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Competitiveness of NC Dairy Farms

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Milk prices continue to be highly volatile, which makes it tough to know whether a dairy farm is doing well or not. North Carolina's dairy farm numbers continue to slide and some people wonder if there is a future in dairy farming. However, at least a few NC dairy farms seem to be holding their own with farms in other parts of the country. Eight North Carolina dairy farmers participated in a pilot project that began in 1999, as part of an effort to develop performance measures specifically for NC farms. Eleven farms participated in 2000. This NC pilot program is taking advantage of the "Top Dairies Project" developed at Cornell University, with financial support from the NC Dairy foundation. The "Top Dairies Project" has two main purposes: To help dairy farmers assess the competitiveness of their farms compared to other farms across the country and to help them identify the strong and weak aspects of their individual farms' performance. The URL for this project is http://www.cpdmp.cornell.edu/

It is very helpful to be able to compare farm performance with other farms in the same part of the country. Thanks to the North Carolina cooperators, we have benchmarks that all NC dairy farmers can use. This information is presented here and is also available on the web at http://www.ag-econ.ncsu.edu/, under the N.C. Dairy Financial Performance Pilot Project. Contributors to the Cornell project can access the database and extract information about other parts of the country and about different sizes of farm. The data on the web page are presented in tabular form but the key points are summarized here. All the comparisons are for confinement Holstein herds because there were almost no Jersey herds or grazing herds in the database.

On average, the North Carolina farms were more profitable than the herds in the Cornell database, Table 1, using Net Farm Income (NFI) per cow and Return on Assets (ROA) as profit measures. NFI is the return to the family for the work they do and for their investments in the farm. ROA (sometimes called return on investment) is commonly used by non-farm businesses because a firm must generate a high enough rate of return to justify borrowing money at market interest rates if it is to survive. There were seven NC farms with data for both years and these farms generated a ROA of 6.8% in 1999 and 5.7% in 2000, compared to the average of 6.0% and 1.1%, respectively, for all the farms in the database. The ROA was calculated after making an allowance of approximately $50,000 for the value of family labor for the NC farms.

In 1999, the NC farms performed better than the average for farms in the Northeast based on NFI and ROA, Table 2A. Only the Midwest beat the NC farms in NFI/Cow. However, the NC farms lagged behind the Midwest and the Southwest (which includes California) in ROA . The NC farms had both the highest gross income per cow and the highest cost per cow. Regional data for 2000 are incomplete, Table 2B.

The Cornell data for 1999 showed that profitability increased with herd size, from a ROA of 3.5% for herds of less than 100 cows to 11.2% for herds over 600 cows, Table 3A. The smallest herds had the lowest milk price but this does not explain much of the difference. The larger herds had higher milk production per cow and a lower investment per cow. Net farm income per cow was similar for all size groups and NFI per 100 lb. of milk declined as herd size increased. This suggests there are few economies of scale, although there may be regional effects that confound this result. The 2000 results were less pronounced, Table 3B. The smallest herds had a negative ROA at -2.6% and the 400 to 599 cow group had the best performance at 5.0%. The largest group, herds of 600 or more cows, had the smallest NFI per cow ($122) and a ROA of 3.5%.

Farms were grouped by return on assets. In 1999, the above average group had a ROA of 11.2% compared to only 0.8% for the below average group, Tables 4A & 4B. In 2000, the corresponding results were -4.9% and 5.5%. The spread was similar but the lower milk prices in 2000 cut into the returns. The higher profit group was considerably larger, on average, had higher milk per cow and lower investment per cow. They had much higher income per cow and their cost per cow was somewhat higher, so their NFI per cow was about twice as large. On a per 100 lb. basis, income was only slightly larger but costs were significantly lower.

The results were similar when the farms were grouped by milk production per cow, but the profit differences were not as pronounced, Tables 4A & 4B. In both years, the higher production group had a herd average of over 22,000 lb. compared to a 16,000 to 17,000 average for the low group. The ROA for the high group was 4 to 5 points larger than the low group and NFI/Cow was about 50% greater. However, the high milk group didn't perform quite as well as the high ROA group. Achieving high herd production does not guarantee maximum profits.

The main conclusions from this analysis are as follows:

- The North Carolina dairies were nationally competitive from a profitability standpoint. However, there are more differences among farms than between regions.
- Larger farms were more profitable, on the average, but the data doesn't identify the optimum herd size. Lower investment per cow was an important contributor to higher profits and there is little evidence of large economies of scale.
- The more profitable farms produced more milk per cow and had higher costs per cow. Clearly, herd productivity continues to be important but only when high levels of milk production are achieved in a cost-effective manner.

- Each dairy farmer should assess his or her current financial status and past performance. Assess both profitability and cash flow feasibility before expanding or making other major investments.

Finally, a word or two of caution is in order. These farmers contributed their data voluntarily and we cannot say that their information is typical of a particular region or herd size. In fact, it is clear that these farms are larger that the average for the respective regions. Nevertheless, it provides useful benchmarks for assessing herd performance and competitiveness.

Table 1. Regional competitiveness, confinement Holstein herds, 1999 and 2000

Item	1999		2000	
	NC	US	NC	US
Farm characteristics				
No. of Farms[a]	7	484	7	295
No. of Cows	259	248	270	279
No. of People	5.9	5.8	6.3	6.3
Milk/cow, lb.	21889	19,860	22,112	19,886
Milk/Person, lb.	949,166	923,322	923,187	956,001
Investment/cow	$7,720	$7,181	$6,995	$7,151
Net Farm Income	$159,615	$136,696	$121,337	$58,309
Unpaid Family Labor	$49,286	$45,042	$52,857	$56,588
Return on Assets	6.8%	6.0%	5.7%	1.1%
Per Cow				
Income	**$/cow**	**$/cow**	**$/cow**	**$/cow**
Milk	3,664	2,950	3,306	2,668
Other	356	470	520	528
Total	4,020	3,420	3,826	3,196
Expense				
Feed	1,212	774	1,270	800
Labor	388	303	411	339
Crop inputs	150	173	162	147
Other	1,312	1,328	1,277	1,328
Total Oper. Exp.	3,062	2,578	3,120	2,614
Depreciation	329	275	223	292
Total Expense	3,391	2,899	3,343	2,906
Net Farm Income	629	564	483	289
Per 100 lb.				
Income	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**
Milk	16.75	14.85	14.98	13.42
Other	1.62	2.41	2.39	2.75
Total	18.37	17.26	17.37	16.17
Expense				
Feed	5.55	3.92	5.76	4.06
Labor	1.79	1.44	1.85	1.62
Crop inputs	0.68	0.87	0.73	0.73
Other	6.03	6.82	5.72	6.86
Total Oper. Exp.	14.05	13.05	14.06	13.27
Depreciation	1.51	1.41	1.02	1.49
Total Expense	15.56	14.46	15.08	14.76
Net Farm Income	2.82	2.78	2.29	1.40

[a] Data are for the same 7 NC dairy farms in 1999 and 2000.

Source: Calculated by the author from NC farm data and information extracted from the Cornell University Top Dairies database.

Table 2A. Regional competitiveness, confinement Holstein herds, 1999

Item	NC	US	Northeast	Midwest	Southwest
Farm characteristics					
No. of Farms	8	484	183	61	7
No. of Cows	262	248	191	191	1,579
No. of People	6.2	5.8	5.1	4.6	17.0
Milk/cow, lb.	21,183	19,860	18,912	20,772	20,650
Milk/Person, lb.	949,166	923,322	764,699	927,276	2,012,985
Investment/cow	$7,077	$7,181	$6,842	$8,017	$4,355
Net Farm Income	$159,615	$136,696	$104,571	$124,037	$586,772
Unpaid Family Labor	$47,500	$45,042	$39,662	$35,191	$100,090
Return on Assets	6.8%	6.0%	5.1%	8.8%	11.4%
Per Cow					
Income	**$/cow**	**$/cow**	**$/cow**	**$/cow**	**$/cow**
Milk	3,587	2,950	2,801	3,021	2,939
Other	336	470	424	771	234
Total	3,923	3,420	3,225	3,792	3,173
Expense					
Feed	1,148	774	744	581	1,303
Labor	440	303	263	304	276
Crop inputs	148	173	158	265	23
Other	1,321	1,328	1,276	1,548	992
Total Oper. Exp.	3,057	2,578	2,441	2,698	2,594
Depreciation	326	275	251	339	182
Total Expense	3,382	2,899	2,692	3,037	2,776
Net Farm Income	580	564	532	753	397
Per 100 lb.					
Income	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**
Milk	16.88	14.85	14.78	14.61	14.32
Other	1.58	2.41	2.34	3.76	1.08
Total	18.46	17.26	17.12	18.37	15.40
Expense					
Feed	5.40	3.92	3.96	2.77	6.28
Labor	2.07	1.44	1.28	1.40	1.34
Crop inputs	0.69	0.87	0.83	1.27	0.11
Other	5.83	6.82	6.97	7.49	4.85
Total Oper. Exp.	13.99	13.05	13.04	12.93	12.58
Depreciation	1.53	1.41	1.36	1.65	0.89
Total Expense	15.92	14.46	14.40	14.58	13.47
Net Farm Income	2.73	2.78	2.70	3.76	1.93

Source: Calculated by the author from NC farm data and information extracted from the Cornell University Top Dairies database.

Table 2B. Regional competitiveness, confinement Holstein herds, 2000

Item	NC	US			
Farm characteristics					
No. of Farms	11	295			
No. of Cows	278	279			
No. of People	7.2	6.3			
Milk/cow, lb.	22,330	19,886			
Milk/Person, lb.	841,737	956,001			
Investment/cow	$8,573	$7,151			
Net Farm Income	$165,912	$58,309			
Unpaid Family Labor	$65,426	$56,588			
Return on Assets	9.1%	1.1%			
Per Cow					
Income	**$/cow**	**$/cow**	**$/cow**	**$/cow**	**$/cow**
Milk	3,340	2,668			
Other	546	528			
Total	3,886	3,196			
Expense					
Feed	1,134	800			
Labor	478	339			
Crop inputs	181	147			
Other	1,288	1,328			
Total Oper. Exp.	3,081	2,614			
Depreciation	207	292			
Total Expense	3,288	2,906			
Net Farm Income	597	289			
Per 100 lb.					
Income	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**
Milk	14.97	13.42			
Other	2.49	2.75			
Total	17.76	16.17			
Expense					
Feed	4.53	4.06			
Labor	2.15	1.62			
Crop inputs	0.81	0.73			
Other	6.32	6.86			
Total Oper. Exp.	13.81	13.27			
Depreciation	0.93	1.49			
Total Expense	14.74	14.76			
Net Farm Income	2.72	1.40			

Source: Calculated by the author from NC farm data and information extracted from the Cornell University Top Dairies database.

Table 3A. Herd size and farm performance, confinement Holstein herds, 1999

Item	Under 100	100 to 199	200 to 399	400 to 599	600 and up
Farm characteristics					
No. of Farms	203	108	90	38	42
No. of Cows	64	141	286	491	1,127
No. of People	2.3	4.0	7.0	11.1	20.1
Milk/cow, lb.	18,243	19,736	21,075	22,549	22,795
Milk/Person, lb.	511,274	697,338	865,075	1,000,590	1,227,294
Investment/cow	$7,866	$7,328	$6,157	$6,706	$6,023
Net Farm Income	$38,894	$71,233	$156,281	$253,374	$632,129
Unpaid Family Labor	$29,802	$41,961	$53,728	$62,221	$91,506
Return on Assets	3.5%	5.3%	8.8%	9.0%	11.2%
Per Cow					
Income	**$/cow**	**$/cow**	**$/cow**	**$/cow**	**$/cow**
Milk	2,688	2,934	3,160	3,390	3,390
Other	462	498	470	462	443
Total	3,150	3,432	3,630	3,852	3,833
Expense					
Feed	686	749	838	926	991
Labor	153	313	427	526	539
Crop inputs	165	201	176	166	144
Other	1,287	1,372	1,350	1,362	1,337
Total Oper. Exp.	2,291	2,635	2,791	2,980	3,011
Depreciation	249	298	282	258	263
Total Expense	2,540	2,933	2,640	3,238	3,274
Net Farm Income	608	496	555	512	558
Per 100 lb.					
Income	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**
Milk	14.75	14.86	15.00	15.05	14.88
Other	2.59	2.53	2.24	2.07	1.94
Total	17.34	17.39	17.24	17.12	16.82
Expense					
Feed	3.79	3.85	4.02	4.11	4.40
Labor	0.79	1.54	2.01	2.33	2.35
Crop inputs	0.90	1.00	0.83	0.73	0.62
Other	7.26	6.97	6.44	6.09	5.88
Total Oper. Exp.	12.74	13.36	13.30	13.26	13.25
Depreciation	1.40	1.51	1.35	1.60	1.12
Total Expense	13.14	14.87	14.65	14.86	14.37
Net Farm Income	3.18	2.49	2.57	2.23	2.43

Source: Calculated by the author from NC farm data and information extracted from the Cornell University Top Dairies database.

Table 3B. Herd size and farm performance, confinement Holstein herds, 2000

Item	Under 100	100 to 199	200 to 399	400 to 599	600 and up
Farm characteristics					
No. of Farms	105	67	63	28	31
No. of Cows	62	139	290	487	1,054
No. of People	2.2	3.8	6.9	10.7	19.9
Milk/cow, lb.	17,765	19,094	21,628	22,279	23,096
Milk/Person, lb.	505,233	702,493	908,784	1,015,143	1,210,316
Investment/cow	$7,523	$7,755	$6,672	$6,508	$6,198
Net Farm Income	$21,368	$42,213	$74,891	$133,582	$83,203
Unpaid Family Labor	$34,877	$51,093	$63,912	$77,130	$107,168
Return on Assets	-2.6%	1.9%	3.5%	5.0%	3.7%
Per Cow					
Income	**$/cow**	**$/cow**	**$/cow**	**$/cow**	**$/cow**
Milk	2,321	2,599	2,907	3,037	3,080
Other	530	525	555	591	529
Total	2,851	3,124	3,462	3,628	3,609
Expense					
Feed	732	772	834	901	934
Labor	168	299	452	533	604
Crop inputs	129	163	160	137	153
Other	1,247	1,297	1,430	1,398	1,421
Total Oper. Exp.	2,276	2,531	2,876	2,969	3,112
Depreciation	222	296	318	389	373
Total Expense	2,498	2,827	3,194	3,358	3,485
Net Farm Income	351	295	265	268	122
Per 100 lb.					
Income	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**
Milk	13.23	13.63	13.43	13.72	13.37
Other	2.92	2.85	2.62	2.64	2.31
Total	16.15	16.48	16.05	16.39	15.68
Expense					
Feed	4.19	4.10	3.83	4.06	4.07
Labor	0.88	1.56	2.08	2.41	2.61
Crop inputs	0.71	0.84	0.75	0.61	0.65
Other	7.30	6.88	6.67	6.33	6.20
Total Oper. Exp.	13.08	13.38	13.33	13.41	13.53
Depreciation	1.28	1.60	1.54	1.74	1.63
Total Expense	14.36	14.98	14.87	15.15	15.16
Net Farm Income	1.77	1.49	1.17	1.20	0.52

Source: Calculated by the author from NC farm data and information extracted from the Cornell University Top Dairies database.

Table 4A. Characteristics of higher and lower profit, and higher and lower producing confinement Holstein herds, 1999

Item	Return on Assets		Milk Sold per Cow	
	Below Avg.	Above Avg.	Below Avg.	Above Avg.
Farm characteristics				
No. of Farms	242	242	228	256
No. of Cows	149	348	141	344
No. of People	4.0	7.6	3.7	7.7
Milk/cow, lb.	18,491	21,230	16,703	22,672
Milk/Person, lb.	728,8556	1,025,672	670,419	1,027,995
Investment/cow	$7,830	$6,531	$6,926	$7,407
Net Farm Income	$43,810	$229,581	$58,397	$206,430
Unpaid Family Labor	$42,815	$47,269	$35,031	$53,958
Return on Assets	0.8%	11.2%	3.5%	8.2%
Per Cow				
Income	**$/Cow**	**$/Cow**	**$/Cow**	**$/Cow**
Milk	2,722	3,178	2,483	3,366
Other	425	514	440	496
Total	3,147	3,692	2,923	3,862
Expense				
Feed	747	803	672	866
Labor	243	362	191	402
Crop inputs	178	168	151	193
Other	1,330	1,325	1,208	1,433
Total Cash Exp.	2,498	2,658	2,222	2,894
Depreciation	303	249	258	292
Total Expense	2,801	2,907	2,480	3,186
Net Farm Income	346	783	441	674
Per 100 lb.				
Income	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**
Milk	14.71	14.99	14.86	14.85
Other	2.37	2.46	2.66	2.19
Total	17.08	17.45	17.52	17.04
Expense				
Feed	4.07	3.78	4.03	3.83
Labor	1.28	1.65	1.09	1.75
Crop inputs	0.96	0.78	0.90	0.84
Other	7.29	6.30	7.36	6.34
Total Cash Exp.	13.60	12.51	13.38	12.76
Depreciation	1.65	1.17	1.55	1.28
Total Expense	15.25	13.68	14.93	14.04
Net Farm Income	1.81	3.75	2.57	3.98

Source: Calculated by the author from NC farm data and information extracted from the Cornell University Top Dairies database.

Table 4B. Characteristics of higher and lower profit, and higher and lower producing confinement Holstein herds, 2000

Item	Return on Assets		Milk Sold per Cow	
	Below Avg.	Above Avg.	Below Avg.	Above Avg.
Farm characteristics				
No. of Farms	124	170	128	166
No. of Cows	195	330	139	377
No. of People	5.0	7.1	3.5	8.4
Milk/cow, lb.	18,480	20,914	16,082	22,822
Milk/Person, lb.	818,275	1,022,421	672,973	1,032,631
Investment/cow	$7,420	$6,965	$6,898	$7,357
Net Farm Income	-$22,739	$110,557	$26,642	$75,691
Unpaid Family Labor	$55,487	$57,136	$40,822	$68,484
Return on Assets	-4.9%	5.5%	-1.5%	3.1%
Per Cow				
Income	**$/Cow**	**$/Cow**	**$/Cow**	**$/Cow**
Milk	2,429	2,844	2,184	3,043
Other	475	568	471	573
Total	2,904	3,412	2,655	3,616
Expense				
Feed	775	818	682	891
Labor	276	385	207	441
Crop inputs	150	145	123	165
Other	1,361	1,311	1,168	1,608
Total Cash Exp.	2,562	2,659	2,180	2,956
Depreciation	300	286	253	321
Total Expense	2,862	2,945	2,433	3,277
Net Farm Income	41	465	220	338
Per 100 lb.				
Income	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**	**$/100 lb.**
Milk	13.14	13.63	13.55	13.33
Other	2.72	2.78	3.06	2.51
Total	15.86	16.41	16.61	15.84
Expense				
Feed	4.25	3.93	4.26	3.91
Labor	1.38	1.79	1.23	1.92
Crop inputs	0.81	0.68	0.76	0.71
Other	7.60	6.34	7.47	6.41
Total Cash Exp.	14.04	12.74	13.72	12.95
Depreciation	1.68	1.35	1.60	1.39
Total Expense	15.72	14.09	15.32	14.34
Net Farm Income	0.12	2.30	1.26	1.48

Source: Calculated by the author from NC farm data and information extracted from the Cornell University Top Dairies database.