



I once had the pleasure of visiting a tea processing plant in Rwanda. My favorite part of the tour was tasting the five different qualities of tea that the plant produced, I thought their lowest quality tasted the best. Though tasting was an interesting treat for me, for the processing plant, tasting their product is a necessary part of quality control. Quality assurance takes on many forms in many different industries, but for the cocoa processing industry, color is king. Accurately measuring the color of fermented and processed cocoa beans can help reduce wastage in their production cycle and guarantee a quality product.

Quality Assurance Throughout Processing

No matter who cocoa processors are selling to, buyers are sure to want good, consistent quality. That quality can often be determined by the color of the cocoa beans, after fermentation, drying, and roasting. Some cocoa processors may simply use their eyes to guess the color, and therefore the quality, of their cocoa. Eyeballing cocoa for color can be about as accurate as having me try to guess which kind of tea is the highest quality. However, quality assurance can be streamlined using spectrophotometers to accurately measure cocoa color. This can reduce a processor's wastage in the fermentation process, and guarantee consistent quality control in the drying and roasting stages.



Raw cocoa beans take on a more even brown color after processing. Image Credit: Flickr User thart2009 ([CC BY 2.0](#))

Fermentation

Just like with tea processing, cocoa beans go through chemical changes as they flow through the processing cycle. As you know, the first chemical process is fermentation, which oxidizes the tannins, giving beans a more palatable flavor. The fermentation process is the first opportunity for wastage, as when beans are over or under fermented, they are unusable. Spectrophotometry can help catch fermentation process problems right away by measuring color. This early alert to process problems can help save time and money.

The stages of fermentation can be tracked by measuring color. Over-fermented beans are too dark, while under-fermented beans take on a purplish hue¹. Measuring the color at this stage can sound the alarm on over or under fermented beans. If quality control points out a problem in fermentation right away, it can be fixed immediately before ruining more raw cocoa beans. Ruined beans can be thrown out instead of being completely processed, saving time and money.

Drying

The next stage in the process is drying, which reduces acidity levels in the cocoa beans². The determinant of quality here is, you guessed it, color. Drying the beans does not have as major an effect as fermenting or roasting, but it is still important to check quality at this stage. Quality control during drying can help check if drying methods are effective, or if they need to be changed

Roasting

During the roasting process, spectrophotometry can monitor the progression of the Maillard Reaction³, helping control the final flavor of the beans. The color is again one of the most important indicators of this process and can be used to control final quality. Buyers often check quality themselves before purchasing. If the quality is not good, and consistent, the beans will be unmarketable. However, if the quality is thoroughly checked before going to market, processors can be certain that their buyers will love their cocoa.



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Quality Control through Color Measurement

So I've said that cocoa's quality is linked to color, but why can't a quality control manager just eyeball it? Well, eyeballs change, but calibrated instruments don't. Spectrophotometers use standard illuminants and quantify color using CIE lab coordinates to ensure that cocoa color is accurately measured every time. Better yet, with a portable spectrophotometer, like those in [Hunterlab's MiniScan EZ series](#), the system is as mobile as the quality control manager but more accurate.

Tea quality control is often done through tasting, a pleasant, if inaccurate, method. Tea and cocoa both have wide varieties of flavors, but if neither is processed with careful quality control, they'll both leave a sour taste in processor's mouths. Color measurement is key in quality control for cocoa beans, and eyes aren't accurate enough for the job. Portable spectrophotometers will guarantee consistent quality control with all the mobility, and none of the human factor. To learn more, contact the experts at [Hunterlab](#).

1. "Cocoa/Cocoa Beans," http://www.tis-gdv.de/tis_e/ware/genuss/kakao/kakao.htm
2. "Application of various methods for determination of the color of cocoa beans roasted under variable process parameters,"
2014, <https://link.springer.com/article/10.1007%2Fs00217-013-2123-6>
3. "Application of various methods for determination of the color of cocoa beans roasted under variable process parameters,"
2014, <https://link.springer.com/article/10.1007%2Fs00217-013-2123-6>