



# Enhancing Candy Manufacturing with Spectrophotometric Color Measurement

## Introduction

Candy is one of the most visually driven categories in the global food industry. From brightly colored gummies to glossy chocolate bars and translucent hard candies, appearance is inseparable from consumer expectations of taste, quality, and indulgence. Even minor deviations in color, gloss, or coating uniformity can make candy appear off-flavor, stale, or of lower quality—eroding brand trust.

Spectrophotometric color measurement provides an objective, repeatable method for monitoring candy appearance throughout production. By quantifying color values with precision, manufacturers can ensure batch-to-batch consistency, detect process deviations early, and reinforce brand identity. This paper explores the importance of color in candies, the challenges of visual inspection, and how **HunterLab's Aeros spectrophotometer** provides the ideal solution for candy manufacturers.

## Importance of Color in Candy

- **Hard Candies** – Bright, saturated hues signal bold flavors; dull or inconsistent colors suggest staling or poor mixing.
- **Chocolate Bars** – Consumers expect uniform brown tones with proper gloss; lighter or darker shifts may indicate incorrect cocoa ratios, fat bloom, or over-roasting.
- **Gummies** – Color intensity reinforces fruit flavors; uneven hues can appear unappetizing and undermine perceived freshness.



- **Coated Candies** - Surface coatings (e.g., candy shells, sugar coatings) must be uniform in hue and coverage to match consumer expectations and package imagery.

## Challenges in Candy Appearance Control

- **Surface Gloss and Transparency** - Candies often have shiny or translucent surfaces, making visual inspection unreliable.
- **Ingredient Variability** - Natural colors (fruit juices, cocoa) and artificial colorants can shift hue between lots.
- **Coating Uniformity** - Uneven application leads to mottling or streaks.
- **Storage Effects** - Exposure to humidity, heat, or oxygen can fade or darken candy appearance.
- **Subjective Visual Checks** - Human inspection cannot consistently detect subtle shifts in brightness, hue, or saturation.

## Why Instrumental Color Measurement is Essential

Spectrophotometric analysis quantifies **CIELAB values**:

- **L\*** - Lightness (too pale or too dark).
- **a\*** - Red-green axis (critical for fruit-flavored gummies and coatings).
- **b\*** - Yellow-blue axis (important for bright candy shells, fruit tones, or caramel notes).

These values create precise color “fingerprints” that:

- Define acceptable tolerances for each candy type.
- Detect deviations before products are packaged.
- Provide objective data for supplier and process consistency.



## Recommended Solution – HunterLab Aeros

The **HunterLab Aeros** spectrophotometer is the ideal solution for candies of all shapes and surfaces:

- **Non-Contact Measurement** – Analyzes candies in natural form without pressing, grinding, or altering appearance.
- **Large Area Capture (27.5 in<sup>2</sup>, 35 readings in 5 seconds)** – Ensures representative results for irregular or heterogeneous samples (gummies, coated candies, chocolate pieces).
- **Auto Height Adjustment & Rotation** – Guarantees repeatable results regardless of sample size or pile depth.
- **Integrated Touchscreen & Software** – Provides instant pass/fail analysis against stored standards.

### Benefits for Candy Manufacturers:

- Ensures consistent bright, appetizing appearance across product types.
- Detects ingredient or process variability early, reducing costly waste.
- Strengthens brand trust by ensuring every package matches consumer expectations.
- Simplifies QA workflows with fast, representative measurements.

## Hypothetical Case Studies Bases on Real-World Examples

### Case Study 1 – Hard Candy Hue Shift

#### Background

A confectionery company produces fruit-flavored hard candies. Each flavor is tied to a specific bright color standard.



## Challenge

The **Aeros** detected lower **a\*** values in the red cherry variety, producing a paler, less vibrant appearance. Investigation found a weakened dye-to-syrup ratio due to a dosing error.

## Corrective Action

- The syrup mixing process was recalibrated.
- Incoming colorant batches were measured against standards using **Aeros** before production.

## Outcome

Candies returned to their bright, consumer-recognized appearance.

## Key Takeaway

Objective **L\***, **a\***, **b\*** values, in this case the **a\*** value, catch subtle color shifts that visual inspection may miss.

## Case Study 2 – Chocolate Bar Darkening

### Background

A premium chocolate brand experienced consumer complaints that bars looked darker than usual.

### Challenge

**Aeros** measurements confirmed lower **L\*** values, indicating darker product. Investigation revealed an over-roasted cocoa batch was used in the formulation.

### Corrective Action

- The cocoa supplier's lots were re-screened for **L\*** consistency.



- Aeros checkpoints were implemented during blending to detect ingredient-driven shifts.

### Outcome

The brand eliminated off-spec chocolate before packaging, ensuring consistent premium appearance.

### Key Takeaway

L\* values provide an early-warning system for ingredient-related deviations in chocolate.

## Case Study 3 – Gummy Candy Uniformity

### Background

A manufacturer producing multicolored gummy bears noticed variability in consumer perception of flavor recognition.

### Challenge

The **Aeros** detected inconsistent **b\*** values (yellow hue) across batches of lemon gummies, making them appear too pale. This undermined consumer expectations for “bright citrus” flavor.

### Corrective Action

- Colorant dosing was adjusted and mixing processes were standardized.
- Aeros was used to create a master color profile for each gummy variety.

### Outcome

The lemon gummies returned to their bright, expected color profile, reinforcing consumer recognition of flavor.



## Key Takeaway

$b^*$  values play a key role in fruit candy perception and brand recognition.

## Conclusion

Candies depend on vibrant, uniform colors to communicate flavor, freshness, and indulgence. From translucent hard candies to glossy chocolates and fruity gummies, consumers rely on appearance to set expectations of taste and quality.

The **HunterLab Aeros spectrophotometer** provides the ideal solution for candy manufacturers, offering:

- Objective  $L^*$ ,  $a^*$ ,  $b^*$  measurements.
- Non-contact, large area averaging of heterogeneous candy samples.
- Fast, repeatable results eliminate subjectivity.

With Aeros, confectionery producers can deliver candies that are visually consistent, appealing, and true to their brand identity—bag after bag, bar after bar.