

REFLECTANCE VARIABLES FOR ASSESSMENT OF GROUND BEEF COLOR



R. A. Mancini, M. C. Hunt & D. H. Kropf
 Kansas State University, Manhattan, KS, 66506



INTRODUCTION

- Numerous variables exist for evaluating meat color and color stability.
- Historically, researchers have evaluated discoloration as an accumulation of metmyoglobin (MMb) using $K/S\ 572nm \div K/S\ 525nm$ rather than a decline in oxymyoglobin (OMb) determined using $K/S\ 610nm \div K/S\ 525nm$.

OBJECTIVE

- Assess the utility of $K/S\ 610 \div K/S\ 525$ for directly estimating OMb and color stability.
- Assess the interrelationships amongst commonly used reflectance measurements.

CONCLUSIONS

- If research objectives include calculating myoglobin forms, $K/S\ 610 \div K/S\ 525$ will estimate the proportion of OMb on the surface of ground beef and will assess ground beef discoloration when a visual panel is not available.
- Due to the collinearity among reflectance variables, a^* may be the only variable necessary to assess discoloration.
- $K/S\ 610 \div K/S\ 525$ is not affected by MMb & DMb outliers, which detrimentally affect OMb determined by difference. Thus, $K/S\ 610 \div K/S\ 525$ is a logical choice for estimating OMb and results in fewer outliers compared to OMb by difference.
- Visual color was highly correlated to OMb ($r = -0.93$), MMb ($r = 0.90$), and a^* ($r = -0.97$).

MATERIALS AND METHODS

- Ground beef chubs (n = 12, 4.54 kg, 19% fat) were allocated to 1 of 12 storage temperature (0, 4.5 or 8.9°C) and time (0, 4, 8, or 12 days) combinations over 3 replications before being reground (0.32cm), overwrapped in PVC, and displayed continuously under 1,614 lux of Deluxe Warm light for 48 hours at 0, 4.5 or 8.9°C.
- Visual color was assessed at 0, 24, and 48 hours by a trained panel (n = 7) using a five point scale of 1 = bright cherry red to 5 = brown.
- Used a HunterLab MiniScan™, 3.2 cm aperture, 10° obs, & Illuminant A to assess:

Direct OMb using $K/S\ 610 \div K/S\ 525$	Indirect OMb using $100\% - (DMb+MMb)$
MMb using $K/S\ 572 \div K/S\ 525$	DMb using $K/S\ 474 \div K/S\ 525$
CIE $L^*a^*b^*$, hue angle, chroma, a^*/b^*	$\%R\ 630 \div \%R\ 580$ & $\%R\ 630 - \%R\ 580$

Relationships (r) between visual color and reflectance measures for ground beef.

	Direct OMb K/S 610	Indirect OMb 100-(MMb+DMb)	MMb K/S 572	DMb K/S 474	L*	a*	b*
Visual color	-0.93	-0.92	0.90	0.17	-0.80	-0.97	-0.94
Direct OMb K/S 610	1.00	0.98	-0.98	-0.07	0.68	0.94	0.88
Indirect OMb	0.98	1.00	-0.99	-0.09	0.68	0.93	0.88
MMb K/S 572	-0.98	-0.99	1.00	-0.05	-0.62	-0.94	-0.85