Abstract

Tasco-14® (a proprietary product of Ascadian Seaplants LTD, Dartmouth, Nova Scotia) is derived from dried brown seaweed, Ascophyllum nodosum, and was fed to increase carcass merit, decrease Escherichia coli O157:H7 and lower Salmonella spp. prevalence. Crossbred beef cattle (Bos indicus x Bos taurus) (n=579) in a large West Texas commercial feedyard served as experimental units (179 control and 400 treatment) for carcass characteristic analysis. After arrival at the feedyard from the ranch, a 45 day adjustment period was followed by treatment (n=400) receiving 2% Tasco-14® supplementation on a dry matter basis for 14 days. Control cattle (n=179) were fed a control diet not containing Tasco-14®. Carcasses were evaluated for quality and yield characteristics 48h postmortem. Two hundred head from the initial feeding group were sampled and served as experimental units (100 treatment, 100 control) for Salmonella spp. and EHEC determination during first feeding of diet treatment. Hide swab and fecal samples were obtained for ADAP approved microbiological assays from treatment and control animals, one day before feeding of Tasco-14® and at the end of 144 feeding. Tasco-14® samples were collected one time 14d before transportation to the abattoir in order to decrease EHEC O157:H7 and Salmonella spp. in feces and on hides. Hide swabs and fecal samples were collected one day before feeding Tasco-14® and immediately following exsanguinations at the abattoir. Treatment groups exhibited higher marbling scores than the control group (P<0.0001). Prevalence of EHEC O157 hide/fecal (P=0.001) and EHEC O157:H7 hide/fecal (P=0.001) after a second feeding period (144 prior to harvest) exhibited a significant reduction for treatment diets as compared with the control group. Prevalence of Salmonella spp. on hide swabs did not exhibit change for treatment cattle (P=0.64), however, control animals exhibited an increase for Salmonella spp. prevalence (P<0.0001) from pre second feeding levels. Salmonella spp. prevalence increased for both treatment and control fecal samples over prefeeding levels (P<0.0001). However, Tasco-14® treatment samples exhibited a significantly lower post treatment prevalence of Salmonella spp. for fecal samples as compared with control. The supplementation of Tasco-14® to reduce prevalence EHEC O157 and EHEC O157:H7 is supported by this research. Tasco-14® supplementation exhibits promise for use as a pre harvest food safety intervention, improve carcass merit, and increase shelf life in beef cattle.

Introduction

Increasing food safety, while maintaining the appeal and quality of meat products has quickly become one of the leading issues surrounding the beef and food industries. The increased incidence of food borne illnesses has been attributed to a variety of food borne pathogens such as Salmonella spp. and Escherichia coli O157:H7 (Díez-González et al., 1998). A majority of research has implicated feces, hide, hair, hooves and ingesta as sources of in- farm contamination (Korak et al., 1997). The development of pre-harvest interventions systems, which eliminate or reduce the prevalence of food borne pathogens exhibits promise for the industry. Supplementation with certain feed additives, such as probiotics and/or diet changes, have been shown to exhibit anti-microbial characteristics, while sustaining or improving carcass quality attributes (Kudva et al., 1997).

Objectives

Determine the effects of Tasco-14® supplementation at 2% of diet on Escherichia coli O157:H7 and Salmonella spp.

Determine the effects of Tasco-14® supplementation on marbling scores, carcass merit and retail display color value.

Materials and Methods

- 579 crossbred (Bos taurus x Bos indicus) steers and steers were supplemented for carcass characteristic analysis (n=400 treatment, n=179 control)
- 200 head (n=100 treatment, n=100 control) were used for microbiological sampling
- A commercial corn based diet was utilized as the control diet
- Treatment diet consisted of the control diet with the addition of 2% Tasco-14® on a dry matter basis
- Hide swabs and fecal samples were collected for microbiological assays immediately following a 45 day adjustment period, and immediately after a 14d Tasco-14® supplementation period
- Samples were also taken one day prior to a second 14d Tasco-14® supplementation and immediately following exsanguinations at the abattoir
- Carcasses were evaluated for quality and yield factors at 48h postmortem
- Escherichia coli O157:H7 was isolated using immunomagnetic bead separation
- Escherichia coli O157:H7 prevalence increased during the (ADAP approved) BAX® System
- Salmonella spp. was isolated using the (ADAP approved) BAX® System
- Salmonella spp. analysis was performed using the (ADAP approved) BAX® System
- Automated detection for bacterial screening
- Salmonella spp. was evaluated using the BAX system
- Salmonella spp. prevalence increased for both treatment and control fecal samples over prefeeding levels (P<0.0001)
- Treatment groups exhibited lower post treatment prevalence of Salmonella spp. for fecal samples as compared with control. The supplementation of Tasco-14® to reduce prevalence EHEC O157 and EHEC O157:H7 is supported by this research. Tasco-14® supplementation exhibits promise for use as a pre harvest food safety intervention, improve carcass merit, and increase shelf life in beef cattle.

Results

Table 1. Least squares means and SD for treatment and control carcass traits

<table>
<thead>
<tr>
<th>Trait</th>
<th>Treatment</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color Uniformity</td>
<td>0.99 ± 0.03</td>
<td>1.01 ± 0.02</td>
</tr>
<tr>
<td>Marbling</td>
<td>0.01 ± 0.01</td>
<td>0.01 ± 0.01</td>
</tr>
<tr>
<td>Biceps (cm²)</td>
<td>10.5 ± 0.5</td>
<td>10.5 ± 0.5</td>
</tr>
<tr>
<td>Longissimus (cm²)</td>
<td>12.3 ± 0.3</td>
<td>12.1 ± 0.3</td>
</tr>
<tr>
<td>Fleischery PYG</td>
<td>2.5 ± 0.1</td>
<td>2.5 ± 0.1</td>
</tr>
<tr>
<td>Crude Protein (%)</td>
<td>23.5 ± 1.2</td>
<td>23.4 ± 1.2</td>
</tr>
<tr>
<td>Fat (%)</td>
<td>20.7 ± 1.1</td>
<td>20.8 ± 1.1</td>
</tr>
<tr>
<td>Retail color evaluation</td>
<td>3.5 ± 0.5</td>
<td>3.5 ± 0.5</td>
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</tbody>
</table>

Implications

Results indicate Tasco-14® can be supplemented at 2% of the diet for 14d prior to harvest to reduce EHEC O157:H7 levels in both feces and on hides by reducing the number of animal shedders and decreasing the numbers of those animal shedders. Tasco-14® can be used as a pre-harvest food safety intervention. Further research is necessary to determine if Tasco-14® can be supplemented to increase marbling scores and increase shelf life.

Literature Cited