Consumer Acceptability of Commercially-available Domestic Grass-fed and Grain-fed Beef

C. Strong, L. Stewart, D. Johnson, L. Eubanks, and C. Carr

Summary
All beef producers are looking for ways to increase their profit margin. Some producers are trying to accomplish this by becoming niche meat marketers, rather than commodity cattle producers. One of the most popular niche markets in the southeast is to utilize available forage resources, to produce and market grass-fed beef. The purpose of this project was to evaluate consumer acceptance of cooked grass-fed and grain-fed beef steaks. Ribeye rolls were acquired from commercial providers, fabricated into steaks, randomized to ensure steaks from at least 2 animals per treatment were fed to each sensory session (n = 10), then vacuum sealed and allowed 21 d postmortem aging prior to freezing. Steaks cooked to the same internal temperature and only ribeye muscle from each steak was cut into sample cubes and panelists were served two cubes from each treatment while still warm. A total of 410 panelists evaluated samples over 10 sessions. Age, gender, or background of panelists did not affect findings. Panelists found grain-fed steaks to be more tender (P = 0.02; 6.0 vs. 5.4) and juicy (P < 0.01; 6.9 vs. 6.2) than grass-fed steaks. Panelists also rated grain-fed steaks higher for flavor acceptability (P < 0.01; 6.5 vs. 5.8) and overall acceptability (P < 0.01; 6.4 vs. 5.7) than grass-fed steaks. Despite greater mean ratings for grain-fed beef, 24% of panelists preferred grass-fed beef overall. These results complement those of previous preference studies.

Introduction
With the current economic climate, many beef producers are looking for ways to increase their profit margin. Some producers are trying to accomplish this by becoming niche meat marketers, rather than commodity cattle producers. One of the most popular niche markets in the southeast is to utilize available forage resources, to produce and market grass-fed beef. Although forages are an economically viable feed source, they are less nutrient dense than concentrated feeds. Therefore, differences exist between the two beef end products. Considerable research has been conducted with carcass merit and carcass quality of grain and grass-fed beef (Cox et al., 2006; Schaake et al., 1993); however, previous findings (Bowling et al., 1977; Hedrick et al., 1983) suggest consumers discriminate against grass-fed beef. Over time, most American consumers have become used to the palatability of commodity grain-fed beef. The purpose of this project was to evaluate consumer acceptance of commercially available grass-fed and grain-fed beef steaks.

Materials and Methods
Ribeye rolls were acquired from commercial providers, fabricated into steaks, randomized to ensure steaks from at least 2 animals per treatment were fed at each sensory session (n = 10), then vacuum sealed and allowed 21 d postmortem aging prior to freezing. Steaks were thawed for 18 h at 39°F, then cooked on an open hearth, variable heat grill (Model 31605 AH, Hamilton Beach/Proctor-Silex Inc., Southern Pines, NC). Steaks were turned once at an internal temperature of 80°F and were allowed to finish cooking, reaching an internal temperature of 160°F (AMSA, 1995).

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Temperature was monitored using copper-constantan thermocouples placed in the geometric center of each steak connected to a recording thermometer (Measurement Computing Corp., Norton, MA) and recorded using a DASYLab 12.0 in Windows 7 (Measurement Computing Corp., Norton, MA). The ribeye muscle from each steak was cut into 0.5 in³ sample cubes and panelists were served 2 cubes from each treatment while still warm. Each panelist was given a ballot to record their demographic information including: gender, age range (≤ 20, 21-30, 31-40, 41-50, 51-60, and ≥ 61 yrs), and background (farm or non-farm) and to evaluate cooked tenderness and juiciness from 1 to 9 (1 = extremely tough/dry to 9 = extremely tender/ juicy) and flavor acceptability and overall acceptability from 1 to 9 (1 dislike extremely to 9 like extremely). Data were analyzed using the mixed model procedure of SAS (SAS Inst., Inc., Cary, NC) with treatment (grain or grass-fed), gender, age range, and background as fixed effects and panel event as a random effect.

**Results**

A total of 410 panelists evaluated samples over 10 sessions. In this report, age range, gender, or background of panelists did not affect \( P \geq 0.25 \) consumer findings. All consumer sensory data are reported in Table 1. Panelists found grain-fed steaks to be more tender \( P = 0.02 \) and juicy \( P < 0.01 \); Table 1) than grass-fed steaks. Panelists also rated grain-fed steaks higher for flavor acceptability \( P < 0.01 \) and overall acceptability \( P < 0.01 \) than grass-fed steaks. Despite greater mean ratings for grain-fed beef, 24.1% of panelists preferred grass-fed beef overall (Figure 1). These results complement those of previous studies by Umburger et al. (2002) and Cox et al. (2006) who reported between 23 and 34% of surveyed consumers preferred the overall palatability of grass-fed beef over grain-fed beef.

**Literature Cited**

Table 1. Consumer acceptability of commercially-available domestic grass-fed and grain-fed beef

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Grain-fed</th>
<th>Grass-fed</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tenderness¹</td>
<td>6.0 ± 0.2</td>
<td>5.4 ± 0.2</td>
<td>0.02</td>
</tr>
<tr>
<td>Juiciness¹</td>
<td>6.9 ± 0.2</td>
<td>6.2 ± 0.2</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Flavor²</td>
<td>6.5 ± 0.2</td>
<td>5.8 ± 0.2</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Overall²</td>
<td>6.4 ± 0.2</td>
<td>5.7 ± 0.2</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

¹ 9 = extremely tender, juicy; 1 = extremely tough, dry.
² 9 = extreme like; 1 = extreme dislike.

Figure 1. Grain-Fed vs. Grass-Fed Beef Overall Consumer Preference