

Every parent of a college student will understand that the student's diet is probably heavy on pizza, ramen noodles, and macaroni & cheese. Parents who are concerned about this diet might take some comfort from Kraft's recent decision to phase out artificial preservatives and synthetic colors from its ubiquitous mac & cheese products<sup>1</sup>. Yet any food processor's decision to move toward natural ingredients will pose challenges that, if not handled properly, can affect the appearance, taste, and overall quality of food products.



The familiar orange-yellow elbow macaroni and cheese is a welcome site to many college students. And it's always the same color. Image Source: Flickr User [Aidan Morgan](#) (CC BY 2.0)

To maintain consistent product color, a food processing company transitioning to natural food dyes and ingredients must adjust processing conditions in real time. Consider this challenge in the context of butter. Milk from dairy cows that are raised on artificial feed generates butter that is pale or white. Butter that starts out as milk from natural grass-fed cows is bright yellow<sup>2</sup>. So, a food processor that uses grass-fed butter is adding higher levels of yellow pigmentation to its food products. More importantly, that level varies with natural changes in the cow's diet. The same is true for cheeses and other products that start out as milk. The challenge is compounded as other natural ingredients are utilized.

## Food Processors Make Real-Time Adjustments for Color Consistency

The final color of any food product is a function of the product's ingredients, the chemical environment (*e.g.* acidity) at various stages of the processing cycle, and the processing conditions themselves (*e.g.* temperature)<sup>3</sup>. Food processors already implement controls over environment and conditions but also need to implement controls to respond to the greater variability of natural ingredients. Extra adjustments are needed to smooth out color variations that result from natural ingredient variations.

With macaroni and cheese, for example, a processor might adopt a natural annatto extract in place of synthetic yellow dyes. Annatto is a natural yellow colorant that is derived from the seeds of bush. Its yellow to orange color results from a blend of naturally-occurring compounds, including carotenoids, bixin, and norbixin<sup>4</sup>. By altering the amount of annatto added in the process, the processor can alter the final color of their mac & cheese. To make these changes, however, the processor needs a simple and economical tool to measure the product's color during the processing cycle.



Annatto seeds in their natural form. Image credit: Flickr User [Jonathan Stonehouse](#) (CC BY 2.0)

## Spectrophotometers Measure Food Color Against Objective Standards

Food processors test ingredients before using them in actual processing conditions. Natural ingredients can be within specifications yet still exhibit significant variability that will affect downstream color. Line operators and technicians can use portable spectrophotometers to assess color differences at multiple processing stages. These instruments provide objective color analysis quickly and reliably by measuring light reflected from opaque objects. Based on this analysis, any necessary adjustments to color can be implemented.

HunterLab has long been an industry leader in providing spectrophotometers that are uniquely adaptable to food processing industry challenges. The company produces a range of both benchtop and portable devices that have different measurement modalities for every specific phase of a food processing cycle. Our product specialists can show you how to use our instruments to maintain a perfect end product color regardless of ingredient specification variability. Please contact us for more information about our color measurement and food industry expertise.

1. "Kraft ends mac and cheese fake coloring. Will it still be yellow?" 2015, <http://money.cnn.com/2015/04/20/news/companies/kraft-macaroni-cheese-fake-color/>
2. "THE COLOR OF FOOD: ARTIFICIAL VS. NATURAL," <http://www.foodrenegade.com/the-color-of-food-artificial-vs-natural/>
3. "Maintaining Color Stability," 2006, <https://www.naturalproductsinsider.com/articles/2006/08/maintaining-color-stability.aspx>
4. "Natural Food colors," [http://foodscintech.blogspot.com/2014/10/natural-food-colors\\_29.html](http://foodscintech.blogspot.com/2014/10/natural-food-colors_29.html)