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Staff Paper

Dairy Animal Ratios From Michigan Annual Financial Analyses

by

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Staff Paper #2003-01 **January, 2003**

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8 pages

Executive Summary

Year end financial analyses from 158 Michigan dairy farms for 2001 were studied to see if useful information about numbers of animals could be derived. It was found that 121 farms had records adequate to calculate turn over and cull rates. The average turn over rate for cows averaged 37 %. The median turn over rate was 35 %. The turn over rate exceeded 42 % on 30 % of the farms. A scatter diagram indicated lower turn over rates might be weakly associated with net farm income per cow. About 8 % of the farms had problems in reporting bull calf sales or other disposition. Nearly 11 % of the farms appeared to not be actually making animal counts at year end.

Background

The purpose of this study was to illustrate the use of annual financial summary documents to measure herd turnover, cull rates, and report average results from a panel of Michigan dairy farms. A good year end financial analysis of a farm requires 2 balance sheets, one at the beginning of the year and one at the end, plus an income statement for the 12 months between the 2 balance sheets. A complete dairy farm balance sheet will have a detailed schedule of animal numbers broken down by age category with dollar values. A common break out lists cows (that have freshened at least once), calves, open heifers, bred heifers, and bulls for breeding. If male calves are kept, they are probably called dairy beef.

During the year, animals are bought and sold. The income statement should have a record that separates dairy beef, calves, and cull cows sold into different categories to ease income tax reporting. Purchases should be recorded in similar categories. Good record systems will show the number of head, and perhaps weights, as well as the dollars, of all these animal categories.

A complete system doing the above things has the information to track animal number movements through the herd at least annually. For example, if farmers raise their own replacements and do not buy any cows or bred heifers, then the beginning inventory of bred heifers plus cows minus the number of culls sold should be equal to the end inventory of cows when measured in number of head of animals. With these physical inventories and counts, one can calculate turnover rates and have some indication of death losses. Analysts could find useful information about a farm from these physical counts that will supplement financial performance ratios.

I decided to explore how much physical data was available from dairy farm records that had year end analyses completed for 2001 of the above described quality. These are the same farms for whom financial results were reported in Staff Paper No 2002-21 titled “2001 Business Analysis Summary for Dairy Farms” by me. I used the data to calculate turnover rates and cull

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rates by generally accepted formulas. The strengths and weaknesses of the data set and average turnover rates are given below. Implications are discussed at the end.

Completeness of panel data

There were 158 farm records available. These dairies each had a Finan[2] analysis done for 2001. They either cooperated with MSUE's Telfarm system, or had their records supervised by the Farm Credit System of Wisconsin (Upper Peninsula herds in Michigan), or by Greenstone of Michigan. The number of head, as well as dollars, was keyed into an electronic spreadsheet. The data came from beginning and ending balance sheets and the income statement for 2001. In the process of inputting the data, it was discovered 37 of the 158 farms, or 23 % did not have complete enough information to be included in the turnover rate calculations. Eleven of the 37 did not have break out of head on the inventories because the data was not collected; it was probably available at the farm. Four either started up or sold out during the year; the head were available but the turnover rates would not make sense if they had been used. Another 10 had inconsistencies or partial blocks of missing data which would have taken a farm contact to correct. Twelve of the 37 had no indications of bull calf disposition. Due to the possibility of other incomplete data, these farms were left out.

This left 121 farms deemed complete enough to go into the calculations. However, on some of these 121, the number of calves sold, or number of cull cows sold were estimated using average prices. A quality check was run on head at the beginning and at the end of the year for each farm. Four break out categories were tested; number of calves, open heifers, bred heifers and cows. On 10 of the 121 farms, the number of head were identical at both ends of the year for all 4 categories. Another 3 farms had 3 categories with the same number of head. While this situation is possible, it is not likely. I suspect at least some of the 13 managers estimated year end quantities by reporting them equal to what was on the beginning of the year reports instead of doing an actual head count. These factors weaken the quality of the calculated results.

Herd Turn Over and Cull Rates

The herd turnover calculation formula is: Rate = A divided by B, where

A = cows departing the herd during the year

B = average number of cows in the herd during the year

The herd cull rate calculation formula is: Rate = A divided by (A + B), where

A = cows departing the herd during the year

B = average number of cows in the herd during the year[3]

Cows departing the herd could have been cows and bred heifers sold for dairy purposes, or culled. This information was available from the 121 farms. However, they could also have departed from

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[2] Part of Finpack, the software package from the Center for Farm Financial Management, Department of Agricultural and Applied Economics, University of Minnesota.

[3] Both formulas came from personal discussion with Dr. Ted Ferris of MSU's Animal Science Department

the herd due to death, on farm meat consumption, or bartered to employees for labor. Finan does not get data on these latter 3 uses.

These other causes for departure were estimated by figuring sources and uses of cows for each herd, where Sources were:

Beginning inventory of cows
Beginning inventory of bred heifers
Purchases of cows and bred heifers

and Uses were:

Sales of cows and bred heifers for dairy uses
Sales of cull cows
Ending inventory of cows

The total sources and uses were compared. On 4 of the 121 farms, sources were equal to uses. All the cows were accounted for by the calculation. If the uses were greater than the sources, it was assumed that open heifers on hand at the time of the beginning inventory had been bred and calved before the end of the year. This was true on 36 of the 121 farms. These 36 had an average of 12 head that probably came from heifers classified as open on the beginning of year inventory.

If the uses were less than the sources, it was assumed that the number of unexplained cows must have died, although they could have been eaten, bartered, or given away. This was true on 81 of the 121 farms. These 81 farms had an average of 27 unexplained cows per farm. These 27 cows imply a 14 % death loss if compared to the average cow herd size of all 121 farms.

The Turn Over Rate for the 121 farms ranged from 4 % to 89 %. The average was 37 %. The standard deviation was 14 % and the median was 35 %. Chart 1 is the frequency distribution of farms by rate.

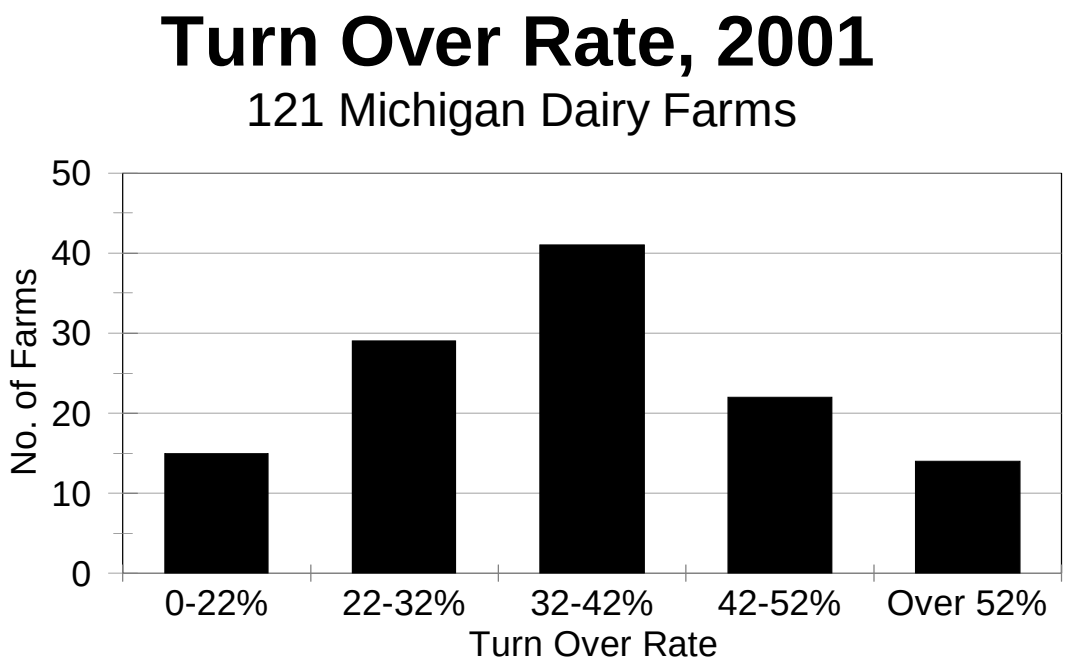

Chart 1

The cull rate formula defined above was the method some DHIA's used in the past. Given the same data, this formula will result in a smaller number than will the turn over formula. The cull rate for the 121 farms ranged from 4 % to 48 %. The average cull rate was 26 %. The standard deviation was 7 % and the median was 26 %. Chart 2 is the frequency distribution of farms by cull rate.

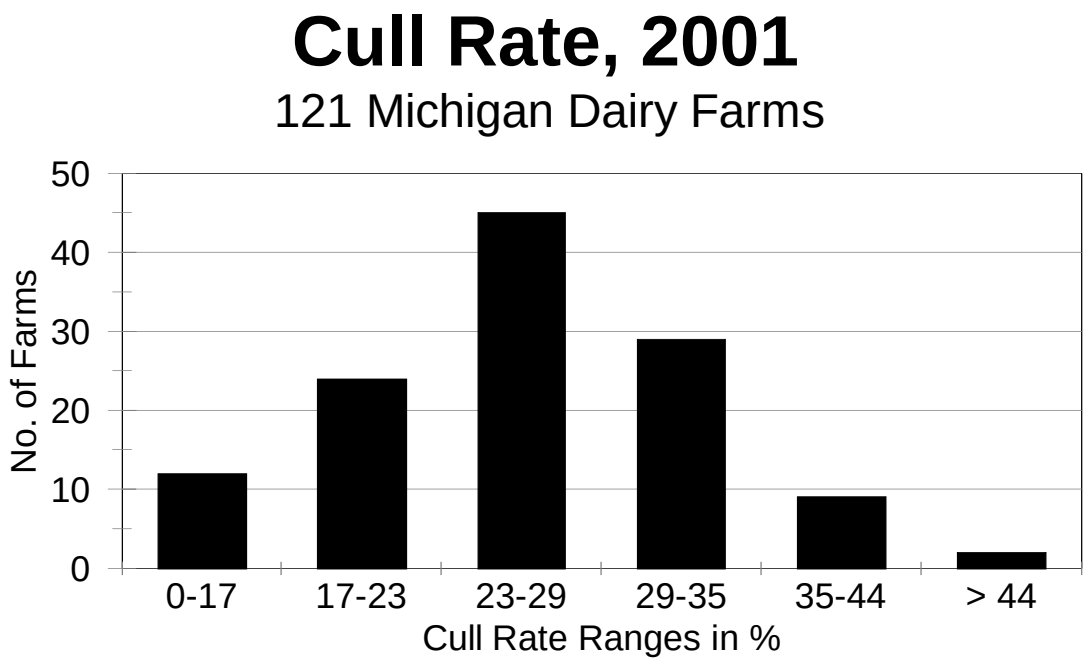

Chart 2

Discussion of Turn Over Rate

In Chart 1, 12 % of the 121 farms had a turn over rate above 52 %. Another 18 % were in the range of 42 to 52 %. Or, 30 % of the farms had a turn over rate above 42 %. If it is assumed that the higher turnover rates were due to excessive health problems and involuntary culling, then farm profitability was lower than it could be. If this is true, then the net farm income per cow should be correlated with the turn over rate. The scatter diagram of plotting these two data are in Chart 3. The turn over rate is a decimal fraction; .20 = 20 %. The correlation does not appear strong, although a trend line in Chart 3 would probably slope downwards from left to right. If so, this would support the idea that lower turn over is associated with higher profitability.

A similar plot was done comparing debt to asset ratio with turn over. It appeared as inconclusive as does Chart 3. The thought was that high turn over would lead to many purchased cows which would have to be financed with debt.

One could argue that high turn over rates cause high net farm incomes. If a farmer had a reasonable calving interval, a well management reproduction program, raised all heifer calves, and had little death loss in calves and replacements, there would be lots of bred heifers available. The formula used above starts with beginning inventory of bred heifers. The well managed farm might sell these bred heifers just before freshening. This would make the turn over rate high as calculated in the above formula, but net income might then be high if the heifers sold for more

than their cost of growing. Could this explain some observations in the upper right side of Chart 3?

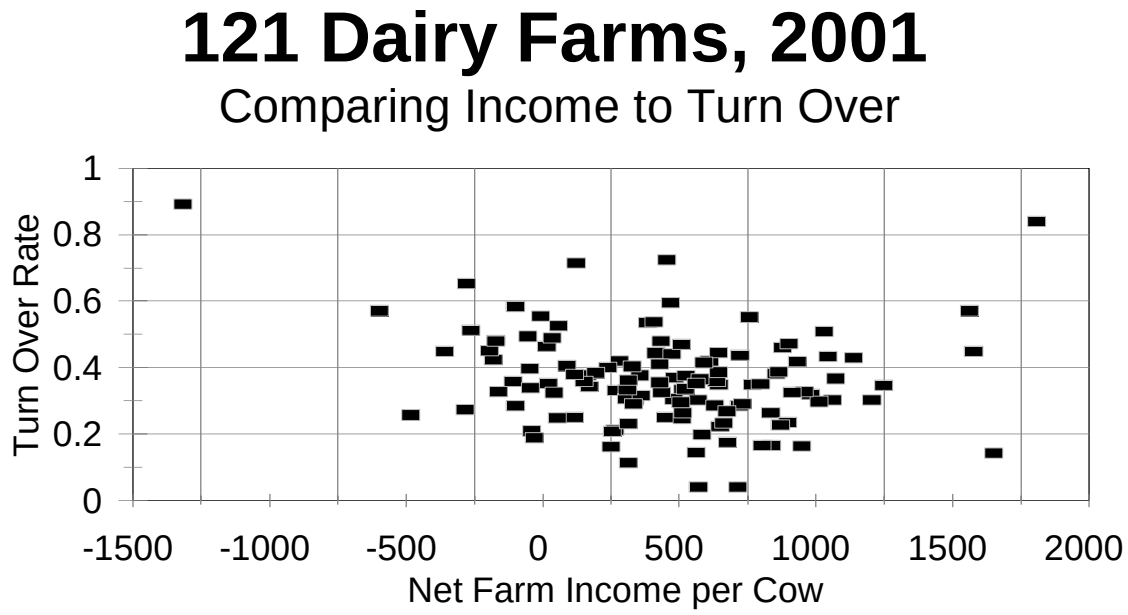

Chart 3

Calves Unexplained in the Data

The financial analysis data has the potential to track the movement of calves in and out of the herd, although the reporting system used did not ask about number of births and deaths. Calculations were done estimating the potential births, and using unexplained calf numbers as an indicator of death rates. Number of births were:

Beginning inventory of cows
Beginning inventory of bred heifers
Cows and bred heifers purchased during the year

It was assumed one calf was born during the year to each bred heifer in beginning inventory and to each cow and bred heifer purchased. The average calving interval of 14 months was divided into 12 and multiplied by the number of cows in beginning inventory. This means each cow on hand contributed .857 of a calf during the year. Calves were assumed to be half males and half females.

Sources of heifer calves were:

Beginning inventory of heifer calves
Beginning inventory of open heifers
Purchased calves and open heifers
Estimated births

Uses, or explained heifer calves were:

Sales of heifer calves

Sales of open heifers
Ending inventory of bred heifers
Ending inventory of open heifers
Ending inventory of heifer calves

Sources were compared to uses. On 3 farms, the uses of heifers calves were greater than the sources. On the other 118 farms, the uses, or explained number of heifer calves were less than the sources. Calculating the unexplained calves as a percentage of the total sources of calves, the unexplained averaged 22 %. This could mean that calf death losses were 22 %.

The way calf sales by sex are reported, or not reported, may cause problems in getting accurate calf numbers. If the financial system identifies it as a heifer calf or a bull calf sale, accuracy is good. If the category is merely called calf sales, then one is not sure whether it was a bull or a heifer calf. In keying in the data, it was assumed all calf sales not identified specifically as heifer calf sales were bull calves.

Sources of bull calves were:

Beginning inventory of bull calves
Beginning inventory of dairy beef
Purchased bull calves
Estimated births

Uses, or explained bull calves were:

Sales of bull calves
Sales of dairy beef
Ending inventory of dairy beef
Ending inventory of bull calves

On 10 of the 121 farms, the uses were greater than the sources of bull calves. The other 111 farms had an average of 38 % of the sources of bull calves left unexplained. This implies an average death loss of 38 % of bull calves.

I can think of no obvious reason that bull calves should be 38 % unexplained while the heifer calves were 22 % unexplained. Bull calf prices were high enough in 2001 to encourage their being marketed. This situation, coupled with the fact that 12 farms had no indication of any bull calves on the farm at all, raises questions about whether the analysis system encourages accurate reporting.

Breeding Bulls

The farm inventory systems did seem to do well at separating bulls for use in breeding from bull calves kept for beef sales. Breeding bulls appeared on the ending inventory of 75 of the 121 farms, or 62 %. Most of them were purchased so they were shown on the depreciation schedule as well as the beginning or ending inventories.

Messages from the Data

1. About 30 % of the farms had turn over rates in excess of 42 %. The industry is starting to talk of ‘turn over’ rates instead of ‘cull’ rates. Turn over is calculated as cows leaving the herd divided by average cow numbers for the year. The analyst should challenge the management teams who have the higher rates and encourage resolution of any indicated problems

in breeding and health management. Congratulate those with turn over rates at or below the average of 37 %.

2. There is something wrong with the way a portion of Michigan farm records are accounting for bull calves. At the start, I noted 12 of 158 farms, or nearly 8 %, had no indication of bull calves ever being on the farm. There were no calf sales, no bull calves in inventory, and no beef sales. Did they all die? Did they all get eaten? Were they all bartered in lieu of wages? Did all calvings result in females? Are a lot of folks like a Vermont hill farmer I once knew, who said what he did with the money from his bull calf sales were nobody's business but his own? When the pay statements were received from the livestock auction, were income totals put into the farm records as cull cow sales without breaking out the calf sales? Although the last point is the likely explanation, it would not be acceptable to an income tax auditor. Another indicator of reporting problems is that 38 % of bull calves available were unexplained while heifer calves were only 22 % unexplained. An analyst should look for indications of bull calves in the financial records to be assured complete accuracy of the system.

3. Over 62 % of the panel herds use natural service to some degree as indicated by breeding bulls appearing on year end inventories. If there are no breeding bulls in the inventory, the analyst might ask if this were true.

4. There were 13 farms with identical numbers of animals by category at the beginning and at the end of the year. An analyst might question whether or not an actual animal count was done.

5. If data are to be collected on death losses, bartering, and on-farm consumption, the financial analyses systems may have to be modified to handle the information.

6. Good annual financial analysis systems have the potential to track animal number movements that occurred through the year. A simple spreadsheet template could provide an analyst with a quick way to organize herd numbers from the financial reports, look at turnover rates, and judge the quality of herd reporting. An example template to do this is available via the internet at: www.msu.edu/user/nott/DHerdRao.xls

Copies of this report

This report may be obtained on the internet at:

www.msu.edu/user/nott/Staff_Paper_2003-01.pdf