

independence in table 9 provide strong evidence that a farm's use of automatic takeoffs on milking units and of artificial insemination is associated with the farm's financial success, where success is defined as being in the top 20 percent of the income distribution. The practice of using automatic takeoffs on milking units and of milking cows three times per day by commercial dairy farms in the traditional milk-producing States is found to be strongly related to their financial success.

Based on expected per-unit returns, which are not size-driven like net farm income, none of the management practices considered is strongly related to the financial success of dairies in the non-traditional milk-producing States (table 9). This finding points to the likelihood that better-than-average management in controlling costs and/or size economies, rather than just management practices that involve the use of advanced technology makes certain dairies in the non-traditional milk-producing States climb to the top 20 percent. In contrast, the identification of a commercial dairy farm in the traditional milk-producing States as one of the top 20 percent is shown to be strongly related to its use of artificial insemination.

Conclusions

Findings from this study point to significant differences in the resource base, in the structure of profitability, and in management practices between commercial dairy farms in the non-traditional and traditional milk-producing States. Concentration measures such as decile ratios, Lorenz curves, and Gini coefficients show that debt capital, farm assets, equity, income, herd inventory, and milk sales are more concentrated in non-traditional milk-producing States than in traditional milk-producing States.

For commercial dairy operations in the non-traditional milk-producing States, performing weighted least squares regression on a net farm income model identified debt-to-asset ratio and farm size, as measured by the number of milking cows, as important determinants of farm profitability. For dairy farms in the traditional milk-producing States, the results pointed to use of rented acres, herd size, productivity per cow, per-cow purchased feed and land, buildings, and equipment costs, age of the operator, and level of adoption of capital- and management-intensive technologies as important determinants of farm financial performance. Higher levels of profitability

will be reaped by dairy farms in the traditional milk-producing States if efforts to increase efficiency in milk production are emphasized, along with increased emphasis at controlling per-cow investment and cost of purchased feed. Significant improvements in profitability will result from adopting a technology that combines better recordkeeping with advanced milking parlors.

For commercial dairies in the non-traditional milk-producing States, regression results based on a per-unit returns model revealed the importance of cow productivity in increasing profitability. Dairy farm management in these States that lowers per-cow expenditures on items such as forage production, purchased feed, hired labor, and per-cow investment will significantly improve the financial performance of these farming operations. Per-unit returns of dairies with advanced milking parlors are found lower, because of higher replacement costs, than the returns of dairies with traditional milking parlors. For the group of

Table 9—Results of test of independence of expected income (net farm and net returns per unit of output) of top 20 percent of commercial dairy operations and management practices, for selected milk-producing States, 1993

Test of independence	F-statistic	
	Non-traditional ¹ States	Traditional ² States
Net farm income		
Computerized milking system	1.03	0.03
Use of automatic takeoffs on milking units	4.43 ^b	13.94 ^c
Use of artificial insemination	3.77 ^b	0.16
Dairy cows milked three times per day	0.14	3.23 ^a
Net returns per unit		
Computerized milking system	1.19	2.27
Use of automatic takeoffs on milking units	0.32	1.37E-07
Use of artificial insemination	1.83	10.81 ^c
Dairy cows milked three times per day	0.22	0.03

a,b,c denote statistical significance at 0.10, 0.05, and 0.01 levels, respectively.

¹Relevant numerator and denominator degrees of freedom are 1 and 135, respectively.

²Relevant numerator and denominator degrees of freedom are 1 and 321, respectively.

Source: USDA, Economic Research Service.

commercial dairy farms in the traditional milk-producing States, in addition to improving cow performance, returns are found to increase significantly if the debt-to-assets ratio is lowered, and if per-cow forage and purchased feed costs are controlled.

Dairy farming is labor intensive. The increase in the minimum wage enacted in 1996 is likely to make it harder for many dairy operations to afford farm labor (Findeis, 1995). This study finds that an increase in the cost of labor in the non-traditional milk-producing areas will dramatically affect the farms' profitability levels. To these farms, reducing the amount of hired labor, while implementing production methods capable of increasing labor productivity might be a viable strategy. Since farm labor accounts for about 10 percent of all farm production expenses on dairy farms (Oliveira, 1991), it is evident that rising labor costs on farms without labor-saving technologies can be substantial.

The study provides evidence of the linkage of herd size to the profitability of the farm business, particularly for commercial dairy farms in the non-traditional milk-producing States. The incidence of large farming operations in these milk-producing States (at an average size of 370 milking cows) and the evidence from this study that points to higher net farm income resulting from continued farm expansion indicate the presence of some underlying incentives. Incentives that provide impetus for farm enlargement include production and marketing economies, management expertise, tax incentives, specialization, labor-saving equipment and timeliness in getting things done, nonfarm investment, and farm consolidation (Krause and Kyle, 1970; Stanton, 1978).

For a commercial dairy producer in the traditional milk-producing States, profitability of the farm business seems to be highly correlated with the adoption of capital- and management-intensive technologies. Dairy farms in this group have much lower adoption rates for the combined technologies, at 9 percent compared with 42 percent for farms in non-traditional milk-producing States (table 3). Efforts by policymakers to widen access to relatively inexpensive credit to allow for the purchase of costly labor-saving equipment, particularly to low-equity farms operated by young farmers, should assist commercial dairy farms in these milk-producing States to remain competitive.

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