

Kentucky Farm Business Management Program

**Dairy Cow Enterprise
2003 Costs and Returns Summary**

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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.

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2003 DAIRY ENTERPRISE ANALYSIS

Abstract

This report contains the findings of a study of dairy enterprises on farms participating in the Kentucky Farm Business Management (KFBM) program.

1. In 2003, 30 enterprises were evaluated. Farms in this study averaged 144.7 cows, and ranged in size from 28 to 677 cows. Average milk production per cow was 17,414 pounds, with farm averages ranging from 15,342 pounds per cow to 23,130 pounds per cow.
2. Average **Net Returns Over All Costs** of dairy enterprises studied were negative. Net returns, considering both cash and non-cash costs, averaged a loss of \$282 per cow. On a per hundredweight (cwt.) basis of milk produced, net returns averaged (\$1.62).
3. **Total Returns** averaged \$2,747 per cow. Milk prices averaged \$13.87 per cwt. Beef prices are presently being reported separately for market animals and breeding animals¹. Producers received \$68.98 per cwt. of market beef sold and \$42.10 per cwt. of breeding animals sold in 2003. These figures show mixed movement from 2002 prices of \$61.90 and \$48.85 for market and breeding animals, respectively. The studied farms produced 537 pounds of beef per cow. This is slightly lower in comparison to 2002's figure of 563 pounds of beef per cow. Beef returns averaged \$193 per cow in 2003 compared to \$186 per cow in 2002. Beef returns per cow equaled 7.02% of total dairy returns per cow in 2003 versus 7.09% recorded in the 2002 KFBM Dairy Enterprise Study.
4. These 30 enterprises averaged \$3,028 **Total Costs** per cow in 2003, an increase of \$113 per cow from the 2002 average. Non-feed costs increased \$44 per cow from 2002's \$1,540 per cow to \$1,584 per cow in 2003.

This publication expands on these highlights and on the factors contributing to the results.

¹ 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 2003 have been collected and analyzed. This report focuses on the 2003 results of 30 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 small sample of 30 enterprises, Kentucky dairy enterprises, on average, were not able to cover all costs in 2003. Milk production was higher in 2003 versus 2002. With total costs per cow being higher in 2003 versus 2002, and prevailing low milk prices, average net returns over all costs stayed negative for a second straight year. Six of the last eleven and 3 of the last four years (1995, 1996, 1997, 2000, 2002, and 2003) showed negative average net returns over all costs per cow.

Methods and Definitions Used in Study

Production and financial data were calculated as a component of the complete farm business records of Kentucky Farm Business Management (KFBM) program members. From these data, "size-type" averages were determined for dairy farms. Dairy farms were defined as farms on which the value of feed fed was more than 40 percent of the crop returns and the dairy enterprise utilized more than one-third of the value of feed fed. Three size-type standards were determined for dairy farms based on geographic regions (i.e., Central Kentucky, Western Kentucky, and state-wide). Non-feed and resource costs were then allocated to each respective livestock enterprise based upon 2000, 2001, and 2002 cost data. To refine the allocations, each cost was adjusted proportionately across all livestock activities and any cropping activities.

In providing data that are not influenced by source of labor (i.e., hired vs. unpaid) and level of indebtedness (debt interest payments), data were standardized. This was achieved through including imputed charges on unpaid labor and capital investments. Performance was measured through the calculation of residual returns to management or management returns. The standardization of data between farms with varying quantities of unpaid labor and equity contributions provide an effective measure for comparing performance. Thus, the importance of reviewing the data based upon some unit of production (i.e., per hundred weight, per cow, etc.).

Upon determination of per unit non-feed and resource costs, dairy enterprise production averages were used to complete the respective analyses. Production efficiency averages for various types of livestock enterprises are determined each year from KFBM member data. The averages include total returns, feed costs, and other production variables (i.e., feed efficiency, death loss, etc.). By merging the data sets together, a complete livestock enterprise summary is achieved. However, due to data

limitations, there is no reporting of high return and low return farms based on management returns per acre.

The following definitions used within the farm analysis program are important to the proper interpretation of the material presented:

Total Returns - This is the total return attributable to the livestock enterprise for the year. It includes the value of milk sold, the value of all animals sold (including market and capital), the value of milk and beef used for family consumption, and an inventory adjustment (positive or negative) for the difference in the value of livestock on the farm at the beginning and ending of the year.

Feed Costs - This is the value of purchased and homegrown feed fed. The purchased feed cost is determined from a producer's actual cost and is adjusted for inventory amounts at the beginning and ending of the year. The cost of homegrown feed is determined by charging a twelve-month average "on-farm" per unit market value (what producers would receive if the feed was sold and marketing costs deducted) on the amounts fed.

Non-Feed Cash Costs - This is the actual cash expenditure, with accrual adjustments, for selected operating expenses of farm operators included in the 2003 sample. It does not include cash expenditures for purchased concentrates or grains fed to livestock.

Non-Feed Non-Cash Costs - Unpaid labor, depreciation and interest on equity capital are considered non-cash costs. Homegrown feed is a non-cash cost, but is included in feed cost in these analyses.

Total Cost of Production - This is the total charge (cash and non-cash) for all factors of production, except management, use by the livestock enterprise during the year.

Unpaid Labor - Is the imputed charge for any operator labor contribution toward livestock production. The 2003 imputed rate charged for unpaid labor is \$29,700 per 12 month equivalent or \$2,475 per month. The 2001 and 2002 imputed rates for unpaid labor are \$27,000 and \$28,800 per 12 month equivalent, respectively.

Machinery and Building Depreciation - Taken from depreciation schedules designed to reflect economic depreciation as maintained by the KFBM Program, equipment is generally depreciated over a ten-year period. Most farm buildings, except for single purpose structures, are depreciated over a twenty-five-year period for this economic analysis.

Non-Cash Interest Charge - Represents the imputed equity interest charge for the average annual capital investment for machinery, buildings, land and an imputed interest charge on cash operating expenses. The 2003 imputed interest rate is 6.25 percent. The 2001 and 2002 imputed rates are 8 and 6.75 percent, respectively.

Net Returns or Management Returns - The net return remaining to reward management after charges are made for all other factors of production. It is calculated by deducting the total of all production costs from total revenue.

Adjusted Costs of Milk - Is the cost of producing milk assuming that the value of beef produced equals the cost of producing that beef. It is calculated by subtracting the value of beef produced from the total cost of production. The result of this calculation allows for a better comparison of production costs to the price received for milk sold.

Returns per \$100 Feed Fed - A gauge to examine the effectiveness of feed usage. The returns from feeding \$100 of feed are calculated by dividing total returns by total feed costs and multiplying 100.

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.

It is important to emphasize that standardized producer data is used in this study. Where labor and capital resources vary among producers, these variations are muted through imputed cost determinations. **Table 2** reflects historical rates used in the past and the current study.

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

The 30 dairy enterprises in 2003 had an average of 144.7 cows in the milking herd. Enterprises ranged in size from 28 to 677 cows. Milk production per cow in this study averaged 17,414 pounds, an increase of 155 pounds from the 17,259 pounds average in 2002. The 2002 Kentucky average production as reported by the Kentucky Agricultural Statistics Service (KASS) was 13,230 pounds per cow, up 261 pounds from the 12,969 pounds per cow average reported for 2001. 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 30% more milk production per cow for the farmer-cooperator on the KFBM Program that participated in the 2002 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 122,000 head in 2002. In addition, milk production in Kentucky and the southeast has declined as a percentage of the nation's

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 production during this period. Kentucky's decline in number of cows and increase in milk per cow follows a similar national trend.

Average Costs and Returns

Net returns over all costs to dairy farms in KFBM had been quite erratic in the late 80's and 90's but were expected to be less erratic in the future due to legislation within the last Farm Bill. Looking at the past several years of this study, 2003 shows the second consecutive instance of negative management returns for KFBM dairies. It is also the third time in the last four years that management returns have been negative. 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 2001 were \$2.19 per cwt. higher than those received in 2000. The 2000 milk price of \$13.93 per cwt. halted the upward trend in milk prices that occurred 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. Now with milk prices back at or near 2000 levels and cost considerably higher, returns have suffered.

Milk prices received over the 1990 to 2003 period have been volatile. Before 2000 monthly price charts 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 Basic Formula 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 marketing orders and put in place a new component pricing system that responded more quickly to market prices. Analysts say that the new order system has given a slight boost to most Kentucky milk prices. In much of the South prices are now determined by milk supply and the demand for skim milk and butterfat while most of the rest of the country use multiple component pricing. During the first half of 2003, butter prices were the main driver of farm-level milk prices in Kentucky, but the cheese market was more influential in the second half of the year. 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 \$2,746 on the farms studied, \$125 more than the 2002 average of \$2,621. Beef production per cow decreased compared to 2002 and beef prices (market) received improved from 2002 levels while beef prices (breeding) declined versus 2002. Beef returns increased from \$186 per cow in 2002 to \$193 per cow in 2003.

Total costs per cow were up slightly, from \$2,915 in 2002 to \$3,028 in 2003. Non-feed costs increased \$44 per cow, while feed costs increased \$69 per cow. The increase in non-feed costs continues the upward trend that has continued since 1993 with the exception of 1996 and 2000. Feed costs began to climb in the latter part of 2003 and

continue to remain relatively high and has forced producers to become more efficient in feed conversion.

Net returns per cow were slightly higher in 2003 compared to 2002, however, it must be noted that 2002 and 2003 have been the poorest return years on record. Producers in this study experienced a negative \$282 per cow average net return over all costs in 2003, while 2002 showed a net return of a negative \$294 per cow. Average total returns per cwt. of milk produced, including beef returns, were \$15.77 on the farms in this study. This was an increase of \$0.58 per cwt. from 2002's \$15.19 and is \$2.08 per cwt. off the record high for the KFBM Dairy Enterprise Study attained in 2001 when returns were \$17.85 per cwt.

Total costs of production averaged \$17.39 per cwt. of milk produced in 2003, an increase of \$0.50 per cwt. from the average of \$16.89 recorded in 2002. This is a combination of non-feed cash costs being \$0.18 more and feed costs being \$0.32 more per cwt. of milk produced in 2003 versus 2002. Producers spent more on every item within the category of non-feed cash costs in 2003 than they did in 2002, except for building and fence repairs, machine hire, property taxes and interest. Net returns over all costs averaged negative \$1.62 per cwt. of milk produced in 2003. This year's data provides the third instance in the last four years of negative management returns in the KFBM Dairy Enterprise Studies. So, even though returns per cwt. of milk produced were higher, returns were not more than enough to offset the costs so that a positive return over all costs could be generated for the average farm.

The value of beef amounted to \$1.11 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. Beef returns in 2003 (7.0%) mirrored the portion of total returns in 2002 (7.1%). This is primarily due to the fact the total milk production was up 11.1% versus 2002 and total beef production was up only 4.9% versus 2002. Possibly with the escalating prices that beef producers in general have received in 2003, many cash strapped farmers may have culled a little harder than usual in response to the high beef prices. After adjusting the costs of production per cwt. of milk produced by the value of beef production, \$1.11 per cwt., the adjusted cost of producing milk was lowered to \$16.28 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

Dairy Enterprises
KFBM 1996-2003

Item	1996	1997	1998	1999	2000	2001	2002	2003	3 Year Average*
Number of Dairy Cows	117.7	129.7	140.0	131.7	143.0	135.1	131.4	144.7	137.1
Total Dairy Returns	2614	2672	2910	2990	2557	3021	2621	2746	2796
Costs of Production:									
Feed	1450	1417	1349	1278	1236	1319	1375	1444	1379
Building & Fence	67	70	75	74	80	88	84	79	83
Machinery & Equipment	328	340	378	393	374	405	441	454	433
Labor	408	433	463**	468	431	444	495	524	488
Livestock Supplies	139	140	150	155	142	135	136	140	137
Veterinary	69	75	92	79	73	77	78	80	78
Interest	238	246	252**	242	258	252	255	253	253
Insurance, Taxes & Misc.	38	37	41	47	38	47	52	55	51
Total Cost of Production	2740	2758	2801	2735	2631	2768	2915	3028	2904
Net Returns Over All Costs	-125	-85	109	254	-73	253	-294	-282	-108
Total Dairy Returns	2614	2672	2910	2990	2557	3021	2621	2746	2796
Feed Costs	1450	1417	1349	1278	1236	1319	1375	1444	1379
Returns Over Feed Costs	1164	1255	1561	1712	1322	1702	1246	1302	1417
Non-Feed Costs	1290	1340	1452	1458	1395	1449	1540	1584	1524
Net Returns Over All Costs	-125	-85	109	254	-73	253	-294	-282	-108

* 3 Year Average column is a simple average of the items over the years of 2001, 2002 and 2003.

** Because of a change in software provider, 1998 data did not include unpaid labor figures or non-cash interest charges. Area Extension Specialist in Farm Business Management, Craig D. Gibson, has extrapolated the data using the raw data. This has erased the gap for 1998 in calculating Total Costs of Production, Non-Feed Costs and Net Returns Over All Costs that was evident in the 1999 and 2000 KFBM Dairy Enterprise Analysis Studies.

Table 2

**Average Costs and Returns
Per CWT. of Milk Produced**

**Dairy Enterprises
KFBM 1996-2003**

Item	1996	1997	1998	1999	2000	2001	2002	2003	3 Year Average*
Total Dairy Returns	16.47	15.57	15.96	17.62	15.25	17.85	15.19	15.77	16.27
Costs of Production:									
Feed	9.16	8.29	7.40	7.61	7.46	7.83	7.97	8.29	8.03
Building & Fence	0.43	0.42	0.41	0.44	0.47	0.51	0.49	0.45	0.48
Machinery & Equipment	1.97	1.98	2.06	2.33	2.24	2.41	2.55	2.61	2.52
Labor	2.61	2.53	2.54**	2.76	2.58	2.62	2.87	3.01	2.83
Livestock Supplies	0.84	0.79	0.82	0.89	0.82	0.77	0.79	0.80	0.79
Veterinary	0.42	0.43	0.50	0.45	0.42	0.44	0.45	0.46	0.45
Interest	1.53	1.44	1.38**	1.44	1.55	1.49	1.48	1.45	1.47
Insurance, Taxes & Misc.	0.27	0.21	0.22	0.28	0.23	0.28	0.30	0.32	0.30
Total Costs of Production	17.33	16.09	15.33	16.20	15.76	16.36	16.89	17.39	16.88
Net Returns Over All Costs	-0.86	-0.52	0.63	1.42	-0.51	1.49	-1.70	-1.62	-0.61
Total Dairy Returns	16.47	15.57	15.96	17.62	15.25	17.85	15.19	15.77	16.27
Feed Costs	9.16	8.29	7.40	7.61	7.46	7.83	7.97	8.29	8.03
Returns Over Feed Costs	7.31	7.28	8.56	10.01	7.79	10.01	7.22	7.48	8.24
Non-Feed Costs	8.17	7.80	7.93	8.59	8.29	8.52	8.92	9.10	8.85
Net Returns Over All Costs	-0.86	-0.52	0.63	1.42	-0.51	1.49	-1.70	-1.62	-0.61
Milk Price Received (\$/CWT)	15.53	14.44	15.93	16.46	13.93	16.12	13.29	13.87	14.43
Adjusted Total Cost of Milk	16.39	14.96	14.34	15.04	14.44	14.66	15.81	16.32	15.60
Yearly Rates for Labor, Interest & Fed Corn:									
Fed Corn Produced on Farm (\$/Bu.)	3.75	2.78	2.39	2.11	2.09	2.08	2.29	2.51	2.29
Unpaid Labor Rate/Year	19800	21600	22800	24000	25200	27000	28800	29700	28500
Interest Rate: Non-Land	9.0%	9.0%	9.0%	8.5%	9.0%	8.0%	6.75%	6.25%	7.0%
Interest Rate: Land	5.0%	5.0%	5.0%	5.0%	4.5%	4.5%	4.0%	4.0%	4.16%

* 3 Year Average column is a simple average of the items over the years of 2001, 2002 and 2003.

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Variability in Costs and Returns

A consistent finding in all twenty-four 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 past studies 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

As explained in the Methodology and Definitions, the 2002 and 2003 data was refined using actual 2000 and 2001 cost and return data. So, with this year's Dairy Study we were unable to perform the aforementioned classifications. However, a portion of the data could be extracted into a High Third component and an average component and that data is presented in **Table 3**. Averages for economic and production variables are presented in **Table 4, Table 4A, Table 4B**.

High returns enterprises averaged \$8.13 per CWT M.E. of returns above feed costs. This equates to \$1,811 per cow. For the farms that make up the average group, returns above feed costs amounted to \$6.92 per CWT M.E. or \$1,302 per cow. As evidenced by past studies, one characteristic that separates the best from the rest is the ability to control feed costs. In the 2003 study the High Third group was able to beat the average by \$509 per cow. This \$509 per cow can go a long way in assisting with the bottom line.

Total returns for the high returns group averaged \$15.06 per CWT M.E. (\$3,355 per cow), up from 2002's high returns group that posted an average of \$14.19 per CWT M.E. (\$2,782 per cow). Total returns were \$608 greater for the high returns group compared to the average returns group. High returns farms received \$14.56 per cwt. for the milk they sold while average returns farms received \$13.87 per cwt. for the milk they sold. Beef returns per CWT M.E. were \$0.24 (\$90 per cow) higher on the high returns farms relative to the average returns group. 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 returns above feed costs between the high returns and average returns groups was \$509 per cow. As shown above, the high returns groups experienced \$608 more per cow on the return side, but a \$101 disadvantage per cow on the feed costs

side. Milk production averaged 20,290 pounds per cow for the high returns group, 2,876 more pounds per cow than the average returns group. Beef produced per cow was 93 pounds more for the high returns group than those comprising the average returns group, 630 pounds vs. 537 pounds.

Total feed costs averaged \$1,544 per cow on the high returns farms, and \$1,444 per cow on the low returns farms, making the difference of \$100 per cow. Thus, in 2003, the high third group actually had higher feed costs per cow yet, due to the spread on the returns side, they were able to net more per cow over feed costs versus the average.

Death loss as a percent of total beef pounds produced was 19.9% for the high returns group compared to 20.5% for the average returns group. Usually the lower returns group experiences the highest death loss percentage. Higher death loss percentages are an indication of herd health problems and less management control.

Table 3

Per CWT Milk Equivalent (M.E.) Averages

Dairy Enterprises
KFBM 2003

Enterprise Summary:	Units	Average Per CWT M.E.	Average Per Cow	Average High Third Per CWT M.E.	High Third Average Per Cow
Number of Herds	Herds	30	30	10	10
Total Dairy Returns	\$	14.60	2747	15.06	3355
Total Feed Costs	\$	7.68	1444	6.93	1544
Returns Above Feed Costs	\$	6.92	1302	8.13	1811
Other Economic Variables:	Units	Average Farm		Average High Third	
Returns Per \$100 Feed Fed	\$	190		217	
Price Received Per CWT of Milk	\$	13.87		14.56	
Price Received Per CWT Beef (Market)	\$	68.98		78.91	
Other Production Variables:	Units	Average Farm		Average High Third	
Average Number of Cows	Cows	144.7		179.2	
Cows Dry	%	14.7		13.8	
Animal Units in Herd	Units	281		349	
Number of Calves Born	Head	130		175	
Calving %	%	90		97	
Total Milk Production	CWT	25192		36360	
Milk Per Cow	Lbs.	17414		20290	
Total Beef Production	CWT	776		1128	
Beef Per Cow	Lbs.	537		630	
Butterfat %	%	3.65		3.75	
Butterfat Per Cow	Lbs.	624		726	
Protein %	%	3.04		3.04	
Protein Per Cow	Lbs.	581		599	
Value of Feed Fed Per CWT M.E.	\$	7.68		6.93	
Total Concentrates Per CWT M.E.	Lbs.	57		54	
Hay & Dry Forage Per CWT M.E.	Lbs.	38		28	
Corn Silage Per CWT M.E.	Lbs.	118		108	
Other Silage Per CWT M.E.	Lbs.	19		10	
Pasture Days Per Animal Unit	Days	39		34	
Hay Equivalent Per Cow	Tons	8.9		N/A	
Average Purchase Price Per Breeding Animal	\$	1296		1407	
Breeding Cull Rate	%	24.8		21.1	
Weight Per Breeding Animal Sold	Lbs.	1210		1221	
Price Received Per CWT (Breeding)	\$	42.10		44.23	
Death Loss: Total Pounds	Lbs.	15907		22438	
Death Loss: % of Pounds Produced	%	20.5		19.9	
Deaths: Market	Head	24		38	
Deaths: Breeding	Head	10		13	
Breeding Survival Rate	%	93.5		97.2	

Table 4**Per Cow Averages for Economic and
Production Variables****Dairy Enterprises
KFBM 2001-2003**

Enterprise Summary:	Units	2001	2002	2003	Average
Number of Herds	Herds	33	27	30	30
Total Dairy Returns	\$	3021	2621	2746	2796
Total Feed Costs	\$	1319	1375	1444	1379
Returns Above Feed Cost	\$	1702	1246	1302	1417
Total Non-Feed Costs	\$	1447	1540	1584	1524
Net Returns Over All Costs	\$	255	-294	-282	-107
Other Economic Variables:	Units	2001	2002	2003	Average
Returns Per \$100 Feed Fed	\$	231	191	190	204
Price Received Per CWT of Milk	\$	16.12	13.29	13.87	14.43
Price Received Per CWT Beef (Market)	\$	79.65	61.90	68.98	70.18
Capital Investment Per Cow:	Units	2001	2002	2003	Average
Livestock	\$	1629	1711	1649	1663
Non-Livestock	\$	1122	1184	1385	1230
Total	\$	2751	2894	3034	2893
Other Production Variables:	Units	2001	2002	2003	Average
Average Number of Cows	Cows	135.0	131.4	144.7	137.0
Cows Dry	%	14.9	15.0	14.7	14.9
Animal Units in Herd	Units	266	268	281	272
Total Milk Production	CWT	23297	22673	25192	23721
Total Beef Production	Lbs.	83574	73991	77621	78395
Beef Per Cow	Lbs.	590	563	537	563
Milk Per Cow	Lbs.	16921	17259	17414	17198
Butterfat Per Cow	Lbs.	618	639	624	627
Value of Feed Fed Per CWT M.E.	\$	7.1	7.4	7.7	7.4
Total Concentrates Per CWT M.E.	Lbs.	62	63	57	61
Hay & Dry Forage Per CWT M.E.	Lbs.	33	34	38	35
Corn Silage Per CWT M.E.	Lbs.	116	112	118	115
Other Silage Per CWT M.E.	Lbs.	22	19	19	20
Pasture Days Per Animal Unit	Days	47	50	39	45
Hay Equivalent Per Cow	Tons	9.0	8.6	8.9	8.8
Average Purchase Price Per Breeding Animal	\$	1191	1476	1296	1321
Breeding Cull Rate	%	25.4	24.9	24.8	25.0
Weight Per Breeding Animal Sold	Lbs.	1191	1184	1210	1195
Price Received Per CWT (Breeding)	\$	45.59	48.85	42.10	45.51
Death Loss: % of Pounds Produced	%	22.6	21.5	20.5	21.53
Death Loss: Total Pounds	Lbs.	14120	15908	15907	15312
Deaths: Market	Head	23	25	24	24
Deaths: Breeding	Head	10	13	10	11
Breeding Survival Rate	%	95.9	95.3	93.5	94.9
Labor Summary:	Units	2001	2002	2003	Average
Months Per Cow	Months	0.23	0.26	0.23	0.24
Milk Production Per Worker Per Year	Lbs.	972800	948627	915041	894234

Table 4A

Per Cow Averages for Costs and Returns

Dairy Enterprises
KFBM 2001-2003

Enterprise Returns:	Units	2001	2002	2003	Average
Milk Returns	\$	2725	2291	2415	2477
Patronage Returns	\$	4	4	3	4
Dairy Market Loss Assistance	\$	0	140	135	92
Beef Returns	\$	291	186	193	223
Total Dairy Returns	\$	3021	2621	2746	2796
Non-Feed Cash Costs:	Units	2001	2002	2003	Average
Livestock Supplies	\$	135	136	140	137
Veterinary	\$	77	78	80	78
Fuel & Oil	\$	30	34	40	35
Machinery Repair	\$	85	92	99	92
Building & Fence Repair	\$	49	46	36	44
Machine Hire	\$	140	151	140	144
Utilities	\$	84	92	99	92
Light Vehicle	\$	0	0	1	0
Paid Labor	\$	249	254	288	264
Insurance	\$	26	32	33	30
Property Taxes	\$	3	4	5	4
Miscellaneous	\$	17	16	17	17
Cash Interest	\$	96	98	96	97
Total Non-Feed Cash Costs	\$	991	1034	1074	1033
Feed Costs:	Units	2001	2002	2003	Average
Concentrates	\$	851	882	919	884
Hay & Dry Roughage	\$	188	203	231	207
Corn Silage	\$	227	240	255	241
Other Silage	\$	33	28	23	28
Pasture Charge	\$	20	22	17	20
Total Feed Costs	\$	1319	1375	1444	1379
Non-Feed Non-Cash Costs:	Units	2001	2002	2003	Average
Unpaid Labor	\$	195	241	236	224
Machinery Depreciation	\$	66	71	75	71
Building Depreciation	\$	39	37	42	39
Non-Cash Interest	\$	156	157	157	157
Total Non-Feed Non-Cash Costs	\$	456	506	510	491
Net Returns Summary:	Units	2001	2002	2003	Average
Total Costs of Production	\$	2766	2915	3028	2903
Adjustment for Beef Income	\$	291	186	193	223
Adjusted Total Cost of Milk	\$	2475	2729	2835	2680
Net Returns Over All Costs	\$	255	-294	-282	-107
Costs & Returns Summary:	Units	2001	2002	2003	Average
Total Dairy Returns	\$	3021	2621	2746	2796
Feed Costs	\$	1319	1375	1444	1379
Non-Feed Costs	\$	1447	1540	1584	1524
Net Returns Over All Costs	\$	255	-294	-282	-107
Costs Summary:	Units	2001	2002	2003	Average
Non-Feed Cash Costs	\$	991	1034	1074	1033
Feed Costs	\$	1319	1375	1444	1379
Non-Feed Non-Cash Costs	\$	456	506	510	491
Total Costs of Production	\$	2766	2915	3028	2903

Table 4B

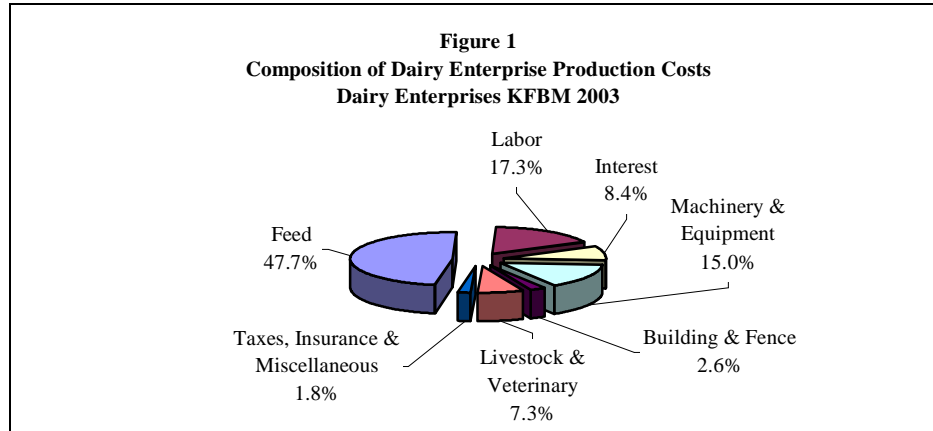
Per CWT Averages for Costs and Returns

Dairy Enterprises
KFBM 2001-2003

Enterprise Returns:	Units	2001	2002	2003	Average
Milk Returns	\$	16.12	13.27	13.87	14.42
Patronage Returns	\$	0.02	0.02	0.02	0.02
Dairy Market Loss Assistance	\$	0.00	0.81	0.78	0.53
Beef Returns	\$	1.70	1.08	1.11	1.30
Total Dairy Returns	\$	17.85	15.19	15.77	16.27
Non-Feed Cash Costs:	Units	2001	2002	2003	Average
Livestock Supplies	\$	0.77	0.79	0.80	0.79
Veterinary	\$	0.44	0.45	0.46	0.45
Fuel & Oil	\$	0.18	0.20	0.23	0.20
Machinery Repair	\$	0.52	0.54	0.57	0.54
Building & Fence Repair	\$	0.29	0.27	0.21	0.26
Machine Hire	\$	0.83	0.87	0.81	0.84
Utilities	\$	0.50	0.53	0.57	0.53
Light Vehicle	\$	0.00	0.00	0.00	0.00
Paid Labor	\$	1.44	1.47	1.65	1.52
Insurance	\$	0.16	0.18	0.19	0.18
Property Taxes	\$	0.02	0.03	0.03	0.03
Miscellaneous	\$	0.10	0.09	0.10	0.10
Cash Interest	\$	0.57	0.57	0.55	0.57
Total Non-Feed Cash Costs	\$	5.82	5.99	6.17	5.99
Feed Costs:	Units	2001	2002	2003	Average
Concentrates	\$	5.05	5.11	5.28	5.15
Hay & Dry Roughage	\$	1.13	1.18	1.32	1.21
Corn Silage	\$	1.33	1.39	1.46	1.39
Other Silage	\$	0.20	0.16	0.13	0.16
Pasture Charge	\$	0.12	0.13	0.10	0.12
Total Feed Costs	\$	7.83	7.97	8.29	8.03
Non-Feed Non-Cash Costs:	Units	2001	2002	2003	Average
Unpaid Labor	\$	1.18	1.39	1.35	1.31
Machinery Depreciation	\$	0.38	0.41	0.43	0.41
Building Depreciation	\$	0.22	0.22	0.24	0.23
Non-Cash Interest	\$	0.92	0.91	0.90	0.91
Total Non-Feed Non-Cash Costs	\$	2.70	2.93	2.93	2.85
Net Returns Summary:	Units	2001	2002	2003	Average
Total Costs of Production	\$	16.35	16.89	17.39	16.88
Adjustment for Beef Income	\$	1.70	1.08	1.11	1.30
Adjusted Total Cost of Milk	\$	14.65	15.81	16.28	15.58
Net Returns Over All Costs	\$	1.50	-1.70	-1.62	-0.61
Costs & Returns Summary:	Units	2001	2002	2003	Average
Total Dairy Returns	\$	17.85	15.19	15.77	16.27
Feed Costs	\$	7.83	7.97	8.29	8.03
Non-Feed Costs	\$	8.52	8.92	9.10	8.85
Net Returns Over All Costs	\$	1.50	-1.70	-1.62	-0.61
Costs Summary:	Units	2001	2002	2003	Average
Non-Feed Cash Costs	\$	5.82	5.99	6.17	5.99
Feed Costs	\$	7.83	7.97	8.29	8.03
Non-Feed Non-Cash Costs	\$	2.70	2.93	2.93	2.85
Total Costs of Production	\$	16.35	16.89	17.39	16.88

Cost Structure for Entire Group

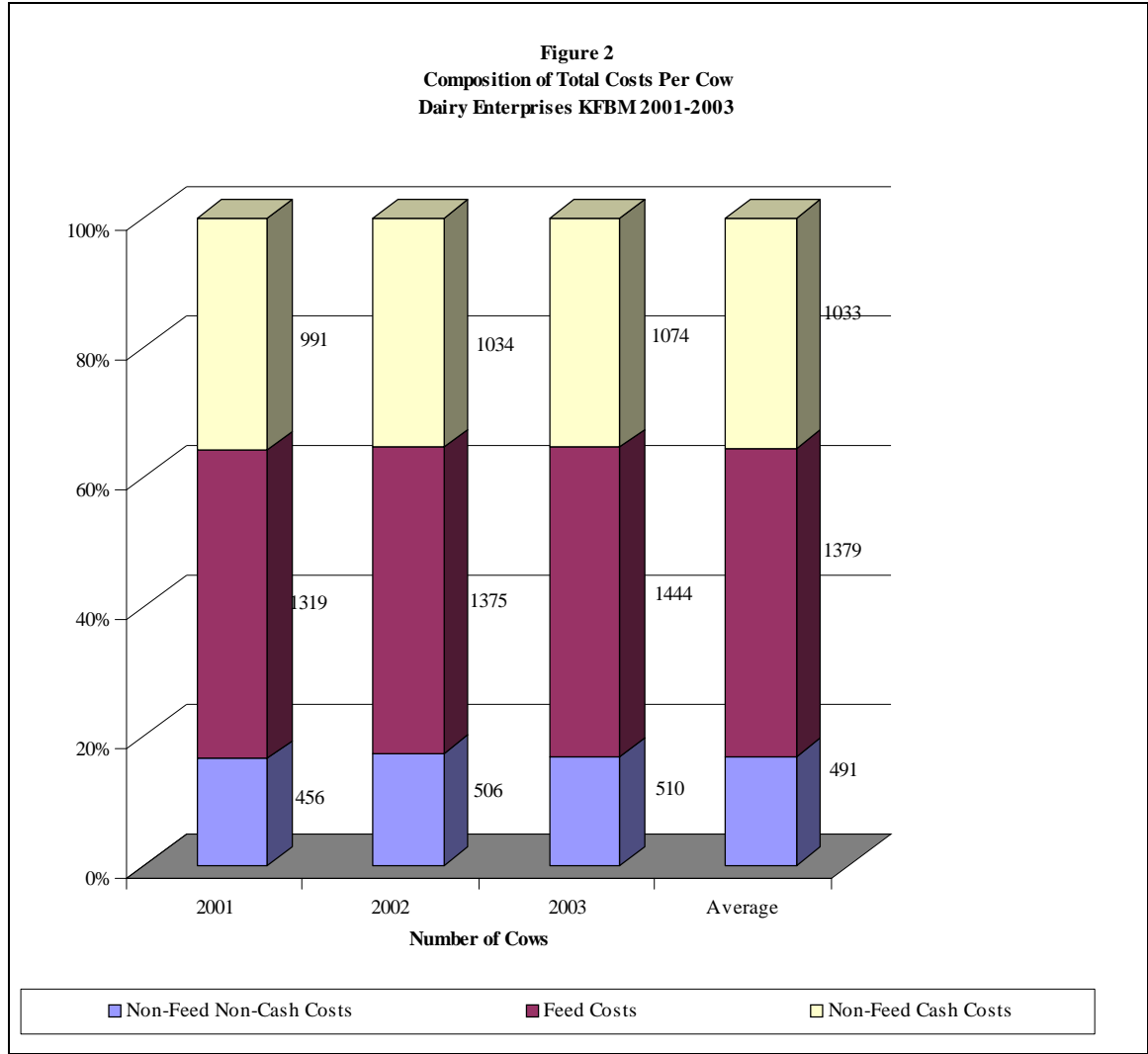
Cost items as a percentage of total cost in 2003 are shown in **Figure 1**. As expected, feed was the largest single production cost at \$1,444 per cow, amounting to 47.7% of total costs per cow. Labor, the second largest cost in the dairy enterprise, accounted for 17.3% of the total costs. In 2002, feed costs were \$1,375 per cow, amounting to 47.2% of total costs per cow. 2001 feed costs totaled \$1,319 per cow or 47.7% of total costs per cow. Labor costs have risen only slightly during this period with 2002 and 2001 showing 17.0% and 16.1% respectively.



One would have assumed that labor cost as a percent of total costs would have risen at a greater rate 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 \$1,650 per month in 1996 to \$2,475 per month in 2003. 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 (131.4 cows in 2002 vs. 144.7 in 2003.) To see the impact of this relationship within the 2003 study, refer to **Figure 2** on the next page, where unpaid labor is included in Non-feed Non-cash Costs. Paid labor costs increased from \$254 per cow in 2002 to \$288 per cow in 2003, but unpaid labor costs per cow decreased slightly from \$241 per cow in 2002 to \$236 per cow in 2003. So, one can see that total labor costs increased from \$495 per cow in 2002 to \$524 per cow in 2003, and labor as a percentage of total production costs on a dairy enterprise remained steady at 17.3%.

Machinery and equipment costs (repairs, fuel & oil, utilities, light vehicle, machinery hire and machinery depreciation) increased by \$23 per cow from 2002 and amounted to 15% of total costs per cow, mirroring 2001. Interest costs were 8.4% of total costs per cow, approximately \$2 less per cow than 2002. Cash interest costs were slightly lower from \$98 per cow in 2002 to \$96 per cow in 2003, while non-cash interest amounted to \$157 per cow, constant when compared to 2002. Total investment per cow was \$3,034 per cow in 2003. This is up from 2002's figure of \$2,894 per cow. One would hypothesize that due to the onset of lower milk prices in 2002 many dairy enterprises would have chosen to make less new capital purchases during 2002 and 2003 versus 2001. However, with the recent availability of accelerated depreciation options

(Bonus 30%, Bonus 50% and Section 179) it is understandable that many producers have used tax management strategies to replace capital items. Non-livestock capital investment per cow increased from 2002's \$1,184 to \$1,385 in 2003.



Livestock supplies and veterinary expenses increased \$6 per cow over 2002 to \$220 per cow and comprised 7.3% of total costs per cow identical in comparison to 2002. Building and fence costs (repairs and depreciation) were 2.6% of total costs per cow and the sum of insurance, miscellaneous and taxes accounted for the remaining 1.8% 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.

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. 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 2002 and 2003, the farms in this study averaged a loss of \$294 and \$282 per cow, respectively. Farms with this magnitude of a loss cannot expect to stay in the dairy business if these types of losses continue. During the 5 years between 1998 and 2002 Kentucky lost approximately 900 dairy farms. This amounts to a 26% decline versus a 21% decline seen nationally. The West has been gaining market share and the Southeast has been losing market share for years. However, the declining number of dairy farms everywhere else obscures the increased presence in the West.

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 4A**, and **4B**.

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. 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 2003 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 30 farms in this study averaged \$228 per cow above the sum of non-feed cash costs and feed costs. Total returns average \$2,746 per cow while non-feed cash costs plus the value of feed fed amounted to \$2,518 per cow. For each cwt. of milk produced, non-feed cash costs plus total feed costs averaged \$14.46. Total returns per cwt. milk produced for these farms averaged \$15.77. This left \$1.31 per cwt. or \$228 per cow 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 \$510 per cow or \$2.93 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 5** for the years 1995 through 2003.

An upward trend is evident in milk production per cow and butterfat per cow. Another improvement had been in the amount of milk produced per worker. However, in the last three years this has appeared to begin to flatten. 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 and remained somewhat flat in 1998. 1999 and 2000 introduces a different method of calculating investment. A complete explanation can be found in the footnote to **Table 5**. 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.

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. The 2001-2003 figures represent much lower death loss than 2000's record of 31.0%.

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 5

**Economic and Production Variables That Influence Profits Dairy Enterprises
KFBM 1995-2003**

Item	Units	1995	1996	1997	1998	1999	2000	2001	2002	2003	3 Year Average
Average Number of Cows	Head	110.7	117.7	129.7	140.0	131.7	143.0	135.1	131.4	144.7	137.1
Cows Dry	%	14.6	15.4	14.6	14.0	15.6	15.9	14.9	15.0	14.7	14.9
Animal Units in Herd	Units	219.0	229.0	256.0	271.0	247.6	271.4	266	268	281	272
Milk Production	CWT	18691	18964	22414	24025	22508	24530	23297	22673	25192	23721
Beef Production	Lbs.	65641	67629	77800	79046	81206	77432	83574	73991	77621	78395
Beef Per Cow	Lbs.	564	555	576	565	578	545	590	563	537	563
Milk Per Cow	Lbs.	16697	15869	17187	17179	16948	16763	16921	17259	17414	17198
Butterfat Per Cow	Lbs.	610	586	622	624	607	618	618	631	624	624
Milk Per Worker Per Year	Lbs.	791478	794985	856262	N/A	815906	910637	972800	948627	915041	894234
Death Loss:											
% of Beef Production	%	18.3	21.2	21.4	25.7	20.9	31.0	22.6	21.5	20.5	21.5
Feed Fed Per CWT M.E.*	Units	1995	1996	1997	1998	1999	2000	2001	2002	2003	3 Year Average
Concentrates	Lbs.	437	436	450	61	62	58	62	63	57	61
Hay & Dry Forage	Lbs.	272	302	221	24	31	35	33	34	38	35
All Silage	Lbs.	891	948	1087	137	145	140	138	131	137	135
Pasture Days Per Animal Unit	Days	53	47	45	54	46	46	47	50	39	45
Prices Received:	Units	1995	1996	1997	1998	1999	2000	2001	2002	2003	3 Year Average
CWT Milk	\$	15.53	13.18	14.44	15.93	16.46	13.93	16.12	13.29	13.87	14.43
CWT Beef (All)**	\$	44.23	34.94	39.72	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CWT Beef (Market)	\$	N/A	N/A	N/A	46.55	58.14	71.25	79.65	61.90	68.98	70.18
CWT Beef (Breeding)	\$	N/A	N/A	N/A	37.09	37.48	41.81	45.59	48.85	42.10	45.51
Capital Investment Per Cow*** :	Units	1995	1996	1997	1998	1999	2000	2001	2002	2003	3 Year Average
Total	\$	2703	2706	2775	2749	2894	2542	2751	2894	3034	2893
Livestock	\$	1500	1469	1482	1535	1504	1519	1629	1711	1649	1663
Non-Livestock	\$	1203	1237	1293	1215	1390	1023	1122	1184	1385	1230

* 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 are not included as a component of the capital investment calculation.

Costs and Returns by Herd Size

The average size of the dairy herds studied in 2003 was 144.7 cows, and the herds ranged in size from 28 to 677 cows. Determining how well different sized dairy herds compete financially is the major objective of this section of the 2003 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.

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 30 enterprises studied in 2003 and the 27 enterprises studied in 2002 were divided into two size groups:

1. Between 40 and 79 cows.
2. Greater than 79 cows.

The results are presented in **Table 6** and **Table 6A**.

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 and 2000, 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 2001, the group with 75 to 100 cows had the lowest non-feed cash costs, \$791 per cow and \$5.16 per cwt. of milk produced. The group with 101 to 150 cows experienced the highest non-feed cash costs at \$1,130 per cow and \$6.17 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. Typically the relationship that exists between paid labor and unpaid labor as herd size increases is 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.

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 144.7 in 2003. During this same period, total milk produced for the average herd increased from 1,168,584 pounds to 2,519,247 pounds. Thus, the average farms in these studies have increased total milk production by 116% since 1981.

Table 6

**Per Cow Averages for Economic
and Production Variables by Herd Size**

**Dairy Enterprises
KFBM 2003**

Enterprise Summary:	Units	Average	40-79	>79
Number of Herds	Herds	30	10	20
Total Dairy Returns	\$	2747	2561	2776
Total Feed Costs	\$	1444	1395	1452
Returns Above Feed Cost	\$	1302	1166	1324
Other Economic Variables:	Units	Average	40-79	>79
Returns Per \$100 Feed Fed	\$	190	184	191
Price Received Per cwt. of Milk	\$	13.87	13.08	13.99
Price Received Per cwt. Beef (Market)	\$	68.98	65.58	70.68
Other Production Variables:	Units	Average	40-79	>79
Average Number of Cows	Cows	144.7	58.8	187.6
Cows Dry	%	14.7	16.2	14.5
Animal Units in Herd	Units	281	126	359
Number of Calves Born	Head	130	56	167
Calving %	%	90	95	89
Total Milk Production	CWT	25192	9324	33127
Milk Per Cow	Lbs.	17414	15856	17658
Total Beef Production	CWT	776	366	981
Beef Per Cow	Lbs.	537	623	523
Butterfat %	%	3.65	3.73	3.61
Butterfat Per Cow	Lbs.	624	591	629
Protein %	%	3.04	N/A	3.04
Protein Per Cow	Lbs.	581	N/A	581
Value of Feed Fed Per CWT M.E.	\$	7.68	7.66	7.68
Total Concentrates Per CWT M.E.	Lbs.	57	61	56
Hay & Dry Forage Per CWT M.E.	Lbs.	38	48	36
Corn Silage Per CWT M.E.	Lbs.	118	81	123
Other Silage Per CWT M.E.	Lbs.	19	5	21
Pasture Days Per Animal Unit	Days	39	51	37
Hay Equivalent Per Cow	Tons	8.9	8.3	9.0
Average Purchase Price Per Breeding Animal	\$	1296	1162	1302
Breeding Cull Rate	%	24.8	23.1	25.1
Weight Per Breeding Animal Sold	Lbs.	1210	1245	1205
Price Received Per CWT (Breeding)	\$	42.10	44.47	41.74
Death Loss: Total Pounds	Lbs.	15907	5361	21180
Death Loss: % of Pounds Produced	%	20.5	14.6	21.6
Deaths: Market	Head	24	7	32
Deaths: Breeding	Head	10	4	13
Breeding Survival Rate	%	93.5	96.7	91.9

Table 6A

**Per Cow Averages for Costs and
Returns by Herd Size**

**Dairy Enterprises
KFBM 2002**

Enterprise Summary:	Units	Average	40-79	>79
Number of Herds	Herds	27	8	19
Total Dairy Returns	\$	2622	2628	2644
Total Feed Costs	\$	1375	1485	1368
Returns Above Feed Cost	\$	1247	1143	1276
Other Economic Variables:	Units	Average	40-79	>79
Returns Per \$100 Feed Fed	\$	191	177	193
Price Received Per cwt. of Milk	\$	13.29	13.15	13.31
Price Received Per cwt. Beef (Market)	\$	61.90	58.57	62.74
Other Production Variables:	Units	Average	40-79	>79
Average Number of Cows	Cows	131.4	61.0	175.4
Cows Dry	%	15.0	17.1	14.6
Animal Units in Herd	Units	268	136	355
Number of Calves Born	Head	129	60	172
Calving %	%	98	99	98
Total Milk Production	CWT	22673	10207	30689
Milk Per Cow	Lbs.	17259	16732	17495
Total Beef Production	CWT	740	467	943
Beef Per Cow	Lbs.	563	765	537
Butterfat %	%	3.70	3.81	3.65
Butterfat Per Cow	Lbs.	631	634	636
Protein %	%	N/A	N/A	N/A
Protein Per Cow	Lbs.	N/A	N/A	N/A
Value of Feed Fed Per CWT M.E.	\$	7.36	7.91	7.27
Total Concentrates Per CWT M.E.	Lbs.	63	64	62
Hay & Dry Forage Per CWT M.E.	Lbs.	34	43	32
Corn Silage Per CWT M.E.	Lbs.	112	94	115
Other Silage Per CWT M.E.	Lbs.	19	9	20
Pasture Days Per Animal Unit	Days	50	62	45
Hay Equivalent Per Cow	Tons	8.6	9.0	8.5
Average Purchase Price Per Breeding Animal	\$	1476	1662	1512
Breeding Cull Rate	%	24.9	44.1	21.7
Weight Per Breeding Animal Sold	Lbs.	1184	1005	1248
Price Received Per CWT (Breeding)	\$	48.85	84.52	39.10
Death Loss: Total Pounds	Lbs.	15908	6415	21886
Death Loss: % of Pounds Produced	%	21.5	13.8	23.2
Deaths: Market	Head	25	11	34
Deaths: Breeding	Head	13	5	19
Breeding Survival Rate	%	95.3	96.1	94.9

Conclusions and Observations

While these 30 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 for 2002 and 2003 are substantially different from the 2001 KFBM Dairy Enterprise Study. Primarily, this is a result of lower milk prices.
2. Kentucky has been gradually losing dairy market share, recently falling below 1% of the nation's milk production, but with average milk per cow around 13,230 lbs./cow/year versus a national average approaching 19,000 lbs./cow/year it is amazing that the rate of exit hasn't been even faster. However, it must be noted that lower gross per cow doesn't always equate with a lower net per cow.

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 a positive cash flow to meet all requirements.

Planning, organizing, staffing, directing, 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 Area Extension Specialist in Farm Business Management. Your local County Extension Agent for Agriculture can assist you in arranging a meeting with your Area Extension Specialist in Farm Business Management.

Figure 3
KFBM Membership 2003

**Map of Cooperator's Locations
 by Area and County, 2003**

