Texture in Food Production

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Texture, and the related mouthfeel of a product, plays an essential role in how consumers evaluate a product. In some cases, these characteristics are even more important than those of taste, appearance, or smell. Texture refers to how the physical attributes of a food texture are processed by the brain during mastication. Characteristics like hard, soft, crisp, crunchy, are used by consumers to describe food texture. Mouthfeel is related to texture in that it refers to the interactions between the surfaces in the mouth and the food. In its most simple form, mouthfeel is exactly that: how it feels in the mouth.

Once the producer has an understanding of how the consumer views the texture and mouthfeel of their product, they can develop methods to measure, and ultimately control, these properties during processing. It is vital that producers be able to measure, and therefore control, these attributes in order to maintain customer loyalty, texture analyser systems like the TMS PRO system from Food Technology Corporation is able to determine mouth feel and textural characteristics for producers.

Initially, processors must determine what consumers expect in relation to texture of their product. This is typically done through consumer feedback using tools such as surveys and consumer evaluation panels. Armed with this information, processors can develop a method that allows them to measure and control these characteristics. Food producers constantly strive to produce a product that is desirable to the consumer in all aspects. Often they have to deal with circumstances like regulation changes, or even changes in the raw ingredient supply that can have an effect on the texture and mouthfeel of a product. Another, and prevalent, situation is where a company decides to make a product with an adjusted fat level, to market to the health-conscious buyer. Fat content is a major factor in how a person perceives quality in relation to texture. Sensory testing and texture analysis clearly have a crucial role to play in product quality and consistency.

These two techniques are used by food producers in combination to measure and control food texture. The difference between them is that sensory testing is subjective while texture analysis is objective. Each method has its pros and cons, though ideally they should be used together in order to verify information. The first step is to compare human sensory test data with instrumental texture analysis data on a standard product, judged to have ‘good texture’. Next, the same process is performed on samples of the same product deemed to have ‘off spec’ texture characteristics. Once this correlation is made, a target range can be established. This range can then be entered into the texture analyser’s software to give production QC testers quick and objective pass or fail information. Any product that falls into the fail category can be flagged for human sensory evaluation testing to confirm the findings of the texture analysis. This synergistic relationship between the two primary methods of texture assessment allows processors to make quick and informed decisions on the parameters that can affect the final texture and mouthfeel of a product.

Gathering texture data from the consumer but the most critical step is how processors use this data to control their product and ensure its consistency. A substantial amount of testing needs to be done on all fronts, the data then interpreted and individual findings correlated. Processors can then begin to fine tune their processing steps or recipe to produce a product that is consistently deemed desirable by consumers. Canned and retorted products are a good example. The thermal process by which these items are preserved will have an effect on the final product. Typically longer or hotter cook times required to sterilize certain products will produce a softer or less firm product, which consumers could find less desirable. The required thermal processing profile is more crucial for the microbiological safety of the product than the food’s texture profile. If a processor has to lengthen the cook time for preservation reasons, the final product will usually be different from what is intended. Sensory and instrumental texture analysis can be used to determine if this is going to be significant. If the variation still falls within the criteria determined by the initial testing, the product can be released. If it falls outside the criteria, processors may still be able to make formulation changes to keep the finished product within specification.

Calcium for example, is a popular texture-modifying ingredient often added to canned products to help maintain a desirable texture and mouthfeel. Usually these changes to formulation are tested on a small scale, pilot process before applying them to full-scale processing lines. For these reasons texture and mouthfeel are important characteristics to understand and control at all levels of the food production process.

Texture and mouthfeel are often overshadowed by taste but that does not make them any less important to the food industry. At a consumer level, no-one likes surprises. Bite into a potato chip and you expect it to be crispy. Most people do not understand how much effort goes into ensuring that chips are indeed crispy. It starts with incoming raw product. The formulation and process must then be constantly adjusted (often daily, or even hourly) to maintain a level of quality consistent with consumer requirement using the results of the sensory testing and texture analysis. Processors have a challenging job producing a consistent product given the many variables involved. It is truly aiming for a moving target.

The product must then arrive to the customer safely, on time, and in acceptable condition. No one expects a sealed bag of potato chips to be stale (i.e. an undesirable texture). While the safety of food is the primary concern for all products, quality is also a major concern and needs to be monitored before complaints are raised. In reality, the interpretation of an ‘ideal’ texture and mouthfeel of a product is quite individual among consumer groups. Given the amazingly large scale of food production there is bound to be some product generated that is considered to be of lower-end quality. Occasionally, minor quality issues may be accepted by consumers but long-term quality issues can lead to more serious problems. Companies can best meet consumer expectations through measurement (sensory testing and texture analysis) and control (formulation and processing parameters). The most important thing to understand about texture and mouthfeel is the relationship with quality. Whether it is a chip that is crispy, cheese that is soft, or a vegetable that is firm; these characteristics are inherently linked to the perceived quality of a product. One of the most difficult challenges is to quantify these traits in a consistent manner. Methods such as sensory science and instrumental texture analysis (and the correlation of the two) have become very effective at providing measurements of texture and mouthfeel. Consequently, most products that are available to consumers today are very consistent. It is a rare occasion when one is surprised by the texture or mouthfeel of a commercially available product. As consumers, we have a desired texture and mouthfeel ingrained in our brain for each consumable that we eat. Few of us understand the extraordinary lengths to which food manufacturers go to ensure that we get exactly what we expect every time.