Determinants of Farm Size and Structure

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FIRM LEVEL AGRICULTURAL DATA COLLECTED AND MANAGED AT THE STATE LEVEL

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Data from individual farm financial records is available in at least two dozen states. These farm record programs are sponsored by three types of groups: (1) farm management associations, (2) departments of agricultural economics and Cooperative Extension and (3) vocational-technical school programs. In several states there is cooperation between the farm management associations and agricultural economists in the collection and analysis of data from individual farm records. Much of this effort is primarily related to extension farm management programs but in some cases the data is the basis for research studies. This paper is primarily concerned with (1) the use of this firm level data as a basis for studying issues such as farm size and structure and (2) whether the data could be made consistent to facilitate comparisons of net returns across states.

The history of farm record data collection as part of an extension-type effort varies greatly among states. Some states appear never to have been involved in such activity while others have been continuously involved for several decades. A few states (universities) have started new data collection efforts in recent years but perhaps more significantly several (Purdue, Ohio State, Wisconsin) largely discontinued such efforts after 1983. However, Purdue restarted their efforts in 1987. Some of the farm record efforts have been in close cooperation with independent and largely farmer-financed farm management associations. The largest of these efforts is in Illinois. A combination of farm management fieldmen and college staff summarized and analyzed 7,375 records for 1988. It is probably fair to state that the farm records and analysis programs in most states are a blend of education and service to the farmers involved and a source of information to be used in extension programs with other farmers and in teaching programs at various universities and colleges. While the data have been used for research, probably in no state was that the original purpose for collecting the data.

Use of this farm record data for research purposes lies on a somewhat shaky foundation: in no state are the records collected on a random sample basis. Rather, data is collected from farmers who voluntarily agree to participate in these educational-service programs. Nevertheless, researchers have used the data for a variety of studies, many of which relate to the relationship between various management factors or variables such as farm size and measures of net returns from operating the business. A purist could argue that the non-random sample negates or at least seriously impairs the validity of the results.

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However, many researchers argue or apparently believe that, even though the records, on the average, come from farms that are above average in size and are operated by above average managers, the results are useful and that the conclusions probably wouldn't be much different if the record data came from a random sample of farms of the same farm type.

With the exception of a few states such as Illinois and Kansas, the number of farm records available in any one year may be small enough that valid analysis is limited, particularly if the researcher wants to study farms of a particular type on similar soil resources. In addition, because farmers do not necessarily participate on a continuous basis, numbers become even more limited if the desire is to study the same farms over a period of years. The numbers situation leads to the question of combining farms from several states to study issues such as costs or net returns by farm size. An immediate problem of such a data combination is that each state (really the data collectors therein) has its own idea of how the data should be collected and analyzed. For example, the measures of net returns and the way they are calculated are extremely variable among states. Whether such differences could be resolved, so that every state uses the same procedures in the future is questionable.

The inconsistencies among states appear in several items such as methods of: (1) asset valuation, (2) handling appreciation of assets, (3) handling inventory changes, (4) calculating depreciation, (5) handling charges in accounts receivable and payable, (6) calculating "value of farm production," (7) calculating interest on assets and production expenses, and (8) calculating the value of operator's labor and management and non-operator family labor. In addition, some states publish data for the total farm business, including the landlord's share while others publish only the data for the operator's share. Most of these inconsistencies are the apparent result of the notions of economists in the various states about these issues. It is clear that we have agreed upon neither what to measure nor how to measure it. Methods of charging depreciation, interest and operator and family labor and methods of asset valuation for several states are shown in Table 1.

The matter of publishing the data for the total business, including the operator and landlord shares vs. publishing only the operator share appears to be a particular problem and is related partly to the prevalence of tenant operators in some states. Illinois has chosen to publish in the annual Summary of Illinois Farm Business Records the combined operator-landlord shares, although this is not clearly pointed out in the bulletin. The operator's share is published for only one item which is net farm income. Operator and landlord shares are published in a separate publication (Scott) which is much less widely distributed. Minnesota (Olson) and Indiana publish only the operator's share. Missouri has chosen to publish in a two column format, the numbers for the operator and for the total business, with the difference being the landlord's share (Hein). This writer suggests that when a "management return" or "labor and management return" is being computed, the computation should be for the person who is managing the business and that in most cases it is the operator. However, in some share rental situations it is possible that the landlord or his representative exerts substantial (or even total) managerial control over the business.

The Missouri procedure appears to solve the reporting problem by publishing both the operator share and total business - - the choice of which is the important data is left to the reader.

One problem in studying the data published by the various states is that the publications frequently do not fully describe the procedures used to compute the various measures of net returns. For example, it is not always clear whether assets are valued based on market value, book value (cost less depreciation) or something else. Some of the implications of asset valuation relative to computing net returns are discussed in the next section.

Asset Valuation

The market values of farm assets frequently are quite different from the book values. For example, the market value of land is likely to be substantially greater than the book value (cost) if the land was purchased 20 or more years ago but less than book value if it was purchased in the late 1970's. Market values of machinery are likely to be higher than book values if rapid depreciation has been used for income tax purposes and inflation tends to make the divergence greater. Farmers who report on the cash basis for tax purposes have no basis or book value in raised livestock. Most farm record systems value raised animals at market or perhaps at some kind of modified market value in the case of breeding stock. This is done even in systems that use book value for assets such as land, buildings and machinery.

Asset valuation procedures affect the charge for equity capital and for total capital in systems that do not include interest paid in expenses. Asset valuation also affects the calculation of return on equity and return on total assets.

Those who argue for using market values as the basis for the calculation of interest charges and return on investment believe that the opportunity cost of equity capital should be based on the amount of money that is invested in the farm business that could earn a return if invested elsewhere.1/

Appreciation of Assets

In recent years, many analysts have argued that appreciation of assets should not be included in calculating net returns from the year's operation of a farm business. For

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1/The amount that would be available for alternative investments should be adjusted for the tax that would be paid on the sale of farm assets, but seldom is.

example, if the value of the land increases $20,000 during the year, this $20,000 should be considered ownership income rather than operating income. Similarly, if the value of a herd of breeding stock increases $5,000 during the year due to a change in the general level of cattle prices, this $5,000 should not be included in annual operating income. The same concept can be applied to depreciable assets such as machinery and buildings, but the mechanics are more difficult. For example, the depreciation on a tractor that is charged to the income statement should reflect using up a year in the life of that tractor. Take a simple example in which a machine has an initial cost of $12,000 and is expected to provide services for 12 years. With straight line and no salvage value, each year's depreciation would be $1,000. After six years, the adjusted basis or book value would be $6,000. However, during a period where machinery prices were rising at 5 percent per year, a new machine at the end of year six would cost $16,081 and the value of the used machine would likely be greater than if there were no inflation. Rather than reducing the depreciation to reflect the effects of inflation, "real" depreciation should be charged to the income statement and appreciation should be credited to the ownership account. The difficult part is to know how to calculate "real" depreciation. In practice, those who calculate appreciation on machinery use income tax depreciation as a proxy for real depreciation. A comparison of income tax adjusted basis with market value at both the beginning and the end of the year allows appreciation to be calculated. With rapid depreciation for income tax purposes, it is likely that both depreciation and appreciation are overstated.

Using market values for all assets and including the change in inventory values in the calculation of measures of net return has the potential of distorting such measures because of fluctuations in asset values. The Coordinated Financial Statements procedure of Frey and Klinefelter seeks to separate the income from operating the farm from the gains (or losses) from owning the assets by using a two-column valuation procedure on the balance sheet. One column is market value and the other is a cost (or modified cost) based valuation. This procedure as currently used does not actually use the cost-based values for all assets. For example, raised breeding stock and a number of other assets are valued at market rather than at cost. In addition, use of adjusted basis from income tax records for valuation of depreciable assets and the accompanying depreciation as a charge on the income statement may overstate the depreciation charge in the early years of asset life if rapid depreciation is being used for tax purposes.

Of the farm record systems reviewed, only one (New York) explicitly calculates and publishes appreciation. It is likely that many of the other systems keep appreciation on land out of the net return calculations by not including the change in land values in changes in inventories. If market values are used for some of the net return calculations, the changes in market values are done "between years."

In the systems where machinery depreciation is calculated from the changes in market values of the machinery, any inflation in used machinery prices, which some people consider to be appreciation, results in the depreciation charge being lower than it otherwise would be.

Depreciation

The method used to calculate depreciation can affect the net income and other measures of profitability. The two common methods of depreciation used in farm record systems are (1) income tax and (2) net figure derived from (beginning inventory + purchases) - (ending inventory + sales) with inventories being at market value. A variation on the second method is to use a standard percentage, such as 10 percent, of beginning + new. One might think that distortion of income caused by the use of income tax rapid depreciation would be only temporary and minor -- depreciation can be taken only once. For example, five year rapid depreciation under the accelerated cost recovery system (ACRS) would lead to a high depreciation charge in the early 1980's, but this would be offset by no depreciation on these items once the five year period is over. However, particularly in an inflationary period it is likely that use of income tax depreciation, whether rapid or straight line, will result in a higher depreciation charge than using a market value approach.

An example which illustrates the depreciation charges calculated by different methods is shown below, using the 1988 Cornell dairy farm business summary data:

A. Average machinery depreciation from income tax = $14,402
   Appreciation on machinery = $2,391
B. Decline in market value
   Example:

Beginning	$106,405	End	$111,210
+ New	17,303	+ Sales	487
	$123,708		$111,697

   Depreciation = $123,708 - 111,697 = $12,011
   Note that appreciation equals the difference between depreciation calculated by methods A and B.
C. Standard percentage of market value, beginning plus new
   Example:
   123,708 x 10% = 12,371

Accounts Receivable and Payable

Most farmers report on the cash rather than accrual basis for income tax purposes. A true financial picture of a business requires accrual accounting. All of the farm record systems reviewed included changes in inventories in calculations of net returns. Some of the systems specifically list the changes in accounts receivable and payable and changes in prepaid expenses. It is not clear whether the remaining systems make these adjustments. To the extent that changes in these items are significant, net returns are distorted if such changes are not accounted for.

Value of Farm Production

The purpose of calculating value of farm production is unclear to this author. This measure is not calculated in the farm record systems of several of the states. For the systems where it is calculated, in general, value of farm production is total receipts minus purchased livestock and purchased feed.

Value of farm production apparently is intended to be some sort of "value added" concept. Its origin may go back to a time when purchased inputs such as fertilizer, pesticides and fuel were minimal and purchased livestock and feed were the major inputs acquired from off the farm. As currently calculated value of farm production has little relevance as a value-added concept.

Interest

A few systems do not include interest paid as an expense, but charge interest at standard rates for all farms. One argument for using this procedure is that it allows comparisons among farms independent of debt levels. While debt level is subject to a measure of managerial control, debt level is at least partly a function of items such as a farm operator's stage in the life cycle of the business and how much was inherited from others.

Those who argue that interest paid should be a farm expense believe that a true measure of net income from operating the business can be obtained only by including interest paid in farm expenses. That belief is hard to argue against.

This writer would like to see both calculations, that is, a net income calculated by including interest paid and another measure calculated by using a standard interest charge on all the capital used by each farm business. The latter calculation would facilitate comparisons of managerial results that are not based on debt level, something that is partly a function of things over which the operator has no control.

Some states use interest actually paid and interest on equity at a standard rate for some of the profitability calculations while others use a standard charge on all capital, regardless of whether it is equity or debt.

The example below illustrates the varying interest charges that result, depending (A) on the level of debt and equity and (B) on using a standard charge on all capital.

A. Debt and equity
   Example: $500,000 assets
   "Net" before interest = $60,000

	100% equity		100% debt
	$60,000		$60,000
Interest on $500,000: 5% real =	25,000	@ 10% paid =	50,000
Net farm income	$35,000		$10,000

B. Standard interest charge on all capital rather than interest paid plus interest on equity.
Example: $500,000 @ 8% = $40,000

In (A) for a farmer with 100 percent equity, the interest charge is $25,000 but $50,000 if the farmer has all debt. In (B), with a standard charge of 8 percent, the interest is $40,000.

Interest on Equity

There appears to be agreement that an opportunity cost charge should be made for the use of equity capital in the business. The disagreement is over the level of the charge. In the business summaries reviewed, charges ranged from around 5 percent to 12 percent. A variety of arguments, stated or implied, are used to support the level of interest rate used. Some are intended to be "real" rates while others clearly are intended to be nominal rates. For example, the Cornell system uses a 5 percent real rate on equity capital. This rate is intended to represent the long-term average rate of return, after removing the effect of inflation, that could be earned in non-farm investments of comparable risk. It is argued that in addition to this real rate, the farm operator benefits from appreciation of assets in a way similar to benefits from investing in the stock market. To charge a nominal rate based on current market interest rates would, in a sense, be double counting.

In reality, interest on equity could be charged at either real or nominal rates and the charge could be based on either market value or book value of assets. The varying combinations that could be used would lead to large variations in the charge for equity capital. There does not seem to be a compelling theoretical argument saying that any one procedure is the correct one. However, this author believes that market values of assets should be used as the basis for calculating equity and charging interest on equity, assuming that one believes in opportunity costs. He also believes that equity capital should be charged at a real rate rather than at a nominal rate.

Value of Operator Labor and Management and Family Labor

A variety of methods are used by the various systems to value operator labor and management. Several states use a standard hourly rate on all farms, sometimes explicitly based on something like the going rate for hired labor. The hours to which the rate is applied must be an estimate because few farmers keep records of hours actually worked.

Some states use a standard charge per month, such as $1,000 or $1,200 2/ as the management charge. New York does not use any of these standard charge procedures for valuing operator labor and management. Instead, each operator is asked to estimate the combined value of his/her labor and management. If there is more than one operator, a value is obtained for each.

The value of operator labor and management is used to help calculate measures of net return such as return on investment or return on equity. A higher charge for labor and management results in a lower total return to assets or equity and therefore a lower rate of return. One advantage of using a standard charge procedure is that every farm is treated the same way albeit an arbitrary way. In the Cornell procedure, each operator could influence the rate of return by the value he assigns to his labor and management.

The Importance of Imputed Costs

It is important to point out the methods used to calculate imputed costs (depreciation, interest on equity or total assets and value of operator labor and management) have a large impact on measures of profitability because these items make up a large proportion of total costs. For example, in the case of 1987 Illinois northern and central grain farms, in computing management returns ($12,326 on average) the imputed charges for interest on non-land capital ($16,284), land charge-net rent ($56,818) and operator labor (approximately $15,354) total $88,456 or 85 percent as much as all other costs including depreciation. If depreciation, which is also an imputed or at least allocated cost, is included with imputed costs, the total of the imputed costs are 1.28 times all other costs, not including depreciation. Thus, in the computation of management returns in this example the imputed costs are nearly as important, or if depreciation is included, more important than the costs that can be accurately measured. If interest on land (land charge-net rent) was charged at 4 percent rather than 5 percent, the average management return would be $23,684 rather than $12,326. If the interest charge was 6 percent rather than 5 percent the average management return would be $968.

The intent here is not to say that Illinois is doing something wrong -- it is only to illustrate the importance of the imputed costs in some of the profitability calculations. Similar examples could be drawn from the calculations made in other states. (What is the appropriate interest charge on land? Clearly the interest rate on mortgage loans in most cases is above 5 percent.)

2/In several systems all farms have one operator, according to the published data. Some of these farms must have more than one operator. Apparently, any operators in excess of one are counted as hired labor and such labor valued with a procedure not explained in the publication.

Perhaps there is one consolation if such data are being used to study farm size issues: if the procedures are used consistently on all farms being studied, the level of imputed charges may not affect the relationships between farm size and profitability.

Contrast of the Methods of Several States

Data from the 1988 New York dairy farm business summary (DFBS) are used in tables 2 through 12 to illustrate the differing procedures and results obtained by using the procedures of several states. One difficulty in making the calculations was to know whether to include or exclude appreciation. Therefore, it was included or excluded in a somewhat arbitrary way, depending on this author's interpretation of how it was handled in the various state reports.

Not every state in the United States with a farm record program is included in the tables. Most of the North Central states with a farm record program are included, along with New York, which has attempted to identify appreciation, and Pennsylvania which has a substantial number of records. Agrifax, a commercial service sponsored by the Farm Credit System, is also included. The Agrifax system presented is the one used in the Springfield district and may or may not be the same as the systems used in other districts. Numbers of farms in the systems represented in Tables 2 through 12 are: New York, 406; Illinois, 7,375; Iowa, not reported; Michigan, 449; Missouri, 313; N. Dakota, 343; S. Dakota, 183; Oklahoma, 161; Kansas, 2,030; Nebraska, 99; Pennsylvania, 888; and Minnesota, 265.

The differences among the systems are numerous and it is probably not worthwhile to attempt to discuss all of them. Instead, comments will be made about the differences between the Cornell and Illinois systems.

While there are several differences in the two systems, only a few will be discussed here. In calculating Net Farm Income, Cornell includes interest paid as an expense but Illinois does not. In calculating Labor and Management Income, Cornell uses interest paid and 5 percent <u>real</u> interest on equity while Illinois uses 5 percent on land and 10 percent on all other capital. Cornell separates appreciation on land, machinery and livestock in making the profitability calculations. Net farm income and return on capital are calculated with and without appreciation. It is likely that appreciation is not included in the Illinois calculations, but neither is it shown separately.

Availability of Data

The data for the state-supervised farm record systems are collected on a confidential basis. Therefore, data must be handled in a way to maintain confidentiality. In many states, the data are available for use by researchers at the university but usually under rather strict procedural guidelines. Researchers from other states would be able to gain access to the

data for research purposes only by making individual arrangements with the person in charge of the data gathering project. In some cases, access to the data is limited by the nature of the arrangements between the university and the farm business management associations.

Tentative Conclusions

Anyone who would like to combine data from two or more states to study issues such as farm size and structure is faced with a rather formidable task. In addition to obtaining permission to use the data, a researcher would be faced with the task of reformulating data to make it consistent in terms of charges for items such as depreciation, interest, operator labor and family labor. Some of this may be difficult or impossible because the necessary data may not exist in the record files.

Considering the non-random character of the data along with the inconsistencies among systems, perhaps researchers should seek another source of data.

A number of people believe that a standard procedure for farm business summaries should be used by all groups who sponsor farm record system. A standard procedure would facilitate making comparisons among states and systems as well as allowing research using data from more than one state. Conversations with persons involved with the data in several states suggest that it will not be easy to get the various states to conform to a standard procedure. One reason for not changing is to maintain continuity with past data. Another is difficulty of getting agreement on a "correct" procedure to handle items such as imputed costs and asset valuation procedures. One person suggested that it might be easier to get the various systems to agree to apply a standard set of procedures to the data stored in the computer than to change the published data. Published data for each state would continue to follow past procedures, but there would also be a data set consistent across states that could be used for research purposes. If this could be done by just changing items such as the interest rate charged on equity capital, conformance could be easily achieved. However, some changes likely would require changes in the basic data collection. For example, if the standard procedure was to use market values of assets, a system that used book values would also need to collect market values. Nevertheless, the merit of this approach should be studied.

Currently, a Financial Standards Task Force sponsored by the American Bankers Association with membership form the academic community, financial institutions and other interested groups is working toward a set of standard procedures for farm accounting and financial reports. When this effort is concluded in the next few months, groups who sponsor farm record programs should seriously consider adoption of the standard procedures resulting from the task force.

Table 1.

Methods used for depreciation, asset valuation, interest charges and unpaid labor charges, Corn Belt States and New York

	Illinois 1988	Iowa 1986	Michigan 1986	Minnesota and Indiana 1988	Missouri 1988	New York 1988
No. of farms	7375	?	449	Minn. = 265	313	406
Depreciation						
Real estate	tax	?	tax?	Indirect	tax	tax
Machinery	tax	10% of C.V.	tax?	Indirect	tax	tax
Dairy and Breeding Livestock	tax		tax?	Indirect	?	Indirect
Interest						
Interest paid	No	Yes	for NFI	Yes	Yes	Yes
Interest on equity	No	6%	No?	6%	No?	5% real
Interest on total						
Land	5%*	No	8.5%	No	8%	No
Other	10%**	No	8.5%	No	8%	No
Asset valuation						
Land	Market	?	Market (agr.)	Market	Market	Market +
Buildings	Cost-	?	Cost-	Market	Cost-	Market +
Equipment	tax depr.	Market	tax depr.	Market	tax depr.	Market +
Dairy and Breeding Livestock	?	?	?	?	Market Trend	Market +
Labor						
Operator	1250/mo.	1200/mo.	5.00/hr.	15,000/yr.	?	***
Family	1250/mo.	700/mo.	5.00/hr.		?	700/mo.

? The method used cannot be determined from the published report.
* Land charge-net rent, revised annually based on average landlord net rents received.

** Revised annually.

+ Market values are used in calculating interest on equity. Year-to-year changes in market values of real estate, equipment and livestock are labelled appreciation and excluded from the calculation of labor and management income.

*** For calculating return on investment, each farmer estimates the value of his labor and management.

Table 2.

Calculation of Measures of Net Returns, Average for 1988 New York Dairy Farm Business Summary

		Without Appreciation	With Appreciation
Total Accrual Receipts		262,510	282,795
Total Operating Expense	199,127		
Expansion livestock	2,259		
Machinery depreciation	14,402		
Building depreciation	8,213		
Total Accrual Expenses		224,001	224,001
Net Farm Income		38,509	58,794
Less: Unpaid family labor @ $700 per month		1,950	1,950
Return to operator labor, management and equity		36,559	56,844
Less: Real interest @ 5% on 409,571 equity		20,479	
Labor and management income		16,080	
Labor and management income per operator (1.35 operators)		11,911	
Return to operator labor, management and equity		36,559	56,844
- Value of operator labor and management (1.35 operators)		27,133	27,133
Return on equity capital		9,426	29,711
+ Interest paid		17,603	17,603
Return on total capital		27,029	47,314
Rate of return on equity capital (409,571)		2.3%	7.3%
Rate of return on total capital (624,841)		4.3%	7.6%

Table 3.

Calculation of Measures of Net Income, Illinois System, Using 1988 New York Data.

Value of farm production	194,093
- Total operating expense, except feed, livestock and interest	115,366
- Depreciation	22,615
Net farm income	56,112
- Unpaid family labor, 2.79 mos. @ $1,225/mo.	3,209
- Interest on all capital (land @ 5%, all other @ 10%)	55,113*
Labor and Management Income	-2,210
- Value of operator labor (16.2 mos. @ $1,225)	18,630
Management Return	-20,840
Net farm income	56,112
- Operator and family labor @ $1,150/mo.	21,839
Capital and management earnings	34,273
÷ Total investment (624,841)	
Rate earned on investment	5.5%

*An assumption was made that one-half the real estate on the average NY dairy farm is land.

Note: In the Illinois system the calculations include the landlord's as well as the operator's share. The New York data do not include any share-rented farms.

The data used are the New York "without appreciation" numbers.

Table 4.

Calculation of Measures of Net Income, Iowa System, Using 1988 New York Data.

Gross Product (Receipts minus purchased feed and livestock)	194,093
- Operating expenses (except feed)	105,498
- Fixed expenses (including interest paid)	44,249*
Accrual net farm income	44,346
- Operator labor, 16.2 mos. @ $1,200	19,440
- Family labor, 2.8 mos. @ $700	1,960
- Charge for 409,571 equity capital @ 6%	24,575
Return to management	-1,629
Accrual net farm income	44,346
+ Interest paid	17,603
- Value of operator and family labor	21,400
Return to capital owned	40,549
÷ Total assets owned	624,841
Percent Return to capital owned	6.5%

*Includes depreciation at 10% of machinery value plus 4% of estimated building value, which is assumed to be 1/2 the real estate value.

Table 5.

Calculation of Measures of Net Income, Michigan System, Using 1988 New York Data.

Value of production (Receipts less purchased feed and livestock)		194,093
Expenses except feed, livestock and interest paid	137,981	
+ Interest on all capital @ 8.5%	53,111	
+ Value of operator and family labor	23,730*	
Total costs		214,822
Management income		-20,729
+ Value of operator labor		20,250
Labor income**		-479
Management income		-20,729
+ Interest at 8.5%		53,111
Return on owned (total) capital		32,782
+ Average owned (total) capital		624,741
Rate earned on owned capital***		5.3%

*Operator labor 3,000 x 1.35 = 4,050 hrs. @ $5.00 = $20,250.
Family labor 696 hrs. @ $5.00 = 3,480
**Conceptually equal to NY's labor and management income.
***Return on capital includes management.

Note 1: The Michigan system does not calculate appreciation. It is not clear whether price changes on livestock are included in inventory changes. It is assumed here that Michigan calculates depreciation the same way Cornell does and that appreciation of livestock and real estate is excluded from the income calculations.

Note 2: The above calculations are the standard procedure used for all types of in the Michigan system. For dairy farms only, the Michigan system also calculates Net Farm Income about the same way that Cornell does except that appreciation is not specifically separated.

Table 6.

Calculation of Measures of Net Income, Missouri System, Using 1988 New York Data.*

Value of farm production	194,093
- Operating costs (including interest paid, depreciation and unpaid family labor)	159,084
= Net operating profit (which is return to operator's labor and management and equity capital)	35,009
+ Interest paid	17,603
= Return to land, labor, capital and management	52,612
- Value of managerial labor ($5.00 x 3,000 x 1.35 operators)	20,250
= Returns to capital and management	32,362
- Interest on capital (624,841) @ 8%	49,987
= Return to management	-17,625
Returns to capital and management	32,362
+ Total capital	624,841
= Percent return to capital and management	5.2%

*The measures described here are for the operator. In the Missouri system, each measure is also calculated for the total business, including the landlord's share. Appreciation is excluded.

Table 7.

Calculation of Measures of Net Income, North and South Dakota System, Using 1988 New York Data.*

Total farm receipts (including capital sales and inventory increase)	287,357
- Total farm expense, including capital purchases, unpaid family labor and interest @ 7% on all capital	261,599
= Return to operator labor and management	25,758
+ Unpaid family labor	1,950
+ Interest on equity (which is 7% of avg. total capital minus interest paid)	24,498
= Return to capital and family labor	52,206

*Operator share. Return to operator labor and management for the total farm including landlord's share, is also calculated. It is not clear how they handle appreciation, but in the calculations here appreciation is included.

Table 8.

Calculation of Measures of Net Income, Oklahoma System, Using 1988 New York Data.*

Total farm receipts (includes capital sales)	255,314
- Total farm expenses (includes capital purchases)	234,730
= Net cash income	20,584
+ Adjustment for changes in accounts receivable and payable	2,139
= Net farm earnings	22,723
+ Change in inventories	31,134
= Net farm income (return to operator and unpaid family labor, net worth and management)	53,857
+ Interest expense	17,603
= Return to unpaid labor, total capital and management	71,460
- Interest on total capital @ treasury note rate (6.46% in 1988)	40,365
= Return to unpaid labor and management	31,095
Return to unpaid labor, total capital and management	71,460
- Value of unpaid family labor @ $4.00/hr.	2,800
= Return to operator labor, total capital and management	68,660
- Value of operator labor @ $4.00/hr.	16,200
= Return to total capital and management	52,460
- Interest on total capital	40,365
= Return to management	12,095
Return to total capital and management	52,460
+ Average total capital	624,841
= Rate of return on capital and management	8.4%
Return to equity capital and management	34,857
(Average equity capital	409,571
= Percent return to equity capital	8.5%

*It is not clear how the Oklahoma system handles appreciation, but in the calculations here appreciation is included.

Table 9.

Calculation Measures of Net Income, Kansas System, Using 1988 New York Data.

Gross farm income, including inventory change		262,510
- Cash operating expense (including interest paid)		201,386
- Depreciation		22,615
= Net farm income		38,509
- Interest on 409,571 equity @ 10%		40,957
- Unpaid family labor		1,950
= Return to labor and management		-4,398
= Return to labor and management (per operator)		-3,258
Net farm income		38,509
+ Interest paid		17,603
- Charge for operator labor ($15,000 per operator)	20,250	
- Value of unpaid labor		1,950
- Management charge (10% of gross income)		26,251
= Return to capital		7,661
÷ Total capital managed, including the value of rented land*		
= Rate earned on total capital		1.2%
Return to capital		7,661
- Interest paid		17,603
= Return on net worth		-9,942
÷ Net worth		409,571
= Percent return on net worth		-2.4%

*This calculation is made based on total capital owned because the value of rented land is not known in the New York System. Appreciation is not included.

Table 10.

Calculation of Measures of Net Income, Nebraska System, Using 1988 New York Data.

Gross farm returns	262,510
- Total operating expenses	201,386
- Depreciation	22,615
= Net farm income (return to operator and family labor, management and equity capital)	38,509

Note: Appreciation of assets is excluded.

Table 11.

Calculation of Measures of Net Income, Pennsylvania System, Using 1988 New York Data.

Total farm receipts (cash)	253,379
- Cash farm operating expenses	202,613
Net cash operating income	50,766
+ Livestock inventory change	3,735
+ Feed inventory change	3,717
+ Supply inventory change	837
- A/P change	492
+ A/R change	2,631
- Other adjustments	70
- Depreciation	22,615
Net farm income	38,509
9% on 624,841 investment less interest paid*	38,633
Family labor and management income	-124

*It appears that in the Pennsylvania system assets are valued at book value rather than at market value. The $624,841 is market value from the N.Y. data. The interest charge would be lower and the labor and management income higher if book values were used as the basis for the interest charge. Appreciation is excluded.

Table 12.

Calculation Measures of Net Returns, Minnesota and Indiana Systems, Using 1988 New York Data.*

Gross cash farm income (not including breeding livestock)	237,098
- Total cash expense, except breeding livestock	198,406
= Net cash farm income	38,692
~ Changes in inventory and accounts receivable and payable	6,625
= Net operating profit	45,311
+ Change in breeding livestock inventory	15,807
- Depreciation and other capital adjustments	22,615
= Profit or loss (return to operator labor and management, family labor and equity capital)	38,509
- Interest on $409,571 net worth @ 6%	24,574
= Labor and management earnings	13,935
Profit or loss	38,509
+ Interest paid	17,603
- Operator labor and management (1.35 operators @ $15,000)	20,250
= Return to farm investment	35,862
÷ Average farm investment	624,841
= Rate of return on investment	5.7%
Profit or loss	38,509
- Operator labor and management	20,250
= Return to farm net worth	18,259
÷ Average farm net worth	409,571
= Rate of return on net worth	4.5%

*The calculations were made by excluding appreciation of assets. It is not clear in the Minnesota (FINAN) procedure whether or not appreciation on breeding cattle and depreciable assets is excluded from the calculations.

Table 13.

Calculation of Measures of Net Income, Agrifax System, Using 1988 New York Data.

Cash receipts (A)	253,379
+ Change in inventory, raised livestock	3,735
+ Change in inventory, feed and crops	3,717
+ Change in accounts receivable	2,631
+ Net other non-cash income	(70)
= Value of farm production (C)	263,392
Adjusted cash operating expenses* (B)	202,268
+ Building depreciation	8,213
+ Equipment depreciation	14,402
= Adjusted farm operating expenses (D)	224,883
Net Farm Income (A) - (B)	51,111
Net Farm Earnings (C) - (D)	38,509
+ Net non-farm income	3,849
- Family living and taxes	27,664**
= Net Earnings	14,694

*Adjusted for Changes in A/P, prepaid expenses, and supply inventories.

**May be overstated because the Cornell system includes withdrawals for savings.

Note: Appreciation is excluded.

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