Using Crop Residues

The Great Opportunity for Nebraska Agriculture

Terry Klopfenstein
Corn Residue

- 10.3 million acres
  - 6.3 irrigated
  - 4.0 dryland
- 170 bu/ac yield?
  - 200 irrigated
  - 122 dryland
- 80% of grain as residue (dry)
  - 4.8 tons/ac irrigated
  - 2.93 ton/ac dryland
Cattle Needs

- Cow Grazing
- Calf Grazing
- Feedlot Cattle, Stalks, Silage
- Drylot Cows
Cattle Needs

- Cow Grazing: 3.6 million tons
- Calf Grazing: 0.40 million tons
- Feedlot Cattle: 2.0 million tons
- Drylot Cows: 0.48 million tons
- Total: 4.68 million tons
Corn Residue Balance

- Irrigated – 30.24 million tons
- Dryland – 11.7 million tons
- Total – 41.96 million tons
- Maximum use – 4.68 million tons
- Percent maximum use – 11.2%
- Irrigated only – 15.5%
Corn Plant Parts

- Husk (6.7%)
- Leaf Blade (22.1%)
- Leaf Sheath (10.8%)
- Cob (11.9%)
- Stem (48.5%)
Digestibility (%)

Current Values (2010)  Previous Research (88-91)

- Leaf Blade: 45, 45
- Leaf Sheath: 41
- Top 1/3 Stem: 37
- Bottom 2/3 Stem: 34, 43
- Husk: 61, 67
- Cob: 41, 34
- Shank: 49
Options for Corn Residue Harvest

- Corn Silage
- Baled Stalks
- Husklage
- Husklage Stalks
BENEFITS OF THE CORNROWER

- Reduces passes through the field and costs
- Eliminates any chance of dirt in the windrow
- Chopped stover increases baler intake capacity
- Bale density increased over other methods
- Provides control of the amount of stover harvested
- Adjustable windrow forming aides dry-down
- Chopped stover releases moisture quickly
- Easy to understand and operate, the combine operator will hardly know it’s on the machine
- Minimal maintenance requirements
- Test show less than 3 gallons of fuel per hour used above standard non-chopping corn head in side by side comparison at 4 mph harvest speed with 8 row header!
- Grain quality, loss rate and other functions are not impacted at all by the Cornrower

ONLY A CORNROWER CAN GUARANTEE CLEAN WINDROWS LIKE THIS. ‘CONCAVE’ SHAPE IS MADE POSSIBLE BY WINDROW SHIELDS FOR BETTER DRYDOWN AND EVEN BALER FEEDING.

The Cornrower will be available for harvest 2012 in limited numbers. For more information on availability, costs, capabilities and details on how the Cornrower can work for you, contact Jim Straeter at 800-327-5936 Cornrower is a Product of Straeter Innovation Inc.

2012 AE50 AWARD WINNER!

Windrow your stover while you shell your corn, without the dirt, rocks, extra trips and labor!

Unique approach "catches" stover under the corn head before it goes to the ground, chops and delivers stover to uniform windrow - all in one pass!

Cornrower is trademark protected and manufactured under US patent 7856800, and 8087223. Other patents pending.
In February 2013, at the National Farm Machinery Show, Geringhoff’s all new Stover Collection System was introduced. Geringhoff is the world leader in the development and manufacturing of stover collection harvest headers. European farmers rely on Geringhoff’s biomass collection system to support an extensive network of biofuel production factories. Geringhoff offers a single pass process during harvest that creates a user defined windrow free of rocks and debris. No stalk chopper or rake merger is necessary.
Calf Performance on Husklage

- Three year summary
- 85% to 95% of diet
- DMI = 13.3 lb/d
- ADG = 1.39 lb
- F:G = 10.5
- IVDMD 55.3%
Corn grain yield research plots near York, NE

Samples separated into:
- Grain
- Cob
- Husk
- Remaining residue (stem, leaf, and shank)
Three harvest times:

- Sept 1
  - MEM hybrids = 38.33% DM
  - MLM hybrids = 34.84% DM
- Sept 15
  - MEM hybrids = 45.45% DM
  - MLM hybrids = 41.16% DM
- Sept 29

MEM = Moderately early maturity hybrids (107-111 day)
MLM = Moderately late maturity hybrids (112-117 day)
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<tr>
<th>Item</th>
<th>Harvest</th>
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<th>P-value</th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>F-test</td>
<td>Lin.</td>
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<tr>
<td>Grain Yield</td>
<td>195.0</td>
<td>195.0</td>
<td>195.0</td>
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<tr>
<td>DM Yield</td>
<td>11.00^b</td>
<td>12.18^a</td>
<td>10.25^c</td>
<td>&lt;0.01</td>
<td>&lt;0.01</td>
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<td>Grain, %</td>
<td>51.36^c</td>
<td>52.40^b</td>
<td>62.23^a</td>
<td>&lt;0.01</td>
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<tr>
<td>Residue NDF</td>
<td>65.42^b</td>
<td>62.51^c</td>
<td>66.65^a</td>
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<td>Residue TDN</td>
<td>49.97^b</td>
<td>51.05^a</td>
<td>42.55^c</td>
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<td>Corn Plant TDN</td>
<td>70.59^c</td>
<td>71.46^b</td>
<td>72.08^a</td>
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**TDN (tons)/acre**

- **Sept 1**: 6.5 tons/acre
- **Sept 15**: 7.6 tons/acre
- **Sept 29**: 8.3 tons/acre

15.2% less TDN

Harvested

-$309/acre gross at $5.00/bu corn
Options for Treatment

- Sodium Hydroxide
  - effective
  - hazardous
- Ammonia
  - effective
  - palatability
  - adds nitrogen
- Calcium oxide (or hydroxide)
  - less effective
  - adds calcium
  - palatability
Shreck et al., 2011

- Optimize use of chemical treatments

- Factors:
  - DM
  - Chemical
  - Reaction Length
  - Ambient Temperature
  - Forage type

Effects on Digestibility

In Vitro
Summary of *in vitro* work

- **Chemical treatment, relative to control:**
  - 3%CaO 2%NaOH: 15% unit increase in DMD
  - 4%CaO 1%NaOH: 14% unit increase in DMD
  - 5% CaO: 11% unit increase in DMD

- **DM:**
  - 35%: 1.25% reduction
  - 50%: optimum

- **Temperature, relative to room temp (30°C):**
  - 40°C: 1% unit increase

- **7 d treatment**

  Shreck, 2011
• **Ground (Mighty Giant, Jones Mfg, Beemer, NE)**

- 3-in screen
• CaO added at 5% (DM-basis) of forage
- Granular CaO
- Standard quicklime (1/4”)
- >98% purity
- 71% Ca
- $350/ton
• Water added to equal 50% DM
# Treated Straw for Growing Calves\textsuperscript{1,2}

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<th>Untreated</th>
<th>Treated</th>
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<tr>
<td>DMI</td>
<td>16.4</td>
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<tr>
<td>ADG</td>
<td>1.67</td>
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<td>F:G</td>
<td>10.10</td>
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<tr>
<td>IVDMD</td>
<td>36.1</td>
<td>43.1</td>
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\textsuperscript{1}728 lb initial wt.

\textsuperscript{2}30% distillers grains, 3% supplement.
Treated Stalks for Growing Cattle\(^1,2\)

<table>
<thead>
<tr>
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<th>Untreated</th>
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<td>DMI</td>
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<tr>
<td>ADG</td>
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<tr>
<td>F:G</td>
<td>7.55</td>
<td>7.46</td>
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\(^1\)688 lb initial wt.

\(^2\)36\% distillers grains, 4\% supplement.
Feeding Options

- Silage – flexible
- Ammoniated – no grinding
- Stalks/Husklage – ground
  - wet distillers
  - limit feeding
Cost Per Unit TDN

Corn - $5.50/bu, 90 TDN = $.127
Corn Silage – 9.5 corn, 70 TDN = $.107
Corn Silage – 10 corn, 70 TDN = $.112
Stalks - $65, 43 TDN = $.109
Lime Treated Stalks, = +10 TDN = $.128
Husklage - $65, 55.3 TDN = $.085
Distillers – 90% corn, 115 TDN = $.090