



Quality hamburgers start with fresh ground beef, which many consumers measure by the color quality of the raw meat. Image Source: Flickr' user bour3

Hamburgers are the All-American food and nothing screams summer like the smell of sizzling ground beef on a backyard grill. This summertime tradition has been around for ages and hamburger was once the staple food in the American household. I remember when I was growing up, my mom put hamburger in everything. From the ever-popular varieties of family casseroles to the excitement of the huge metal mixing bowl filled to the brim with ground beef, just waiting for the influx of guest to arrive. Old friends of mine still refer to my mom's 'famous hamburgers' that she would meticulously mix by hand and form into the perfect patty.

While my mom adored her ground beef, she was also quite picky about the quality of meat she chose. We always bought our hamburger meat fresh from the butcher and my mom would carefully inspect the color before purchasing. "Always choose the freshest meat for the best burgers", she would say, as the butcher would hold up a bright pink handful in his gloved hands. As an adult, I now consider myself somewhat of a connoisseur of quality hamburgers and have developed some new favorite recipes that challenge even the best burger joints in town.



Myoglobin is the protein found in ground beef that gives it its red coloring and is recognized as a sign of meat quality and freshness. Image Source: Flickr' user Artizone

Fresh Ground Beef Color

If you were to walk up to the meat counter at your local supermarket, you would expect to see a fresh assortment of bright red meats. Colors of brown or gray might indicate to spoilage or that the meat has been sitting on the shelf a bit too long. But where do we get the notion that color relates to these traits? [Color perception is actually an instinctual quality](#) built into our DNA that protects our bodies from consuming potentially dangerous foods¹. Like the bright colors of the poison dart frog that warns its prey not to eat, discolored meat products work the same within the internal safety coding systems of our brain.

We expect bright red coloring when it comes to ground beef, so monitoring the source of color is an important step in the [quality control of meat products](#). Myoglobin is the protein found in ground beef that produces this bright red color we've come to expect². This protein does not occur from blood circulating through the meat, but it is actually present in the muscle itself, fixated within the tissues. Spectrophotometers measure myoglobin using a color scale that quantifies even the slightest variation in red coloring. This information then provides important data, which can be used to predict color quality and shelf life expectancy in ground beef.

Spectrophotometers are a valuable tool for monitoring shelf life of hamburger meat during processing as well as after packaging. Color measurement instrumentation offers the versatility

needed for continuous monitoring and quantification of changes that occur in ground beef color, which affect [product quality and profit](#). The USDA (United States Department of Agriculture) receives numerous calls on a daily basis from consumers concerned about the color of meat products. In fact, “nearly 15% of retail beef is discounted in price due to surface discoloration, which corresponds to annual revenue losses of \$1 billion”³. That is why many major beef producers rely on state-of-the-art color technology to consistently monitor changes that occur in muscle foods after slaughter. [Color stability](#) greatly influences marketability making the knowledge of myoglobin chemistry and color measurement technology necessary for economic stability within this industry.



Color stability of frozen hamburger meat is an indication of quality and shows that beef was processed and packaged at the peak of freshness. Image Source: Flickr' user stu_spivack

Monitoring Frozen Ground Beef Quality

While my mother always relied on butcher fresh ground beef, I must admit that I have grown accustomed to stocking my freezer with the frozen tube style hamburger patties that can be ready on a moments notice. Since many our summertime BBQs are impromptu and consist of my teenage boys and a handful of their friends, quality and convenience (plus a large number of patties to accommodate the appetite of growing boys) are my main priority. However, that does not mean that I am willing to skimp on quality.

Not all frozen hamburger patties are created equal and once again, color is a strong indicator of quality in frozen meats. Color stability can also diminish in sub zero temperatures, though at a much slower rate. Therefore it is important that meat is packaged and frozen at the peak of freshness to preserve color quality. Since changes in meat color involve the concentration of myoglobin and its response to oxidization, it is important to monitor color throughout production as effects on color can vary throughout processing, packaging, and storage. These changes are highly sensitive and require objective color assessment and continuous monitoring to ensure that optimal product color is maintained.

Spectrophotometers effectively measure color by emulating human eye functioning while controlling the viewing angle and light source. Isolating these variables reduces errors in perception and enables consistent quantification of color. Continual color assessment monitors real-time changes to help avoid loss of quality and can alert producers to possible product contamination.

The Right Choice in Color Measurement

Whether fresh or processed, refrigerated or frozen, ground beef requires objective color analysis to ensure that guidelines are followed and quality is guaranteed. HunterLab is a leading name in spectrophotometric technology and was the first to receive USDA approval for the evaluation of food color.

Major beef producers depend on HunterLab instrumentation to meet their color analysis needs. From large production plant monitoring to research and testing methods for creating better products, HunterLab spectrophotometers are specifically designed for use in the agricultural and meat production industries. Choices in spectrophotometers can vary, but in order to ensure quality and accurate data for meat color analysis, beef producers must select reliable technology. HunterLab's line of color measurement tools and spectrophotometers are designed specifically to meet industry needs. We work closely with leaders in meat science research and are continually developing products to help industries remain competitive. [Contact HunterLab](#) today to learn more.

1. "Bio-pigmentation and Biotechnological Implementations", May 18, 2017, https://books.google.com/books?id=qU8nDwAAQBAJ&pg=PR17&lpg=PR17&dq=color+instincts+for+food+spoilage&source=bl&ots=laZfyN-sQD&sig=X4C_JZ7CcgxrDL2jpGJ-IYFq1Wk&hl=en&sa=X&ved=0ahUKEwiQi6Wrp4nVAhXL1IMKH9R9BkkQ6AEIJDA#v=onepage&q=color%20instincts%20for%20food%20spoilage&f=false
2. "Meat Science", July 2015, <http://meat.tamu.edu/ansc-307-honors/meat-color/>
3. "Current research in meat color", 2005, <https://pdfs.semanticscholar.org/076d/8a3d696ce41f990eba8f8e04f331b8de4f8f.pdf>