



General information	
PPP-number	DFI-AF-18006 (AF-17026)
Title	How low can you go: Consumer methodology and strategies for maintaining sensory quality of novel healthy foods.
Theme	
Implementing institute	Wageningen Food and Biobased Research
Project leader research (name + e-mail address)	Marcel Meinders marcel.meinders@wur.nl
Coordinator (on behalf of private partners)	Christien van Beusekom (Crisp Sensation) Javier Ignacio Sáinz Lobo (Prodalysa)
Project-website address	https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksprojecten-LNV/Expertisegebieden/kennisonline/How-low-can-you-go-1.htm
Start date	1-1-2018
Final date	31-10-2021

Approval by the coordinator of the consortium	
The annual report must be discussed with the coordinator of the consortium. The "TKI's" appreciate additional comments concerning the annual report.	
Assessment of the report by the coordinator on behalf of the consortium:	Approved
Additional comments concerning the annual report:	

Summary of the project	
Problem definition	The daily intake of sodium, sugar, and fats by modern western consumers, looking for convenience in preparation combined with the increasing snacking trend, is too high. This leads to health issues and rising costs of healthcare. In many countries, both the food industries and consumers have pledged to make western diets healthier. However, the assortment of processed foods meeting nutrition and health requirements is still small and available products do not often meet convenience and expectations.
Project goals	To achieve breakthrough innovations in the following areas: 1. fundamental insights into the functional role of ingredients and their interactions in the complex food matrix during processing, 2. physical and chemical based models that link (thermo-dynamical) ingredient properties and ingredients composition to the mechanical and sensorial properties of food, 3. fundamental insights into the role of stevia derived glycosides and their interactions with other sugars, sweeteners and enhancers on sweetness perception and metabolism. Using state-of-the-art technologies two work packages are defined, being WP1: Functionality of stevia derived glycosides WP2: Ingredient interactions and processing in complex food matrices <i>Desired impact:</i>

	<p>The proposed project aims at developing new strategies for developing convenient and healthy (e.g. sugar and/or fat reduced) foods (impact for food sector and society) allowing food manufacturers (impact for the food sector) to produce new food products that meet convenience, shelf-life, nutrition, health and preference requirements (impact for the society) and will be successful on the market. The following deliverable is intended: Knowledge-based strategies to create foods with a healthier formulation while meeting consumer's expectations</p>
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Results	
Planned results 2019	<p>WP1</p> <ul style="list-style-type: none"> • WP1.1 Literature study to increase basic understanding of stevia glycosides-receptor interactions. • WP1.2 Characterisation of sample properties and receptor-binding effects • WP1.3 Design culture method to add saliva and mucus layer to cell assays and study interactions. <p>WP2</p> <ul style="list-style-type: none"> • WP 2.2 Characterization of product properties during process chain • WP 2.3 Impact of ingredients and crumb production process on crumb performance • WP 2.4 Effect of processing steps in snack preparation chain on crumb sensory properties • WP 2.5 Effect of batter/barrier and substrate properties on crumb sensory properties • WP 2.7 Sensory and consumer studies • WP 2.8 Implementation and development of quantitative design rules for prediction and optimization of microwavable snack quality
Achieved results 2019	<p>WP1</p> <p>WP1.1 Literature study has been started and summarized. This basic knowledge is needed to design a cell assay approach to measure the sweet as well as bitter taste responses of different (modified) stevia glycosides fractions in a sensitive and high throughput way.</p> <p>WP1.2 Several different samples have been screened for sweet receptor interaction using different read-out formats (calcium vs beta-arrestin). Concentration curves have been generated and samples have been compared to acquire knowledge about how sample characteristics can define receptor action.</p> <p>WP1.3 Saliva was collected from volunteer's. Mucus was purchased commercially. Several different concentrations and ratios have been tested that doesn't kill the cells or influence the read-out of the receptor assay.</p> <p>WP2</p> <p>WP 2.1: Detailed scoping finalized in 2018</p> <p>WP 2.2: Product reference has been characterization during the whole snack production chain from crumb application, pre-frying till freezing, storage and final heating in the microwave. Measured properties include water contents and water activities of the different snack components (substrate, coating, crumb) at different stages in the production chain, including storage in freezers at two different temperatures (-5°C and -20°C) to monitor shelf life. Characterization also includes sound and fracture characteristics of the crumbs of the products stores after a certain period and after microwave heating, giving an estimation of sensory crispness and product shelf-life. Shelf-life experiments are still</p>

	<p>running. Furthermore, a technique to measure water and fat content profiles and in these snacks is under development using Near Infrared Red multispectral imaging.</p> <p>WP 2.3: Different types of crumbs, produced using different formulations, are characterized during the snack production process and compared to that of the reference. Shelf-life experiments are still running.</p> <p>WP 2.4: Substrate, coating and crumbs are followed during the production chain. From this it became clear that certain process steps, like coating and freezing after pre-frying have a large impact on crumb moisture content. In 2020 experiments are planned to optimize these steps to increase shelf-life.</p> <p>WP 2.5 Products with different substrates are followed during the production chain and it was found that initial water activity has an important effect on shelf-life and final crumb characteristics. Experiments are continued in 2020</p> <p>WP 2.7: The sensory studies to gain insight in the effect of processing steps in snack preparation chain on crumb sensory properties has been moved to 2020, because more insights are needed to be able to prepare a better crumb than the reference, which is needed to make the sensory comparison useful.</p> <p>WP 2.8: A mechanistic models based on the thermo-dynamical description of water transport in polymeric porous and non-porous systems has been developed to describe the water transport during the whole production chain of the whole product. Comparison with experimental data is planned for 2020</p>
Planned results 2020	<p>WP1</p> <p>WP1.2 Finalize testing of current samples with sweet and bitter receptor assays and proceed with new samples if needed.</p> <p>WP1.3 Optimize further the saliva/mucus experimentations</p> <p>WP1.4 Study health effects of stevia glycosides in the intestinal tract using several different in vitro cell culture assays.</p> <p>WP2</p> <p>WP 2.2: Continue characterization of product properties during the snack preparation phases at standard conditions and development NIR technique to measure water profiles.</p> <p>WP 2.3: Continue impact of ingredients and crumb production process on crumb performance running</p> <p>WP 2.4: Continue effect of processing steps in snack preparation chain on crumb sensory properties.</p> <p>WP 2.5: Continue effect of batter/barrier and substrate properties on crumb sensory properties</p> <p>WP 2.6: Start integrated application of new developed concepts</p> <p>WP 2.7: Start sensory and consumer studies</p> <p>WP 2.8: Continue development and validate mechanistic model</p>

Deliverables/products in 2019External reports:

- Regularly update reports
 - 190613UpdateHoLoGoWP2_CS
 - 190613UpdateHoLoGoWP2_WUR
 - 190930UpdateHoLoGoWP2_CS
 - 190630UpdateHoLoGoWP2_WUR
 - 190630UpdateHoLoGoWP2_XRT

<https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksprojecten-LNV/Expertisegebieden/kennisonline/How-low-can-you-go-1.htm>

<https://topsectoragrifood.nl/project/imparas/attachment/dfi-af-18006b-annualreport-2018-hologo/>