

2000 Dairy Enterprise Analysis

Kentucky Farm Business Management

Agricultural Economics-Extension No. 2001-14
October 2001

Colby A. Blair, Darwin V. Foley, and Jack McAllister

University of Kentucky
Department of Agricultural Economics
400 Charles E. Barnhart Bldg.
Lexington, KY 40546-0276

Phone: 859-257-5762

Fax: 859-323-1913

URL: <http://www.uky.edu/Ag/AgEcon/>

Kentucky Farm Business Management 2000 Dairy Enterprise Analysis

Acknowledgements

Special recognition is extended to the Farm Business Analysis Specialists and farmers that contributed data to the Kentucky Farm Business Management (KFBM) program. Without their involvement, this study would not have been possible. Considerable time and effort were invested in allocating cost of inputs used by more than one enterprise, and making other judgments necessary to ensure the accuracy of the data. The authors also acknowledge the contributions of four former State Coordinators, Dr. Craig Infanger, Dr. Steve Isaacs, Dr. Fred Justus, and Dr. Chuck Moore, for their efforts in establishing the original analytical format for the data collection and the analysis of the dairy enterprises. Dr. Will Snell began serving as KFBM State Coordinator in 1999 and continues to serve in that role. Their leadership has been responsible for the continuation of this study.

The Area Farm Business Analysis Specialists are:

Colby A. Blair	Bluegrass Association	(859) 252-3673	cablair@uky.edu
Rick Costin	Lincoln Trail Association	(270) 737-4799	rcostin@uky.edu
Darwin V. Foley	Louisville Association	(502) 633-5513	dfoley@uky.edu
David L. Heisterberg	Pennyroyal Association	(270) 886-5281	dheister@uky.edu
Rush H. Midkiff	Pennyroyal Association	(270) 842-5823	rmidkiff@uky.edu
William M. Snell	State Coordinator	(859) 257-7288	wsnell@uky.edu
Gregg Ibendahl	State Farm Mgt. Specialist	(859) 257-3616	gibendah@uky.edu
KFBM Website	http://www.uky.edu/Ag/AgEcon/farmmgmt.html		

A Special Note to Our Readers

The data for this study are drawn from the detailed financial and production records of producers cooperating with the Kentucky Farm Business Management program. The data are not drawn from a random sample of farms in the state. However, these data are the most accurate and detailed farm financial information available and represent the closest approximation to “real world” farm financial data that are available to researchers and educators. Every attempt has been made to select farms for these research studies that are “typical” and have complete financial information available for analysis. These data are carefully cross-checked by our farm management specialists before inclusion in this analysis. It should be noted that farms included in this study are representative of commercial farms producing major commodities and livestock but not of all farms in Kentucky.

TABLE OF CONTENTS

Abstract	1
Introduction	2
Methods and Definitions Used in Study.....	2
Description of Dairy Enterprises Studied and Comparison with KY Dairy Industry	4
Average Costs and Returns	4
Variability in Costs and Returns.....	7
Cost Structure for Entire Group	12
Implications and Analyses of Financial Returns	13
Production and Other Variables That Can Influence Profits	14
Costs and Returns by Herd Size	17
Costs and Returns by Milk Production Per Cow.....	23
Costs and Returns by Total Costs Per Cow.....	27
Conclusions and Observations	31

LIST OF TABLES

Table 1: Average Costs and Returns Per Cow, Dairy Enterprises KFBM 1993-2000.....	6
Table 2: Average Costs and Returns Per CWT. of Milk Produced, Dairy Enterprises KFBM 1993-2000.....	6
Table 3: Per Farm Averages for Economic and Production Variables by Net Returns Over All Costs Per Cow, Dairy Enterprises KFBM 2000	9
Table 3: A Per Cow Averages for Costs and Returns by Net Returns Over All Costs Per Cow, Dairy Enterprises KFBM 2000	10
Table 3B: Per CWT. Averages for Costs and Returns by Net Returns Over All Costs Per Cow, Dairy Enterprises KFBM 2000	11
Table 4: Economic and Production Variables That Influence Profits, Dairy Enterprises KFBM 1991-2000.....	16
Table 5: Practical Ranges for Economic and Production Variables That Influence Profits, Dairy Enterprises KFBM 2000	17
Table 6: Per Farm Averages for Economic and Production Variables by Herd Size, Dairy Enterprises KFBM 2000.....	20
Table 6A: Per Cow Averages for Costs and Returns by Herd Size, Dairy Enterprises KFBM 2000	21
Table 6B: Per CWT. Averages for Costs and Returns by Herd Size, Dairy Enterprises KFBM 2000.....	22

Table 7: Per Farm Averages for Economic and Production Variables by Milk Production Per Cow, Dairy Enterprises KFBM 2000.....	24
Table 7A: Per Cow Averages for Costs and Returns by Milk Production Per Cow, Dairy Enterprises KFBM 2000.....	25
Table 7B: Per CWT. Averages for Costs and Returns by Milk Production Per Cow, Dairy Enterprises KFBM 2000.....	26
Table 8: Per Farm Averages for Economic and Production Variables by Total Costs Per Cow, Dairy Enterprises KFBM 2000.....	28
Table 8A: Per Cow Averages for Costs and Returns by Total Costs Per Cow, Dairy Enterprises KFBM 2000.....	29
Table 8B: Per CWT. Averages for Costs and Returns by Total Costs Per Cow, Dairy Enterprises KFBM 2000.....	30

LIST OF FIGURES

Figure 1: Net Returns Over All Costs Per Cow vs. Milk Production Per Cow, Dairy Enterprises KFBM 2000.....	8
Figure 2: Composition of Production Costs, Dairy Enterprises KFBM 2000.....	12
Figure 3: Composition of Totals Cost Per Cow by Herd Size, Dairy Enterprises KFBM 2000.....	19
Figure 4: Net Returns Over All Costs Per Cow vs. Total Costs Per Cow, Dairy Enterprises KFBM 2000.....	27
Figure 5: KFBM Membership by County, 2000.....	32

KENTUCKY FARM BUSINESS MANAGEMENT 2000 DAIRY ENTERPRISE ANALYSIS

Colby A. Blair , Darwin V. Foley and Jack McAllister¹

Abstract

This report contains the findings of a study of dairy enterprises on farms participating in the Kentucky Farm Business Management (KFBM) program. In 1998, KFBM changed vendors for summary processing and, as a result, the program also changed the methodology used in cost analysis. This will explain the deficiencies in some of the trend charts for the 1998 year. For 1999 and 2000, the authors put forth extra effort to prevent gaps in the KFBM data. This will allow the study to continue to show a trend for all variables.

1. In 2000, 31 enterprises were evaluated. Farms in this study averaged 143 cows, and ranged in size from 42 to 466 cows. Average milk production per cow was 16,763 pounds, with farm averages ranging from 11,643 pounds per cow to 21,212 pounds per cow.
2. Average **Net Returns Over All Costs** of dairy enterprises studied were slightly negative. Net returns, considering both cash and non-cash costs, averaged -\$73 per cow. On a per hundredweight (cwt.) basis of milk produced, net returns averaged -\$0.51.
3. **Total Returns** averaged \$2,557 per cow. Milk prices averaged \$13.93 per cwt. Beef prices are presently being reported separately for market animals and breeding animals². Producers received \$71.25 per cwt. of market beef sold and \$41.81 per cwt. of breeding animals sold in 2000. These figures show upward movement from 1999 prices of \$58.14 and \$37.48 for market and breeding animals, respectively. The studied farms produced 545 pounds of beef per cow. This is slightly lower in comparison to 1999's figure of 578 pounds of beef per cow. Beef returns averaged \$224 per cow in 2000 compared to \$199 per cow in 1999. Beef returns per cow equaled 8.76% of total dairy returns per cow in 2000 versus 6.66% recorded in the 1999 KFBM Dairy Enterprise Study.
4. These 31 enterprises averaged \$2,631 **Total Costs** per cow in 2000, a decrease of \$104 per cow from the 1999 average. Non-feed costs decreased \$63 per cow from 1999 and feed costs are back to 1995 levels.
5. Dairy enterprises varied greatly in levels of production efficiency, costs and returns. Although average net returns over all costs were slightly negative, 13 of 32 herds had positive net returns over all costs per cow. The high return farms averaged \$168 net returns per cow or \$1.01 per cwt. of milk produced. The low return farms averaged a net loss of -\$316 per cow or -\$2.10 per cwt. of milk produced.

This publication expands on these highlights and on the factors contributing to the results. It includes results of analyses of the cost structure and profitability of dairy enterprises when sorted by net returns per cow, herd size, milk production per cow and total costs per cow.

¹ Colby A. Blair and Darwin V. Foley are Bluegrass Area and Louisville Area Farm Business Analysis Specialists with the Kentucky Farm Business Management program, a cooperative effort between the Department of Agricultural Economics, University of Kentucky, and the incorporated Farm Analysis Groups whose members are farmers. These cooperator-farmers are located in 57 counties in Central and Western Kentucky (see [Figure 5](#) at the end of this publication). Ten different Farm Analysis Specialists work with these farms on a regular basis to ensure accurate and complete record keeping. At year's end, they provide the cooperator-farmers with a complete summary and analysis of the farm business. Jack McAllister is an Extension Professor in Dairy Cattle Genetics, Systems and Economics with The University of Kentucky's Animal Sciences Department.

² Because the figure for average price received on all beef sold on a cwt. basis no longer exists there will be no comparisons made to this figure.

Introduction

In 1979, the Kentucky Agricultural Experiment Station initiated a study to determine how well Kentucky dairy farmers compete with other dairy farmers in this region. Physical and financial records of dairy enterprises on farms in the Kentucky Farm Business Management (KFBM) program for 1979 through 2000 have been collected and analyzed. This report focuses on the 2000 results of 31 dairy enterprise records, and compares these to findings for the past several years so that changes during this period can be examined.

Based on results from this admittedly small sample of 31 enterprises, Kentucky dairy enterprises, on average, were unable to cover all costs in 2000. Milk production was higher probably due to low feed prices, mainly the price of grain. Although total costs per cow were lower in 2000 versus 1999, lower milk prices kept average net returns over all costs negative. From 1993 to 2000 only three years (1993, 1994, and 1999) showed positive average net returns over all costs per cow.

Methods and Definitions Used in Study

Most of this study's production and financial data was calculated as a normal part of the complete farm business records kept by participants in KFBM. For inputs used by more than one enterprise, the cooperating farmers and their Farm Business Analysis Specialist allocated the appropriate proportion of the costs to the dairy enterprise. In 1998, KFBM adopted the Illinois Farm Business Management program for year-end analysis. The data collection and reporting format is different from past studies, specifically all years prior to 1998. The 1998 data presentation was different and comparisons with prior years were rather limited. However, for 1999 and forward, KFBM has made an extra effort to present the data in a manner that will allow comparisons to be made with previous years. The exception is that there will be some gaps in comparison when a relationship to 1998 is made. The following definitions and explanations are used:

Total Returns – The total returns attributable to the dairy enterprise for the year. This figure is a sum of the following variables:

- The value of milk sold.
- The value of milk and beef used for farm and family consumption.
- The value of all dairy animals sold.
- An adjustment for the difference in the value of dairy animals on the farm at the time of the beginning and ending inventories of the said animals.

In 2000 milk returns accounted for 91.24% of total dairy enterprise returns with beef returns accounting for the remaining 8.76%.

Total Costs of Production – The total charge, both cash and non-cash, for all factors of production, except management, used by the dairy enterprise for the year. Inputs were charged using the procedures and rates employed in KFBM. In 2000, operator and family labor was charged \$2,100 per month (\$25,200 per year). Interest on both borrowed and equity capital was charged at rates of 4.5% per year for land and 9.0% per year for buildings, equipment, cash operating expenses, and feed and livestock inventories. Land used for dairy lots and building sites was valued at its agricultural value. See [Table 2](#) for the interest rates and unpaid labor charges used in prior years.

Depreciation on buildings, machinery and equipment used in the dairy enterprise was taken from the operator's depreciation schedule, with adjustments to the straight-line method of depreciation when farms used expense election for new purchases. Values for machinery and building depreciation were taken from economic depreciation schedules as maintained by the KFBM program. Equipment is generally depreciated over ten years and farm buildings, excluding feed and grain bins or single purpose structures, are depreciated over 25 years.

Feed raised on the farm was charged at its yearly average market value, that is, the price farmers would have received if the feed were sold and marketing costs were deducted. For example, corn produced and fed on the farm was charged to the dairy enterprise at \$2.09 per bushel in 2000. Charges for hay and silage depended upon type and quality. Pasture was charged at \$0.22 per day of grazing by an animal unit where 1 animal unit equals 1,000 pounds.

Net Returns Over All Costs – The result of **Total Returns less Total Costs**. Because all cash and non-cash costs, except charges for management, are deducted, **Net Returns Over All Costs** represent the financial reward attributable to the management of the dairy enterprise. This study presents this value on a per farm, per cow and per cwt. basis.

Charges must be made for all inputs to correctly determine enterprise profitability. One must recognize, however, that non-cash charges for the individual farmer’s labor and interest on her/his equity capital are also returns to these factors of production. This assumes that returns are high enough to reward these inputs. Since these are the farmer’s resources, the returns can be used for whatever purposes he/she wishes. Examples of such avenues for the excess returns could be family living, principal repayment, investment, etc.

Returns and Costs of Milk Production – The dairy enterprise is different from most agricultural enterprises because it has two major outputs, milk and beef. While milk is the primary product sold, the value of beef produced and sold can be substantial. Having two outputs produced simultaneously presents problems in allocating production costs and returns. The question arises as to what proportion of each cost should be charged to milk and what proportion to beef.

The method selected in this study is to make an adjustment to total cost equal to the value of beef produced by the dairy enterprise, rather than to allocate each individual cost item to milk and beef. This is illustrated with the following measures:

$$\begin{aligned} \text{Total Returns Per cwt. of Milk} &= \frac{\text{Total Dairy Returns (Milk \& Beef)}}{\text{Total cwt. of Milk Produced}} \\ \text{Total Costs Per cwt. of Milk} &= \frac{\text{Total Dairy Costs (Milk \& Beef)}}{\text{Total cwt. of Milk Produced}} \end{aligned}$$

Adjusted Costs of Milk – This is the cost of producing milk assuming that the value of the beef produced equals the cost of producing that beef. This figure is calculated by subtracting the value of beef produced from the total costs of milk. Although beef is a supplemental product of milk production, it is imperative to account for its value. By making the assumption that beef production costs are equal to beef returns, one can compare the remaining costs of production to the price of milk. One should take note that by using this methodology, costs of milk produced would be increased in the case of negative beef returns. This scenario occurred on 6 of the 32 farms in the present study.

The following equation will express the aforementioned method as a formula:

$$\text{Adjusted Cost of Milk} = \frac{(\text{Total Dairy Costs}) - (\text{Total Value of Beef Produced})}{\text{Total Milk Produced}}$$

This figure is presented on a per farm, per cow and per cwt. basis in this study.

CWT. Milk Equivalents (M.E.) – The value of beef produced divided by the average price received per cwt. of milk sold; plus the total cwt. of milk produced.

Description of Dairy Enterprises Studied and Comparison with Kentucky's Dairy Industry³

The 31 dairy enterprises in 2000 had an average of 143.0 cows in the milking herd. Enterprises ranged in size from 42 to 466 cows. Six herds (19%) had 75 or fewer cows, seven herds (23%) had from 75 to 100 cows, eight herds (26%) had between 100 and 150 cows, and ten herds (32%) had more than 150 cows.

Milk production per cow in this study averaged 16,763 pounds, a decrease of 185 pounds from the 16,948 pounds average in 1999. The 2000 Kentucky average production as reported by the Kentucky Agricultural Statistics Service (KASS), was 12,803 pounds per cow, up 435 pounds from the 12,368 pounds per cow average reported for 1999. It can be noted here that farms that participated in the KFBM Program and are represented in this study produce at a significantly higher level on a per cow basis than the average dairy farm in Kentucky. The data shows approximately 31% more milk production per cow for the farmer-cooperator on the KFBM Program that participated in the 2000 Dairy Enterprise Study relative to the average dairy operator in Kentucky as reported by KASS.

While production per cow for Kentucky dairy herds has climbed steadily from the period when this study began, the number of cows in Kentucky has declined dramatically, from 255,000 head in 1979 to 132,000 head in 2000. In addition, milk production in Kentucky and the southeast has declined as a percentage of the nation's total production during this period. Kentucky's decline in number of cows and increase in milk per cow follows a similar national trend. While both Kentucky's and the Southeast's total milk production has declined as a percentage of national milk production, Kentucky has the highest per capita milk production of the 12 southeastern states.

Average Costs and Returns

Net returns over all costs to dairy farms in KFBM has been quite erratic in the late 80's and 90's and are expected to be even more erratic in the future due to the lowering of price support programs for both grain and milk. Looking at the past several years of this study, 1999 shows the only instance of positive management returns for KFBM dairies since 1994. Although an analysis of 1998 is not complete due to alternative methods, it does appear that 1998 was also a year that showed positive management returns for dairies in the KFBM study. Cost and return data that detail these results are presented in [Table 1](#) and [Table 2](#).

From 1987 to 1992, changes in net returns over all costs were driven mostly by both changing milk prices and increases in milk production per cow. However, in 1993, 1994 and 1995 increases in costs of production had a greater impact on net returns. Milk prices received per cwt. in 2000 were \$2.53 per cwt. lower than those received in 1999. This halts the upward trend in milk prices that data produced from 1997 to 1999. The upward trend in milk prices coupled with the downward trend in feed prices had contributed to positive returns for the farms studied in 1999.

Milk prices received over the 1990 to 2000 period have been fairly volatile. Monthly price charts for the years 1990 through 1999 showed that production driven seasonal price patterns had given way to price patterns determined by the interaction of milk supply and an erratic demand for cheese. Local prices lagged the Minnesota - Wisconsin price – a price that reflected the demand for cheese -- by a two-month period. In January of 2000, new federal legislation reduced the number of milk orders and put in place a new component pricing system to producers that responded more quickly to market prices. Analysts say that the new order system has given a slight boost to Kentucky milk prices. Prices are now determined by milk supply and the demand for milk's components (skim milk and butterfat). During this time it has been seen that butter prices as well as cheese prices have played a major role in the butterfat component of the new pricing system. For more information on the component pricing system, the reader may contact the Milk Market Administrator, P. O. Box 19030, Louisville, Kentucky 40261 (502) 499-0040.

Total returns per cow averaged \$2,557 on the farms studied, \$433 less than the 1999 average of \$2990. Beef production per cow decreased compared to 1999 and beef prices received, both market animal and breeding animal, improved from 1999 levels. Beef returns increased from \$199 per cow in 1999 to \$224 per cow in 2000.

³Participation in this study was voluntary. No attempt was made to randomly select participants; consequently, no attempt is made to draw inferences about dairy herds outside this sample. However, the results are likely a reasonable representation of relatively progressive commercial dairy enterprises.

Total costs per cow were down slightly, from \$2,735 in 1999 to \$2,631 in 2000. Non-feed costs decreased \$63 per cow, while feed costs decreased \$42 per cow. The decrease in non-feed costs is the first reversal of the upward trend that had continued since 1993 with the exception of 1996 and the unknown of 1998. Feed costs will continue to remain low and possibly decrease through 2001 and allow producers to capture some of the lowest feed costs in several years.

Net returns per cow were significantly lower in 2000 compared to 1999. Producers in this study experienced a -\$73 per cow average net return over all costs in 2000, while 1999 showed a net return of \$254 per cow. Average total returns per cwt. of milk produced, including beef returns, were \$15.25 on the farms in this study. This was a decrease of \$2.37 per cwt. from 1999's record high of \$17.62 and \$0.71 lower than 1998's return of \$15.76.

Total costs of production averaged \$15.76 per cwt. of milk produced in 2000, a decrease of \$0.44 per cwt. from the average of \$16.20 recorded in 1999. This is, primarily, a result of non-feed cash costs being \$0.44 less per cwt. of milk produced in 2000 versus 1999. Producers spent less on every item within the category of non-feed cash costs in 2000 than they did in 1999, except for fuel and oil and building and fence repair. Net returns over all costs averaged -\$0.51 per cwt. of milk produced in 2000. 1999's KFBM Dairy Enterprise Study provides the first positive management return in the KFBM Dairy Enterprise Studies since 1994 (although 1998 might also have been positive if all data had been available). So, although costs per cwt. of milk produced were lower, returns were not enough to offset the costs to the extent that a positive return over all costs could be generated for the average farm.

The value of beef amounted to \$1.32 per cwt. of milk produced. Although dairy herds produce as much beef per cow as beef herds, the value of beef production as a percent of a cow's total returns had decreased as milk production per cow had increased. However, this year marked a difference where beef returns in 2000 (8.76%) actually made up a larger portion of total returns versus 1999 (6.70%). This is primarily due to the escalating prices that beef producers in general have received in 2000. After adjusting the costs of production per cwt. of milk produced by the value of beef production, \$1.32 per cwt., the adjusted cost of producing milk was lowered to \$14.44 per cwt. This figure is used to compare cost per cwt. of milk produced to milk price received per cwt. of milk produced to see if milk sales are covering milk costs.

Table 1: Average Costs and Returns Per Cow									
Item	1993	1994	1995	1996	1997	1998	1999	2000	Average*
Number of Dairy Cows	107.7	105.2	110.7	117.7	129.7	140.0	131.7	143.0	123.2
Total Dairy Returns	2410	2450	2343	2614	2672	2910	2990	2557	2618
Costs of Production:									
Feed	1222	1208	1240	1450	1417	1349	1278	1236	1300
Building & Fence	64	68	60	67	70	75	74	80	70
Machinery & Equipment	292	319	323	328	340	378	393	374	343
Labor	356	380	412	408	433	N/A**	468	431	412
Livestock Supplies	115	120	137	139	140	150	155	142	137
Veterinary	66	70	82	69	75	92	79	73	76
Interest	219	232	253	238	246	N/A**	242	258	241
Insurance, Taxes & Misc.	38	38	42	38	37	41	47	38	40
Total Cost of Production	2372	2435	2553	2740	2758	N/A	2735	2631	2603
Net Returns Over All Costs	40	15	-210	-125	-85	N/A	254	-73	-26
Total Dairy Returns	2410	2450	2343	2614	2672	2910	2990	2557	2618
Feed Costs	1222	1208	1240	1450	1417	1349	1278	1236	1300
Returns Over Feed Costs	1188	1242	1103	1164	1255	1561	1712	1322	1318
Non-Feed Costs	1148	1227	1313	1290	1340	N/A	1458	1395	1310
Net Returns Over All Costs	40	15	-210	-125	-85	N/A	254	-73	-26

Table 2: Average Costs and Returns Per CWT. Of Milk Produced									
Item	1993	1994	1995	1996	1997	1998	1999	2000	Average*
Total Dairy Returns	15.02	15.51	14.02	16.47	15.57	15.96	17.62	15.25	15.68
Costs of Production:									
Feed	7.68	7.70	7.47	9.16	8.29	7.40	7.61	7.46	7.85
Building & Fence	0.39	0.43	0.38	0.43	0.42	0.41	0.44	0.47	0.42
Machinery & Equipment	1.85	1.91	1.95	1.97	1.98	2.06	2.33	2.24	2.04
Labor	2.27	2.43	2.50	2.61	2.53	N/A**	2.76	2.58	2.53
Livestock Supplies	0.71	0.74	0.79	0.84	0.79	0.82	0.89	0.82	0.80
Veterinary	0.40	0.43	0.48	0.42	0.43	0.50	0.45	0.42	0.44
Interest	1.37	1.48	1.53	1.53	1.44	N/A**	1.44	1.55	1.48
Insurance, Taxes & Misc.	0.24	0.24	0.25	0.27	0.21	0.22	0.28	0.23	0.24
Total Costs of Production	14.87	15.48	15.36	17.33	16.09	N/A	16.20	15.76	15.87
Net Returns Over All Costs	0.15	0.04	-1.33	-0.86	-0.52	N/A	1.42	-0.51	-0.23
Total Dairy Returns	15.02	15.51	14.02	16.47	15.57	15.96	17.62	15.25	15.68
Feed Costs	7.68	7.70	7.47	9.16	8.29	7.40	7.61	7.46	7.85
Returns Over Feed Costs	7.34	7.81	6.55	7.31	7.28	8.56	10.01	7.79	7.83
Non-Feed Costs	7.19	7.78	7.87	8.17	7.80	N/A	8.59	8.29	7.96
Net Returns Over All Costs	0.15	0.04	-1.33	-0.86	-0.52	N/A	1.42	-0.51	-0.23
Milk Price Received (\$/CWT)	13.35	13.81	13.18	15.53	14.44	15.93	16.46	13.93	14.58
Adjusted Total Cost of Milk	13.20	13.78	14.52	16.39	14.96	N/A	15.04	14.44	14.62
Labor & Interest Rates:									
Unpaid Labor Rate/Year	17400	18000	19200	19800	21600	22800	24000	25200	21000
Interest Rate: Non-Land	8.5%	9.0%	9.5%	9.0%	9.0%	9.0%	8.5%	9.0%	8.9%
Interest Rate: Land	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	4.5%	4.9%

* Average column is a simple average of the items over the years that data was available.

** Because of a change in software provider, 1998 data did not include unpaid labor figures or non-cash interest charges. This will leave a gap for 1998 in calculating Total Costs of Production, Non-Feed Costs and Net Returns Over All Costs. Extra effort was taken in 1999 and 2000 by the authors to resume these calculations, however, the gap created in 1998 due to the lack of figures is irreparable. These figures are not usable for 1998 and for purposes of comparing 1999 and/or 2000 to these figures, a comparison will be made to the 1997 year.

Variability in Costs and Returns

A consistent finding in all twenty-two years of this study has been the large variation among dairy enterprises in levels of production efficiency, costs per unit of production, and net returns per unit of production. This variability illustrates the complex nature of the dairy production process and the large number of factors that affect unit costs.

To show the extent of variation in costs and returns, and to examine how some important factors contribute to that variation, enterprises in this study were first divided into three approximately equal groups using net returns per cow as a basis for division into the groups. The three groups were classified as:

1. High Returns
2. Middle Returns
3. Low Returns

Averages for economic and production variables sorted by net returns over all costs per cow are presented in [Table 3](#), [Table 3A](#) and [Table 3B](#).

High returns enterprises averaged \$168 per cow of net returns over all costs. This equates to \$1.01 per cwt. of milk produced. For the farms that make up the low returns group, total costs exceed total returns by \$316 per cow, resulting in a loss of \$2.10 per cwt. of milk produced. Eighteen (58%) of the farms in the 2000 study failed to cover all costs. This data contrasts with the 1999 study when only six (21%) of the twenty-eight farms in the study were unable to cover all costs. In order for the low returns group of farms to become profitable in the long run (i.e., cover all costs of production) substantial improvement must occur.

Total returns averaged \$2,767 per cow for the high returns group, down from 1999's high returns group that posted an average of \$3,244 per cow. Total returns were \$544 greater for the high returns group compared to the low returns group. Both high returns farms and low returns farms received \$13.94 per cwt. for the milk they sold. High returns farms received \$1.04 more per cwt. of milk produced for the beef they sold relative to the low returns group. Compared to the average farm, high returns farms' milk sales and beef sales brought \$0.01 more and \$0.56 more per cwt for milk and beef respectively. In past years of this study, high returns farms have generally received a slightly higher price for both milk and beef, but high prices received have not been a significant factor distinguishing whether or not a farm falls into the high returns group.

The difference in net returns over all costs between the high returns and low returns groups was \$484 per cow. As shown above, the high returns groups experienced \$544 more per cow on the return side, while the low returns group witnessed approximately \$61 of an advantage per cow on the costs side. Milk production averaged 17,550 pounds per cow for the high returns group, over 2,489 more pounds per cow than the average farm in the low returns group. Beef produced per cow was 165 pounds more for the high returns group than those comprising the low returns group, 635 pounds vs. 470 pounds.

Total costs averaged \$2,599 per cow on the high returns farms, and \$2,538 per cow on the low returns farms, making the difference of \$61 per cow. Thus, in 2000, cost differences between groups were much less significant than differences in returns. After an adjustment for beef income, the high returns producers had an adjusted total cost of milk equating to \$2,276 per cow, \$12.94 per cwt., compared to \$2,415 per cow, \$16.04 per cwt., on the low returns farms, a difference of \$139 per cow or \$3.10 per cwt.

The \$61 difference in total costs was made up of the high returns group incurring approximately \$17 more per cow on feed items and experiencing approximately \$45 more per cow on non-feed items when compared to the low returns group. In the breakdown of feed costs, the low returns group spent less per cow on hay and dry roughage and other silage versus the high returns group. The high returns group spent less on concentrates, corn silage, and that group's charge for pasture was less than that of the low returns group on a per cow basis. Non-feed cash costs per cow were more than 9% higher for the farms comprising the high returns group versus those farms included in the low returns group, the largest differences occurring within veterinary and paid labor expenses. For non-feed non-cash costs the low returns group incurred more unpaid labor charges as well as economic depreciation for buildings relative to the high returns group.

Death loss as a percent of total pounds produced was 18.4% for the high returns group compared to 28.2% and 45.9% for the middle and low returns groups, respectively. This is the typical relationship that prevails in KFBM Dairy Enterprise Studies. Higher death loss percentages are an indication of herd health problems and less management control.

In 2000, net returns per cow were correlated with milk per cow (See [Figure 1](#)). Production for the high returns group was 330 less pounds per cow than that of the middle returns group and 2,489 more pounds per cow than that of farms in the low returns group. This was very similar to the difference that existed between the two in 1999. KFBM's 1999 Dairy Enterprise Study reported milk production per cow of 17,867 pounds and 15,279 pounds for the high returns group versus the low returns group, a difference of 2,588 pounds. In 1997 net returns over all costs per cow were not correlated with milk production per cow. Production for the high returns group was basically that of the low returns group and the middle returns group. The previous year, 1996, showed some correlation between milk production per cow and net returns over all costs per cow. Production for the high returns group exceeded both the middle returns group and the low returns group by 115 and 994 pounds per cow, respectively. In 1995, there was no correlation and in that year the milk production per cow of the three groups fell within 156 pounds of each other, similar to 1997.

There were twelve farms in this study with milk production greater than 18,000 pounds per cow. Six of these farms fell into the high returns group. Four farms are located in the middle returns group. Two of these farms is located in the low returns group. There were ten farms in this study with milk production less than 15,000 pounds per cow. Seven out of the bottom ten farms, in terms of milk production per cow, were members of the low returns group. One farm was located in the middle returns group. Two were located in the high returns group. Net returns over all costs per cow is plotted against milk production per cow in **Figure 1** for all 31 herds studied in 2000. The pattern appears to have a noticeably upward trend and helps explain why milk production was a strong factor in determining net returns.

Figure 1
Net Returns Over All Costs Per Cow vs. Milk Production Per Cow
Dairy Enterprises KFBM 2000

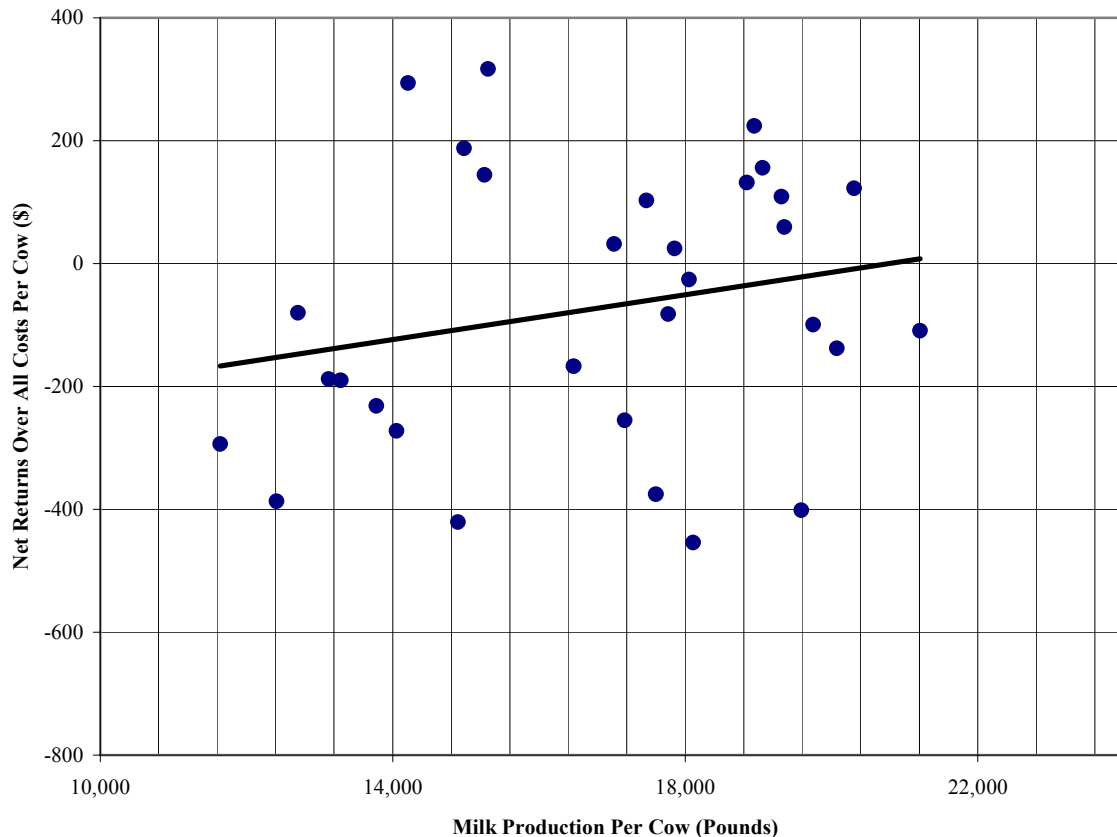


Table 3: Per Farm Averages for Economic and Production Variables by Net Returns Over All Costs Per Cow, Dairy Enterprises KFBM 2000

Enterprise Summary:					
	Units	Average	High	Middle	Low
Number of Herds	Herds	31	11	9	11
Total Dairy Returns	\$	374731	450525	464494	225495
Total Feed Costs	\$	176468	200986	211473	123309
Returns Above Feed Cost	\$	198263	249539	253021	102186
Total Non-Feed Costs	\$	204723	223637	266534	135238
Net Returns Over All Costs	\$	-6460	25902	-13513	-33051
Other Economic Variables:					
	Units	Average	High	Middle	Low
Returns Per \$100 Feed Fed	\$	208	223	220	183
Price Received Per CWT of Milk	\$	13.93	13.94	13.91	13.94
Price Received Per CWT Beef (Market)	\$	71.25	74.44	79.11	61.62
Capital Investment Per Cow:					
	Units	Average	High	Middle	Low
Livestock	\$	1519	1567	1459	1520
Non-Livestock	\$	1019	954	1196	939
Total	\$	2538	2522	2655	2459
Other Production Variables:					
	Units	Average	High	Middle	Low
Average Number of Cows	Cows	143	160	174	100
Cows Dry	%	15.9	16.8	14.3	16.3
Animal Units in Herd	Units	271	320	327	178
Total Milk Production	CWT	24530	28490	30985	15290
Total Beef Production	Lbs.	77432	108019	79675	45010
Beef Per Cow	Lbs.	545	635	525	470
Milk Per Cow	Lbs.	16763	17550	17880	15061
Butterfat Per Cow	Lbs.	618	642	670	550
Value of Feed Fed Per CWT M.E.	\$	6.79	6.19	6.43	7.69
Total Concentrates Per CWT M.E.	Lbs.	58	57	51	64
Hay & Dry Forage Per CWT M.E.	Lbs.	35	39	23	40
Corn Silage Per CWT M.E.	Lbs.	110	96	112	123
Other Silage Per CWT M.E.	Lbs.	30	24	41	27
Pasture Days Per Animal Unit	Days	46	40	50	48
Hay Equivalent Per Cow	Tons	8.5	8.7	8.3	8.5
Average Purchase Price Per Breeding Animal	\$	1012	1092	1045	931
Breeding Cull Rate	%	24.8	25.7	25.3	23.3
Weight Per Breeding Animal Sold	Lbs.	1237	1329	1249	1137
Price Received Per CWT (Breeding)	\$	41.81	38.34	36.64	49.52
Death Loss: % of Pounds Produced	%	31.0	18.4	28.2	45.9
Death Loss: Total Pounds	Lbs.	18111	16497	16784	20810
Deaths: Market	Head	27	32	33	17
Deaths: Breeding	Head	13	12	14	14
Breeding Survival Rate	%	94.6	96.4	95.0	92.5
Labor Summary:					
	Units	Average	High	Middle	Low
Months Per Cow	Months	0.24	0.22	0.26	0.23
Milk Production Per Worker Per Year	Lbs.	910637	1055299	847818	817373

Table 3A: A Per Cow Averages for Costs and Returns by Net Returns Over All Costs Per Cow, Dairy Enterprises KFBM 2000					
Enterprise Returns:	Units	Average	High	Middle	Low
Milk Returns	\$	2333	2444	2483	2099
Beef Returns	\$	224	323	227	123
Total Dairy Returns	\$	2557	2767	2710	2223
Non-Feed Cash Costs:	Units	Average	High	Middle	Low
Livestock Supplies	\$	142	124	186	123
Veterinary	\$	73	89	74	55
Fuel & Oil	\$	29	27	35	26
Machinery Repair	\$	72	71	69	76
Building & Fence Repair	\$	47	53	47	40
Machine Hire	\$	135	134	131	138
Utilities	\$	76	66	82	81
Light Vehicle	\$	1	0	1	1
Paid Labor	\$	252	252	369	158
Insurance	\$	22	20	26	21
Property Taxes	\$	2	2	3	2
Miscellaneous	\$	14	9	16	17
Cash Interest	\$	75	55	83	88
Total Non-Feed Cash Costs	\$	938	902	1120	825
Feed Costs:	Units	Average	High	Middle	Low
Concentrates	\$	786	777	790	791
Hay & Dry Roughage	\$	186	219	160	175
Corn Silage	\$	200	189	202	208
Other Silage	\$	45	44	58	36
Pasture Charge	\$	19	17	19	19
Total Feed Costs	\$	1236	1247	1230	1230
Non-Feed Non-Cash Costs:	Units	Average	High	Middle	Low
Unpaid Labor	\$	178	160	126	239
Machinery Depreciation	\$	62	64	73	50
Building Depreciation	\$	33	25	41	35
Non-Cash Interest	\$	183	201	192	157
Total Non-Feed Non-Cash Costs	\$	456	450	432	482
Net Returns Summary:	Units	Average	High	Middle	Low
Total Costs of Production	\$	2631	2599	2782	2538
Adjustment for Beef Income	\$	224	323	227	123
Adjusted Total Cost of Milk	\$	2406	2276	2555	2415
Net Returns Over All Costs	\$	-73	168	-72	-316
Costs & Returns Summary:	Units	Average	High	Middle	Low
Total Dairy Returns	\$	2557	2767	2710	2223
Feed Costs	\$	1236	1247	1230	1230
Non-Feed Costs	\$	1395	1353	1552	1308
Net Returns Over All Costs	\$	-73	168	-72	-316
Costs Summary:	Units	Average	High	Middle	Low
Non-Feed Cash Costs	\$	938	902	1120	825
Feed Costs	\$	1236	1247	1230	1230
Non-Feed Non-Cash Costs	\$	456	450	432	482
Total Costs of Production	\$	2631	2599	2782	2538

Table 3B: Per CWT. Averages for Costs and Returns by Net Returns Over All Costs Per Cow, Dairy Enterprises KFBM 2000					
Enterprise Returns:	Units	Average	High	Middle	Low
Milk Returns	\$	13.93	13.94	13.91	13.94
Beef Returns	\$	1.32	1.88	1.24	0.84
Total Dairy Returns	\$	15.25	15.82	15.15	14.77
Non-Feed Cash Costs:	Units	Average	High	Middle	Low
Livestock Supplies	\$	0.82	0.68	1.01	0.80
Veterinary	\$	0.42	0.50	0.40	0.35
Fuel & Oil	\$	0.17	0.16	0.20	0.17
Machinery Repair	\$	0.42	0.41	0.37	0.48
Building & Fence Repair	\$	0.27	0.31	0.24	0.26
Machine Hire	\$	0.81	0.78	0.73	0.90
Utilities	\$	0.46	0.37	0.46	0.56
Light Vehicle	\$	0.00	0.00	0.00	0.01
Paid Labor	\$	1.48	1.40	2.04	1.10
Insurance	\$	0.13	0.12	0.15	0.13
Property Taxes	\$	0.01	0.01	0.01	0.01
Miscellaneous	\$	0.08	0.05	0.09	0.11
Cash Interest	\$	0.45	0.30	0.48	0.58
Total Non-Feed Cash Costs	\$	5.53	5.07	6.17	5.47
Feed Costs:	Units	Average	High	Middle	Low
Concentrates	\$	4.73	4.45	4.44	5.24
Hay & Dry Roughage	\$	1.15	1.30	0.88	1.21
Corn Silage	\$	1.20	1.07	1.19	1.33
Other Silage	\$	0.27	0.25	0.35	0.23
Pasture Charge	\$	0.12	0.10	0.11	0.14
Total Feed Costs	\$	7.46	7.18	6.98	8.14
Non-Feed Non-Cash Costs:	Units	Average	High	Middle	Low
Unpaid Labor	\$	1.10	0.93	0.71	1.58
Machinery Depreciation	\$	0.36	0.34	0.40	0.35
Building Depreciation	\$	0.20	0.14	0.22	0.25
Non-Cash Interest	\$	1.10	1.16	1.06	1.07
Total Non-Feed Non-Cash Costs	\$	2.76	2.57	2.40	3.25
Net Returns Summary:	Units	Average	High	Middle	Low
Total Costs of Production	\$	15.76	14.81	15.55	16.88
Adjustment for Beef Income	\$	1.32	1.88	1.24	0.84
Adjusted Total Cost of Milk	\$	14.44	12.94	14.31	16.04
Net Returns Over All Costs	\$	-0.51	1.01	-0.40	-2.10
Costs & Returns Summary:	Units	Average	High	Middle	Low
Total Dairy Returns	\$	15.25	15.82	15.15	14.77
Feed Costs	\$	7.46	7.18	6.98	8.14
Non-Feed Costs	\$	8.29	7.64	8.57	8.73
Net Returns Over All Costs	\$	-0.50	1.01	-0.40	-2.10
Costs Summary:	Units	Average	High	Middle	Low
Non-Feed Cash Costs	\$	5.53	5.07	2.40	1.58
Feed Costs	\$	7.46	7.18	6.98	8.14
Non-Feed Non-Cash Costs	\$	2.76	2.57	2.40	3.25
Total Costs of Production	\$	15.76	14.81	15.55	16.88

Cost Structure for Entire Group

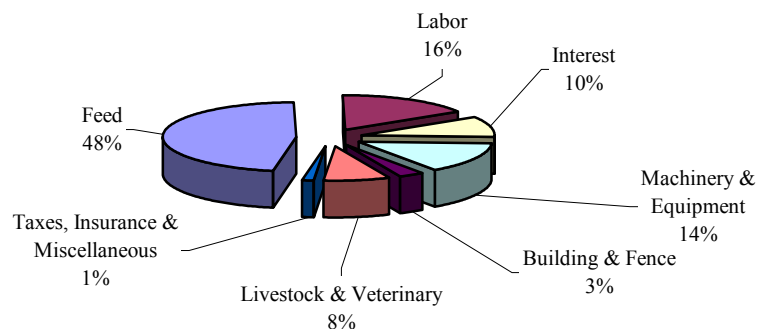
Cost items as a percentage of total cost in 2000 are shown in [Figure 2](#). As expected, feed was the largest single production cost at \$1,236 per cow, amounting to 48% of total costs per cow. Labor, the second largest cost in the dairy enterprise, accounted for 16% of the total costs. In 1999, feed costs were \$1,278 per cow, amounting to 46% of total costs per cow. 1997 feed costs totaled \$1,417 per cow or 51% of total costs per cow. Labor costs have remained fairly constant during this period with 1999 and 1997 showing 17% and 16% respectively.

One would have assumed that labor costs as a percent of total costs would have risen since 1996 due to both an increase in farm wages as well as an increase in the imputed charge for unpaid labor. Unpaid labor charges increased from \$2,000 per month in 1999 to \$2,100 per month in 2000. Unpaid labor costs per cow increased slightly from \$176 per cow in 1999 to \$178 per cow in 2000. It is important to recognize that as cow numbers increased unpaid labor per cow decreased. This relationship exists due to the fact that the operator is spreading her/his unpaid labor over more cows (143 cows in 2000 vs. 131.7 in 1999.) To see the impact of this relationship within the 2000 study, refer to Figure 3 where unpaid labor is included in Non-feed Non-cash Costs. Paid labor costs declined from \$292 per cow in 1999 to \$252 per cow in 2000. So one can see that total labor costs decreased from \$468 per cow in 1999 to \$431 per cow in 2000, but that labor as a percentage of total production costs on a dairy enterprise decreased only slightly (from 17% to 16%).

Machinery and equipment costs (repairs, fuel & oil, utilities, light vehicle, machinery hire and machinery depreciation) decreased by \$19 per cow from 1999 and amounted to 14% of total costs per cow, identical to 1999. Interest costs were 10% of total costs per cow, approximately \$16 more per cow than 1999. Cash interest costs were slightly lower from \$82 per cow in 1999 to \$75 per cow in 2000, while non-cash interest amounted to \$183 per cow, up from \$160 per cow in 1999. Total investment per cow was \$2,538 per cow in 2000. This is down from 1999's figure of \$2,894 per cow. It may be the case with the onset of lower milk prices in 2000 many dairy enterprises chose not make as many new capital purchases during 2000 versus 1999. Non-livestock capital investment per cow decreased from 1999's \$1,390 to \$1,019 in 2000.

Livestock supplies and veterinary expenses fell \$19 per cow under 1999 to \$215 per cow and comprised 8% of total costs per cow compared to 9% of total costs per cow in 1999. Building and fence costs (repairs and depreciation) were 3% of total costs per cow and the sum of insurance, miscellaneous and taxes accounted for the remaining 1% of total costs. Although buildings are often considered the major investment in the start up phase of a new dairy, this study has revealed that dairy producers consistently put more dollars toward machinery and dairy equipment than they do toward buildings. This is due, primarily, to purchases of new technology and new feeding systems such as Total Mixed Rations (TMR) that require a substantial investment in equipment.

Figure 2
Composition of Dairy Enterprise Production Costs
Dairy Enterprises KFBM 2000



Implications and Analysis of Financial Returns

The consolidation of Kentucky's dairy industry in recent years is a cause for concern. Contributing factors in recent years have been stricter health standards, retirement of owners, structural changes in the industry and price volatility due to the lowering of government supports on grain and milk. In certain parts of the state, the encroachment of urbanization has closed many dairies. Higher land prices and a labor market that offers 40 hours per week and benefits have added more challenges. While all of these factors contributed to the consolidation, one can see from the data in this study that lack of profitability even in a period of high milk prices and low feed costs may continue to drive down the number of dairy farms in Kentucky. If the low return farms persist in failing to cover all costs, the farms may no longer be in the dairy business. KFBM teaches that better management is achieved through better records. It is through record keeping that one can obtain the necessary information to make informed decisions.

In the long run, an enterprise should produce returns sufficient to cover the total costs of production with something left over to reward the operator for her/his management and risk-taking. In 2000, 13 of the 31 enterprises studied, 42%, had returns that were sufficient to cover all costs. This is in sharp contrast to 1999 when 79%, or 22 of 28, dairy enterprises did generate enough returns to cover all costs. 1997 and 1996 rates of success amounted to 38% and 35%, respectively. It is a challenge and one should be realistic when determining methods to overcome those obstacles. Year in and year out, regardless of prices and/or costs the best managers continue to experience success. Also, it must be noted here that because of higher input costs and lower milk prices received, many of the inefficient producers have left the dairy business and, likewise, they are no longer included in this study. Thus, the producers that remain in the present study are some of the best managers in the dairy business. A dairy farm manager's potential for success and viability depends upon the following:

- The business's financial position, that is, the proportion of capital that is borrowed.
- The relationship between the farm's returns and the composition of the cost structure.

In 2000, the low returns farms averaged a loss of \$316 per cow. Farms with this magnitude of a loss cannot expect to stay in the dairy business if these types of losses continue. Over the last 5 years Kentucky has lost approximately 600 dairy farms. This amounts to a 29% decline versus a 30% decline in the southeast and the 25% decline seen nationally. Apparently, the decline of dairy farms in Kentucky is no different than what is occurring in either the Southeast or the nation as a whole.

Since total costs of production include both cash and non-cash costs as well as feed and non-feed costs, it is useful to look at these components individually. While it is easy to play down non-cash costs as "paper" costs, accounting for both cash and non-cash costs is essential when analyzing the long run profitability of an enterprise. From such an analysis, one can envision the opportunities that he/she has to invest unpaid labor and equity elsewhere. It is imperative that all costs be included so that the profitability of competing enterprises can be compared. Through a comparison of competing enterprises, on a total costs basis, one is able to make informed decisions and can hopefully allocate the farm's resources in the most profitable manner. Further, the enterprise should pay the farm a reasonable wage for labor, a reasonable interest rate on the capital investment, and the farm should generate returns sufficient to cover the costs of depreciation (the loss in value of capital invested in machinery, equipment and buildings). Moreover, a livestock enterprise should pay for home grown feed that could be sold or used by another enterprise.

One logical way to examine a dairy enterprise's economic performance is to divide total costs into three broad components:

1. Non-Feed Cash Costs
2. Feed Costs
3. Non-Feed Non-Cash Costs

Feed costs include both the costs of purchased feeds and the market value of home grown feeds. Separating feed from the other cost categories is logical because feed is a product that can generally be sold or fed to another livestock enterprise. It follows that feed should be charged against the livestock enterprise at the price for which it could be sold, less marketing costs. Detailed breakdowns of cash and non-cash costs on a per cow and a per cwt. basis are shown in [Tables 3A, 3B, 6A, 6B, 7A, 7B, 8A](#) and [8B](#).

If dairy enterprise returns do not exceed non-feed cash costs plus the value of feed fed, one can conclude that the farm may be losing money by feeding the feed that is produced. Although this has not happened recently for the low returns group, it is important to note that such a case would present a situation where it could be more profitable to sell home grown feed instead of feeding it. KFBM prides itself in the ability to perform complete farm enterprise analysis. For any given dairy enterprise it is noted that there are other enterprises on that operation that may include hay, corn silage, other silage, etc. Costs are allocated to forage and/or grain enterprises and then the hay, silage, etc. is “sold” to the dairy enterprise at a fair market rate. KFBM then determines whether or not such sectors of the operation are cost effective to be supporting. For instance, in 2000 all home grown corn silage was “sold” to the dairy enterprise at \$20 per ton. If a given farm saw that it was costing it more than \$20 per ton to put up the corn silage then it may be more profitable to buy the corn silage from someone else at \$20/ton or find another source of feed that may be raised less expensively.

The 31 farms in this study averaged \$383 per cow above the sum of non-feed cash costs and feed costs. Total returns average \$2,557 per cow while non-feed cash costs plus the value of feed fed amounted to \$2,174 per cow. For each cwt. of milk produced, non-feed cash costs plus total feed costs averaged \$12.99. Total returns per cwt. milk produced for these farms averaged \$15.25. This left \$2.26 per cwt. to cover non-feed non-cash costs.

Non-feed non-cash costs include imputed charges for the operator’s labor as well as her/his family’s labor. Also included in these costs are imputed interest on the operator’s own investment, primarily buildings, facilities, equipment and dairy animals, and depreciation of the value of capital items used by the dairy enterprise. Non-feed non-cash costs for this study’s farms averaged \$456 per cow or \$2.76 per cwt. of milk produced.

The seriousness of covering cash costs and feed costs, but not covering non-cash costs is sometimes called “living off of depreciation,” and depends on two things:

1. The magnitude of the deficiency in covering all non-cash costs.
2. How long the deficit persists.

Unless there is income from some other source such as an off-farm job, income must be provided for family living expenses as well as cash for repayment of principal on loans, replacement of current capital items and any farm improvements that must be made. Farms that consistently fail to cover all or most non-cash costs will not survive in the long run without off-farm income. If they do survive, it is because they are either willing or able to accept a return on labor and/or capital that is below the opportunity costs of these resources.

Production and Other Variables That Can Influence Profits

The dairy enterprise involves a complex production process with a number of factors affecting costs and returns. Some are, for the most part, beyond the individual farmer’s control. Examples of such factors could be milk and beef prices, weather conditions, interest rates and government programs. Other factors are directly influenced by the operator’s actions or inactions.

To analyze a dairy enterprise, one must examine the level of performance achieved in different aspects of the production process. This study will look at the following two measures of performance:

1. How the enterprise has performed over time.
2. Performance variability within the enterprise.

Averages for the frequently calculated measures of dairy production performance over time are presented in [Table 4](#) for the years 1991 through 2000.

An upward trend is evident in milk production per cow and butterfat per cow. Another improvement has been in the amount of milk produced per worker. In calculating milk produced per worker, each full time worker is counted as 12 months of labor and part time labor is converted to a full time equivalent based on a 2,500 hour year, about 48 hours per week. Months of labor are applied to part time employees according to number of hours worked.

Capital investment per cow increased notably during the early years of this study to \$2,478 in 1982, and then declined to \$2,059 in 1987. The trend was mixed until 1993 when it took the largest increase, \$297. Capital investment per cow increased in each of the years from 1993 to 1997. 1998's figure is unknown while 1999 and 2000 introduces a different method of calculating investment. A complete explanation can be found in the footnote to [Table 4](#). Capital investment now includes the value of livestock, remaining undepreciated value of machinery and buildings (average of the beginning and end of the year values), and a portion of the feed inventories that are attributable to the dairy enterprise. Cash operating expenses are no longer included in the calculation.

Although the year-to-year averages of different production aspects were quite consistent, large variations were found among individual enterprises each year. To show the extent of such variations, practical ranges were determined for many of the production performance measures calculated in this study. The practical ranges are shown in [Table 5](#) and they include the performances of approximately 81% of all enterprises studied in 2000. To determine these ranges, the three lowest and the three highest individual values were dropped in an effort to remove unusual circumstances from the results. Large variations in performance between the production and economic variables listed clearly show that some of the farms could make a considerable improvement in production efficiency and management decisions. The poultry industry and the pork industry have made great strides in production efficiency by micro managing each part of the production process. Indications are that this trend applies to the dairy industry as well.

Percent Dry Cows and **Death Loss** are important indicators of management control. A high percentage of dry cows indicate breeding problems and a longer calving interval, and will likely reduce both milk production and feed efficiency. Death loss as a percent of pounds produced is obviously influenced by the death of cows. The loss of one cow has the same influence on percent of pounds produced as a dozen or more baby calves. The loss of one cow means more in dollars per head, but a loss of a high percentage of the heifer calves is also costly because it affects the future of the herd. 2000 figures represent the highest death loss of all years since 1991. An upward trend is evident for these years.

A high ratio of **Concentrates Fed Per CWT. of M.E.** may indicate overfeeding of concentrates, an unbalanced ration or a lack of high quality forages. A high quantity of **Hay Equivalents Per Cow** suggests that roughage is being wasted or that the farm has larger cows and/or more replacement animals are on hand per cow. Since feed is the largest cost item in the operation, cost control and management of this component can have the biggest impact on **Net Returns Over All Costs**.

Non-Livestock Capital Investment per cow is affected by both the stage of life of the operation and the manager's capital purchase decisions. New or expanding operations typically have high capital investments, while mature operations that are "winding down" are using up their assets and typically have low capital investments. However, wide ranges still exist regardless of stage of life due to the differences in management control and discipline. Balance should be sought in order to keep the dairy operating efficiently without making unnecessary, expensive purchases.

Milk Price is a function of the seasonality of sales, the buyer of the milk, butterfat and protein test results, volume and quality incentives, and location within the state. In general, the further south the milk is marketed, the higher the milk price.

Table 4: Economic and Production Variables That Influence Profits, Dairy Enterprises KFBM 1991-2000											
Item	Units	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Average Number of Cows	Head	100.9	100.9	107.7	105.2	110.7	117.7	129.7	140.0	131.7	143.0
Cows Dry	%	14.3	15.0	13.9	14.7	14.6	15.4	14.6	14.0	15.6	15.9
Animal Units in Herd	Units	186.3	206.1	206.7	204.0	219.0	229.0	256.0	271.0	247.6	271.4
Milk Production	CWT	15549	16510	17425	16865	18691	18964	22414	24025	22508	24530
Beef Production	Lbs.	66833	69584	65483	66317	65641	67629	77800	79046	81206	77432
Beef Per Cow	Lbs.	605	648	590	617	564	555	576	565	578	545
Milk Per Cow	Lbs.	15170	15326	15999	15802	16697	15869	17187	17179	16948	16763
Butterfat Per Cow	Lbs.	567	567	577	584	610	586	622	624	607	618
Milk Per Worker Per Year	Lbs.	784676	802499	789059	779880	791478	794985	856262	N/A	815906	910637
Death Loss:											
% of Beef Production	%	13.2	13.2	17.9	15.8	18.3	21.2	21.4	25.7	20.9	31.0
Feed Fed Per CWT M.E.*	Units	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Concentrates	Lbs.	453	453	473	447	437	436	450	61	62	58
Hay & Dry Forage	Lbs.	309	255	293	261	272	302	221	24	31	35
All Silage	Lbs.	906	1035	1035	894	891	948	1087	137	145	140
Pasture Days Per Animal Unit	Days	51	51	46	52	53	47	45	54	46	46
Prices Received:	Units	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
CWT Milk	\$	12.86	13.90	13.35	13.81	15.53	13.18	14.44	15.93	16.46	13.93
CWT Beef (All)**	\$	57.77	54.94	56.96	50.70	44.23	34.94	39.72	N/A	N/A	N/A
CWT Beef (Market)	\$	N/A	N/A	N/A	N/A	N/A	N/A	N/A	46.55	58.14	71.25
CWT Beef (Breeding)	\$	N/A	N/A	N/A	N/A	N/A	N/A	N/A	37.09	37.48	41.81
Capital Investment Per Cow***											
Total	\$	2268	2305	2602	2623	2703	2706	2775	N/A	2894	2538
Livestock	\$	1480	1517	1510	1533	1500	1469	1482	N/A	1504	1519
Non-Livestock	\$	788	788	1092	1090	1203	1237	1293	N/A	1390	1019

* From 1991-97 this figure was reported as Feed Fed Per 1,000 Lbs. of Milk/Per 100 Lbs. of Beef. From 1998 forward this figure will be presented as Feed Fed per cwt. Milk Equivalent (M.E.)

** Years 1991-97 reported dollars received per cwt. of all beef sold. From 1998 forward KFBM will be reporting the dollars received per cwt. of market and breeding animals sold separately.

*** Prior to 1999 Capital Investment Per Cow included cash operating expenses as a component. Beginning with 1999, cash-operating expenses is not included as a component of the capital investment calculation.

Table 5: Practical Ranges for Economic and Production Variables That Influence Profits, Dairy Enterprises KFBM 2000			
Item*	Units	High	Low
Prices Received:			
Milk CWT	\$	14.28	13.35
Beef CWT (Market)	\$	92.55	53.04
Beef CWT (Breeding)	\$	46.50	33.42
Dry Cows			
Dry Cows	%	20.3	11.9
Beef per Cow	Lbs.	770	177
Milk Per Cow	Lbs.	19753	13127
Butterfat Per Cow	Lbs.	734	474
Death Loss:			
% of Lbs. Produced	%	73.4	10.4
Breeding Cull Rate	%	36.9	11.4
Breeding Survival Rate	%	97.9	89.2
Feed Per CWT M.E.:			
Concentrates	Lbs.	72	48
Hay and Dry Roughage	Lbs.	67	14
Corn Silage	Lbs.	161	59
Other Silage	Lbs.	74	0
Pasture Days Per Animal Unit			
Pasture Days Per Animal Unit	Days	67	19
Hay Equivalent Per Cow			
Hay Equivalent Per Cow	Tons	11.3	6.5
Capital Investment Per Cow:			
Livestock	\$	1837	1140
Non-Livestock	\$	1576	557
Total	\$	3117	1940
Milk Per Worker Per Year			
Milk Per Worker Per Year	Lbs.	1,128,870	643,462
Labor Per Cow			
Labor Per Cow	Months	0.32	0.15

Costs and Returns by Herd Size

The average size of the dairy herds studied in 2000 was 143 cows, and the herds ranged in size from 42 to 466 cows. Determining how well different sized dairy herds compete financially is the major objective of this section of the 2000 KFBM Dairy Enterprise Study.

Economies of scale (lower costs and/or higher returns per unit of production as enterprise size increases) may exist for the dairy enterprise. If so, they can come from two sources. First, external to the production process, is the ability of an operator with a large enterprise to do the following:

1. Buy inputs in quantities large enough to receive a price discount.
2. Sell in larger quantities and receive a volume premium for products sold.

Secondly, larger operations can justify improved technology by spreading the fixed costs over more units of production. This can lower fixed labor cost, interest and depreciation on a per unit basis of production.

* In determining the practical range, the 3 highest and 3 lowest values for each individual item were dropped. Thus, each practical range contains performances achieved on approximately 81% of the enterprises studied. Note that the high column can indicate either good or poor performance depending on the item listed.

Economies of scale may be offset by diseconomies, primarily those associated with the greater demands on management. With a small enterprise, an operator may, for a while, get by with only moderate attention to breeding schedules, sanitation, disease control and feeding practices. This lack of attention could prove disastrous for a large enterprise.

Management of a larger herd also typically involves much more business management and less physical labor on the part of the manager/operator. Increased levels of personnel management and financial planning can be a difficult task for managers of expanding operations.

To examine the relationships between enterprise size and per unit costs and returns, the 31 enterprises studied in 2000 were divided into four size groups:

1. Fewer than 75 cows.
2. Between 75 and 100 cows.
3. Between 101 and 150 cows.
4. Greater than 150 cows.

The results are presented in [Table 6](#), [Table 6A](#) and [Table 6B](#).

A fairly consistent finding prior to 1994 had been that the smaller enterprises tended to have the highest costs and the lowest net returns over all costs. However, for the years 1995 and 1996 this was not the case. From 1995 to 1997, all of the groups, on average, had negative returns. In 1995 and 1996, the farms with less than 75 cows fared the best on a per cow basis. In 1997, farms with fewer than 75 cows fared the worst on a per cow basis, while farms with more than 125 cows fared the best on a per cow basis. In 1999, farms with milking herds between 101 and 150 cows realized the most returns over all costs per cow and farms with less than 75 cows realized the least.

In 2000, the group with 75 to 100 cows had the lowest non-feed cash costs, \$805 per cow and \$5.04 per cwt. of milk produced. The largest herds, those with greater than 150 cows, experienced the highest non-feed cash costs at \$1,120 per cow and \$6.35 per cwt. of milk produced. Non-feed non-cash costs (unpaid labor, machinery depreciation, building depreciation and non-cash interest) were the highest on a per cow basis for the group that had less than 75 cows and the lowest on a per cow basis for the group that had more than 150 cows. This supports the theory of economies of scale for the dairy enterprise. [Figure 3](#) presents this data on a per cow basis. When looking at the table, the relationship between paid labor and unpaid labor as herd size increases one sees that as paid labor increases, unpaid labor decreases. Also cash labor is the biggest component of non-feed cash costs and unpaid labor is about equally as important as non-cash interest in non-feed non-cash costs. If one were to look further into cash labor costs per month of labor it can be hypothesized that the larger dairies pay more per month for their labor, because there is an increased need for management expertise as dairies become larger. Milk production per cow and total returns per cow were the highest for herds of 150 or more cows. While this group had the highest milk production, 17,483 pounds per cow, those with less than 75 cows had the lowest milk production at 15,904 pounds per cow.

Because the number of farms in each category is small, it is difficult to draw solid conclusions about size and profitability. It is apparent, however, in Kentucky and the nation's dairy industry that average size of herds in operation is increasing. The average size herd in this study has increased from 90.3 in 1981 to 143.0 in 2000. During this same period, total milk produced for the average herd increased from 1,168,584 pounds to 2,453,000 pounds. Thus, the average farms in these studies have increased total milk production by 110% since 1981. In 2000, the herds consisting of greater than 150 cows produced the most milk per worker per year, 974,435 pounds. The herds consisting of 75 to 100 cows produced the least amount of milk per worker per year with 801,567 pounds.

Figure 3
Composition of Total Costs Per Cow by Herd Size
Dairy Enterprises KFBM 2000

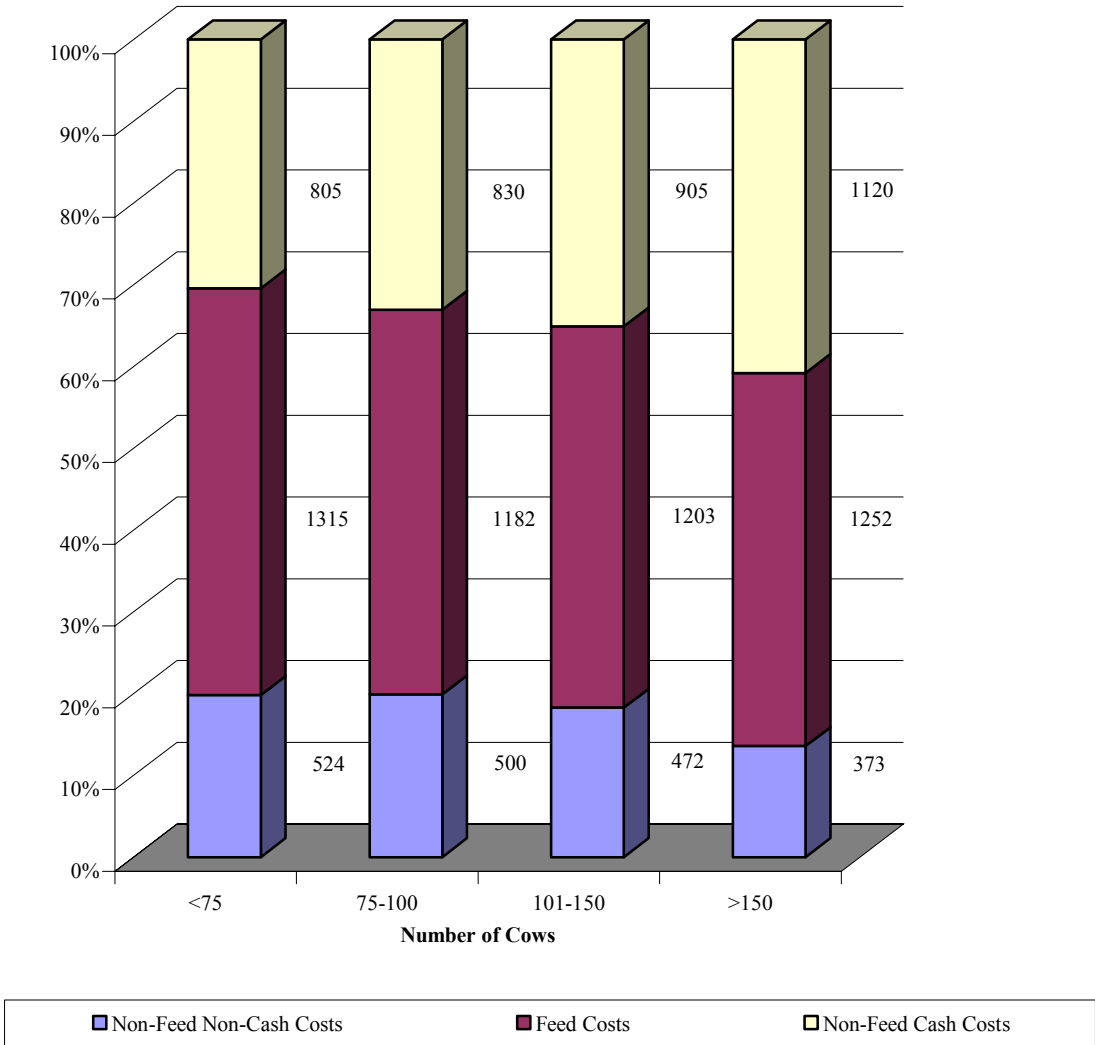


Table 6: Per Farm Averages for Economic and Production Variables by Herd Size, Dairy Enterprises KFBM 2000						
Enterprise Summary:	Units	Average	<75	75-100	101-150	>150
Number of Herds	Herds	31	6	7	8	10
Total Dairy Returns	\$	374731	133315	220482	305767	682727
Total Feed Costs	\$	176468	71973	105603	141632	316640
Returns Above Feed Cost	\$	198263	61343	114880	164135	366087
Total Non-Feed Costs	\$	204723	72244	118423	161709	379032
Net Returns Over All Costs	\$	-6460	-10901	-3543	2426	-12945
Other Economic Variables:	Units	Average	<75	75-100	101-150	>150
Returns Per \$100 Feed Fed	\$	208	186	211	215	213
Price Received Per cwt. of Milk	\$	13.93	13.66	13.73	14.06	14.13
Price Received Per cwt. Beef (Market)	\$	71.25	71.02	67.82	82.52	64.77
Capital Investment Per Cow:	Units	Average	<75	75-100	101-150	>150
Livestock	\$	1519	1621	1426	1496	1540
Non-Livestock	\$	1019	917	1070	962	1090
Total	\$	2538	2538	2497	2459	2630
Other Production Variables:	Units	Average	<75	75-100	101-150	>150
Average Number of Cows	Cows	143	54	88	117	255
Cows Dry	%	15.9	16.2	16.1	16.4	15.1
Animal Units in Herd	Units	271	113	175	217	477
Total Milk Production	CWT	24530	8733	14267	20306	44573
Total Beef Production	Lbs.	77432	34527	45306	59192	140256
Beef Per Cow	Lbs.	545	647	505	496	550
Milk Per Cow	Lbs.	16763	15904	15980	17191	17483
Butterfat Per Cow	Lbs.	618	575	579	647	647
Value of Feed Fed Per CWT M.E.	\$	6.79	7.47	6.72	6.45	6.71
Total Concentrates Per CWT M.E.	Lbs.	58	64	54	56	59
Hay & Dry Forage Per CWT M.E.	Lbs.	35	39	37	28	36
Corn Silage Per CWT M.E.	Lbs.	110	119	105	119	103
Other Silage Per CWT M.E.	Lbs.	30	41	29	40	16
Pasture Days Per Animal Unit	Days	46	44	59	38	43
Hay Equivalent Per Cow	Tons	8.5	9.6	8.6	8.5	7.9
Average Purchase Price Per Breeding Animal	\$	1012	833	911	849	1176
Breeding Cull Rate	%	24.8	29.9	24.3	22.8	23.5
Weight Per Breeding Animal Sold	Lbs.	1237	1227	1220	1258	1240
Price Received Per CWT (Breeding)	\$	41.81	41.16	49.00	44.00	35.43
Death Loss: % of Pounds Produced	%	31.0	22.4	29.0	39.0	31.1
Death Loss: Total Pounds	Lbs.	18111	7435	8121	15378	33695
Deaths: Market	Head	27	11	18	18	50
Deaths: Breeding	Head	13	5	5	13	25
Breeding Survival Rate	%	94.6	95.2	97.3	93.9	92.9
Labor Summary:	Units	Average	<75	75-100	101-150	>150
Months Per Cow	Months	0.24	0.22	0.25	0.24	0.23
Milk Production Per Worker Per Year	Lbs.	910637	948277	801567	898096	974435

Table 6A: Per Cow Averages for Costs and Returns by Herd Size, Dairy Enterprises KFBM 2000						
Enterprise Returns:	Units	Average	<75	75-100	101-150	>150
Milk Returns	\$	2333	2173	2193	2412	2464
Beef Returns	\$	224	253	275	175	211
Total Dairy Returns	\$	2557	2426	2468	2586	2675
Non-Feed Cash Costs:	Units	Average	<75	75-100	101-150	>150
Livestock Supplies	\$	142	136	104	140	173
Veterinary	\$	73	60	75	67	83
Fuel & Oil	\$	29	28	18	37	30
Machinery Repair	\$	72	56	48	80	91
Building & Fence Repair	\$	47	33	55	46	49
Machine Hire	\$	135	157	114	144	129
Utilities	\$	76	76	77	68	81
Light Vehicle	\$	1	2	0	0	0
Paid Labor	\$	252	122	270	236	332
Insurance	\$	22	14	21	24	26
Property Taxes	\$	2	2	1	2	3
Miscellaneous	\$	14	15	10	12	16
Cash Interest	\$	75	104	37	48	106
Total Non-Feed Cash Costs	\$	938	805	830	905	1120
Feed Costs:	Units	Average	<75	75-100	101-150	>150
Concentrates	\$	786	846	765	739	803
Hay & Dry Roughage	\$	186	180	172	174	210
Corn Silage	\$	200	217	172	219	193
Other Silage	\$	45	53	48	56	30
Pasture Charge	\$	19	20	24	16	16
Total Feed Costs	\$	1236	1315	1182	1203	1252
Non-Feed Non-Cash Costs:	Units	Average	<75	75-100	101-150	>150
Unpaid Labor	\$	178	291	201	174	99
Machinery Depreciation	\$	62	57	55	74	60
Building Depreciation	\$	33	28	36	22	43
Non-Cash Interest	\$	183	149	208	201	171
Total Non-Feed Non-Cash Costs	\$	456	524	500	472	373
Net Returns Summary:	Units	Average	<75	75-100	101-150	>150
Total Costs of Production	\$	2631	2646	2512	2580	2745
Adjustment for Beef Income	\$	224	253	275	175	211
Adjusted Total Cost of Milk	\$	2406	2393	2237	2405	2535
Net Returns Over All Costs	\$	-73	-219	-44	7	-70
Costs & Returns Summary:	Units	Average	<75	75-100	101-150	>150
Total Dairy Returns	\$	2557	2426	2468	2586	2675
Feed Costs	\$	1236	1315	1182	1203	1252
Non-Feed Costs	\$	1395	1329	1330	1377	1493
Net Returns Over All Costs	\$	-73	-219	-44	7	-70
Costs Summary:	Units	Average	<75	75-100	101-150	>150
Non-Feed Cash Costs	\$	938	805	830	905	1120
Feed Costs	\$	1236	1315	1182	1203	1252
Non-Feed Non-Cash Costs	\$	456	524	500	472	373
Total Costs of Production	\$	2631	2646	2512	2580	2745

Table 6B: Per CWT. Averages for Costs and Returns by Herd Size, Dairy Enterprises KFBM 2000						
Enterprise Returns:	Units	Average	<75	75-100	101-150	>150
Milk Returns	\$	13.93	13.66	13.73	14.06	14.13
Beef Returns	\$	1.32	1.59	1.72	1.03	1.11
Total Dairy Returns	\$	15.25	15.25	15.46	15.09	15.24
Non-Feed Cash Costs:	Units	Average	<75	75-100	101-150	>150
Livestock Supplies	\$	0.82	0.84	0.60	0.79	0.98
Veterinary	\$	0.42	0.36	0.44	0.37	0.47
Fuel & Oil	\$	0.17	0.18	0.12	0.21	0.17
Machinery Repair	\$	0.42	0.36	0.31	0.45	0.51
Building & Fence Repair	\$	0.27	0.21	0.32	0.27	0.28
Machine Hire	\$	0.81	0.97	0.73	0.85	0.72
Utilities	\$	0.46	0.48	0.52	0.39	0.47
Light Vehicle	\$	0.00	0.01	0.00	0.00	0.00
Paid Labor	\$	1.48	0.76	1.65	1.37	1.88
Insurance	\$	0.13	0.08	0.14	0.14	0.15
Property Taxes	\$	0.01	0.01	0.01	0.01	0.02
Miscellaneous	\$	0.08	0.09	0.07	0.07	0.09
Cash Interest	\$	0.45	0.66	0.24	0.29	0.60
Total Non-Feed Cash Costs	\$	5.53	5.04	5.15	5.22	6.35
Feed Costs:	Units	Average	<75	75-100	101-150	>150
Concentrates	\$	4.73	5.35	4.81	4.35	4.59
Hay & Dry Roughage	\$	1.15	1.15	1.12	1.05	1.25
Corn Silage	\$	1.20	1.33	1.14	1.29	1.10
Other Silage	\$	0.27	0.34	0.29	0.34	0.16
Pasture Charge	\$	0.12	0.13	0.17	0.09	0.09
Total Feed Costs	\$	7.46	8.30	7.53	7.12	7.19
Non-Feed Non-Cash Costs:	Units	Average	<75	75-100	101-150	>150
Unpaid Labor	\$	1.10	1.84	1.29	1.03	0.57
Machinery Depreciation	\$	0.36	0.36	0.33	0.43	0.34
Building Depreciation	\$	0.20	0.18	0.21	0.13	0.27
Non-Cash Interest	\$	1.10	0.95	1.29	1.17	1.01
Total Non-Feed Non-Cash Costs	\$	2.76	3.33	3.11	2.75	2.19
Net Returns Summary:	Units	Average	<75	75-100	101-150	>150
Total Costs of Production	\$	15.76	16.68	15.79	15.09	15.72
Adjustment for Beef Income	\$	1.32	1.59	1.72	1.03	1.11
Adjusted Total Cost of Milk	\$	14.44	15.09	14.07	14.05	14.61
Net Returns Over All Costs	\$	-0.51	-1.43	-0.33	0.00	-0.48
Costs & Returns Summary:	Units	Average	<75	75-100	101-150	>150
Total Dairy Returns	\$	15.25	15.25	15.46	15.09	15.24
Feed Costs	\$	7.46	8.30	7.53	7.12	7.19
Non-Feed Costs	\$	8.29	8.37	8.27	7.97	8.53
Net Returns Over All Costs	\$	-0.51	-1.43	-0.33	0.00	-0.48
Costs Summary:	Units	Average	<75	75-100	101-150	>150
Non-Feed Cash Costs	\$	5.53	5.04	5.15	5.22	6.35
Feed Costs	\$	7.46	8.30	7.53	7.12	7.19
Non-Feed Non-Cash Costs	\$	2.76	3.33	3.11	2.75	2.19
Total Costs of Production	\$	15.76	16.68	15.79	15.09	15.72

Costs and Returns by Milk Production Per Cow

Historically, study has shown that high milk production per cow is important in determining the profitability of a dairy enterprise. [Table 7](#), [Table 7A](#) and [Table 7B](#) divide the 31 studied farms into three groups based on pounds of milk production per cow.

As would be expected, total returns per cow increased as production level increased, with the highest producing group, over 18,000 pounds of milk per cow grossing \$894 more per cow than the lowest producing group, under 15,000 pounds of milk per cow. This more than offset the \$757 per cow cost advantage held by the group producing less than 15,000 pounds of milk per cow.

In contrast to 1999, where all groups were profitable when divided according to milk production per cow, 2000 data shows no group being profitable in terms of net returns over all costs of production. The group producing more than 18,000 pounds of milk per cow did experience the least negative net returns over all costs. Scanning the data after sorting by milk production revealed that, of the 10 farms that fell into the milk production per cow category of less than 15,000 pounds, seven were members of the low returns group based on net returns over all costs per cow. This probably explains why this group experienced the least profit in comparison to the other groups based on milk production per cow. Of the 13 farms that fell into the milk production per cow category of greater than 18,000 pounds, seven were members of the high returns group based on net returns over all costs per cow. From 1993 to 2000, with the exception of 1995, the group with the highest milk production per cow had the highest net returns over all costs on a per cow basis.

Non-feed cash costs per cow ranged from a low of \$682 for the under 15,000 pounds of milk production per cow to \$1,207 for the over 18,000 pounds of milk production per cow. The higher producing herds spent \$200 more per cow on livestock supplies (DHIA, BST, breeding fees, cleaning supplies, etc.) and veterinary services. Livestock supplies ranged from \$89 per cow for the under 15,000 pound herds to \$204 per cow for the over 18,000 pound herds. Veterinary costs exhibited a similar relationship, \$37 per cow for the low producing group and \$122 for the high producing group. The lowest producing herds also had the lowest non-feed cash costs on a per cwt. basis. Feed costs per cow were higher for the higher producing herds than that of the herds in the less than 15,000 pounds category, as one would expect. Feed costs per cwt. of milk produced were highest for the less than 15,000 pound group and lowest for the greater than 18,000 pound group. On a per cwt. of milk produced basis, the greater than 18,000 group had the lowest non-feed non-cash costs. Labor costs can be either cash (hired) or non-cash (operator). Labor costs per cwt. Of milk produced were fairly flat across production groups.

Table 7: Per Farm Averages for Economic and Production Variables by Milk Production Per Cow, Dairy Enterprises KFMB 2000					
Enterprise Summary:	Units	Average	<15000	15000-18000	>18000
Number of Herds	Herds	31	10	9	12
Total Dairy Returns	\$	374731	182818	466279	545004
Total Feed Costs	\$	176468	97711	230083	233102
Returns Above Feed Cost	\$	198263	85107	236196	311901
Total Non-Feed Costs	\$	204723	99921	246239	303395
Net Returns Over All Costs	\$	-6460	-14814	-10043	8507
Other Economic Variables:	Units	Average	<15000	15000-18000	>18000
Returns Per \$100 Feed Fed	\$	208	187	206	229
Price Received Per CWT of Milk	\$	13.93	13.95	14.02	13.87
Price Received Per CWT Beef (Market)	\$	71.25	61.38	66.13	82.89
Capital Investment Per Cow:	Units	Average	<15000	15000-18000	>18000
Livestock	\$	1519	1440	1497	1624
Non-Livestock	\$	1019	818	1090	1099
Total	\$	2538	2258	2587	2724
Other Production Variables:	Units	Average	<15000	15000-18000	>18000
Average Number of Cows	Cows	143	90	187	178
Cows Dry	%	15.9	17.7	15.3	15.0
Animal Units in Herd	Units	271	151	352	365
Total Milk Production	CWT	24530	11955	31367	34415
Total Beef Production	Lbs.	77432	36714	86255	131066
Beef Per Cow	Lbs.	545	471	548	630
Milk Per Cow	Lbs.	16763	13509	16881	19360
Butterfat Per Cow	Lbs.	618	494	618	718
Value of Feed Fed Per CWT M.E.	\$	6.79	7.55	6.94	6.02
Total Concentrates Per CWT M.E.	Lbs.	58	61	61	53
Hay & Dry Forage Per CWT M.E.	Lbs.	35	47	36	23
Corn Silage Per CWT M.E.	Lbs.	110	111	105	115
Other Silage Per CWT M.E.	Lbs.	30	41	23	25
Pasture Days Per Animal Unit	Days	46	54	45	39
Hay Equivalent Per Cow	Tons	8.5	8.8	8.3	8.4
Average Purchase Price Per Breeding Animal	\$	1012	952	1116	935
Breeding Cull Rate	%	24.8	22.0	26.0	26.8
Weight Per Breeding Animal Sold	Lbs.	1237	1115	1298	1297
Price Received Per CWT (Breeding)	\$	41.81	52.87	37.70	35.61
Death Loss: % of Pounds Produced	%	31.0	51.4	24.0	18.6
Death Loss: Total Pounds	Lbs.	18111	15466	22101	19553
Deaths: Market	Head	27	14	29	40
Deaths: Breeding	Head	13	11	15	16
Breeding Survival Rate	%	94.6	93.2	95.5	95.0
Labor Summary:	Units	Average	<15000	15000-18000	>18000
Months Per Cow	Months	0.24	0.20	0.23	0.27
Milk Production Per Worker Per Year	Lbs.	910637	838413	997079	901054

Table 7A: Per Cow Averages for Costs and Returns by Milk Production Per Cow, Dairy Enterprises KFBM 2000					
Enterprise Returns:	Units	Average	<15000	15000-18000	>18000
Milk Returns	\$	2333	1885	2364	2685
Beef Returns	\$	224	195	193	289
Total Dairy Returns	\$	2557	2080	2558	2974
Non-Feed Cash Costs:	Units	Average	<15000	15000-18000	>18000
Livestock Supplies	\$	142	89	115	204
Veterinary	\$	73	37	63	122
Fuel & Oil	\$	29	26	25	34
Machinery Repair	\$	72	54	59	98
Building & Fence Repair	\$	47	32	47	60
Machine Hire	\$	135	119	133	145
Utilities	\$	76	71	75	83
Light Vehicle	\$	1	1	0	1
Paid Labor	\$	252	166	246	337
Insurance	\$	22	15	26	24
Property Taxes	\$	2	1	2	3
Miscellaneous	\$	14	11	14	16
Cash Interest	\$	75	60	93	81
Total Non-Feed Cash Costs	\$	938	682	897	1207
Feed Costs:	Units	Average	<15000	15000-18000	>18000
Concentrates	\$	786	700	814	836
Hay & Dry Roughage	\$	186	193	196	174
Corn Silage	\$	200	164	198	233
Other Silage	\$	45	45	34	51
Pasture Charge	\$	19	21	19	16
Total Feed Costs	\$	1236	1124	1261	1310
Non-Feed Non-Cash Costs:	Units	Average	<15000	15000-18000	>18000
Unpaid Labor	\$	178	191	173	162
Machinery Depreciation	\$	62	46	51	79
Building Depreciation	\$	33	28	37	35
Non-Cash Interest	\$	183	166	168	202
Total Non-Feed Non-Cash Costs	\$	456	431	429	479
Net Returns Summary:	Units	Average	<15000	15000-18000	>18000
Total Costs of Production	\$	2631	2238	2587	2995
Adjustment for Beef Income	\$	224	195	193	289
Adjusted Total Cost of Milk	\$	2406	2043	2393	2706
Net Returns Over All Costs	\$	-73	-159	-29	-21
Costs & Returns Summary:	Units	Average	<15000	15000-18000	>18000
Total Dairy Returns	\$	2557	2080	2558	2974
Feed Costs	\$	1236	1124	1261	1310
Non-Feed Costs	\$	1395	1113	1326	1685
Net Returns Over All Costs	\$	-73	-159	-29	-21
Costs Summary:	Units	Average	<15000	15000-18000	>18000
Non-Feed Cash Costs	\$	938	682	897	1207
Feed Costs	\$	1236	1124	1261	1310
Non-Feed Non-Cash Costs	\$	456	431	429	479
Total Costs of Production	\$	2631	2238	2587	2995

Table 7B: Per CWT. Averages for Costs and Returns by Milk Production Per Cow, Dairy Enterprises KFBM 2000

Enterprise Returns:	Units	Average	<15000	15000-18000	>18000
Milk Returns	\$	13.93	13.95	14.02	13.87
Beef Returns	\$	1.32	1.39	1.14	1.50
Total Dairy Returns	\$	15.25	15.34	15.15	15.37
Non-Feed Cash Costs:	Units	Average	<15000	15000-18000	>18000
Livestock Supplies	\$	0.82	0.66	0.67	1.05
Veterinary	\$	0.42	0.27	0.37	0.64
Fuel & Oil	\$	0.17	0.19	0.15	0.18
Machinery Repair	\$	0.42	0.40	0.35	0.51
Building & Fence Repair	\$	0.27	0.24	0.28	0.30
Machine Hire	\$	0.81	0.87	0.78	0.75
Utilities	\$	0.46	0.54	0.44	0.43
Light Vehicle	\$	0.00	0.01	0.00	0.00
Paid Labor	\$	1.48	1.26	1.45	1.73
Insurance	\$	0.13	0.12	0.15	0.12
Property Taxes	\$	0.01	0.01	0.01	0.02
Miscellaneous	\$	0.08	0.08	0.08	0.08
Cash Interest	\$	0.45	0.46	0.54	0.42
Total Non-Feed Cash Costs	\$	5.53	5.10	5.28	6.22
Feed Costs:	Units	Average	<15000	15000-18000	>18000
Concentrates	\$	4.73	5.15	4.80	4.32
Hay & Dry Roughage	\$	1.15	1.40	1.19	0.90
Corn Silage	\$	1.20	1.23	1.16	1.22
Other Silage	\$	0.27	0.34	0.20	0.26
Pasture Charge	\$	0.12	0.16	0.11	0.08
Total Feed Costs	\$	7.46	8.28	7.46	6.78
Non-Feed Non-Cash Costs:	Units	Average	<15000	15000-18000	>18000
Unpaid Labor	\$	1.10	1.40	1.02	0.85
Machinery Depreciation	\$	0.36	0.35	0.29	0.41
Building Depreciation	\$	0.20	0.22	0.22	0.18
Non-Cash Interest	\$	1.10	1.22	1.01	1.04
Total Non-Feed Non-Cash Costs	\$	2.76	3.18	2.54	2.48
Net Returns Summary:	Units	Average	<15000	15000-18000	>18000
Total Costs of Production	\$	15.76	16.57	15.28	15.48
Adjustment for Beef Income	\$	1.32	1.39	1.14	1.50
Adjusted Total Cost of Milk	\$	14.44	15.18	14.15	13.99
Net Returns Over All Costs	\$	-0.51	-1.23	-0.13	-0.11
Costs & Returns Summary:	Units	Average	<15000	15000-18000	>18000
Total Dairy Returns	\$	15.25	15.34	15.15	15.37
Feed Costs	\$	7.46	8.28	7.46	6.78
Non-Feed Costs	\$	8.29	8.28	7.82	8.70
Net Returns Over All Costs	\$	-0.51	-1.22	-0.13	-0.11
Costs Summary:	Units	Average	<15000	15000-18000	>18000
Non-Feed Cash Costs	\$	5.53	5.10	5.28	6.22
Feed Costs	\$	7.46	8.28	7.46	6.78
Non-Feed Non-Cash Costs	\$	2.76	3.18	2.54	2.48
Total Costs of Production	\$	15.76	16.57	15.28	15.48

Costs and Returns by Total Costs Per Cow

When the 1995 KFBM Dairy Enterprise Study was published, the authors, Darwin V. Foley and Herb Holloway, theorized that perhaps the declining milk and beef prices in 1995 had shifted importance away from milk production to the area of cost control. We have continued to look at total costs per cow as they relate to net returns over all costs. These results are tabulated in [Table 8](#), [Table 8A](#), and [Table 8B](#).

The 31 enterprises were divided into three total costs per cow ranges:

1. \leq \$2,300
2. \$2,301 - \$2,800
3. $>$ \$2,801

Although cost items as a whole did not play as much of a role as return items when determining net returns in 2000, that is not to say that some of the lower return groups could not have improved their situations by exercising more control over their costs. As in 1995 through 1999, milk production per cow and total returns per cow increased as total costs per cow increased.

As we move to higher average cost groups in the 2000 study, we see that returns also increase as costs increase, but net returns improve from the lowest cost group (-\$69) to the mid level cost group (-\$45) and then decline further (-\$105) for the high cost group. The mid group (\$2,300 - \$2,800 per cow) had the lowest adjusted cost of producing milk (\$14.22) in 2000. In 1999, the herds were divided into four groups and the next to highest cost per cow group had the lowest adjusted cost of producing milk (\$14.17). [Figure 4](#) shows the same trend line for 2000 (net returns over all costs per cow declining as total costs per cow increase) as was shown for 1999, but in 1999 total dairy returns per cow peaked in the next to highest cost herds. For each break between cost groups in 1999 the total costs of production per cow increased by a greater percentage than did the total returns per cow between the same groups. When the highest cost farms were compared to the lowest cost farms in 2000, they spent an average of \$968 more per cow, yet received only \$932 more per cow in total returns. This study has shown over time that cost control is extremely important in dairy operations. It also has shown that the lowest cost per cow operations are not likely to have the lowest adjusted cost of producing milk, because they are not likely to have production levels high enough to optimize per unit costs.

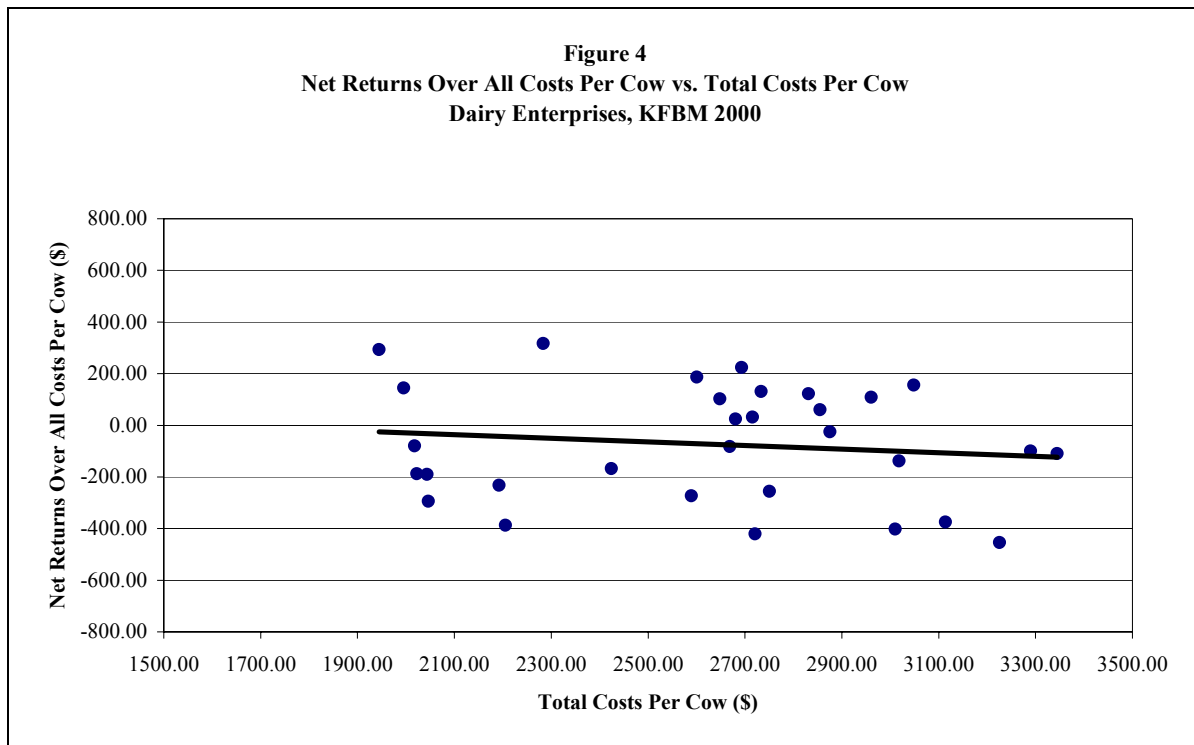


Table 8: Per Farm Averages for Economic and production Variables by Total Costs Per Cow, Dairy Enterprises KFBM 2000

Enterprise Summary:	Units	Average	<2300	2300-2800	>2800
Number of Herds	Herds	31	9	11	11
Total Dairy Returns	\$	374731	246959	365290	488714
Total Feed Costs	\$	176468	128244	174848	217544
Returns Above Feed Cost	\$	198263	118715	190442	271169
Total Non-Feed Costs	\$	204723	125546	193940	280288
Net Returns Over All Costs	\$	-6460	-6831	-3498	-9118
Other Economic Variables:	Units	Average	<2300	2300-2800	>2800
Returns Per \$100 Feed Fed	\$	208	194	203	225
Price Received Per CWT of Milk	\$	13.93	14.09	13.88	13.85
Price Received Per CWT Beef (Market)	\$	71.25	61.29	73.24	77.41
Capital Investment Per Cow:	Units	Average	<2300	2300-2800	>2800
Livestock	\$	1519	1323	1582	1616
Non-Livestock	\$	1019	761	1094	1155
Total	\$	2538	2084	2676	2771
Other Production Variables:	Units	Average	<2300	2300-2800	>2800
Average Number of Cows	Cows	143	122	141	163
Cows Dry	%	15.9	16.6	16.1	15.1
Animal Units in Herd	Units	271	195	275	331
Total Milk Production	CWT	24530	16726	24193	31253
Total Beef Production	Lbs.	77432	38718	74871	111668
Beef Per Cow	Lbs.	545	327	662	605
Milk Per Cow	Lbs.	16763	13526	16862	19312
Butterfat Per Cow	Lbs.	618	506	611	716
Value of Feed Fed Per CWT M.E.	\$	6.79	7.35	6.81	6.32
Total Concentrates Per CWT M.E.	Lbs.	58	61	61	53
Hay & Dry Forage Per CWT M.E.	Lbs.	35	53	33	22
Corn Silage Per CWT M.E.	Lbs.	110	101	111	118
Other Silage Per CWT M.E.	Lbs.	30	37	29	25
Pasture Days Per Animal Unit	Days	46	52	43	43
Hay Equivalent Per Cow	Tons	8.5	8.4	8.8	8.4
Average Purchase Price Per Breeding Animal	\$	1012	1061	952	1001
Breeding Cull Rate	%	24.8	19.4	28.2	25.7
Weight Per Breeding Animal Sold	Lbs.	1237	1158	1255	1285
Price Received Per CWT (Breeding)	\$	41.81	49.41	40.94	36.47
Death Loss: % of Pounds Produced	%	31.0	55.9	20.1	21.4
Death Loss: Total Pounds	Lbs.	18111	17565	14700	21968
Deaths: Market	Head	27	16	25	38
Deaths: Breeding	Head	13	13	10	17
Breeding Survival Rate	%	94.6	92.7	96.3	94.5
Labor Summary:	Units	Average	<2300	2300-2800	>2800
Months Per Cow	Months	0.24	0.20	0.23	0.27
Milk Production Per Worker Per Year	Lbs.	910637	907291	924528	899484

Table 8A: Per Cow Averages for Costs and Returns by Total Costs Per Cow, Dairy Enterprises KFBM 2000					
Enterprise Returns:	Units	Average	<2300	2300-2800	>2800
Milk Returns	\$	2333	1907	2341	2673
Beef Returns	\$	224	108	270	274
Total Dairy Returns	\$	2557	2015	2612	2947
Non-Feed Cash Costs:	Units	Average	<2300	2300-2800	>2800
Livestock Supplies	\$	142	78	127	208
Veterinary	\$	73	31	64	115
Fuel & Oil	\$	29	21	29	35
Machinery Repair	\$	72	58	53	103
Building & Fence Repair	\$	47	33	44	61
Machine Hire	\$	135	112	133	155
Utilities	\$	76	71	72	84
Light Vehicle	\$	1	1	0	1
Paid Labor	\$	252	177	226	340
Insurance	\$	22	19	20	27
Property Taxes	\$	2	1	2	3
Miscellaneous	\$	14	10	13	17
Cash Interest	\$	75	56	71	94
Total Non-Feed Cash Costs	\$	938	669	853	1244
Feed Costs:	Units	Average	<2300	2300-2800	>2800
Concentrates	\$	786	622	848	858
Hay & Dry Roughage	\$	186	217	181	167
Corn Silage	\$	200	144	208	237
Other Silage	\$	45	39	44	51
Pasture Charge	\$	19	19	19	18
Total Feed Costs	\$	1236	1041	1300	1331
Non-Feed Non-Cash Costs:	Units	Average	<2300	2300-2800	>2800
Unpaid Labor	\$	178	159	201	171
Machinery Depreciation	\$	62	39	64	78
Building Depreciation	\$	33	22	39	37
Non-Cash Interest	\$	183	153	199	191
Total Non-Feed Non-Cash Costs	\$	456	374	503	477
Net Returns Summary:	Units	Average	<2300	2300-2800	>2800
Total Costs of Production	\$	2631	2084	2657	3052
Adjustment for Beef Income	\$	224	108	270	274
Adjusted Total Cost of Milk	\$	2406	1976	2387	2778
Net Returns Over All Costs	\$	-73	-69	-45	-105
Costs & Returns Summary:	Units	Average	<2300	2300-2800	>2800
Total Dairy Returns	\$	2557	2015	2612	2947
Feed Costs	\$	1236	1041	1300	1331
Non-Feed Costs	\$	1395	1043	1356	1721
Net Returns Over All Costs	\$	-73	-69	-45	-105
Costs Summary:	Units	Average	<2300	2300-2800	>2800
Non-Feed Cash Costs	\$	938	669	853	1244
Feed Costs	\$	1236	1041	1300	1331
Non-Feed Non-Cash Costs	\$	456	374	503	477
Total Costs of Production	\$	2631	2084	2657	3052

Table 8B: Per CWT. Averages for Costs and Returns by Total Costs Per cow, Dairy Enterprises KFBM 2000					
Enterprise Returns:	Units	Average	<2300	2300-2800	>2800
Milk Returns	\$	13.93	14.09	13.88	13.85
Beef Returns	\$	1.32	0.79	1.66	1.42
Total Dairy Returns	\$	15.25	14.87	15.54	15.27
Non-Feed Cash Costs:	Units	Average	<2300	2300-2800	>2800
Livestock Supplies	\$	0.82	0.59	0.75	1.07
Veterinary	\$	0.42	0.23	0.38	0.60
Fuel & Oil	\$	0.17	0.16	0.18	0.19
Machinery Repair	\$	0.42	0.42	0.31	0.53
Building & Fence Repair	\$	0.27	0.24	0.26	0.31
Machine Hire	\$	0.81	0.82	0.80	0.80
Utilities	\$	0.46	0.55	0.43	0.43
Light Vehicle	\$	0.00	0.01	0.00	0.00
Paid Labor	\$	1.48	1.34	1.33	1.75
Insurance	\$	0.13	0.14	0.11	0.14
Property Taxes	\$	0.01	0.01	0.01	0.02
Miscellaneous	\$	0.08	0.08	0.08	0.09
Cash Interest	\$	0.45	0.44	0.42	0.50
Total Non-Feed Cash Costs	\$	5.53	5.01	5.05	6.44
Feed Costs:	Units	Average	<2300	2300-2800	>2800
Concentrates	\$	4.73	4.62	5.08	4.45
Hay & Dry Roughage	\$	1.15	1.56	1.09	0.87
Corn Silage	\$	1.20	1.09	1.24	1.25
Other Silage	\$	0.27	0.30	0.26	0.26
Pasture Charge	\$	0.12	0.14	0.12	0.09
Total Feed Costs	\$	7.46	7.72	7.79	6.93
Non-Feed Non-Cash Costs:	Units	Average	<2300	2300-2800	>2800
Unpaid Labor	\$	1.10	1.18	1.23	0.90
Machinery Depreciation	\$	0.36	0.30	0.37	0.40
Building Depreciation	\$	0.20	0.18	0.23	0.19
Non-Cash Interest	\$	1.10	1.13	1.20	0.99
Total Non-Feed Non-Cash Costs	\$	2.76	2.78	3.03	2.48
Net Returns Summary:	Units	Average	<2300	2300-2800	>2800
Total Costs of Production	\$	15.76	15.51	15.88	15.84
Adjustment for Beef Income	\$	1.32	0.79	1.66	1.42
Adjusted Total Cost of Milk	\$	14.44	14.72	14.22	14.42
Net Returns Over All Costs	\$	-0.51	-0.64	-0.34	-0.57
Costs & Returns Summary:	Units	Average	<2300	2300-2800	>2800
Total Dairy Returns	\$	15.25	14.87	15.54	15.27
Feed Costs	\$	7.46	7.72	7.79	6.93
Non-Feed Costs	\$	8.29	7.80	8.08	8.92
Net Returns Over All Costs	\$	-0.51	-0.64	-0.33	-0.57
Costs Summary:	Units	Average	<2300	2300-2800	>2800
Non-Feed Cash Costs	\$	5.53	5.01	5.05	6.44
Feed Costs	\$	7.46	7.72	7.79	6.93
Non-Feed Non-Cash Costs	\$	2.76	2.78	3.03	2.48
Total Costs of Production	\$	15.76	15.51	15.88	15.84

Conclusions and Observations

While these 32 enterprises cannot be claimed as statistically representative of all dairy herds in the state of Kentucky, some conclusions can be drawn about these enterprises:

1. Net Returns Over All Costs Per Cow is substantially different from the 1999 KFBM Dairy Enterprise Study. Primarily, this is a result of lower milk prices. However due to high beef prices, and low feed prices, especially grain, many farms were still able to cover all costs and provide a financial reward for their management skills.
2. As always, enterprises varied greatly in Net Returns Over All Costs, Milking Herd Size, Milk Production Per Cow and Total Costs. These variances occurred both on a per cow basis and on a per cwt. of milk produced basis. These enterprises also showed great variability within each production cost category.
3. There seems to be a direct relationship that associates higher milk production per cow with higher net returns over all costs per cow.
4. Total Dairy Returns had more impact on profitability than did Total Costs of Production.
5. The lowering of the price support program for milk and grain increases the price risk that dairies face. Where prices were once rather seasonal and stable, prices are now affected more strongly by the price of butter and cheese and, likewise, more volatile.

This study helps to illustrate the wide range in profitability witnessed by Kentucky dairy enterprises and why the lack of profitability with individual herds has put many farms out of business. The trends for Kentucky dairy herds that remain in business are larger herd sizes and more milk per cow. While the increase in herd size and production level may be necessary to generate sufficient total returns for the operator, this study also points out that cost control, through effective management decisions that are based on sound record keeping, is extremely important in arriving at more than adequate net returns over all costs. Producers along with dairy consultants must carefully study the costs associated with increased production, and determine where the marginal return of increased production no longer exceeds marginal costs. Those who are susceptible to price risk should look to avenues that may allow them to lock in prices for feed inputs and/or milk price received that will insure cash flow requirements.

Planning, organizing, directing, coordinating and controlling the available resources of land, labor and capital is the essence of farm management. Management decisions must be based on sound information and it is the belief of KFBM that sound information can be gleaned from solid record keeping. Enterprise analysis is an essential component of the total analysis of the farm business. There is no substitute for keeping and using comprehensive production and financial records such as those provided through the Kentucky Farm Business Management program. Should you have any questions regarding membership into KFBM please contact your local Farm Business Analysis Area Specialist. Your local County Extension Agent for Agriculture can assist you in arranging a meeting with your Farm Business Analysis Area Specialist.

Map of Cooperator's Locations by Area and County, 2000

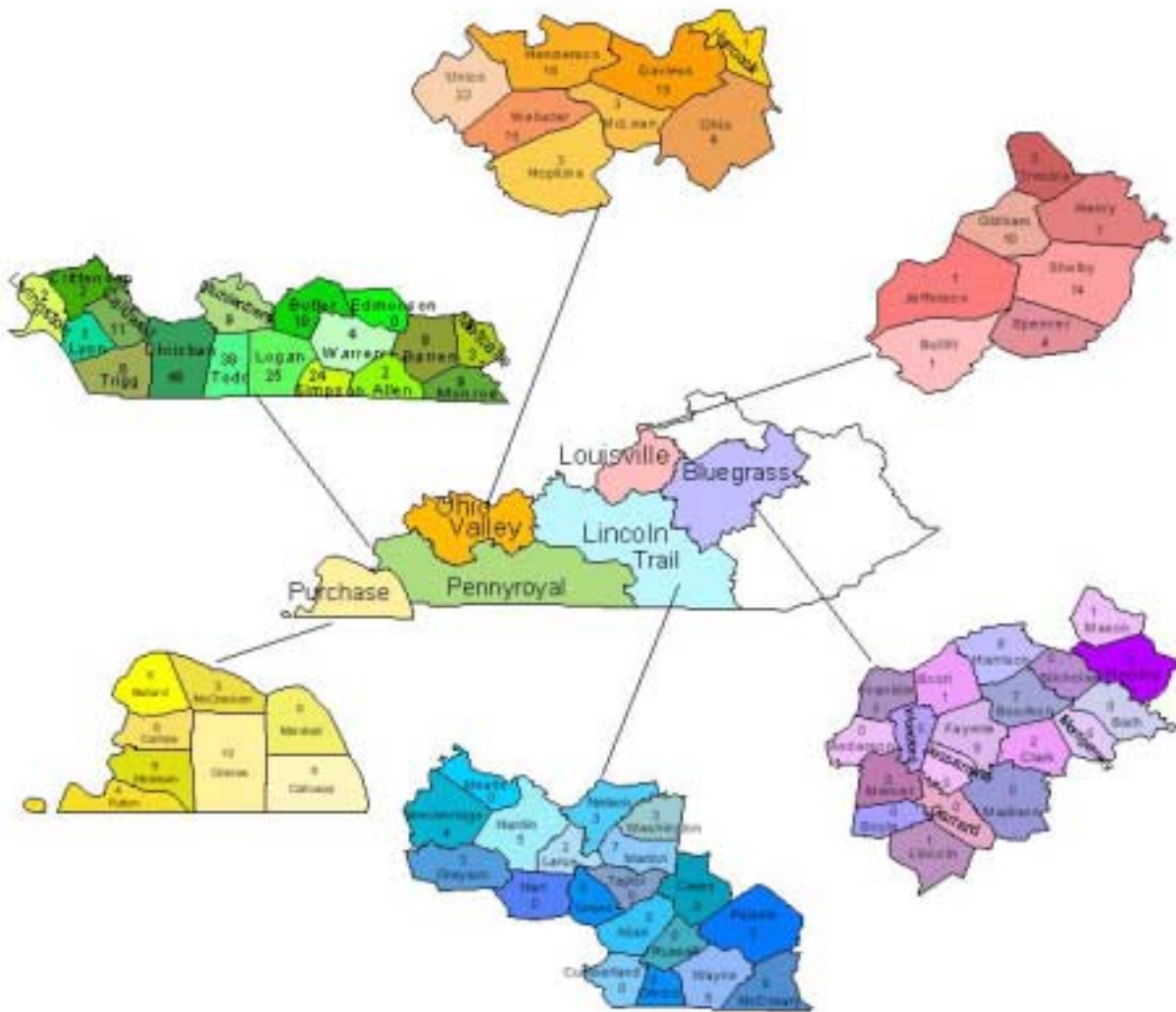


Figure 5 KFBM Membership by County 2000