



# Enhancing Tomato Soup Manufacturing with Spectrophotometers for Color Quality Control

## Introduction

Tomato soup is one of the most iconic processed tomato products, widely consumed both as a standalone meal and as a base for prepared foods. Its appeal depends heavily on its color—consumers expect a bright, appetizing red-orange that signals freshness, quality, and flavor. If soup appears too pale, brownish, or inconsistent, customers may perceive it as stale, diluted, or inferior.

Historically, color grading relied on visual inspection against USDA reference standards. While valuable in the past, these methods are subjective, prone to human error, and unsuitable for today's large-scale, global food supply chains. The **HunterLab ColorFlex L2 Tomato spectrophotometer** eliminates guesswork by providing objective, reproducible, and USDA-aligned measurements. With tomato-specific indices like **Tomato Soup Score (TSS)** and a/b ratio built in, it enables processors to maintain consistency, optimize production, and protect brand reputation.

## Importance of Color in Tomato Soup

- **Consumer Appeal**

A uniform red-orange color reassures consumers of quality, freshness, and flavor. Brown, dull, or uneven hues signal poor quality.

- **USDA Grading**

Up to 30% of the USDA grade for tomato products depends on color. The Tomato Soup Score provides an objective measure to assign consistent grade values.



- **Formulation and Processing Insight**  
The balance of tomato solids, water, seasonings, and thermal treatment all affect color. Measuring color ensures formulation targets are met and thermal processes do not degrade pigments.
- **Supplier and Buyer Confidence**  
Quantitative color data helps align expectations across suppliers, processors, and buyers, reducing disputes.

## What Color Reveals About Tomato Soup

1. **Pigment Content**
  - Lycopene is the key red pigment. Higher TSS and a\*/b\* values reflect stronger pigment concentration and consumer-preferred redness.
2. **Thermal Processing Effects**
  - Pasteurization or cooking can darken soup, lowering L\* and shifting color toward brown.
3. **Ingredient Interactions**
  - Additives like dairy, starch, or spices may lighten or shift soup color. Spectrophotometric monitoring ensures the blend still meets target specifications.
4. **Batch Consistency**
  - Monitoring each lot ensures final soup color remains uniform, regardless of tomato source or formulation changes.

## Applications for Tomato Soup Production

- **Raw Material Evaluation**  
Check incoming tomato paste or concentrate with TPS or FTCl to ensure it supports consistent soup coloration.



- **Formulation Control**  
Measure color during blending to verify desired balance before thermal processing.
- **Finished Product Grading**  
Use Tomato Soup Score (TSS) to evaluate the quality and USDA compliance of final soup.
- **Multi-Plant Standardization**  
Apply the same scoring across facilities to ensure brand consistency worldwide.

## Best Practices for Color Measurement in Soup

1. **Sample Preparation**
  - Place soup in standardized dishes, ensuring smooth, bubble-free surfaces. Homogenize samples before testing.
2. **Measurement Geometry**
  - Use the ColorFlex L2 Tomato's **45°/0° geometry**, which correlates closely with visual perception and meets USDA methods.
3. **Tomato-Specific Scales**
  - **Tomato Soup Score (TSS)** for USDA-aligned grading.
  - **a/b ratio** for red-to-yellow balance.
  - Related scales (TPS, TJS, TSS, FTCl, Lycopene Index) for raw materials and other products.
4. **Calibration and Standardization**
  - Calibrate daily with the HunterLab Tomato Calibration Tile, white tile, and black glass.
5. **Data Logging**
  - Store results digitally and connect to SPC or LIMS for long-term tracking and customer documentation.



## ColorFlex L2 Tomato – Purpose-Built for Soup

- **Preloaded USDA Scales** – Includes Tomato Soup Score, Tomato Paste Score, Tomato Sauce Score, Tomato Juice Score, FTCl, Lycopene Index, and a/b ratio.
- **45°/0° Geometry** – USDA standard for tomato grading.
- **Rugged, Spill-Resistant Design** – Suited for QA/QC labs in food processing plants.
- **User-Friendly Operation** – Touchscreen interface simplifies training and daily operation.
- **Connectivity** – Supports USB, HDMI, and Ethernet for integration with QC systems.

## Case Study: Soup Producer Achieves Global Consistency

### Background:

A global soup brand faced inconsistencies in product color across multiple plants. Some batches appeared lighter or browner, resulting in customer complaints and costly rework.

### Solution:

The company deployed the **ColorFlex L2 Tomato** across all facilities, using Tomato Soup Score (TSS) as the global quality benchmark. Samples were measured at formulation, mid-cook, and final packaging stages. Results were automatically logged and compared across plants.

### Results:

- Reduced variability between plants and batches.
- Fewer customer complaints and returns.
- Improved yield of Grade A soup with reduced off-spec rework.



- ROI achieved within a season due to greater efficiency and fewer quality issues.

## Conclusion

For tomato soup producers, color is a defining quality trait. It influences consumer appeal, USDA grading, and brand identity. Visual checks alone cannot provide the objectivity and consistency required in today's global markets.

The **HunterLab ColorFlex L2 Tomato** delivers a dedicated solution for soup quality control, providing USDA-aligned **Tomato Soup Score** values and related indices in a rugged, easy-to-use instrument. With ColorFlex L2 Tomato, manufacturers can:

- Monitor soup color throughout production.
- Detect and correct deviations before product release.
- Provide objective data to regulators and customers.
- Ensure brand consistency across facilities and markets.

In an industry where **color defines flavor in the consumer's mind**, the ColorFlex L2 Tomato ensures tomato soup meets the highest standards of quality and consistency.