Economics of Grass-fed Beef Production

Allen Williams
Rod Ofte
Pasture Project

Economics of Grass-fed Beef

- Getting Started in Grass-fed Beef
  - Genetics
  - Managed Grazing: Rotation = $
  - Fencing / Watering Solutions
  - Winter Forage Options
- Financials
  - Cow/Calf vs Finishing
  - Direct Marketing Scenario
  - 5 Year Cash Flow

Economics of Grass-fed Beef

- Economic Benefits of Holistic Management
  - Improve Soil Health
  - Reduce Erosion, Improve Water Retention
  - Improve Water Quality

Today's Bad Idea

What About The Grass-fed Sector?

- In major US metro areas – Grass fed beef accounted for between 3% and 6% of all beef sales.
Grass-fed Sector

- **Mintel Red Meat Report – 2012**
  - Importance On Scale of 1-10:
    - Grass Fed – 7.2
    - Impact on environment – 7.5
    - Hormone/Antibiotic Free – 7.9
    - Taste – 8.7
  - 43% had purchased "Grass Fed" or "Locally Raised" beef in 2012.

Value of Grass Fed Beef Market

- **1998**
  - 100+ serious grass fed beef producers
  - $4-$5 million retail value – Domestic
  - Industry in infancy
  - Thought of as “fad”
  - Little attention paid by larger programs and packers, or even producers

Value of Grass Fed Market

- **2013:**
  - More than $2 billion sold in U.S.
    - $450 million domestic
    - $1.5 billion+ imported
  - More than 3000 producers involved.
  - Growing @ 25-30% rate annually.
  - Has penetrated all major market sectors.
  - Major branded program and packer interest.

Economic Data

- University Studies and Farm/Ranch Case Study data show:
  - Takes average of 0.8 – 1.2 acres per head to finish steers.
  - More than enough available acres to finish 30 million+ head annually in U.S.
  - Skilled grass finishers net $300 – $500+ per acre.
  - Build soil rather than deplete.
    - Value of SOM is $750/acre per 1.0%.

Selecting Genetics for Forage Based Production

- Must have great longevity
- High fertility.
- Sound feet & legs, eyes, udder & teats, teeth.
- Low to moderate milk
- Highly adapted to their environment
- Moderate frame (BIF Frame Score 3.0-5.0)
  - Bulls = 52 – 56 inches
  - Cows = 48 – 52 inches
  - Adequate depth, thickness, and gut capacity.

Cow Herd Attributes
Bull Selection – What Are We Looking For?
“The animal that is really functionally efficient has small, sleek and very shiny teats.”
J.C.B.

“The body of the highly fertile cow is in beautiful proportion; she looks feminine or broody. Seen from behind, the largest diameter of the body is the mid-rib region. She has a tremendous stomach capacity…”
J.C.B.
Rotational Grazing 101

Pasture recovery is Critical!

Pasture Cover Impacts

Infiltration and Runoff

3 inches of rainfall in 90 minutes, 10% slope, silt loam soil

(University of Nebraska & USDA-SCS, 1937)

<table>
<thead>
<tr>
<th>Pasture Type</th>
<th>Ground Cover</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent pasture</td>
<td>95%</td>
</tr>
<tr>
<td>Fair pasture</td>
<td>75%</td>
</tr>
<tr>
<td>Poor pasture</td>
<td>50%</td>
</tr>
</tbody>
</table>

Restoration Using Multi-Paddock Grazing – Noble Foundation

Planned Multi-Paddock Grazing

Soil loss (tons/A) Percent runoff

<table>
<thead>
<tr>
<th>Soil loss (tons/A)</th>
<th>10</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent pasture</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Fair pasture</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>Poor pasture</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Decrease drought impacts

<table>
<thead>
<tr>
<th>% Leaf Volume Removed</th>
<th>% Root Growth Stoppage</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td>30%</td>
<td>0%</td>
</tr>
<tr>
<td>40%</td>
<td>0%</td>
</tr>
<tr>
<td>50%</td>
<td>2-4%</td>
</tr>
<tr>
<td>60%</td>
<td>50%</td>
</tr>
<tr>
<td>70%</td>
<td>74%</td>
</tr>
<tr>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>90%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Range Condition: Excellent, Good, Poor

Manure Distribution

- Manure Distribution

<table>
<thead>
<tr>
<th>Rotation Frequency</th>
<th>Years to Get 1 Pile/sq. yard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous</td>
<td>27</td>
</tr>
<tr>
<td>14 day</td>
<td>8</td>
</tr>
<tr>
<td>4 day</td>
<td>4 – 5</td>
</tr>
<tr>
<td>2 day</td>
<td>2</td>
</tr>
<tr>
<td>1 time a day</td>
<td>??</td>
</tr>
</tbody>
</table>

Fencing 101

- Invest in good fencing solutions
- Cost Share Programs: EQIP
- Build to suit your needs with the future in mind

What kind of fence is best?

Key Considerations:
- Budget and phase if needed
- Terrain (hills, woods, streams)
- Cattle Type
- Internal vs perimeter
- Feed Availability
Fencing, Fencing, Fencing.. Fencing, Fencing, Fencing..

Photo by Bev Henkel, Norfolk

Water Management

4/1/2014
Water Management

- Don’t let water be limiting factor in finishing.
- Gains will be limited if cattle have to walk too far to water or if water source is poor.
- For optimum finishing – water available in each paddock.
- Different for cows.

Quick Couplers.
Upper Midwest “Grazing” programs require managing harvested forage. Think through your goals and resources to complete a winter forage plan. Winter gains and health maintenance are critical for a successful beef program. A variety of feeding systems can be built to suit your needs and budget.
Winter Forage Management

Winter Stockpile Grazing

Pasture Improvement

- What can be done to speed up pace of improvement?
  - Stocking Density
  - Frost Seeding
  - Rotation – Rest
  - Clipping “Yes” or “No”? “Maybe”?
    - Mow for Hay
  - Seeding/Pasture Renovation Options??
    - No Till seeding
    - Warm vs Cool?
    - Complexity/Diversity – No monocultures

Millet: 9% CP 50% TDN
Sorghum/Sudan: 12% CP 72% TDN

Hairy Vetch: 18% CP 70% TDN
BRIX

- Higher Brix – Result of improving SOM and soil microbial populations.

What is Brix?

- Dissolved plant solids include sugars (such as sucrose and fructans), minerals, amino acids, proteins, lipids, and pectins.
- About 50-80% of the Brix measurement represents plant sugars, with the remaining portion representing the other plant solids.

What is a Refractometer?

- A simple optical instrument that measures the amount of light refracted in a liquid.
- Standard piece of equipment for many agronomists and commonly used in the fruit and vegetable industries.

Brix Index of Common Forages

<table>
<thead>
<tr>
<th>Forage</th>
<th>Poor</th>
<th>Avg</th>
<th>Good</th>
<th>Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alfalfa</td>
<td>4</td>
<td>8</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>Ryegrass</td>
<td>6</td>
<td>10</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>Sorghum</td>
<td>6</td>
<td>10</td>
<td>22</td>
<td>30</td>
</tr>
<tr>
<td>Fescue</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Bermuda</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>8</td>
</tr>
</tbody>
</table>

Effects of Stage of Maturity on Pasture Composition
Why High Brix in Forages?
- Research shows that High Brix forages increase animal gains and milk production.
- High Brix forages also are more drought resistant, freeze tolerant, and more resistant to plant disease and pests.
  - (Moorby, 2001).
  - (Moller, 1996).
  - (Downing & Gamroth, 2007; Miller, et al, 1999).
  - (Allison, 2007).
  - (McKenzie, 2007).

Benefits of High Brix
- More sugars, minerals, and proteins – Less water
- Forages and crops will taste “sweeter” and be more nutrient dense
- Enhanced aroma
- Indication of nutrient uptake
- Helps plants resist disease and insect infestation
- Stored forages & crops – Longer “shelf” life, better nutritional values, better flavor characteristics

Brix Advantage
- Brix 5.0% or less = ADG in low 1’s.
- Brix 8-12% = ADG in low to mid-2’s.
- Brix 12 – 15% = ADG in mid-high 2’s.
- Brix > 15% = ADG in high 2’s to 3’s.
- Every 1.0% increase in Brix adds 0.1 to 0.3 ADG.

Important Grazing Tips
- Know DM availability and allow 3.0% - 3.5% daily.
- Take no more than 30% available DM.
- Move forward rapidly to not allow too many bites of the same plant.
- Know the brix content.
- Turn into new paddocks in early to mid-afternoon (peak brix or plant sugars).
- Stage of forage maturity critical – Mid-stage to slightly beyond…

Environmental benefits of Holistic Management
- It All Starts With The Soil!!

The Soil is Alive!!
90% of soil function is mediated by microbes.

Microbes depend on plants.

How we manage plants is critical!

Plant growth & health highly correlated with how much life & what kind of life is in the soil!

- Microbes Matter!!!
- Microbial community structure crucial.
- Highly Important
  - Fungi to Bacteria ratio
  - Predator to Prey ratio

Plant growth & health highly correlated with how much life & what kind of life is in the soil!

Building Topsoil

Soil Insects

Earthworm Castings

The Value of Soil Organic Matter

Can we control runoff with OM?

- **2% OM** will hold 32,000 gallons of water or **21%** of a 10 year storm (5.5 inches).
- **5% OM** will hold 80,000 gallons of water or **53%** of a 10 year storm (5.5 inches).
- **8% OM** will hold 128,000 gallons of water or **85%** of a 10 year storm (5.5 inches).

### Value of Soil Organic Matter (1.0% SOM Nutrients/Acre)

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Nutrient (Lbs)</th>
<th>Unit Value/lb</th>
<th>Value/Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>1000</td>
<td>$0.56</td>
<td>$560</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>100</td>
<td>$0.67</td>
<td>$67</td>
</tr>
<tr>
<td>Potassium</td>
<td>100</td>
<td>$0.54</td>
<td>$54</td>
</tr>
<tr>
<td>Sulfur</td>
<td>100</td>
<td>$0.50</td>
<td>$50</td>
</tr>
<tr>
<td>Carbon</td>
<td>10000</td>
<td>$0.037</td>
<td>$20</td>
</tr>
<tr>
<td>Value of 1.0% SOM in Nutrients/Acre</td>
<td>$751</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: J. Soil and Water Conserv. 49 (3), 100-104.

5.0% SOM = $3755
Strategies for Land Improvement

Building SOM and Soil Microbial Populations Through:
- Plant Species Diversity
- Livestock Impact

Diversity
Livestock Impact

Constant Observation

Where Do Majority of Soil Microbes Live & Function?

Soil Temperatures

Indicator: Soil Temperature

- At 70 °F, 100% of soil moisture is used for growth.
- At 100 °F, 85% of soil moisture is lost and 15% is used for growth.
- At 115 °F, microbes begin to breakdown, and
- At 140 °F, they die.
Adaptive High Stock Density Grazing

250,000 lbs per Acre

150,000 lbs per Acre

500,000 lbs per acre

1,000,000 lbs per Acre

Moving the “Mob”
Building Soil OM

- Mississippi – 1.0% - 4.2% (4 years)
- New York – 1.5% - 4.1% (5 years)
- Kansas – 1.6% - 3.9% (5 years)
- Nebraska – 2.1% - 5.5% (6 years)
- Michigan – 2.2% - 6.1% (6 years)
- Wisconsin – 2.3% - 5.0% (4 years)

Degree of Finish

What is a “Finished” Animal?

- Topline
- Tailhead
- Hip
- Ribs
- Girth
- Brisket
- Fat Pones
High Quality Eating Experience

Economic Analysis Spreadsheet
- www.wallacecenter.org/pastureproject
- www.farmbiztrainer.com

Grass-fed Beef Marketing Options
- Direct Marketing
- Thousand Hills
- Grass-Run Farms
- Wisconsin Grass-fed Beef Cooperative
- US Wellness Meats
- Honored Prairie