

## U.S. CONSUMER ACCEPTANCE AND VALUE OF WET AGED AND DRY AGED BEEF STEAKS

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## Background

Fresh meat is aged to enhance palatability. Unique flavors and increased tenderness are common characteristics of aged meat. Whole carcasses, primal cuts, and steaks benefit from aging. Wet and dry aging are common aging techniques. Meat that is vacuum packaged in a sealed barrier film and held at a temperature above the freezing point of the meat is classified as wet or vacuum aged, which can occur during shipping and storage. Dry aging is the process of aging unpackaged meat in a cooler, while humidity is controlled. Dry aging, while more expensive than wet aging, can also be utilized for entire carcasses or individual subprimal cuts. Beef aged in air (dry aging) develops a different flavor profile than beef aged in vacuum bags (wet aging).

## Objectives

This research was conducted to compare sensory traits and U.S. consumer value of wet versus dry-aged beef.

## Methods

Fresh strip loins (IMPS #180) were purchased unfrozen from a commercial meat packer Nebraska and from a commercial beef aging facility in Georgia. Prime and Choice strip loins from Nebraska were vacuum (wet) aged in a 2 C cooler for 37 days. Dry aged beef was aged for 30 days at the aging facility prior to shipping and vacuum aged for 7 days during shipping prior to cutting.

The strip loins were cut into 2.5-cm thick steaks. The first steak was utilized for marbling score and proximal analysis. The second steak from the anterior end of the loin was used to determine Warner-Bratzler shear value. The third and fourth steaks were evaluated by the taste panels. The remaining steaks were sold frozen in an auction to the consumer panelists.

Two pairs of loins were matched for taste panels: 1) wet aged Prime versus dry aged Prime and 2) wet aged Choice versus dry aged Choice. The steaks were paired to similar Warner-Bratzler tenderness scores and marbling score to reduce variation within the pair.

**Taste Panels:** Steaks were broiled to 70 C, cut into cubes, and held in a double broiler for < 20 min until served. Samples were rated on an eight point hedonic scale, where 1 = extremely undesirable and 8 = extremely desirable. One sample from the pair was served and evaluated for desirability of flavor, juiciness, tenderness, and overall acceptability. The second sample of the pair was then served and evaluated for sensory traits. After both samples had been evaluated for sensory traits, the panelists then submitted a written, sealed bid for each steak. Taste panels (12/city) were conducted in Chicago, IL and Denver, CO. A total of 273 panelists participated.

**Auction Procedures:** Panelists were paid \$50 to participate. They were not required to bid; however, if panelists won the auction, they were required to buy the beef. The steaks were taken from the same strip loin as the taste sample. A reference price of \$7/lb was given prior to auctions.

An n<sup>th</sup> price Vickery auction (n = 2, 3, or 4) determined the purchase price, or the amount the winner(s) paid, for the steak. This auction procedure encourages participants to bid what they truly value the meat to be.

## Results and Discussion

No significant differences for flavor, juiciness, tenderness, and overall acceptability were detected between dry aged Choice strip loins and wet aged Choice strip loins (Table 1). The shear force was no different, so the absence of a difference in tenderness is not surprising. Consumers valued the wet aged Choice numerically, but not significantly, over the dry aged Choice steaks by \$0.25/0.45 kg (Table 2). The average value for wet aged Choice and dry aged Choice samples were \$3.82/0.45 kg and \$3.57/0.45 kg.

Wet aged Prime strip loins were rated significantly higher ( $P < .01$ ) for flavor, tenderness, and overall acceptability than dry aged Prime strip loins (Table 1). Even though the strip loins in a pair were matched to similar marbling scores, the fat content of the wet aged Prime steaks were significantly higher ( $P < .01$ ) than the dry aged Prime steaks. The 4.6% higher fat content in the wet aged Prime steaks could account for higher juiciness rating. Consumers in this study valued wet aged Prime strip loins significantly higher than dry aged Prime strip loins (Table 2). Consumers placed a value of \$4.02/0.45 kg for wet aged Prime steaks and \$3.58/0.45 kg for the dry aged Prime steaks.

When consumers were grouped according to their preference (sample in the pair with the highest overall acceptability score), 39.2% of consumers preferred wet aged Choice, 29.3% preferred dry aged Choice, and 31.5% of the consumers had no preference. Consumers who preferred the dry aged Choice steaks were willing to bid a \$1.99/0.45 kg premium ( $P < .01$ ) for their preference, while consumers with a preference towards wet aged Choice steaks were willing to bid \$1.77/0.45 kg more ( $P < .01$ ) for wet aged Choice samples (Table 3). Although more consumers preferred wet aged Prime steaks (45.8%), 27.5% of the consumers preferred the dry aged Prime steaks, and 26.7% did not indicate a preference in the pair of steaks. Consumers paid a \$1.92/0.45 kg more for their preference (Table 3), whether wet aged or dry aged.

Dry aging beef is an expensive method, requiring extra storage time and yield loss due to evaporation. Results from this study indicate consumers who prefer dry aged beef are willing to pay more for the dry aged steaks. Since wet aged beef is consumed by the average consumer, consumers may not be accustomed to the unique flavor profile of dry aged beef. While the market exists for dry aged beef, the less expensive alternative of wet aging may be more economical with acceptable sensory qualities.

## Conclusion

At similar tenderness and marbling, no differences in desirability or value were found for wet versus dry-aged Choice beef. For Prime, wet-aged steaks were rated more desirable in flavor, juiciness, and overall acceptability and valued more than dry-aged Prime. A significant proportion (27-30%) of consumers preferred dry-aged beef and were willing to pay > \$1.90/0.45 kg more for them. Consumers can detect sensory differences in beef and are willing to pay for their preference.

Table 1. Taste panel evaluations ratings<sup>a</sup> for wet aged and dry aged strip steaks matched by shear force and marbling

Pair	Flavor	Juiciness	Tenderness	Overall Acceptability
Dry Aged Choice	5.77	5.30	5.59	5.56
Wet Aged Choice	5.91	5.39	5.68	5.72
Difference	-0.14	-0.09	-0.09	-0.16
Significance	.18	.37	.38	.09
Dry Aged Prime	5.70	5.66	5.61	5.55
Wet Aged Prime	6.08	5.82	6.00	5.94
Difference	-0.38	-0.16	-0.39	-0.39
Significance	.01	.10	.01	.01

<sup>a</sup> Taste panel scores were based on an eight point hedonic scale, where 4 = slightly undesirable, 5 = slightly desirable, and 6 = moderately desirable.

Table 2. Auction data<sup>a</sup> for wet aged and dry aged steaks matched by shear force and marbling

Pair	Bid (\$/0.45 kg)
Dry Aged Choice	3.57
Wet Aged Choice	3.82
Difference	-0.25
Significance	.12
Dry Aged Prime	3.58
Wet Aged Prime	4.02
Difference	-0.44
Significance	.01

<sup>a</sup> Consumers (n = 40) who bid \$0 for all samples were removed from the bid data set.

Table 3. Bids from consumers<sup>a</sup> with different preferences for wet aged or dry aged strip steaks

	Prime		
	Preference		
	Dry Age (\$/0.45 kg)	Wet Age (\$/0.45 kg)	No Preference (\$/0.45 kg)
Dry age	4.75	2.93	3.33
Wet age	2.76	4.70	3.53
n	80	107	86
Significance	.01	.01	.41
Percent	29.3	45.8	26.7
	Choice		
	Preference		
	Dry Age (\$/0.45 kg)	Wet Age (\$/0.45 kg)	No Preference (\$/0.45 kg)
Dry age	4.38	2.99	4.14
Wet age	2.46	4.91	4.04
n	75	125	73
P-value	.01	.73	.01
Percent	27.5	45.8	26.7