

CORNELL
AGRICULTURAL ECONOMICS
STAFF PAPER

CASH VERSUS ACCRUAL ACCOUNTING INFORMATION FOR
DAIRY FARM MANAGEMENT

by

William F. Lazarus

July 1987

No. 87-22

Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York, 14853

It is the policy of Cornell University actively to support equality of educational and employment opportunity. No person shall be denied admission to any educational program or activity or be denied employment on the basis of any legally prohibited discrimination involving, but not limited to, such factors as race, color, creed, religion, national or ethnic origin, sex, age or handicap. The University is committed to the maintenance of affirmative action programs which will assure the continuation of such equality of opportunity.

ABSTRACT

Two cost and efficiency measures, crop expense per acre and feed and crop expense per hundredweight of milk, are compared on a cash and accrual basis. Records from 470 dairy farms were used for the comparison. Serious errors would be introduced by using the cash calculation on some farms.

Cash Versus Accrual Accounting Information for
Dairy Farm Management

by

William F. Lazarus*

Farm accounting information is necessary for a number of purposes. These purposes can be classified broadly into (1) tax reporting and management, (2) credit application and (3) business management analysis and decision making. Farm businesses are unique from a tax reporting viewpoint because they are allowed to report tax information on a cash basis. Nearly all other types of businesses are excluded from using a cash basis system of accounting. Under a cash basis system, only the actual cash receipts and cash expenditures which take place within an accounting period are recorded in the financial records. Farm businesses using the accrual basis of accounting must combine the cash transactions of the business with the value of items in inventory (e.g., feed, crops in storage, livestock, etc.) and items sold or purchased on account (Harsh *et al.*, p. 73).

Under the current tax law structure, virtually all farmers and ranchers should report their tax liability on a cash basis. Volding and Boehlje used a multiperiod growth model to demonstrate that farms using the cash method, prepaying expenses and delaying sales can significantly improve their financial position compared to using the accrual accounting method. The Federal Tax Reform Act of 1986 limits the deductibility of prepaid expenses to 50 percent of the deductible farming expenses of the taxable year (other than the prepaid expenses) (Casler and Smith). Even with this new limit, there would still appear to be significant opportunities for reducing tax liabilities with the cash basis method.

*Assistant Professor, Department of Agricultural Economics, Cornell University.

Seger and Lins compared cash and accrual measures of farm income. They show that cash accounting records can give farmers and lenders a grossly inaccurate perception of true net income, with obvious implications for credit decisions.

On-farm computers can simplify the more complex calculations involved in accrual basis accounting, making its use more feasible for farm use than when all of the calculations must be done manually. Frequent, up-to-date management reports can be produced on an accrual basis while preserving the cash basis information for tax reporting. Accountants, Extension specialists and farm management textbooks (e.g., Lippin and Catlett; Harsh *et al.*) routinely recommend the accrual method as best for management purposes, but there has been little empirical work demonstrating how much difference there is likely to be between measures of cost control and efficiency calculated on a cash basis and a accrual basis in actual farm situations. It is difficult to know in advance whether the more accurate accrual information is likely to result in sufficiently improved decisions and profitability to justify the added complexity and increased data entry time required.

Even if a full accrual system is not used, it is still possible to maintain day-to-day accounting records on a cash basis, and then manually adjust for changes in inventories and open accounts at periodic intervals such as year-end, for a mixed cash/accrual system. This is not too difficult where only a few items such as net farm income are the major concern, as discussed by Seger and Lins in a credit application context. For decision making and cost control, the adjustments should also be made frequently and by individual enterprises and income and

expense accounts that are the basis for the decisions and control process. This is a much more tedious process unless computerized.

Purpose

The purpose of this paper is to consider the choice of cash versus accrual measures of efficiency and cost control for business management analysis and decision making, with an emphasis on short run, frequently made operating decisions.

Data and Method

Accounting records from 470 New York dairy farms were used to evaluate the errors resulting from calculating three measures of cost control and efficiency from cash basis records rather than those calculated on an accrual basis.

Dairy farmers in New York have been participating in a farm business summary and analysis program (DFBS) conducted by Cooperative Extension since the early 1950's. Similar programs are carried out by a number of other states. The primary objective of DFBS is to help farmers improve their management skills through appropriate use of record data and application of modern farm business management decision making techniques. Participating farmers summarize income and expenses, inventories, livestock numbers and production, crop acres and yields in cooperation with county Extension staff, at year-end. Each participating farmer receives a computerized report for his farm containing a variety of analysis factors. Factors include size of business, rates of production, labor and capital efficiency, cost control and financial ratios. The individual farm information is also combined into a central database at Cornell University that is used for applied research studies, Extension educational programs, and classroom exercises (Smith *et al*).

The DFBS report was substantially revised in 1985 by the farm management staff at Cornell University. Previously, cash income and expense items were used to calculate net cash farm income. Changes in inventories, appreciation in capital asset values and other noncash adjustments were made to calculate several accrual basis income measures. Cost control and efficiency measures such as crop expense per tillable acre and feed and crop expense per hundredweight of milk sold were calculated from cash income and expenses. The new report uses cash income and expenses to calculate cash flow coverage. Changes in inventories and open accounts are allocated to individual income and expense items, for an accrual income statement and accrual measures of cost control and efficiency. No attempt is made in DFBS to measure changes in cash investment in growing crops and farm products used for personal consumption, two items that also in theory should be accounted for in the accrual adjustment.

The additional effort required to allocate the changes in inventories and open accounts probably deterred some farmers from participating in 1985 who might have otherwise participated in the older, simpler system. The number of full-time dairy farm owner-operator participants dropped from 458 in 1984 to 404 in 1985, a 12 percent drop in numbers. Competing demands on Extension staff time by the Milk Production Termination Program and other activities probably also limited participation, so the net effect of the change in data requirements is impossible to determine. The worsening financial situation may also have made some operators reluctant to divulge information required for participation.

Table 1, from Smith *et al.*, shows selected operating expense and income items and totals on a cash and accrual basis, from an income

Table 1. Selected Cash And Accrual Farm Expenses And Income,
404 New York Dairy Farms, 1985

<u>Expense Item</u>	Change in			
	Cash +	Inventory ^a	+ or	Accounts Payable = Accrual
<u>Feed</u>				
Dairy grain & conc.	41,542	\$-74	-156	41,312
Dairy roughage	1,305	-30	-15	1,260
Other livestock	717	27	5	749
<u>Crops</u>				
Fertilizer & lime	8,687	177	7	8,871
Seeds & plants	3,333	-62	15	3,286
Spray, other crop exp.	3,186	-78	32	3,140
Total Operating				
Expenses	\$161,157	\$-154	\$ 15	\$161,018
<u>Income Item</u>				
Dairy cattle	11,261	\$4,281	138	15,679
Crops	1,507	684	6	2,197
Total Income	\$202,388	\$4,882	\$313	\$207,582
Net Operating				
Income	\$41,231			\$46,564

Source: Smith, Knoblauch and Putnam

^a"Change in inventory" for expense items is the value of amounts used out of inventory. For income items, it is net additions to inventory.

statement averaged for 404 full-time dairy farm owner-operator participants in 1985. The inclusion of inventory and open accounts changes reduces average operating expenses by \$139 compared to cash operating expenses, a change of less than 0.1 percent. Dairy cattle and crop inventory changes are included in accrual income, and are the largest two differences between the cash and accrual measures. Accrual income is \$5,195 or 2.6 percent higher than cash income. The fertilizer and lime category is the largest inventory change on the expense side, with an increase of \$177. The largest change in accounts payable is the dairy grain and concentrates item, with a decrease of \$156. Net operating income (total income minus total operating expenses) was \$5,333 or 12.9 percent higher on an accrual basis than on a cash basis, largely because of the changes in dairy cattle inventories. The complete income statement also includes hired labor, machinery, livestock real estate and miscellaneous expense items and several income items not shown in Table 1 due to space limitations.

Two factors that receive considerable use as indicators of cost control and efficiency on DFBS farms are crop expense per tillable acre and crop and feed expense per hundredweight of milk sold. The latter measure is calculated with and without inclusion of grown crops inventory and accounts receivable changes. Crop expense per tillable acre is calculated by adding the cost categories directly related to crop production, including fertilizer and lime, seeds and plants, and spray and other crop expense. Note that this leaves out machinery and labor costs which are usually treated as variable in a one-year planning horizon, but which pose difficult allocation problems in a business analysis. Dividing by tillable acres is a way of normalizing across different farm

sizes. Differences in crop acreage mix cause problems when interpreting differences in crop expense per tillable acre across farms. An individual farm business using a computerized accounting system could obtain more meaningful figures by enterprising different crops, but the comparison of cash and accrual basis measures shown here would still hold.

Crop expense per tillable acre reflects exogenous influences such as price changes as well as whether the farm operator is managing soil fertility by soil testing and conserving the nutrient value of manure. Insect scouting and weed mapping can also minimize spray expenses by avoiding unnecessary chemical applications.

Crop expense per hundredweight of milk is calculated two ways. The first method is to add the first two feed expense categories, dairy grain and concentrates and dairy roughage, to crop expenses and divide by hundredweights of milk sold. The second method subtracts crop sales from dairy feed purchases and crop expenses before dividing by milk sold. If the marginal crop expense for crops sold equals their sale value, then this should give a more accurate measure of the net feed and crop expense incurred by the dairy enterprise. The cash value of crops sold is small in relation to total feed and crop expense on most dairy farms, so even if this assumption does not hold exactly, the discrepancy in the cash measure would be fairly small. However, crop inventory changes included in accrual crop sales are fairly large on some farms, causing greater discrepancies between the cash and accrual rankings for this measure than under the first method of calculation.

Feed and crop expense per hundredweight of milk sold is affected by both how well the costs are controlled and how efficient the farm business is at attaining high milk production levels per cow. The first

method of calculating crop and feed expense per hundredweight, without crop sales and inventory changes, is perhaps a better measure of cost control than the second method because it is less affected by random, exogenous influences such as weather-related crop yield variation. The second measure would better reflect a change in the cropping program that affects both input costs and yields.

Many other factors could be used for business management analysis and decision making. The choice and interpretation of factors would differ among individual farm situations. These particular factors were chosen only because they have been commonly used and they serve to illustrate the importance of doing the calculations on an accrual basis.

In the DFBS program, an individual farm operator is provided benchmarks for evaluating the factors calculated for his farm. One type of benchmark used is to sort all of the individual farm records by the factor of concern. The sorted records are divided into ten groups or deciles, and the factor is averaged within each decile. These ten decile averages, listed in a column, give a quick visual set of benchmarks showing range and central tendency for that factor, for comparison to the individual farm's figure.

Table 2 shows decile averages for the three factors, calculated on a cash and accrual basis, for 470 DFBS farms. Table 2 was calculated for the entire 1985 DFBS database including 66 dairy farm renters, dairy-cash crop farmers, and part-time dairy farm operators not included in the averages shown in Table 1.

Table 3 shows the degree to which using the accrual basis calculation changes the relative decile ranking of farms. The procedure used was to rank each of the 470 farms by each factor on a cash and accrual

Table 2. Cost Control and Efficiency Factors, Cash and Accrual Average by Decile, 470 New York Dairy Farms, 1985

Decile	Crop Expense/ Tillable Acre		Feed & Crop Expense/ Cwt. Milk		Feed & Crop Expense Minus Crop Sales/ Cwt. Milk	
	Cash	Accrual	Cash	Accrual	Cash	Accrual
1	11.05	12.31	2.49	2.54	1.48	\$1.44
2	23.50	24.02	3.19	3.20	2.81	2.71
3	30.38	31.52	3.51	3.59	3.29	3.22
4	37.16	39.94	3.80	3.86	3.62	3.56
5	45.57	47.75	4.03	4.10	3.90	3.85
6	52.89	53.53	4.26	4.31	4.16	4.12
7	58.83	59.66	4.51	4.50	4.42	4.39
8	66.10	66.03	4.81	4.82	4.73	4.74
9	76.55	76.27	5.16	5.17	5.10	5.18
10	104.53	101.76	6.19	5.98	6.11	6.17
All Farms	50.66	51.28	4.19	4.21	3.96	3.94

Table 3. Farms Changing Decile Ranking for Cost Control and Efficiency
when Cash Basis Is Used, 470 New York Dairy Farms, 1985

Difference Cash	Feed & Crop	Feed & Crop Expense
Ranking Minus	Expense/	Minus Crop Sales/
Accrual Ranking	Tillable Acre	Cwt. Milk
		percent
-8	-	0.2
-7	0.4	-
-6	0.2	0.4
-5	0	0.8
-4	1.1	1.7
-3	1.3	2.1
-2	3.0	4.5
-1	7.2	9.6
0	67.7	53.6
1	15.5	19.1
2	1.5	5.3
3	1.7	1.1
4	0.2	0.6
5	0.2	0.6
6	-	-
7	-	0.2
8	-	-
<u>Average Absolute Difference</u>		
All Farms	\$4.18	\$0.26
> One Decile Chg.	\$23.50	\$0.83

basis. The accrual decile ranking was subtracted from the cash ranking. A negative "difference" in the left column of Table 3 indicates that a farm's cash basis factor was lower than the accrual factor. Using the cash basis factor would result in an underestimate of the true accrual cost. A positive difference indicates that the cash factor overestimates the accrual cost.

For most farms, there is relatively little difference between the cash and accrual ranking, as one might expect. Two-thirds of the farms stay in the same decile ranking for crop expense per tillable acre, and 90 percent either stay in the same decile or move only one decile up or down. For the other ten percent, it appears that omitting inventories and open accounts changes could cause serious errors in analyzing the business and making decisions. The intervals between accrual decile averages vary. The smallest interval is \$5.78, between the fifth and sixth decile. The absolute value of the difference between the cash and accrual basis calculation of each factor is shown at the bottom of Table 3, for all farms and for only those farms that changed ranking by two deciles or more. For all farms, the error caused by using the cash calculation for crop expense per tillable acre is only \$4.18. But for the ten percent of the farms that change ranking by two deciles or more, the error averages \$23.50 per acre.

A larger number of farms changed ranking for feed and crop expense per hundredweight of milk (third column of Table 3) than for crop expense per acre. The smallest interval between accrual deciles is \$0.19, between the sixth and seventh decile. Eighteen percent of the farms moved up or down more than one decile. For those farms, the error from using the cash calculation averages \$0.83 per hundredweight, or \$1.06

per hundredweight when crop sales and inventory changes are included (fourth column of Table 3). The third comparison, feed and crop expense minus crop sales per hundredweight, is dominated by the large changes in crop inventories that occurred on many farms. Only one-third of the farms stayed in the same decile, and one-third moved more than one decile. The smallest interval between accrual rankings is \$0.27 per hundredweight.

It is interesting that subtracting crop sales and inventory changes changed the accrual ranking for feed and crop expense per hundredweight substantially. Only 32 percent of the farms were in the same accrual decile ranking without crop sales subtracted (fifth column of Table 2) as with crop sales subtracted (the last column).

Milk sales on these dairy farms is no doubt a more constant income source than many other types of farms experience. Other farm types might, therefore, be expected to have more fluctuations in accounts payable as income variability forces the use of accounts payable as a means of short-term financing. Since our data set is restricted to dairy farms, this hypothesis can not be tested.

Conclusions

For most dairy farms, cost control and efficiency factors calculated on an accrual basis for farm business analysis would not be much different from those calculated on a cash basis. However, serious errors would be introduced on some farms. To monitor costs and efficiency by means of accounting records, farm operators should consider maintaining accrual basis records which would track changes in inventories and accounts payable and receivable, especially if a computerized system is available to do the more extensive calculations.

References

- Casler, G. and S. Smith. *Farm Income Tax Management and Reporting Manual*. A.E. Ext. 86-32, Department of Agricultural Economics, Cornell University, November 1986.
- Harsh, S.B., L. Connor and G. Schwab. *Managing the Farm Business*. Englewood Cliffs, N.J.: Prentice-Hall, Inc. 1981.
- Libbin, J. and L. Catlett. *Farm and Ranch Financial Records*. New York: Macmillan Publishing Company, 1987.
- Seger, D. J. and D. A. Lins. "Cash Versus Accrual Measures of Farm Income". *North Central Journal of Agricultural Economics*, 8(1986):219-226.
- Smith, S., W. Knoblauch and L. Putnam. *Business Summary: New York 1985*. A.E. Res. 86-25, Department of Agricultural Economics, Cornell University, October 1986.
- Volding, T. and M. Boehlje. "An Economic Evaluation of Cash and Accrual Accounting Methods". *Journal of the American Society of Farm Managers and Rural Appraisers*, 41(1977):15-20.