

University of Idaho

College of Agricultural *and* Life Sciences



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EBB-D5-14 Costs and Returns for a 5000-Head Open Lot Holstein Dairy in Southern Idaho

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Budget spreadsheets are available at the following link:

<http://web.cals.uidaho.edu/idahoagbiz/enterprise-budgets/>

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Summary of Annual Costs and Returns for Operating a 5,000-Head Open Lot Dairy in Southern Idaho, 2014 (\$/head/year)

	(\$/Head/Year)
Annual Milk Production (cwt/head)	241.27
Milk Price (\$/cwt), Average for 2014	\$22.45
Annual Milk Revenue (\$/head/year)	\$5,417
Total Revenue (\$/head/year)	\$6,020
Annual Feed Costs (\$/head/year)	\$2,231
Total Variable Costs (\$/head/year)	\$3,723
Fixed Costs (\$/head/year)	\$587
Total Costs (\$/head/year)	\$4,311
Returns over Variable Costs (\$/head/year)	\$2,296
Returns over Total Costs (\$/head/year)	\$1,709

In the spreadsheet version, you can change values in red and they will be updated throughout the budget.
<http://web.cals.uidaho.edu/idahoagbiz/enterprise-budgets/>

Background & 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 average costs and returns per cow associated with a 5,000-cow dairy herd. The rolling 365-day 3.5% fat-corrected milk for the year is 24,127 lb per cow, which is the state average for 2014. The herd is milked three times a day in two double 36 parallel parlors and kept in open lots with no additional housing. All pens have lock-type stanchions for herd management. The owner contributes to the daily labor requirement. The \$2,421 per lactating cow facility investment (see Capital Cost per head, Table 5) is based on the best estimate of current cost and the average value of each component over its useful life.

Dairy Overview

Herd Information

The herd consists of 5,000 cows total with 10% dry, 3% close-up heifers, 8% close-up cows, and 6% fresh cows. The remaining cows, 73% (3650), are in the high energy category in terms of feed. The herd replacement rate is 40% annually (35% cull loss and 5% mortality) with purchased heifers used as replacements. The herd has a 5% mortality rate on mature cows and an average 13.8-month calving interval.

Labor

Labor requirements per day and per year, both hired and owner labor, are listed in Table 1 below. All milking labor is hired (100 hours/day) and includes all cleanup. Feeding labor is hired (24 hours/day for feeding plus creating rations). Facility management labor is split between hired (32 hours/day) and owner (3 hours/day). Herd management labor is also split between the herd manager plus hired labor (32 hours/day) and the herd owner (2.5 hours/day). Manure is managed in open lots and removed twice a year by a custom operator. Feed lanes are scraped once or twice daily.

Feeds

Total Mixed Rations (TMR) are combined with alfalfa using a vertical mixer. A base commodity mix is fed to all cows. In addition, the milking herd receives a supplement mix. These two blends are developed by a consultant who creates rations based on current relative feed costs and cattle nutrient needs specific to the requirements of each group of cows. A representative daily feed ration would consist of hay, grain, and other supplements as shown in Table 2 and Table 3. Average total feed cost per cow for the whole herd is \$5.18 per day while average total feed cost per lactating cow is \$6.70 per day.

Herd Health

Artificial insemination (AI) is used for breeding. Breeding, testing, veterinary services, and medicine are included in the annual veterinary services charge.

Table 1. Daily (hr/herd) and Annual (hr/head) Labor

	Daily (hr/herd)		Annual labor (hr/cow)		Total
	Hired	Owner	Hired	Owner	
Milking	100.0	0.0	7.3	0.0	7.3
Feeding	24.0	0.0	1.3	0.0	1.3
Facility mgmt.	32.0	3.0	2.5	0.2	2.7
Herd mgmt.	32.0	2.5	2.5	0.2	2.7
Manure mgmt.	0.0	0.0	0.0	0.0	0.0
Total	188.0	5.5	13.6	0.4	14.0

Table 2. Daily Feed Ration, Quantities and Costs for All Cows*

Feed item:	Quantity lb/day	Price* \$/cwt	Cost \$/day
Alfalfa hay, dairy	11.70	\$11.75	\$1.37
Feeder hay	3.56	\$10.00	\$0.36
Straw	0.35	\$2.80	\$0.01
Wet sugarbeet pulp	3.48	\$1.80	\$0.06
Wet Dry Distillers Grain (DDG)	4.46	\$3.05	\$0.14
Corn silage (30%DM, 15% shrink)	31.43	\$2.25	\$0.71
Haylage (38%DM, 10% shrink)	7.62	\$3.50	\$0.27
Beet pulp	0.99	\$9.10	\$0.09
Corn	9.49	\$9.50	\$0.90
Barley	1.45	\$7.75	\$0.11
Wheat DDG (Canada)	1.54	\$13.75	\$0.21
Canola	1.80	\$12.00	\$0.22
Distillers	1.81	\$9.50	\$0.17
Cottonseed	3.61	\$18.00	\$0.65
Molasses	1.44	\$14.15	\$0.20
Bypass fat (EB 100)	0.35	\$67.00	\$0.24
Ryegrass pellets	0.49	\$8.50	\$0.04
Mineral (ton)	0.89	\$20.50	\$0.18
Mineral, fresh (ton)	0.09	\$65.50	\$0.06
Mineral, dry cow (ton)	0.03	\$76.00	\$0.02
Mineral, dry cow AD (ton)	0.14	\$73.10	\$0.11
Total cost, all cows			\$6.12

*includes 73% high energy lactating cows, 6% fresh cows, 8% close-up cows, 3% close-up heifers, and 10% dry cows.

Table 4: Annual Enterprise Budget for a 5,000-Head Open Lot Dairy in Southern Idaho

Item	Quantity Per Head	Unit	No. of Cows	Price or Cost	Value or Cost/Dairy	Value or Cost/Head/Yr	Value or Cost/Cwt
Income, Lactating Cows:					\$30,099,808	\$6,020	\$24.95
Milk (cwt/head)	241.27	cwt	5000	\$22.45	\$27,082,557.50	\$5,416.51	\$22.45
Bull Calves (head)	0.48	head	5000	\$181.00	\$434,400.00	\$86.88	\$0.36
Heifer Calves (head)	0.48	head	5000	\$234.00	\$561,600.00	\$112.32	\$0.47
Cull Cows (head)	0.35	head	5000	\$1,155.00	\$2,021,250.00	\$404.25	\$1.68
Feed Costs, All Cows:					\$11,128,365.32	\$2,231.49	\$9.22
Feed (ton/head/yr):							
Alfalfa hay, dairy	2.14	head	5000	\$235.00	\$2,515,462.12	\$503.09	\$2.09
Feeder hay	0.65	head	5000	\$200.00	\$650,815.72	\$130.16	\$0.54
Straw	0.06	head	5000	\$56.00	\$17,718.59	\$3.54	\$0.01
Wet sugarbeet pulp	0.70	head	5000	\$36.00	\$126,155.56	\$25.23	\$0.10
Wet Dry Distillers Grain (DDG)	0.82	head	5000	\$61.00	\$248,986.00	\$49.80	\$0.21
Corn silage (30%DM, 15% shrink)	6.61	head	5000	\$45.00	\$1,265,036.54	\$253.01	\$1.05
Haylage (38%DM, 10% shrink)	1.39	head	5000	\$70.00	\$439,035.69	\$87.81	\$0.36
Beet pulp	0.18	head	5000	\$182.00	\$165,597.13	\$33.12	\$0.14
Corn	1.74	head	5000	\$190.00	\$1,650,644.72	\$330.13	\$1.37
Barley	0.27	head	5000	\$155.00	\$205,746.13	\$41.15	\$0.17
Wheat DDG (Canada)	0.28	head	5000	\$275.00	\$387,848.04	\$77.57	\$0.32
Canola	0.33	head	5000	\$240.00	\$395,434.65	\$79.09	\$0.33
Distillers	0.33	head	5000	\$190.00	\$314,543.84	\$62.91	\$0.26
Cottonseed	0.66	head	5000	\$360.00	\$1,188,226.50	\$237.65	\$0.98
Molasses	0.26	head	5000	\$283.00	\$371,726.99	\$74.35	\$0.31
Bypass fat (EB 100)	0.06	head	5000	\$1,340.00	\$431,093.46	\$86.22	\$0.36
Ryegrass pellets	0.09	head	5000	\$170.00	\$76,513.60	\$15.30	\$0.06
Mineral (ton)	0.16	head	5000	\$410.00	\$333,341.91	\$66.67	\$0.28
Mineral, fresh (ton)	0.02	head	5000	\$1,310.00	\$105,821.92	\$21.16	\$0.09
Mineral, dry cow (ton)	0.01	head	5000	\$1,520.00	\$44,779.55	\$8.96	\$0.04
Mineral, dry cow AD (ton)	0.03	head	5000	\$1,462.00	\$193,836.68	\$38.77	\$0.16
Non-Feed Costs, Herd:					\$7,460,000.00	\$1,492.00	\$6.18
Labor, including fringe costs	1.00	head	5000	\$375.00	\$1,875,000.00	\$375.00	\$1.55
Veterinary, breeding, testing	1.00	head	5000	\$132.00	\$660,000.00	\$132.00	\$0.55
Supplies	1.00	head	5000	\$217.00	\$1,085,000.00	\$217.00	\$0.90
Bedding	1.00	head	5000	\$76.00	\$380,000.00	\$76.00	\$0.31
Repairs and maintenance	1.00	head	5000	\$136.00	\$680,000.00	\$136.00	\$0.56
Herd replacement costs	1.00	head	5000	\$200.00	\$1,000,000.00	\$200.00	\$0.83
Utilities	1.00	head	5000	\$50.00	\$250,000.00	\$50.00	\$0.21
Milk hauling	1.00	head	5000	\$85.00	\$425,000.00	\$85.00	\$0.35
State & association charges	1.00	head	5000	\$30.00	\$150,000.00	\$30.00	\$0.12
Legal & accounting	1.00	head	5000	\$7.00	\$35,000.00	\$7.00	\$0.03
Miscellaneous (fuel, insur., etc.)	1.00	head	5000	\$62.00	\$310,000.00	\$62.00	\$0.26
Insurance	1.00	head	5000	\$27.00	\$135,000.00	\$27.00	\$0.11
Interest	1.00	\$	5000	\$95.00	\$475,000.00	\$95.00	\$0.39
Total Operating Costs					\$18,588,365.32	\$3,723.49	\$15.41
Net Returns Above Variable Costs					\$11,511,442.18	\$2,296.47	\$9.54
Fixed Costs:							
Capital recovery costs*	1.00	head	5000	\$486.64	\$2,433,218.61	\$486.64	\$2.02
Insurance*	1.00	herd	1	\$38,280.58	\$38,280.58	\$7.66	\$0.03
Overhead (2.5% Operating Costs)	1.00	herd	1	\$464,709.13	\$464,709.13	\$92.94	\$0.39
*See Table 3.					\$0.00	\$0.00	\$0.00
Total Fixed Costs					\$2,936,208.32	\$587.24	\$2.43
Total Costs (Operating and Fixed)					\$21,524,573.64	\$4,310.73	\$17.84
Net Returns Above Total Costs					\$8,575,233.86	\$1,709.23	\$7.11

Breakeven Price and Yield

The first breakeven analysis below presents breakeven milk prices (\$/cwt) that will cover operating costs, ownership costs, and total costs for the base yield in the enterprise budget above, as well as for milk yields that are 10% above and below the base yield.

The second breakeven analysis below presents breakeven yields that will cover operating costs, ownership costs, and total costs for the base price in the enterprise budget above, as well as for milk prices that are 10% above and below the base yield.

In the spreadsheet version (Excel) of this budget, the percentages in the orange cells can be changed and all values will be updated.

Costs, prices, and yields in this breakeven table are all linked to values in the budget above, so any changes in the budgets will be automatically updated in these breakeven analyses.

Breakeven Milk Prices (\$/cwt):

	Less:	Base Yield (cwt/hd/yr):	Plus:
	5%		5%
	229.2	241.27	253.3
Operating Cost Breakeven	\$16.25	\$15.43	\$14.70
Ownership Cost Breakeven	\$2.56	\$2.43	\$2.32
Total Cost Breakeven	\$18.81	\$17.87	\$17.02

These tables are also available for you to modify in a spreadsheet version. You may download them from our website, <http://web.cals.uidaho.edu/idaohoqbiz/enterprise-budgets/current-cost-of-production-studies/current-dairy-budgets/>

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Table 5. Capital Costs for a 5,000-Head Open Lot Dairy in Southern Idaho

Item	Quantity Per Dairy	Unit	Price or Cost	Value or Cost
Initial Capital Outlays:				
Cattle:				\$8,900,000
Initial cow purchase	5000	hd	\$1,780	\$8,900,000
Land:				\$4,320,000
Land purchase	300	ac	\$4,650	\$1,395,000
Site Prep: Permits, well, roads	5000	hd	\$585	\$2,925,000
Feeding Facilities:				\$547,192
Scales	1	farm	\$105,400	\$105,400
Commodity shed, 14 bays	1	farm	\$217,800	\$217,800
Hay sheds (180' x 50')	4	farm	\$56,000	\$223,992
Milking Barn				\$2,140,368
Buildings	8000	sq ft	\$62	\$497,760
2 double 36 parallel stalls	144	stall	\$11,400	\$1,642,608
Open Lots				\$3,136,925
Sheds, 400 sq ft per cow	5,000	head	\$425	\$2,203,625
Shades: 40 sq ft per cow	200,000	sq ft	\$5	\$933,300
Hospital Barn				\$404,430
Building	2100	sq ft	\$62	\$130,662
Double 12 parallel stalls	24	stall	\$11,400	\$273,768
Machinery, 5000-cow facility:				\$1,497,500
Generator	2	farm	\$79,100	\$158,200
Farm pickups, new	1	farm	\$41,200	\$41,200
Farm pickups, used	2	farm	\$20,600	\$41,200
4-wheelers	2	farm	\$6,300	\$12,600
10-wheel truck (manure removal)	2	farm	\$61,700	\$123,400
Tractor-125 HP	1	farm	\$99,400	\$99,400
Tractor-75 HP	1	farm	\$61,700	\$61,700
Tractor-60 HP	1	farm	\$46,000	\$46,000
Straw Spreader	2	farm	\$40,100	\$80,200
Loaders, new	1	farm	\$156,900	\$156,900
Loaders, used	2	farm	\$82,600	\$165,200
Skid steer loader	2	farm	\$36,600	\$73,200
Telehandler loader	1	farm	\$52,300	\$52,300
Semis, with feedbox mixers, new	1	farm	\$128,600	\$128,600
Semis, with feedbox mixers, used	1	farm	\$66,900	\$66,900
Dump truck	2	farm	\$16,700	\$33,400
Vacuum tank	1	farm	\$68,000	\$68,000
Backhoe	1	farm	\$50,200	\$50,200
Boxscraper	1	farm	\$3,500	\$3,500
Brush hog, 10'	1	farm	\$9,600	\$9,600
Gooseneck trailer, 28'	1	farm	\$25,800	\$25,800
Miscellaneous	1	farm	\$63,200	\$60,000
Total Capital Costs				\$12,106,415
Capital Costs per head				\$2,421
Average Capital Costs (Purchase - Salvage Value)/2				\$6,111,475
Average Capital Costs per Cow (5,000 head)				\$1,222
Total Capital Recovery Costs				\$2,433,219
Capital Recovery Costs per Cow (5,000 head)				\$487

Table 8: Investment Summary for 5,000-Head Open Lot Dairy in Southern Idaho

Item	Quantity Per Dairy	Unit	Price or Cost	Value or Cost (total)	Years of Life (n)	Salvage Value (\$/head)	Salvage Value (\$/herd)	Discount Rate (i)	Capital Recovery Factor	Capital Recovery Value
Initial Capital Outlays:										
Cattle:				\$8,900,000	3	\$1,155	\$5,775,000	5.00%	0.3672	\$1,436,250
Initial cow purchase	5000	hd	\$1,780	\$8,900,000						
Land:				\$4,320,000						
Land purchase*	300	ac	\$4,650	\$1,395,000				7.50%		\$104,625
Site Prep: Permits, well, roads**	5000	hd	\$585	\$2,925,000	30	\$0		6.00%	0.0727	\$212,501
Feeding Facilities:				\$547,200						
Scales	1	farm	\$105,400	\$105,400	30	\$0		6.00%	0.0727	\$7,657
Commodity shed, 14 bays	1	farm	\$217,800	\$217,800	30	\$0		6.00%	0.0727	\$15,823
Hay sheds (180' x 50')	4	farm	\$56,000	\$224,000	30	\$0		6.00%	0.0727	\$16,274
Milking Barn				\$2,137,600	30	\$0		6.00%	0.0727	\$155,297
Buildings	8000	sq ft	\$62	\$496,000						
2 double 36 parallel stalls	144	stall	\$11,400	\$1,641,600						
Open Lots				\$3,125,000						
Sheds, 400 sq ft per cow	5,000	head	\$425	\$2,125,000	30	\$0		6.00%	0.0727	\$154,381
Shades: 40 sq ft per cow	200,000	sq ft	\$5	\$1,000,000	30	\$0		6.00%	0.0727	\$72,650
Hospital Barn				\$403,800	30	\$0		6.00%	0.0727	\$29,336
Building	2100	sq ft	\$62	\$130,200						
Double 12 parallel stalls	24	stall	\$11,400	\$273,600						
Machinery, 5000-cow facility:				\$1,497,500					Total:	\$220,960.22
Generator	2	farm	\$79,100	\$158,200	10	\$7,910	\$15,820	6.00%	0.1359	\$20,899
Farm pickups, new	1	farm	\$41,200	\$41,200	8	\$4,120	\$4,120	6.00%	0.1610	\$6,217
Farm pickups, used	2	farm	\$20,600	\$41,200	8	\$2,060	\$4,120	6.00%	0.1610	\$6,425
4-wheelers	2	farm	\$6,300	\$12,600	8	\$630	\$1,260	6.00%	0.1610	\$1,965
10-wheel truck (manure removal)	2	farm	\$61,700	\$123,400	10	\$6,170	\$12,340	6.00%	0.1359	\$16,302
Tractor-125 HP	1	farm	\$99,400	\$99,400	10	\$9,940	\$9,940	6.00%	0.1359	\$12,754
Tractor-75 HP	1	farm	\$61,700	\$61,700	20	\$6,170	\$6,170	6.00%	0.0872	\$5,212
Tractor-60 HP	1	farm	\$46,000	\$46,000	20	\$4,600	\$4,600	6.00%	0.0872	\$3,885
Straw Spreader	2	farm	\$40,100	\$80,200	10	\$4,010	\$8,020	6.00%	0.1359	\$10,595
Loaders, new	1	farm	\$156,900	\$156,900	10	\$15,690	\$15,690	6.00%	0.1359	\$20,132
Loaders, used	2	farm	\$82,600	\$165,200	8	\$8,260	\$16,520	6.00%	0.1610	\$25,763
Skid steer loader	2	farm	\$36,600	\$73,200	3	\$3,660	\$7,320	6.00%	0.3741	\$25,086
Telehandler loader	1	farm	\$52,300	\$52,300	3	\$5,230	\$5,230	6.00%	0.3741	\$17,923
Semis, with feedbox mixers, new	1	farm	\$128,600	\$128,600	10	\$12,860	\$12,860	6.00%	0.1359	\$16,501
Semis, with feedbox mixers, used	1	farm	\$66,900	\$66,900	8	\$6,690	\$6,690	6.00%	0.1610	\$10,095
Dump truck	2	farm	\$16,700	\$33,400	20	\$1,670	\$3,340	6.00%	0.0872	\$2,821
Vacuum tank	1	farm	\$68,000	\$68,000	10	\$6,800	\$6,800	6.00%	0.1359	\$8,725
Backhoe	1	farm	\$50,200	\$50,200	20	\$5,020	\$5,020	6.00%	0.0872	\$4,240
Boxscraper	1	farm	\$3,500	\$3,500	20	\$350	\$350	6.00%	0.0872	\$296
Brush hog, 10'	1	farm	\$9,600	\$9,600	10	\$960	\$960	6.00%	0.1359	\$1,232
Gooseneck trailer, 28'	1	farm	\$25,800	\$25,800	8	\$2,580	\$2,580	6.00%	0.1610	\$3,893
Miscellaneous	1	farm	\$63,200	\$60,000	16	\$0	\$0	7.00%	0.1059	\$6,351
Insurance:				\$34,498						
Insur., facilities @ \$5 per \$1,000	1	farm	\$27,362	\$27,362						
Insur., machinery, @ \$4 per \$1,000	1	farm	\$5,990.00	\$5,990						
Liability Insur. (\$1 million coverage)	1	farm	\$1,146	\$1,146						
Total Investment Costs/Salvage Value				\$21,025,598		\$116,535				
Capital Costs/Salvage Value per Head				\$4,205		\$23				
Average Capital Costs				\$10,571,066.50						
Average Capital Costs per Head				\$2,114						
Total Capital Recovery Costs				\$2,432,106						\$2,432,106
Capital Recovery Costs per Head				\$486						\$486

*Opportunity cost on land investment is calculated as land value multiplied by the interest rate. Land is not depreciable.

**Site preparation charges include nutrient management expenses.