

An Economic Analysis of Selected Alabama Dairy Farms

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PREFACE

This bulletin is a contributing study to Southern Region Research Project S-166, "The Impact of Changing Costs, Institutions, and Technology in the Southern Dairy Industry."

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*Information contained herein is available to all persons
without regard to race, color, sex, or national origin.*

AN ECONOMIC ANALYSIS OF SELECTED ALABAMA DAIRY FARMS, 1982

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INTRODUCTION

FOR OVER 20 years, the number of milk producing units in Alabama has been declining. Total milk marketings by Alabama dairies have been declining since the early 1970's. Consumption of milk and dairy products in the State remains strong and exceeds in-state produced supply, requiring the importation of milk from other states. High Class I (fluid) utilization, coupled with Class I location differentials, provides the opportunity for Alabama dairy farmers to market their milk at greater than national average prices. However, according to USDA cost and return analyses, the Southern Region of the United States has the highest costs and lowest net returns of any region in the nation (3).

Only a limited number of studies have been made on cost of production in the Southern Region. However, some studies are made on a continuing basis, three of which are summarized in table 1.

In a nationwide study, the Economic Research Service of USDA estimated total costs and net returns to operator, family labor, and management for the years 1979, 1980, and 1981. Data were obtained via a 1980 survey and then indexed for 1979 and 1981. This series of reports has been updated annually since 1974. Production cost studies were mandated by Congress in 1975. Total costs of dairying for the entire United States were found to be \$10.61, \$12.20, and \$13.00 per hundredweight, respectively, for the 3 years reported in

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TABLE 1. COMPARISON OF PER HUNDREDWEIGHT COSTS AND RETURNS TO DAIRYING, VARIOUS STUDIES, 1979-82

Item/study	Results, by year			
	1979	1980	1981 ¹	1982
	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>
<i>Costs</i>				
USDA				
U.S. (all region av.)	10.61	12.20	13.00	
Appalachian	11.72	13.59	14.49	
Southern Plains	10.71	12.92	14.14	
North Carolina			17.18	16.29
Kentucky		14.35	15.53	
<i>Returns</i>				
USDA ²				
U.S. (all region av.)	2.81	2.13	1.97	
Appalachian	1.86	.94	.70	
Southern Plains	3.69	2.10	1.73	
North Carolina ³			-2.27	-1.64
Kentucky ³	2.17	.42	.18	

¹Preliminary for the USDA study.

²Net returns to operator, family labor, and management.

³Return to management.

this study. In 1981, costs per hundredweight ranged from \$12.34 in the Pacific Region to \$14.49 in the Appalachian Region. Total costs in the Southern Plains were reported to be \$10.71, \$12.92, and \$14.14 per hundredweight, respectively, for the study years. Within the Appalachian Region (the study region nearest Alabama) costs were \$11.72, \$13.59, and \$14.49 per hundredweight, respectively, for 1979, 1980, and 1981. Net returns reported for 1981 ranged from \$0.70 in the Appalachian Region to \$2.43 in the Upper Midwest Region. Net returns for the entire United States were \$2.81, \$2.13, and \$1.97, respectively, for the 3 years reported. Net returns in the Southern Plains Region were \$3.69, \$2.10, and \$1.73 per hundredweight, and \$1.86, \$0.94, and \$0.70 per hundredweight in the Appalachian Region for the years, respectively.

North Carolina researchers found total costs per hundredweight to be \$17.18 in 1981 and \$16.29 in 1982, for that state. Return to management per hundredweight was found to be -\$2.74 and -\$1.64, respectively, for the 2 years reported (2). Costs and returns to dairying in Kentucky were also studied. Total costs per hundredweight were \$14.35 and \$15.53 for 1980 and 1981, respectively. Net returns for the years 1979, 1980, and 1981 were \$2.17, \$0.42, and \$0.18 per hundredweight, respectively (5).

Due to differences in study methods and definition of net returns, direct comparison of the findings of these reports cannot be made. However, the general consensus of low returns to dairying in the South when compared to national averages and to other regions of the country should be noted. This study reports net returns to operator's land, labor, and management, since no charges were made for these items in the enterprise analyses.

PURPOSE AND METHOD OF STUDY

The perplexing problem facing the Alabama dairy industry is why, in the presence of strong demand and above average prices, dairies continue to leave production. The need for information about costs and returns to dairying in Alabama was felt. This study provided enterprise analyses for eight Alabama dairies for 1982. Each analysis is presented in budget format, similar to previous Auburn University budget publications. Each dairy is described in some detail, with the good and bad points of each operation identified. Also, a financial planning and projection procedure is presented.

An analysis of the profitability of dairying in Alabama as an agricultural enterprise was made by utilizing budget-like tables developed for eight Alabama dairy farms. All of these dairies used the Production Credit Association's AGRIFAX computerized farm records service. Cost and return data were obtained from these records with the consent of the eight farmers. The records were a consistent information source that provided concise, useful information well suited to the analysis procedure.

The analysis process involved the gleaning of receipts to be credited to and costs to be deducted from the dairy enterprise. Sales of calves, cull cows, heifers, and milk products were all credited to the dairy enterprises. Calves sold at or before weaning were considered part of the dairy enterprise, while sales of older calves as beef (other than culls) were not. Receipts were relatively easy to allocate, with only a few exceptions. However, cost allocation was somewhat more complicated.

Costs of capital ownership and use (machinery, equipment, and livestock inventory) were obtained from each farmer's depreciation schedule and were distributed to the dairy in proportion to their use by the dairy. Cost allocation ratios were, for the most part, provided by the eight participating

dairy farmers. For example, a tractor with a book value of \$7,500 that was used 50 percent by the dairy represented an investment of \$3,750 by the dairy. Ownership costs were based on \$3,750 of investment and variable costs were allocated as one-half to the dairy. The depreciation schedules used were all AGRIFAX generated. Labor hours and wages were similarly distributed among enterprises.

In the case where production of all other agricultural products was small in comparison to the dairy's total sales, the ratio of sales of all other farm production to dairy enterprise sales was used to reduce input costs. For example, if a dairy generated \$96,000 in income and there was also \$4,000 in income from the sale of wheat, all input costs shared by the wheat and dairy enterprises were reduced by 4 percent when included in the dairy enterprise budget. This assumes an equal rate of return on input investment between alternative enterprises and the dairy, which is likely erroneous. However, miscalculations caused by this assumption represented only a small error in the analyses.

As was the practice with previous Auburn University dairy budgets, background budgets were employed to determine pertinent variable and fixed cost figures for silage, pasture, and other on-farm produced inputs. These background budgets, for the sake of brevity, are not provided in this study, but were accurate to the greatest degree possible. The dairy budgets are presented in a form similar to the Auburn University Budget Generator format, the budget generator used by the Alabama Cooperative Extension Service and Alabama Agricultural Experiment Station. However, because of limitations of the data, sales of cattle and calves were grouped and not divided into culls, steers, etc. Also, additional fixed cost information was available and hence this area was somewhat expanded over the previous budgets. No fixed cost values were included for annual forages, since such costs as land maintenance and fencing were included as variable costs for the 1982 year. Fixed costs for perennial forages were the prorated establishment costs for each forage (4). Net returns were defined as the residual funds available from the dairy enterprise receipts after payment of fixed and variable costs. The value of any unpaid labor, including operator labor, was not deducted as a cost. Hence, net returns represent returns to unpaid labor, land, and management.

Interest rates used in the budgeting analysis were determined in the following manners (6).

1. Interest on operating capital: 14.6 percent, the arithmetic mean of quarterly announced Production Credit Association production-type loans for 1982.

2. Interest on intermediate investment: 12.8 percent, the arithmetic mean of 1-, 2-, 3-, and 5-year U.S. Treasury Notes and Bonds, Constant Maturities for 1982.

3. Interest on mortgage: 12.3 percent, the arithmetic mean of quarterly announced Federal Land Bank real estate loan rates for 1982.

The latter interest rate is not necessary for the budget analysis, but will be employed in the Transition Planning procedure, which is a computerized financial program for use in analysis of investment changes in the farm business.

Average production per cow and cow numbers were determined from individual farmer and Dairy Herd Improvement Association (DHIA) records. Price received per hundred-weight for dairy products was calculated by dividing dairy product income by the number of hundredweights of milk marketed. The value of any milk used on the farm was not included in the enterprise analyses.

Enterprise analyses for the eight participating Alabama dairy farms are presented in the following pages in ascending order by dairy product sales. Weaknesses of each are noted, along with suggestions for improvement.

DAIRY ENTERPRISE ANALYSES

The eight dairies included in this study were diverse. Size ranged from 45 to 400 cows in 1982, and the feeding systems ranged from utilizing only purchased feeds and silage to the production of five different feeds on the farm. In order that comparisons of the eight dairies could be made, a system of internal ratios was developed. Table 2 provides 16 ratios and production rates calculated for each of the eight dairies, along with the arithmetic means for each of the 16 ratios. Because of the diversity of the dairies studied, the ratio means should be viewed with some caution. These means were calculated for use in comparison only, and are not intended for use as a strict standard.

TABLE 2. COSTS AND EFFICIENCY FACTORS FOR EIGHT DAIRY FARMERS, ALABAMA, 1982

Dairy number	Production per cow	Price per cwt.	Price per cwt. after hauling and mkt.	Variable cost per cwt.	Fixed cost per cwt.	Total cost per cwt.	Feed cost per cwt.	Var. cost as pct. of dairy rev.
	<i>Lb.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Dol.</i>	<i>Pct.</i>
1	14,629	15.53	13.40	12.43	4.41	16.84	7.30	67
2	10,800	13.54	13.02	7.97	5.19	13.16	5.18	54
3	10,500	15.93	15.42	15.43	3.26	18.69	8.83	85
4	12,500	15.42	14.88	11.69	5.28	16.97	5.58	71
5	9,000	15.31	14.81	14.53	2.79	17.32	9.82	91
6	12,976	15.55	14.66	12.35	4.35	16.71	6.35	74
7	12,298	15.66	13.91	12.18	2.94	15.12	7.64	68
8	13,622	15.74	14.06	14.89	3.98	18.87	8.92	87
Mean	12,041	15.34	14.27	12.69	4.03	16.71	7.45	75

Continued

TABLE 2 (CONTINUED). COSTS AND EFFICIENCY FACTORS FOR EIGHT DAIRY FARMERS, ALABAMA, 1982

Dairy number	Fixed cost as pct. of dairy rev.	Total cost as pct. of dairy rev.	Feed cost as pct. of dairy rev.	Feed cost as pct. of milk check	Livestock inv. as pct. of dairy rev.	Mach. inv. as pct. of dairy rev.	Inv. as pct. of dairy rev.	Milk check as pct. of dairy rev.	Total ret. per cwt.	Net ret. per cwt.
	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Pct.</i>	<i>Dol.</i>	<i>Dol.</i>
1	24	91	39	55	95	14	108	72	18.57	1.73
2	35	88	35	40	118	81	199	88	14.82	1.66
3	18	103	49	57	44	43	87	85	18.06	-.63
4	32	103	35	37	100	52	152	90	16.55	-.41
5	17	108	62	66	61	20	82	93	15.94	-1.37
6	26	100	38	43	80	35	115	85	16.77	.06
7	16	84	42	55	50	9	59	77	18.07	2.95
8	23	110	52	63	68	14	82	82	17.21	-1.67
Mean	24	98	44	52	77	34	110	84	17.00	.29

Some of the ratios provided in table 2 require explanation. Dairy revenue is the sum of milk sales, plus cattle and calf receipts. All the hundredweight ratios were calculated using the number of hundredweights of milk sold during 1982. Price per hundredweight after hauling and marketing represents milk check receipts. This was calculated primarily to test the cost of the feeding program as a percent of the milk check. The ratios for these farms provided no clues that could consistently flag problem areas within a dairy. For example, the two largest dairies both had low machinery complements, as compared to dairy revenue. However, these two were the least and the most profitable dairies in the study. No other ratios provided consistent indicators to dairy profitability, not even feed cost. Thus, no single ratio can be singled out as a good indication of dairy profitability; rather, the combination of management practices present on the farm eventually decides the profitability of each dairy.

Dairy Number 1

Dairy Number 1 was a husband and wife operation, milking 45 purebred Holstein cows during 1982. The farm consisted of 170 acres, of which 110 acres were tillable. The operators had been dairying for 8 years and were using a milking barn that was over 20 years old. This dairy produced hay, silage, and some grain, and purchased feed during the study year, table 3. This farm produced a positive net return of \$1.73 per hundredweight in 1982, due mainly to high production (14,629 pounds marketed per cow and the highest in the study) and low labor and machinery costs. Machinery investment was low, resulting from utilizing equipment purchased as used equipment, which in 1982 was almost fully depreciated. Labor was hired only during peak need periods. No other family members worked as unpaid labor on the farm.

In comparison to the other seven study farms, four cost areas were somewhat high: hauling and marketing, utilities, interest on livestock capital, and veterinarian and medicine. The \$2.13 per hundredweight charge for hauling and marketing was partially negated by the fairly high price received for dairy products (\$1.70 of the \$2.13 per hundredweight charge was for hauling). Utilities amounted to \$72.87 per head, the highest in the study. Excess capacity in the milking barn and

TABLE 3. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 1 (45-COW HERD, 14,629 POUNDS OF MILK MARKETED PER COW), ALABAMA, 1982

Item	Unit	Price or	Quantity	Value or
		cost		cost
		<i>Dol.</i>		<i>Dol.</i>
1. Gross receipts				
Dairy products	cwt.	15.52	6,583.00	102,247
Cattle and calves				19,981
Total				122,228
2. Variable costs				
Labor	hr.	3.00	455.67	1,367
Repairs and main.	mo.	565.58	12.00	6,787
Feed	ton	216.85	175.00	37,948
Supplies	hd.	53.27	45.00	2,397
Breeding	unit	10.44	86.00	898
Utilities	hd.	72.87	45.00	3,279
Hauling & marketing	cwt.	2.13	6,583.00	14,026
DHIA	mo.	92.00	12.00	1,104
Vet & medicine	hd.	46.29	45.00	2,083
Corn silage	acre	119.50	35.00	4,183
Hay	acre	97.75	30.00	2,933
Corn for grain	acre	115.00	15.00	1,725
Pasture	acre	85.25	15.00	1,279
Fuel (dairy)	gal.	1.15	721.09	835
Int. on op. cap.	dol.	14.6%	6,710.05	980
Total variable costs				81,824
3. Income above var. costs.....				40,404
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	115,900.00	14,835
Depr. on livestock cap.	dol.			2,621
Int. on mach. & equip.	dol.	12.8%	16,911.00	2,175
Depr. on mach. & equip.	dol.			6,483
Hay	acre	15.35	30.00	461
Pasture	acre	11.89	15.00	178
Other fixed costs	dol.			2,279
Total fixed costs				29,032
5. Total costs				110,856
6. Net returns to operator's land, labor, and management				11,372

holding facilities caused this high charge. Present facilities could handle a 75-cow herd with no modification. The operator placed a high value on his animals, mainly due to their productive ability, which resulted in the large charge for livestock ownership. Veterinary and livestock expense was likewise the highest in the study. No explanation of this high cost was available.

The cost of the feeding program employed on this farm during 1982 totaled 55 percent of the milk check, slightly above the mean of the eight study dairies, table 2. The high production per cow and high butterfat percentage (over 3.8 percent annual average) suggest this feeding program was effective. All other costs and returns were acceptable.

This dairy fared relatively well in 1982, when compared with the remaining study dairies. No major alterations in the feeding program or managerial practices would be advised, based on observations of the other dairies. However, the potential for growth of this dairy is present. The ability to double-crop in the production of forages, capacity of the dairy's physical facilities, and the owners' management abilities provide an excellent opportunity for expansion of herd size. The breeding program already present on the farm would allow growth without the purchase of any cattle. Further explanation and analysis of these ideas are presented later in the transition planning analysis for this dairy farm.

Dairy Number 2

Low variable costs allowed a positive net return for Dairy Number 2 in 1982, table 4. This dairy farmer milked 100 grade Holsteins during the study year and produced 40 acres of corn silage. The lowest milk price of the eight dairies, low production per cow, and high fixed costs did not prevent this dairy from earning \$1.66 per hundredweight in net returns.

The low-cost feed program utilized by this dairy stimulated only 10,500 pounds of milk per cow, quite low in comparison to the other Holstein herds in the study. Poultry litter was used as silage fertilizer on this farm, and was included at a cost of \$19 per acre in the variable cost of silage. However, high silage yields were obtained, keeping the necessary number of acres small, thus lowering total feed costs. Variable costs totaled only \$7.97 per hundredweight, \$4.72 per hundredweight less than the study average. The operator and his wife provided the majority of the labor for the farm, which kept hired labor costs to \$0.89 per hundredweight, well below the study average of \$1.61. The summing of feed and labor costs yielded \$7.07 per hundredweight, leaving only \$0.90 per hundredweight for all remaining variable costs.

Fixed costs for this farm amounted to \$5.19 per hundredweight, 29 percent greater than the eight-dairy mean. A large machinery complement, 81 percent of dairy revenue in value and the greatest in the study, along with the highest valued cattle in terms of dairy revenue forced up the fixed costs.

The cost of breeding should be explained. This dairy farmer owned stock in a bull, which paid dividends in the form of semen, thus keeping breeding costs to only \$206 for the year.

TABLE 4. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 2 (100-COW HERD, 10,800 POUNDS OF MILK MARKETED PER COW) ALABAMA, 1982

Item	Unit	Price or cost	Quantity	Value or cost
		<i>Dol.</i>		<i>Dol.</i>
1. Gross receipts				
Dairy products	cwt.	13.50	10,800.00	146,284
Cattle and calves				13,834
Total				160,118
2. Variable costs				
Labor	hr.	3.50	2,760.00	9,662
Repairs and main.	mo.	20.83	12.00	2,500
Feed	ton	180.36	281.00	50,681
Supplies	hd.	15.44	100.00	1,544
Breeding				206
Utilities	hd.	44.21	100.00	4,421
Hauling & marketing	cwt.	.52	10,800.00	5,582
DHIA	mo.	107.42	12.00	1,289
Vet & medicine	hd.	24.71	100.00	2,471
Corn silage	acre	123.80	40.00	4,940
Pasture	acre	15.00	20.00	300
Temporary grazing ¹	acre	.00	250.00	0
Fuel (dairy)	gal.	1.15	1,230.43	1,415
Int. on op. cap.	dol.	14.6%	7,084.25	1,034
Total variable costs				86,045
3. Income above var. costs				74,073
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	189,200.00	24,218
Depr. on livestock cap.	dol.			2,554
Int. on mach. & equip.	dol.	12.8%	129,500.00	16,576
Depr. on mach. & equip. ..	dol.			10,175
Pasture	acre	11.89	20.00	238
Other fixed costs	dol.			2,347
Total fixed costs				56,108
5. Total costs				142,153
6. Net returns to operator's land, labor, and management				17,965

¹1982 was the first year this farm planted winter grazing. None of the grazing was available in 1982, hence no cost was allocated to the 1982 budget.

In spite of the apparent negative factors, the success of this dairy does not allow many suggestions. However, an increase in feed should increase milk production, and likely increase net returns. Some machinery could probably be eliminated, allowing a lower charge for this investment, thus lowering fixed costs.

Dairy Number 3

A herd of registered Jersey cattle averaged 10,500 pounds of milk marketed per cow for 192 cows on this farm during 1982. Above average variable costs resulted in a net return of $-\$0.62$ per hundredweight during the study year. Dairy Number 3 was the only dairy in the study that did not feed any silage, table 5.

TABLE 5. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 3 (192-COW HERD, 10,500 POUNDS OF MILK MARKETED PER COW) ALABAMA, 1982

Item	Unit	Price or cost	Quantity	Value or cost
		<i>Dol.</i>		<i>Dol.</i>
1. Gross receipts				
Dairy products	cwt.	15.93	14,870.00	236,887
Cattle and calves				31,635
Total				268,522
2. Variable costs				
Labor	hr.	4.22	10,100.00	42,220
Repairs and main.	mo.	1,033.75	12.00	12,399
Rent	yr.	1,074.00	1.00	1,074
Feed	ton	155.00	683.74	105,980
Machinery hire	mo.	141.50	12.00	1,698
Supplies	hd.	38.64	192.00	2,418
Breeding	unit	18.55	422.40	7,836
Vet & medicine	hd.	28.84	192.00	5,537
DHIA	mo.	261.08	12.00	3,133
Alfalfa hay purchases	ton	181.08	79.00	14,305
Pasture	acre	36.03	285.00	10,268
Hay	acre	14.00	50.00	700
Utilities	hd.	34.47	192.00	6,618
Hauling & marketing	cwt.	.51	14,870.00	7,616
Int. on op. cap.	dol.	14.6%	18,881.26	2,752
Total variable costs				224,554
3. Income above var. costs				43,968
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	117,255.00	15,009
Depr. on livestock cap.	dol.			2,354
Int. on mach. & equip.	dol.	12.8%	115,080.00	14,720
Depr. on mach. & equip. ..	dol.			8,218
Pasture	acre	11.89	285.00	3,389
Hay	acre	15.35	50.00	595
Other fixed costs	dol.			4,231
Total fixed costs				48,516
5. Total costs				273,070
6. Net returns to operator's land, labor, and management				-4,548

Several variable cost items proved to be above average for this farm. Feed cost, which was \$1.38 greater per hundredweight than the eight-dairy mean, totaled only 57 percent of the milk check. A high milk fat test of 4.4 percent held down this relative cost. Labor costs were about one dollar per hundredweight more than the study average. Semen cost averaged \$18.55 per unit, compared to an average of \$11.00 for the six dairies that purchased similar amounts of semen.

Low fixed costs kept this dairy from experiencing further losses. Livestock value was small when related to total dairy revenue. The 44 percent of dairy revenue ratio was the smallest in the study. Depreciation of \$10,572 likewise kept down the level of fixed costs.

The trimming of only a few costs would have allowed a positive net return for this dairy in 1982. Use of silage to reduce feed costs and wiser use of labor would probably erase the \$0.63 per hundredweight loss. Other costs were not unusual, when compared to the other dairies, and given the relatively favorable condition of this dairy during the study year, should not be altered greatly.

Dairy Number 4

The fourth dairy in the study had the smallest loss of the four with negative net returns. During 1982, 160 Holstein cows were milked. Extensive use of forages produced on the

TABLE 6. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 4 (160-COW HERD, 12,500 POUNDS OF MILK MARKETED PER COW) ALABAMA, 1982

Item	Unit	Price or cost	Quantity	Value or cost
		<i>Dol.</i>		<i>Dol.</i>
1. Gross receipts				
Dairy products	cwt.	15.42	20,000.00	308,387
Cattle and calves				22,627
Total				331,014
2. Variable costs				
Labor	hr.	2.50	11,429.00	28,572
Repairs and main.	mo.	1,777.50	12.00	21,330
Rent	yr.	2,500.00	1.00	2,500
Feed	ton	161.78	597.00	96,283
Breeding	unit	7.08	304.00	2,153
Vet & medicine	hd.	36.73	160.00	5,876
Supplies	hd.	81.04	160.00	12,967
Utilities	hd.	58.21	160.00	9,313
Machinery hire	mo.	734.33	12.00	8,812
DHIA	mo.	179.92	12.00	2,159
Hauling & marketing	cwt.	.54	20,000.00	10,865
Silage	acre	42.00	220.00	9,240
Bermudagrass hay	acre	14.00	40.00	560
Winter grazing	acre	10.00	500.00	5,000
Pasture	acre	3.00	145.00	435
Fuel (dairy)	gal.	1.15	12,917.00	14,849
Int. on op. cap.	dol.	14.6%	19,242.83	2,809
Total variable costs				233,723
3. Income above var. costs				97,291
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	333,050.00	42,630
Depr. on livestock cap.	dol.			0
Int. on mach. & equip.	dol.	12.8%	171,190.00	21,912
Depr. on mach. & equip. ..	dol.			16,466
Bermudagrass hay	acre	15.35	40.00	614
Pasture	acre	11.89	145.00	1,724
Other fixed costs	dol.			22,250
Total fixed costs				105,596
5. Total costs				339,319
6. Net returns to operator's land, labor, and management				-8,305

farm kept feed cost low at \$5.58 per hundredweight, over \$1.80 less than the study mean. Net returns were -\$0.41 per hundredweight during an admittedly poor year, according to the operator, table 6.

Only one dairy had lower per hundredweight variable costs than this dairy. The \$11.69 per hundredweight total was respectable in comparison to the other study dairies. However, the highest fixed costs in the study forced the negative net returns for this dairy. Livestock investment was nearly equal to total dairy revenue, and was 23 percent above average in this category. Machinery investment was 18 percent above the study average, in terms of percent of dairy revenue, at 52 percent. Livestock values seemed excessive in light of the herd production average, and lessening of machinery complement should lower fixed costs to a more reasonable level.

This dairy received 90 percent of its total revenue from the milk check, the greatest in the study. Relatively small hauling and marketing costs, coupled with below average sales of cattle and calves during 1982, kept this value high.

Dairy Number 5

Dairy Number 5 was a family operated farm, milking 230 Jersey cows during the study year. This farm totaled 1,100 acres, 740 of which were owned by the operator. The balance was rented from family members, hence the low per acre rent charge. A stanchion-type milking barn was used on this farm with a pipeline milking system in the parlor. Three different silage crops were grown, totaling 125 acres. A large pasture was utilized, and hay was grown on 250 acres. A net return of -\$29,482 was experienced during 1982, or -\$1.37 per hundredweight, table 7. This was the only farm in the study that did not use the DHIA record-keeping system.

When comparing this dairy to the remaining seven studied, several cost items were notably different. Early in 1982 this dairy purchased bulls, eliminating the need for artificial breeding, so semen costs were only \$75 for the year. Feed costs amounted to 66 percent of the milk check, highest of the study. In spite of high feed costs, production per cow was only 9,000 pounds. The major cause of the low production was management, via reduced attention to details of animal health. The low veterinary and medicine cost per head of only \$5.72 helped support this fact. Need for upgraded phys-

TABLE 7. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 5 (230-COW HERD, 9,000 POUNDS OF MILK MARKETED PER COW) ALABAMA, 1982

Item	Unit	Price or cost <i>Dol.</i>	Quantity	Value or cost <i>Dol.</i>
1. Gross receipts				
Dairy products	cwt.	15.31	20,717.00	317,172
Cattle and calves				13,109
Total				330,281
2. Variable costs				
Labor	hr.	3.55	14,440.00	51,206
Repairs and main.	mo.	764.67	12.00	9,176
Pasture rent	yr.	2,463.00	1.00	2,463
Feed	ton	162.58	1,140.00	185,270
Machinery hire	mo.	629.58	12.00	7,555
Supplies	hd.	26.73	230.00	6,418
Breeding				75
Vet & medicine	hd.	5.72	230.00	1,315
Utilities	hd.	19.37	230.00	4,456
Hauling & marketing	cwt.	.50	20,717.00	10,270
Sorghum silage	acre	101.52	35.00	3,553
Wheat silage	acre	56.40	30.00	1,692
Corn silage	acre	90.24	60.00	5,414
Pasture	acre	5.00	480.00	2,400
Hay	acre	20.50	250.00	5,125
Fuel (dairy)	gal.	1.15	916.00	1,053
Int. on op. cap.	dol.	14.6%	24,687.69	3,604
Total variable costs				301,045
3. Income above var. costs				29,236
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	202,500.00	25,920
Depr. on livestock cap.	dol.			46
Int. on mach. & equip.	dol.	12.8%	67,651.00	8,659
Depr. on mach. & equip. ..	dol.			9,736
Pasture	acre	11.89	480.00	5,707
Hay	acre	15.35	250.00	3,838
Other fixed costs	dol.			3,811
Total fixed costs				57,717
5. Total costs				358,762
6. Net returns to operator's land, labor, and management				-28,481

ical facilities also resulted in reduced milk production by causing animal stress and contributing to the associated health problems. Attention to animals should not have been a factor, since this farm utilized above average amounts of hired labor.

The relatively small loss experienced by Dairy Number 5 can be attributed to low fixed costs. Livestock and machinery investment were both below average, resulting in low interest charges; depreciation on livestock capital amounted to only \$46, and machinery depreciation was quite low at \$9,736. Total fixed costs per hundredweight amounted to \$2.79, the lowest of the study dairies, \$1.24 per hundredweight less than average.

Changes necessary for this dairy all relate to the need for increasing production per cow. Without radical changes in the feeding program, the farmer believes that an increase in production per cow of 1,500 pounds could be achieved over the next several years. Greater attention to detail and improved physical facilities would permit this increase. These ideas are further explained and analyzed when this dairy is altered through transition planning.

Dairy Number 6

Dairy Number 6 provided a slight positive net return in 1982, table 8, and, unlike the other farms, no single cost area proved to be notably excessive. Above average milk price and

TABLE 8. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 6 (174-COW HERD, 12,976 POUNDS OF MILK MARKETED PER COW) ALABAMA, 1982

Item	Unit	Price or cost	Quantity	Value or cost
		<i>Dol.</i>		<i>Dol.</i>
1. Gross receipts				
Dairy products	cwt.	15.55	22,579.00	351,202
Cattle and calves				27,429
Total				378,631
2. Variable costs				
Labor	hr.	4.25	9,700.00	46,364
Repairs and main.	mo.	950.00	12.00	11,400
Rent	yr.	26,419.00	1.00	26,419
Feed	ton	149.46	805.00	115,270
Machinery hire	mo.	233.33	12.00	2,800
Supplies	hd.	40.56	174.00	7,058
Breeding	unit	15.96	261.00	4,168
Vet & medicine	hd.	26.85	174.00	4,672
Utilities	hd.	31.95	174.00	5,560
Hauling & marketing	cwt.	.89	22,579.00	20,095
DHIA	mo.	185.25	12.00	2,223
Fuel (dairy)	gal.	1.15	1,179.00	1,356
Corn silage	acre	61.00	150.00	9,150
Pasture	acre	29.50	360.00	10,620
Hay	acre	36.75	20.00	735
Purchased hay	ton	70.00	110.00	7,700
Int. on op. cap.	dol.	14.6%	22,979.92	3,354
Total variable costs				278,944
3. Income above var. costs				99,687
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	302,025.00	38,659
Depr. on livestock cap.	dol.			46
Int. on mach. & equip.	dol.	12.8%	132,000.00	16,896
Depr. on mach. & equip. ..	dol.			26,222
Pasture	acre	11.89	360.00	4,280
Hay	acre	15.35	20.00	307
Other fixed costs	dol.			11,856
Total fixed costs				98,266
5. Total costs				377,210
6. Net returns to operator's land, labor, and management				1,421

production of 12,976 pounds per cow from the herd's grade and registered Holsteins allowed its positive net returns.

Total costs per hundredweight of milk for this dairy were equal to the average. Fixed costs were slightly above the study mean, but the difference was not appreciable. Variable costs were below average, in response to a \$6.58 per hundredweight feed cost. Hired labor costs totaled \$1.83 per hundredweight, \$0.04 above average. No other cost items seemed unreasonable or excessive.

Possible improvement for this dairy would be to stimulate higher production per cow to increase milk income. The strategy for this increase is debatable, given current cost alignments. This dairy provided an excellent example of the premise previously mentioned, the need for comprehensive management, since the only area noticeably in need of improvement was production per cow.

Dairy Number 7

Dairy Number 7 was the largest dairy to provide a positive net return in the study. Despite disease problems which lowered milk production, this dairy amassed a net return of over \$90,000 in 1982, table 9.

This dairy was the only farm that purchased silage during the study year. The purchase of silage, at \$40 per ton, reduced the need for extensive crop production machinery. Four different hay crops were raised on the farm, but equipment required for the 212 acres of hay production was minimal. The \$80,000 investment in machinery and equipment was only 9 percent of dairy revenue, the lowest in the study. Likewise, livestock investment was below average, at 50 percent of receipts in value. Depreciation accounted for nearly one-half of this dairy's fixed costs, which was more than \$1.50 below the study average.

No variable cost items were glaringly low; however, labor costs were somewhat below average on a per hundredweight basis.

The breeding program of this herd is worthy of some detailed discussion. The 1,010 units of semen used arose from 3.9 breedings per conception. Throughout 1982 this herd was plagued with the disease *Haemophilus somnus*, a viral disease which causes abortion during early pregnancy. Cows aborting caused increased breedings per calving, and lowered milk

TABLE 9. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 7 (259-COW HERD, 12,298 POUNDS OF MILK MARKETED PER COW) ALABAMA, 1982

Item	Unit	Price or	Quantity	Value or
		cost		cost
		Dol.		Dol.
1. Gross receipts				
Dairy products	cwt.	15.66	31,853.00	498,969
Cattle and calves				75,805
Total				575,774
2. Variable costs				
Labor	hr.	4.00	8,212.50	32,850
Repairs and main.	mo.	766.58	12.00	9,199
Feed	ton	175.00	986.00	172,529
Hay purchased	ton	55.56	45.00	2,500
Supplies	hd.	47.93	259.00	12,414
Breeding	unit	6.22	1,010.00	6,284
Vet & medicine	hd.	32.84	259.00	8,506
Utilities	hd.	32.77	259.00	8,487
Hauling & marketing	cwt.	1.75	31,853.00	55,632
DHIA	mo.	294.33	12.00	3,532
Silage purchased	ton	40.00	1,438.00	57,500
Bermudagrass hay	acre	44.88	60.00	2,663
Alfalfa hay	acre	62.00	32.00	1,984
Rye hay	acre	47.70	75.00	3,578
Rye-ryegrass-clover hay	acre	58.75	45.00	2,644
Fuel (dairy)	gal.	1.15	2,600.00	2,990
Int. on op. cap.	dol.	14.6%	31,928.22	4,662
Total variable costs				387,954
3. Income above var. costs				187,820
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	284,875.00	36,464
Depr. on livestock cap.	dol.			26,403
Int. on mach. & equip.	dol.	12.8%	55,000.00	7,040
Depr. on mach. & equip. ..	dol.			19,450
Bermudagrass hay	acre	12.00	60.00	720
Alfalfa hay	acre	76.84	32.00	2,459
Other fixed costs	dol.			1,118
Total fixed costs				93,654
5. Total costs				481,608
6. Net returns to operator's land, labor, and management				94,166

production due to longer dry periods. Production per cow in this herd averaged 12,208 pounds, too low for Holsteins. The discovery of this disease forced extra culling of dairy cattle, reducing the size of this herd from that of previous years.

Profit lost as a result of the disease can only be loosely estimated, but an increase in herd production average to 13,500 pounds per cow would have provided additional milk receipts of almost \$80,000. Costs added from this increase would probably have been minimal.

The only suggestion for this farm was calfhooed vaccination for *Haemophilus somnus* and all other infectious diseases. The eradication of this disease from the herd should enhance profits even further than were realized in 1982.

Dairy Number 8

Dairy Number 8 milked 400 grade Holsteins during the study year. Five forage crops were raised on the farm, and additional hay and mixed feeds were purchased. Net returns for this dairy were -\$90,260 in 1982, or -\$1.65 per hundredweight. This farmer owned 743 acres and rented an additional 450 acres, at a cost of \$17,875, table 10. The farm is owned by brothers, with many of the hired laborers being family members.

TABLE 10. COSTS AND REVENUE ANALYSIS FOR DAIRY NUMBER 8 (400-COW HERD, 13,622 POUNDS OF MILK MARKETED PER COW) ALABAMA, 1982

Item	Unit	Price or cost <i>Dol.</i>	Quantity	Value or cost <i>Dol.</i>
1. Gross receipts				
Dairy products	cwt.	15.74	54,490.00	857,673
Cattle and calves				80,370
Total				938,043
2. Variable costs				
Labor	hr.	4.00	26,230.00	104,917
Repairs and main.	mo.	1,855.00	12.00	22,254
Rent	yr.	17,875.00	1.00	17,875
Dairy cow rental	cwt.	2.50	3,600.00	9,000
Feed	ton	239.00	1,750.00	418,250
Mach. hire	mo.	244.67	12.00	2,936
Supplies	hd.	44.34	400.00	17,734
Breeding	unit	7.73	880.00	6,804
Vet & medicine	hd.	20.66	400.00	8,262
Utilities	hd.	40.12	400.00	16,049
Hauling & marketing	cwt.	1.68	54,490.00	91,543
Hay	acre	47.50	65.35	3,087
Alfalfa haylage	acre	71.43	35.00	2,500
Silage	acre	86.00	475.00	40,850
Hay purchased	ton	46.88	160.00	7,500
Temporary grazing	acre	28.75	160.00	4,520
Pasture	acre	15.00	510.00	9,150
DHIA	mo.	479.67	12.00	5,756
Fuel (dairy)	gal.	1.15	10,870.00	12,500
Int. on op. cap.	dol.	14.6%	66,790.58	9,751
Total variable costs				811,238
3. Income above var. costs				126,805
4. Fixed costs				
Int. on livestock cap.	dol.	12.8%	638,000.00	81,664
Depr. on livestock cap.	dol.			27,329
Int. on mach. & equip.	dol.	12.8%	126,625.00	16,208
Depr. on mach. & equip. ..	dol.			60,814
Hay	acre	15.35	65.00	943
Alfalfa hay	acre	76.84	35.00	910
Pasture	acre	11.89	510.00	6,064
Other fixed costs	dol.			23,133
Total fixed costs				217,065
5. Total costs				1,028,303
6. Net returns to operator's land, labor, and management				-90,260

The cost of the feeding program amounted to 63 percent of the milk check, somewhat higher than average. A poor crop year forced increased purchases of feed, resulting in the high feed bill. This dairy was the only farm in the study leasing cattle during the study year. A contract of \$0.025 per pound of milk produced by 30 rental cows amounted to a \$9,000 payment to the leasor. The cost effectiveness of this outlay was unknown, however these cows would not have been leased had serious cash-flow problems not already been present. Fixed costs were near the study average, both on a per hundred-weight and percent of dairy revenue basis. All other costs and return items seemed reasonable.

Production per cow was 13,622 pounds during the study year, which needed improving. Breeding efficiency improvements would allow cows to re-enter the herd quicker, increasing production per year. Some physical changes in the dairy might also boost production. Concreted walkways and reduction of mud in alleys would lessen animal stress, which might improve production rates.

Implications

The eight dairies studied were probably not a representative cross section of Alabama dairies. The managers of these dairies would likely be considered above average. In addition, the fact that these farmers are concerned enough about their operations to keep adequate records says a good deal about their managerial abilities. However, the input costs faced by these dairymen should be representative of costs for most Alabama dairies during 1982.

Comparisons were made of cost elements and revenue on a per cow basis for the eight herds, table 11. These calculations provide a more direct method of viewing costs among the operations studied. A simple or unweighted average was determined for the eight operations.

Wide ranges in both costs and revenues were found among the dairies. However, caution should be exercised in interpreting and evaluating these costs and returns differences. Cost differences per cow arose from a number of factors, including variations in milk production levels and structural variations in elements of both variable and fixed costs. One important disparity involved the handling of labor cost. Some operators who utilized primarily unpaid family labor had low

TABLE 11. MEASURES OF COSTS AND REVENUE PER COW, EIGHT ALABAMA DAIRY FARMS, 1982

Item	Dairy farm								Average
	1	2	3	4	5	6	7	8	
Cows per dairy, number	45	100	192	160	230	174	259	400	195
Production per cow, pounds	14,629	10,800	10,500	12,500	9,000	12,976	12,298	13,622	12,041
Variable cost, dol.									
Labor	30.38	96.62	219.90	178.58	222.63	266.46	126.83	262.29	175.46
Repairs and maintenance	150.82	25.00	64.58	133.31	39.90	65.52	35.52	55.64	71.29
Purchased feed and hay	843.29	506.81	626.48	601.77	805.52	706.72	897.80	1,064.38	756.60
Perennial hay crops	65.18	—	3.65	3.50	22.28	4.22	17.94	7.72	15.56
Temporary hay crops	—	—	—	—	—	—	24.02	—	3.00
Grown silage and grains	131.29	49.40	—	57.75	46.34	52.59	—	108.38	55.72
Pasture	28.42	3.00	53.48	2.72	10.43	61.03	—	22.88	22.74
Temporary grazing	—	—	—	31.25	—	—	—	11.30	5.32
Machine hire	—	—	8.84	55.08	32.85	16.09	—	7.34	15.02
Supplies	53.27	15.44	12.59	81.04	27.90	40.56	47.93	44.34	40.38
Breeding	19.96	2.06	40.81	13.46	.33	23.95	24.26	17.01	17.73
Vet and medicine	46.29	24.71	28.84	36.72	5.72	26.85	32.84	20.66	27.83
Utilities	72.87	44.21	34.47	58.21	19.37	31.95	32.77	40.12	41.75
Hauling and marketing	311.69	55.82	39.67	67.91	44.65	115.49	214.80	228.86	134.86
DHIA	24.53	12.89	16.32	13.49	—	12.78	13.64	14.39	13.51
Fuel (dairy)	18.56	14.15	—	92.81	4.58	7.79	11.54	31.25	22.58
Land rent	—	—	5.59	15.62	10.71	151.83	—	44.69	28.56
Livestock rent	—	—	—	—	—	—	—	22.50	2.81
Interest on operating capital	21.78	10.34	14.33	17.56	15.67	19.28	18.00	24.38	17.67
Total variable cost	1,818.33	860.45	1,169.55	1,460.78	1,308.88	1,603.11	1,497.89	2,028.13	1,468.39

Continued

TABLE 11. (CONTINUED). MEASURES OF COSTS AND REVENUE PER COW, EIGHT ALABAMA DAIRY FARMS, 1982

Item	Dairy farm								Average
	1	2	3	4	5	6	7	8	
Fixed costs, dol.									
Interest on livestock capital ...	329.66	242.18	78.17	266.44	112.70	222.18	140.79	204.16	199.54
Depreciation on livestock capital	58.24	25.54	12.26	0	.20	.26	101.94	68.32	33.35
Depreciation on machinery and equipment	48.33	165.76	76.67	136.95	37.65	97.10	27.18	40.52	78.77
Interest on machinery and equipment	144.07	101.75	42.80	102.91	42.33	150.70	75.10	152.04	101.46
Permanent pasture	3.96	2.38	17.65	10.78	24.81	24.60	0	15.16	12.42
Permanent hay crops	10.24	0	3.10	3.84	16.69	1.76	12.27	4.63	6.57
Other fixed costs	50.64	23.47	22.04	139.06	16.57	68.14	4.32	57.83	47.76
Total fixed costs	645.14	561.08	252.69	659.98	250.95	564.74	361.60	542.66	479.87
Total costs, dol.	2,463.47	1,421.53	1,422.24	2,120.76	1,559.83	2,167.86	1,859.49	2,570.79	1,948.25
Other measures per cow									
Total income	2,716.18	1,601.18	1,398.55	2,068.96	1,436.00	2,176.04	2,223.07	2,345.11	1,995.64
Total variable costs	1,818.33	860.45	1,169.55	1,460.78	1,308.88	1,603.11	1,497.89	2,028.13	1,468.39
Income above variable costs	897.85	740.73	229.00	608.18	127.12	572.93	725.18	316.98	527.25
Total fixed costs	645.14	561.08	252.69	659.98	250.95	564.74	361.60	542.66	479.87
Total costs	2,463.47	1,421.53	1,422.24	2,120.76	1,559.83	2,167.86	1,859.49	2,570.79	1,948.25
Net returns	252.71	179.65	-23.69	-51.80	-123.83	8.18	363.58	-225.68	47.39

labor costs. Influence of this apparent cost saving shows up for these dairies in the need for relatively higher net returns, which include returns to operator and other unpaid labor. In another area, the dependency on purchased feed versus grown grains and forage affects allocation of costs between fixed and variable costs. Operators depending primarily on purchased feed reported higher feed costs than would be associated with feed and forage production. Probably a more meaningful estimation of costs, both fixed and variable, would be obtained by following the expenditure patterns of the dairies over several years.

Keeping in mind the structural differences in farm operations affecting costs and net returns, net returns per cow ranged from $-\$225.68$ to a positive return of $\$363.58$. Dairy Number 8, in particular, experienced substantial losses, and unless costs can be reduced or revenue increased, it could not remain in business long.

While the development of a single dairy enterprise budget from the available data was not possible, some important information was obtained. Labor and feed provided the major variable cost items for the majority of the eight dairies. Labor cost averaged $\$1.61$ per hundredweight and feed cost averaged $\$7.41$ per hundredweight. During 1982, commercial feeds purchased by these dairies averaged $\$180$ per ton. Feed costs averaged 52 percent of the milk check, near the old thumb rule of 50 percent. Four of the eight dairies studied failed to produce a positive net return in 1982.

Sixteen production and external ratios were developed and calculated from the enterprise analyses, but no factor was statistically significant in determining net returns. Likewise, when comparing each analysis and ratios of the eight dairies, many conflicts were found, signaling the need for comprehensive management within a dairy to achieve a positive net return. It should be noted that all eight dairies had positive incomes over variable costs, suggesting that even the dairies with negative net returns should be able to continue production in the short run. However, the continued failure to cover fixed costs or debt obligations by these dairies would make the future uncertain.

USDA marketing assessments and higher costs in 1983 likely lessened net returns for these and all Alabama dairies that year. Policy decisions and a reduction in the dairy support

price reduced prices again in early 1984. Thus, the outlook for dairy farmers in Alabama is less than optimistic. Comprehensive farm and financial management will be necessary to insure the survival of Alabama dairy farms. Presented below is a tool which may help meet the needs of farm managers and dairy farmers in decision making.

TRANSITION PLANNING

This section provides a brief description of the transition planning model, its purposes and function, the selection of two dairies for transition analysis, and the results of the transition procedure.

The Model

Transition planning is a Fortran IV-based computer model originally developed by Ed Carson at Purdue University in the early 1970's and first named long range financial planning. Modifications were made in the program by Herman Harrison in 1975, A. Y. Chow in 1980, Jeffrey Sims in 1983, and others at various institutions (7). The adjustment by Sims was made to reflect Alabama and U.S. income tax structure for 1982, and to adjust for changes in the self-employment tax rate for that year.

The transition planning model analyzes the effect of a change in investment in the farm business on cash flow, solvency, credit needs, and capacity and profitability over time. Information required by the model includes general farm information, crop and livestock budget data, non-farm business information, balance sheet and change in investment values, undistributed costs, and miscellaneous information. The model can easily accommodate 5 crop and 2 livestock budgets and 11 change-in-investment budgets. With minor modification, 15 crop budgets, 15 change-in-investment budgets, and 5 livestock budgets can be employed. Tables outputted by the model are: (1) summary of input information, (2) projected profit and loss statement, (3) profitability, debt servicing, and payback, (4) balance sheet and analysis, and (5) flow of funds summary. At the discretion of the user, the transition can be projected over 1 to 4 years, with all information provided for each year. The balance sheet provides additional beginning-of-the-year information for year 1. The program provides an option for the analysis of increased or decreased product

prices. The user specifies a given percentage factor for these output price adjustments. All tables are automatically provided under the altered pricing option (transition planning model).

In simpler terms, transition planning provides financial information over time, caused by a change in the level of investment in the farm business. These changes in investment may be represented by alterations in the number of crop acres, crop mix, livestock numbers, machinery and equipment complement, production rates, inventory, nonfarm investment, or a mix of these business alternatives. It should be noted that transition planning makes no alterations in the farm enterprise mix to increase efficiency or profitability. The model only evaluates changes imposed on the present farm and does not select the changes to be made. Selection of enterprise mix must be made outside the transition planning model, through use of linear programming, personal preference, or other objective function-maximizing techniques.

Input data required for the model involve budget values for all enterprise changes and for present enterprises. Crop, livestock, and nonfarm budget information includes the number of units of each enterprise each year, variable cost per unit, yield or production rates, direct labor in hours per unit, and the price per unit of production. Some balance sheet information is required for the beginning of the transition period, and is then calculated automatically for the remaining years, while other data are required specifically for each year. Input and output prices may be altered during the transition years, or held constant. This provides the opportunity for possible error, if expectations and reality are not alike, via substantial changes in input or product prices in the future.

Selection of Dairies for Transition

Of the eight dairies evaluated, two were selected for alteration and analysis through transition planning. Because of their sizes and present lack of alternative enterprises on the farm, Dairies Number 1 and 5 were selected. The absence of alternative enterprises provides the opportunity for analysis of changes in cash flow, profitability, and solvency due only to changes in the dairy enterprise. No effect of other enterprises will bias the analysis.

Changes to be made were selected at the request of the two dairy operators. No quantitative profit-maximizing techniques

were utilized, hence all changes are personal preference. Alterations selected by an objective function-maximizing procedure would likely differ from the changes that were imposed.

Input data for each dairy were obtained from the enterprise budgets developed, and from additional AGRIFAX records. Coefficients used in the transition that did not appear on these records were obtained from the operators or estimated with their supervision.

Because of the extended planning horizon analyzed by transition planning, projections on costs and returns must be made 4 years in advance. Using the enterprise analyses developed as a 'year 0' base, these projections were made for the 4 transition years. Table 12 provides yearly adjustment factors

TABLE 12. ADJUSTMENT FACTORS USED IN TRANSITION PLANNING

Item	Source ²	Percentage of adjustments per year ¹			
		Year 1	Year 2	Year 3	Year 4
Variable cost per cow	(3)	+5.3	+5.3	+5.3	+5.3
Variable cost per acre (forages)	(1)	+7.8	+7.8	+7.8	+7.8
Milk price ³	(1)	-8.0	+8.0	+6.0	+6.0
Value of animals	(1)	+9.2	+9.2	+9.2	+9.2
Interest	(6)	0	0	0	0
Machinery and equipment	(1)	+9.2	+9.2	+9.2	+9.2
Beef price	(1)	+9.2	+9.2	+9.2	+9.2
Family living ⁴	—	+7.0	+7.0	+7.0	+7.0
Value of the operator's labor ⁴	—	+7.0	+7.0	+7.0	+7.0

¹Change from the previous year

²Refer to Literature Cited.

³Reduction of milk price in year 1.

⁴Implicit price deflator.

used in the transitions, and the sources from which these factors are derived. All factors were determined by averaging the annual percentage changes in each particular category from 1977 to 1981. The price of milk was reduced \$0.65 per hundredweight in year 1, and then increased to the year 0 base due to the imposition of two \$0.50 assessments in 1983. Interest rates were held constant due to the uncertainty of future rates and wide variability of recent rates.

Selected measures of profitability and solvency are shown in tables 13 and 14, and were drawn from the model output (6). Each dairy was transitioned under three output pricing scenarios, once under the 'best guess' pricing system presented in table 12. The second scenario ignores the decline in milk

TABLE 13. SELECTED MEASURES OF PROFITABILITY AND SOLVENCY, DAIRY NUMBER 1

Item and unit	Scenario number one				Scenario number three			
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Total adj. farm cash								
income, dol.	127,063	165,229	198,638	226,451	146,122	190,013	228,433	260,418
Variable cash exp., dol.	102,683	126,137	142,883	161,665	102,684	126,137	142,883	161,665
Other cash exp., dol.	41,253	50,645	73,836	86,100	41,253	47,862	67,029	74,027
Total cash exp., dol.	143,937	176,782	216,719	247,776	143,937	174,000	209,911	235,692
Net profit after tax, dol.	-18,136	-11,815	-27,243	-31,527	923	15,752	8,826	14,514
Av. farm invest., dol.	338,975	342,726	347,764	351,827	338,975	342,726	347,764	351,837
Rate earned on farm								
invest., pct.	-0.4	3.9	1.4	2.9	5.3	11.1	9.9	12.6
Change in invest., dol.	7,765	-262	10,388	-2,212	7,765	-262	10,338	-2,212
Years to repay debt, yr.	999	999	999	999	999	999	999	999
Assets, dol.								
Current	138,770	149,870	155,870	162,420	138,870	149,870	155,870	162,420
Intermediate	10,743	4,260	13,377	9,394	10,743	4,260	13,377	9,394
Long-term	233,902	219,123	214,344	209,565	223,902	219,123	214,344	209,565
Total	373,515	373,523	383,591	381,379	373,515	373,253	383,591	381,379
Liabilities, dol.								
Current	92,733	150,736	216,227	292,412	73,674	104,110	133,532	163,676
Intermediate	56,944	43,194	48,944	36,694	56,944	43,194	48,944	36,694
Long-term	125,885	118,085	110,285	102,485	125,885	118,085	110,285	102,485
Total	275,562	312,015	375,456	431,591	256,503	265,389	292,761	302,855
Net worth, dol.	97,953	61,238	8,135	-50,212	117,012	107,864	90,830	78,524

TABLE 14. SELECTED MEASURES OF PROFITABILITY AND SOLVENCY, DAIRY NUMBER 5

Item and unit	Scenario number one				Scenario number three			
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Total adj. farm cash								
income, dol.	362,256	416,713	451,598	500,892	420,044	479,220	519,337	576,025
Variable cash exp., dol.	280,804	298,411	314,319	333,545	280,804	298,411	314,319	333,545
Other cash exp., dol.	142,033	156,445	169,578	182,490	142,033	148,446	151,286	152,328
Total cash exp., dol.	422,837	454,856	483,897	516,035	422,837	446,857	465,604	485,872
Net profit after tax, dol.	-70,232	-50,839	-44,995	-27,840	-15,444	19,666	36,305	64,416
Av. farm invest., dol.	970,032	952,836	940,140	927,444	970,032	952,836	940,140	927,444
Rate earned on farm								
invest., pct.	-2.5	.4	1.7	4.2	3.1	6.9	8.9	12.3
Change in invest., dol.	-21,696	-12,696	-12,696	-12,696	-12,696	-12,696	-12,696	-12,696
Years to repay debt, yr.	999	999	999	999	999	999	999	9.3
Assets, dol.								
Current	247,380	247,380	247,380	247,380	247,380	247,380	247,380	247,380
Intermediate	76,264	66,528	56,792	47,056	72,264	66,528	56,792	47,056
Long-term	648,040	645,080	642,120	639,160	648,040	645,080	642,120	639,160
Total	971,684	958,988	946,292	933,596	971,684	958,988	946,292	933,595
Liabilities, dol.								
Current	133,165	204,642	270,275	318,751	78,377	79,348	63,681	19,902
Intermediate	126,799	103,466	80,132	56,799	126,899	103,466	80,132	56,799
Long-term	97,935	87,935	77,935	67,935	97,935	87,935	77,935	67,935
Total	357,899	396,042	423,342	443,485	303,111	270,749	221,748	144,635
Net worth, dol.	613,785	562,946	517,950	490,111	668,573	688,239	724,544	788,961

price in year 1, and allows milk prices to increase 6 percent each year. Scenario number three upwardly adjusts all output prices 15 percent from the best guess pricing scheme.

Description of Changes to be Made and Analysis of Results

Dairy Number 1

The owner of Dairy Number 1 wished to increase his herd from the 45-cow level during 1982 to 75 cows over the transition period. Hay crops and temporary grazing were to be increased to 50 acres each. No additional cattle would be purchased, heifers were to be brought into the herd over the usual replacement of culls at a rate of 10 in each of years 1 and 2, and 5 in each of years 3 and 4. During year 1, a \$15,000 hay barn was to be built to meet increased hay storage capacity requirements. A mixwagon and feedbunks totaling \$19,500 were to be purchased in year 3, and hay baling equipment valued at \$8,000 was to be acquired in year 4. The operator owned no haying equipment and all hay harvesting was done by a custom operator.

The silo capacity was adequate only for the 50 acres of silage presently produced and used, hence increases in cow numbers necessitated a decrease in silage fed per cow. This decrease was to be made up by increases in purchased feed and the increased acres of hay and pasture.

The operator expected sales of \$10,000 in breeding stock, above the usual sale of cull cows, in each of years 3 and 4. Finally, a full time laborer would be hired in year 3 and kept through year 4.

In comparison to the positive net returns the dairy experienced in 1982, the increasing of herd size and subsequent changes in forage acres and purchases of machinery and buildings proved unprofitable, table 13. The attempt to expand during a period of depressed milk prices and high (and rising) input costs resulted in losses to the operator, increased debt load, and eventual negative net worth in year 4, under the best guess pricing scenario. The dairy was unable to produce a positive profit in any of the 4 transition years, which increased current debt from \$92,733 in year 1 to \$292,412 in year 4. Current debt increased \$251,380 from the year 0 base. The dairy's total liabilities increased from \$275,562 in year 1 to

\$431,591 in the last transition year, versus total assets of \$373,515 and \$381,379, respectively, for years 1 and 4. Average farm investment remained fairly stable throughout the transition period, moving from \$338,975 to \$351,827. Total assets likewise were not greatly affected over the 4 transition years.

The major cause of the financial difficulties during this period was the increased debt load incurred by the dairy. In year 4, differences in total cash receipts and total cash expenses accounted for only \$23,315 of the total farm loss. The transition procedure carries each year's operating loss into the next year as a current liability. Thus, the inability to reduce debt in any year and the further acquisition of assets by borrowing forced the reduction in net worth.

Under the assumption of no decrease in milk product prices, Dairy Number 1 continued to make poor progress. Net profit after tax was positive in years 2 and 4, but negative in years 1 and 3, the years when the substantial additional borrowing was made. Net worth declined from \$139,089 in year 0 to \$47,051 in the last transition year. The need for short-term credit increased from \$75,273 to \$453,090 throughout the transition.

The third scenario allowed all output prices to increase 15 percent over the best guess pricing system. Even under these conditions, the expansion of this dairy by the methods described was unwise. Even though a positive net profit after tax was obtained in all 4 years, there were insufficient funds for repayment of previous debt and debts acquired during the transition period. Net worth dropped 33 percent from year 1 to year 4, from \$117,012 to \$78,524, but did not become negative as in the first pricing scenario.

Farm assets were identical to the first pricing system, but total liabilities were reduced nearly \$130,000 in year 4 over the first pricing system.

The effects of changes imposed on Dairy Number 1 were predictable. The addition of new debt in a period of increasing costs and reduced returns proved unwise under all three pricing schemes. Likewise, the use of more expensive production inputs increased the difference between costs and returns. Thus, the opportunity for this dairy to expand during the time frame analyzed, under the assumptions given, was not present.

Dairy Number 5

Alternatives imposed on Dairy Number 5 provide an example of transition planning's use when most investment changes are made by increasing variable costs and production rates. During 1982, the year 0 base, this dairy had an average production of only 9,000 pounds per cow. Due to personal problems, the operator admitted allowing too little time for care of his animals.

The decision was made to increase fertilizer used on pastures and to hire an additional full-time laborer. Also, the operator stated he would increase his management time on the farm. The latter increase was not charged monetarily to the dairy, but should aid in the attempt to increase production. An investment of \$10,000 to place concrete around the milking parlor was to be made in year 1. This should decrease animal stress and provide additional production potential.

Increases in average production would be as follows: in year 2, average production would climb to 10,000 pounds per cow, and in year 4 to 10,500 pounds per cow. This allows 4 years for an increase in herd average of 1,500 pounds per cow, which is by no means an unattainable goal. Herd size was to remain at 230 cows.

In comparison to Dairy Number 1, this dairy began the transition with a lighter debt load and greater total assets. Its profitability potential was greater than Dairy Number 1, due mainly to larger herd size and lower fixed cost per cow.

Under the best guess pricing scenario (scenario number one), this dairy failed to show a positive net profit after tax in any of the 4 years. Unlike Dairy Number 1, however, net profit increased each year throughout the transition, table 14.

Assets declined somewhat during the 4-year period, due mainly to depreciation. However, debt load increased each year, reducing net worth from \$613,785 to \$490,111 between years 1 and 4. The increased debt load was due to borrowing to cover net losses the previous year, since current liabilities were the only debts that increased. Intermediate and long-term liabilities decreased during the transition period.

Given this pricing system, the dairy would never be able to repay its total debt. However, if input and output prices continued the trend anticipated in the 4-year transition period beyond the analyzed 4 years, the dairy might show a positive profit in either year 5 or 6. This points to a weakness in

transition planning—the 4-year planning horizon. In effect, the transition is begun and the analysis ended some time before the full effects would be known. In other words, transition planning leaves the farmer somewhat in the middle of a transition rather than analyzing its full effect. There is no easy solution to this problem, since furthering the time frame projection only allows the possibility of increased error in projection of prices and outputs.

Under transition scenario two, when the fall in milk product prices was ignored, Dairy Number 5 fared very well. Net profit after tax was $-\$34,628$ in year 1, but became positive in all succeeding years, eventually becoming $\$42,335$ in year 4. Net worth fell from the year 0 base in the first year, but increased each following year. Current liabilities rose, peaked in year 3, and fell in year 4. Total farm assets were identical to the best guess pricing scenario, since all profit above the need for current expense and current liabilities was applied to intermediate and long-term debt. No asset-increasing purchases or changes in inventory were made.

The effect of pricing within scenario number three proved even more profitable for this dairy. Like scenario number two, net profit after tax was negative in year 1 but rose to $\$19,666$ in year 2, and to over $\$64,000$ in the last transition year. Unlike any of the previous pricing schemes, for either dairy, this scenario allowed the repayment of all debt in 9.3 years if the current trends held throughout the years following the transition.

In year 4, total liabilities of $\$144,635$ had fallen to less than half the year 1 total of $\$303,111$. Net worth rose over $\$100,000$ during the 4 years. Current liabilities fell from $\$78,377$ in year 1 to $\$19,902$ in the final transition year.

Evaluation

Given changes in investment in the farm business, transition planning provides useful financial information over time. The 4-year time frame proved too short for analysis of substantial changes in the farm, but the short-term effects were easily retrieved. As with any financial projection system, the results are only as good as the assumptions.

Three pricing scenarios were used for projections into the future for two dairy examples. Neither dairy produced a positive net profit after tax under scenario number one. The

period of increasing costs and declining returns made any increased investment impossible. Within the framework of scenario two, Dairy Number 1 provided a positive profit in 2 of the 4 years, due to increased investment with borrowed funds in year 3. Dairy Number 5 was profitable under the first transition scenario. This dairy was similarly profitable under the third scenario, only with ever greater net profit. Dairy Number 1 produced a positive profit in all 4 years under this pricing scheme, but was never able to repay its current liabilities.

In general, expansion by increasing debt load during the period of reduced profit potential was unwise, as illustrated by Dairy Number 1. Dairy Number 5 provided an example of increased production rates by greater use of variable inputs. This investment procedure allowed greater net returns when the cost-price squeeze period was over.

Transition planning should be of interest to farm planners and agricultural credit institutions, due to the excellent information it provides in the short run. However, analysis of a farm over extended time periods proves risky if there is a divergence of reality and the assumptions made.

SUMMARY AND CONCLUSIONS

In spite of a favorable market for milk in Alabama, the number of dairy farmers and total milk marketings in the State have been declining since the early 1970's. The continued exit of milk producers in Alabama while national milk production rose suggested that dairying may be less profitable in the State than in other areas of the country. Comparison of U.S. and Southern region studies on the cost of producing milk indicated narrowing profit margins faced by Southern dairy farmers.

To examine the profitability of dairying in Alabama, eight dairy farmers were studied. All used the Production Credit Association's AGRIFAX farm records system and should have been above-average operations. Enterprise budgets were developed for each farm. These dairies varied greatly in size, organization, and feeding systems. During 1982, the two smallest dairies and the second largest dairy provided positive net returns to operator's labor, land, and management. This finding is somewhat in disagreement with the historical evaluation of dairy structure in the State which revealed that larger

dairies tend to remain in business longer, whereas smaller operations either became larger or exited. The budgeting analysis provided no factors which consistently pointed to problem or benefit areas within the dairies studied.

The organization of cost and return data to provide a single enterprise budget was not undertaken, however some comparisons were made among the study dairies. Variable costs per hundredweight of milk marketed ranged from \$7.97 to \$15.43, averaging \$12.69. Fixed costs ranged from \$2.79 to \$5.28 per hundredweight, averaging \$4.03. Net returns averaged \$0.29 per hundredweight with a range of -\$1.67 to \$1.73. Feed costs as a percent of the milk check averaged 52 percent. Also, a substantial difference existed among the operations in the dairy revenue per hundredweight of milk marketed, ranging from \$13.54 to \$15.93. Caution should be exercised in interpreting and comparing these cost and return differences as the budgets were not standardized.

Two of the study dairies were further analyzed using a computer program known as transition planning. Adjustments in the investment level and production rates and costs were projected over a 4-year period. In both cases, the changing of investment in the farm under the best guess pricing system proved unprofitable. The addition of costs during a period of depressed milk receipts and escalating input prices resulted in reducing already thin profit margins to negative levels. The smaller dairy could not repay extra debts incurred even when output prices were raised 15 percent. However, under these optimistic projections the larger dairy became more solvent in the fourth year, due primarily to greater profit potential and a lower beginning debt load. In general, the decision to increase costs during a period of slight profit margins proved unsound.

The eight dairies studied may or may not provide a representative sample of dairies in Alabama. Likewise, assumptions made about future costs and returns may have been realistic, but possibly were not. It was shown, at least for these dairies, that dairying in Alabama was likely unprofitable in 1982, and attempts to expand or increase costs in the near future may lead to increased debt loads and insolvency.

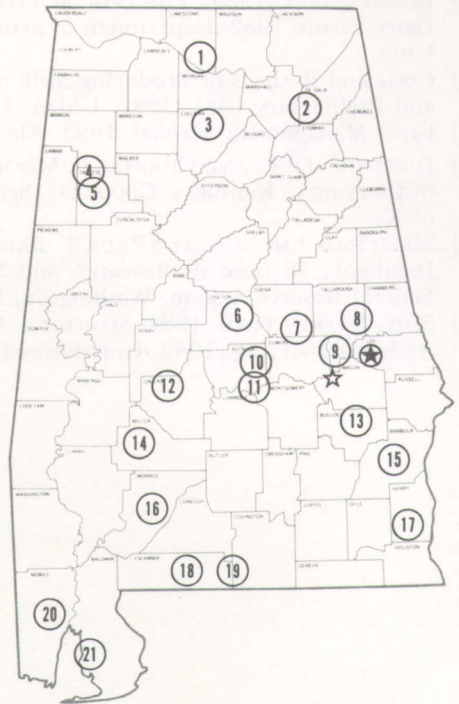
The future of the dairy industry in Alabama is uncertain. This analysis has provided information on costs and returns to dairying in the State; however, further investigation into the causes of the continued loss of producers is needed.

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Alabama's Agricultural Experiment Station System AUBURN UNIVERSITY

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Research Unit Identification

- ★ Main Agricultural Experiment Station, Auburn.
- ☆ E. V. Smith Research Center, Shorter.

1. Tennessee Valley Substation, Belle Mina.
2. Sand Mountain Substation, Crossville.
3. North Alabama Horticulture Substation, Cullman.
4. Upper Coastal Plain Substation, Winfield.
5. Forestry Unit, Fayette County.
6. Chilton Area Horticulture Substation, Clanton.
7. Forestry Unit, Coosa County.
8. Piedmont Substation, Camp Hill.
9. Plant Breeding Unit, Tallassee.
10. Forestry Unit, Autauga County.
11. Prattville Experiment Field, Prattville.
12. Black Belt Substation, Marion Junction.
13. The Turnipseed-Ikenberry Place, Union Springs.
14. Lower Coastal Plain Substation, Camden.
15. Forestry Unit, Barbour County.
16. Monroeville Experiment Field, Monroeville.
17. Wiregrass Substation, Headland.
18. Brewton Experiment Field, Brewton.
19. Solon Dixon Forestry Education Center, Covington and Escambia counties.
20. Ornamental Horticulture Substation, Spring Hill.
21. Gulf Coast Substation, Fairhope.