

2012 Idaho Livestock Costs and Returns Estimate



EBB-DR1-12

Holstein Small Herd Replacement Enterprise

400 head

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University of Idaho Extension

Agricultural Economics & Rural Sociology

Background and Assumptions

Economic costs are used in the University of Idaho costs and returns estimates. All resources are valued based on market price or opportunity cost. This budget represents the costs and returns associated with a 400 head Holstein replacement enterprise.

Enterprise Overview

Replacement Information

Replacement calves are purchased at 1-3 days of age at the current market price. The heifers remain in the replacement program until 2 - 4 weeks before calving. Heifers are reared in a drylot facility. Calves are fed a liquid diet for the first 60 days and housed in individual pens. Group pens are used thereafter. Housing is provided in the pens for calves from weaning to 400 pounds.

Heifers enter breeding groups at 750-800 pounds and are bred by artificial insemination. Rations are designed to produce a 1,200-pound heifer in 22.5 months. The total number of replacements of all ages is equal to 400 head. Each year 210 females enter the replacement program from the dairy cow enterprise. Heifers in this program are bred to calve at 24 months of age at about 1,200 pounds. The number on hand is based on the number entering the replacement enterprise per year minus culling and death losses (Table 1).

Mortality Estimates and Market Value

Assumptions regarding mortality rates are presented in Table 1. At 5%, mortality is highest during the first few days of a calf's life. From 3 days to weaning, the mortality rate is 3%. From weaning to 400 lb, the mortality rate falls to 0.7%, and from 400 lb to breeding, the mortality rate is just 0.3%. From breeding to calving, the mortality rate is a scant 0.1% but the culling rate is 2.5%. Market value ranges from \$150 per head at 3 days to \$250 at weaning, \$450 at 400 lb, \$860 at breeding, and \$1300 at calving.

Table 1: Mortality, culling rates, and market values by time period.

Time period	Mortality (%)	Culling (%)	Market value at end of period (\$/head)
Birth to 3 days	5.0	0	150
3 days to weaning	3.0	0	250
Weaning to 400 lb	0.7	0	450
400 lb to breeding	0.3	0	860
Breeding to calving	0.1	2.5	1,300

Distribution by Ages

The replacements in this enterprise are assumed to be evenly distributed over the time period from 3 days to just before calving at 24 months of age. The following distribution was used for ration formulation and facility requirements.

Table 2: Number of heifers by feeding stage.

Feed period	% of total	Number of heifers
Liquid feeding	8.2	33
Weaning to 400 lb	17.8	71
400 lb to breeding	36.5	146
Breeding to calving	37.5	150

Labor

Calves are fed liquid diets for 60 days, which requires 2.5 hours of labor per day. From 61 days to market the replacements require 3.0 hours daily for all types of labor requirements (feeding, management, cleaning, etc.).

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Feeds

Liquid diets consist of Colostrum, pasteurized hospital milk and powered milk starter. Feeds after the liquid phase consist of concentrates, alfalfa hay, and silages. Rations are based on computer formulation to provide the rates of gain as shown in Table 3 below.

The first year heifers start out on a liquid diet for two months (Table 4). At three months of age they migrate to a calf starter ration and begin to eat some hay. By five months of age their diet consists of hay and silage, both corn and earlage. At seven months each heifer consumes 30 lb of corn silage per day, plus 9 lb of hay, 1.8 lb of push-out (from

cleaning up leftover feed), and 0.2 lb of minerals. Cost per head per day averages \$1.39 per day for the first 2 months, \$3.22 per day for 3 to 4 months, \$0.95 per day for months 5 through 6, and \$1.80 per day for the 7 to 12-month period.

The second year heifers start consuming more hay and silage increases from 30 to 40 lb per day by 16 months (Table 5). Cost per head per day is \$1.80 per day for the 13-month-old heifers, \$1.75 per day during months 14 and 15, and \$2.12 per day for the 16- to 19-month old heifers. During the final period, from 20-22.5 months of age, cost per head per day averages \$2.29 per head per day.

Table 3: Rate of gain by feeding period (lb/day)

Group	Period	Rate of gain (lb/day)
1	Liquid feeding	0.8
2	Weaning to 400 lb	1.6
3	400 lb to breeding	1.8
4	Breeding to calving	1.6

NOTE: Heifers average a gain of 1.60 lb/day over the period from 3 days of age to calving.

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Table 4: Feed composition and price per head by period, Year 1.

	Cost (\$ per 100-lb)	Quantity (lb/day)			
		Group 0 - 2 mo.	Group 3 - 4 mo.	Group 5 - 6 mo.	Group 7 - 12 mo.
Colostrum	30.00	18.0			
Hospital milk, pasteurized	4.00	10.0			
Balanced ration powdered milk	174.00	0.25			
Calf starter	17.20	3.0	16.0		
Hay	11.00		1.0	6.25	9.0
Corn Silage	3.00			6.25	30.0
Earlage	7.00			2.5	
Bunk push-out	(1.00)			1.0	1.8
Mineral	47.00				0.20
Cost per head per day		\$1.39	\$3.22	\$0.95	\$1.80

Table 5: Feed composition and price per head by period, Year 2.

	Cost (\$ per 100-lb)	Quantity (lb/day)			
		Group 13 mo.	Group 14-15 mo.	Group 16-19 mo.	Group 20-22.5 mo.
Corn Silage	3.00	30.0			
Hay	11.00	9.0	11.0	13.0	
Silage (half corn, half cannery)	2.00	30.0	30.0	40.0	40.0
Cannery silage	1.10				13.0
Top dress	13.00				4.0
Bunk push-out	(1.00)	1.90	1.84	2.25	2.3
Mineral	47.00	0.20	0.20	0.20	0.16
Cost per head per day		\$1.80	\$1.75	\$2.12	\$2.29

Table 6: Enterprise Budget for Raising Holstein Replacement Heifers in Southern Idaho, 400-head facility, Year One: Day old to 12 months (365 days)

	Period (days)	Quantity (units/head)	Unit	Price/ Cost (\$/head)	Price/ Cost per head per day	Price/ Cost per head	Price/ Cost per dairy
Income:							
Replacement heifers	365	0.00	hd	\$1,450.00	\$3.97	\$1,450	\$580,000
					\$3.97	\$1,450.00	\$580,000.00
Operating Costs:							
Baby calf purchase	1			\$150.00	\$0.41	\$150.00	\$60,000.00
Feed (head/day):							
Day old							
Colostrum	1	0.18	cwt	\$30.00	\$5.40	\$5.40	\$2,160
					\$0.00	\$0.00	\$0
Liquid feeding phase (Months 1-2)							
Hospital milk, pasteurized	59	0.10	cwt	\$4.00	\$1.33	\$78.18	\$31,270.00
Balanced ration powdered milk		0.25	lb	\$1.74	\$0.38	\$22.42	\$8,968
Calf starter		3.00	lb	\$0.17	\$0.44	\$25.67	\$10,266
					\$0.51	\$30.09	\$12,036
Months 3-4							
Calf starter	60	0.16	cwt	\$17.20	\$3.22	\$193.45	\$77,378.64
Hay		0.01	cwt	\$11.10	\$2.75	\$165.12	\$66,048
Antibiotic (bovitec with tetracycline)		1.00	dose	\$0.36	\$0.11	\$6.73	\$2,691
					\$0.36	\$21.60	\$8,640
Months 5-6							
Corn Silage	60	6.25	lb	\$0.03	\$0.95	\$69.71	\$27,885
Earlage		2.50	lb	\$0.07	\$0.19	\$11.25	\$4,500
Hay		6.25	lb	\$0.11	\$0.18	\$10.50	\$4,200
Push-out (percent fed)		10%	percent	1.06	\$0.69	\$41.63	\$16,650
					-\$0.11	\$6.34	\$2,535
Months 7-12							
Corn Silage	185	30.00	lb	\$0.03	\$1.80	\$403.84	\$161,534.60
Hay		9.00	lb	\$0.11	\$0.90	\$166.50	\$66,600
Mineral		0.20	lb	\$0.47	\$1.00	\$184.82	\$73,926
Push-out (percent fed)		10%	percent	1.90	\$0.09	\$17.39	\$6,956
					-\$0.19	\$35.13	\$14,053
Total feeding costs				Average:	\$2.69	\$261.45	\$104,231.92
Vaccination/Veterinary Expenses							
Scour bolus		1.00	hd	\$6.00	\$0.09	\$31.98	\$12,794
Inforce (2cc)		2.00	hd	\$1.36	\$0.02	\$6.00	\$2,400
Vit E (4cc)		1.00	hd	\$0.14	\$0.01	\$2.72	\$1,088
Ultrabac 8 (5cc)		4.00	hd	\$0.26	\$0.00	\$0.14	\$56
Bovishield 5 Gold (2cc)		3.00	hd	\$2.84	\$0.00	\$1.06	\$423
Spirovac (2cc)		1.00	hd	\$2.18	\$0.02	\$8.51	\$3,406
Bangs (brucella)		1.00	hd	\$3.88	\$0.01	\$2.18	\$873
Magnet		1.00	hd	\$0.35	\$0.01	\$3.88	\$1,552
Pfizer J-5 (5cc)		2.00	hd	\$1.49	\$0.00	\$0.35	\$140
SRP (2cc)		2.00	hd	\$2.08	\$0.01	\$2.98	\$1,192
					\$0.01	\$4.16	\$1,664
					\$0.00	\$0.00	\$0
Labor							
Baby calves (through 4 months old)		0.06	hr	\$15.00	Average: \$0.55	\$98.88	\$39,550.00
Heifer calves (5 - 12 months old)		0.03	hr	\$15.00	\$0.83	\$98.18	\$39,270
					\$0.41	\$99.23	\$39,690
						\$0.00	\$0
Miscellaneous							
Bedding		1.00	hd	\$37.50	\$0.06	\$37.50	\$15,000
Operating Costs							
Interest on Operating Costs		1.00	percent	6%	\$0.23	\$34.79	\$13,894.53
Total Operating Costs							
					\$4.01	\$614.60	\$245,470.03

Table 6: Enterprise Budget for Raising Holstein Replacement Heifers in Southern Idaho, 400-head facility, Year One: Day old to 12 months (365 days)

	Period (days)	Quantity (units/head)	Unit	Price/ Cost (\$/head)	Price/ Cost per head per day	Price/ Cost per head	Price/ Cost per dairy
Fixed Costs:							
Annual capital recovery costs*		1.00	head	\$208.96	\$0.57	\$208.96	\$83,585.80
Insurance*		1.00	herd	\$3.50	\$0.01	\$3.50	\$1,400.00
Annual overhead (2.5% Oper Costs)		1.00	herd	2.5%	\$0.04	\$14.50	\$5,798.12
*See Table 2.							
Total Fixed Costs					\$0.62	\$226.96	\$90,783.91
Total Costs (Operating and Fixed)					\$4.64	\$841.56	\$336,253.94

**Table 7: Enterprise Budget for Raising Holstein Replacement Heifers in Southern Idaho, 400-head facility
One year old to approximately 22.5 months (310 days)**

	Period (days)	Quantity (units/head)	Unit	Price/ Cost (\$/head)	Price/ Cost per head per day	Price/ Cost per head per year	Price/ Cost per dairy per year
Income:					\$3.43	\$1,250	\$500,132
Replacement heifers	310	1.00	hd	\$1,289.00	\$3.53	\$1,289.00	\$515,600.00
Death and cull loss		3.00%	percent	\$1,289.00	-\$0.11	-\$38.67	-\$15,468.00
Operating Costs:							
Feed (head/day):							
Month 13					\$1.80	\$65.49	\$26,195
Corn Silage		30.00	lb	\$0.03	\$0.90	\$27.00	\$10,800
Hay		9.00	lb	\$0.11	\$1.00	\$29.97	\$11,988
Mineral		0.20	lb	\$0.47	\$0.09	\$2.82	\$1,128
Push-out (percent fed)		10%	percent	1.90	-\$0.19	\$5.70	\$2,279
Months 14-15 (breeding age)					\$1.75	\$126.82	\$50,726
Silage (half corn, half cannery)		30.00	lb	\$0.02	\$0.62	\$36.90	\$14,760
Hay		11.00	lb	\$0.11	\$1.22	\$73.26	\$29,304
Mineral		0.20	lb	\$0.47	\$0.09	\$5.64	\$2,256
Push-out (percent fed)		10%	percent	1.84	-\$0.18	\$11.02	\$4,406
Months 16-19					\$2.12	\$167.64	\$67,056
Silage (half corn, half cannery)		40.00	lb	\$0.02	\$0.82	\$49.20	\$19,680
Hay		13.00	lb	\$0.11	\$1.43	\$85.80	\$34,320
Mineral		0.20	lb	\$0.47	\$0.09	\$5.64	\$2,256
Push-out (percent fed)		10%	percent	2.25	-\$0.23	\$27.00	\$10,800
Months 20-22.5					\$2.29	\$240.91	\$96,364
Cannery Silage		40.00	lb	\$0.01	\$0.44	\$46.20	\$18,480
Hay		13.00	lb	\$0.11	\$1.44	\$151.52	\$60,606
Topdress		4.00	lb	\$0.13	\$0.52	\$54.60	\$21,840
Mineral		0.16	lb	\$0.82	\$0.13	\$13.83	\$5,531
Push-out (percent fed)		10%	percent	2.40	-\$0.24	\$25.23	\$10,093
Total feeding costs				Average:	\$2.08	\$175	\$69,823
Vaccination/Veterinary Expenses					\$0.08	\$27.96	\$11,186
Scour bolus		1.00	hd	\$6.00	\$0.02	\$6.00	\$2,400
Inforce (2cc)		2.00	hd	\$1.36	\$0.01	\$2.72	\$1,088
Vit E (4cc)		1.00	hd		\$0.00	\$0.00	\$0
Ultrabac 8 (5cc)		4.00	hd	\$0.26	\$0.00	\$1.06	\$423
Bovishield 5 Gold (2cc)		3.00	hd	\$2.84	\$0.02	\$8.51	\$3,406
Spirovac (2cc)		1.00	hd	\$2.18	\$0.01	\$2.18	\$873
Bangs (brucella)		1.00	hd		\$0.00	\$0.00	\$0
Magnet		1.00	hd	\$0.35	\$0.00	\$0.35	\$140
Pfizer J-5 (5cc)		2.00	hd	\$1.49	\$0.01	\$2.98	\$1,192
SRP (2cc)		2.00	hd	\$2.08	\$0.01	\$4.16	\$1,664
					\$0.00	\$0.00	\$0
Labor					\$0.41	\$127.58	\$51,030.00
Heifer calves (13 - 21.5 months old)		0.03	hr	\$15.00	\$0.41	\$127.58	\$51,030
						\$0.00	\$0
Miscellaneous					\$0.06	\$37.50	\$15,000
Bedding		1.00	hd	\$37.50	\$0.06	\$37.50	\$15,000
Total Operating Costs					\$2.61	\$367.60	\$147,038.96
Interest on Operating Costs		1.00	percent	6%	\$0.16	\$22.06	\$8,822.34
Net Returns Above Variable Costs						\$860.68	\$344,271

**Table 7: Enterprise Budget for Raising Holstein Replacement Heifers in Southern Idaho, 400-head facility
One year old to approximately 22.5 months (310 days)**

	Period (days)	Quantity (units/head)	Unit	Price/ Cost (\$/head)	Price/ Cost per head per day	Price/ Cost per head per year	Price/ Cost per dairy per year
<u>Fixed Costs:</u>							
Annual capital recovery costs*		1.00	head	\$208.96	\$0.57	\$208.96	\$83,585.80
Insurance*		1.00	head	\$3.50	\$3.50	\$3.50	\$1,400.00
Annual overhead (2.5% Oper Costs)		1.00	head	2.5%	\$0.00	\$9.19	\$3,675.97
Year 1 Total Costs plus interest		1.00	head	\$892.05	\$2.44	\$892.05	\$356,821.49
Total Fixed Costs					\$6.52	\$1,113.71	\$445,483.26
Total Costs (Operating and Fixed)					\$9.13	\$1,481.31	\$592,522.22
Net Returns Above Total Costs					-\$5.70	-\$230.98	-\$92,390.22

Table 8. Capital Costs for Raising Holstein Replacement Heifers in Southern Idaho

Item	Quantity Per Dairy	Unit	Price or Cost	Value or Cost	Years of Life (n)	Salvage Value (\$/head)	Salvage Value (\$/herd)	Discount Rate (i)	Capital Recovery Factor	Capital Recovery Value
Initial Capital Outlays:										
Land:				\$50,000						
Land purchase	10	ac	\$5,000	\$50,000				7.50%		\$3,750
Feeding Facilities:				\$211,500						
Bulk feeders (creep feeders)	3	farm	\$500	\$1,500	12	\$0		6.00%		\$0
Commodity shed, 5 bays	1	farm	\$210,000	\$210,000	30	\$0		6.00%	0.0727	\$15,257
Calf pens				\$118,867						
Hutches, wooden (3 calves/pen)	133	pen	\$314	\$41,867	3	\$0		6.00%	0.3740	\$15,658
Group pens, windbreaks	7	stall	\$11,000	\$77,000						
Machinery:				\$344,688						
Farm pickups, used	1	farm	\$20,000	\$20,000	8	\$2,000	\$2,000	6.00%	0.1610	\$3,018
4-wheelers	2	farm	\$6,000	\$12,000	8	\$600	\$1,200	6.00%	0.1610	\$1,871
Tractor-125 HP	1	farm	\$95,000	\$95,000	10	\$9,500	\$9,500	6.00%	0.1359	\$12,189
Straw Spreader	1	farm	\$35,000	\$35,000	10	\$3,500	\$3,500	6.00%	0.1359	\$4,491
Loader, used	1	farm	\$74,000	\$74,000	8	\$7,400	\$7,400	6.00%	0.1610	\$11,167
Semi, with feedbox mixer & scale, used	1	farm	\$65,000	\$65,000	8	\$6,500	\$6,500	6.00%	0.1610	\$9,809
Dump truck	1	farm	\$16,188	\$16,188	20	\$1,619	\$1,619	6.00%	0.0872	\$1,367
Boxscraper	1	farm	\$3,000	\$3,000	20	\$300	\$300	6.00%	0.0872	\$253
Gooseneck trailer, 28'	1	farm	\$24,500	\$24,500	8	\$2,450	\$2,450	6.00%	0.1610	\$3,697
Miscellaneous	1	farm	\$10,000	\$10,000	16	\$0	\$0	7.00%	0.1059	\$1,059
Insurance:				\$4,177						
Insur., facilities @ \$5 per \$1,000	1	farm	\$1,652	\$1,652						
Insur., machinery, @ \$4 per \$1,000	1	farm	\$1,378.75	\$1,379						
Liability Insur. (\$1 million coverage)	1	farm	\$1,146	\$1,146						
Total Capital Costs				\$739,231	\$33,869					
Capital Costs per Head				\$1,848.08	\$84.67					
Average Capital Costs (Purchase - Salvage Value)/2				\$800						
Average Capital Costs per Head				\$2						
Total Capital Recovery Costs				\$83,586			\$83,586			
Capital Recovery Costs per Head				\$209			\$209			

Table 9. Summary of Costs and Returns for Raising Replacement Dairy Heifers, 400-animal operation (\$/head)

		Year 1	Year 2
	Unit	\$/head	\$/head
Income	head	\$0	\$1,250
Feed	head	\$261	\$175
Labor	head	\$99	\$128
Veterinary	head	\$32	\$28
Misc.	head	\$222	\$60
Variable Costs	head	\$615	\$368
Returns over Variable Costs	head	-\$615	\$883
Fixed Cost	head	\$227	\$1,114
Total Cost	head	\$842	\$1,481
Returns over Total Costs	head	-\$842	-\$231

Note: Year one costs are added to year two costs, plus interest, so year two's returns represent returns for the full 680-day cycle.