DIFFERENT AIR FLOW CHANGES MICROBIAL COMPOSITION OF DRY-AGED BEEF AND ITS SENSORY PROPERTIES

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Abstract – The objective of this study was to investigate the effect of different air flow on sensory properties of dry-aged beef. Different air flows (0, 2.5, and 5 m/s) were applied to control the rate of moisture evaporation in the dry-aged beef during aging process and moisture content, microbial composition, umami-related compounds (inosine 5'-monophosphate and glutamic acid), and sensory evaluation were analyzed. Application of different air flow did not affect moisture content; however, it varied microbial composition among the dry-aged groups. The dry-aged beef at 0 m/s of air flow was occupied with 99.8% of Mucoraceae family, whereas 2.5 and 5 m/s of air flow had higher composition of *Debaryomyces*. Intensities of dry-aged odor and flavor were the highest in the beef with 5 m/s air flow followed by 2.5 and 0 m/s, resulting in the higher overall acceptability with the faster air flow.

Key Words – dry-aged odor and flavor, dry-aging with different air flow, mold and yeast

I. INTRODUCTION

The dry-aged beef is well-known for a highly concentrated beefy flavor due to the flavor precursors' concentration during dry aging process [1]. This is attributable to moisture evaporation controlled with air flow; however, its role on sensory properties of the dry-aged beef has not been studied. Therefore, the objective of this study was to investigate the effect of different air flow on sensory properties of dry-aged beef.

II. MATERIALS AND METHODS

Dry-aging Process

Both side of 3 carcasses were arranged for control (non-aging) and dry aging with 3 different air flows (0, 2.5, 5 m/s; D0, D2.5 and D5, respectively). Control sample was collected on 0 day, while the dry-aged samples were aged for 28 days and trimmed off. Both samples were vacuum-packaged and frozen at –70°C until analyses.

Moisture content, microbial composition, and sensory properties

Moisture content, microbial composition (mold, yeast and bacteria), and sensory properties (umami-related compounds and sensory evaluation) were analyzed based on the methods of Kim *et al*. [2] and Oh *et al*. [3] with a few modifications..

Statistical analysis

A randomized incomplete block design was applied. The general linear model was analyzed with the fixed effect (air flow) and the random effect (carcass and side of the carcass) using SAS 9.3 (SAS Institute Inc., Cary, NC, USA). Mean values with standard error of the means (SEM) were reported and significances were determined on the basis of the Student-Newman-Keuls multiple comparison test at a level of $P<0.05$.

III. RESULTS AND DISCUSSION

Moisture content and microbial analysis

As application of different air flow did not affect moisture content, we tried to analyze microbial composition because different role of microorganisms was reported in sensory properties of dry-cured meat

products [4]. As a result, different air flow varied mold/yeast composition among the dry-aged groups. D0 was occupied with 99.8% of Mucoraceae family, a newly-found species in the present study, and 0.2% of *Debaryomyces*, whereas D2.5 and D5 had more *Debaryomyces* in their composition. In addition, a relatively higher composition of *Pseudomonas* was detected in D0 than D2.5 and D5 for bacterial composition.

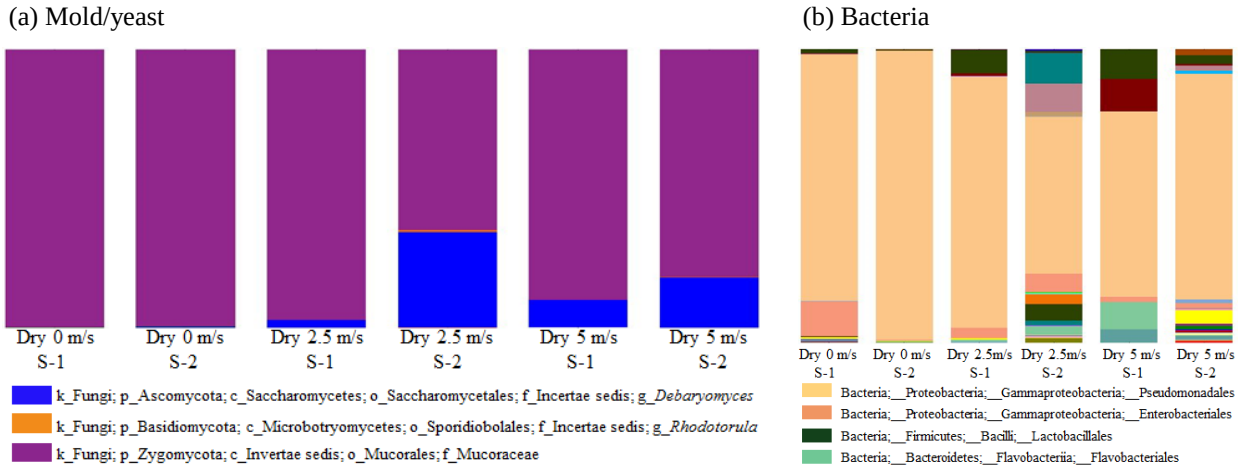

Figure 1. The composition of (a) mold/yeast and (b) bacteria in dry-aged beef by different air flow.

Sensory properties

The intensities of dry-aged odor and flavor were the highest in D5 followed by D2.5 and D0, resulting in a high overall acceptability of D2.5 and/or D5 (data now shown). This might be attributable to higher contents of inosine 5'-monophosphate and glutamic acid in these groups occurred from different composition of microorganisms and their role on sensory properties of dry-aged beef.

IV. CONCLUSION

This study found different air flows do not affect moisture evaporation but could influence the composition of microorganisms during dry aging process. This different microbial composition in the dry-aged beef may provide different odor and flavor intensities and affects overall acceptability. The investigation for the role of the newly found species of Mucoraceae family is on-going.

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