



Calculating Financial Ratios for Cotton Farmers

Amanda Blocker, Gregg Ibendahl, and John Anderson

Introduction – Sixteen Farm Financial Ratios

An income statement and balance sheet only partially explain whether a farm is profitable and is in good financial standing. While these two financial statements are extremely important, they are only the starting point in analyzing a farm's financial position. Cotton farmers can benefit from the use of financial ratios. These ratios can help determine how efficient the operation is and can help detect problems early before they get out of hand. Financial ratios basically put the numbers from an income statement and balance sheet into the proper perspective for analysis. The use of financial ratios allows a farm to compare itself over time and also allows comparisons to other farms in the same year even if these farms are different sizes. The sixteen ratios cover the areas of liquidity, solvency, profitability, repayment capacity, and financial efficiency.

Liquidity

Liquidity is a measure of how quickly the assets can be converted into cash. Cash is the most liquid of assets but any asset that converts to cash within a year is liquid. A farm operates on cash and without it, it simply cannot function. Liquidity ratios help farmers determine if they will have enough cash to meet expenses for the next year. Liquidity is a measure of short-term viability.

There are many ratios that can be used to determine liquidity, but two are used most commonly and can be calculated quickly and easily. These are current ratio, and working capital. The current ratio measures how well current liabilities could be covered if all the current assets were liquidated. It is calculated by dividing total current assets by total current liabilities. Working capital is a dollar computation that shows how much capital would still be available if all current farm assets were liquidated and all current liabilities were paid off. Working capital

Table 1. Liquidity Ratios

Current Ratio = Current assets / Current liabilities
Working Capital = Current assets - Current liabilities

is calculated by subtracting total current liabilities from total current farm assets.

Solvency

Solvency is a measure of the value of assets owned by a farm when compared to the amount of liabilities. Solvency answers the question of who owns the farm. Does the cotton farmer own more than the lender or vice-versa. By measuring solvency, farmers can determine if they should still operate. Lenders are especially interested in these ratios as they do not want to increase their stake in the farm operation as time passes.

There are three ratios that are calculated to measure solvency. These are debt/asset ratio, equity/asset ratio, and debt/equity ratio. The names of these indicate the calculations to be made. Debt/asset ratio is a type of risk measure. It indicates how much of total assets are owed to creditors. Equity/asset ratio shows how much of the farm's assets are owned by the farmer. Given that Debt + Equity = Assets, the ratios of debt/asset and equity/asset are complements of each other. In other words, D/A + E/A must equal 1 (i.e., the lender's stake and the farmer's stake equals the total farm assets). Debt/equity ratio is a similar measure of financial risk. In fact, all three ratios are related. If one ratio is known, the other two can be calculated directly without knowing any other information.

Table 2. Solvency Ratios

Debt-to-Asset Ratio = Total liabilities / Total Assets
Equity-to-Asset Ratio = Total Equity / Total Assets
Debt-to-Equity Ratio = Total liabilities / Total Equity

Profitability

Profitability measures how effectively or efficiency resources in the farm are being used to generate a profit. All assets can be used to generate profit including debt capital. By calculating the profitability ratios, farmers can determine if assets are correctly placed and if debt is being properly utilized.

There are four profitability ratios: rate of return on farm assets, rate of return on farm equity, operating profit margin, and net farm income. Rate of return on assets (ROA) is a measure of how well the total assets are creating profit. ROA is calculated by adding net income from operations and interest expense, then subtracting the value of operator and unpaid labor. Interest expense is added back so that a farmer's financial structure does not influence the results. Next, divide that calculation by average total assets, which is simply adding the beginning of the year and the end of the year total assets, then dividing by two. Rate of return on equity (ROE) measures how well the farmer's equity is being used to generate a profit. ROE can be calculated by subtracting the value of operator and unpaid labor from net income from operations, then dividing that number by the average total equity, which is the beginning of the year equity and end of the year total equity divided by two. Operating profit margin shows how much of net sales is actually profit. Operating profit margin is calculated similarly to ROA. The only difference is the denominator where value of farm production is used. Finally, the farmer should evaluate net income as a measure of farm profitability. Because NFI is not a ratio, it does not account for farm size. Thus, it should be used carefully (i.e., do not use NFI to compare farms of different sizes). However, it is a good starting point for farm analysis.

Table 3. Profitability Ratios

Rate of Return on Assets (ROA)

$$= \frac{(\text{Net income from operation} + \text{Farm interest expense} - \text{Value of operator and unpaid labor})}{\text{Average total assets}}$$

Rate of Return on Equity (ROE)

$$= \frac{(\text{Net income from operation} - \text{Value of operator and unpaid labor})}{\text{Average total equity}}$$

Operating Profit Margin

$$= \frac{(\text{Net income from operation} + \text{Farm interest expense} - \text{Value of operator and unpaid labor})}{\text{Value of farm production}}$$

Net Farm Income (NFI)

Repayment Capacity

Repayment capacity is simply how well the farm can repay its debts. This measure determines if the farmer is able to pay off their term debt by using both farm and non-farm income after taking out living expenses, taxes, and social security taxes.

There are two basic ratios that can be used to measure this capacity. These are term debt and capital lease coverage ratio, and capital replacement and term debt repayment margin. Term debt and capital lease coverage ratio shows the farmer's ability to cover all term debt and lease payments. Term debt and capital lease coverage ratio is calculated by adding together net income from operations, total non-farm income, depreciation expense, interest on term debt and capital leases; then subtracting total income tax expense and family living withdrawal. Finally divide this number by the principal and interest payments on term debt and capital leases. This number should be greater than one. Capital replacement and term debt repayment shows the farmer's ability to pay the long term debts and replace the capital. Capital replacement and term debt repayment margin can be calculated by adding net income, and depreciation expense. Next, subtract total income tax expense, family living withdrawal, payment on prior unpaid operating debt, and principal payments on current portion of term debt and capital leases.

Table 4. Repayment Capacity

Term Debt and Capital Lease Coverage

$$= \frac{(\text{Net income from operations} + \text{Total non-farm income} + \text{Depreciation expense} + \text{Interest on term debt and capital leases} - \text{Total income tax expense} - \text{Family living withdrawal})}{(\text{Principal and Interest payments on term debt and capital leases})}$$

Capital Replacement and Term Debt Repayment Margin

$$= \frac{(\text{Net income from operations} + \text{Total non-farm income} + \text{Depreciation expense} + \text{Interest on term debt and capital leases} - \text{Total income tax expense} - \text{Family living withdrawal})}{\text{Capital Replacement and Term Debt Repayment Capacity} - \text{Principal payments on current portions of term debt} - \text{Principal payments on current portions of capital leases}}$$

$$= \text{Capital Replacement and Term Debt Repayment Margin}$$

Financial Efficiency

Financial Efficiency measures how well farms use their resources and provides more detail than ROA and ROE. Like those two ratios, the financial efficiency ratios can be used to compare different size and types of farms. The financial efficiency ratios concentrate on the different sections of the income statement.

Some of the ratios used to measure efficiency are asset turnover ratio, operating expenses ratio, depreciation expense ratio, interest expense ratio, and net income from operations ratio. Asset turnover ratio is an assessment of how well assets are being used to generate revenue. Asset turnover ratio is calculated by dividing value of farm production by the average total assets. The next four ratios are called operational ratios. Operating expense ratio is calculated by subtracting depreciation from operating expense then dividing this number by value of farm production. Depreciation expense ratio is the depreciation expense divided by value of farm production. Interest expense ratio is the interest expense divided by value of farm production. Net income from operations ratio is the net income from operations divided by value of farm production. The last four ratios should total to 100 percent.

Table 5. Financial Efficiency

Asset Turnover Ratio

$$= \text{Value of farm prod} / \text{Average total assets}$$

Operating Expense Ratio

$$= (\text{Operating expenses} - \text{Depreciation}) / \text{Value of farm production}$$

Depreciation Expense Ratio

$$= \text{Depreciation} / \text{Value of farm production}$$

Interest Expense Ratio

$$= \text{Depreciation} / \text{Value of farm production}$$

Net Income From Operations (NIFO) Ratio

$$= \text{NIFO} / \text{Value of farm production}$$

The sixteen farm financial ratios listed above are the ones recommended by the Farm Financial Standards Council. All of these ratios, once calculated, should be compared to farms of similar size and operation type. Also, a farm's own ratios should be compared over time. Many of these ratios fluctuate from year to year and between farms with several factors such as size, market price of product, type of business, and other variable characteristics of the farm being important factors. This makes it impossible to set a single standard for all farms (although 'ballpark' standards can be used). Therefore, the two types of comparisons is the best way to use the numbers.

By calculating and analyzing these ratios, the farmer can see areas that can be improved to enhance farm output and efficiency.

Table 6. Ratio Calculation Example

Liquidity

Current Ratio

$$\text{CR} = 217100 / 208044 = 1.04$$

Working Capital

$$\text{WC} = 217100 - 208044 = 9056$$

Solvency

Debt/asset ratio

$$\text{D/A} = 392504 / 1587800 = 0.25$$

Equity/Asset ratio

$$\text{E/A} = 1195296 / 1587800 = 0.75$$

Debt/Equity Ratio

$$\text{D/E} = 392504 / 1195296 = 0.33$$

Profitability

Rate of Return on Assets

$$\text{ROA} = (52430 + 29053 - 30000) / 1587800 = 3.24\%$$

Rate of Return on Equity

$$\text{ROE} = (52430 - 30000) / 1195296 = 1.88\%$$

Operating Profit Margin

$$\text{OPM} = (52430 + 29053 - 30000) / 498800 = 10.32\%$$

Net Income

$$\text{NI} = 55430$$

Repayment Capacity

Term Debt and Capital Lease Coverage Ratio

$$(52430 + 25000 + 100000 + 19175 - 9000 - 40000) / 50096 = 2.95$$

Capital Replacement and Term Debt Repayment Margin

$$(52430 + 25000 + 100000 + 19175 - 9000 - 40000) = 147605 - 30921 = 116684$$

Financial Efficiency

Asset Turnover Ratio

$$\text{AT} = 498800 / 1587800 = 31.41\%$$

Operating Expense Ratio

$$\text{OE} = (417317 - 100000) / 498800 = 63.62\%$$

Depreciation Expense Ratio

$$\text{DE} = 100000 / 498800 = 20.05\%$$

Interest Expense Ratio

$$\text{IE} = 29053 / 498800 = 5.82\%$$

Net Farm Income from Operations Ratio

$$\text{NFI ratio} = 52430 / 498800 = 10.51\%$$

NOTE: all numbers in calculations come directly from income statement or balance sheet EXCEPT for:

Family living =	\$40,000
Off-farm income =	\$25,000
Tax =	\$9,000
Value of operator labor =	\$30,000
Principal on term debt =	\$30,921
Interest on term debt =	\$19,175

Table 7. Accrual-Adjusted Income Statement**Revenue**

Market Livestock			
Cash Sales	\$0		
Inventory Change	\$0		
Accrued Market Livestock Revenue		\$0	
Crops			
Cash Sales	\$325,000		
Inventory Change	\$35,000		
Accrued Crop Revenue		\$360,000	
Government payments		\$125,000	
Accounts Receivable Change		-\$1,200	
Other farm income		\$20,000	
Gross Revenue			\$503,800

minus:

Market Livestock purchase		\$0	
Feed Purchase		\$0	
Crops bought for resale		\$5,000	
Value of Farm Production (VFP)			\$498,800

Expenses

Cash Operating Expenses	\$315,000		
Accrued Operating Expense Change	\$2,317		
Depreciation	\$100,000		
Total Operating Expenses			\$417,317
Interest	\$30,000		
Accrued Interest Change	-\$947		
Total Interest Expense			\$29,053

Net Income from Operations (NFIFO)

Gain/Loss on sale of capital assets	\$3,000		\$52,430
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Net Farm Income**\$55,430****Table 8. End of Year Balance Sheet**

Current Assets	Market Value	Current Liabilities	Market Value
Cash, Savings, & CD's	5,000	Accounts Payable	13,000
Investment in Growing Crops	41,000	Lease Payment	0
Accounts Receivable	800	Loans Due within 12 months	142,604
Market Livestock	0	Principal due within 12 months	30,921
Crops and Feed	85,000	Accrued interest	10,600
Prepaid Expenses	29,200	Accrued Tax liability	10,750
Supplies	56,100	Other	169
Total Current Assets	217,100	Total Current Liabilities	208,044
Non Current Assets		Non-Current Liabilities	
Breeding livestock	0	Real Estate Mortgage	117,208
Machinery and Equipment	600,000	Intermediate notes	64,103
Buildings and improvements	69,700	Life insurance policy loans	3,149
Land	700,000		
Other	1,000		
Total Non-Current Assets	1,370,700	Total non-current liabilities	184,460
		Total Liabilities	\$392,504
		Owner's Equity	\$1,195,296
Total Assets	\$1,587,800	Total Liabilities & Owners Equity	\$1,587,800