

Economic Considerations Regarding the Raising of Dairy Replacement Heifers



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Introduction

- Replacement heifer raising is typically the 2nd or 3rd largest cost of production on dairies
- Commonly accounts for <6% to >14% of total production costs for dairies^{1,2}
- Trails only feed (typically 55-65%) and possibly labor (typically 9-12%)

¹California Department of Food and Agriculture https://www.cdfa.ca.gov/dairy/dairycop_annual.html

²Personal communication with two private accounting firms

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Variables Affecting Replacement Costs

- First, cost can be evaluated on two levels:
 - Cost as a % of the herd's cost of production
 - Actual cost/heifer entering the herd
- Performance factors:
 - Morbidity, mortality, rate of gain, reproductive performance, age at first calving
- Management factors:
 - Breed, housing choice/ environment, nutritional strategy, labor, herd expansion plans, replacement needs
- Age at first calving and herd replacement rates are two of the largest factors affecting cost
 - Both impact the number of heifers needed
 - Age at first calving also has a large impact on cost/heifer
 - Reducing age at first calving by 1 month lowered cost of a replacement program by 4.3%¹

¹Tozer & Heinrichs, 2001. *J. Dairy Sci.*, 84(8): 1836-1844.

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Published Estimates of Cost

- Assuming a wet calf value of \$150 & interest of 7%¹:
 - Total investment in animal at calving = \$2,232¹
 - Interquartile range of \$1,860-\$2,263
 - 17 dairies with avg age at first calving of 23 months
- Assuming a wet calf value of \$150 & interest of 4.5%²:

	Tie stall	Free stall	Heifer grower	Average
Calf	\$526	\$527	\$411	\$514
Heifer	\$1,956	\$1,963	\$1,519	\$1,863
Total Cost	\$2,482	\$2,490	\$1,930	\$2,377

¹Karszes. 2014. <https://ecommons.cornell.edu/bitstream/handle/1813/36889/DairyReplaceCost12-3.pdf?sequence=1&isAllowed=y>; Cornell Pro-Dairy White Paper EB 2014-02

²Vanderwerff et al., 2013. <http://fyi.uwex.edu/heifermgmt/rearing-costs/>; Univ. of Wisconsin-Extension white paper.

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Objectives

- To examine the economic cost of replacement heifer raising by comparison of conventional vs. intensive heifer systems
 - Housing and feeding modeled principally around a mid-western system
 - Cost considerations/categories:
 - Feed
 - Labor
 - Health/vet med
 - Breeding
 - Culling
 - Housing
 - Interest
 - Wet calf
- Very important: need to account for expenses incurred by heifers that die or are sold

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Model Design

- Spreadsheet model to mimic a conventional and an intensive heifer program
- Intensive program highlights:
 - More nutrient-dense milk replacer, starter, grower rations (more metabolizable protein allowable growth)
 - More total feed/day/heifer due to larger animals eating more
 - Lower morbidity & mortality
 - Lower AGEFB and AGEFR
 - Higher future milk production
- Final “cost” is based on value at calving (cost/ heifer that actually calves)

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Model Design

- Feed:
 - Pre-weaning rations (milk replacer and starter grains) based upon published research
 - Post-weaning rations – built using Cornell Net Carbohydrate and Protein System; designed to meet growth targets by stage
- Housing¹⁻³:
 - Age appropriate housing – hutch, small indoor group pens, large outdoor group pens, free stall, and bedded pack barn using published cost estimate/ft²
- Labor^{3,4}:
 - Hourly wage using published estimates by stage

¹Graves, R. E., Tyson, J. T., McFarland, D. F., & Wilson, T. H. 2008. Penn State Housing Plans for Calves and Heifers. *NRAES-201*: 278.
²Graves, R. E. 2006. <http://extension.psu.edu/animals/dairy/news/2006/bedded-pack-barns-for-dairy-cattle>. Penn State Extension.
³Vanderwerff et al., 2013. <http://yl.uwex.edu/heifer/mq/ml/rearing-costs/>: Univ. of Wisconsin-Extension white paper.
⁴Karszes, 2014. <https://ecommons.cornell.edu/bitstream/handle/1813/36889/DairyReplaceCost12-3.pdf?sequence=1&isAllowed=y>;
 Cornell Pro-Dairy White Paper EB 2014-02

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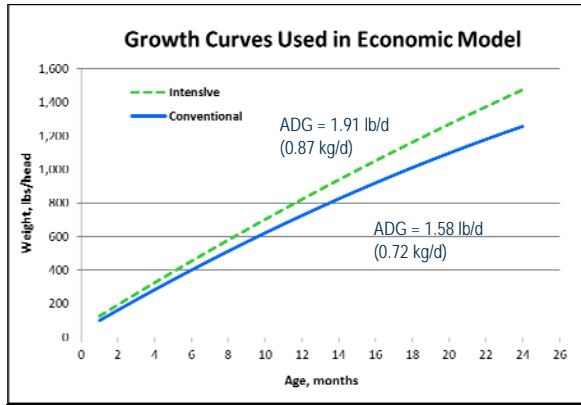
The Model is Divided into *STAGES* Based on Major Management Needs (Feeding/ Housing/ Breeding)

Program	Stage I hutch calves	Stage II	Stage III	Stage IV prebreeding	Stage V postbreeding	Stage VI close-up
Conventional	Birth - 2 months	2 - 4 months	4 - 10 months	10.0 - 17.4 months	17.4 - 23.1 months	23.1 - 25.1 months
Intensive	Birth - 2 months	2 - 4 months	4 - 10 months	10.0 - 15.3 months	15.3 - 21.0 months	21.0 - 23.0 months

- Differences after 10 months are due to difference in age at first service
 - Based on different rates of growth prior to breeding (i.e, when they reach breeding size)

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Growth Curves



Intensive:

Blend of private herd data (50%), 75th %ile (25%) & 95th %ile (25%)¹

Conventional:

Average of median and 75th %ile²

DMI predictions based on NRC ³:

$$NRC\ DMI = (BW^{0.75}) * ((-0.0466 * NE_m^2) + (0.2435 * NE_m) + (-0.1128)) / NE_m$$

¹Personal communication, Dr. Bob Corbett, unpublished data from Utah, 2011 and Penn State 2004 growth guidelines (<http://www.das.psu.edu/research-extension/dairy/nutrition/heifers>), accessed on February 2016

²Penn State 2004 growth guidelines (<http://www.das.psu.edu/research-extension/dairy/nutrition/heifers>), accessed on February 2016

³Nutrient Requirements of Dairy Cattle: Seventh Revised Edition, 2001: The National Academies Press; p. 6.

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Growth Stages and Period-Specific Mortality Risks

Program	Stage I Birth – 2 mos	Stage II 2 – 4 mos	Stage III 4 – 10 mos	Stage IV 10 mos - breeding	Stage V Post breeding	Stage VI Final 2 mos)	Overall Mortality Risk
Conventional	7.0%	2.5%	1.0%	0.5%	0.3%	0.3%	11.5%
Intensive	3.0%	1.8%	0.5%	0.5%	0.3%	0.3%	6.3%

- Mortality data adapted from NAHMS, 2007¹
- For intensive system, reductions in mortality were based on Corbett data² and clinical experience

¹USDA. 2010. Dairy 2007, Heifer calf health and management practices on US dairy operations, 2007.

²Personal communication, Dr. Bob Corbett, unpublished data from Utah, 2011

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Growth Stages and Period-Specific Morbidity Risk and Cost Estimates

Program	Stage I		Stage II	Stage III	Stage IV	Stage V	Stage VI
	Birth – 2 mos		2 – 4 mos	4 – 10 mos	10 mos - breeding	Postbreeding	Close-up
	Diarrhea	Respiratory	Respiratory	Any Treatment	Any Treatment	Any Treatment	Any Treatment
Conventional	40%	35%	15%	4.0%	2.0%	1.1%	0.8%
	\$17.43		\$4.10	\$1.60	\$1.37	\$0.87	\$0.73
Intensive	16%	14%	5%	2.0%	1.5%	0.8%	0.6%
	\$6.97		\$1.23	\$0.80	\$1.03	\$0.65	\$0.55

- Morbidity data for conventional calves adapted and modified from NAHMS, 2007¹
 - Morbidity costs were estimated using standard tx protocols and reported medication costs
- For intensive system, reductions in morbidity were based on Corbett data² and clinical experience

¹USDA. 2010. Dairy 2007, Heifer calf health and management practices on US dairy operations, 2007.

²Personal communication, Dr. Bob Corbett, unpublished data from Utah, 2011

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Quick reminder before looking at specific values...

- All costs, whether by growth stage, or in total, are adjusted to a “per surviving heifer” basis
 - i.e., with higher mortality rates, the remaining heifers must “carry” more expense
 - Hypothetical example (not considering initial calf value):
 - 10 calves enter hutches
 - 9 calves survive and move to next stage (actual cost = \$297/ calf)
 - 1 calf dies the day before movement (total cost = \$293)
 - Net cost/ surviving calf = $(9 \times \$297) + (1 \times \$293) / 9 = \$329$

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Starting Assumptions

- Newborn heifer value \$200
- Birth weight 88 lbs
- Breeding weight 850 lbs (51" WH)
- Labor/ hr \$14
- Interest 6%
- AI cost/ service \$18
- Milk price \$18/ cwt

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Milk Feeding Assumptions for Stage I: 24 hrs to 2 months ("hutch" calves)

- Conventional :
 - 20/20 milk replacer
 - Cost: \$53/50 lbs
 - Feeding rate: 1.0 lb/ gal
- Intensive:
 - 28/18 milk replacer
 - Cost: \$68/50 lbs
 - Feeding rate: 1.25 lb/ gal

Stage	# of Days	Conventional: Amt/ d (gal)	Intensive: Amt/ d (gal)
1	7	1	1.25
2	35	1	1.75
3	7	1	0.875
Total	49 d	49 gal (49 lbs) (49 lbs)	76 gal (95 lbs) (95 lbs)
Avg gal/d		1	1.55
Total cost		\$52	\$129

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Grain Feeding Assumptions for Stage I: Birth to 2 months ("hutch" calves)

- Conventional
 - 20% CP starter (AF)
 - Cost: \$295/ ton AF
- Intensive
 - 22% CP starter (AF)
 - Cost: \$314/ ton AF

Stage	# of Days	Conventional: Amt/ d (lbs)		# of Days	Intensive: Amt/ d (lbs)
1	7	0.13		7	0.1
2	42	2.44		35	0.8
3	14	4.44		21	3.8
Total Feed	63	165		63	109
Total Cost		\$23			\$17

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Growth Stage I: Birth to 2 months ("hutch" calves)

	Conventional	Intensive
Colostrum	\$22	\$21
Milk	\$54	\$131
Starter	\$24	\$17
Total Feed	\$100	\$170
Labor	\$85	\$84
Vet Med/ Health	\$23	\$11
Housing and Other	\$33	\$32
Interest	\$1	\$1
Total Cost*	\$242	\$298
Cost/ Day	\$3.84	\$4.74
Cost Including Wet Calf*	\$459	\$507
Entering Weight (lb)	88	88
Exit Weight (lb)	167	198
ADG (lb/d)	1.25	1.75

* Adjusted for death loss

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Growth Stage II: 2 to 4 months

	Conventional	Intensive
Grain	\$48	\$57
Hay	\$5	\$5
Total Feed	\$53	\$63
Labor	\$25	\$25
Vet Med/ Health	\$4	\$1
Housing and Other	\$22	\$21
Interest	\$3	\$3
Total Cost*	\$107	\$114
Cost/ Day	\$1.82	\$1.93
Entering Weight (lbs)	167	198
Exit Weight (lbs)	284	325
ADG (lb/d)	1.99	2.16

* Adjusted for death loss

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Growth Stage III: 4 to 10 months

	Conventional	Intensive
Feed (TMR)	\$232	\$255
Labor	\$64	\$64
Vet Med/ Health	\$8	\$7
Housing and Other	\$75	\$75
Interest	\$16	\$18
Total Cost*	\$395	\$420
Cost/ Day	\$2.17	\$2.30
Entering Weight (lbs)	284	325
Exit Weight (lbs)	622	702
ADG (lb/d)	1.85	2.06

* Adjusted for death loss

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Growth Stage IV*:

Breeding	10.0 - 17.4 mo.	10.0 - 15.3 mo.
	Conventional	Intensive
Feed (TMR)	\$303	\$240
Labor	\$63	\$45
Vet Med/ Health	\$3	\$3
Breeding	\$37	\$37
Housing and Other	\$30	\$22
Interest	\$35	\$26
Total Cost	\$471	\$373
Cost/ Day	\$2.10	\$2.32
Entering Weight (lbs)	622	702
Exit Weight (lbs)	983	1,012
ADG (lb/d)	1.61	1.92

* Adjusted for death loss

*Duration of this stage depends on age at first service (a function of growth rate) and reproductive efficiency

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Reproductive Management Costs

Conventional		Service cost/ insemination	\$18.00	Open Heifer/ lb	\$1.00	Average breeding cost/ hd		\$37.109			
IR, %	68%	CR, %	55%	% Female	47%						
		Number							Breeding costs (plus palpation)	\$33,064	
Cycle #	CR	# @ Risk	# Bred	# Preg	# Open	Remaining	DOPN	# Heifers	# Bulls	Cost/ surviving heifer	\$38.63
1	58%	891	606	353	253	538	3,709	166	187		
2	57%	538	366	209	157	329	6,589	98	111	Repro Cull Costs:	
3	55%	329	223	123	101	206	6,452	58	65	Rearing (thru breeding)	\$1,804
4	52%	206	140	72	68	133	5,315	34	38	Returns	
5	47%	133	91	42	48	91	4,007	20	22	Open culls	\$1,162
6	47%	91	62	29	33	62	3,341	14	15		
7	47%	62	42	20	22	42	2,693	9	10	Net cost for culls/ heifer placed	\$20.91
8	47%	42	29	13	15	29	2,119	6	7	Net cost for culls/ heifer finished	\$21.77
		55%	2,292	1,558	862	29	40	405	457		
		38%									
Intensive		Service cost/ insemination	\$18.00	Open Heifer/ lb	\$1.00	Average breeding cost/ hd		\$37.109			
IR, %	68%	CR, %	55%	% Female	47%						
		Number							Breeding costs (plus palpation)	\$34,994	
Cycle #	CR	# @ Risk	# Bred	# Preg	# Open	Remaining	DOPN	# Heifers	# Bulls	Cost/ surviving heifer	\$38.62
1	58%	943	641	374	267	569	3,925	176	198		
2	57%	569	387	221	166	348	6,973	104	117	Repro Cull Costs:	
3	55%	348	236	130	106	218	6,829	61	69	Rearing (thru breeding)	\$1,790
4	52%	218	148	77	72	141	5,626	36	41	Returns	
5	47%	141	96	45	51	96	4,241	21	24	Open culls	\$1,242
6	47%	96	65	31	35	66	3,536	14	16		
7	47%	66	45	21	24	45	2,850	10	11	Net cost for culls/ heifer placed	\$18.02
8	47%	45	30	14	16	31	2,243	7	8	Net cost for culls/ heifer finished	\$18.75
		55%	2,426	1,649	912	31	40	429	484		

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Growth Stage V: Post-breeding to Close-up

Post-breeding	17.4 - 23.1 mo.	15.3 - 21.0 mo.
	Conventional	Intensive
Feed (TMR)	\$293	\$311
Labor	\$37	\$37
Vet Med/ Health	\$2	\$2
Repro Culls	-\$39	-\$42
Housing and Other	\$24	\$24
Interest	\$39	\$39
Total Cost	\$356	\$370
Cost/ Day	\$2.05	\$2.13
Entering Weight (lbs)	983	1,012
Exit Weight (lbs)	1,222	1,322
ADG (lb/d)	1.38	1.78

* Adjusted for death loss

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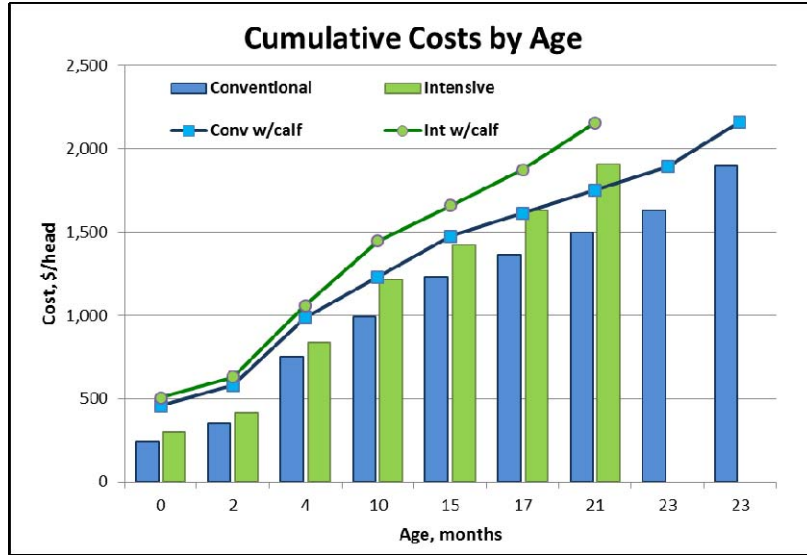
Growth Stage VI: (Springers)

Springers	23.1 - 25.1 mo.	21.0 - 23.0 mo.
	Conventional	Intensive
Feed (TMR)	\$149	\$159
Labor	\$26	\$26
Vet Med/ Health	\$14	\$14
Housing and Other	\$57	\$57
Interest	\$16	\$16
Total Cost	\$261	\$272
Cost/ Day	\$4.29	\$4.46
Entering Weight (lbs)	1,222	1,322
Exit Weight (lbs)	1,297	1,425
ADG (lb/d)	1.24	1.69

* Adjusted for death loss

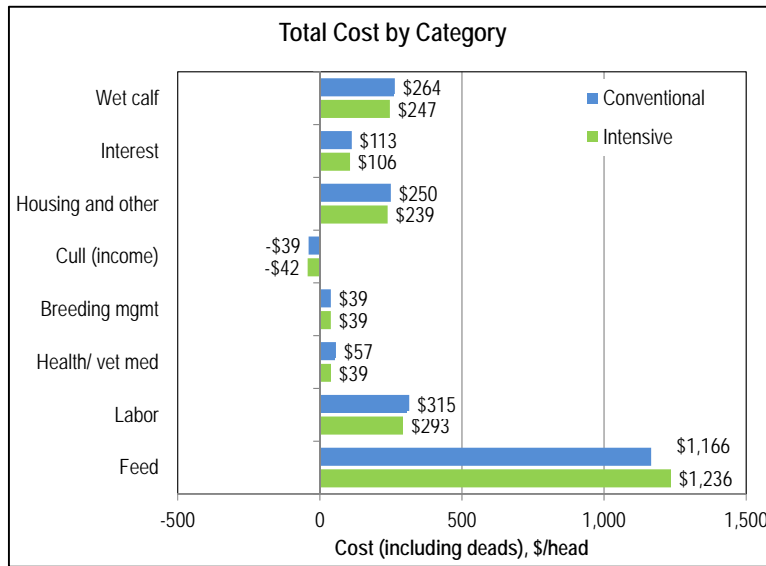
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Cumulative Cost Throughout the Rearing Period



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Total Costs by Category



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Summary of Costs by Stage

Stage Age in months Feeding Program	Hutch Birth to 2		Post Wean 2 to 4		Growing 4 to 10		Breeding 10.0-17.4 10.0-15.3		Post-breeding 17.4-23.1 15.3-21.0		Close-up 23.1-25.1 21.0-23.0	
	Conv.	Int.	Conv.	Int.	Conv.	Int.	Conv.	Int.	Conv.	Int.	Conv.	Int.
Colostrum*	\$22	\$21										
Milk*	\$54	\$131										
Starter*	\$24	\$17										
Grain*			\$48	\$57								
Hay*			\$5	\$5								
Feed (TMR)*					\$232	\$255	\$303	\$240	\$293	\$311	\$149	\$159
Total Feed*	\$100	\$170	\$53	\$63	\$232	\$255	\$303	\$240	\$293	\$311	\$149	\$159
Labor*	\$85	\$84	\$25	\$25	\$64	\$64	\$63	\$45	\$37	\$37	\$26	\$26
Vet Med/ Health*	\$23	\$11	\$4	\$1	\$8	\$7	\$3	\$3	\$2	\$2	\$14	\$14
Breeding / Repro Culls*							\$37	\$37	-\$39	-\$42		
Housing and Other*	\$33	\$32	\$22	\$21	\$75	\$75	\$30	\$22	\$24	\$24	\$57	\$57
Interest*	\$1	\$1	\$3	\$3	\$16	\$18	\$35	\$26	\$39	\$39	\$16	\$16
Total Cost*	\$242	\$298	\$107	\$114	\$395	\$420	\$471	\$373	\$356	\$370	\$261	\$272
Cost/ Day	\$3.84	\$4.74	\$1.82	\$1.93	\$2.17	\$2.30	\$2.10	\$2.32	\$2.05	\$2.13	\$4.29	\$4.46
Entering Weight (lbs)	88	88	167	198	284	325	622	702	983	1,012	1,222	1,322
Exit Weight (lbs)	167	198	284	325	622	702	983	1,012	1,222	1,322	1,297	1,425
Average daily gain (lbs)	1.25	1.75	1.99	2.16	1.85	2.06	1.61	1.92	1.38	1.78	1.24	1.69
Cumulative ADG (lbs)	1.25	1.75	1.61	1.95	1.75	2.02	1.69	1.99	1.61	1.93	1.58	1.91
Cumulative from birth												
Total Cost*	\$242	\$298	\$355	\$417	\$755	\$839	\$1,230	\$1,217	\$1,632	\$1,633	\$1,899	\$1,909
Cost/ Day*	\$3.84	\$4.74	\$2.92	\$3.43	\$2.48	\$2.76	\$2.33	\$2.62	\$2.32	\$2.55	\$2.49	\$2.73
Cost Including Wet Calf*	\$459	\$507	\$581	\$631	\$989	\$1,061	\$1,475	\$1,446	\$1,893	\$1,876	\$2,163	\$2,156

* Adjusted for death loss

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How Do These Modeled Costs Compare?

	Karszes ¹	Conventional	Intensive
Avg Dairy Gain	1.75	1.58	1.91
Feed:Gain	8.5	10.2*	8.9*
Avg DMI (lbs)	15.2	16.2	17.0
Feed Costs per Day	\$1.67	\$1.53	\$1.77
Feed Costs per Lb Gain	\$0.96	\$0.96	\$0.92
Total Cost	\$2,232	\$2,163	\$2,156

*Mortality adjusted

¹Karszes. 2014. <https://ecommons.cornell.edu/bitstream/handle/1813/36889/DairyReplaceCost12-3.pdf?sequence=1&isAllowed=y>
Cornell Pro-Dairy White Paper EB 2014-02

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How Do The Modeled Costs Compare? (costs do NOT include the value of the calf)

	References ¹⁻³	Conventional	Intensive
Feed	51-60%	61%	65%
Labor	20%	17%	15%
Housing	8-11% (not incl bedding)	13% (Incl bedding)	13% (Incl bedding)
Other variable (health, breeding, interest, etc)	14-18% (incl bedding)	11% (not incl bedding)	10% (not incl bedding)
Culls (income)		-2%	-2%

¹Gabler et al., 2000. *J. Dairy Sci.*, 83(5): 1104-1109.

²Vanderwerff et al., 2013. <http://fyi.uwex.edu/heifermgmt/rearing-costs/>; Univ. of Wisconsin-Extension white paper.

³Akins & Hagedorn 2015. <http://eauclair.uwex.edu/files/2013/10/2015-Cost-of-Raising-Replacements-Factsheet-Final.pdf>; University of Wisconsin-Extension white paper.

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Intensive Rearing Can Reduce Total Heifer Inventory

Projected Heifer Needs: 1000 Cow Dairy (milking + dry) with Varying Culling Risks

Culling Risk	30%	33%	36%	39%
Total Replacements Needed/ Yr	300	330	360	390
Conventional				
Number need placed/ month	28	31	34	37
Total avg heifer inventory	634	698	761	825
Intensive				
Number need placed/ month	27	29	32	35
Total avg heifer inventory	580	638	696	754

- With an intensive system and accelerated growth/ management:
 - Fewer heifers need to be placed in hutches each month
 - Lower total heifer inventory needed
 - Alternatively, extra heifers could be raised

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A Higher Preweaning Daily Gain is Associated with More First Lactation Milk*

$$-106 \text{ kg} + 1,551.4 \text{ kg} \times \text{ADG (kg/d; P = 0.01)}$$

	1st Lactation
Additional ADG of modeled intensive program (lb/d)	0.5
Extra milk predicted for first lactation (lbs)	780
Interest rate	6%
Marginal milk/ lb DM	2.36
Milk price:	\$0.18
Feed cost/ lb TMR (DM)	\$0.11
Marginal milk net value/ lb	\$0.14
Net value of extra marginal milk	\$105
Net present value of extra marginal milk	\$99
Culling risk - Lact = 1	28%
Estimated average value of extra milk/ heifer	\$85

*Soberon, F. and M. E. Van Amburgh. 2013. J of Animal Sci 91(2):706-712.

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Summary of Results by Stage

	Convention System		Intensive System	
Calf Invest. Cost at Calving (adj for deads and culls)	\$264		\$247	
Initial weight	40 kg	88 lb	40 kg	88 lb
Weight at Calving	588 kg	1297 lb	646 kg	1425 lb
Age at First Service (months)	14.6		12.5	
Average Age at First Calving (months)	25.1		23.0	
# of Days to Calving	763		700	
Average Daily Gain (birth to calving)	0.72 kg	1.58 lb	0.87 kg	1.91 lb
Total Rearing Cost/ Heifer (including deads and culls but no calf value)	\$1,899		\$1,909	
Net Wet Calf Investment Cost (including deads and culls)	\$264		\$247	
Total Rearing Cost/ Heifer (including deads and culls and wet calf value)	\$2,163		\$2,156	
Avg Cost/ Day (incl deads and culls but no calf value)	\$2.49		\$2.73	
Avg Cost/ Day (incl deads and culls and wet calf value)	\$2.83		\$3.08	
Average Daily Gain (birth to weaning)	0.57 kg	1.25 lb	0.79 kg	1.75 lb
Additional Milk Predicted in 1st Lactation			354 kg	780 lb
Culling Risk - 1st lactation	28%		28%	
Additional Marginal Milk Value (1st Lactation)	\$0		\$85	
Net Cost/ heifer	\$2,163		\$2,071	
Net Return for Intensive - Profit or (Loss)			\$92	

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What Are Some of the Big Drivers Behind Heifer Raising Costs?

- Wet calf value
- Weight at first service
- Growth rate and efficiency
- Feed cost
- Mortality

Sensitivity Analysis Around Wet Calf Value and Weight at First Service (holding all else equal)

		Calf price, \$/head						
		\$100	\$150	\$200	\$250	\$300	\$350	\$400
Weight at 1st service, lbs	750	\$1,884	\$1,945	\$2,007	\$2,068	\$2,129	\$2,190	\$2,251
	775	\$1,920	\$1,981	\$2,043	\$2,104	\$2,165	\$2,227	\$2,288
	800	\$1,957	\$2,018	\$2,080	\$2,141	\$2,203	\$2,264	\$2,326
	825	\$1,994	\$2,056	\$2,117	\$2,179	\$2,240	\$2,302	\$2,364
	850	\$2,032	\$2,094	\$2,156	\$2,217	\$2,279	\$2,341	\$2,402
	875	\$2,071	\$2,133	\$2,194	\$2,256	\$2,318	\$2,380	\$2,442
	900	\$2,110	\$2,172	\$2,234	\$2,296	\$2,358	\$2,420	\$2,482

Sensitivity Analysis Around Wet Calf Value and Cost of Feed (holding all else equal)

Feed cost was adjusted at the ingredient level for all rations by a fixed percentage as shown below:

		Feed cost adjustment						
		-20%	-10%	5%	0%	5%	10%	20%
Calf price, \$/head	\$100	\$1,777	\$1,904	\$2,096	\$2,032	\$2,096	\$2,160	\$2,288
	\$150	\$1,838	\$1,966	\$2,158	\$2,094	\$2,158	\$2,222	\$2,349
	\$200	\$1,900	\$2,028	\$2,219	\$2,156	\$2,219	\$2,283	\$2,411
	\$250	\$1,962	\$2,090	\$2,281	\$2,217	\$2,281	\$2,345	\$2,473
	\$300	\$2,024	\$2,151	\$2,343	\$2,279	\$2,343	\$2,407	\$2,534
	\$350	\$2,085	\$2,213	\$2,405	\$2,341	\$2,405	\$2,468	\$2,596
	\$400	\$2,147	\$2,275	\$2,466	\$2,402	\$2,466	\$2,530	\$2,658

Sensitivity Analysis Around Wet Calf Value and Cost of Feed (holding all else equal)

Mortality was adjusted using a fixed percentage multiplied across each stage-specific mortality risk. 100% = 6.3% mortality across the entire raising period. 50% = 3.2% and 200% = 12.4%.

		Proportional mortality adjustment						
		25%	50%	75%	100%	125%	150%	200%
Weight at 1st service, lbs	750	\$1,972	\$1,984	\$1,995	\$2,007	\$2,019	\$2,033	\$2,058
	775	\$2,008	\$2,020	\$2,031	\$2,043	\$2,055	\$2,069	\$2,095
	800	\$2,044	\$2,057	\$2,068	\$2,080	\$2,092	\$2,106	\$2,132
	825	\$2,082	\$2,094	\$2,106	\$2,117	\$2,130	\$2,144	\$2,170
	850	\$2,120	\$2,132	\$2,144	\$2,156	\$2,168	\$2,183	\$2,209
	875	\$2,158	\$2,171	\$2,183	\$2,194	\$2,207	\$2,222	\$2,248
	900	\$2,198	\$2,210	\$2,222	\$2,234	\$2,247	\$2,261	\$2,288

Sensitivity Analysis Around Varying Insemination Risk and Conception Risk (holding all else equal)

		Average Insemination Risk						
		43%	48%	53%	58%	63%	68%	73%
Average Conception Risk	35%	\$2,410	\$2,368	\$2,335	\$2,307	\$2,284	\$2,266	\$2,249
	40%	\$2,353	\$2,317	\$2,287	\$2,266	\$2,246	\$2,228	\$2,213
	45%	\$2,309	\$2,277	\$2,253	\$2,232	\$2,214	\$2,198	\$2,185
	50%	\$2,274	\$2,248	\$2,224	\$2,205	\$2,189	\$2,175	\$2,163
	55%	\$2,248	\$2,222	\$2,201	\$2,183	\$2,168	\$2,156	\$2,144
	60%	\$2,224	\$2,200	\$2,181	\$2,164	\$2,151	\$2,139	\$2,129
	65%	\$2,203	\$2,181	\$2,164	\$2,149	\$2,136	\$2,125	\$2,116

Disclaimer

- We have tried to represent the costs and benefits as closely as possible
- Approaches to raising heifers can vary tremendously for labor, feed, housing, etc – this model attempts to look at a “representative” operation that is bottle feeding calves in individual hutches
- More hard data for actual inputs (DMI, health and vet med costs, bedding/ housing, labor, etc) for the specific system being modeled would improve the accuracy and reliability of the estimates
- Of course, individual results may vary!

Summary

- The cost of raising heifers is typically higher than many realize
- Must consider costs incurred by heifers that die or are sold
 - Must also consider interest cost for money invested in raising
- This spreadsheet model:
 - Is consistent with published results
 - Demonstrates both the cost and the value of utilizing a more intensive (biologically normal) approach
 - Intensive = higher cost/d but lower total cost and greater value
- Several large factors impact heifer raising costs including feed, labor, mortality, wet calf value, and weight at first service
- Feed cost is the highest single source of costs for raising heifers (followed by labor)

Thanks For Your Attention!



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