Dairy Enterprise – 600 Lactating Cows (Freestall)

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Production Level

Costs per unit and net returns in a dairy enterprise are highly dependent on the level of milk production. Production levels vary for a number of reasons such as livestock genetics, weather, input levels, and management. Budgeting at multiple production levels can help producers examine the financial risk of a livestock enterprise that is directly related to production risk. Table 1 shows milk production levels and income over feed costs from the Heart of America DHIA Summary of Holstein Herds for the last 5 years broken down by quartile of rolling herd average. The following estimated budget includes two production levels — 19,000 and 24,000. The 19,000 pounds reflects producers in the top 25 to 50 percentile (slightly above average); whereas, the 24,000 pounds is intended to reflect production levels of the top 5 percent of producers. The projected budget at the two production levels is presented on both a per cow and a per hundredweight (cwt) basis.

Capital Requirements

Capital invested in dairy facilities varies greatly depending on herd size and degree of mechanization. The capital needed to establish a new 600 lactating cow dairy operation with modern equipment using freestall housing is estimated to be $1,814,942 with another $1,231,200 for the cows. A partial breakdown of the investment assumptions used for the cost return projections is shown in Table 2. This budget is based on a total herd size of 720 cows, with 600 cows (83 percent of the herd) being milked at any one time. Investment amounts are given as total for farm, per cow in the herd, and per lactating cow.

Feed Costs

Dairy cows require high quality forage and grain. Concentrates and grain requirements increase as milk production increases. However, as shown in Table 1, the value of increased production generally will offset the added feed cost associated with the higher production levels. Table 3 shows the amounts and cost of feed used for the different production levels in this budget. At over $1,000 per cow per year, feed is obviously the most important factor in the cost of production. Feed costs are based on market prices, thus, for dairy operations that produce some, or all, of their grain and forage requirements this allocates the cost of producing the feed to the dairy enterprise. Because feed costs are so important, Table 4 shows how the return on investment (Line G in the budget) decreases at various milk prices when feed costs increase by 10 percent.

Returns

Producers receive income primarily from the sale of milk. Additional income is received from the sale of calves and culled breeding stock. In this budget it is assumed that replacement heifers are purchased and thus all calves are sold. It is further assumed that one-third (33 percent) of the cows are replaced each year due to culling and death loss. Cull income is assigned to 28 percent of the herd annually. The other 5 percent represents death loss and cows with no salvage value. Because milk sales make up the majority of income, returns are very sensitive to milk prices. Table 4 shows the return on investment (Line G in the budget) at two levels of feed cost and varying milk prices.

Table 1. *Heart of America DHIA Summary for Holstein Herds, 1997-01*

	Rolling herd average quartile			
Year	Bottom 25%	Lower middle 25%	Upper middle 25%	Top 25%
	Average Milk Production, lbs/cow/year			
1997	13,904	17,269	19,430	22,294
1998	13,893	17,032	19,173	22,506
1999	14,260	17,432	19,595	23,014
2000	14,939	18,170	20,375	23,493
2001	14,331	17,503	19,963	23,208
	Average Income Over Feed Cost, $/cow/year			
1997	$874	$1,147	$1,349	$1,612
1998	$1,149	$1,447	$1,720	$2,064
1999	$1,160	$1,433	$1,676	$2,118
2000	$918	$1,164	$1,392	$2,727
2001	$1,115	$1,534	$1,602	$2,218

Information Included in Budget – 600 Lactating cow dairy

1. **Milk sales:** based on the annual production per cow times milk price.
2. **Volume premium:** dairies that can ship milk in semi loads at a time often get a premium based on volume. A premium of $0.25 per cwt. is included for a 600-cow dairy.
3. **Government payment (MILC):** the Market Income Loss Contract payment is based on 45 percent of the difference between $16.94 per cwt and the monthly Boston Class I milk price on up to 2.4 million pounds of annual production per dairy operation.
4. **Calves sold:** based on a 95 percent calf crop and selling all calves (heifers and bulls) at birth.
5. **Cull cows sold:** assumes cull income is realized on 28 percent of the herd even though 33 percent of the herd is replaced annually. The 5 percent with no income represents cow death loss and cows with zero salvage value.
6. **Feed:** includes total feed for the dairy cow on an annual basis (see Table 3 for details).
7. **Labor:** based on 8.57 full-time persons at an average of $34,000 (salary + benefits) per person ÷ the number of cows in the herd.
8. **Veterinary, drugs, and supplies:** costs for prevention and treatment of disease.
9. **Utilities and water:** telephone, electricity, fuel, and water costs allocated to the dairy enterprise.
10. **Fuel, oil, and auto expense:** share of the farm car and trucks plus gasoline, diesel, and oil for scraping and hauling manure and for hauling feed to the dairy herd.
11. **Milk hauling and promotion costs:** milk-hauling costs at $0.65/cwt. and promotion costs at $0.15/cwt.
12. **Building and equipment repairs:** annual building and equipment repairs allocated to dairy enterprise calculated as 2 percent of the total investment.
13. **Breeding/genetic charge:**

a. **Capital replacement:** price of a heifer replacement times the replacement rate.
b. **Semen, A.I. services, and supplies:** includes semen, artificial insemination services, and supplies.
c. **Interest:** interest is charged on the value of the breeding herd, which is based on the cost of replacement heifers entering the herd.
d. **Insurance:** averages approximately 1 percent of the value of the breeding herd.

14. **Professional fees (legal accounting, etc.):** business costs allocated to the dairy enterprise.
15. **Miscellaneous:** miscellaneous costs (subscriptions, education, etc.) allocated to the dairy enterprise.
16. **Depreciation on buildings and equipment:** depreciation is based on the total original cost less the salvage value of buildings and equipment on a per cow basis ÷ the estimated life. The budget value is based on a total investment of buildings and improvements of $2,199 per cow and an investment of $306 per cow for equipment. The useful life is assumed to be 15 years for buildings and improvements and 8 years for equipment. A salvage value of 10 percent is assumed on buildings and improvements and equipment.
17. **Interest on land, buildings, and equipment:** interest is charged on the land investment at a rate of 5.75 percent and one-half the average investment [(initial cost + salvage value) ÷ 2] for buildings and improvements and equipment at a rate of 8 percent.
18. **Insurance and taxes on land, buildings and equipment:** insurance on buildings and equipment is based on the original cost times 0.25 percent, taxes are based on 1.5 percent of the original cost for buildings and improvements and 0.50 percent for land.
19. **Interest on operating costs:** calculated on one-half of operating costs at a rate of 8 percent.

E. **Breakeven milk price to cover total costs:** represents the price needed for milk per cwt. to cover total costs of production. Assumes government payment, calf and cull income, and all costs remain constant.

F. **ASSET TURNOVER:** (returns per cow ÷ total assets) asset turnover is the percentage of total investment recovered by total returns. Inverting this measure allows different enterprises to be compared on the basis of capital required to generate a dollar of gross income.

G. **NET RETURN ON ASSETS:** [(returns over total costs + interest on breeding herd + interest on operating costs + interest on land, buildings, and equipment) ÷ assets] net return on assets is the percentage return on investment capital (both borrowed and equity). This measure enables comparisons to be made between enterprises as well as other investment alternatives.

COST-RETURN PROJECTION — 600 LACTATING COW FREESTALL DAIRY (REPLACEMENTS PURCHASED[1])

	Production Level (lbs milk sold)				
	19,000		24,000		Your Farm
	Per cow	Per cwt	Per cow	Per cwt	
RETURNS PER COW:					
1. Milk sales @$12.99/cwt	2,468.94	12.99	3,118.67	12.99	
2. Volume premium	47.50	0.25	60.00	0.25	
3. Government payment (MILC)	52.59	0.28	53.97	0.22	
4. Calves sold: 95% × $125/head	118.75	0.63	118.75	0.49	
5. Cull cows sold: 1,400 lbs × 28% × $49.58/cwt.	194.35	1.02	194.35	0.81	
A. GROSS RETURNS	$ 2,882.13	$ 15.17	$ 3,545.74	$ 14.77	
COSTS PER COW:					
6. Feed (from Table 3)	$ 1,006.32	$ 5.30	$ 1,243.75	$ 5.18	
7. Labor	404.76	2.13	404.76	1.69	
8. Veterinary, drugs, and supplies	80.00	0.42	90.00	0.38	
9. Utilities and water	154.75	0.81	170.23	0.71	
10. Fuel, oil, and auto expense	50.63	0.27	50.63	0.21	
11. Milk hauling and promotion cost	152.00	0.80	192.00	0.80	
12. Building and equipment repairs	50.42	0.27	50.42	0.21	
13. Breeding/genetic charge:					
a. Capital replacement: 33% × $1,710/head	564.30	2.97	564.30	2.35	
b. Semen, A.I. services, and supplies	40.00	0.21	45.00	0.19	
c. Interest	136.80	0.72	136.80	0.57	
d. Insurance	17.10	0.09	17.10	0.07	
14. Professional fees (legal, accounting, etc..)	22.00	0.12	22.00	0.09	
15. Miscellaneous	20.00	0.11	25.00	0.10	
16. Depreciation on buildings and equipment	166.31	0.88	166.31	0.69	
17. Interest on land, buildings, and equipment	111.13	0.58	111.13	0.46	
18. Insurance & taxes on land, buildings, & equipment	39.33	0.21	39.33	0.16	
B. SUB TOTAL	$ 3,015.85	$ 15.87	$ 3,328.75	$ 13.87	
19. Interest on ½ operating costs @ 8%	73.84	0.39	84.76	0.35	
C. TOTAL COSTS PER COW	$ 3,089.69	$ 16.26	$ 3,413.50	$ 14.22	
D. RETURNS OVER TOTAL COST (A-C)	$ -207.55	$ -1.09	$ 132.23	$ 0.55	
E. BREAKEVEN MILK PRICE, $/cwt		$ 14.09		$ 12.44	
F. ASSET TURNOVER (A ÷ Assets)[2]	95.28%		117.22%		
G. NET RETURN ON ASSETS [(D + 13c + 17 + 19) ÷ Assets][2]	2.70%		10.99%		

[1] *For cost of raising replacement heifers see MF-399.*
[2] *Assets equal total value of breeding herd and land, buildings and equipment.*

Table 2. *Building, Equipment, and Breeding Herd Investment — 600 Lactating Cow Dairy*

Item	Total	Per cow in herd	Per lactating cow
Number of cows	XXX	720	600
Free stall barn	$720,000	$1,000	$1,200
Feed storage:			
Hay barn	$30,883	$43	$51
Silage bunker	$216,667	$301	$361
Commodity shed	$29,330	$41	$49
Protein bin	$6,363	$9	$11
Milking parlor (12 stalls)	$312,000	$433	$520
Manure storage system	$228,000	$317	$380
Rolling equipment*	$200,000	$278	$333
Miscellaneous**	$71,700	$100	$120
TOTAL	$1,814,942	$2,521	$3,025
Breeding herd	$1,231,200	$1,710	$2,052
TOTAL INVESTMENT	$3,046,142	$4,231	$5,077

[1]Rolling equipment is all feed handling and processing equipment, tractors, trailers, pickups, etc.

[2]Miscellaneous includes land (18 acres), site preparation, electrical grading, water cooling system, etc.

Table 3. *Feed Requirements and Costs for Two Levels of Milk Production Per Cow Per Year*

	Production Level (lbs milk sold)			
	19,000		24,000	
Feed	**Lbs/cow**	**Dollars/cow**	**Lbs/cow**	**Dollars/cow**
Corn silage @ $20.32 per ton	11,443	$116.26	14,628	$148.62
Alfalfa silage @ $54.40 per ton	3,623	98.54	5,434	147.80
Alfalfa hay @ $120.67 per ton	2,646	159.65	2,977	179.60
Grass hay @ $57.33 per ton	788	22.57	1,313	37.62
Corn, rolled @ $4.84 per cwt.	3,672	177.57	4,321	208.94
Soybean meal @ $179.29 per ton	1,512	135.50	2,079	186.40
Dry distillers grain @ $5.45 per cwt.	973	53.05	973	53.05
Soybean hulls @ $83.25 per ton	1,555	64.74	1,555	64.74
Feed grade fat @ $10.50 per cwt.	80	8.43	161	16.87
Whole cotton seed @ $128.19 per ton	1,136	72.79	1,298	83.18
Minerals/vitamins @ $17.50 per cwt.	556	97.24	668	116.92
TOTAL FEED COST		$1,006.32		$1,243.75

Table 4. *Sensitivity of Return on Investment (Line G) to Milk Price*

	Production Level (lbs milk sold)			
	19,000		24,000	
Milk price	Base feed[1]	+10% feed	Base feed[2]	+10% feed
$13.49	4.95%	2.57%	13.83%	10.89%
$12.99	**2.70%**	0.32%	**10.99%**	8.05%
$12.49	0.45%	-1.92%	8.15%	5.21%
$11.99	-1.79%	-4.17%	5.32%	2.38%
$11.49	-4.04%	-6.42%	2.48%	-0.46%
$10.99	-6.28%	-8.66%	-0.36%	-3.30%

[1]Government payment (MILC) is held constant across price levels.
[2]Feed cost is equal to that in the budget.

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