University of Nevada Cooperative Extension

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Fact Sheet 19-01

Effects of wet and dry aging on yields, tenderness and microbial loads of beef loins

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Summary
A total of 48 beef short loins (24 USDA Choice and 24 USDA Prime) were randomly assigned to two aging methods (dry vs. wet aging) and two aging lengths (21 and 42 days). No effects of aging method were observed on tenderness of strip loins steaks. Within grade, Prime strip loins aged for 42 days were more tender than strip loins aged for 21 days. Within aging method, wet-aged Prime strip loins were more tender than Choice strip loins. Overall, dry aging led to lower microbial counts on beef surface when compared to wet aging. However, lower short loin yields were observed when samples were dry-aged. Dry-aging beef does not improve tenderness when compared to wet aging.

Introduction
Dry-aged beef is growing in popularity in the U.S. due to claims associated to better tenderness and flavor when compared to conventional wet-aged beef. Wet aging is commonly used by large beef processors due to the ability of lowering production costs and improving product logistics. When wet aging, beef cuts are packaged under vacuum, which allows the moisture to be retained until the product reaches the consumer, another processing facility or a retail store. When dry aging, beef is not packaged. Small operations usually hold carcasses in coolers for at least 15 days prior to fabrication, whereas food service establishments (usually upscale restaurants) acquire vacuum-packaged bone-in cuts aged around five days, remove from the bags, and dry age them in racks for periods that commonly vary from 21 to 42 days. Ribeyes and short loins are the most common cuts. In this fact sheet, we studied the effects of wet and dry aging on tenderness, yield loss, and bacteria loads of Prime and Choice strip loins fabricated from short loins aged for 21 and 42 days.

Procedure
USDA Prime and Choice short loins (IMPS 173, n=48, 24 carcasses, two per carcass) were obtained commercially. In order to minimize statistical error, each loin from the same animal was assigned to wet or dry aging treatments. Short loins were aged for 21 and 42 days at 36 F in a refrigerated cooler. Before being dry-aged, loins were wet-aged for eight days while boxes were transported from the commercial facility to Wolf

Pack Meats, the University of Nevada, Reno, USDA harvest and processing plant. Short loins that were dry aged were removed from bags and placed in racks, whereas wet-aged loins were kept in bags. After being aged, loins were weighed to determine shrinkage. Dry-aged samples were weighed after being removed from the bag on day eight and after aging was concluded on day 21 or 42.
On the day of fabrication, short loins were swabbed to evaluate mesophilic bacteria counts (APC – aerobic plate counts). Strip loins were excised from the short loins, and two steaks were fabricated. Steaks were properly trimmed, vacuum packaged, and frozen until tenderness analysis could be made. Two different analysis were preformed to evaluate instrumental tenderness of steaks, Warner-Bratzler Shear Force (WBSF) and Slice Shear Force (SSF). These two methods use different types of blades to cut the meat. Desmin degradation analysis was performed by Western Blotting (WB). Higher degradation of desmin indicates higher biological tenderization. Data was analyzed using SAS.

Results

As expected, dry-aging led to higher shrinkage when compared to wet-aging. Aging length did not affect yields when short loins were wet-aged, but significantly increased shrinkage up to 9.66 percent when dry-aging was extended to 42 days (Table 1). This was due to moisture loss (Figure 1). Wet-aged samples had significantly higher microbial counts (APC) when compared to dry-aged samples (4.68 vs 2.04 CFU/log/cm^2, for wet and dry aging. respectively), whereas longer aging time (42 days) led to higher counts when compared to 21 days (4.19 vs. 2.52 CFU/log/cm^2, respectively).

When evaluating tenderness, SSF values showed that wet-aged Choice steaks were tougher than Prime steaks. Dry-aged Choice steaks were more tender wet-aged, whereas no differences were observed in Prime steaks. Warner-Bratzler Shear Force values (N) of steaks aged for 42 days were significantly lower (more tender) than values for those aged for 21 days (25.57 vs. 29.04, respectively, $P < 0.0001$) whereas Prime steaks were more tender than Choice steaks (25.68 vs 28.93, respectively, $P < 0.0001$). Wet-aged Prime steaks had higher degradation of desmin when compared Choice. However, desmin degradation of dry-aged Choice and Prime loins did not differ. Overall, desmin degradation is in agreement with SSF and WBSF data.

Conclusion

Dry aging beef does not improve tenderness when compared to wet aging. Although lower bacteria loads are found on the surface of dry-aged beef when compared to wet-aged beef. Dry-aging increases moisture loss and consequently decreases product yields.

Implications

Dry aging decreases weights of short loins. The longer the beef is aged the more weight is lost, which may negatively affect profitability. Additionally, when fabricating dry-aged beef, additional trimming is required to remove dry surfaces, which also leads to lighter weights and lower yields. Lower bacteria counts may potentially decrease cross contamination of samples during fabrication. Establishments that choose to commercialize dry-aged beef need to find out appealing claims to add value in the product to compensate weight losses that happen during the dry aging process. Claims associated with better tenderness of dry-aged beef are not supported by scientific data.

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Figure 1. Dry-aged (left) and wet-aged short loins.

Table 1. Effects of aging method and time (day) on short loin yield loss (%)

	Aging Method	
Day	**Wet**	**Dry**
21	0.64^{b}	4.68^{Ba}
42	0.95^{b}	9.66^{Aa}

^{A,B} means having different superscript within aging method effect are significantly different at $P < 0.0001$.

^{a,b} means having different superscript within day effect are significantly different at $P < 0.0001$.

Table 2. Effects of quality grade and aging method on Slice Shear Force (SSF, N)

	Aging Method	
USDA Quality Grade	**Wet**	**Dry**
Choice	225.08^{Aa}	177.27^{b}
Prime	180.09^{B}	192.42

^{A,B} Means having different superscript within aging method effect are significantly different at $P < 0.0001$.

^{a,b} Means having different superscript within day effect are significantly different at $P < 0.0001$.