

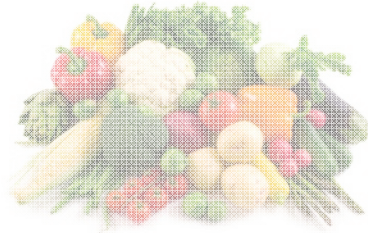
Less fat and less sugar in muffins and madeleines

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Healthy eating is essential to prevent diseases and promote health



Demand of consumers for healthier foods continues to increase



To alter composition of foods to develop healthier products while maintaining **sensory quality**, consumer acceptance, affordability, sustainability



■ Sensory properties

- Loss of taste intensity (sweetness)
- Loss of overall flavour
- Loss of mouth-feel and texture perception

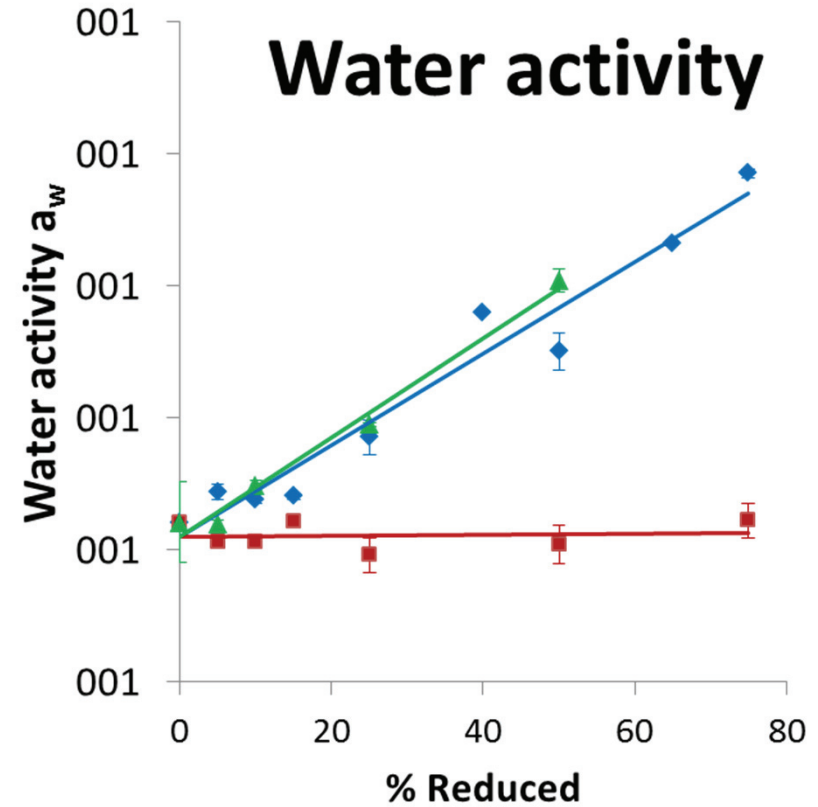
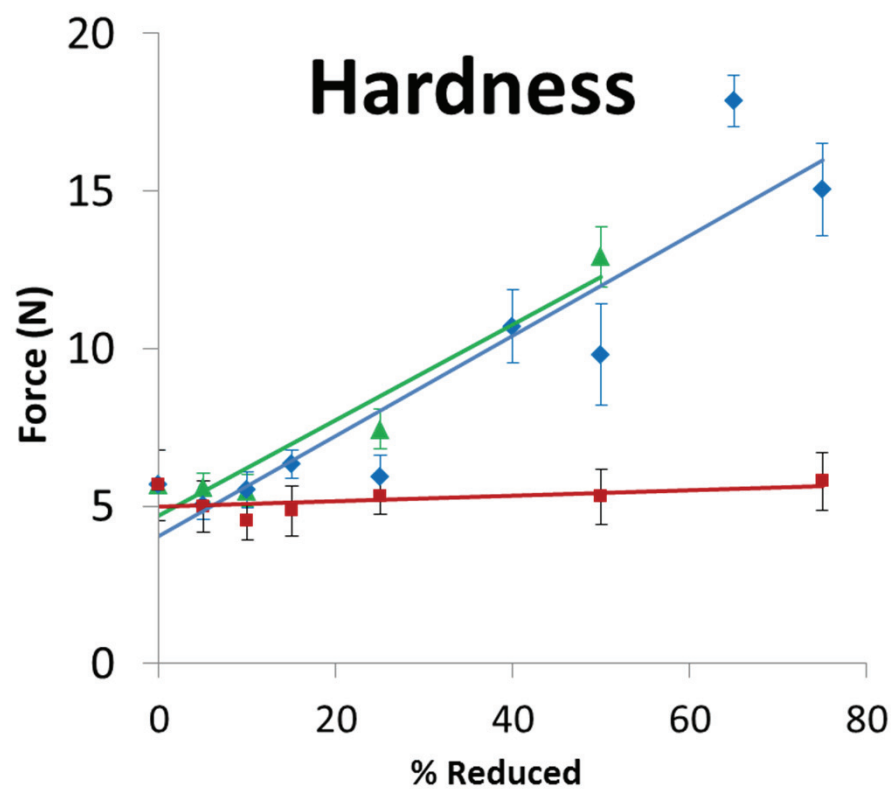
=> Decline in preference and product acceptability

■ Functional properties

- Structuring processes during baking and food structure change

=> Manufacturing problems, unacceptable texture





▲ sugar and fat ◆ sugar ■ fat

- Oil reduction does not change hardness and water activity.
- Sugar reduction changes hardness and water activity.

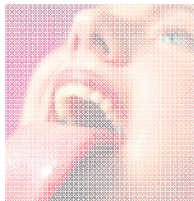




Stepwise gradual reduction over time: “health by stealth”



Sugar and fat replacement



Odours to enhance taste and flavour



- Decrease sugar and fat content in products over months/years in small steps
- Gradual reduction steps are small => consumers do not notice changes
- Consumers “Learn to Like” sugar and fat reduced foods
- Significant reductions achieved by food industry especially when used by all manufactures
- Reduction level will be reached below which changes in sensory properties are noticed and products become not acceptable





- Triangle test
- Choose the sample that is different from the other two samples:



A



B



A





- Triangle test
- Choose the sample that is different from the other two samples:



A



B



A



A



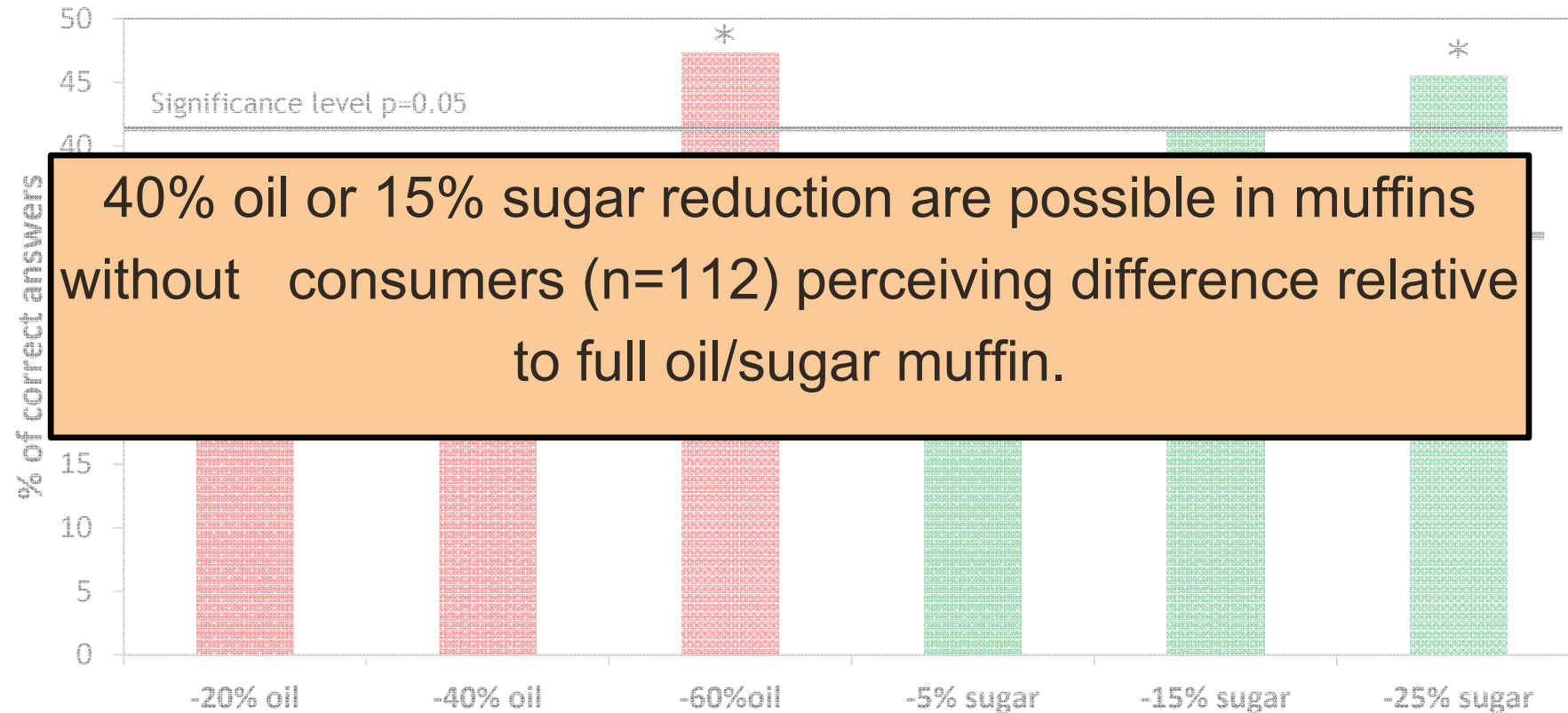
A



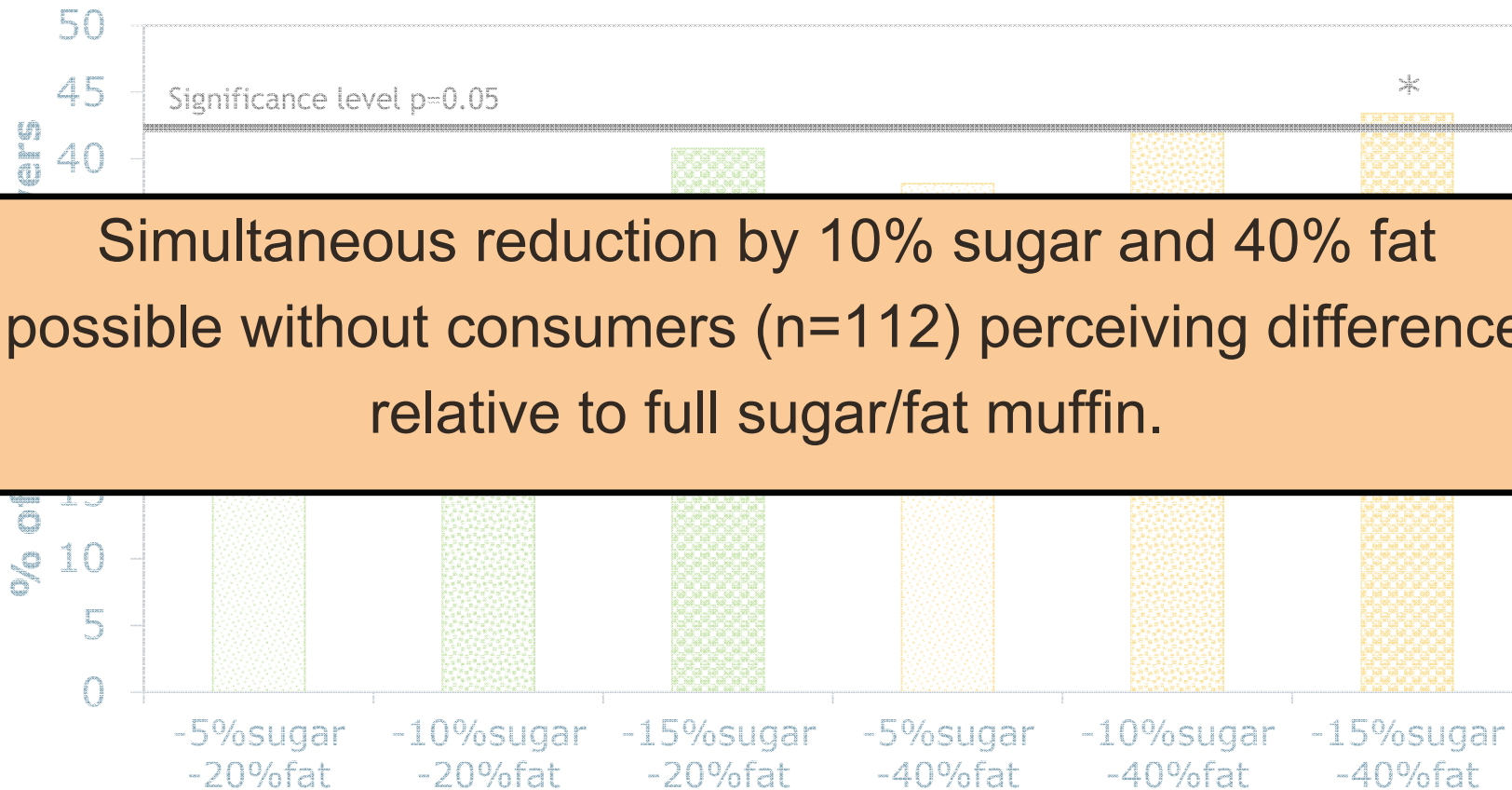
B

- Statistical significance testing is used to determine whether or not samples are different

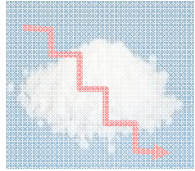




40% oil or 15% sugar reduction are possible in muffins without consumers (n=112) perceiving difference relative to full oil/sugar muffin.



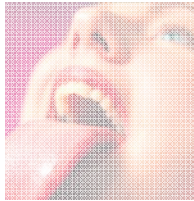
Simultaneous reduction by 10% sugar and 40% fat possible without consumers (n=112) perceiving difference relative to full sugar/fat muffin.



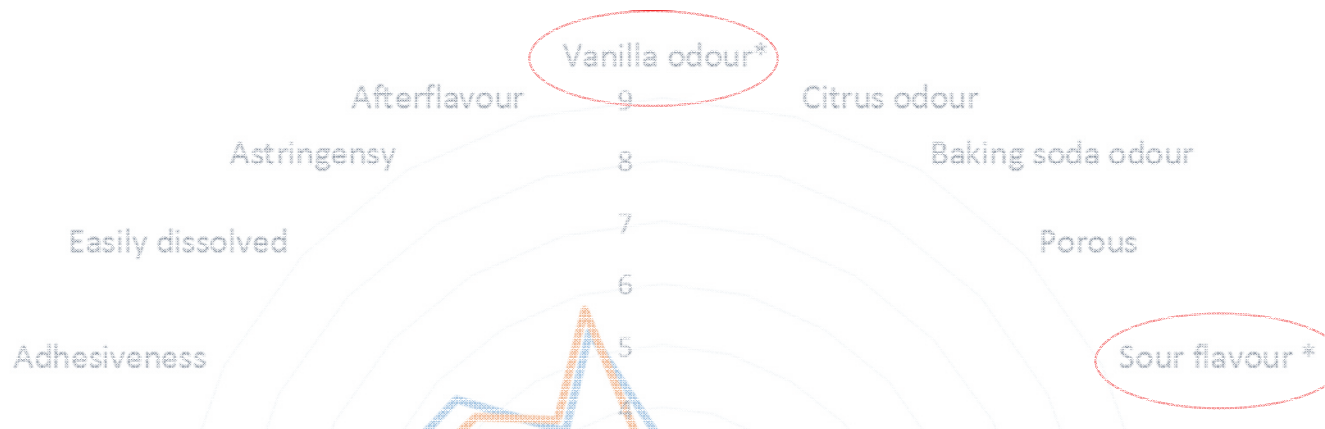
Stepwise gradual reduction over time: "health by stealth"



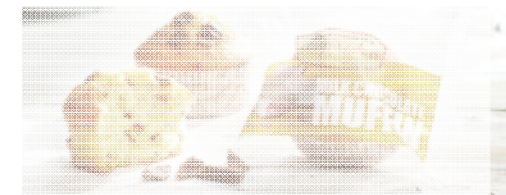
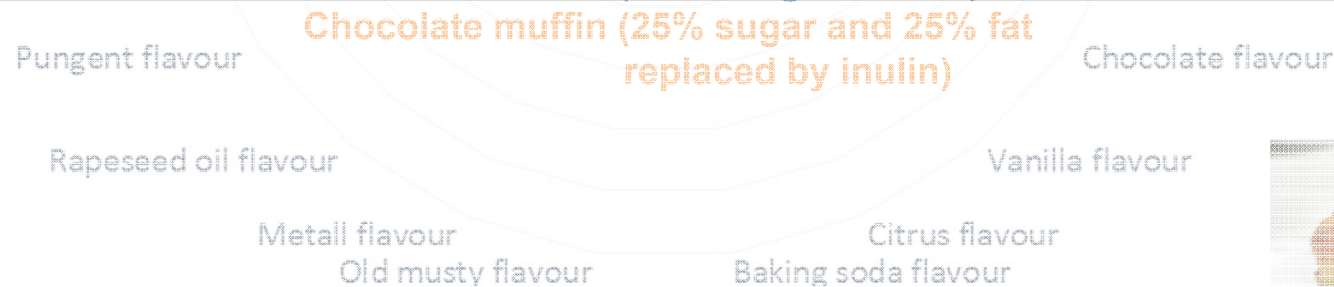
Sugar and fat replacement

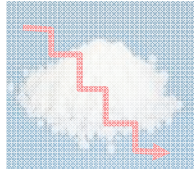


Odours to enhance taste and flavour



Simultaneous reduction of 25% sugar and 25% fat in commercial muffins is possible by partial replacement of sugar and fat with inulin while maintaining technical, organoleptic and hedonic properties.





Stepwise gradual reduction over time: “health by stealth”



Sugar and fat replacement

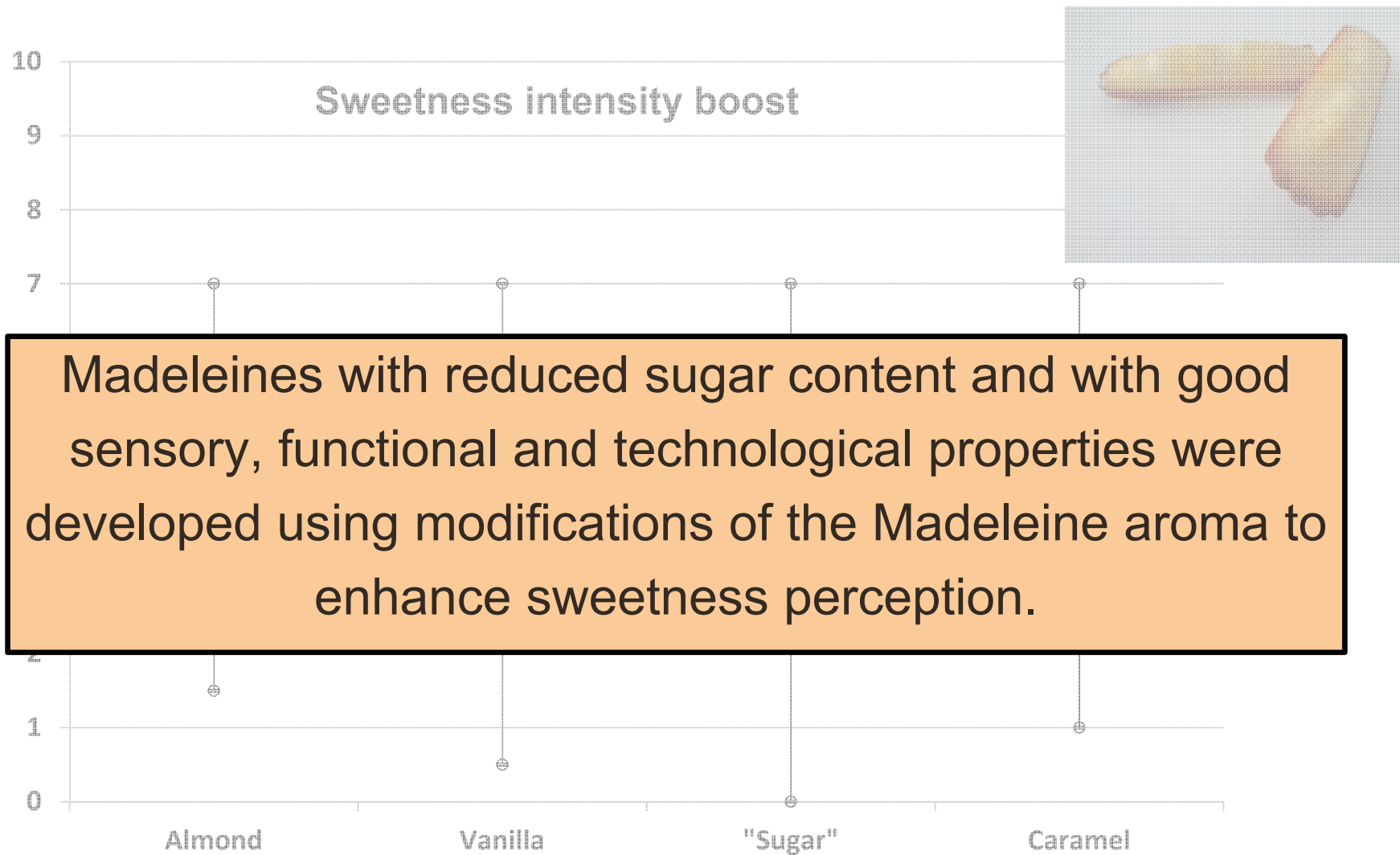


Odours to enhance taste and flavour

- **Odor induced sweetness enhancement**
- Use aromas that are associated with sweetness (i.e. caramel, vanilla, almond) to enhance sweet taste
- Cross modal odor – taste interaction

Tasting with your nose!







Stepwise gradual reduction over time: “Health by stealth”

10% sugar and 40% fat reduction possible (muffins)



Sugar and fat replacement by inulin

25% sugar and 25% fat reduction possible (muffins)



Odours to enhance taste and flavour

**Sugar and fat reduction possible while optimizing flavour
(madeleines)**

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Thank you for your attention!

