Differences Among High, Medium, and Low Profit Dairy Operations: An Analysis of 2004-2008 Kansas Farm Management Association Dairy Enterprises

K. M. Schulte and K. C. Dhuyvetter

Summary

The financial bottom line, or net income, is a key factor in determining how successful a dairy has been historically as well as an indicator of the financial ease or struggles the dairy might have in the future. What causes net income to vary from one operation to another is a key question for dairy farmers. For example, does milk price received, feed cost, total cost, or milk production have the greatest impact on net return variability? In this study, we evaluated Kansas Farm Management Dairy Enterprise data from the past 5 years to determine correlation of revenue, production, and cost factors among groups of high, medium, and low profit dairy operations. High-profit producers had larger operations, had slightly greater total costs ($62.63 per cow), and received slightly lower milk prices ($0.56/100 lb of milk) compared with low-profit producers. In contrast, the high profit group produced significantly more milk per cow. Milk price received and cost per cow did not affect profit nearly as much as total milk produced per cow. This study was conducted with data reported by small to midsize dairy herds. Further research should examine whether these results hold true for large herds.

Introduction

Profitability within the dairy industry has been in the spotlight during the past 5 years as a result of extreme volatility in the commodity markets that greatly affects not only income from milk sales but also feed costs, which represent a large percentage of total expenses. Recently, many producers have focused on marketing milk and feed to create set prices received and paid. In addition, because of the decline in the milk price during 2009, some producers cut feed costs to make up for loss in milk income and others focused on improving production to generate more revenue. Small to midsize producers have felt a major crunch in their cash flow and net income in the past few years. Net income largely determines how long a farm can survive. A dairy farmer who made little to no profit during 1 year with no capital saved will continue to struggle in future years. In contrast, producers who have capital saved from previous profitable years can survive longer during times of low milk prices and increased costs.

Dairy farmers exercise different management approaches to increase profit including: (1) minimizing costs to increase profit, (2) minimizing assets per production unit to reduce fixed costs, (3) marketing milk to receive the best milk price possible to increase revenue, and (4) increasing production to maximize revenue and profit. In theory, a skilled manager should be able to balance asset utilization, reduce cost, and maximize revenue to increase net income. Many managers, however, are unable to optimize each of these factors. The objective of this study was to determine which factors (receiving a higher milk price, reducing cost, or increasing milk production) a small to midsize dairy enterprise should focus on to increase net income.

Experimental Procedures

Forty dairy farms from the Kansas Farm Management Association database were selected on the basis of their participation in reporting data during the past 5 years (2004 to 2008). To be

included in the analysis, a farm must have reported data a minimum of 3 of the 5 years. The average number of years farms reported data was 4.5 years (6 farms had 3 years, 11 had 4 years, and 23 had 5 years). The farms were sorted from high to low on average returns over total costs (i.e., profit) and then separated into the, top, middle, and bottom third (13, 14, and 13 farms, respectively). The multiyear average number of cows per farm was 115 (range: 35 to 257 cows). The various cost categories were aggregated into 9 groups, and revenue was grouped into milk sales, net cattle sales, and other income. Other factors evaluated included pounds of milk per cow, culling rate, milk price per 100 lb of milk, and income over feed cost.

To normalize data, results are reported on a per-cow basis. There is debate within the dairy industry regarding whether data should be analyzed on a per-cow or per-hundredweight basis. The 40 farms were ranked from 1 to 40 (1 = highest profit, 40 = lowest profit) on the basis of both profit per cow and profit per 100 lb of milk. Figure 1 plots per-cow rankings on the vertical axis against per-hundredweight rankings on the horizontal axis. Most of the farms fall very close to the 45-degree line, indicating the rankings are quite similar (points falling on the line represent farms with the same ranking for each measure). On the basis of the output for these 40 farms, the ranking of net returns over total cost is closely correlated for both outcomes (profit per cow vs. profit per 100 lb of milk). Thus, analyzing either outcome is sufficient.

The farms were analyzed by calculating an average of each revenue, cost, or other factor category from its years of reporting data. On the basis of this average, the farm was placed in the top, middle, or low profitability group. Once profitability groups were formed, group data were evaluated at an average for each category. Then, the various farm characteristics (e.g., farm size, milk production, milk price, income, and costs) were compared for all 3 profitability groups. Differences between the high and low groups were reported as both absolute and percentage differences. As an additional analysis, regression models were estimated to quantify relationships that existed among farm characteristics (independent variables) and profit and cost (dependent variables). Independent variables included were herd size, milk production (pounds per cow), milk price (profit regression only), cull rate, feed as a percentage of total cost, and percentage of farm labor allocated to livestock.

Results and Discussion

Table 1 reports farm information, income, and cost data for the 3 profitability groups (high, medium, and low). Farms in the high profit group had larger herds than the medium and low profit farms. Culling rate, defined as cows purchased divided by herd size, was similar for high and low profit farms but considerably less for the medium profit farms. Pounds of milk produced per cow was the most significant independent factor affecting profit, with a total difference between the top and bottom profitability groups of 30% (5,268 lb per cow). Milk price was similar for all 3 groups and was actually slightly greater ($0.56/100 lb of milk) for the low profit farms compared with the high profit farms. Given the greater milk production and comparable price, the high profit farms generated nearly $800 per cow more income from milk sales. As profitability increased, net cattle sales increased because of greater culling rates or because cows sold had greater value as a result of increased production or genetics. Given that culling rates were similar, greater net cattle sales for the high profit farms were likely the result of cows in the high profit group being sold for greater value than those in the low profit group. Other income was a fairly minor category, and no differences existed among the 3 profitability groups. When all categories were included, the high profit farms averaged $1,065 more income per cow than the low profit farms (slightly more than $500 per cow compared with medium profit farms).

A comparison of cost categories among the different profitability groups showed that high profit farms had greater costs in some categories and lower costs in others, and they had a slightly higher total cost per cow (Table 1). High profit farms spent about $90 per cow more on feed costs, which, given the large difference in milk production, clearly indicates a considerably smaller feed cost per 100 lb of milk. Labor costs per cow were slightly lower for the high profit farms, which is likely due to high profit farms being larger and therefore relying on more hired labor (i.e., operator labor makes up a smaller percentage of total labor). When aggregated, veterinary and dairy supplies costs were about $140 per cow greater for the high profit farms compared with the low profit farms. Machinery and utilities/fuel were lower for the high profit farms ($49.71 and $30.64, respectively), which likely is a result of spreading costs over more cows (i.e., economy of size). The high profit farms averaged $62.63 per cow more cost, but when coupled with the significantly greater income ($1,065), net returns were greater. High profit farms averaged $1,000 more profit than low profit farms and had a $450 per cow advantage over medium profit farms. These differences were very significant and almost entirely the result of high profit farms producing more milk while holding costs constant.

To independently evaluate the effects of various farm characteristics on economic variables, 2 regression models were estimated: 1 focused on profit and 1 on total costs. In the profit analysis, pounds of milk produced per cow accounted for the most variation ($P < 0.001$) in profitability, revealing that production is the driving factor behind profitability differences between operations (Table 2). Milk price in relation to profit, with all other variables held constant, was also a key factor ($P < 0.05$). Of the cost factors evaluated, feed as a percentage of total cost and percentage of farm labor devoted to livestock were not significantly related to profit. In addition, variability in culling rates between operations was not related to profitability differences.

When costs per cow were evaluated with farm characteristics variables, pounds of milk produced per cow again was the most economically significant factor (Table 2). Percentage of labor allocated to livestock was positively associated with costs per cow and tended ($P < 0.10$) to account for a significant proportion of the variation associated with cost per cow. This positive relationship may indicate that farms that are more diversified (i.e., lower percentage of labor devoted to livestock) have lower costs per cow than farms that are more specialized. In contrast, feed cost as a percentage of total costs was not related to costs per cow.

Two other factors evaluated in the regression were culling rate and mean year of reported data. Culling rate, which was not statistically related to profitability, was positive and affected ($P < 0.05$) total cost. In other words, selling cull cows did not affect profit, but greater culling rates were associated with higher total costs per cow. In addition, the mean year of reported data tended ($P < 0.10$) to be significant in explaining profit and was related ($P < 0.05$) to explaining costs per cow. These trends in year differences may slightly skew the results reported in Table 1 because the year effect is not accounted for. However, because the regression results account for year differences and because data used in the analyses represent 4.5 of the 5 years for all reporting farms, one can be confident the results are accurate and can conclude that increasing milk production is key to increasing profit for small to midsize dairy enterprises in Kansas.

Table 1. Dairy enterprise measures among high, medium, and low profit groups[1]

		Profit category			High minus low	
Item[2]	All farms	High	Middle	Low	Absolute	%
Number of farms	40	13	14	13		
Number of cows per herd	115	135	130	79	57	72
Culling rate, %	25.6	28.1	21.0	28.0	0.13	0
Pounds of milk	20,610	22,966	21,129	17,697	5,268	30
Milk price, per 100 lb of milk	$16.48	$16.32	$16.25	$16.88	–$0.56	–3
Milk sales	$3,369	$3,731	$3,420	$2,951	$780	26
Net cattle sales	$267	$440	$209	$156	$284	183
Other income	$59	$59	$60	$58	$0.89	2
Gross income	$3,695	$4,230	$3,689	$3,165	$1,065	34
Feed	$1,749	$1,763	$1,807	$1,672	$90.91	5
Labor	$596	$594	$528	$672	–$78.19	–12
Vet	$115	$113	$128	$102	$10.47	10
Dairy supplies	$300	$354	$321	$224	$130.32	58
Marketing/breeding	$93	$86	$111	$82	$4.05	5
Machinery	$323	$308	$304	$358	–$49.71	–14
Utilities/fuel	$158	$151	$143	$182	–$30.64	–17
Interest	$319	$335	$291	$332	$3.00	1
Other	$76	$76	$60	$93	–$17.59	–19
Total cost	$3,729	$3,779	$3,694	$3,716	$62.63	2
Net return to management	–$34.34	$451.06	–$5.04	–$551.31	$1,002	

[1] Sorted by net return to management (returns over total costs) per cow.
[2] All items are on a per-cow basis unless indicated otherwise.

Table 2. Regression analysis for profit and cost models

	Profit ($/cow)		Cost ($/cow)	
Variable	Coefficient	*P* value	Coefficient	*P* value
Intercept	36,901	0.113	-42,958	0.025
Cows, number of head	1.00	0.385	-0.26	0.798
Milk production, lb/cow	0.08	0.002	0.10	0.001
Milk price, $/100 lb of milk	176.82	0.024		
Culling rate, %	1.14	0.793	9.64	0.038
Feed percent of total cost	17.07	0.175	-15.27	0.157
Livestock labor percentage	-3.64	0.464	7.68	0.079
Years	-398.91	0.080	421.27	0.021
R-square	0.4547		0.6217	

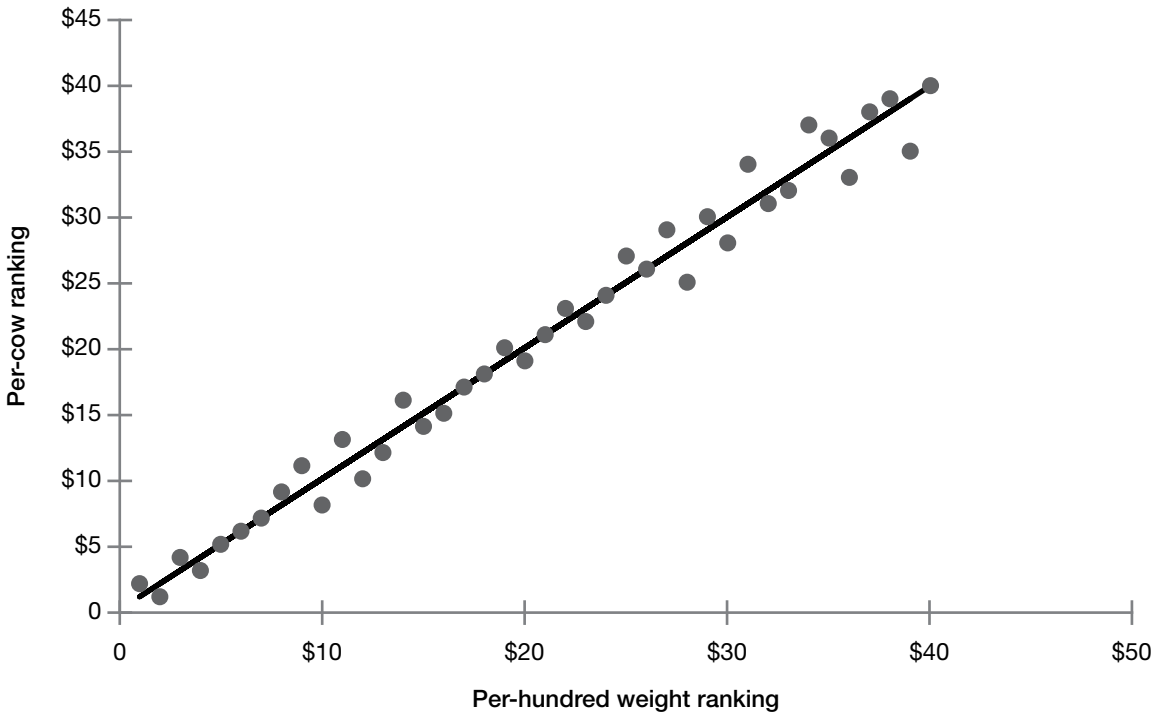

Figure 1. Gross return less total cost (i.e., profit) is correlated positively (r = 0.99) when analyzed per farm on a per-hundredweight (100 lb of milk) basis versus a per-cow basis.