

CONSUMER ACCEPTABILITY OF BISON STEAKS TREATED WITH OREGANO AND ROSEMARY EXTRACTS

Vipasha Sood^{1*}, Wenchao Tian¹, Claudia Narvaez-Bravo¹, Susan D. Arntfield¹, Argenis Rodas González²,

¹Department of Food and Human Nutritional Sciences and ²Department of Animal Science,
University of Manitoba, Winnipeg, Manitoba R3T 2N2, Canada

*Corresponding author email: soodv@myumanitoba.ca

I. INTRODUCTION

Bison meat color is consistently unstable [1] and discolors rapidly under aerobic packaging during retail display. Therefore, new technologies to address this issue are needed. Consumer preferences for natural, organic and clean-labels foods should be considered when searching for new technologies to improve color stability. Among those natural alternatives, essential oils (EOs) and extracts have emerged as a possible technology to reduce the synthetic preservative usage in meat products [2]. Oregano and rosemary extracts possess antioxidant properties, and they can offer oxidative stability in meat products [3]; consequently, they could be applied in bison meat. A study conducted by Sood et al. [4] reported that oregano considerably improved colour stability of bison steaks by increasing metmyoglobin reducing activity in comparison with rosemary oil; however, it was not determined if the extracts affected the palatability attributes of the meat. Therefore, the present study was to examine the effects of oregano and rosemary extracts in bison steaks on the palatability attributes and acceptability evaluated by consumers.

II. MATERIALS AND METHODS

A total of 10 strip-loins from grade A1 bison carcasses were obtained from a federal slaughter plant and shipped to the University of Manitoba Food Science Pilot plant (Winnipeg MB, Canada) within 48 h post-mortem. Upon arrival, the sub-primals were aged for 7 days at 4°C. At the end of the aging period, each sub-primal portion was removed from their packages, cut into three equal portions, weighed, and randomly allotted to 1 out of 3 treatments with extracts (non-enhanced, 0.05 % rosemary extract and 0.08% oregano extract at 10% wt/wt). Strip loin portions were allowed to equilibrate for 5 min after injection and then were weighed to determine the final percentage of injection. 2.54cm thick steaks were obtained from each of the three treated portions, vacuum-packaged and immediately stored at -40 °C for sensory study. Prior to sensory testing, steaks were thawed at 4°C for 24 h. For sample preparation, cooking procedures, and cooking equipment the guidelines described by the American Meat Science Association [5] were followed. The steaks from each extract treatment were assigned and cooked in individual electric grill to avoid contamination of flavour compounds among treatments. Electric grills were preheated (approximately at 165°C) and steaks were placed on it, turned once during cooking (at 35 °C) and removed from the grill when they reached the desired internal temperature (71°C). Cooked steaks were trimmed to zero fat cover and 8–15 cubed samples (2.5 cm³ of size) were derived from each steak and placed in a preheated pan to keep samples warm (at 50°C) until serving. Cubed samples from each of the three treatments were served warm on pre-coded disposable plastic plates, accompanied with a glass of water, diluted apple juice (10%) and unsalted crackers to cleanse panelists' palate after tasting each sample. Ninety consumers conformed the taste panel. Panelists consisted of men and women, who were regular beef eaters (98% consume more than once a week), of various level of education, income and ethnicity. Consumers scored the samples through a 9-point hedonic scale (1=dislike extremely; 9=like extremely) for tenderness, juiciness, flavor and overall liking along with the acceptability of all these attributes and the flavour profile. Palatability attribute data was analyzed as a randomized block design. Thus, the model contained extract treatment as the main effect, and the consumer panelist were considered as a random variable (block). Chi-squared analysis was performed for overall acceptability and flavour profile.

III. RESULTS AND DISCUSSION

The extract treated steaks under study were not significantly different to the control group ($P > 0.05$) for tenderness juiciness and overall liking. However, consumers reacted more positively to bison steaks injected with rosemary extract, than the steaks treated with oregano as evidenced by greater scores for all traits ($P < 0.05$). Therefore, rosemary injected steaks were more desirable and palatable than oregano counterpart. Nevertheless, all treatments had the same score range, which corresponded to "Like slightly" of a 9-point hedonic scale used in the experiment. Additionally, no difference was detected in flavour score ($P = 0.06$), and all treatments exhibited the same flavour profile ($P = 0.46$), with the most common flavour descriptors being: unidentified (29.10%), serummy/bloody (15.30%), livery (11.57%) and grainy (10.82%) flavours. On the other hand, when the percentages of acceptability were compared, a tendency was observed ($P = 0.06$), where the highest percentage of overall acceptability was obtained by steaks treated with rosemary (86.52%), followed by control (76.40%) and oregano (72.22%).

The results of the present study tend to be somewhat opposite to those obtained by Scramlin et al. [6], who studied the effect of oregano oil (0.5%) on palatability variations in beef longissimus and found no effect on tenderness and juiciness attributes but unacceptable scores for off-flavor and overall acceptability. In contrast, Al-Hijazeen et al. [7] applied oregano (0 to 200mg/kg) plus tannic acid (5 to 10 ppm) in ground chicken; and concluded that regardless of tannic acid concentration, ground chicken treated with 200 mg/kg of oregano EOs had greater overall acceptability ($P < 0.05$) than control. In the case of other EOs, Mohamed et al. [8] added marjoram and rosemary EOs at 200 mg/kg to beef patties formulated with 200 g/kg mechanically deboned poultry meat, and reported that both EOs increased the overall acceptability of the patties ($P < 0.05$) with respect to the control group.

CONCLUSION

These results indicate that the bison steaks treated with oregano and rosemary extracts do not confer negative changes to the palatability attributes and flavour profile. However, rosemary treated bison steaks were appreciated by the consumers as more palatable.

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