Economic value of a dairy cow and optimal replacement policies: Part 1

V.E. Cabrera
University of Wisconsin-Madison Dairy Science
Rationale

Projected net return

Discounted future net return
Always compared to a replacement

Includes transaction replacement cost
Salvage value - Springer cost

Cow Value = $625

Cow \(\text{PAR}=3, \ MIM=5, \ MIP=1\)
Replacement
Basic principals of calculation
Markov-chains

Cabrera, 2012
Importance of the cow value

Critical economic implications

Optimal management of herd
Keep or Replace

Important information
Value of a pregnancy
Cost of a pregnancy loss
Cost of a day open

Crucial decisions
Treat or not treat
Breed or not breed
The economic value of a dairy cow
Online decision support tool

Example:
Value of this 2\textsuperscript{nd} lactation, 1 MIM, open cow is $897
Video demonstration
Available at DairyMGT.info

Economic Value of a Dairy Cow

Wisconsin University of Wisconsin-Madison

Extension

Department of Dairy Science
Single cow analysis
Decision for specific cow

### INPUTS - Edit Values in This Block

**Evaluated Cow Variables**
- Current Lactation
- Current Months after Calving
- Current Months in Pregnancy
- Expected Milk Production Rest of Lactation, %
- Expected Milk Production Next Lactations, %

**Replacement Cow Variable**
- Expected genetic improvement, % additional milk

**Herd Production and Reproduction Variables**
- Herd Turnover Ratio, %/year
- Rolling Herd Average, lb/cow per year
- 21-d Pregnancy Rate, %
- Reproduction Cost, $/cow per month
- Last Month After Calving to Breed a Cow
- Do-not-Breed Cow Minimum Milk, lb/day
- Pregnancy Loss after 35 Days Pregnant, %
- Average Cow Body Weight, lb

### OUTPUTS - Interactive Results

**Value of the Cow, $**
- 628

**Compared Against a Replacement, $**
- Milk Sales, $
- Feed Cost, $
- Calf Value, $
- Non-reproductive Cull, $
- Mortality Cost, $
- Reproductive Cull, $
- Reproduction Costs, $
- Replacement Transaction, $

**Herd Structure at Steady State**
- Days in milk
- Days to Conception
- Percent of Pregnant
- Reproductive Culling, %
- Mortality, %
- 1st Lactation, %
- 2nd Lactation, %
- > 3rd Lactation, %

**Herd Economic Variables**
- Replacement Cost, $/cow
- Salvage Value, $/lb live weight
- Calf Value, $/calf
- Milk Price, $/cwt
- Milk Butterfat, %
- Feed Cost Lactating Cows, $/lb dry matter
- Feed Cost Dry Cows, $/lb dry matter
- Interest Rate, %/year

**Economics of an Average Cow, $/year**
- Net Return, $
- Milk Sales, $
- Feed Cost, $
- Calf Sales, $
- Non-Reprod. Culling Cost, $
- Mortality Cost, $
- Reproductive Culling Cost, $
- Reproductive Cost, $

**Part II**

**Dollar Value**

**Breakdown Value of the Cow**

**Most Important Factors**

**Other Factors**
Herd analysis
Decisions at the herd level
Economic value of a dairy cow
Practical decision-making

Cull or not cull
Positive cow value indicates cow brings more value than replacement

Lactation

- $1,900
- $1,320
- $740
- $160
- $420
- $1,000

8 MIM, 2 MIP

Average
+20% milk
-20% milk

1 2 3 4 5 6 7 8
Lactation
Economic value of a dairy cow
Practical decision-making

Breed or not breed
Better chance for higher value cows

+20% milk
-20% milk

2nd lactation cow

Months after calving
Economic value of a dairy cow
Practical decision-making

Treat or not treat
More investment allowed in higher value cows

<table>
<thead>
<tr>
<th>Cow value, $</th>
<th>Months after calving</th>
</tr>
</thead>
<tbody>
<tr>
<td>$900</td>
<td>2nd lactation cow</td>
</tr>
<tr>
<td>$675</td>
<td>Open</td>
</tr>
<tr>
<td>$450</td>
<td>Pregnant 3 MIM</td>
</tr>
<tr>
<td>$225</td>
<td>Pregnant 5 MIM</td>
</tr>
<tr>
<td>$0</td>
<td>Pregnant 7 MIM</td>
</tr>
<tr>
<td>-$225</td>
<td></td>
</tr>
</tbody>
</table>
Economic value of a dairy cow
Practical decision-making

Calculate the value of a pregnancy
Difference between pregnant and non-pregnant

<table>
<thead>
<tr>
<th>Months after calving</th>
<th>1st Lactation</th>
<th>2nd Lactation</th>
<th>3rd Lactation</th>
<th>4th Lactation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>$125</td>
<td>$154</td>
<td>$183</td>
<td>$211</td>
</tr>
<tr>
<td>4</td>
<td>$154</td>
<td>$183</td>
<td>$211</td>
<td>$240</td>
</tr>
<tr>
<td>5</td>
<td>$183</td>
<td>$211</td>
<td>$240</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>$211</td>
<td>$240</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>$240</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Calculate the cost of a pregnancy loss
Difference between non-pregnant and pregnant

<table>
<thead>
<tr>
<th>Months in pregnancy</th>
<th>1st Lactation</th>
<th>2nd Lactation</th>
<th>3rd Lactation</th>
<th>4th Lactation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$170</td>
<td>$353</td>
<td>$535</td>
<td>$718</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Economic value of a dairy cow
Practical decision-making
Economic value of a dairy cow
Practical decision-making

Calculate the cost of a day open
Difference between value of non-pregnant cow in 2 successive days

E.g., $5.16 (month 2-3) and $4.26 (month 5-6)

2nd lactation cow

Cow value, $

$900
$675
$450
$225
$0
-$225

Months after calving
**Herd Selection Guide**

Breeding and replacement decisions

---

### New report being offered

- to ≥ 3,500 dairy farmers in Wisconsin

### Economic values of cows calculated with tool

<table>
<thead>
<tr>
<th>Current Lactation</th>
<th>Lifetime Average</th>
<th>Genetics</th>
<th>Test Day</th>
<th>Exp. Rel. $</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME Milk</td>
<td>LS SCC</td>
<td>TCI</td>
<td>ME Milk</td>
<td>LS SCC</td>
</tr>
<tr>
<td>46513</td>
<td>1.1</td>
<td></td>
<td>46513</td>
<td>1.1</td>
</tr>
<tr>
<td>43440</td>
<td>0.8</td>
<td></td>
<td>43440</td>
<td></td>
</tr>
<tr>
<td>42577</td>
<td>1.9</td>
<td></td>
<td>42577</td>
<td></td>
</tr>
<tr>
<td>42690</td>
<td>1.4</td>
<td></td>
<td>42690</td>
<td></td>
</tr>
<tr>
<td>41259</td>
<td>1.6</td>
<td></td>
<td>41259</td>
<td></td>
</tr>
<tr>
<td>42777</td>
<td>2.4</td>
<td></td>
<td>42777</td>
<td></td>
</tr>
<tr>
<td>39417</td>
<td>5.4</td>
<td>2404</td>
<td>39616</td>
<td>0.5</td>
</tr>
<tr>
<td>33255</td>
<td>0.9</td>
<td>428</td>
<td>35944</td>
<td>4.6</td>
</tr>
<tr>
<td>33183</td>
<td>1</td>
<td>913</td>
<td>34185</td>
<td>1.7</td>
</tr>
<tr>
<td>35178</td>
<td>1.4</td>
<td>3517</td>
<td>34188</td>
<td>3.8</td>
</tr>
<tr>
<td>34011</td>
<td>3.8</td>
<td></td>
<td>34011</td>
<td>3.8</td>
</tr>
<tr>
<td>33609</td>
<td>1.6</td>
<td></td>
<td>33609</td>
<td></td>
</tr>
<tr>
<td>27406</td>
<td>0.8</td>
<td>612</td>
<td>35667</td>
<td>1.9</td>
</tr>
<tr>
<td>33656</td>
<td>0.9</td>
<td></td>
<td>33556</td>
<td></td>
</tr>
<tr>
<td>17783</td>
<td>1.2</td>
<td>-6148</td>
<td>26926</td>
<td>3.3</td>
</tr>
<tr>
<td>23564</td>
<td>2.1</td>
<td></td>
<td>23564</td>
<td></td>
</tr>
<tr>
<td>19546</td>
<td>1.7</td>
<td></td>
<td>19546</td>
<td></td>
</tr>
<tr>
<td>19173</td>
<td>1.6</td>
<td></td>
<td>19173</td>
<td></td>
</tr>
<tr>
<td>18936</td>
<td>1.6</td>
<td></td>
<td>18936</td>
<td></td>
</tr>
<tr>
<td>17321</td>
<td>1.3</td>
<td></td>
<td>17321</td>
<td></td>
</tr>
</tbody>
</table>
Examples
Fast answers to complicated questions

MIM to replace open cow?
• 1st Lactation:
• 2nd Lactation:
• 3rd+ Lactation:

Cost of open day?
• 3rd lactation, 4 to 5 MIM:

Invest $200 in mastitis treatment?
• 2nd lactation, 7MIM, 3 MIP:
• Producing <15% milk this lactation:
Thanks