Understanding how to measure the color of ice cream allows manufacturers to consistently produce aesthetically attractive products that optimize sensory appeal.
Image Source: Pexels user stock.tookapic.com

It's not every day that an ice cream becomes a media sensation. But a few weeks ago, Morgenstern's Finest Ice Cream's newest flavor became the topic of gushing articles in everything from *People* to *Refinery29* to *Teen Vogue*. The reason? It's black.

Nick Morgenstern, the founder of the New York-based ice cream shop, created the coconut-flavored ice cream by combining coconut flakes, coconut cream, and coconut milk with "the charred and processed remains of a coconut shell."[1] The result is an inky, Instagram-ready concoction that might just do for Morgenstern **what black toilet paper did for Renova**; already crowds are flocking to get a taste of what is being called the trendiest treat of the summer.[2]

What Morgenstern's ice cream tells us is not just that it's really hard to Instagram an ice cream cone before it melts on a hot afternoon in New York, but that ice cream color matters. Whether it's a novel new shade or a tried and true classic, the color of ice cream is essential to **forming your customers' expectations and sensory experiences**. As such, instrumental color measurement can be an invaluable part of quality assessment, and knowing how to correctly measure the color of ice cream allows you to precisely monitor the shade of each flavor to ensure the perfect appearance.

While ice cream is known as a tasty frozen treat, accurate color measurement relies on melted liquid samples.
Image Source: Unsplash user Madeline Tallman

Is Ice Cream a Liquid or a Solid?

Measuring the color of foods is well-established as an essential component of overall quality control and spectrophotometers are playing as consumer standards rise. Generally, this is a fairly straightforward process, particularly as non-contact spectrophotometry generally minimizes sample preparation. Ice cream, however, is a bit different, as it fluctuates between a liquid and semi-solid state depending on temperature. “The physical characteristics of ice cream do make it hard to measure consistently; it would be detrimental to alter the production process to attempt to attain a sample of the frozen finished product and most measurements would be taken in a warm laboratory meaning the sample would be changing consistency as it melts,” writes Rachael Stothard**,** **“**Therefore, when talking of measuring the colour of ice cream, it is not the frozen matter being measured but rather the liquid substance that gives ice cream its desired colour.”[3]

Preparing Ice Cream for Measurement

The first step, then, for measuring the color of ice cream is to melt the sample to bring it to a liquid state. Once the sample is liquified it can either be poured or pipetted into a sample cup for analysis. Unfortunately, neither pouring nor pipetting is a perfect method; pouring presents the possibility of inconsistent thickness between samples whereas a pipette can introduce air bubbles that may interfere with color results. Whichever method you choose, you must ensure that the sample is thick enough to prevent excess light from traveling through it, potentially interfering with the accuracy of

your results. Ideally, an opaque cover should also be used to “absorb any excess light that may pass through the sample.” A white backing tile, on the other hand, is not recommended as it can reflect excess light back into the spectrophotometer and yield incorrect measurements.

Sample averaging allows you a reliable dataset that can be compared against the standard for each flavor.
Image Source: Pexels user jeshoots.com

The Benefits of Sample Averaging

For the most accurate data, multiple samples should be taken of each ice cream batch. While a single sample saves time, it does so by sacrificing accuracy; there may be many reasons an isolated sample is not representative of the batch as a whole, including the physical characteristics of the sample itself, sample preparation faults, and equipment problems, such as dirty or scratched sample cups. Accepting or a rejecting an entire batch based on a single sample, then, increases the risk of rejecting good batches and accepting bad ones, compromising overall quality and incurring real economic costs. Averaging multiple samples, however, gives you greater insight into the batch as a whole and dramatically increases confidence in your results, giving you a solid basis for comparison against the standard. Sample averaging is ideally performed by analyzing four separate samples. While it is also possible to take multiple readings of the same sample, turning it between each reading, this data will not be as reliable as that obtained from multiple discrete samples.

Consistent Measurement for Consistent Results

Spectrophotometrically measuring the color of ice cream can drastically improve the consistency of production and optimize product quality. In order for this to happen, however, your color measurement methods must be universal, implemented the same way every time, both within and between manufacturing locations. By implementing specific, detailed assessment protocols, you can ensure that your products are being evaluated to the highest standard and that the data obtained is both accurate and meaningfully interpreted. Once your system has been standardized, color measurement results may be used on a pass/fail basis or for color correction purposes.

HunterLab Quality

HunterLab has been a pioneer in the field of color measurement for over 60 years. Today, **our sophisticated spectrophotometers** are renowned throughout the food industry for their extraordinary accuracy, diverse applications, and user-friendly designs. When paired with our advanced color measurement software packages, HunterLab gives you an unprecedented level of insight into your products and exponentially expands your color management abilities. **Contact us** to learn more about our innovative technologies and world-class customer support services and let us help you select the perfect instruments for your needs.

1. "Black Ice Cream Is Now Officially A Thing," May 24, 2016, http://www.refinery29.com/2016/05/111911/black-ice-cream-morgensterns-finest-ice-cream
2. "This Delicious Black Ice Cream Is the Trendiest New Treat For Summer," May 26, 2016, http://elitedaily.com/envision/black-ice-cream-nyc-instagram/1505281/
3. "How to Measure the Color of Ice Cream," January 15, 2016, http://www.colourmeasure.com/knowledge-base/2015-01-16-how-to-measure-the-colour-of-ice-cream