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Meat and Muscle Biology™

A New Paradigm for Dry-Aging: Effects of Fat Dry-Aging on Physicochemical and Textural Characteristics of Ground Beef Patties

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Objectives

Dry-aging has been known to improve eating quality attributes of beef products (in particular unique flavor and/or juiciness). While fat plays an important role in flavor development of aged beef products, the current aging practice (including dry-aging) predominantly deals with whole muscle aging rather than separated fat aging. We hypothesized that dry-aging of beef fat would result in positive impacts on quality characteristics of ground beef patty. If successful, this would be a novel approach of value-adding process of beef fat as a naturally-enhanced flavor ingredient for manufacturing dry-aged ground beef. The objective of this present study was to determine the physicochemical and textural properties of ground beef patties formulated with wet-/dry-aged fat.

Materials and Methods

Beef round muscle (*M. semimembranosus* and *semitendinosus*) and backfat were collected from beef carcasses at 7 d postmortem. Trimmed beef backfat was randomly assigned into 5 treatment groups as follows; unaged-fat (control), wet-aged fat for 2 wk (2WA) or 4 wk (4WA) and dry-aged fat for 2 wk (2DA) or 4 wk (4DA). Wet-aging of beef fat was performed in a vacuum bag in a chilling room (at 1°C; 80% relative humidity), whereas dry-aging was conducted without any packaging material in the same chilling condition. Beef patties were formulated with 80% round lean and 20% each assigned fat. Proximate composition, display weight loss, cooking loss and texture profile analysis were determined at each manufacturing day. Display color stability by measuring instrumental color and visual discoloration, pH and lipid oxidation (2-thiobarbituric acid reactive substances, TBARS) were performed at the initial and after 5 d of retail display. The experimental design was a completely randomized block design with 3 independent batches, and the PROC Mixed procedure of SAS (SAS Inst. Inc., Cary, NC) was used for data analysis ($P < 0.05$) by using least significant differences.

Results

The addition of aged-fat slightly decrease pH value of beef patties ($P < 0.05$). Similar proximate composition (moisture, protein, lipid and ash) and cooking yield of beef patties were found between the treatments ($P > 0.05$). The addition of aged-fat for 4 wk (4DA or 4WA) resulted in significantly higher hardness, gumminess, and chewiness of beef patties than control. While CIE a* (redness) of beef patties with aged fat was decreased during display storage, beef patties with 4WA showed the most rapid decrease in redness during display ($P < 0.05$). Similarly, beef patties made with wet-aged fat (2WA and 4WA) showed the most rapid discoloration, whereas beef patties with dry-aged fat maintained little to no discoloration. Furthermore, the highest TBARS value was observed at beef patties with 4WA between the treatments at the end of display ($P < 0.05$).

Conclusion

These results indicate that the addition of dry-aged fat positively impact on color and lipid oxidative stability of beef patties, while resulting in little impact on chemical composition of beef patties. The addition of aged fat for 4 wk increased hardness, gumminess and chewiness of beef patties, regardless of aging method. The follow up analyses including sensory attributes and flavor related chemical compounds would be highly warranted to determine the efficacy of fat dry-aging in meat flavor development.