



Business Analysis: Which financial tools should I use?

Kevin C. Dhuyvetter, Department of Agricultural Economics
John F. Smith, Department of Animal Science and Industry
Kansas State University, Manhattan, KS

1



Answering the questions at hand...

- **The appropriate financial tools or methods of analysis to use will depend on the questions you are asking. For example,**
 - **What is my risk-bearing ability?**
 - **Was I profitable last year?**
 - **Should I invest \$X in a cooling system?**



It is important to use the right tool for the question at hand (the wrong tool or method of analysis can lead to incorrect conclusions).

2



Key Financial Statements

- **Financial statements/tools for business analysis (most commonly used)**
 - Balance sheet
 - Income statement
 - Cash flow statement
 - Financial ratios
 - Partial budget
 - Enterprise / whole-farm budget

3



Data used for analysis...

- **Most all financial statements/tools can be used with either actual data (*ex-post* analysis) or projected data (*ex-ante* analysis).**
- **When data allow, analyses based upon actual data are often preferred to those based on projections.**
- **In many cases, actual data are insufficient to answer the specific question at hand, thus financial analyses based upon projected data may be more appropriate.**

4



Data used for analysis...

- Balance sheet
 - Income statement
 - Cash flow statement
- } Typically used with actual data
- Cash flow statement
 - Partial budgets
 - Enterprise budgets
 - Whole-farm budgets
- } Typically used with projected data

5



Balance sheet (net worth statement)

- Primary standard measure of the worth of a business *at a point in time* (e.g., Jan 1)
- An accounting and valuation of all that is owned and owed in business (i.e., assets, liabilities, and owner equity)
- Measures financial strength and risk-bearing ability of business (keystone statement in credit decisions)
- Useful for trend analysis (i.e., analyzing balance sheets over multiple years)

6



Balance sheet issues...

- Use of cost and market valuation
- Valuation of heifers being raised
- Valuation of inventories
- Valuation of depreciable assets
- Capital leases
- Deferred taxes

7



Example balance sheet

Table 1. Balance Sheet for Dairy Farms Enrolled in Kansas Farm Management Association

		<u>1/1/2003</u>	<u>12/31/2003</u>	<u>Change</u>	<u>Average</u>
ASSETS:					
Cash	(1)	28,200	26,499	-1,701	27,350
Marketable Securities	(2)	0	0	0	0
Accounts Receivable	(3)	3,937	3,453	-484	3,695
Fertilizer and Supplies	(4)	7,148	7,532	384	7,340
Investment in Growing Crops	(5)	0	0	0	0
Crops Held for Sale and Feed	(6)	70,120	80,503	10,383	75,312
Market Livestock	(7)	3,431	2,561	-870	2,996
TOTAL CURRENT ASSETS	(8)	112,836	120,548	7,712	116,692
(Add Lines 1 through 7)					
Breeding Livestock	(9)	199,025	198,577	-448	198,801
Machinery and Equipment	(10)	209,806	214,148	4,342	211,977
Buildings	(11)	80,288	75,674	-4,614	77,981
Investments in Cooperatives	(12)	51,468	50,523	-945	50,996
Land	(13)	495,925	514,094	18,169	505,010
TOTAL NONCURRENT ASSETS	(14)	1,036,512	1,053,016	16,504	1,044,764
(Add Lines 9 through 13)					
TOTAL ASSETS	(15)	1,149,348	1,173,564	24,216	1,161,456
(Add Lines 8 and 14)					

Asset section of two (Jan 1, 2003 and Jan 1, 2004) balance sheets

8



Example balance sheet

Table 1. Balance Sheet for Dairy Farms Enrolled in Kansas Farm Management Association

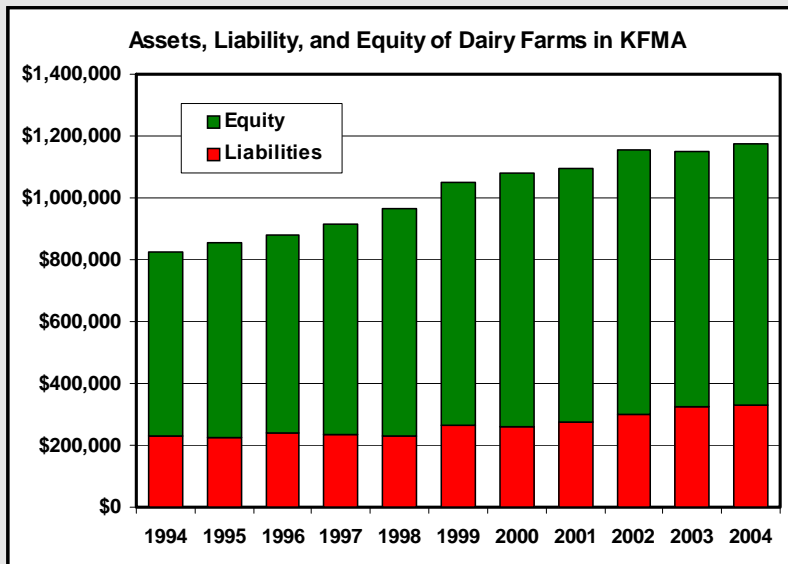
		1/1/2003	12/31/2003	Change	Average
LIABILITIES AND OWNER EQUITY:					
Accounts Payable	(16)	0	0	0	0
Taxes Payable	(17)	0	0	0	0
Accrued Expenses	(18)	2,725	2,451	-274	2,588
Current Portion: Deferred Taxes	(19)	0	0	0	0
Notes Due Within One Year	(20)	87,180	73,069	-14,111	80,125
Current Portion of Term Debt	(21)	0	0	0	0
Accrued Interest	(22)	0	0	0	0
TOTAL CURRENT LIABILITIES	(23)	89,905	75,520	-14,385	82,713
(Add Lines 16 through 22)					
Noncurrent Portion: Deferred Taxes	(24)	0	0	0	0
Noncurrent Portion: Notes Payable	(25)	234,218	253,034	18,816	243,626
Noncurrent Portion: Real Estate Debt	(26)	0	0	0	0
TOTAL NONCURRENT LIABILITIES	(27)	234,218	253,034	18,816	243,626
(Add Lines 24 through 26)					
TOTAL LIABILITIES	(28)	324,123	328,554	4,431	326,339
(Add Lines 23 and 27)					
OWNER EQUITY	(29)	825,225	845,010	19,785	835,118
(Subtract Line 28 from Line 15)					
TOTAL LIABILITIES AND OWNER EQUITY	(30)	1,149,348	1,173,564	24,216	1,161,456
(Add Lines 28 and 29)					

Liability and owner equity sections of two balance sheets

9



Example balance sheets



10



Analyzing balance sheets over time...

- Return on equity (ROE) – a measure of financial profitability
- Calculating one-year ROE from balance sheets

$$\text{ROE} = \frac{\text{ending NW} - \text{beginning NW}}{\text{beginning NW}}$$

$$11.2\% = \frac{2,475,000 - 2,225,000}{2,225,000}$$

11



Analyzing balance sheets over time...

- Return on equity (ROE) – a measure of financial profitability
- Calculating multiple-year ROE from balance sheets

$$\text{ROE} = \left(\frac{\text{NW}_{\text{end}}}{\text{NW}_{\text{beg}}} \right)^{\left(\frac{1}{\text{end-beg}} \right)} - 1$$

$$8.4\% = \left(\frac{2,475,000}{1,200,000} \right)^{\left(\frac{1}{2004-1995} \right)} - 1$$

12



Uses of the balance sheet...

- Acquiring debt
- Considering farm business risks
- Measuring financial progress
- Calculating profitability
- Changing ownership

 **Extremely important tool for business analysis, but cannot tell you why you were (or were not) successful.**

13



Income statement (P&L statement)

- **Key financial statement for measuring the success (net income or profit) of a business over a period of time (e.g., 2004, 1st qtr of 2005)**
- **Important to recognize the difference between cash- and accrual-based income statements**
 - Cash approach - net cash flow, taxable income. Easy, but does not show true net income.
 - Accrual approach - needed to properly analyze business performance.
- **Accrual net income reflects profitability of business, cash net income may or may not**

14




Income statement (P&L statement)

- **Accrual includes income *earned* and expenses *incurred*, whereas cash includes income *received* and expenses *paid*.**
- **Four major items on an accrual income statement**
 - Cash receipts
 - Changes in inventories
 - Cash expenses
 - Depreciation or adjustments for capital items

15



Uses of the income statement...

- **Analyze profitability of operation**
 - **Identify operation's strengths & weaknesses**
 - **Measuring financial progress (multiple years)**
-  **Critical for determining the profitability of your business, but often lack data necessary to isolate the profitability associated with a specific management practice (i.e., additional data often needed to account for "other" factors).**

16



Cash flow statement (source and uses)

- **Recording of the dollars coming in and going out of a business over a time period (e.g., 2004, 1st qtr 2005)**
 - Cash inflows – money coming into the business (e.g., sales, loans, gifts)
 - Cash outflows – money leaving the business (e.g., expenses, P&I payments, cash withdrawals)
- **Cash flow based on actual data is used to analyze the business. Cash flow based on projected data is for business planning (e.g., how and when borrowed money will be repaid).**

17



Uses of the cash flow statement...

- **Tracking receipts and expenditures**
- **Identifying the timing of cash flows**
- **Identify the ability to meet cash commitments**
- **Important communication tool with lenders**



Cash flow statements are useful for business analysis, but they are of limited value for making profit-based management decisions (probably the most misused financial statement).

18



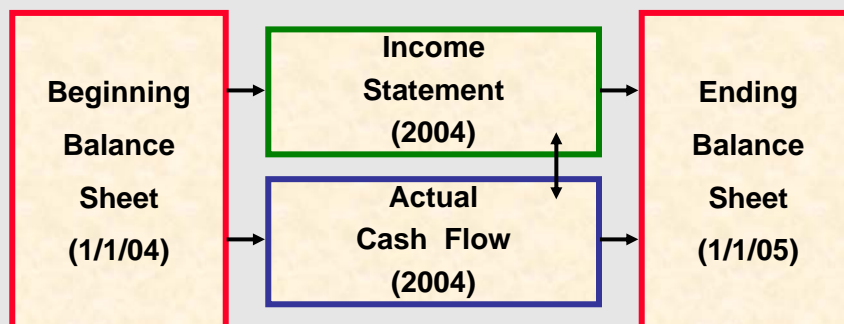
Income and cash flow statements...

- Examples are in proceedings
 - Farm cash flow = \$26,872
 - Accrual net farm income = \$58,021
- Accrual income statement and cash flow statement are **NOT** measuring the same thing.

19



Three basic financial statements...



The income and cash flow statements link beginning and ending balance sheets together.

20



Financial ratios

- Allow you to analyze and measure your progress toward five key business objectives:
 - Liquidity
 - Solvency
 - Profitability
 - Financial Efficiency
 - Repayment Capacity



Ratios are useful for benchmarking, but they have limited value for isolating the profitability associated with specific management practice (i.e., they are most useful for “big picture” analyses and to look at trends).

21



Partial budget

- Typically used to examine the expected economic returns associated with a particular management intervention.
- Only considers the income and expenses impacted by the intervention (generally, fairly straightforward, but depending on question at hand, can become quite complex).
- Requires assumptions – faith you put into your results depends on accuracy of the assumptions.

22



Partial budget...

Intervention Benefits

Increased revenue	(1)
+ Decreased costs	(2)
<hr/>	
= Total benefit	(B)

Intervention Costs

Decreased revenue	(3)
+ Increased costs	(4)
<hr/>	
= Total costs	(C)

Total benefit (B) - Total cost (C) = Profitability of Intervention

Not all four factors will always be relevant.

23



Example partial budget

Table 7. Partial Budget Analysis for Adding Fans and Sprinklers to a Dairy

Intervention Benefits:		
(1)	Increased Revenue	
	– Increased milk	10 lb/day x 85 days x \$12/cwt
		\$102.00 per cow
(2)	Decreased Costs	
	– None	
		\$ 0.00
	Total Benefits (B)	\$102.00
Intervention Costs:		
(3)	Decreased Revenue	
	– None	
		\$ 0.00
(4)	Increased Costs	
	– Fans/sprinklers ¹	\$85/cow x 0.2505
		\$ 21.29
	– Electricity	\$10.65/kW (demand) \$0.06/kWh (energy)
		\$ 8.98
	– Water	1,360 gallons x \$1.60/1000 gallons
		\$ 2.18
	– Feed	4 lb/day x 85 days x \$0.07/lb
		\$ 23.80
	Total Costs (C)	\$ 56.25 per cow
Profitability of Intervention		
	Benefits minus Costs	\$102.00 – \$56.25
		\$ 45.75 per cow
	Benefit-Cost (B/C) ratio	\$102.00 / \$56.25
		1.81

¹ The \$85/cow represents the amount required to purchase and install fans and sprinklers and the 0.2505 is an amortization factor to reflect the annual depreciation and interest cost (based on 5-year life and 8% interest).

24



Example partial budget

Table 7. Partial Budget Analysis for Adding Fans and Sprinklers to a Dairy

Profitability of Intervention		
Benefits minus Costs	\$102.00 – \$56.25	\$ 45.75 per cow
Benefit-Cost (B/C) ratio	\$102.00 / \$56.25	1.81
Breakeven Analysis:		
Breakeven milk price ²	\$56.25 / (10 lb x 85 days) x 100	\$ 6.62 per cwt
Sensitivity Analysis:		
B/C ratio @ \$9/cwt milk	\$76.50 / \$56.25	1.36
B/C ratio @ 8# milk response	\$81.60 / \$56.25	1.45
B/C ratio @ \$0.09/lb feed	\$102.00 / (21.29 + 8.98 + 2.18 + 30.60)	1.62
B/C ratio @ +20% utilities	\$102.00 / (21.29 + 10.78 + 2.62 + 23.80)	1.74

² This is the breakeven milk price to cover the costs associated with the cooling system (i.e., breakeven price on the incremental milk production). Thus, so long as milk prices are at this level or greater it is economically advantageous to install the cooling system even though the dairy may not be covering total costs.

B/C ratio reflects the dollars of returns per dollar of cost.

25



Uses of partial budget...

- Estimate the profitability associated with a particular production practice (confounding effects are kept out of the analysis).
- Easy to conduct sensitivity analyses around key factors.



Very useful for business analysis and often the tool of choice for making profit-based management decisions (they do not identify total profitability of operation which is both good and bad).

26



Enterprise budget (whole-farm budget)

- Used to examine the expected economic returns of the entire enterprise (operation).
- Considers all income and expenses and thus breakeven prices and overall profitability measures can be calculated.
- Requires assumptions – faith you put into your results depends on accuracy of the assumptions.

27



Example enterprise budgets...

Farm Management Guide MF-2442

Dairy Enterprise – 2,400 Lactating Cows (Freestall)

Department of Agricultural Economics



Kansas State University Agricultural Experiment Station and Cooperative Extension Service



Farm Management Guide MF-2540

Dairy Enterprise – 2,400 Lactating Cows (Drylot)

Department of Agricultural Economics



Kansas State University Agricultural Experiment Station and Cooperative Extension Service



Projected budgets developed at K-State.

28



**2,400 lactating
cow freestall
budget at two
production levels**

	COST-RETURN PROJECTION — 2,400 LACTATING COW FREESTALL DAIRY (REPLACEMENTS PURCHASED ¹)				Your Farm
	Production Level (lbs milk sold)				
	19,000	24,000	19,000	24,000	
	Per cow	Per cwt	Per cow	Per cwt	
RETURNS PER COW:					
1. Milk sales @\$13.23/cwt.....	\$ 2,513.38	\$ 13.23	\$ 3,174.80	\$ 13.23	
2. Volume premium.....	95.00	0.50	120.00	0.50	
3. Government Payment (MILC).....	10.86	0.06	10.86	0.05	
4. Calves sold: 95% × \$200/head.....	190.00	1.00	190.00	0.79	
5. Cull cows sold: 1,400 lbs × 28% × \$58.41/cwt.....	228.97	1.21	228.97	0.95	
A. GROSS RETURNS	\$ 3,038.21	\$ 15.99	\$ 3,724.63	\$ 15.52	
COSTS PER COW:					
6. Feed (from Table 3).....	\$ 1,056.01	\$ 5.56	\$ 1,307.58	\$ 5.45	
7. Labor.....	307.02	1.62	307.02	1.28	
8. Veterinary, drugs, and supplies.....	182.78	0.96	245.56	1.02	
9. Utilities and water.....	162.75	0.86	179.03	0.75	
10. Fuel, oil, and auto expense.....	54.68	0.29	54.68	0.23	
11. Milk hauling and promotion cost.....	152.00	0.80	192.00	0.80	
12. Building and equipment repairs.....	63.93	0.34	63.93	0.27	
13. Breeding/genetic charge:					
a. Capital replacement: 34% × \$1,600/head.....	544.00	2.86	544.00	2.27	
b. Semen, A.I. services, and supplies.....	40.00	0.21	45.00	0.19	
c. Interest.....	112.00	0.59	112.00	0.47	
d. Insurance.....	16.00	0.08	16.00	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.....	166.04	0.87	166.04	0.69	
17. Interest on land, buildings, and equipment.....	98.79	0.52	98.79	0.41	
18. Insurance & taxes on land, buildings, & equipment.....	41.53	0.22	41.53	0.17	
B. SUB TOTAL	\$ 3,039.52	\$ 16.00	\$ 3,420.14	\$ 14.25	
19. Interest on 1/2 operating costs @ 7%.....	67.38	0.35	79.30	0.33	
C. TOTAL COSTS PER COW	\$ 3,106.90	\$ 16.35	\$ 3,499.45	\$ 14.58	
D. RETURNS OVER TOTAL COST (A-C)	\$ -68.69	\$ -0.36	\$ 225.18	\$ 0.94	
E. BREAK-EVEN MILK PRICE, \$/cwt		\$ 13.59		\$ 12.29	
20. Lactating cow feed cost, \$/head/day.....	3.18		3.92		
21. Dry cow feed cost, \$/head/day.....	1.11		1.46		
F. ASSET TURNOVER (A ÷ Assets)²		73.09%		89.60%	
G. NET RETURN ON ASSETS [(D + 13c + 17 + 19) ÷ Assets] ²		5.04%		12.40%	

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




**2,400 lactating
cow drylot
budget at two
production levels**

	COST-RETURN PROJECTION — 2,400 LACTATING COW DRYLOT DAIRY (REPLACEMENTS PURCHASED ¹)				Your Farm
	Production Level (lbs milk sold)				
	18,000	22,000	18,000	22,000	
	Per cow	Per cwt	Per cow	Per cwt	
RETURNS PER COW:					
1. Milk sales @\$13.23/cwt.....	\$ 2,381.14	\$ 13.23	\$ 2,910.23	\$ 13.23	
2. Volume premium.....	90.00	0.50	110.00	0.50	
3. Government Payment (MILC).....	10.86	0.06	10.86	0.05	
4. Calves sold: 95% × \$200/head.....	190.00	1.06	190.00	0.86	
5. Cull cows sold: 1,400 lbs × 28% × \$58.41/cwt.....	228.97	1.27	228.97	1.04	
A. GROSS RETURNS	\$ 2,900.97	\$ 16.12	\$ 3,450.06	\$ 15.68	
COSTS PER COW:					
6. Feed (from Table 3).....	\$ 1,002.44	\$ 5.57	\$ 1,192.92	\$ 5.42	
7. Labor.....	243.06	1.35	243.06	1.10	
8. Veterinary, drugs, and supplies.....	182.78	1.02	245.56	1.12	
9. Utilities and water.....	217.50	1.21	233.78	1.06	
10. Fuel, oil, and auto expense.....	54.68	0.30	54.68	0.25	
11. Milk hauling and promotion cost.....	144.00	0.80	176.00	0.80	
12. Building and equipment repairs.....	44.47	0.25	44.47	0.20	
13. Breeding/genetic charge:					
a. Capital replacement: 34% × \$1,600/head.....	544.00	3.02	544.00	2.47	
b. Semen, A.I. services, and supplies.....	40.00	0.22	45.00	0.20	
c. Interest.....	112.00	0.62	112.00	0.51	
d. Insurance.....	16.00	0.09	16.00	0.07	
14. Professional fees (legal, accounting, etc.).....	22.00	0.12	22.00	0.10	
15. Miscellaneous.....	20.00	0.11	25.00	0.11	
16. Depreciation on buildings and equipment.....	120.01	0.67	120.01	0.55	
17. Interest on land, buildings, and equipment.....	69.06	0.38	69.06	0.31	
18. Insurance & taxes on land, buildings, & equipment.....	27.47	0.15	27.47	0.12	
B. SUB TOTAL	\$ 2,859.46	\$ 15.89	\$ 3,170.99	\$ 14.41	
19. Interest on 1/2 operating costs @ 7%.....	64.50	0.36	74.29	0.34	
C. TOTAL COSTS PER COW	\$ 2,923.96	\$ 16.24	\$ 3,245.28	\$ 14.75	
D. RETURNS OVER TOTAL COST (A-C)	\$ -23.00	\$ -0.13	\$ 204.78	\$ 0.93	
E. BREAK-EVEN MILK PRICE, \$/cwt		\$ 13.36		\$ 12.30	
20. Lactating cow feed cost, \$/head/day.....	2.96		3.53		
21. Dry cow feed cost, \$/head/day.....	1.43		1.64		
F. ASSET TURNOVER (A ÷ Assets)²		85.85%		102.10%	
G. NET RETURN ON ASSETS [(D + 13c + 17 + 19) ÷ Assets] ²		6.59%		13.62%	

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



Uses of enterprise budget...

- **Estimate the overall profitability associated with the operation (also conduct sensitivity analysis to examine relevant risks).**
 - **Tool of choice when many factors are impacted by a management intervention being considered (e.g., freestall vs. drylot).**
-  **Powerful tool for looking at profitability of alternative management practices assuming assumptions can be made accurately (downside is that impact of specific intervention is not as isolated as with a partial budget).**

31



Net present value (NPV)

- **Net present value is basically a more sophisticated partial or enterprise budget that explicitly accounts for the time value of money.**
- **Depending on the question being asked, the increased level of complexity of the analysis may not be necessary.**
- **NPV is most useful when future flows of income and expenses vary over time.**

32



Answering the questions at hand...

- The appropriate financial tools or methods of analysis to use will depend on the questions you are asking. For example,
 - What is my risk-bearing ability?
 - Was I profitable last year?
 - Should I invest \$X in a cooling system?

33



Summary

- It is important that producers understand the differences between the various financial statements/tools available when making business management decisions.
- As a general rule, analyses based on actual data are preferred to those relying upon projections (i.e., assumptions).
- Question(s) being asked, data availability, and analysis capabilities will often dictate the appropriate tool that should be used.

34



Summary

- **Key financial statements – balance sheet, income statement, and cash flow statement – are useful and critically important for measuring the success of your dairy.**
- **Key financial statements are also very useful for providing benchmarking information both directly and indirectly through financial ratios.**

35



Summary

- **When benchmarking individual measures, there may be confounding issues that need to be accounted for (if confounding effects exist, an analysis based on one factor is inappropriate).**
- **Because of confounding factors, using financial statements based on actual data to identify why a business is or is not successful can be difficult.**
- **A multi-variate analysis is required when using income statement data to analyze the profitability of specific management practices.**

36



Summary

- If data or method of analysis does not allow for confounding factors to be accounted for, then analyses based on projected data are likely superior to actual data.
- Partial/enterprise budgets require assumptions (i.e., projections), but they do account for confounding effects (consider the trade-off).



It is important to use the right tool for the question at hand (the wrong tool or method of analysis can lead to incorrect conclusions).

37

Kevin C. Dhuyvetter
785-532-3527
kcd@ksu.edu

Questions ?