Kernza: a Perennial Grain and Forage Crop for watershed conservation in Wisconsin

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Kernza

- Why growing Kernza?
- Grain yields
- Forage yield and nutritive value
- Weed suppression
- Invitation to try it on farm
Could perennial grains be the next climate-saving superstars?

Behold Kernza: Could this wheat save the planet?

Can This Breakfast Cereal Help Save The Planet?

Kernza: The wheat ecologists dream about.
Kernza intermediate wheatgrass
Perennial Grains Improve Water Quality

Jungers, 2016

![Graph showing soil water nitrate levels over time for different crops.](image)
Farmer Perspectives on Growing Kernza

Lanker et al., 2019

Motivations –
“I guess I was just interested in something new, looking to try something different.”

- Sense of innovation
- Environmental consciousness
- Niche markets
- Connection to Kernza network

Management -
“we don’t know much about the management.”

- Lack of agronomic management information
- Planting: diverse methods, late dates
- Harvest grain: 3 Combine, 4 swathing
- Limited inputs (some fertilizer)
- Weeds: perennials; Cutting/mowing
Kernza dual-use management

Forage harvest

Grain and forage harvest

Forage harvest

Spring  Summer  Fall
Kernza Forage Yield in the US

1st year: ~ 4 – 12 Mg/ha ()
2nd year: ~ 2.5– 9 Mg/ha (2.2 - 8 Ton ac)

Culman et al.
Kernza yields across US

<table>
<thead>
<tr>
<th></th>
<th>First year</th>
<th>Second year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grain</td>
<td>450 – 900 lb/ac</td>
<td>50 – 600 lb/ac</td>
</tr>
<tr>
<td>Forage</td>
<td>3.5 – 11 Ton/ac</td>
<td>2.2 – 8 Ton/ac</td>
</tr>
</tbody>
</table>

Grain prices (2019)
- $ 0.85/lb for conventional grain
- $ 1/lb for organic.

Seed cost: $4/lb, @12 lb/ac
<table>
<thead>
<tr>
<th>Month</th>
<th></th>
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<tbody>
<tr>
<td>Sept</td>
<td></td>
</tr>
<tr>
<td>Oct</td>
<td></td>
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</table>

[...]

<table>
<thead>
<tr>
<th>Month</th>
<th></th>
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<tbody>
<tr>
<td>April</td>
<td>May</td>
</tr>
<tr>
<td>June</td>
<td>July</td>
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<tr>
<td>Aug</td>
<td>Sept</td>
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<td>Oct</td>
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Spring grazing: Before stem elongation (May 1)
Grain harvest: ~Aug 1
Fall grazing: Mid-October
Forage and grain yields – 1st year, Wi

Favre et al., 2019
Relative forage quality

- Spring
- Summer
- Fall
- Annual

Monoculture
- Lactating dairy cow
- Stocker calf
- Lactating beef cow, heifer
- Dry cow

Favre et al., 2019
Beef cows performance in a feeding trial with Kernza crop residue in winter

<table>
<thead>
<tr>
<th></th>
<th>100% grass-alfalfa haylage</th>
<th>50% Kernza crop residue + 50% haylage</th>
<th>p-value</th>
<th>SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow final body weight</td>
<td>kg</td>
<td>769</td>
<td>739</td>
<td>0.05</td>
</tr>
<tr>
<td>Average daily gains</td>
<td>kg day^{-1}</td>
<td>0.92</td>
<td>0.45</td>
<td>0.02</td>
</tr>
<tr>
<td>Dry Matter intake</td>
<td>g kg BW^{-1}</td>
<td>28.7</td>
<td>21.4</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Increase in Body</td>
<td>-</td>
<td>0.3</td>
<td>0.1</td>
<td>0.05</td>
</tr>
<tr>
<td>Condition Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calf birth weight</td>
<td>kg</td>
<td>40.8</td>
<td>39.5</td>
<td>0.55</td>
</tr>
<tr>
<td>Calf weaning weight</td>
<td>kg</td>
<td>203</td>
<td>211.2</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Favre, 2019
Grazing does not affect grain yield
Grazing may reduce lodging
Dual-use Intermediate wheatgrass cropping systems effectively suppress weeds over three production years

Zimbrick, Stoltenberg, and Picasso, 2020
Weed community composition

first year

Summer annuals: Shepherd’s purse and Pennycress

second and third years

Dandelion

White cockle

Annual fleabane
Weed biomass

Zimbrick, Stoltenberg, and Picasso, 2020
Plant before September 15!

Kernza grain yield first year (kg/ha)

- Red clover fall
- Red clover spring

R² = 0.904
R² = 0.6808

Olugbenle et al., in prep.
OK Larry, but just what is Kernza?

Not a clue, but I only need to plant it once.

That's all I need to know.
Thank you!