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Basic knowledge models for the design of bread texture

Bread making process can be defined by the succession of steps, with operating parameters and raw material properties as input variables and dough properties as output ones, rheological characteristics acting on both sides. With the help of domain specialists, we have defined the variables of bread making and focused on four main operations: mixing, proofing, laminating, and baking. Starting from concepts of rheology and multiscale analysis of dough structure, basic knowledge models (BKMs) are proposed and defined as a common representation of product changes for each operation, in a realistic range of dough compositions, and we delineate the areas where they are not available. Once completed, these BKMs could provide a tool to design the texture of various bread products. On page 5, Guy Della Valle and co-workers evaluate some BKMs available for the different operations of the bread making chain, and try to show how they can predict the evolution of porosity and bubble homogeneity. Their limitations will define the possible trends for future research. The results presented in the following have been obtained from models that have been tested in an approximate range of compositions of baked products studied in the EU-project (European Community's Seventh Framework Programme, FP7/2007e2013): "Design and development of REAlistic food Models with well characterized micro- and macrostructure and composition (DREAM)."

The BKMs proposed express the specific energy delivered during mixing could be determined through a simple balance equation; this variable helps to predict gluten structuration and dough viscosity, the main output of mixing operation. Secondly these BKMs, based on a multiscale analysis of dough proofing and involving main rheological properties, allow assessing its porosity and homogeneity. Thirdly, numerical models can be used to compute dough thickness after laminating, but there is a need to develop BKMs to take dough porosity into account. Finally, besides the many baking models based on differential equations of heat and mass transfers in porous media, the crust index of bread can be deduced from a BKM expressed by a simple function of baking time. In agreement with their definition, the inputs and outputs of every BKM must be defined, so that these models can be integrated into a chain in order to predict bread density and cellular structure. This task requires the friendly use of computer tools like the Knowledge Based System developed for the modelling of the mixing operation. The computer design of cereal food products requires (1) to integrate the available know-how and expertise for specific process operations (shaping for instance) where the use of models based on partial differential equations is still difficult, and (2) to extend the existing models to a larger domain of composition, in order to cope for the necessary increase in dietary fibres, for instance, that will modify greatly the rheological behaviour of dough.

Measurement and relationships between food, eating behaviour and emotion

Emotions evoked by products mainly enhance the pleasure of buying, owning, and using them. More recently, food-elicited emotion is increasingly becoming critical for product differentiation as many food products are produced with similar characteristics, packaging, and price. Attempts to measure emotions have been done in the psychology and sociology fields, but measurement of food-elicited emotions is more recent and not well established. On page 15, J.M. King and co-workers review emotion lexicon development, measurement of food-elicited emotions, some factors affecting emotional responses to foods, how emotions affect eating behaviour, and how this information can be utilized for marketing and increasing acceptability of foods. There are several factors that may be should be taken into account when determining emotions elicited by foods, including whether the food must be eaten or not, whether the beginning emotional state of the consumer has an effect and whether external factors such as the environment or other persons present influence the elicited emotions. Depending on the study objective, emotion items weigh differently and the standard for emotion terms selection may vary correspondingly. For example, if the study objective is to investigate the negative sides of a specific food experience, such as using emotion as a shelf life indicator or for product improvement, the standard of selecting negative emotions may be different from that of positive emotions. It is possible that emotions that readily come to mind play determinant roles in purchasing, which may offer another way of asking questions in the survey. As a result, the conclusion from emotion intensity rating should be carefully examined before quantification and applied for strategy making. Check-All-That-Apply (CATA) and measuring emotion by placing in dimensions are two methods that simplified the questionnaire, which may reflect the consumers' response in a more natural way. Although suffering from its own disadvantage, each method should be carefully adopted according to the objective of the study and the results may be compared or combined for better understanding. Perhaps a Rate-All-That-Apply (RATA) method would be more successful to measure emotional response; however, more research is needed.

Careful examination of the way emotion terms are rated reveals that some food is evaluated by presenting food pictures or food recalling (by memory), while some are rated during food consumption. A comparison of two ways of presentation demonstrated that

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consumer's feelings towards spices by name recall alone are stronger and more stable than emotion elicited by a consumption experience, which may be attributed to an idealized image of a product instead of realistic feelings elicited by actual food consumption. For a food product, tasting samples will make a great difference in its emotion profiles and emotions can be produced, reinforced, eliminated or weakened during sample tasting. Brand and packaging affect the food-elicited emotion by communicating with its users besides the food itself and therefore play important roles in shaping the emotional concept of a novel food. Cultural and personal significance are two key components for close emotional communication between novel foods and consumers. Besides the food itself, there are so many other factors that come into play when food-elicited emotional concept is measured. It is suggested that the researchers should keep a record of why specific emotions were thought of by the participants and the context in which emotions were aroused, in case of falling into a fallacy regarding relationships between the emotion profiles and food properties. A situation-oriented experiment was put forward, which integrates all contextual variables together by simulating different eating situations. Suggested means of situation simulation include projector slides, video clips and especially storytelling, which is highly recommended because of its low cost and feasibility in the form of a questionnaire. Facial expression is an influential tool that may interfere with food perception. As discussed above, in the lab setting, pictures of pleasant, neutral and disgust expression have been successfully applied to condition an eater's emotion towards unfamiliar meat and modify the attitude people hold towards familiar meat products. Also, since facial expression is the main way for adults to communicate with children, the younger the children are, the easier they are more influenced by facial expression of others on desire to eat liked or disliked foods. Correspondingly, facial expression interference may serve as a tool to promote healthy eating for kids.

Fish discards management: identification and potential valorization

With the aim of promoting the responsible and sustainable management of marine resources, the European Union and the Food and Agriculture Organization of the United Nations (FAO) have established a set of international guidelines on by-catch management and reduction of discards. In this framework, the minimisation of discards and the optimal valorisation of inevitable unwanted biomass are the main objectives of the optimal and efficient discards management network that has been developed in FAROS LIFE + Project. According to FAO, in 2008, around 27 million tonnes of marine biomass were used for non-food purposes, these including fish meal, fish oil, bait or high-added value compounds production by pharmaceutical or cosmetic industries. On page 29, Luis T. Antelo and co-workers review the most important discarded species by the selected métiers of interest for FAROS project have been analysed regarding possible valorisation options in a wide variety of sectors, including food products for human consumption. A protocol to easily determine the most suitable valorisation strategies for each of them has been also established. In order to carry out this approach, several factors as the status of stocks in the environment, the valorisation potential of each species or by-product and the amounts discarded by métier have been taken into account. As highlighted in this work, there is a common and positive agreement (among citizens, NGOs, the fishing sector, policymakers, scientist, *etc*.) that identifies discards as very negative and that solutions have to be implemented. In this framework of promoting the responsible and sustainable management of the European fishing activity, the European Commission developed a number of actions directed to the development of policies to reduce unwanted by-catches and eliminate discards in European fisheries, as well as to make the best possible use of the captured resources avoiding its waste, including unavoidable discards generated in some fisheries (New Common Fisheries Policy, the Blue Growth Strategy). Any valorisation strategy defined for the analysed discarded species with no current commercial value or discarded due to other reasons could contribute to achieve a responsible fishing activity and to implement basic principles of industrial ecology. The aim of this emergent research and development line is to obtain high-added value products of interest in the food and medical sectors. It was shown how sessile marine species (*i.e*. those that are not able to move and that are usually permanently attached to a solid substrate) caught by the Spanish and Portuguese fleets may contain compounds with several biomedical applications. Therefore, the next challenge will be the on board identification and quantification of such species in order to establish further valorisation alternatives. In addition to these initiatives, sustainable management plans would be necessary for this type of organisms, since such species are found on the seabed, a shared ecosystem vulnerable to bottom fishing gears. These fishing sectors may start, in the short to medium term, contacts with distributors to sale some species (as red gurnard, boarfish, *etc*.) in European food markets in which it is well known that demand exits for them. In addition, in the medium to long term, it would be positive to introduce these new species in their own markets since consumption of fresh/frozen fish in these markets is a very important part of the local traditional diets. For other pelagic species with more presence in markets, as horse mackerel and Atlantic mackerel, the first strategy for discards reduction will include: (a) to avoid high-grading practices; (b) to solve conservation issues on board as a first step on the valorisation chain (fish in bad conditions is not marketable and therefore discarded); and even (c) to modify legislative aspects as the actual quota system