Grazing Economics 101
“Keys to Being a Profitable Forage Producer”
MODNR-SWCP
Mark Kennedy and John Turner

Mostly stolen from
Wesley Tucker
University of Missouri Extension Specialist
and Cow-Calf Producer
Is it only a myth in the cow-calf industry?

What do you think the average cow-calf producer makes per cow per year?

But what is “average?” And WHO want to be “average?”
Key Economic Factors in Cow/Calf Enterprises

- Reproductive Efficiency
- Weaning Weights
- Sales Price
- **Feed Costs**
- **Depreciation**
- Other Variable Costs
- Fixed Costs

MiG can impact all of the above!
## High vs. Low Profit Cow-Calf Producers
(SPA Data IA: 1995-2000)

<table>
<thead>
<tr>
<th>Return &amp; Cost Factors</th>
<th>High 1/4</th>
<th>Average</th>
<th>Low 1/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial return to capital, labor &amp; mgmt.</td>
<td>$127.69</td>
<td>-$9.90</td>
<td>-$144.84</td>
</tr>
<tr>
<td>Per cow</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total financial cost per cow</td>
<td>$230.11</td>
<td>$362.87</td>
<td>$461.96</td>
</tr>
<tr>
<td>Total financial cost per cwt. produced</td>
<td>$47.32</td>
<td>$72.23</td>
<td>$108.04</td>
</tr>
</tbody>
</table>
# High vs. Low Profit Cow-Calf Producers

(SPA Data IA: 1995-2000)

<table>
<thead>
<tr>
<th>Feed Resource Factors</th>
<th>High 1/4</th>
<th>Average</th>
<th>Low 1/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total financial feed cost per cow</td>
<td>$146.05</td>
<td>$195.06</td>
<td>$265.50</td>
</tr>
<tr>
<td>Total financial feed cost per cwt. produced</td>
<td>$29.71</td>
<td>$43.80</td>
<td>$63.84</td>
</tr>
<tr>
<td>Financial pasture cost per animal unit month</td>
<td>$6.47</td>
<td>$9.22</td>
<td>$12.33</td>
</tr>
<tr>
<td>Stored feed fed per cow (dry matter)</td>
<td>3,509 lbs.</td>
<td>3,722 lbs.</td>
<td>4,388 lbs.</td>
</tr>
</tbody>
</table>
### High vs. Low Profit
#### Cow-Calf Producers
(SPA Data IA: 1995-2000)

<table>
<thead>
<tr>
<th>Production Factors</th>
<th>High 1/4</th>
<th>Average</th>
<th>Low 1/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calves born in first 42 days of calving season</td>
<td>83.4%</td>
<td>83.8%</td>
<td>82.4%</td>
</tr>
<tr>
<td>Calf crop weaning percentage</td>
<td>85.7%</td>
<td>83.4%</td>
<td>81.7%</td>
</tr>
<tr>
<td>Pounds weaned per exposed female</td>
<td>421 lbs.</td>
<td>401 lbs.</td>
<td>360 lbs.</td>
</tr>
</tbody>
</table>
Profitability?

- So there’s a difference between top and bottom – It’s not just average
- IA & IL study to determine what separated them
  - 4 yrs: 1996-1999
  - Herd size: 20 to 373 cows
Variables In The Equation

• **Cost Variables**
  • Feed Cost
  • Operating Cost
  • Depreciation Cost
  • Capital Charge
  • Hired Labor
  • Family Labor

• **Production Variables**
  • Calf Weight
  • Calf Price
  • Cull Weight
  • Cull Price
  • Weaning Percentage
  • Calving Distribution

• **Other Variables**
  • Herd Size
  • Investment
Variation in Returns to Labor & Management Explained by Economic Variables (1996 - 1999)

- Feed Cost: 52.2%
- Depreciation Cost: 12.2%
- Operating Cost: 5.1%
- Calf weight: 2.4%
- Capital charge: 1.4%
- Calf price: 3.2%
- Weaning Percent: 1.2%
- Herd size: 1.7%
- Unexplained: 20.6%

Source: 2001 Beef Research Report – Iowa State University
Relative Cost of Supplying a Unit of Energy to Ruminants

- Grazed pasture 100
Relative Cost of Supplying a Unit of Energy to Ruminants

- All Hay
  - Equipment & depreciation, fuel & oil, repair & maintenance, labor

222
Relative Cost of Supplying a Unit of Energy to Ruminants

- Grazed pasture: 100
- Alfalfa hay: 192
- All hay: 222
- Silage: 277
- Dehydrated forages: 419
- Grains & concentrates: 322

Source: Dr. Rob Kallenbach, State Forage Specialist, University of Missouri
Fundamentals of Successful Grazing Management

- Meet the nutritional needs of livestock from standing pasture
- Optimize pasture yield, quality, and persistence

Cow, sheep, goat, or horse can all harvest forages cheaper than you can!
Basic Ingredients to Produce Grass

- Solar Energy
- Water
- Soil Nutrients

Where’s your money going?
# Fertility Removed by Haying vs. Grazing

<table>
<thead>
<tr>
<th>Nutrient Removal (lbs/acre)</th>
<th>3 Tons of Hay</th>
<th>Cow/Calf Pairs or Stockers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>150 N</td>
<td>10 N</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>18 P (40 lb P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;)</td>
<td>3 P (7 lb P&lt;sub&gt;2&lt;/sub&gt;O&lt;sub&gt;5&lt;/sub&gt;)</td>
</tr>
<tr>
<td>Potassium</td>
<td>120 K (145 lb K&lt;sub&gt;2&lt;/sub&gt;O)</td>
<td>0.7 K (1 lb K&lt;sub&gt;2&lt;/sub&gt;O)</td>
</tr>
</tbody>
</table>

Source: Dr. John A. Lory, Environmental Nutrient Management Specialist, University of Missouri
What’s that hay worth, and should you bale it or buy it?

- 1500 lb. bale of fescue hay contains:
  - 30 lb. N @ $.60 = $18.00
  - 15 lb. P @ $.62 = $9.30
  - 38 lb. K @ $.39 = $14.63
  - Total fertilizer cost = $41.93

- 75 % of N is lost, so fertility value of the bale of hay is $28.43 (feed value is a bonus)
Grazing Economics 101

• “Don’t Pay More Than You’re Going To Get”

• Resources are not unlimited
  • We have to make choices about where to allocate our resources
  • We should select options that will make us the most money
Management-intensive Grazing

Key point of economic impact
Increased gains per acre

**Increased forage utilization**
**Extended grazing season**
Increased stocking rates
Potentially greater ADG's

May decrease input costs
**Stored feed (HAY)**
Fertilizer
Weed control costs
Management-intensive Grazing
– cont.

Offers greater management flexibility

Comes at an added cost

- Fence
- Water System
- **Labor**
- **Higher level of management required**
- Greater animal investment (?)
How many paddocks should a cow-calf grazing system have?

- Based on rest period needs of the forage—not less than 8.
- Based on benefit of increased forage utilization—probably not over 10 – 12.

- Note—it’s important to be able to subdivide those paddocks easily to ration forage during dormant/slow-growth periods.
Effect of Paddock Numbers on Seasonal Forage Utilization

Seasonal Utilization Rate Based on Number of Pastures

Seasonal % Utilization vs. # of Pastures
<table>
<thead>
<tr>
<th>Pasture costs/Ac</th>
<th>3 Paddock</th>
<th>12 Paddock</th>
<th>24 Paddock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct animal costs</td>
<td>$24.55</td>
<td>$31.37</td>
<td>$37.87</td>
</tr>
<tr>
<td>Interest Costs</td>
<td>11.30</td>
<td>13.87</td>
<td>17.53</td>
</tr>
<tr>
<td>$600 cow @ 8 %</td>
<td>$9.17</td>
<td>$10.59</td>
<td>$13.57</td>
</tr>
<tr>
<td>$425 steer @ 8 %</td>
<td>2.87</td>
<td>3.61</td>
<td>4.43</td>
</tr>
<tr>
<td>Income over pasture, animal &amp; interest costs</td>
<td>$84.86</td>
<td>$115.43</td>
<td>$117.74</td>
</tr>
</tbody>
</table>
Can a pasture enterprise compete economically with CRP or grain crops?
Adams Co. (SW) Iowa CRP Project Demonstration Farm

Examined economic competitiveness of grazing systems to cropping and CRP on marginal, highly erodible land

The 13 paddock intensive grazing system with cow/calf pairs was the most profitable option

Less intensive (slow rotation) grazing was the 2nd most profitable system

CRP was third

Only one cropping option gave a positive economic return
Factors that Affect MiG Profitability

- Scale economies
- Enterprise
- Pasture productivity
- Length of grazing season
- Forage species
- Feed budgeting
Scale Economies

Lower development costs per acre as more acres are developed

- Fence corners and gates are more expensive, line is cheap

- Fence material *costs escalate rapidly* as acres in system fall below 80

- Ten 5 acre paddocks will be much more expensive per acre to develop than will ten 25 acre paddocks
Enterprise

Ability of the animals to respond to improved grazing and/or forage management

- Cow/calf sales (i.e. calf gains) are buffered by the cows performance

- Stockers provide a more direct relationship between grazing and gains

- Grazing dairies require and respond to consistently high quality and plentiful forage
**Productivity**

Inherent productivity of your pastures

- Higher yielding pastures can justify higher development costs per acre
  - 160 acres divided into 8 paddocks costs the same for pasture yielding 4000 lbs of dry matter forage or 7000 lbs
  - Hard to justify the costs of MiG when it takes 30 acres to support a cow/calf pair as opposed to 4 acres per pair

- Level of "intensification" will be related to the level of productivity
Current Resources

- Baseline
  - Soil fertility
  - Water access
  - Forage base
- Productivity: high vs. low quality
  - High quality resources yield a higher marginal return for the same marginal cost (Required terms)
“Bang for the Buck”

- Implications for regions, for farms, and for fields
- **Example**
  - Ridge Field A yields 110 cow days/yr
  - Bottom Field B yields 160 cow days/yr
  - Forage utilization is increased 30%
- **Question**
  - Which fields on your farm will pay the most for your investment (Resources?)
As with productivity, a longer grazing season provides more days to recover development costs

- 160 days in upper Midwest versus 230 days or more as you move south

BUT, can you extend your grazing season? How much?

- Replacing a day on stored feeds with a day of grazing is very cost efficient
Forage species

Ability to establish and maintain improved forage species due to improved grazing management

- Native range versus introduced tame-grass pastures
- Environment may limit your ability to use improved forage species

- Legume persistence in cool-season pastures
- Related to grazing management (rest periods)
Stocking Rate Decisions

• “Management” Intensive Grazing vs. Intensive Grazing

• Profitability vs. an automatic increase in stocking rate

• Long-term decisions always consider persistence
  • Seed and weed control costs
Stocking Rate

- What is the most profitable stocking rate?
  - A. Max Individual Performance
  - B. Max Total Production Per Acre
  - C. None of the above

- Do market prices matter?
Importance of Gain per Head (Baseline)

- Value of pasture improvement example
  - 200 lb. Gain @ 1 steer/acre
  - 6.5 cwt @ $68.32 = $444.08
  - 4.5 cwt @ $79.02 = $355.59
    - Gross returns $88.49
- Non-pasture expenses $52.27
- Return to pasture & overhead $36.22
Importance of Gain per Head
(MiG Improves Gain)

- 260 lb. gain example
- 7.1 cwt @ $67.05 = $476.06
- 4.5 cwt @ $79.02 = $355.59
  - Gross Returns $120.47
- Non-pasture expenses $53.07
- Return to pasture & overhead $67.40
Importance of Gain per Head
(MiG Improves Profits)

- 30% improvement in gain per head
  - (260 lb. vs. 200 lb.)

- Gives an 86% improvement in profits!
  - ($67.40 vs. $36.22)
Gain per Head vs. Gain per Acre

Baseline
• 1 steer/acre @ 200 lbs gain
  • Profit/acre = $36.22

Option #1 - *Gain per Head*
• 1 steer/acre but increased gain to 260 lbs
  • Profit/acre = $67.40

Option #2 - *Gain per Acre*
• Increase stocking rate stocking rate by 50%
  • 1.5 steers/acre @ 200 lbs/acre
  • Total Production = 300 lbs/acre
  • Profit/acre = $53.33/acre
Which Is The Most Profitable?

- 1 steer – 200 # - $36.22
- 1 steer – 260 # - $67.40
- 1.5 steers – 300# - $54.33
**Gain per Head vs. Gain per Acre**

- More total production but less profit

WHY?
- Each animal must cover its own ownership & maintenance costs!
Market Price Determines It

• When profit margins are tight, closer to maximum individual animal performance.
  • (Each animal must perform better to cover its individual costs.)

• When profit margins are more favorable, closer to maximum gains per acre.
  • (Each animal is generating profits, so cutting costs is not as crucial as increasing output.)
Typical Stocking Rate Effects

![Graph showing the relationship between stocking rate and gain/acre and ADG. The x-axis represents stocking rate, ranging from 0.8 to 1.6, and the y-axis represents lb. gain/acre and ADG, ranging from 0 to 500 and 0 to 2.5, respectively. The graph includes two lines: one for gain/acre (yellow squares) and one for ADG (red diamonds).]
Key Production Concepts

Saleable Output

Max Individual Performance

Max Production

Max Profit

(Fictional biological relationships and projected point of max profit for illustration purposes)

Farm Stocking Rate
Other Livestock?

- Cow/Calf, Dairy, Sheep, Goats, Horses, etc.
- As you increase stocking rate individual performance decreases.
- Depending on the current market prices the maximum profit is somewhere between max individual performance and max production/acre.
Important “Take Home” Message!

Management Intensive Grazing

Goal is to maximize farm net income

Maximum production per acre is generally not where net returns are maximized, *especially if stocking rate exceeds carrying capacity*
When Do Your Forages Make You The Most Money?
400-500 lb Feeder Steer Price
(1993-02) Medium Frame No. 1, Oklahoma City

Price/cwt

Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec
<table>
<thead>
<tr>
<th>Starting Month</th>
<th>Feeder Steers 1993-02 AVG</th>
<th>450#</th>
<th>550#</th>
<th>650#</th>
</tr>
</thead>
<tbody>
<tr>
<td>JAN</td>
<td>70.73</td>
<td>59.75</td>
<td>47.80</td>
<td></td>
</tr>
<tr>
<td>FEB</td>
<td>54.39</td>
<td>48.91</td>
<td>45.01</td>
<td></td>
</tr>
<tr>
<td>MAR</td>
<td>35.74</td>
<td>29.68</td>
<td>33.85</td>
<td></td>
</tr>
<tr>
<td>APR</td>
<td>34.16</td>
<td>38.70</td>
<td>45.62</td>
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<tr>
<td>MAY</td>
<td>46.38</td>
<td>48.58</td>
<td>56.05</td>
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<tr>
<td>JUN</td>
<td>46.37</td>
<td>47.40</td>
<td>50.70</td>
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<tr>
<td>JUL</td>
<td>35.52</td>
<td>42.56</td>
<td>46.62</td>
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<tr>
<td>AUG</td>
<td>33.56</td>
<td>42.03</td>
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<td>SEP</td>
<td>50.34</td>
<td>61.12</td>
<td>71.46</td>
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<tr>
<td>OCT</td>
<td>68.41</td>
<td>79.11</td>
<td>89.67</td>
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<td>NOV</td>
<td>58.62</td>
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<td>69.48</td>
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<tr>
<td>DEC</td>
<td>64.13</td>
<td>51.16</td>
<td>49.91</td>
<td></td>
</tr>
<tr>
<td>AVG</td>
<td>49.86</td>
<td>50.88</td>
<td>55.07</td>
<td></td>
</tr>
</tbody>
</table>

Source: Dr. Ron Plain, Livestock Marketing Specialist, University of Missouri
Forages Aren’t All Created Equal

The same forage at different times of the year is worth different amounts
Stockpiled Fescue vs. Hay

• Feeding hay –
  • $0.80 to $1.00/cow/day
• Feeding stockpiled fescue –
  • $0.40 to $0.50/cow/day
• 20 percent CP in October
  • Drops 2% per month
Billie, Greg, & William Sundwall

- Cross Timbers, MO
- 140 Cows
• Crossbred Angus Herd
They determined to make it work!
Winter Feeding Equipment
Variation in Returns to Labor & Management Explained by Economic Variables (1996 - 1999)

- Feed Cost - 52.2%
- Depreciation Cost - 12.2%
- Operating Cost - 5.1%
- Calf weight - 2.4%
- Capital charge - 1.4%
- Calf price - 3.2%
- Weaning Percent - 1.2%
- Herd size - 1.7%
- Unexplained - 20.6%

Source: 2001 Beef Research Report – Iowa State University
Cha-ching!

• 65% of the variation in profitability of a cow-calf enterprise is due to FEED COST and DEPRECIATION!

• If you want to be consistently profitable (above average) in the cow-calf business your management should focus on minimizing feed costs and depreciation costs.