Improving shelf life of fresh bison steaks treated with oregano and rosemary essential oils

Presenter: Vipasha Sood
INTRODUCTION

❖ The bison industry in Canada is small but growing in size and trying to position their meat products in the Canadian red meat market place.

Steiner et al. (2010)

❖ On meat palatability traits, bison meat has been more tender, more juicy and had lower shear force than beef cattle.

Koch et al. (1995) and Larick et al. (1989)
Early research indicated noticeable differences between bison and beef cattle on meat shelf life traits.

❖ Dark red colour

❖ Consistently unstable (early browning) under retail aerobic packaging conditions.

❖ High retail losses: stock out, markdowns and waste due to expired display life.

❖ Losing fresh meat market, it is sold frozen.
Is it possible improve the inherent color problems through postmortem technologies?
INTRODUCTION

Some technologies have been applied on bison meat:

❖ Blast chilling.
❖ Spray chilling.
❖ Elevated temperature conditioning.
❖ Moisture enhancement and marination.

With limited or no significant effects

Janz et al. (2000); Janz et al. (2001); Dhanda et al. (2002); Janz and Aalhus, (2006); Pietrasik et al. (2006)
It is important to explore other technologies for bison meat which have been successful in improving shelf life attributes in beef steaks.
PREVIOUS RESEARCH

- EOs from oregano and rosemary have potential as natural food antioxidants.
  
  (Nieto, Jongberg, Andersen, & Skibsted, 2013)

- Rosemary extract delayed meat discoloration and extending the shelf life time of meat from around 9 to 13 days.
  
  (Ortuño, Serrano, Jordán, & Bañón, 2014)

- Plants extracts from *Origanum dictamnus* prevent oxidation in porcine meat.

  (Møller, Madsen, Aaltonen, & Skibsted, 1999; Tanabe, Yoshida, & Tomita, 2002)
OBJECTIVE

To examine the effects of essential oils (rosemary and oregano) on color and oxidative stability of bison strip loins in retail display conditions.
MATERIALS AND METHODS
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Strip loins (n=10) from grade A1 bison carcasses obtained and aged for 7 d at 4 °C.
MATERIALS AND METHODS

At day 7 post mortem, initial steak (2.5 cm thick) was obtained for metmyoglobin reducing activity (MRA) and oxygen consumption (OC) analysis according to AMSA (2012) before injecting with essential oils.
MATERIALS AND METHODS

❖ Rest of the loin portion was cut into 3 equal portions; weighed, pH and temperature were determined.

❖ Allotted to treatments with essential oils (non-enhanced, 0.05 % rosemary extract and 0.08% oregano extract in the final product at a 10% pump level).
MATERIALS AND METHODS

Steaks were PVC-overwrapped and placed in retail cabinets for five days at 3 °C under light emitting diodes (LED) at 1240 lx.
MATERIALS AND METHODS

Treatments were evaluated for:

❖ pH and drip loss.
❖ Three scans for instrumental (L*, a*, b*) color was determined using a Minolta Chroma Meter CR-410 (D65, 2°, A 2.54 cm).
❖ Six trained panelists evaluated the samples for display color and discoloration (at each 24 h interval) according to AMSA (2012).
❖ Oxidative rancidity was evaluated by measuring thiobarbituric acid reactive substances (TBARS; mg/kg; Buege and Aust, 1978).
MATERIALS AND METHODS
RESULTS
RESULTS

❖ The pH of rosemary and oregano injection solution were 6.8 and 4.45, respectively.

❖ Regardless of time in retail display, the pH values of injected strip loins were not different among treatments ($P > 0.05$).

❖ Regardless of treatment, the pH in all samples decreased ($P < 0.05$) by the end of the retail display period ($d_0 = 5.76$ and $d_4 = 5.63$).
### RESULTS

Table 1. Changes on physical and metabolic parameters of bison steaks injected with oregano and rosemary essential oils.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Ref(^1)</th>
<th>Control</th>
<th>Oregano</th>
<th>Rosemary</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drip loss, %</td>
<td>-</td>
<td>3.54(^a)</td>
<td>7.07(^b)</td>
<td>6.47(^b)</td>
<td>0.34</td>
</tr>
<tr>
<td>OC</td>
<td>31.07(^{ab})</td>
<td>44.52(^a)</td>
<td>24.06(^b)</td>
<td>35.64(^a)</td>
<td>6.67</td>
</tr>
<tr>
<td>MRA</td>
<td>51.88(^b)</td>
<td>42.62(^a)</td>
<td>49.31(^b)</td>
<td>40.46(^a)</td>
<td>3.42</td>
</tr>
</tbody>
</table>

\(^{ab}\) Means with different superscripts were significantly different (P < 0.05).

SEM: standard error of the mean.

\(^1\)Reference: steak obtained at d 0 before cut the striploin into three equal portions and allotted to 1 out of 3 treatments with essential oils.

OC: oxygen consumption

MRA: Metmyoglobin reducing activity
Fig. 1. Trained panelists color scores (1=pale red or pale pinkish red; 8=very dark or tannish red or brown) and surface discoloration (1=no discolouration; 6=extensive discoloration, 81–100%) for strip-loin injected with oregano and rosemary.
Figure 2. Changes in $L^*$, Chroma and Hue measurements during retail display (0-4 d) in strip-loins injected with oregano and rosemary.
RESULTS

OREGANO

CONTROL
RESULTS

Figure 3: TBARS in strip-loin steaks for control, oregano, and rosemary treatments at the end of retail display period. SEM = 0.07
CONCLUSIONS
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❖ Essential oils did not affect the ultimate pH of the bison steaks.

❖ Essential oil from oregano can considerably improve color stability of bison steaks due to its antioxidants properties and ability to increase MRA capacity in the bison meat.
FUTURE RESEARCH

❖ Effectiveness of essential oils (rosemary and oregano) in reducing **protein oxidation**.

❖ Palatability (**sensory** analysis) of fresh bison meat injected with essential oils.

❖ Determination of **Total iron**, **Non-heme iron** and **heme iron** content in fresh bison meat.
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THANK YOU!
REFERENCES


