Price Characteristics of Centennial Hay Auction

2013 June WAEA Selected Paper

Presented by Katelyn McCullock
Co-authors: Carolyn Davidson and James Robb
Introduction: Hay is Hay

• What is a hay?

• Marketing Challenges
  – Regions
  – End Users
  – Transportation
  – Flexibility in the Ration
  – Competing Feedstuffs
  – Types, Sizes and Grades
Price Transparency

• Too Many Variables
• Data from USDA Sources
  – National and State: USDA-NASS
  – Regional Data: USDA-AMS
• Market Challenges: What can the Grower Control?
Data Set

• Centennial Hay Auction, Fort Collins, CO
  – Monthly, covers a variety of hay types
  – Consistently reports alfalfa, mixed alfalfa/grass and grass hay in all grades and sizes.

• Volume: 1200 tons of all hay and straw monthly
  – Alfalfa: 5900 tons/year
  – Mixed: 2500 tons/year
  – Grass: 4600 tons/year
Data Set

• For Each Hay Type: Average Weighted Price, Year, Month, Tons, Grade, Size, and Total Tons Offered.

• Unique Observations: Grade and Size
  – Example: 3x3 Supreme and 3x3 Fair

<table>
<thead>
<tr>
<th>Hay Type</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>945</td>
</tr>
<tr>
<td>Mixed</td>
<td>662</td>
</tr>
<tr>
<td>Grass</td>
<td>860</td>
</tr>
</tbody>
</table>
Methodology

• Year and Tons: continuous variables
• Month, Grade, and Size: dummy variables
• Total Tons offered at auction was omitted.
• Weighted Average Price was deflated using the Feed Price Index by NASS
• Interactive terms were tested for size x grade combinations: Used all that were significant at the .01 or higher.
• OLS Regression for each hay type
**Results**

- Year, grades, and sizes were significant in all hay types.
- Seasonality seemed to be a factor for alfalfa.
- Tons was significant for mixed alfalfa/grass and grass hays.
- All interactive terms were significant.

<table>
<thead>
<tr>
<th></th>
<th>Alfalfa</th>
<th></th>
<th>Mixed Grass</th>
<th></th>
<th>Grass</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Intercept)</td>
<td>$35,450.00</td>
<td>1992.00</td>
<td>$31,340.00</td>
<td>2301.00</td>
<td>$37,760.00</td>
<td>2225.00</td>
</tr>
<tr>
<td>Year</td>
<td>$ (17.56)</td>
<td>0.99</td>
<td>$ (15.52)</td>
<td>1.15</td>
<td>$ (18.71)</td>
<td>1.11</td>
</tr>
<tr>
<td>Tons</td>
<td>$ (0.07)</td>
<td>0.05</td>
<td>$ (0.28)</td>
<td>0.10</td>
<td>$ (0.24)</td>
<td>0.06</td>
</tr>
<tr>
<td>MonthAugust</td>
<td>$ (27.21)</td>
<td>7.43</td>
<td>$ (6.10)</td>
<td>9.62</td>
<td>$ (12.78)</td>
<td>8.47</td>
</tr>
<tr>
<td>MonthDecember</td>
<td>$ 9.74</td>
<td>8.02</td>
<td>$ 13.33</td>
<td>9.31</td>
<td>$ 0.19</td>
<td>8.43</td>
</tr>
<tr>
<td>MonthFebruary</td>
<td>$ (2.31)</td>
<td>7.14</td>
<td>$ 1.42</td>
<td>9.24</td>
<td>$ (1.51)</td>
<td>8.56</td>
</tr>
<tr>
<td>MonthJanuary</td>
<td>$ 7.95</td>
<td>7.41</td>
<td>$ 10.21</td>
<td>9.85</td>
<td>$ 8.78</td>
<td>8.40</td>
</tr>
<tr>
<td>MonthJuly</td>
<td>$ (22.16)</td>
<td>7.63</td>
<td>$ (14.51)</td>
<td>8.76</td>
<td>$ (25.53)</td>
<td>8.02</td>
</tr>
<tr>
<td>MonthJune</td>
<td>$ (16.95)</td>
<td>7.64</td>
<td>$ (10.87)</td>
<td>9.15</td>
<td>$ (14.40)</td>
<td>8.72</td>
</tr>
<tr>
<td>MonthMarch</td>
<td>$ 3.42</td>
<td>7.10</td>
<td>$ 7.91</td>
<td>9.41</td>
<td>$ 5.00</td>
<td>8.31</td>
</tr>
<tr>
<td>MonthMay</td>
<td>$ 9.84</td>
<td>7.93</td>
<td>$ (2.28)</td>
<td>10.11</td>
<td>$ 5.89</td>
<td>8.64</td>
</tr>
<tr>
<td>MonthNovember</td>
<td>$ (5.80)</td>
<td>7.49</td>
<td>$ 12.24</td>
<td>9.17</td>
<td>$ 2.90</td>
<td>8.51</td>
</tr>
<tr>
<td>MonthOctober</td>
<td>$ (3.94)</td>
<td>7.84</td>
<td>$ 2.26</td>
<td>9.41</td>
<td>$ 13.17</td>
<td>8.83</td>
</tr>
<tr>
<td>MonthSeptember</td>
<td>$ (17.45)</td>
<td>7.22</td>
<td>$ 6.31</td>
<td>9.34</td>
<td>$ (0.10)</td>
<td>8.31</td>
</tr>
<tr>
<td>Size3x4</td>
<td>$ (18.89)</td>
<td>5.27</td>
<td>$ (23.34)</td>
<td>6.57</td>
<td>$ (28.79)</td>
<td>5.98</td>
</tr>
<tr>
<td>Size4x4</td>
<td>$ (30.89)</td>
<td>4.84</td>
<td>$ (50.34)</td>
<td>7.05</td>
<td>$ (42.53)</td>
<td>6.47</td>
</tr>
<tr>
<td>SizeLarge Rd</td>
<td>$ (27.39)</td>
<td>5.80</td>
<td>$ (33.89)</td>
<td>6.60</td>
<td>$ (43.51)</td>
<td>6.26</td>
</tr>
<tr>
<td>SizeSm Rounds</td>
<td>$ (21.36)</td>
<td>7.76</td>
<td>$ (37.34)</td>
<td>8.72</td>
<td>$ (41.28)</td>
<td>7.68</td>
</tr>
<tr>
<td>SizeSmall Square</td>
<td>$ (11.61)</td>
<td>5.75</td>
<td>$ (2.05)</td>
<td>5.83</td>
<td>$ 1.83</td>
<td>5.93</td>
</tr>
<tr>
<td>GradeGood</td>
<td>$ 29.45</td>
<td>4.75</td>
<td>$ 42.00</td>
<td>4.98</td>
<td>$ 38.29</td>
<td>4.66</td>
</tr>
<tr>
<td>GradePremium</td>
<td>$ 51.66</td>
<td>5.18</td>
<td>$ 64.72</td>
<td>6.10</td>
<td>$ 69.51</td>
<td>5.37</td>
</tr>
<tr>
<td>GradeSupreme</td>
<td>$ 70.62</td>
<td>6.31</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>GradeUtility</td>
<td>$ (41.80)</td>
<td>6.30</td>
<td>$ (42.23)</td>
<td>6.40</td>
<td>$ (47.22)</td>
<td>5.74</td>
</tr>
<tr>
<td>SupSmSq</td>
<td>$ 58.67</td>
<td>10.16</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>PremSmSq</td>
<td>$ 33.32</td>
<td>8.38</td>
<td>$ 43.71</td>
<td>8.72</td>
<td>$ 55.28</td>
<td>8.99</td>
</tr>
<tr>
<td>SupLgRd</td>
<td>$ (31.35)</td>
<td>14.98</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Observations | 945 | 662 | 860
Adjusted R | 0.5383 | 0.5938 | 0.6125

Bold= Significant at .01
Results: Continued

- Results Compared to: April, 3x3, Fair Bales in all three cases.
- Size Comparisons:
Results: Continued

• Grade Comparisons:

- $60.00
- $40.00
- $20.00
- $0.00
- $20.00
- $40.00
- $60.00
- $80.00

Graph showing the comparison of Alfalfa, Mixed Grass, and Grass for Grade Supreme, Grade Premium, Grade Good, and Grade Utility.
Results: Continued

• Cross Product Terms:

<table>
<thead>
<tr>
<th></th>
<th>Alfalfa</th>
<th>Mixed Grass</th>
<th>Grass</th>
</tr>
</thead>
<tbody>
<tr>
<td>SupSmSq</td>
<td>$ 58.67</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>PremSmSq</td>
<td>$ 33.32</td>
<td>$ 43.71</td>
<td>$ 55.28</td>
</tr>
<tr>
<td>SupLgRd</td>
<td>($31.35)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Summary
Compared to the 3x3 Fair

- Alfalfa: $190 per ton price swing.
  - +$117.68 to -$73 per ton.
- Mixed Alfalfa/Grass: $199 per ton swing
  - +$106 to -$93 per ton
- Grass: $217 per ton swing
  - $127 to -$91 per ton
Summary

• Alfalfa: Grades carry about a $20 per ton difference, and smaller sizes are highly preferred at higher qualities.

• Grass: Most unforgiving in quality, price differences are much higher between grades ~$30 per ton. Smaller bales are in demand regardless of quality.

• Mixed Grass: Largest discount for 4x4 bales, grade changes more similar to grass.
Summary

• Size and Grade combinations matter the most.
• Auction represents a large variety of livestock owners, and species.
• Farm management: Grass hay growers should focus on quality, while alfalfa growers should focus more on size.
• As a buyer, investment in equipment such as tractor trailers, and tractors could save money as long as volume is there to justify it.
Conclusion/Discussion

• Unique area, and the hedonic model addresses most of the major concerns regarding the data.

• Transparency continues to be a problem with the loss of data.

• Limitations: Lacking drought year data and demand side information
Conclusion/Discussion

• Other auctions have significantly limited data information to apply this type of analysis.
• More recently, hay contracts are made on securing supply.
• Ideas of other models to compare?
Questions

Katelyn McCullock
Dairy and Forage Economist
Livestock Marketing Information Center

Katelyn.mccullock@lmic.info
303/236-0467
www.lmic.info