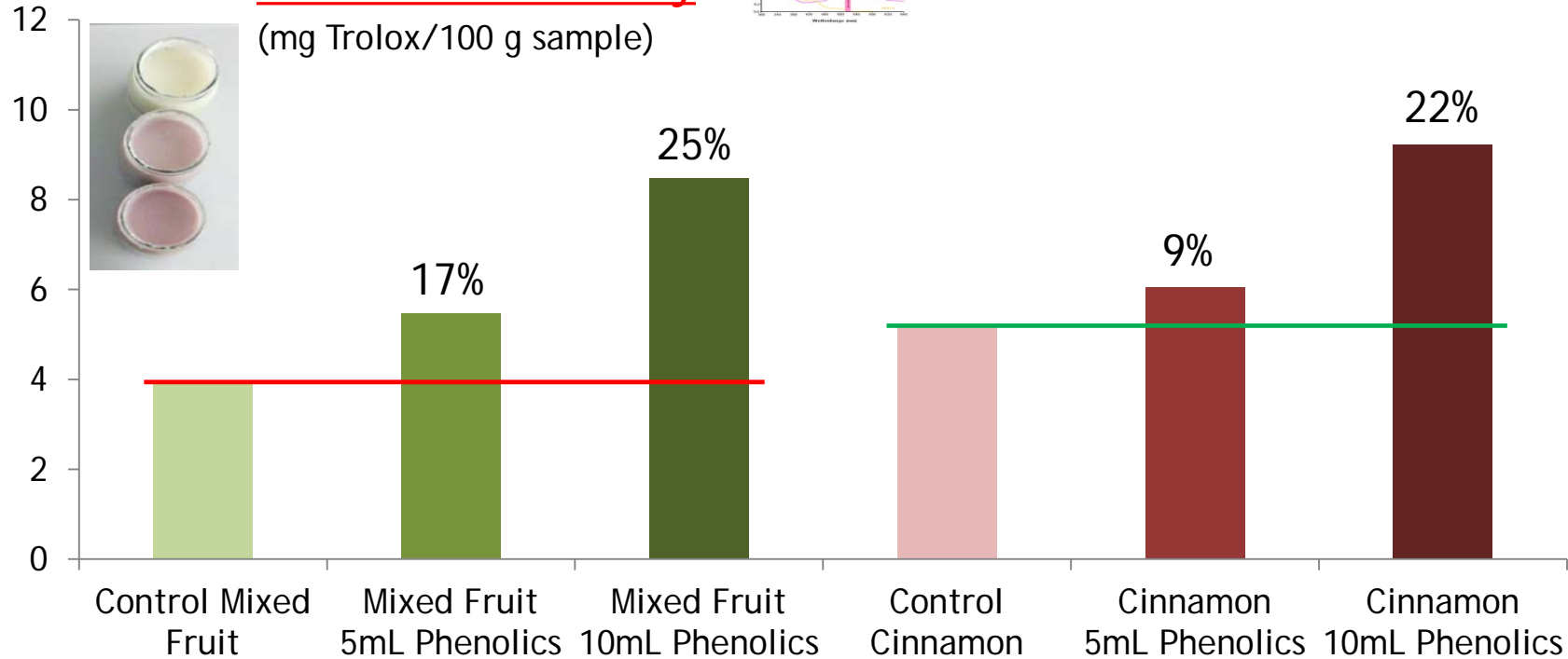


## Antioxidant activity

(mg Trolox/100 g sample)



## Results



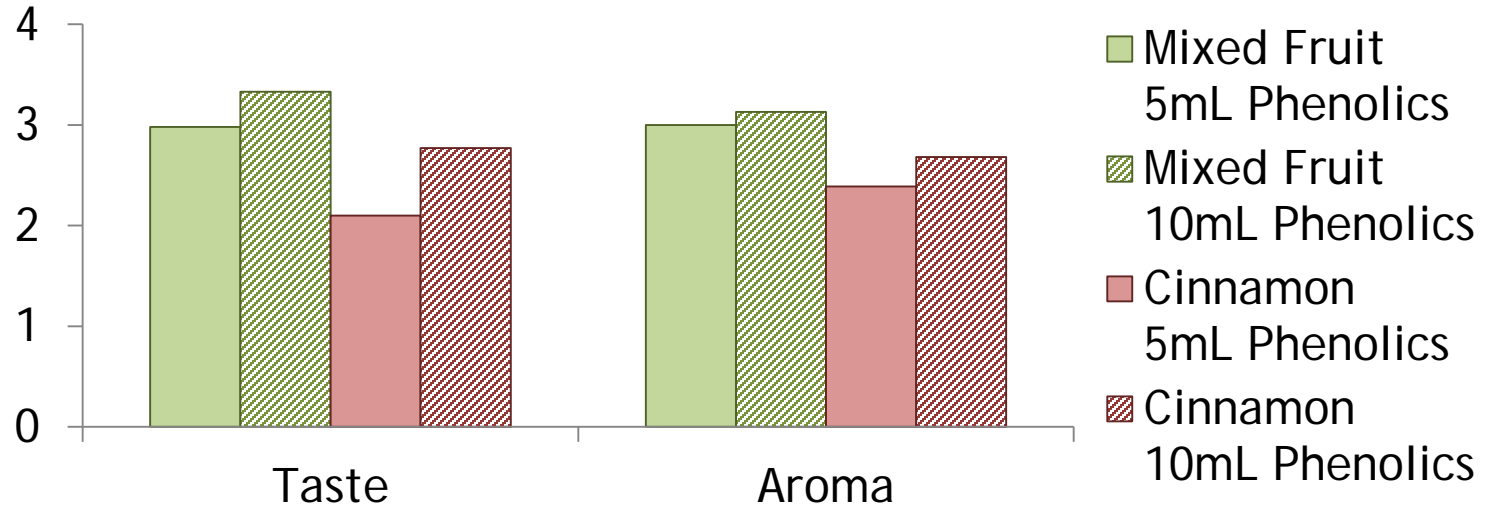
It was observed a low percentage of recovery of antioxidant activity.



# Sensory Evaluation

## Results

- Yogurts fortified with phenolic solution
- 1-unpleasant to 4- very pleasant



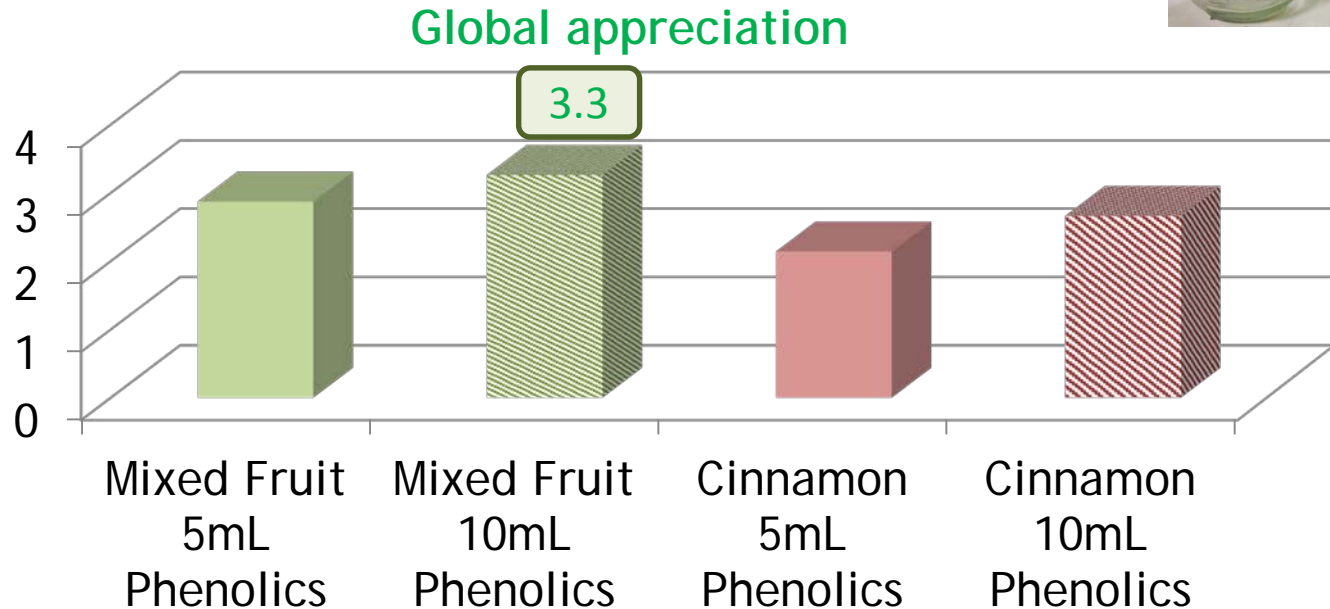
- The samples with mixed fruit aroma were preferred to cinnamon aroma.
- The yogurts containing higher amount of phenolic solution got better appreciation.



## Sensory Evaluation

- Yogurts fortified with phenolic solution
- 1-unpleasant to 4- very pleasant

## Results

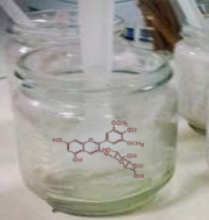


The yogurt with mixed fruit aroma and 10 mL of phenolic solution obtained the highest score.

- The addition of the by-product solution did not cause an observable effect on acidity, an important organoleptic factor for consumer acceptance.
- The products developed possess antioxidant activity proportional to the amount of added phenolic solution .
- The results of sensory evaluation revealed that the fortified yogurts were preferred when compared with the control ones.
- In addition, it was possible to conclude that the yogurt with mixed fruits, sugar, and phenolic-rich solution was preferred by the panellists, getting the highest score.







THANK YOU  
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and CI&DETS for their financial support



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