



## Processing Characteristics and Sensory Attributes of Bacon Manufactured From Seven Value-Added Cuts of Beef

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### Objectives

There is great opportunity for the beef industry to add value to cuts that are currently marketed as low value cuts (i.e., cuts from the chuck, round, and flank/plate). The objective was to evaluate the processing characteristics and sensory attributes of bacon manufactured from seven different cuts of beef.

### Materials and Methods

The seven cuts evaluated included the brisket (IMPS#120), the clod heart (IMPS#114E; divided horizontally into two halves; referenced as the wide half or silverskin side and the narrow half or non-silverskin side), the flank (IMPS#193), the outside flat (IMPS#171B), and the short plate (IMPS#121A; broken down into the deboned short rib half and the navel half). The cuts were injected using a standard commercial bacon cure (water, salt, corn syrup solids, sodium phosphate, sodium erythorbate, sodium nitrate, sodium bicarbonate, and glycerin; Herman Laue Spice Company Inc.; Uxbridge, Ontario, Canada) to a targeted rested pump uptake of approximately 20% ( $\pm$  3%). The injected cuts were cooked

to an internal temperature of 62°C in a smokehouse (ScottPec, Guelph, Ontario). Following cooking, cuts were cooled to 4°C and then sliced into 4.0 mm slices using a deli slicer. Slices were vacuum packaged, boxed, and stored at 4°C for zero, thirty, sixty, or ninety days. Following the allotted storage period, slices were stored at –20°C until evaluation of sensory attributes and cooking loss. Slices were cooked at 204°C for 15 min in a convection oven. Processing characteristics were conducted in six or seven replications for each cut. Sensory evaluation was conducted on three randomly selected samples for each cut at each of the four storage times (the same samples within each cut was used at each storage time). Processing data were analyzed using PROC GLIMMIX of SAS (v9.4) with fixed effect of cut and random effect of replication. A trained descriptive sensory panel of 6–8 panelists evaluated the differences in oxidative flavor and aroma (using a 4-pt nominal scale), and differences in beef flavor intensity, muscle fiber toughness, and connective tissue amount (using magnitude estimation). Sensory data were analyzed as repeated measures using PROC GLIMMIX of SAS (v9.4) with fixed effect of cut, storage day, and their interaction, and random effects of session, panelist, and replication.

**Table 4.** Bacon slice cooking loss and sensory analysis of bacon manufactured with different beef cuts. Main effects of cut after 0, 30, 60, and 90 d of storage

	Brisket	Clod Heart A	Clod Heart B	Flank	Outside Flat	Short Plate (navel half)	Short Plate (deboned short rib half)
Cooking loss, %	44.45 <sup>bc</sup>	48.44 <sup>b</sup>	46.73 <sup>bc</sup>	46.46 <sup>bc</sup>	54.76 <sup>a</sup>	42.24 <sup>cd</sup>	39.56 <sup>d</sup>
Beef flavor intensity	1.94 <sup>ab</sup>	2.11 <sup>ab</sup>	1.66 <sup>b</sup>	2.20 <sup>a</sup>	2.01 <sup>ab</sup>	2.21 <sup>a</sup>	2.12 <sup>ab</sup>
Muscle fiber toughness	2.30 <sup>ab</sup>	2.32 <sup>ab</sup>	2.42 <sup>ab</sup>	2.49 <sup>a</sup>	1.92 <sup>b</sup>	1.35 <sup>c</sup>	2.37 <sup>ab</sup>
Connective tissue amount	0.60 <sup>d</sup>	0.71 <sup>bcd</sup>	0.66 <sup>cd</sup>	0.51 <sup>d</sup>	0.90 <sup>abc</sup>	1.03 <sup>a</sup>	0.92 <sup>ab</sup>
Oxidative flavor	2.02	2.27	2.39	2.32	2.28	2.51	2.13
Oxidative aroma	1.96	1.87	2.08	2.00	1.98	2.05	2.07

<sup>a,b,c</sup> Means lacking a common superscript letter within a row are different ( $P < 0.05$ ).

## Results

As expected, dimensions and processing weights differed ( $P < 0.01$ ) among cuts. Rested pump uptake was not different ( $P = 0.29$ ) among cuts. Smokehouse yield was greater ( $P < 0.05$ ) for the brisket, outside flat, and short plate (both halves) compared with the clod heart (both halves) and flank. Bacon slice cooking loss and sensory characteristics are presented in Table 4.

## Conclusion

Overall, this research indicated that a variety of beef cuts can be used to manufacture beef bacon. The differences in sensory properties that were quantified in this study, allow manufacturers to tailor their cut selection to the sensory properties most valued by their consumers. All cuts exhibited oxidative stability when stored up to 90 d.