VASCULAR RINSING AND CHILLING EFFECTS ON MEAT QUALITY ATTRIBUTES FROM CULL DAIRY COWS WITH DIFFERENT BODY CONDITION SCORES AND WITH DIFFERENT CHILLING TEMPERATURES

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I. OBJECTIVES

Experiments were conducted to determine the meat quality effects of vascularly rinsing (Rinse & Chill® [RC]) carcasses from commercially harvested cull dairy cows with different body condition scores (BCS) and the impact of 2 different RC rinse solution temperatures (ST).

II. MATERIALS AND METHODS

Immediately after exsanguination, carcasses with 2 different BCS (Lean, Light) were conventionally chilled (CN; $n = 15$ each BCS) or vascularly rinsed (RC; $n = 18$ each BCS). RC carcasses were vascularly rinsed with a chilled isotonic solution (3°C; 98.5% water; balance: glucose, polyphosphates, maltose). Carcass temperature (0–24 h) and pH (1, 4, 8, 12, 24 h) were recorded. On 4 d postmortem, muscles (*Longissimus lumborum* [LL]; *Triceps brachii* [TB]) were ground (3 mm plate), packaged (polyvinyl chloride, vacuum), and displayed continuously (3°C, 1,615 lux; 1, 4, 7 d), or stored in the dark. In the ST experiment, RC carcasses were vascularly rinsed (RCT3; solution 3°C; $n = 13$; RCT14; solution 14°C; $n = 15$). Carcass temperature (0–24 h) and pH (1, 4, 8, 12, 24 h) were recorded. At 2 d postmortem, muscles were processed and packed as in the BCS experiment. Color, chemical states of myoglobin, purge, moisture, fat content, total pigments, water-holding capacity, oxygen consumption, and lipid oxidation measurements were determined. Data from each experiment were analyzed separately using PROC MIXED procedures (SAS Institute Inc., Cary, NC). Significance was set at $P < 0.05$.

III. RESULTS

RC resulted in a lower pH at each time postmortem than CN with an overall average of 5.93 and 6.30, respectively. Generally, RC resulted in lower temperatures during chilling (24 h). After 1 h of bloom, RC was more red (CIE *a**, 22.1) than CN (19.9). CIE *a** values pooled over display times found that RC was redder (Lean, 16.9; Light, 16.0) than CN (Lean, 13.6; Light, 14.1). RC resulted in more oxymyoglobin than in the CN Lean. RC did not affect moisture fat-free (MFF) percent in LL. However, in the TB, MFF was greater in the RC by 1.4% (Light) and 2.0% (Lean) than CN. RC Lean LL had less purge loss compared to CN Lean. RC resulted in greater total pigments than the CN. RC ground TB had greater oxygen consumption than CN. RC had lower thiobarbituric acid reactive substances compared to CN. In the ST experiment, RCT3 and RCT14 influenced pH decline during the first 12 h postmortem. In the LL, both RC treatments had a more rapid temperature decline than CN through 4 h postmortem and through 8 h postmortem for RCT14. RCT14 SM resulted in a more rapid temperature decline than RCT3. No differences were found in MFF, and total pigments. RC ground TB had greater expressible moisture and greater purge. RCT3 and RCT14 produced greater redness (CIE *a**) associated with blooming and display times.

RCT3 and RCT14 ground beef resulted in greater oxymyoglobin. RC ground beef had less metmyoglobin during display.

IV. CONCLUSION

Cull dairy cows often represent stress-susceptible animals, which negatively affects meat quality. RC could improve color, potentially decrease the incidence of dark-cutting beef, and reduce lipid oxidation. Differences in rinse ST may influence meat quality outcomes. The warmer RC ST had the ability to chill carcasses faster and may contribute to an extension in the shelf life of meat.

Keywords: carcass chilling method, cull dairy cows, meat color, meat quality