Key Drivers of Profitability on Pasture Based Dairies

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MU Commercial Agriculture Program
If your goal is anything but profitability - if it's to be big, or to grow fast, or to become a technology leader - you'll hit problems.

Michael Porter
Institute for Strategy & Competitiveness
Harvard Business School
4 Keys to Profitability

1.) A simple forage system managed for quality

2.) Cows that calve in large seasonal batches

3.) High speed and low investment parlors

4.) A balance of volume, margin and overhead that creates attractive returns and a desirable lifestyle
What is a Key Business Driver?

- Key business drivers are those factors that influence a farm’s profit the most.

- Why do some farms make more money?

- Managers need to focus attention on these areas to improve profitability the fastest.
Profitability

• Return on Assets % (ROA):
  (Net farm income + interest expense– value of operator labor & mgt.)/total farm assets

• Three distinct levels of ROA
  • Negative
  • Between 0 and the farm’s cost of capital ~ 6.5%
  • Above the cost of capital
Small ROA differences can make huge differences in wealth

<table>
<thead>
<tr>
<th>Mr. Average</th>
<th>Mr. Excel</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 25 years old</td>
<td>• 25 years old</td>
</tr>
<tr>
<td>• Inherits $200,000</td>
<td>• Inherits $200,000</td>
</tr>
<tr>
<td>• Invests in his own dairy</td>
<td>• Invests in his own dairy</td>
</tr>
<tr>
<td>• Earns &amp; reinvests at 4% return over next 40 years</td>
<td>• Earns &amp; reinvests at 6% return over next 40 years</td>
</tr>
<tr>
<td>• Retires at 65</td>
<td>• Retires at 65</td>
</tr>
<tr>
<td>• Net Worth = $ 960,204</td>
<td>• Net Worth = $ 2,057,143</td>
</tr>
</tbody>
</table>
Bermuda Belt
Confinement Hybrid Belt
Fescue Belt

Pacific

Bermuda Belt
Fescue Belt
Confinement Hybrid Belt

Pacific
Fescue Belt

Forage Yield

Herd DMI

Tall Fescue

Clover

Crabgrass

Cereal Rye

Feb Apr Jun Aug Oct
Fescue Belt

Forage Yield

Herd DMI

Tall Fescue

Clover

Crabgrass

Cereal Rye

Feb Apr Jun Aug Oct Dec
Bermudagrass Belt

Forage Yield

- Annual Ryegrass
- Bermudagrass
- Warm Season Annual

Feb  Apr  Jun  Aug  Oct  Dec
Profitability Model

\[
\text{Profit Margin} \times \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \text{Percentage Return on Equity (ROE)}
\]
Profitability Model

\[
\text{Profit Margin} \times \frac{\text{Asset Turnover}}{\text{Leverage}} = \text{Return on Equity}
\]

\[
\frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \text{Return on Equity}
\]

- Plant high energy but reliable pastures, fertilize as needed, allocate paddocks for annuals during seasonal flat spots
- Monitor, Measure & Manage pastures for high energy feed using a grazing wedge
- Calve in seasonal batches in sync with pasture growth curve.
- Use good nutrition, right genetics, attention to health & assisted reproduction technologies to keep cows within 12 month windows
- To lower labor costs, invest in a labor efficient parlor, holding area, calf facilities, & preventative animal health care
Profitability Model

![Diagram showing the Profitability Model formula: Profit Margin \times Asset Turnover \times Leverage = Return on Equity]

Net Income / Sales \times Sales / Assets \times Assets / Equity = Return on Equity

- Stock the farm to its potential, given the constraints of resources, management, and the total system in place
- Avoid machinery purchases by hiring custom operators or buying forage crops
- Raise asset turnover by overstocking and feeding partial TMR when systems are in place to do so without impacting other costs
- Avoid buying non-performing “stranded assets” when purchasing farms, i.e.: wasteland, extra houses, silos, barns, etc.
Profitability Model

\[
\text{Profit Margin} \times \text{Asset Turnover} \times \text{Leverage} = \text{Return on Equity}
\]

\[
\frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \text{Return on Equity}
\]

- Use leverage to raise returns only if the expected long term returns on assets are above the long term cost of capital.

- When ROA > cost of capital, use leverage, but mitigate risks with forward contracting and using fixed rate loans.
Standard 300 Cow MU Dairy Model

- 300 crossbred cows
- 10 pounds grain mix
- 12,700 pounds of milk sold per cow
- Stocking rate = 1.25 cows per acre
- 85 day average dry period
- Forage purchased: Dry cows needs, plus 5 pounds hay per lactating cow during season
- $5,023 investment per cow
300 Cow MU Dairy Model

\[
\text{Profit Margin} \times \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \text{Return on Equity}
\]

\[
19.4\% \times 0.5 \times 1/1 = 9.2\% \ (\text{ROE})
\]

= Percentage Return on Equity (ROE)
300 Cow MU Dairy Model

- 300 crossbred cows
- 15 pounds grain mix
- 12,700 pounds of milk sold per cow
- Stocking rate = 1.25 cows per acre
- 85 day average dry period
- Forage purchased: Dry cows, + 5 pounds hay per lactating cow
- $5,023 investment per cow
300 Cow MU Dairy Model

Add extra 5 lbs. grain/cow/day

\[
\text{Profit Margin} \times \text{Asset Turnover} \times \text{Leverage} = \text{Return on Equity}
\]

\[
\frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \text{Return on Equity}
\]

\[
12.9\% \times 0.5 \times 1 = 6.4\% \text{ (ROE)}
\]

= Percentage Return on Equity (ROE)
300 Cow MU Dairy Model

- 300 crossbred cows
- 10 pounds grain mix
- 12,700 pounds of milk sold per cow
- Stocking rate = 1.25 cows per acre
- 85 day average dry period
- Forage purchased: Dry cows, + 5 pounds hay per lactating cow
- $6,023 (+$1,000 machinery) investment per cow
300 Cow MU Dairy Model

Add $1,000/cow more machinery

<table>
<thead>
<tr>
<th>Profit Margin</th>
<th>Asset Turnover</th>
<th>Leverage</th>
<th>Return on Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
\text{Return on Equity} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}
\]

\[
12.8\% \times 0.4 \times 1 = 5.1\% \text{ (ROE)}
\]

= Percentage Return on Equity (ROE)
# 300 Cow MU Dairy Model

## Summary

\[ \text{Return on Equity} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} \]

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Profit Margin</th>
<th>Asset Turnover</th>
<th>Leverage</th>
<th>Return on Equity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Model</strong></td>
<td>19.4</td>
<td>0.5</td>
<td>None =1</td>
<td>9.2%</td>
</tr>
<tr>
<td>Grain raised from 10 to 15 pounds with no change in production</td>
<td>12.9</td>
<td>0.5</td>
<td>None =1</td>
<td>6.4%</td>
</tr>
<tr>
<td>Increase machinery investment per cow $1,000 with no change in production</td>
<td>12.8</td>
<td>0.4</td>
<td>None =1</td>
<td>5.1%</td>
</tr>
<tr>
<td>Leverage Standard Model with 50% debt at 6.5% per year</td>
<td>12.4</td>
<td>0.5</td>
<td>2.1</td>
<td>13.0%</td>
</tr>
</tbody>
</table>
Return on Assets w/o Apprec. vs Labor Efficiency
40 Grazing Farms, 2010

\[ y = 2 \times 10^{-5} x - 12.684 \]

\( R^2 = 0.5206 \)
Return on Assets w/o Apprec. vs Stocking Rate
40 Grazing Farms, 2010

\[ y = -1.9011x + 6.2456 \]

\[ R^2 = 0.1666 \]
Return on Assets w/o Apprec. vs Milk Sold per Cow
40 Grazing Farms, 2010

\[ y = -0.0005x + 8.9273 \]
\[ R^2 = 0.0846 \]
A Balance of Volume, Margin and Overhead that creates Attractive Returns and a Desirable Lifestyle

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Conventional Dairy</th>
<th>Grazing Dairy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income/Cow</td>
<td>$4,000</td>
<td>$2,250</td>
</tr>
<tr>
<td>Operation costs as % income</td>
<td>80%</td>
<td>65%</td>
</tr>
<tr>
<td>Milk sold per cow (lbs.)</td>
<td>24,000</td>
<td>12,250</td>
</tr>
<tr>
<td>Ownership equity (%)</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Debt per cow</td>
<td>$5,000</td>
<td>$3,000</td>
</tr>
<tr>
<td>Asset turnover</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Investment per cow</td>
<td>$7,500 to $15,000</td>
<td>$5,000 to $7,000</td>
</tr>
<tr>
<td>Return on assets</td>
<td>8%</td>
<td>10%</td>
</tr>
</tbody>
</table>

Conventional Source: The Dairy Dozen, 12 Key Financial Indicators, Gary Sipiorski, Hoards Dairyman, January 25, 2009

Grazing Dairy Source: Personal experience in Missouri, working with dairy grazing operations
Resources

• Measuring and Analyzing Farm Financial Performance (*Purdue*)
  Website: [http://www.agecon.purdue.edu/extension/programs/fbm21/Ec712entry.htm](http://www.agecon.purdue.edu/extension/programs/fbm21/Ec712entry.htm)

• Farm Analysis Solution Spreadsheets (*Illinois*)
  Website: [http://www.farmdoc.illinois.edu/fasttools/index.asp](http://www.farmdoc.illinois.edu/fasttools/index.asp)

• Dairy Business Summary and Analysis (*Cornell*)
  Website: [http://dfbs.aem.cornell.edu/](http://dfbs.aem.cornell.edu/)

• Farm Accounting Software (*Quicken, Quickbooks, etc.*)
Questions?