Effect of supplementing forage-based diets for late-gestation wintering beef cows with dried distillers grains plus solubles or rolled barley grain on methane emissions

Hushton C. Block1*, Alan D. Iwaasa2, Clayton D. Robins1 and Shannon L. Scott1

1Agriculture and Agri-Food Canada, Brandon Research Centre, P.O. Box 1000A, R.R. #3, Brandon, MB, R7A 5Y3, Canada
2Agriculture and Agri-Food Canada, Semiarid Prairie Agricultural Research Centre, P.O. Box 1030, Swift Current, SK, S9H 3X2 Canada

Introduction

Expansion of the ethanol biofuel industry creates a challenge for beef cattle producers by increasing competition for cereal grain, as well as an opportunity through increased supply of co-products suitable for use as livestock feed. However, there is limited information available regarding the value of dried distillers grains plus solubles (DDGS) as a supplemental feed in forage-based production systems that livestock producers can use to make feed formulation decisions. To address this limitation, drylot and metabolism trials were conducted to evaluate the performance of late-gestation wintering cows fed forage-based diets that were un-supplemented, or supplemented with DDGS or rolled barley grain.

Materials and Methods

Drylot Trial (2 years):
- 56-d trial using 3 pens of 8 cows per treatment
- Control (hay/silage or straw/silage), barley (control plus ca. 20% rolled barley grain), and DDGS (control plus ca. 20% DDGS) treatments
- Data collection
  - Total trial feed intake
  - Weight at 0, 14, 28, 42, and 56 d
  - Ultrasound backfat at 0, 29, and 56 d

Metabolism Trial (2 years):
- 63-d replicated Latin square trial
- Three 21-d periods using 9 individually fed cows
- Control (hay/silage), barley (control plus ca. 20% rolled barley grain), and DDGS (control plus ca. 20% DDGS) treatments
- Data collection
  - 4-d (year 1) or 5-d (year 2) feed intake
  - Fecal samples for digestibility
  - TID2 marker
  - 3-d methane emissions (SF6 marker)

Statistical Analyses
- Year and period fixed
- Cow random
- Repeated measures when appropriate

Table 1. Diet composition, % of DM (drylot)

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Barley DDGS Control barley grain</td>
<td>Control DDGS</td>
</tr>
<tr>
<td>Barley silage</td>
<td>41.0 31.7 31.4 39.1 30.7 30.8</td>
<td>41.0 31.7 31.4 39.1 30.7 30.8</td>
</tr>
<tr>
<td>Grass hay</td>
<td>58.9 45.7 46.2</td>
<td>58.9 45.7 46.2</td>
</tr>
<tr>
<td>Oat straw</td>
<td>- 69.8 69.3 69.3 47.0</td>
<td>- 69.8 69.3 69.3 47.0</td>
</tr>
<tr>
<td>Rolled barley grain</td>
<td>- 22.6</td>
<td>- 22.6</td>
</tr>
<tr>
<td>DDGS</td>
<td>- 22.4</td>
<td>- 22.4</td>
</tr>
</tbody>
</table>

Table 2. Diet composition, % of DM (metabolism)

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Year 1</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Barley DDGS Control barley grain</td>
<td>Control DDGS</td>
</tr>
<tr>
<td>Barley silage</td>
<td>38.8 31.0 31.0 38.0 36.2 29.7</td>
<td>38.8 31.0 31.0 38.0 36.2 29.7</td>
</tr>
<tr>
<td>Grass hay</td>
<td>44.6 44.6</td>
<td>44.6 44.6</td>
</tr>
<tr>
<td>Oat straw</td>
<td>- 56.3 45.4 45.4</td>
<td>- 56.3 45.4 45.4</td>
</tr>
<tr>
<td>Rolled barley grain</td>
<td>- 21.6</td>
<td>- 21.6</td>
</tr>
<tr>
<td>DDGS</td>
<td>- 22.1</td>
<td>- 22.1</td>
</tr>
</tbody>
</table>

Conclusions

- Providing supplemental feed as rolled barley grain or DDGS was important in stimulating intake when the forage-based diet was of lower quality.
- Supplemental DDGS for late-gestation wintering beef cows fed a forage-based diet resulted in weight gain and feed efficiency comparable to barley grain providing a basis for feed formulation decisions.
- No effect on methane emissions with improved intake, gain, and feed efficiency suggests supplementation can reduce methane emissions rates with forage-based diets for late-gestation wintering beef cows.
- Estimates emissions rates are at or lower than IPCC (1996) recommended rates.

References


Acknowledgements

Funding provided by:
- Manitoba Cattle Producers Association
- Agriculture and Agri-Food Canada