Optimizing the Quality and Quantity of Dairy Replacement Heifers

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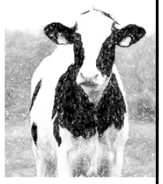
Take-home Points:

1. Replacement Heifers are THE Determinant of Replacement Rate
2. Understand the Nuances Around Heifer Costs
   - Marginal vs. average; raising vs. replacement
3. Replacement Decisions Should be Based on Expected Impact on Profitability (Not Just Cost)



2024 Georgia Dairy Conference, Savannah, Georgia

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Point 1: Replacement Heifers are THE Determinant of Replacement Rate

- Replacement Rate = $\frac{\text{\# Sold + \# Died (Lact>0)}}{\text{Average \# Milking and Dry}}$
- In a STABLE herd that does not purchase heifers, the availability of incoming heifers is THE determinant of replacement rate

  - E.g. In a 1,000 cow herd over a 12-month period, if 350 new lactating animals enter a herd, 350 cows can and will leave the herd
- Quantity and quality of heifers matter!

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Factors Driving Replacement Rate

- Factors that SHOULD influence replacement decision making:
  - Number and quality
  - Net replacement cost (acquisition minus salvage) of my potential replacement heifers
  - Milk price (longer term)
  - Predicted value of current cow(s): production, age, removal risk, reproductive status, etc.
- Factors that *SHOULD* NOT influence replacement decision making:
  - How many I culled last month
  - My neighbor's (or peer group's) replacement rate
  - What the trade magazine says is the target for replacement rate

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The Calving of Heifers ***ALLOWS*** for the Replacement of Less Valuable Cows

- Remember! The replacement of inferior cows with fresh heifers (culling with replacement) is (or should be) all about improving the herd
- A heifer is not entitled to become a lactating member of your herd just because she was born and raised by you…she should earn it
- Question to constantly ask: "Does adding ***this*** fresh heifer into my herd (and thus replacing an existing cow) improve my profit potential?"
  - i.e., Is this incoming heifer better than the lowest value cow in my herd?
  - If not – the heifer shouldn't calve, or if she has calved, she shouldn't stay

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What if a Dairy Produces "More" Heifers than Truly Needed for Replacement Purposes?

- Possible actions taken:
  - "Pushed" cows out of the herd prematurely → NOT optimal
  - Selectively removed inferior heifers prior to calving → improved the quality of the replacement pool
    - Genomic testing
    - Health and growth
  - Sell springers or fresh heifers
  - Calve "extras" and remove on basis of early lactation performance
- Today, I simply do not see this as most herds have rebalanced heifer production and used high levels of beef semen
- Unfortunately, many herds have overcorrected…

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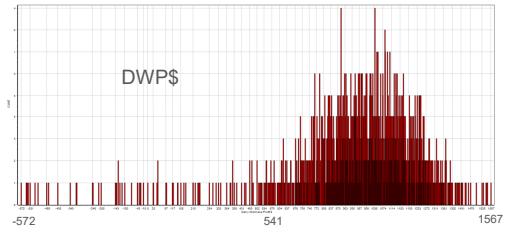
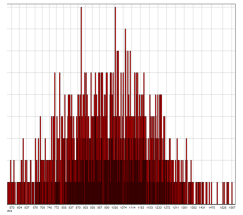
One Management Option: Produce a Few Extra and Remove a Some Young Virgin Heifers Based Upon Genomic Values and Health

Original population vs. top 95% of virgin heifers in a single herd

Original Population
- Mean = 967



Selected Population
- Mean = 1013



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Same Herd: Results of Other Genomic Values

Predicted results of removing bottom 5% of virgin heifers

	gDWP$	gNM$	gMilk	
Original Population (average/heifer)	967	897	1123	
5% Removed (average/heifer)	94	187	-10	
Selected Population (average/heifer)	1013	934	1183	
Improvement	46	37	60	
Value gained/heifer	$92	$59	$25	(using 2.9 lact, $0.14 marginal milk)
Difference kept vs. sold	919	747	1193	
Value difference	$1838	$1195	$485	(using 2.9 lact, $0.14 marginal milk)

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Another Consideration When There are Excess Heifers Above True Replacement Needs

- Calve extra heifers into the herd
- Then, make decisions on keep vs. sell based upon actual, early lactation production
- Advantages:
  - Built in "surplus" for times of extra need
  - Allows selection based on actual performance
  - Provides a bit of insurance
    - National heifer pool → fewer heifers, lower value, rising cost
- More to come on this topic…

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What If You Do Not Have Enough Replacements?

- With fewer replacements, cows targeted for market must be retained longer → delayed replacement and reduced selective culling
- Type of cows for replacement:
  1. Dead cows
  2. Incurable or chronic disease issues
  3. Cows that fail to become pregnant
  4. Health-related poor producers
  5. Poor producers but otherwise healthy
  6. Genetics (heifers +/- cows)

Failing to produce enough heifers results in constrained replacement opportunities

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Consequences of Not Having Enough Replacements

- Scenario to consider:
  - A herd with that historically has run a 38-39% replacement rate "decided" to raise only enough heifers to support a 35% replacement rate
  - I.e., they "decided" to retain cull cows longer (assuming that no significant management changes occurred that truly changed the need for replacements)
- 39% → 35% replacement rate due to insufficient heifers…
  - Now, the average market cow is retained ~ 100 days longer
  - Under current conditions, miking these less productive cows longer than optimal results in lost opportunity of approximately $150-200 or more per delayed replacement

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Headline This Month…

January 4, 2024

Dairy Herd Management

"How Long Will the Sizzling Hot Market for Dairy Replacements Continue?"

Unfortunately, many herds are just now realizing that they do not have enough heifers in their replacement pipeline

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How Many Replacements Should You Produce?

- We usually work from historical replacement needs and historical youngstock removal risks
- But what happened in the past may not repeat itself
  - Trying to "anticipate" future replacement needs but many things can and do change:
    - Cow health challenges
    - Heifer quality
    - Milk price
    - Genetic potential
    - Heifer cost
    - Market cow value
- Consequently, we should add in a bit of a buffer for flexibility
  - Adds cost but provides a bit of insurance

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One Approach to Estimate Replacement Needs

	All	L=1	L=2	L>2
Avg # Milking and Dry	1000	313	256	431
# Sold	311	75	59	178
# Died	59	12	9	37
Herd Turnover	37%	28%	27%	50%
Total Replacements Needed – Status quo	**370**			

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Herd Turnover	37%	28%	27%	50%
Total Replacements Needed – Status quo	**370**			

Year-to-Year Variation (1 std dev of 10-yr RR = 2% of herd)	20 →	**390**
Cushion for unanticipated needs (% of the herd)	**2%**	20 → **410**

20 | **(Note: This is NOT an inventory calculation; thus, age at first calving is not needed)**

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Total Replacements Needed – Status quo	**370**			

Year-to-Year Variation (1 std dev of 10-yr RR = 2% of herd)		20 →	**390**
Cushion for unanticipated needs (% of the herd)	**2%**	20 →	**410**
Net # Heifer Available to Enter Lactation =		**410**	
% of Pregnant Heifers that leave prior to Calving	-4%	-17	
		427	# Heifers that Get Pregnant
% of Breeding Heifers that Conceive	93%		
BREEDING Period		**459**	# Heifers Enter Breeding Period
% Selective removals prior to breeding	-5%	-24	
		483	# Heifer before Selective Culls
% Sold prior to breeding	-4%	-21	
% Dead prior to breeding	-5%	-27	
Heifer completion (born alive to calving)	**77%**	**531**	**# Heifers Born Alive**

21 | **(Note: This is NOT an inventory calculation; thus, age at first calving is not needed)**

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Point 2: Understand the Nuances Around Heifer Costs

- As a cost center, replacements are typically the 2nd or 3rd largest variable cost of production
- But it is an investment that will be paid back via milk and market cow revenue
- Important topics to understand:
  - Average raising cost vs. marginal raising cost
  - Raising cost (acquisition cost) vs. net replacement cost
    - Longer time in the herd → lower cost/day
      - Greater dilution of cost over more days
    - Longer time in the herd → lower net salvage value
      - Salvage value matters!

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Average vs. Marginal Raising Cost

- Facilities are typically built to raise "X" amount of heifers
- In calculating average raising cost for a dairy, housing and other fixed costs are estimated, then divided over "X" number of heifers
  - Average heifer cost = wet calf value, feed costs, mortality losses, treatment costs, labor, housing, bedding, utilities, etc.
  - E.g. $2300-2600 for average raising cost
- Any extra heifers produced beyond "X" number of heifers represent "marginal heifers"
  - Raising a few extras are the least expensive to raise (assuming the numbers are not excessive and thus create health/ welfare issues or significant increases in labor needs)
  - Marginal heifer cost = wet calf value, feed costs, mortality losses, treatment costs, etc. but no "fixed costs" and little to no extra labor
  - E.g. $1750-1900 marginal raising cost

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Raising Cost vs. Replacement Cost

- When discussing replacement rates for herds, we often overly focus on the "acquisition" cost – purchase price, average cost, marginal cost, etc.
- But this is only part of the transaction
- There is also the salvage value of the animal that is being replaced
- Net Replacement Cost = Raising Cost – Net Salvage Value
  - Net Salvage Value = average revenue received per incoming replacement
  - Includes the missing animals that died or were condemned

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Average Net Salvage Value at Slaughter

Net Replacement Cost = Heifer cost – net salvage value

Net salvage value received per new addition depends upon many things:

- market conditions, body condition, weight of market cow → price/lb
- how long the animal stays in the herd (and interest cost)
- how many market cows yield a positive return (i.e., do not die during herd life nor get condemned at slaughter)

Assumptions:

- Mortality risk = 6% per lactation and condemnation risk at slaughter = 7%
- Interest rate = 7%

Net Salvage Value

Replacement Rate	Market Cow Value ($/lb live weight)					
	$0.75	$0.85	$0.95	$1.05	$1.15	$1.25
32%	$666	$755	$843	$932	$1,021	$1,110
34%	$682	$773	$864	$955	$1,046	$1,137
36%	$697	$789	$882	$975	$1,068	$1,161
38%	$710	$805	$899	$994	$1,089	$1,183
40%	$722	$818	$915	$1,011	$1,107	$1,204

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Net Replacement Cost

Net Replacement Cost = Heifer cost – net salvage value

Assumptions:

- Mortality risk = 6% per lactation
- Condemnation risk at slaughter = 7%
- Interest rate = 7%
- Replacement rate = 37%

Net Replacement Cost

Replacement Heifer Cost	Market Cow Value ($/lb live weight)					
	$0.75	$0.85	$0.95	$1.05	$1.15	$1.25
$2,200	$1,497	$1,403	$1,309	$1,215	$1,121	$1,028
$2,300	$1,597	$1,503	$1,409	$1,315	$1,221	$1,128
$2,400	$1,697	$1,603	$1,509	$1,415	$1,321	$1,228
$2,500	$1,797	$1,703	$1,609	$1,515	$1,421	$1,328
$2,600	$1,897	$1,803	$1,709	$1,615	$1,521	$1,428

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Net Replacement Cost

Net Replacement Cost = Heifer cost – net salvage value

Assumptions:
- Mortality risk = 6% per lactation
- Condemnation risk at slaughter = 7%
- Interest rate = 7%
- Replacement heifer cost = $2400

Net Replacement Cost

Replacement Rate	Market Cow Value ($/lb live weight)					
	$0.75	$0.85	$0.95	$1.05	$1.15	$1.25
32%	$1,734	$1,646	$1,557	$1,468	$1,380	$1,291
34%	$1,718	$1,628	$1,537	$1,446	$1,355	$1,264
36%	$1,704	$1,611	$1,518	$1,425	$1,333	$1,240
38%	$1,691	$1,596	$1,501	$1,407	$1,312	$1,218
40%	$1,678	$1,582	$1,486	$1,390	$1,293	$1,197

Notice how the larger factor for Net Replacement Cost is Market Cow Value and NOT Replacement Rate

Why??? → Impact of time and mortality on Net Salvage Value

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Net Replacement Cost/Day of Adult Life

Net Replacement Cost/d= (Heifer cost – net salvage value)/projected number of days

Assumptions:
- Mortality risk = 6% per lactation
- Condemnation risk at slaughter = 7%
- Interest rate = 7%
- Replacement heifer cost = $2400

Net Replacement Cost/d of Adult Life

Replacement Rate	Market Cow Value ($/lb live weight)					
	$0.75	$0.85	$0.95	$1.05	$1.15	$1.25
32%	$1.75	$1.66	$1.57	$1.48	$1.39	$1.30
34%	$1.83	$1.73	$1.63	$1.54	$1.44	$1.34
36%	$1.91	$1.80	$1.70	$1.60	$1.49	$1.39
38%	$1.99	$1.88	$1.77	$1.65	$1.54	$1.43
40%	$2.07	$1.95	$1.83	$1.71	$1.59	$1.48

Again, notice how the larger factor for Net Replacement Cost is Market Cow Value and NOT Replacement Rate

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Point 3: Focus on Profit and Not Simply Cost

Don't over pursue current cashflow at the expense of future profitability (if possible)

- Many in our industry focus heavily on the large *explicit* cost of raising heifers and conclude that there are two goals:
  1) Lower the replacement rate (herd turnover) as much as possible
  2) Bring in heifers as cheaply as possible

- Overdoing points 1 and 2 above can result in significant lost opportunity costs
  - Milking poorer quality animals (poorly grown, chronic health issues)
  - Lower replacement rates due to insufficient heifers forces lousy cows to stay in the milking herd too long

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Background→ Brief Overview of A New Economic Model Used Throughout this Presentation

- A spreadsheet-based economic model was built to mimic the major variable costs and revenue streams associated with milking and dry cows from first calving until removal from the herd (up to 10 lactations)
- Imagine building a hypothetical herd:
  - Year 1:
    - Original group (A) of heifers calve for first time and enter lactation (Lact=1)
    - Some get culled but most survive to the next lactation
  - Year 2:
    - Survivors of the original group now becomes Lact=2
    - New group (B) calves for the first time and enter lactation
  - Year 3:
    - Survivors of original group A now become Lact =3
    - Survivors of group B become Lact=2
    - New group (C) calves for first time and enter lactation
  - Process continues

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Economic Model Overview, Continued

- Parity-specific risks, costs, and milk production are modeled and adjusted to a Net Present Value (NPV) at time of first calving using 7% cost of capital
- Specific inputs:
  - Replacement risk (died, sold with revenue, or sold but condemned)
  - Market cow weight and value
  - Cumulative ECM production and length of lactation for cows removed vs cows that are retained (go dry)
  - Dry period length
  - Calf revenue realized after removing stillbirths, based upon calf type (dairy bull, dairy heifer, or beef cross)
  - Projected transition cow disease costs and management costs (preventive management inputs such as dry cow tubes, vaccines, additives, etc.)

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Model Outcome (and Economic Concept Used in this Presentation): Income over Cost* (IOC)

- Similar to IOFC (income over feed cost) but IOC goes a bit further:
  - (**Milk** + Wet Calf Revenue + Market Cow Revenue) – (**Feed** + Dry Cow + Transition + Replacement Cost)
  - IOC is first tabulated as a Lifetime Value
    - Lifetime production (and costs) are adjusted back to a net present value as of the day of calving
  - Then, IOC is converted to an *Annualized Value*

Income Over Cost* (IOC) =
(Milk revenue + calf revenue +market cow revenue) minus
(Lactating & dry cow feed cost + Transition cost + Replacement cost)

*Note: IOC is not profit as it excludes fixed costs and some other less significant variable costs

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Examining the Relationship Between Replacement Rate and Milk Production on IOC*

Relative Milk Production	Herd Replacement Rate 33%	35%	37%	39%	41%
Average Cow	$2,080	$2,060	$2,037	$2,011	$1,984

Many people think that if they constrain (lower) replacement rate, it will save money but unless something magical happens to lower the true need for replacement, lowering replacement rate "artificially" → results in decreasing profitability

*IOC = (Milk + calf revenue +market cow revenue) – (Lactating & dry cow feed cost + Transition cost + Replacement cost)

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Examining the Relationship Between Replacement Rate and Milk Production on IOC*

Relative Milk Production	Herd Replacement Rate 33%	35%	37%	39%	41%
Average Cow	$2,080	$2,060	$2,037	$2,011	$1,984
2% Below Average	$2,008	$1,987	$1,964	$1,938	$1,911

Restricting replacement production actually results in a diagonal move in this grid and a reduction in profitability since cows that need to be replaced are retained longer due to insufficient replacement heifers being available

*IOC = (Milk + calf revenue +market cow revenue) – (Lactating & dry cow feed cost + Transition cost + Replacement cost)

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Examining the Relationship Between Replacement Rate and Milk Production on IOC*

Relative Milk Production	Herd Replacement Rate 32%	34%	36%	38%	40%
2% Above Average	$2,152	$2,132	$2,106	$2,084	$2,057
Average Cow	$2,080	$2,060	$2,037	$2,011	$1,984
2% Below Average	$2,008	$1,987	$1,964	$1,938	$1,911

- Careful and appropriate *selective* replacement can increase profitability if it results in an increase in production
- A higher replacement rate is costly IF production does not change but it can be more profitable if replacement yields a higher level of production

*IOC = (Milk + calf revenue +market cow revenue) – (Lactating & dry cow feed cost + Transition cost + Replacement cost)

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Consider the following statement:

"You should not cull many first lactation cows because they have not yet paid for themselves…"

- This logic is flawed and often is referred to as "chasing sunk costs"
  - The Sunk Cost Fallacy describes our tendency to follow through on an endeavor if we have already invested time, effort and money whether or not the current costs outweigh the benefits[1]
- Holding on to low producing cows longer lowers the explicit or direct cost of replacement but also lowers *future* revenue (and profit)

[1] https://thedecisionlab.com/biases/the-sunk-cost-fallacy last accessed 5/27/2022

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But, But, But… She Hasn't Paid for Herself!

- The decision to replace a cow should never consider when she has paid for herself, but rather what is most profitable for the slot

Average Cow	Calving to Dry (d)	Total Milk (lb)	Avg/day	Milk + Calf Income	Feed	Dry Cow &Transition	Housing & Other Costs	Net/day
Lact 1	340	24,533	72	$6,203	-$2,475	-$399	-$2,499	
Lact 2	227	19,076	84	$5,010	-$1,809		-$1,668	
Total	**567**	43,609		$11,214	-$4,284	-$399	-$4,167	
Average/day			77	$19.78	-$7.55		-$7.35	$4.17
							Total Net	**$2,364**

Lower Quartile Cow (bottom 25%)	Calving to Dry (d)	Total Milk (lb)	Avg/day	Milk + Calf Income	Feed	Dry Cow &Transition	Housing & Other Costs	Net/day
Lact 1	340	20,853	61	$5,273	-$2,260	-$399	-$2,499	
Lact 2	330	22,247	67	$5,812	-$2,311	-$426	-$2,426	
Lact 3	330	22,333	68	$5,834	-$2,316	-$451	-$2,426	
Lact 4	300	20,040	67	$5,254	-$2,090		-$2,205	
Total	**1300**	85,472		$22,173	-$8,977	-$1276	-$9,555	
Average/day			66	$17.06	-$6.91		-$7.35	$1.82
							Total Net	**$2,364**

- The lower producing cow takes more than twice as long to reach the same economic endpoint
- When you have low producing cows, do you *REALLY* want to keep them long enough for them to pay for themselves???

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Keeping Inferior Cows Around Longer is Focusing on Cost Reduction vs. Profit Maximization

- We should make replacement decisions earlier vs. "waiting to see what happens"
- To illustrate…

  We[1] modeled the expected cost vs. value of replacing 5% of the first lactation cows at 75 DIM based on projected 305d ECM production at that time
  - i.e., replace half of the lowest 10% of first lactation animals based on early lactation production estimates

[1]Overton, M. and S. Eicker. 2022. Use of an NPV model to estimate the value of additional selective replacement of dairy cattle during first lactation. J. Dairy Sci. Vol. 105, Suppl. 1:140.

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Methods

- 15 Holstein herds that used Dairy Comp 305® herd management software was selected
- 1000 cows were randomly selected from each herd that calved for the first time during either 2014 or 2015.
- *At the herd level*, cows were stratified into two groups based upon projected 70 DIM 305d ECM production (D70_305M)
  - Upper 90% (**U90**) vs. Lower 10% (**L10**)
- All relevant performance data through 5 potential lactations were entered into my NPV economic model

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Methods, Continued

- Half of the L10 cows (5% of total herd) were "removed and replaced" with average replacement heifers for the data set
- The annualized values per slot were tabulated and compared based on the changes in marginal milk and calves (revenue) and marginal costs (feed, transition management, replacement, etc.)
  - Original herd = U90 + L10 = 997 Cows
  - "New" herd = U90 + half of L10 + Average Replacements = 997 Cows
    - Additional revenue = market value from half of the L10 cows that were removed
    - Additional costs = cost of the extra replacements (purchase price or marginal raising cost)
- All revenue, costs, and final values are on a "per slot" basis (997 cows)

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Results

		Upper 90 Cows			Lower 10 Cows			Cumulative Avg ECM (lb)	
	Lact #	Replacement Rate	# Starting	Avg # at Risk	Replacement Rate	# Starting	Avg # at Risk	Upper 90	Lower 10
Actual	1	21%	**400**	359	54%	**44**	32	25680	15690
	2	34%	318	263	42%	20	16	27350	23990
	3	41%	208	165	45%	12	9	27310	25270
	4	53%	122	90	45%	6	5	25580	25790
	5	62%	58	40	49%	4	3	23950	22840
Modeled	6	85%	22	13	85%	2	1	20220	19530
	7	88%	3	2	88%	0	0	17300	16680
	8	88%	0	0	88%	0	0	16940	16340
	9	94%	0	0	94%	0	0	13950	13440
	10	100%	0	0	100%	0	0	8070	7730
	ALL	**35%**		**931**	**50%**		**66**	**26220**	**19990**

Total herd size = 931 (U90) + 66 (L10) = 997 (milking and dry)

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Results

Projected Lifetime Info	Upper 90	Lower 10	Difference
Lifetime ECM/DIM (lb, lactating)	87	77	10
Lifetime ECM/d (lb, milking and dry)	77	69	8
Avg Productive Life (d)	958	580	378
Lifetime IOFC/DIM (lactating)	$8.30	$7.00	$1.30
Net Replacement Cost/d	$1.18	$1.89	-0.71
IOC*/year	$2,121	$1,476	$646
IOC*/d	$5.81	$4.04	$1.77

*IOC = (Milk + Calf Revenue) – (Lactating Feed + Dry Cow Feed + Transition Management + Transition Disease Costs + Replacement Costs)

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Results

Original Herd Mix	# Starting 1st Lact	% of Herd	Avg # in Herd	IOC*
Upper 90	400	90%	931	$2,121
Lower 10	44	10%	66	$1,476
Total	444		**997**	**$2,079**

Remove half of Lower 10%:
22 sold @ $1,020 = $22,440 → $22/cow slot

Improvement/slot	**$20**
Cull Revenue/slot	**$22**
Cost of New Animals	**-$30**
Final Net/Cow Slot/Yr	**$12**

Selective Replacement Mix	# Starting 1st Lact	% of Herd	Avg # in Herd	IOC
Upper 90	400	92%	931	$2,121
Lower 10	22	5%	33	$1,476
Average heifer	15	3%	33	$2,079
Total	437		**997**	**$2,099**

Replacement needs:
15 new @ -$2,000 = -$30,000 → -$30/cow slot

- Selective replacement EARLY was a net gain ~$12,000/year
- Keeping these low producing animals in the herd is costly
- ***Replacement of these low producers is only possible if there are sufficient replacement heifers***

***IOC** = **Net Present Value** of all (Milk + Calf + Market Cow Revenue) – (Lactating & Dry Cow Feed + Transition Mgmt & Disease Costs + Replacement Costs)

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Striving for Continuous Improvement…

- *It is critically important to continue working to reduce the risk of cows losing sufficient value to **warrant** replacement!*
  - Reduce disease risk, improve repro, reduce lameness, etc.
  - Genetics, nutritional management, improve cow comfort, etc. are all important
- But, while we are doing all of that, let's also continue focusing on making good economic decisions to improve profitability
- Remember, the question that we need to continuously ask ourselves…

  "Is the immediate and long-term value of *THIS* **slot** improved by keeping the current cow or by replacing her with a fresh heifer?"
- Increasing replacement rate can improve profitability…

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There is a lot of mention about "Lifetime Milk", But Just To Be Crystal Clear…

I am NOT Promoting More Lifetime Milk Per Cow as the *SOLE FOCUS*

- Improving the health, management and genetics such that animals have the ***capacity*** for greater lifetime milk is GREAT!
- BUT:
  - Lifetime productivity is a reasonable outcome to compare ONLY IF key inputs are held constant
    - i.e., parity-specific turnover
  - ***Greater net revenue per day per slot is a much better goal***
  - Keeping animals in the herd longer as the ***sole*** focus increases lifetime milk but will reduce herd profitability

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Comparison of Two Investment Options:

- Option A:
  - Invest $10,000 today
  - In 5 years, you get back $20,000
- Option B:
  - Invest $10,000 today
  - In 3 years, you get back $17,716

Which option do you want?

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Comparison of Two Investment Options:

- Option A:
  - Invest $10,000 today
  - In 5 years, you get back $20,000
  - Rate of return = 15%
  - Lifetime profit = $10,000
  - Avg profit per year = $2000
- Option B:
  - Invest $10,000 today
  - In 3 years, you get back $17,716
  - Rate of return = 21%
  - Lifetime profit = $7,716
  - Avg profit per year = $2572

Assuming both options are available for renewal, which option do you want?

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Now, A Comparison of Two Hypothetical Options for Replacements

- Option A:
  - A group of 1,000 heifers
  - Cost of $1500 each
  - Average heifer at 1st calving:
    - 1275 lb @ 760 d
    - GPTAM of 25
  - Lact=1 305 M: 20,000 lb

Lact	Replacement Risk	Actual Milk/Lact (PREG & Ret)
1	20%	21297
2	26%	26330
3	34%	27102
4	38%	28484
5	41%	28861
6	44%	28697
7	48%	29377
8	49%	28084
9	60%	29759
10	100%	8486
	30%	**25283**

- Option B:
  - A group of 1,000 heifers
  - Cost of $2200 each
  - Average heifer at 1st calving:
    - 1350 lb @ 710 d
    - GPTAM of 475
  - Lact=1 305 M: 23,500 lb

Lact	Replacement Risk	Actual Milk/Lact (PREG & Ret)
1	30%	25089
2	35%	29783
3	48%	29787
4	66%	30161
5	72%	30560
6	76%	30386
7	83%	31106
8	86%	29738
9	99%	31511
10	100%	7826
	40%	**27629**

Which option do you want?

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Comparison of Two Programs

	Option A	Option B
Average ECM/DIM (ALL)	75	81
Total Projected Days (Milk + Dry)	1147	842
Projected lifetime milk (lb ECM)	75,306	60,780
Average IOC/Lifetime	$4,994	$3,738
Net Replacement Cost/Day	$0.72	$1.76

- Which would you say is the winning option?

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Comparison of Two Programs

	Option A	Option B
Average ECM/DIM (ALL)	75	81
Total Projected Days (Milk + Dry)	1147	842
Projected lifetime milk (lb ECM)	75,306	60,780
Average IOC/Lifetime	$4,994	$3,738
Net Replacement Cost/Day	$0.72	$1.76
Avg Projected Lifetime IOFC/DIM	$6.28	$7.37
Avg IOC/Day	$4.35	$4.44
Annualized Average IOC	$1,589	$1,619

- Now, which would you say is the winning option?

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Comparing the Predicted Economic Impact of Four Different Replacement Rates

		"Artificially" Reduced Replacement Rate	Status Quo: "Just Enough"	Small Excess	Moderate Excess
Average Herd Size	1000				
Actual Replacement Rate		35%	37%	39%	41%
Average # Removals/Year (Replacements Needed/Year)		350	370	390	410

Economic assumptions:

Milk price	$0.20/lb	Total Mixed Ration	$0.14/lb dry matter
Holstein Heifer Calf	$150	Conventional Semen	$18
Holstein Bull Calf	$175	Sexed (dairy) Semen	$32
Beef Cross Calf	$400	Beef Semen	$15

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Average # Removals/Year (Replacements Needed/Year)		350	370	390	410
Heifer Completion Risk	80%				
Heifer Calves Born Alive		436	460	485	510
Holstein Bull Calves Born Alive		59	63	66	70
Beef Cross Calves Born Alive		576	539	509	477

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Total Calf Value/Year		$306,250	$295,602	$288,146	$279,427
Breeding Costs/Year		-$59,035	-$60,078	-$62,138	-$64,089
Total Calf Value minus Breeding Cost/Year		$247,215	$235,524	$226,009	$215,337
Calf Value minus Breeding Cost/Year (per cow slot)		**$247**	**$236**	**$226**	**$215**

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Calf Value minus Breeding Cost/Year (per cow slot)		**$247**	**$236**	**$226**	**$215**
Replacements Produced/Year		350	370	390	410
Replacement Rate ***Supported***		**35%**	**37%**	**39%**	**41%**
Potential Deficit or Surplus Heifers		-20	0	20	40
Average Heifer Raising Cost (not including calf value):	-$2,087	-$2,108	-$2,087	-$2,048	-$2,032
Average Marginal Heifer Raising Cost:	-$1,707				
Average Heifer Raising Cost (per cow slot)		**-$738**	**-$773**	**-$799**	**-$833**

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Net of Calf Value and Raising Cost/Cow Slot/Year		**-$491**	**-$537**	**-$573**	**-$618**

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Ave					
Ave					3
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But this is NOT the Complete Picture!

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Comparing the Predicted Economic Impact of Four Different Replacement Rates

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Average Heifer Raising Cost (minus calf value):	-$2,108	-$2,087	-$2,048	-$2,032

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Average Annual Mortality Risk, Condemnation Risk (cows)	6.2%, 6.2%	6.0%, 6.0%	5.7%, 5.8%	5.5%, 5.6%
Projected Net Salvage Value/cow (NPV)	$864	$881	$898	$912
Net Replacement Cost (Cost - Projected NPV Salvage)	-$1,244	-$1,206	-$1,150	-$1,120
Net Replacement Cost/Cow Slot/Year	**-$436**	**-$446**	**-$449**	**-$459**

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Comparing the Predicted Economic Impact of Four Different Replacement Rates

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Net Replacement Cost/Cow Slot/Year		-$436	-$446	-$449	-$459
NPV Annualized Milk Impact/Cow Slot/Year (selective replacement)		-$19	$0	$14	$11

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Delayed Culling Opportunity Cost/d	-$1.60	-$31,152	$0	$0	$0
Market Value for Fresh Lact=1 Sold	$1,500			$30,000	$60,000
Delayed Culling and Extra Heifer Market Value Net/Cow Slot		-$31	$0	$30	$60

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Market Value for Fresh Lact=1 Sold	$1,500			$30,000	$60,000
Delayed Culling and Extra Heifer Market Value Net/Cow Slot		-$31	$0	$30	$60
Total Average Cost/Cow Slot/Year		**-$239**	**-$211**	**-$179**	**-$173**

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Take Home Points from This Demo

- Not producing enough replacements enhances cash flow but will hurt total profitability
- Producing a few extra heifers creates options/ flexibility
  - Option to selectively remove young heifers early in life
  - Option to selectively replace existing, less profitable cows
- Focusing on cost reduction without regard to the impact on future revenue can be a very costly mistake

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Summary

- The replacement of cows with fresh heifers is all about improving the herd
- The quality and availability of replacement heifers is THE determinant of replacement rate
- Replacing cows is expensive but failing to replace cows that should be replaced is also costly
  - Cost of replacements is just one variable to consider when making replacement decisions
- Prioritize the value obtained from the slot and not on a specific cow's productive life…more lifetime days is not always more profitable

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Thank You for Your Attention!

Any Questions?

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