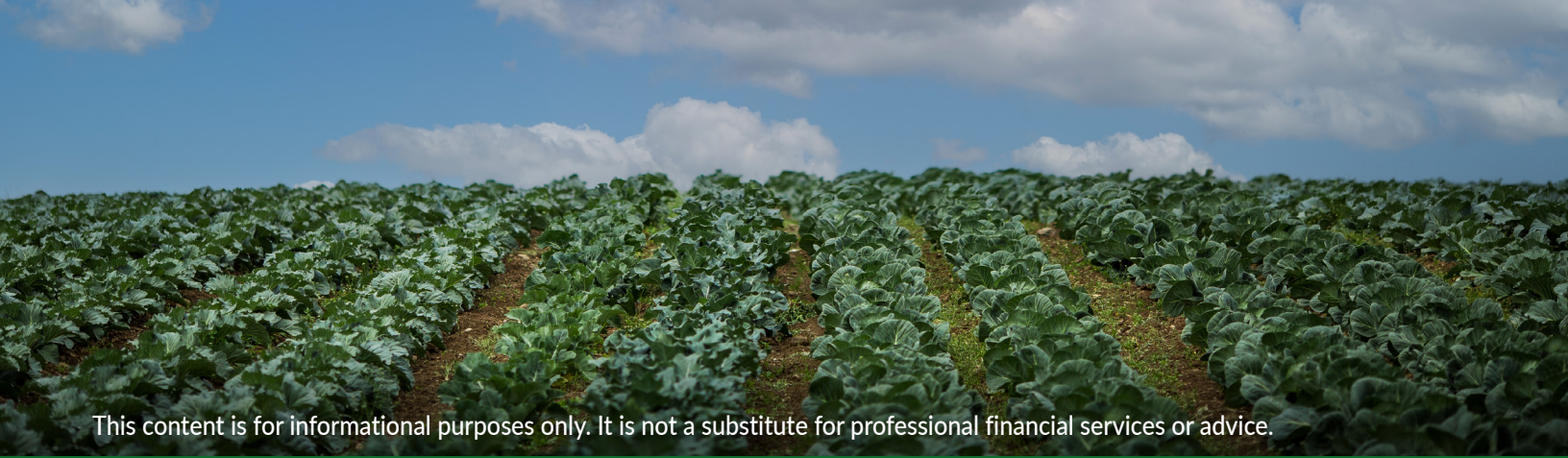


Farm Management Fact Sheet

Farm Efficiency Analysis



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Farm business performance is often measured by profitability, which is related to the value of farm product output less the cost of the inputs associated with producing it. Profitability is also related to how efficiently inputs are used to produce outputs. When used to analyze a farm business, efficiency helps to understand why a business is profitable or not.

Efficiency

Measures of technical or physical efficiency are easily calculated ratios of output per unit of input. Examples include pigs per sow, kit average, milk per cow, tonnes per acre, bales per acre, or units harvested per hour. At another level, measures of physical efficiency can become more complex depending on record keeping. More complicated and detailed measures of physical efficiency include calculations such as increased yield per unit of increased input. For example, a producer might want to know how many additional tonnes of hay per acre were harvested due to increasing the pounds of limestone applied per acre.

In this case, the result would be calculated as:

This year's forage yield – last year's forage yield
3.2 tonnes – 3.0 tonnes

This year's limestone rate – Last year's limestone rate
110 kg – 100 kg

$200\text{kg forage} \div 10\text{ kg limestone} = 20\text{ kg increase in yield per kg of increased limestone}$

The producer could then calculate the value of the increase and determine the cost and benefit of the decision.

Measures of **financial efficiency** can assess the farm's ability to use its financial resources. The Farm Financial Standards Council (FFSC) defines financial efficiency as the intensity with which a business uses its assets

“When used to analyze a farm business, efficiency helps to understand why a business is profitable or not.”



to generate gross revenues, and the effectiveness of production, purchasing, pricing, financing and marketing decisions in generating profit.¹

While there are others, the FFSC recommends the five measures of financial efficiency discussed below. Generally, the five financial efficiency ratios are calculated based on data taken from a farm's coordinated financial statements.

When analyzing a farm business, it is important to review the entire set of financial statements, including the notes. Ratios and efficiency measures illustrate the relationship between the various parts of a set of coordinated financial statements, and help the user to sift through large amounts of data and focus on areas that need attention. Financial ratios, including measures of both physical and financial efficiency, help to ask better questions, but they do not provide answers.



Efficiency and the Law of Diminishing Returns

Operating efficiently contributes to the profitability of the farm business or an enterprise within a farm business. It is important to **optimize** the use of available inputs, and not necessarily maximize them since maximal use of farm resources could negatively impact efficiency and ultimately profitability. The difference between optimizing and maximizing the use of farm inputs is based on the idea of diminishing returns.

The law of diminishing returns says that at a certain point for each additional unit of a particular input, the resulting additional output begins to decrease. Figure 1 illustrates this idea.

Using fertilizer application as an example, beginning at the bottom of the curve in Figure 1, each kilogram of fertilizer per acre increases the resulting yield per acre. At the first "x" on the curve, each additional kilogram of fertilizer still gives an increase in yield, but the increase isn't as great. At some point, the second "x" on the curve, each additional unit of fertilizer actually begins to reduce the yield.

You can look at the same curve in dollars and cents. For each dollar of fertilizer cost incurred, a resulting increase in revenue occurs. At the first "x" revenue is still generated for each additional dollar spent on fertilizer, just not as much. At the second "x" the increase in fertilizer cost actually exceeds the additional revenue resulting from its use. The maximum return occurs on the steepest portion of the curve.

Optimal use of fertilizer, or the most efficient use of fertilizer, is at some point along the curve between the point of diminishing returns and the point of negative returns.

The difference between optimal

and maximal use of resources is an important concept to keep in mind when assessing the efficiency of a farm business.

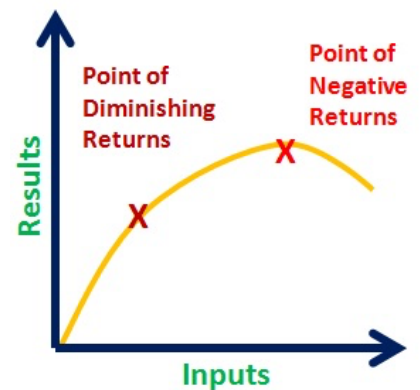


Figure 1. The Law of Diminishing Returns

¹ Farm Financial Standards Council. Financial Guidelines for Agricultural Producers. 2022. III-3.



Measures of Financial Efficiency

On the farm, efficiency is determined to large extent by the technical and managerial ability of its operators. Efficiency on larger farms is related to the performance of the owner as well as employees. Going back to Figure 1, efficiency on the farm is related to how well the owner or managers manage the curve and where each decision they make lands on that curve.

Profitability and efficiency go hand in hand. Farms that are not efficient – that is, they do not use the farm resources well, including labour, capital and equity – are generally less profitable. Furthermore, inefficient use of certain resources – in particular, credit and equity – can limit the growth of the business.

Table 2 contains sample financial data and **Table 3** describes five measures of financial efficiency recommended by the FFSC using the sample data to calculate these indicators.

Table 2. Sample financial data.

Networth Statement Data

	Beginning	Ending
Total Farm Business Assets	352,958	429,965
Equity	73,944	88,529

Income Statement Data

Gross Revenue	233,766
Operating Expenses	185,334
Depreciation	38,221
Interest Expense	9,853
Net Farm Income From Operations	358

Ratios should not be used in isolation since they mean very little as a number on their own. Compare ratios to industry-derived benchmarks or to trends within the

business itself. When calculating financial ratios of any sort, including measures of financial efficiency, be sure to use comparable values. For example, when comparing ratios calculated from total farm assets, be certain that either the market value or cost less depreciation methods of valuation have been used to calculate both ratios.

Each of these five measures of financial efficiency in Table 3 is calculated using Gross Revenue. Here, Gross Revenue is the total of all revenues received for goods produced for sale or services rendered in a specific period of time from normal, ongoing farm business activities. Gross Revenue does not include Other Revenue, or revenue that results from off farm sources or government grants.

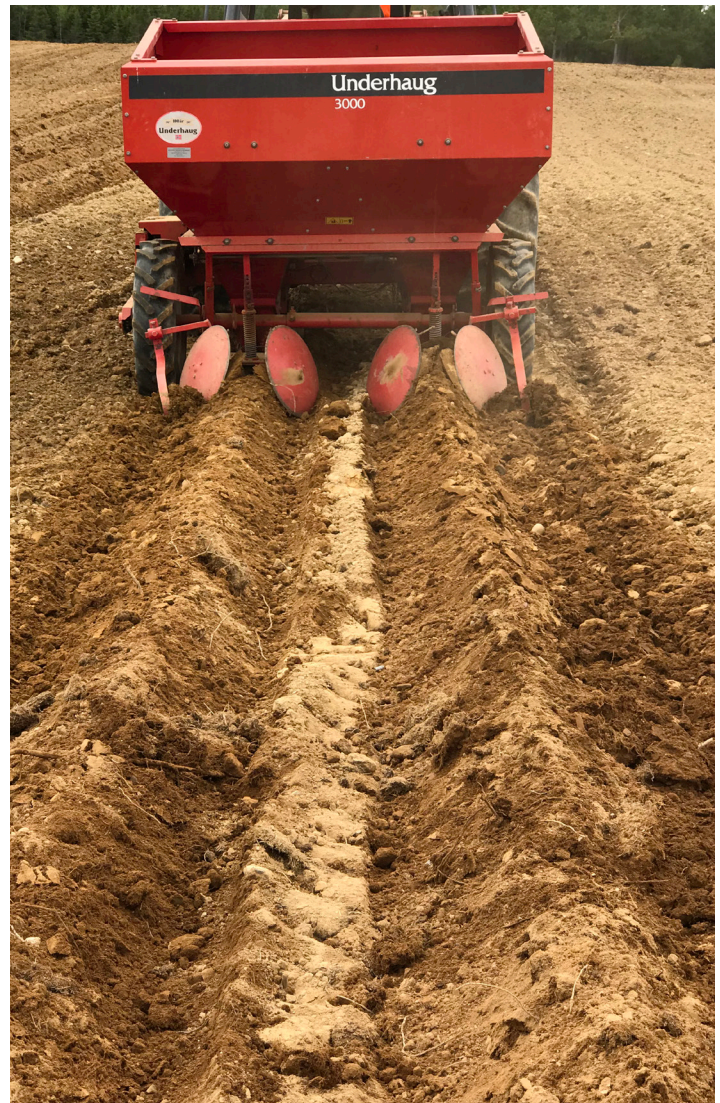




Table 3. Measures of Financial Efficiency

Ratio	Sample Calculation	Interpretation & Comments
Asset Turnover Ratio		<ul style="list-style-type: none"> Measures how efficiently the assets are being used to generate revenue The higher the ratio, the more efficiently the business is using its assets to generate revenue
$\frac{\text{Gross Revenue}}{\text{Average Total Farm Assets}}$	$\frac{233,766}{(352,958 + 429,965)/2} = 59\%$	
Operating Expense Ratio		<ul style="list-style-type: none"> Measures how efficiently a business controls operating expenses While variable by commodity, the normal range is between 50% and 80%
$\frac{\text{Operating Expenses} - \text{Depreciation}}{\text{Gross Revenue}}$	$\frac{185,334 - 38,221}{233,766} = 62\%$	
Depreciation Expense Ratio		<ul style="list-style-type: none"> Measures depreciation relative to sales 10% to 15% is normal; however an upward trend indicates capital asset replacement while a downward trend may indicate a low rate of asset replacement
$\frac{\text{Depreciation}}{\text{Gross Revenue}}$	$\frac{38,221}{233,766} = 16\%$	
Interest Expense Ratio		<ul style="list-style-type: none"> Measures interest costs relative to sales Ranges from 0% to 25%. A high ratio indicates a highly leveraged business that may have trouble generating a profit.
$\frac{\text{Total Farm Interest Expense}}{\text{Gross Revenue}}$	$\frac{9,853}{233,766} = 4.2\%$	
Net Farm Income From Operations Ratio		<ul style="list-style-type: none"> Measures income relative to sales The higher the ratio the better!
$\frac{\text{Net Farm Income from Operations}}{\text{Gross Revenue}}$	$\frac{10,358}{233,766} = 4.4\%$	



Understanding and Interpreting Measures of Financial Efficiency

Asset Turnover Ratio measures how efficiently farm business assets are used to generate farm revenue. This ratio is affected by changes in revenues, or the average value of assets, and is largely influenced by owners' and managers' decisions. Generally, as the ratio increases, the farm business is using relatively fewer assets to produce more revenue. The average value of total assets could be remaining the same year-to-year, while the business is generating more gross revenue; conversely, the same level of revenue could be generated with fewer assets. For example, the market price of the product may have increased, increasing revenues and the asset turnover ratio.



A low asset turnover ratio results when significant investment in assets is required to generate relatively low revenues. This may occur early in a new farm business as production and sales “ramp up.” It could also be the result of “over capitalization,” i.e. when the size and/or quantity of equipment are too large compared to the size of the farm operation. A low asset turnover ratio over a long period could result in a gradual erosion of owners' equity and could be indicative of cash flow problems and poor profitability.



A high ratio is not necessarily good either, and could indicate that the farm is lagging behind in keeping assets up to date due to insufficient cash flow required to re-invest in buildings and equipment. On the other hand, a business late in its life cycle may have a very high ratio, as the owners and managers have decided to reduce investments in equipment as the business winds down.

Like all other ratios, care should be taken in evaluating the asset turnover ratio in isolation. For example, a low asset turnover ratio could be the result of the producer over-estimating the market value of the farm assets. Care should also be taken to ensure the average value of assets is determined consistently using either a market or cost-less depreciation method of valuation, which will result in a high asset turnover ratio.

Operating Expense Ratio considers the operating expenses incurred to produce products for sale but does not include depreciation and interest expenses. The normal range for this efficiency measure is between 50-80 per cent but values vary by commodity. A lower ratio indicates a lower cost per dollar of revenue generated. Farms and agribusinesses with a lower operating expense ratio are more efficient at controlling costs.

The operating expense ratio is susceptible to fluctuations in input costs and market prices for goods produced. A high ratio could result in years when market prices drop,



or if weather or other factors outside the manager's control affect yields or crop values. Therefore, it is important to look at the trend over a longer period. Wide year-to-year fluctuations in the operating expense ratio need to be investigated. A downward trend is generally considered good, while an upward trend also needs investigating.



Depreciation Expense Ratio is relatively easy to calculate when a value for depreciation is included on the income statement. A high ratio indicates a high rate of asset replacement, either as new additional assets or to replace aging assets that have surpassed their normal useful life. An upward trend indicates asset replacement; a downward trend could indicate that assets are not being replaced and, like the asset turnover ratio, could be indicative of other problems.

The depreciation ratio is affected by the method of depreciation used. If assets depreciated at a faster rate, the depreciation expense ratio will increase.

Interest Expense Ratio is also easy to calculate from the balance sheet. A higher interest expense ratio indicates the farm business has a high level of debt financing. As the interest expense ratio increases, profits are squeezed by the cost of borrowing. For example, an interest

expense ratio of 18 per cent means that for every dollar of revenue generated, 18 cents goes to pay interest.

The interest expense ratio should also be considered carefully. A high interest expense ratio is to be expected for a new farm business, and business with a steady predictable revenue flow can better tolerate a higher ratio. A low ratio may indicate that the farm business is not using its equity efficiently and is missing opportunities to grow or modernize in order to capture technological efficiencies or potential efficiencies related to the size and scale of operations.

Net Farm Income from Operations Ratio refers to what is left once operating expenses, depreciation and interest expenses are accounted. This ratio is related to each of the preceding measures of financial efficiency. The net farm income from operations ratio indicates how much income results from farm sales. This ratio varies widely, but generally the higher the ratio, the better.

A Word about Size and Scale

While larger operations may be able to capture certain efficiencies associated with purchasing larger volume or marketing large quantities of product, smaller farms can also operate quite efficiently. Small farms typically allow for more careful attention or more intensive management. They also generally require fewer or smaller assets. What is important is the balance between size





and scale. A small farm run on a large scale may be less efficient. For example, a 100-horsepower tractor may not be the most efficient use of capital when operating a 25-acre farm, depending on the commodity produced and the equipment needed. Conversely, a large farm operated on a small scale will not be efficient. For example, using a one-row potato digger to harvest 60 acres of potatoes is an inefficient use of time, labour and resources.

The bottom line about size and scale is that large farms can be profitable, but small ones can be too. It is important that the size and scale of the operation is well matched with the ability of the managers to manage it.



Summary

Measures of efficiency discussed here are indicators of either the present financial position of the farm, or its financial performance over time. These indicators help to analyze the financial results of the farm business' operating activities, and help sift through a large amount of financial data and focus attention to certain areas. They are not a substitute for careful review of financial records, including notes and other supporting documentation. They can be helpful to evaluate decisions already made, to consider the impact of some activity before it is implemented, and to monitor business performance.

Implementing changes to general farm management practices to improve efficiencies should occur with the goal of improving the overall profitability of the business or enterprise. Efficiency measures will help indicate how successful these changes have been at achieving the business' financial goals.

The Agriculture and Lands Branch of the Department of Fisheries, Forestry and Agriculture offers resources to assist with farm management, including short courses, consultations, publications, and financial assistance for eligible applicants.

For more information, please contact the Agriculture Business Development Division Farm Management Specialist in your area.

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