POTENTIAL OF IN-THE-BAG DRY AGEING TO IMPROVE THE FLAVOUR PROFILE OF BEEF LOW VALUE CUTS

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Introduction

Beef is a more expensive protein source than chicken or pork and, as cost is a key determinant of consumer's buying behaviour, the Canadian beef industry must adapt to appeal to consumers. One strategy could be making low-value cuts more appealing by developing value-added products with enhanced flavour profiles. Dry ageing has been shown to increase desirable umami and brown roasted flavours as well as tenderness and juiciness in beef (Warren & Kastner, 1992; Li et al., 2014). However, traditional out-of-bag dry ageing requires extensive environmental monitoring and results in greater weight losses making it a more expensive and less convenient option. With the development of a new packaging technology that allows for in-the-bag dry ageing (Umai®), dry ageing has become a viable method to create value-added meat products that are more affordable for consumers. These bags mimic traditional dry aging and allow for high one-way water transmission to the exterior, but require less environmental control and reduce weight/yield losses (DeGeer et al., 2009). Ageing time may also play a significant role in the increased palatability of dry-aged beef, including improvements in steak flavour and texture (Campbell, Hunt, Levis and Chambers, 2001). This study evaluated the effects of in-the-bag dry ageing and different ageing periods on the flavour profile of low value cuts from steers.

Material and Methods

In total, 20 carcasses (AAA) from Angus cross youthful animals were used in this study. The flat iron (*infraspinatus*), clod heart (*triceps brachii*) and brisket (*pectoralis profundi*) muscles from both right and left carcass sides (n=40 from muscle type) were collected at the Lacombe Research and Development Centre (Agriculture and Agri-Food Canada, Canada). Controlling for side, muscles were randomly assigned to wet or dry ageing, using conventional oxygen/moisture impermeable vacuum bags (Winpak Vak 3.0 R, Winnipeg, MB, Canada) or specifically manufactured oxygen impermeable/moisture permeable vacuum bags (Umai®, Minneapolis, MN, USA), respectively. After vacuum packing, muscles were placed in a conventional 2 ºC cooler. Half the muscles (n=20 from muscle type; 10 wet and 10 dry-aged) were aged for 21 d and half (n=20 from muscle type; 10 wet and 10 dry-aged) for 42 d. Following ageing, muscles were removed from their respective packaging, and one 2.5-cm steak from each muscle was cut and grilled to internal temperature of 71 ºC for subsequent flavour profile analyses. Steaks were presented in a balanced design to a 9-member trained sensory panel to rate the intensity of aromas (n=19), tastes (n=5) and flavours (n=19) using 15-cm line scales. Flavour profile data were analysed for each muscle using the MIXED model procedure of SAS v. 9.4 (SAS Institute Inc., 2014), with the main effects of ageing treatment and period and their interactions in the model, and panel session and assessor and their interactions were included as random effects.

Results

Ageing treatment×period interactions (P<0.05, Figure 1) were observed in briskets and flat irons. Livery aroma and sour taste were higher at 42 than 21 d dry-aged, but similar in both 21 and 42 d wet-aged briskets, whereas bloody/serumy aroma and corn flavour were higher at 42 than 21 d wet-aged, but similar for both ageing periods in dry-aged briskets. Cruciferous aroma was higher and corn aroma was lower at 42 than 21 d wet-aged but similar in 21 and 42 d dry-aged flat irons, whereas the highest bitter taste was found at 21 d dry-aged, the lowest at 21 d wet-aged, and intermediate at 42 d dry and wet-aged flat irons. Overall, dry ageing decreased (P<0.05, Figure 2) bloody/serumy and sour dairy flavours in briskets and clod hearts, respectively, whereas increased unidentified aroma/flavour in briskets, beef identity flavour in clod hearts, and metallic aroma and brown-roasted flavour in flat irons compared to wet ageing. The 42 d ageing period increased (P<0.05, Figure 3) livery aroma in briskets, sour/dairy aroma and green/hay flavour in clod hearts, and metallic aroma in flat irons, whereas decreased beef identity flavour in clod hearts, and sweet taste and beef identity and bloody/serumy flavours in flat irons compared to 21 d of ageing.

Conclusion: These results show in-the-bag dry ageing as an effective strategy to increase some flavours identified in the literature as desirable, and decrease others that could be perceived as undesirable flavours by consumers in low value cuts of beef; thus creating potential value-added alternatives for specialty marketers to meet the demand of the new generation of foodies. Overall, extending the ageing period from 21 to 42 d did not result in flavour enhancement of beef low value cuts.

References

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Figure 1. Effect of ageing treatment and period on flavour profile from brisket and flat iron samples.

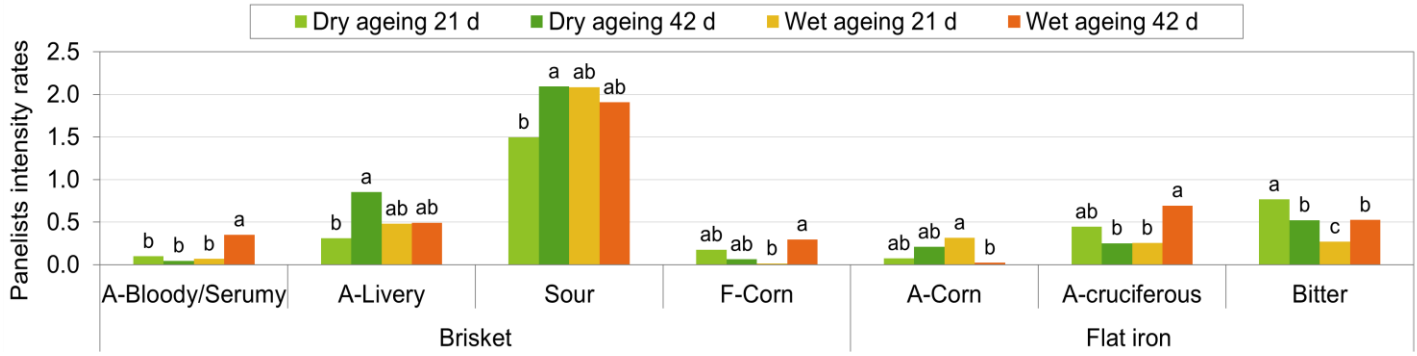

Figure 2. Effect of ageing treatment on flavour profile from brisket, clod heart and flat iron samples.

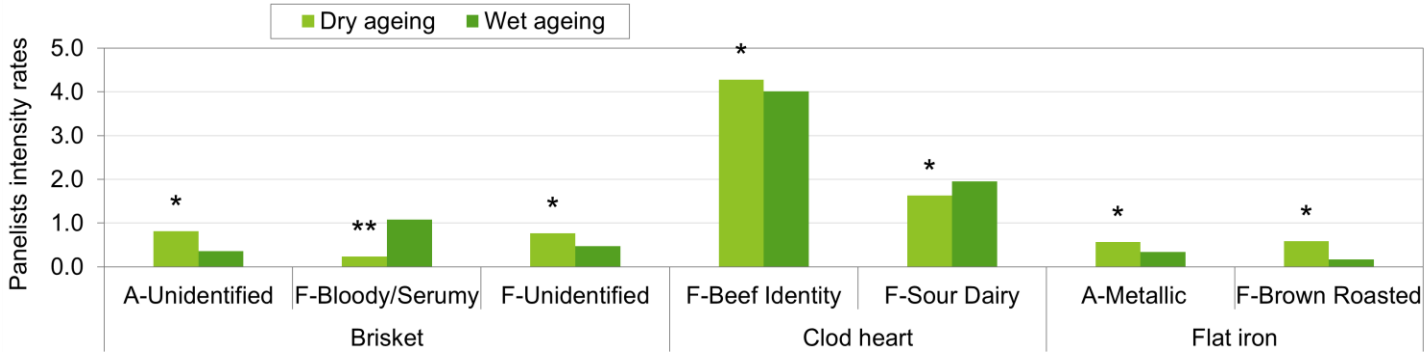

Figure 3. Effect of ageing period on flavour profile from brisket, clod heart and flat iron samples.