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Dairy Replacement Economics
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Goal of The Replacement Program

The mission of the replacement enterprise is to raise the highest quality heifer which will maximize profits once she enters the lactating herd.

A quality heifer is one carrying no limitations that would hinder her ability to produce under the farm's management system.

Profits are maximized by obtaining the highest quality heifer at the lowest possible cost.



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Impact of The Replacement Enterprise

The bottom line of a dairy is impacted by:

- Costs
 - Direct
 - In-direct
- Number of animals being raised
- Quality of the animals



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What is The Cost?


- Hard to know what the “Average” is.
- Few farms treat the replacement enterprise as a separate business and know their actual costs.
- Can use various tools to estimate what costs may be for different areas of the system.

Costs to Raise Dairy Replacements

- 26 farms across the northeast completed a study of costs
- Summer of 2019
- Snapshot of how much spent on raising heifers
- Used to estimate total spent in raising the replacements over the 22.5 months taken to get her into the dairy herd.
- Assumes that all input costs stayed the same

	Cost per Animal Completing	Average	%	80 th Percentile Range	
→	Feed	\$1,087.5	46.2%	\$846.2	\$1,313.9
	Grown Feeds(Per Animal on Farm)	\$633.6		\$395.8	\$838.2
→	Purch. Feeds(Per Animal on Farm)	\$453.9		\$254.6	\$682.7
	Labor	\$310.6	13.2%	\$232.5	\$420.7
	Bedding	\$94.2	4.0%	\$51.2	\$143.7
	Health	\$49.6	2.1%	\$28.5	\$64.3
	Breeding	\$45.3	1.9%	\$33.4	\$59.0
	Maternity Pen	\$17.9	0.8%	\$11.0	\$25.5
	Trucking	\$1.2	0.1%	\$0.0	\$0.0
	Insurance	\$4.0	0.2%	\$0.0	\$6.1
	Machinery Operation	\$37.5	1.6%	\$21.3	\$58.7
	Machinery Ownership	\$38.7	1.6%	\$20.5	\$51.5
	Building Operation	\$25.1	1.1%	\$9.7	\$37.0
	Building Ownership	\$136.8	5.8%	\$87.7	\$190.6
	Manure Storage Operation	\$0.4	0.0%	\$0.0	\$0.8
	Manure Storage Ownership	\$6.4	0.3%	\$0.0	\$11.5
	Manure Spreading	\$62.3	2.6%	\$28.0	\$89.8
→	Custom Boarding	\$145.7	6.2%	\$0.0	\$353.5
	Professional Services & Fees	\$18.1	0.8%	\$0.0	\$29.8
→	Non-Performance Expense	\$121.6	5.2%	\$75.8	\$154.5
	Interest on Daily Investment	\$151.8	6.4%	\$136.8	\$164.6
	Total Cost	\$2,355		\$2,094	\$2,607

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	Cost per Day per Animal	Average	%	80 th Percentile Range	
	Feed	\$1.592	46.1%	\$1.207	\$1.955
	Grown Feeds(Per Animal on Farm)	\$1.246		\$0.793	\$1.399
	Purch. Feeds(Per Animal on Farm)	\$0.979		\$0.487	\$1.152
	Labor	\$0.454	13.1%	\$0.344	\$0.606
	Bedding	\$0.138	4.0%	\$0.079	\$0.205
	Health	\$0.073	2.1%	\$0.042	\$0.094
	Breeding	\$0.067	1.9%	\$0.048	\$0.087
	Maternity Pen	\$0.026	0.8%	\$0.016	\$0.036
	Trucking	\$0.002	0.1%	\$0.000	\$0.000
	Insurance	\$0.006	0.2%	\$0.000	\$0.009
	Machinery Operation	\$0.055	1.6%	\$0.032	\$0.083
	Machinery Ownership	\$0.057	1.6%	\$0.031	\$0.082
	Building Operation	\$0.036	1.1%	\$0.015	\$0.054
	Building Ownership	\$0.200	5.8%	\$0.124	\$0.263
	Manure Storage Operation	\$0.001	0.0%	\$0.000	\$0.001
	Manure Storage Ownership	\$0.009	0.3%	\$0.000	\$0.017
	Manure Spreading	\$0.091	2.6%	\$0.042	\$0.130
	Custom Boarding	\$0.221	6.4%	\$0.000	\$0.520
	Professional Services & Fees	\$0.026	0.7%	\$0.000	\$0.044
	Non-Performance Expense	\$0.177	5.1%	\$0.112	\$0.218
	Interest on Daily Investment	\$0.222	6.4%	\$0.206	\$0.240
	Total Cost	\$3.452		\$3.121	\$3.800

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	Average	%	80 th Percentile Range	
Age, Months	22.5		21.8	23.3
Weight, Pounds	1,340		1,262	1,417
Total Weight Gained	1,099		837	1,322
Average Daily Rate of Gain	1.87		1.73	1.99
All Heifers per Labor Hour	36.0		21.7	51.1
Pre-Weaned Heifers per Labor Hour	11.4		7.3	13.9
Post Weaned Heifers per Labor Hour	56.9		30.3	78.2
Total Investment in Animal	\$2,505		\$2,244	\$2,757
% Non-Completion Rate	14.8%		9.9%	22.1%
Cost per Worker Equivalent	\$50,797		\$42,208	\$57,139
Number of Heifers	969		203	1,395

The Big Two

- Feed and Labor
 - 52%-70% of the total costs to raise heifers for all farms
 - 60% to 68% of total costs for farms providing all labor and feed
- Are they being used efficiently?
- Is a quality heifer being produced?

Feed

- Is enough grown?
- Proper quality?
- How much purchased?
- How much does it cost?
- Feed conversion
- Where is the manure going?
 - Cost not in feed
 - If going long way for land for heifer feed, are costs accounted for correctly

Labor

- Is a good job being done?
- How much does it cost?
- Are the right tools available?
- How efficient/inefficient is the set-up?
 - Size of barns
 - Hand labor
 - Location/design of facilities
 - “Free” barns may cost too much!
- Labor efficiency and effectiveness

Relationship with The Dairy

- Is the cost to raise a dairy replacement:
 - The most important number?
 - The only area of impact on profitability of the dairy farm?

Quality of the Replacement

- Growth vs. milk
- Calving problems
 - Too heavy (fat)
 - Too light (frame)
- General condition of the animal
 - Mastitis
 - Feet and legs
 - Injury
- Prior treatments
- Replacement Heifer Management Snapshot

Quality of The Replacement

- 1st Calf Heifers "Treated" as Calf/Heifer* ≤30%
24 hrs. → 3 mos. _____, 4 mos. → fresh _____
- DOAs in first calf heifers ≤9%
Male DOAs. _____, Female DOAs _____
- 1st Calf avg. peak ≥80% of Mature
1st Calf lactation total yield ≥80% of Mature
- 1st Calf Culls ≤ 60 Days in Milk ≤5%
- 1st Calf ME's ≥Mature
- 1st Calf "Treated" in Lactation* ≤15%
- 85% retention (any herd) to 2nd lactation ≥85%
- Lower #1 reason for 1st lactation culls (continuous improvement)



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Number of Heifers

- How many total heifers are being raised?
- How many are needed to maintain herd size?
- How many are needed to offset heifer cull rate?
- What resources are being committed to heifers?
- How many can be raised in the system
 - Impact on costs
 - Impact on quality



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Number of Heifers

- Two - 200 cow dairies
- One has 130 total heifers in system?
- One has 180 total heifers in system?

- Who has less barns, equipment, bunks, etc?

Age of First Calving

- Number of heifers needed
- Production life
- Investment level

Number of Heifers Maintained, All Ages, for Various Calving Ages and Replacement Rates
Average Herd Size, Milking and Dry Animals **1,000**
Non-Completion Rate*, Dairy Replacements **8.00%**

Calving Age Months	Cow Replacement Rate, Percentage								
	21	24	27	30	33	36	39	42	45
21	383	438	493	548	603	657	712	767	822
22	402	459	517	574	631	689	746	803	861
23	420	480	540	600	660	720	780	840	900
24	438	501	563	626	689	751	814	877	939
25	457	522	587	652	717	783	848	913	978
26	475	543	610	678	746	814	882	950	1,017
27	493	563	634	704	775	845	916	986	1,057
28	511	584	657	730	803	877	950	1,023	1,096

* Non completion rate represents the percent of heifers that start the replacement system that don't enter the dairy herd.

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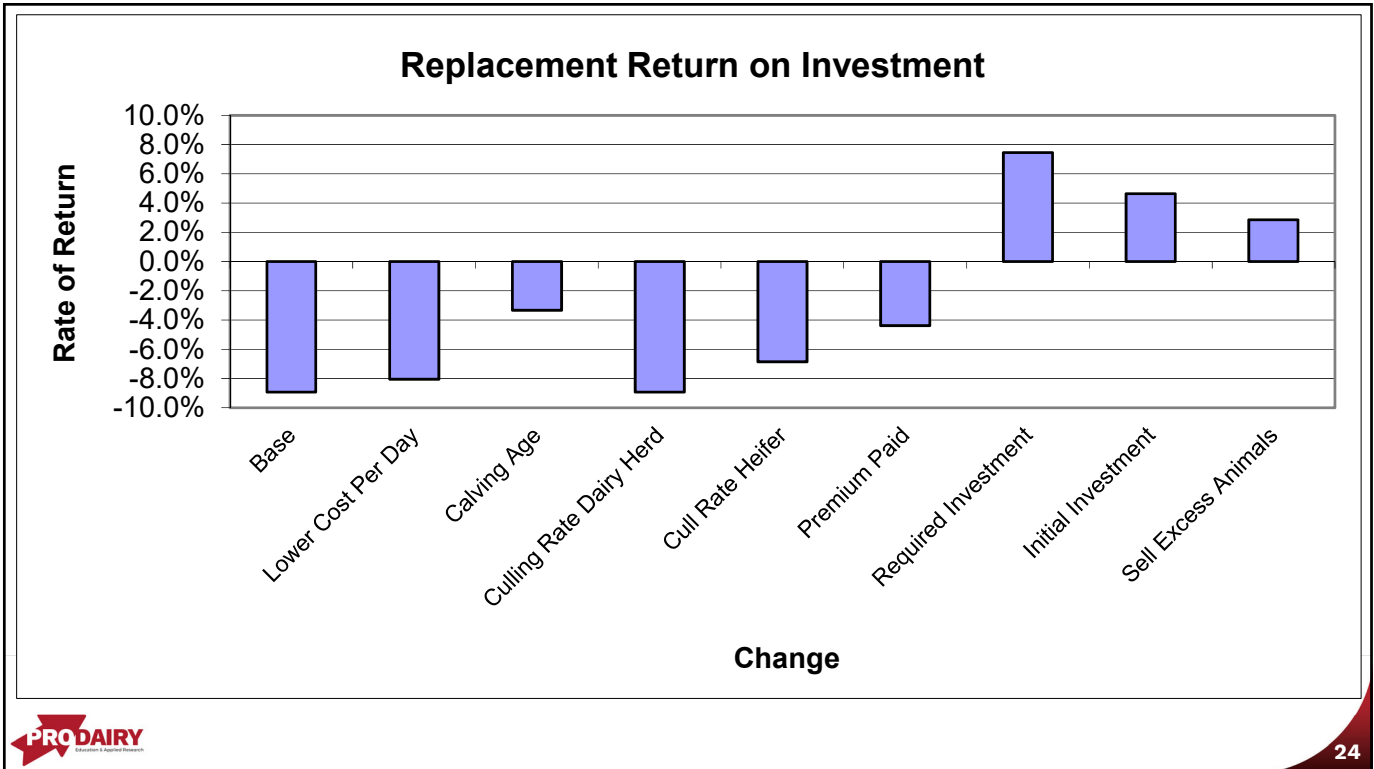
Economic Impact of Replacement Program

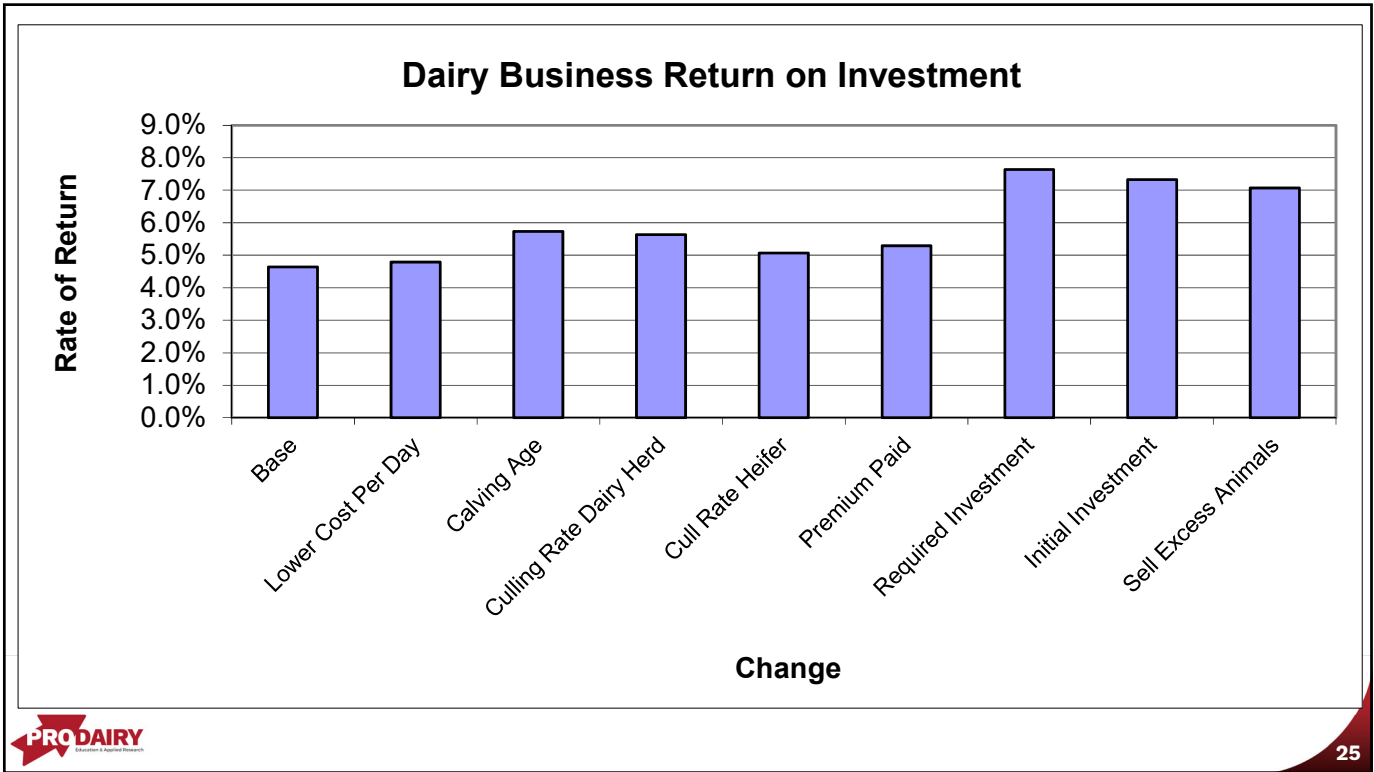
- How does the replacement program impact financial performance of the dairy?
- Can treat as a separate business
- Use values to transfer animals to and from dairy
- Look at how changes in the replacement program can potentially impact the overall financial performance of the dairy.

Farm Information			
Size of dairy, average for year, milking & dry cows			1,000
Cull rate, milking age animals leaving the herd			36.0%
Dairy replacements needed			360
Value of replacements purchased from enterprise			\$1,800
Expense per milking and dry cow			\$648.0
Total value for year			\$648,000
Value heifer calves sold to replacement enterprise			\$150
Replacement Enterprise Information			
Cost per day per animal, raising costs 1			\$2.20
Age of first calving, months			26.0
Investment per animal 2			\$700
Cull Rate, heifer enterprise 3			6.9%
Non-Completion Rate 3		13.92%	
Animals that are culled		Value	
Percent sold 4	50%	600	
Percent died 5	50%	0	

Performance Goals, Replacement Enterprise			
Cost per day, raising costs 1			\$2.15
Calving age			22.0
% Increase in daily costs to meet calving age goal			2.0%
Cull Rate			2.5%
Sale price for excess heifers			\$1,500
Premium paid for quality heifer			\$200
% Increase in daily costs to obtain premium			0.0%
Performance Goals, Dairy Enterprise			
Culling rate, dairy herd			30.0%
% Increase in costs to meet culling rate goal			0.0%

	Summary Of Changes							Combined Changes		
	Base	Lower Cost	Calving Age	Culling Rate	Culling Rate	Premium	Required	Initial	Sell Excess	
		Per Day		Dairy Herd	Heifer Herd	Paid	Investment	Investmet	Start Same	
Replacement Enterprise Only										
Number of Heifers in System	843	843	713	703	802	843	563	563	750	
Percent of Milking Age Animals	84%	84%	71%	70%	80%	84%	56%	56%	75%	
Total Cost per Day	\$2.59	\$2.53	\$2.59	\$2.59	\$2.44	\$2.59	\$2.41	\$2.49	\$2.43	
Total Raising Cost per Animal	\$2,045	\$2,000	\$1,733	\$2,045	\$1,931	\$2,045	\$1,611	\$1,666	\$1,625	
Income per Animal Leaving System	\$1,800	\$1,800	\$1,800	\$1,800	\$1,800	\$2,000	\$2,000	\$2,000	\$1,875	
Total Raising Expenses per Year	\$726,177	\$710,790	\$625,914	\$605,147	\$690,558	\$726,177	\$483,416	\$499,759	\$649,166	
Total Income per Year	\$648,000	\$648,000	\$648,000	\$540,000	\$648,000	\$720,000	\$600,000	\$600,000	\$749,214	
Purchasing Animal Expense	\$62,735	\$62,735	\$62,735	\$52,279	\$57,009	\$62,735	\$47,113	\$47,113	\$62,735	
Net Enterprise Income	-\$140,911	-\$125,525	-\$40,649	-\$117,426	-\$99,566	-\$68,911	\$69,471	\$53,128	\$37,314	
Investment in Buildings & Equipment	\$590,159	\$590,159	\$499,365	\$491,799	\$561,212	\$590,159	\$394,038	\$590,159	\$590,159	
Investment in Cattle	\$988,307	\$969,611	\$725,113	\$823,589	\$894,252	\$988,307	\$537,993	\$553,447	\$721,543	
Total Investment	\$1,578,466	\$1,559,770	\$1,224,478	\$1,315,388	\$1,455,463	\$1,578,466	\$932,031	\$1,143,606	\$1,311,702	
% Return to all Capital	-8.93%	-8.05%	-3.32%	-8.93%	-6.84%	-4.37%	7.45%	4.65%	2.84%	





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Reported Costs to Raise Dairy Replacements

• Michigan	1973	\$617	• Idaho 1991	\$1,159	
	1980	\$1,085	• Pennsylvania		
	1986	\$1,177	1998	\$1,088	
			1985	\$925 Low	
• Wisconsin	1982	\$1,549		\$1,271 Medium	
	1987	\$1,326		\$1,597 High	
	1998	\$1,099	• New York	1990	\$1,265
	2000	\$1,360		1993	\$1,150
	2007	\$1,649		2003	\$1,429
	2015	\$2,110		2007-8	\$1,734
• Washington	1992	\$1,242		2012	\$2,084
				2019	\$2,355

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Summary

- Quality heifers should be the first focus.
- Need to look at all costs to raise heifers.
- Impact on the dairy business performance is more than the cost to raise a heifer.
- Number of heifers being raised, number of animals needed by the dairy to maintain herd size, and quality of heifer play significant role.



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Resources

- <http://www.ansci.cornell.edu/prodairy/resources/decisiontools>
- Can download the following
 - The cost study from 2019
 - The Impact Spreadsheet
 - The Heifer Quality Snapshot
 - Tools for determining labor and feed costs



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Questions?

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