ECONOMICS
INFORMATION
REPORT

NORTH CAROLINA DAIRY FARMING, 1983

Richard A. King
Geoffrey A. Benson
and
Victor G. Ganoza

ECONOMICS INFORMATION REPORT NO. 71
DEPARTMENT OF ECONOMICS AND BUSINESS
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH
RALEIGH, NORTH CAROLINA

EIR-71

June 1984

NORTH CAROLINA DAIRY FARMING, 1983

Richard A. King
Geoffrey A. Benson
and
Victor G. Ganoza

Economics Information Report No. 71
Department of Economics and Business
North Carolina State University at Raleigh
Raleigh, North Carolina

June 1984

ACKNOWLEDGEMENTS

The information in this report was obtained through the cooperation of 441 North Carolina milk producers who participated in the survey. Appreciation is due the North Carolina Milk Commission, especially Executive Secretary Grady Cooper, Jr. who made it possible to write personal letters to each producer on the sample list. Appreciation is also expressed to the Department of Agricultural Economics and Rural Sociology, Clemson University for assistance in coding and summarizing the responses on computer tapes, to Ms. Ellen Berry who assisted in tabulating the responses and to Ms. Mary Ann Justice who prepared the manuscript.

This report is a contribution to Southern Region Project S-166 titled "The Impact of Changing Costs, Institutions, and Technology in the Southern Dairy Industry."

TABLE OF CONTENTS

	Page
INTRODUCTION	5
Overview	5
Survey Method	5
FARM CHARACTERISTICS	7
Location and Herd Size	7
Milk Output	7
Land Ownership	12
Farm Ownership	12
SOURCES OF INCOME	15
Total Farm Sales	15
Income from Dairying	15
Nonfarm Income	15
OPERATOR CHARACTERISTICS	18
Age of Operator	18
Experience	18
Education	18
Financial Status	18
MILK PRODUCTION	22
Milking Facility	22
Milking Equipment	22
Housing	24
Manure-Handling System	24
ROUGHAGE PRODUCTION	27
Land Use	27
Grazing	27
Hay Production	27
Silage Production	30
Silage and Hay Purchases	30
FEEDING SYSTEMS	33
Concentrates Fed	33
Feed-Handling Equipment	33

TABLE OF CONTENTS (continued)

	Page
HERD MANAGEMENT	37
Herd Replacement	37
Herd Performance Testing	37
Artificial Insemination	37
Feed Controls	37
FUTURE DIRECTIONS	40
Adequacy of Present Facilities	40
Plans for New Facilities	40
Operator Plans for the Future	43
OPINIONS OF DAIRYMEN	48
Minimum Size of Herd	48
Returns to Dairying	48
Comparison with Other Enterprises	51
SUMMARY	54

NORTH CAROLINA DAIRY FARMING, 1983

INTRODUCTION

Overview

The dairy industry of North Carolina and the South has seen rapid changes during the past decade, including size of herd, cropping practices, herd management techniques, equipment use and feeding systems. To provide a description of the present structure of the industry, dairy farmers in North Carolina were asked to participate in a mail survey conducted in each of the states in the southern region early in 1983. Dairymen also were asked about future developments on their farms and their opinions about the future of the dairy industry as a whole. These opinions contribute to an understanding of likely future changes. Findings from the survey of North Carolina dairymen are presented in this report.

The first section of the report sketches general characteristics of the survey farms in each geographic region of the state. The next sections discuss milk production, roughage production and concentrate feed supplies. Herd management practices are described, and plans for new facilities presented. The final section summarizes opinions of producers in the sample concerning size of herds, returns to dairying and a comparison with returns from alternative enterprises.

Survey Method

A complete list of the 1325 Grade A milk producers delivering milk to North Carolina plants in December 1982 was provided by the North

Carolina Milk Commission. Eighty-eight producers, each with an out-of-state mailing address, were deleted, leaving a population of 1237 North Carolina producers. A 50-percent sample of 618 names was drawn at random. Three of these, identified as institutional farms, were deleted from the list, leaving a sample of 615 dairymen. Grade A producers located in North Carolina but shipping milk to out-of-state plants were not included in the survey, nor were manufacturing grade milk producers included. Ninety-nine percent of Grade A milk purchased from North Carolina farmers in 1982 was received by North Carolina distributors.

A questionnaire developed by the Southern Region Dairy Marketing Research Committee for use in each state in the region was placed in the mail January 10, 1983 with a personally addressed letter to each person on the sample list. A return stamped envelop was enclosed with each questionnaire. A reminder postcard was mailed to all individuals one week later. On February 2 a second personally addressed letter and a second copy of the questionnaire were sent to those individuals who had not yet responded.

Two questionnaires were not delivered and one duplicate was deleted, reducing the sample to 612 dairymen. Replies were received from 445 individuals. Of these, three chose not to complete the questionnaire and two addition institutional herds were deleted. The 440 completed commercial farm schedules represent a 72-percent response rate. Twenty of the respondents were not producing Grade A milk in January 1983. Thus, the analysis that follows is based on current production data provided by 420 producers.

FARM CHARACTERISTICS

Location and Herd Size

The location of farms participating in this study is shown by county in Figure 1. The state was divided into three regions: Mountain (23 counties), Piedmont (34 counties), and Coastal Plain (43 counties). Dairy farms are most numerous in the Piedmont region where 70 percent of the study farms were located. The Mountain region was represented by 25 percent of the survey farms. The remaining 5 percent of the survey farms were located in the Coastal Plain.

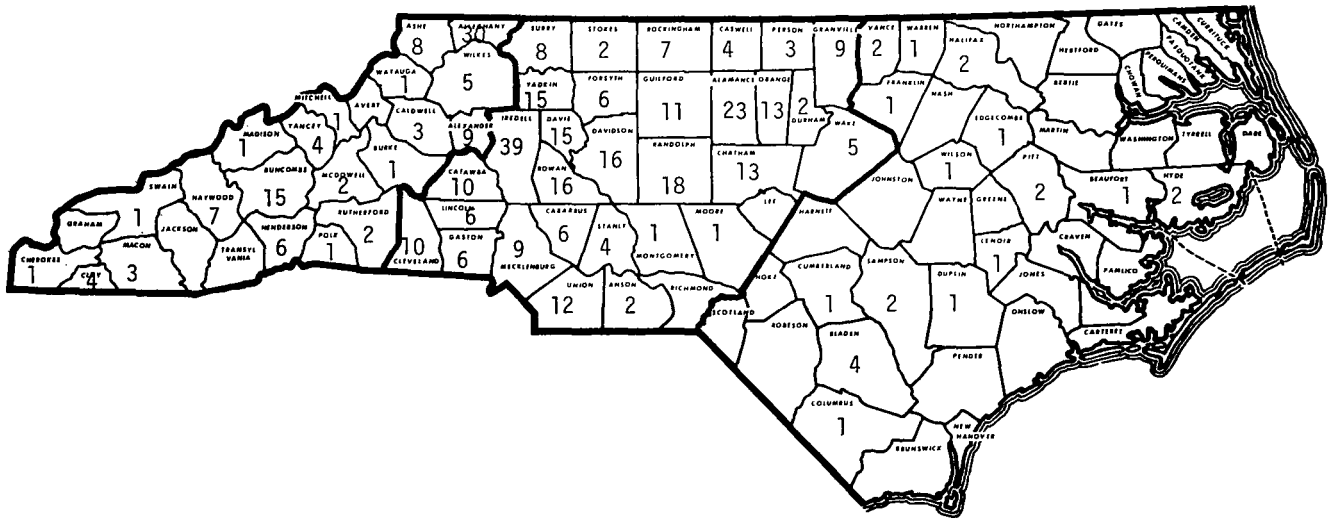
The average herd size on the 420 sample farms was 92 cows in January 1983. This represented an increase of 19 percent over the average of 77.9 cows five years earlier in 1978. When asked to indicate the size of herd planned for 1988, the average response was 100.2 cows, an increase of 8 percent over the coming five-year period.

The number of farms in the sample by size of herd in 1983 is found in Table 1. The average size of herd in 1983 was smaller in the western part of the state than in the eastern part. Farms in the Mountain region averaged 79.4 cows, whereas those in the Piedmont reported an average of 93.3 cows. In the Coastal Plain region dairy farms were less numerous but substantially larger, with an average of 140 cows per farm. Two-thirds of the respondents in the Mountain region reported less than 80 cows, whereas only one-half of the Piedmont respondents and one-third of the Coastal Plain respondents reported herds with fewer than 80 cows. Herds of 140 or more cows were reported in 10 percent of the Mountain farms, 14 percent of the Piedmont farms and 26 percent of the Coastal Plain farms (Table 2).

Milk Output

The average production per cow on the sample farms reporting was 14,596 pounds of milk and 550 pounds of butterfat (Table 3). Regional differences were very small, but farmers with larger herds reported slightly higher production per cow than did those with small herds. Although milk sales in 1982 averaged 1,253,000 pounds per farm, there were large differences among regions, reflecting differences in average

Figure 1. Location of dairy farms in 1983 survey



Mountain Region
105 farms

Piedmont Region
292 farms

Coastal Plain Region
23 farms

Sample total, 420 farms

Table 1. Number of farms reporting, by region and size of herd

Herd size	State total		Region					
			Mountain		Piedmont		Coastal Plain	
	Farms reporting	Ave. no. cows	Farms reporting	Ave. no. cows	Farms reporting	Ave. no. cows	Farms reporting	Ave. no. cows
Less than 50 cows:								
Less than 30	19	24.7	6	24.2	13	24.9	0	0
30-39	26	34.8	16	35.5	10	33.7	0	0
40-49	36	43.8	12	43.2	24	44.1	0	0
Subtotal	81	36.4	34	36.2	47	36.6	0	0
50 to 79 cows:								
50-59	47	52.7	16	52.2	29	53.0	2	52.5
60-69	50	63.7	11	63.0	39	63.9	0	0
70-79	45	73.0	12	73.4	27	72.7	6	73.8
Subtotal	142	63.0	39	61.8	95	63.1	8	68.5
80 to 109 cows:								
80-89	34	82.1	4	80.0	28	82.2	2	85.0
90-99	26	92.8	2	96.0	23	92.6	1	91.0
100-109	27	103.0	3	102.0	21	103.1	3	103.3
Subtotal	87	91.8	9	90.9	72	91.6	6	95.2
110 to 139 cows:								
110-119	17	114.0	3	112.7	12	114.6	2	112.5
120-129	25	124.4	8	123.6	17	124.8	0	0
130-139	11	132.9	1	137.0	9	132.8	1	130.0
Subtotal	53	122.8	12	122.0	38	123.4	3	118.3
140 cows or more:								
140-149	7	144.9	3	145.7	3	144.0	1	145.0
150-199	20	169.3	3	172.0	17	168.8	0	0
200-249	18	213.2	3	204.7	14	212.7	1	245.0
250+	12	348.6	2	425.0	6	329.5	4	339.0
Subtotal	57	217.9	11	219.7	40	206.4	6	291.0
All Farms	420	92.41	105	79.4	292	93.3	23	140.0

Table 2. Percentage distribution of sample farms by region and size of herd

Herd size	State	Region		
		Mountain	Piedmont	Coastal Plain
		(percent)		
Less than 50 cows:				
Less than 30	4.5	5.7	4.5	0
30-39	6.2	15.2	3.4	0
40-49	8.6	11.4	8.2	0
Subtotal	19.3	32.3	16.1	0
50 to 79 cows:				
50-59	11.2	15.2	9.9	8.7
60-69	11.9	10.5	13.4	0.0
70-79	10.7	11.4	9.2	26.1
Subtotal	33.8	37.1	32.5	34.8
80 to 109 cows:				
80-89	8.1	3.8	9.6	8.7
90-99	6.2	1.9	7.9	4.3
100-109	6.4	2.9	7.2	13.1
Subtotal	20.7	8.6	24.7	26.1
110 to 139 cows:				
110-119	4.0	2.9	4.1	8.7
120-129	5.9	7.6	5.8	0.0
130-139	2.6	1.0	3.1	4.3
Subtotal	12.5	11.5	13.0	13.0
140 cows or more:				
140-149	1.7	2.9	1.0	4.3
150-199	4.8	2.9	5.8	0.0
200-249	4.3	2.9	4.8	4.3
250+	2.9	1.8	2.1	17.5
Subtotal	13.7	10.5	13.7	26.1
All farms	100.0	100.0	100.0	100.0

Table 3. Milk production, sales and farm acreage, by size of herd

Item	Units	State total	Size of herd				
			Less than 50 cows	50 - 79 cows	80 - 109 cows	110 - 139 cows	140 cows or more
Number of farms	(No.)	420	81	142	87	53	57
Average number of cows	(No.)	92.4	36.4	63.0	91.8	122.8	217.9
Milk production per cow	(lbs.)	14,596	13,269	14,387	14,982	15,645	15,140
Milk sold, 1982	(thous. lbs.)	1,253	465	820	1,205	1,720	2,978
Acreage per farm:							
Owned	(acres)	221.2	140.7	175.5	228.7	268.8	391.1
Rented in	(acres)	170.7	102.9	128.2	158.7	209.0	352.1
Rented out	(acres)	.9	.4	1.7	.1	.8	1.3
Total	(acres)	391.0	243.2	302.0	387.3	477.0	741.9
Percent acreage rented	(%)	43.4	42.2	42.0	41.0	43.7	47.3
Acreage per cow							
Owned	(acres)	2.39	3.87	2.79	2.49	2.19	1.79
Total	(acres)	4.25	6.70	4.85	4.12	3.90	3.42

herd size. In the Mountain region milk sales averaged 1,026,200 pounds. In the Piedmont, the average was 1,294,200, and in the Coastal Plain average milk sales were 2,063,300 pounds per farm.

Land Ownership

The average dairy farm consisted of 393 acres, of which 221 acres were owned and 170 acres rented in. Twenty-seven operators rented their entire farms. Insignificant amounts of land were reported rented out to others by 6 of the 420 farms. As in the case of size of herd, there were substantial farm size differences among regions. Mountain farms averaged 322 acres, Piedmont farms averaged 402 acres and Coastal Plain farms averaged 530 acres. Farmland per cow ranged from 3.9 acres in the Coastal Plain to 4.3 cows in the Piedmont, or an average of 4.2 acres for all farms reporting. Farmers with smaller herds reported more land per cow than did those with larger herds, with the range from 6.7 acres to 3.4 acres per cow.

Land was rented in by all but 14 percent of the farms reporting. Land rented averaged 43 percent of all land farmed. Seven percent rented the entire farm and another 79 percent rented land to add to the acreage owned (Table 4). The amount of land rented seemed to have little relationship to the number of acres owned or to the size of dairy herd, but it is clear that North Carolina dairy farmers rely heavily on land owned by others. Of those that rented in land, roughly 30 percent rented less than 100 acres, 31 percent rented 100-199 acres and 39 percent rented more than 200 acres.

Farm Ownership

More than half the dairy farmers surveyed were sole proprietors (Table 5). Family partnerships between father and son or husband and wife accounted for 36 percent of the farms. Family corporations were reported on 8 percent of the farms. Sole proprietorship was most common (71 percent) among operators of the smaller herds. Family partnerships and family corporations were more common among the larger farms. Only one nonfamily corporation was reported.

Table 4. Relation of land rented to acreage owned

Acreage owned	State total	Farms renting	Acres rented in			
			1-99	100-199	200-299	300 or more
(acres)	(percent)		(percent of farms renting)			
None	6.5	100.0	18.5	40.7	18.5	22.3
1 - 99	17.4	90.2	24.6	36.9	23.1	15.4
100 - 199	30.4	87.4	34.5	30.0	18.2	17.3
200 - 299	22.0	75.9	34.8	31.9	14.5	18.8
300 or more	23.7	84.8	27.7	26.5	15.7	30.1
Total	100.0	85.8	29.8	31.6	18.1	20.5

Table 5. Farm proprietorship, by size of herd

Size of herd	Ownership arrangement				State total
	Individual	Family partnership	Family corporation	Other	
	(percent of farms)				
Less than 50 cows	69.6	25.3	0	5.1	100.0
50 - 79 cows	54.0	37.3	6.5	2.2	100.0
80 - 109 cows	45.3	44.2	10.5	0	100.0
110 - 139 cows	54.7	28.3	17.0	0	100.0
140 cows or more	38.6	43.9	14.0	3.5	100.0
State total	53.1	36.2	8.5	2.2	100.0

SOURCES OF INCOME

Total Farm Sales

The distribution of total farm sales in 1982 is reported in Table 6. The largest proportion of farmers reported sales between $75,000 and $149,000, with the second largest group reporting $150,000 to $299,000. Total farm sales were directly related to size of dairy herd. More than half the operators with herds of less than 50 cows reported sales under $75,000. Few farmers with herds of 140 or more cows reported sales less than $300,000.

Income from Dairying

Dairy farms in North Carolina are highly specialized. Three out of four farms in the survey sample reported that 90 percent or more of total farm sales came from the dairy enterprise. For the state as a whole, only one in twenty farms reported less than 70 percent of all farm sales from the dairy enterprise, but one in five Coastal Plain farmers were in this category.

One-third of the farms having less than 50 cows reported that non-dairy sales supplied more than 10 percent of gross income. Tobacco was produced on 24 percent of the Coastal Plain farms and on 22 percent of the Mountain farms but on less than 8 percent of the Piedmont dairy farms. Soybeans were produced on 44 percent of the Coastal Plain farms, 20 percent of the Piedmont farms, and 10 percent of the Mountain farms. Small grain sales were reported by one-third of the Coastal Plain farmers. Corn was sold by one-fifth of the Piedmont and Coastal Plain farmers, but few Mountain farmers. Beef cattle production was reported by fewer than one farmer in ten in each region of the state.

Nonfarm Income

Two-thirds of the dairy farmers in the sample reported no income from nonfarm sources in 1982. Eighteen percent reported less than $5,000 of nonfarm income, 12 percent reported $5,000-$20,000 and 5 percent reported nonfarm income over $20,000. Herd size had little influence on the amount of nonfarm income reported, but regional

Table 6. Sources of income, by size of herd

Item	State total	Size of herd				
		Less than 50 cows	50 to 79 cows	80 to 109 cows	110 to 139 cows	140 cows or more
		(percent of farms)				
Total farm sales in 1982:						
Less than $75,000	14.4	53.8	10.1	1.2	2.0	0
$75,000 - 149,999	37.0	43.6	65.9	24.1	6.0	1.9
$150,000 - 299,999	32.2	2.6	21.0	68.7	62.0	20.4
$300,000 - 449,999	11.2	0	1.5	6.0	30.0	42.6
$450,000 or more	5.2	0	2.5	0	0	35.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Income from dairy enterprise:						
90 percent or more	76.6	65.4	78.4	81.2	77.4	80.7
80 - 89 percent	13.0	14.8	10.8	14.1	15.1	12.3
70 - 79 percent	5.6	9.9	3.6	3.5	7.6	5.3
Less than 70 percent	4.8	9.9	7.2	1.2	0	1.7
Total	100.0	100.0	100.0	100.0	100.0	100.0
Nonfarm income in 1982:						
None	65.2	63.0	66.7	67.1	58.8	67.9
Less than $5,000	17.6	13.6	17.4	22.4	17.6	17.0
$5,000 - 9,999	6.9	7.4	8.0	3.5	7.8	7.5
$10,000 - 14,999	2.7	4.9	.7	3.5	3.9	1.9
$15,000 - 19,999	2.7	4.9	1.4	1.2	5.9	1.9
$20,000 - 29,999	2.7	2.4	2.9	2.3	5.9	0
$30,000 or more	2.2	3.7	2.9	0	0	3.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

differences were important. Some 38 percent of the Piedmont farms reported receiving nonfarm income, compared with 32 percent in the Coastal Plain and 28 percent in the Mountain region.

OPERATOR CHARACTERISTICS

Age of Operator

One-third of the dairy farm operators were between 50 and 59 years of age (Table 7). Those under 40 made up 21 percent of the total with another 20 percent between the ages of 40 and 49. Those over 60 years of age represented one-fourth of the total. The average age of farm operator was 50. There were more small herd operators than large herd operators under the age of 40.

Experience

The largest group of dairymen (29 percent) had operated their present dairy units for 30 to 39 years. Each of the three experience groups, less than 10 years, 10 to 19 years, and 20 to 29 years, contained roughly 20 percent of the principal operators. The remaining 9 percent had operated the dairy unit for 40 years or more. A larger proportion of new operators (less than 10 years) were found on the smaller units.

Education

More than 80 percent of the operators in this survey had completed high school. Those who had continued beyond high school to receive technical training made up 9 percent of the total, whereas 27 percent were college graduates or had done some college work. Farms with the largest herds (140 cows or more) had both the largest proportion of operators who had not finished high school and of those who had done college-level work.

Financial Status

To provide insights into the equity position of North Carolina dairy farms in 1983, dairymen were asked to indicate what percent of the sale price of the dairy farm and dairy herd they would be able to retain if they were to sell the farm. The responses, which measure net worth of the operators, are shown in Table 8.

Table 7. Operator characteristics, by size of herd

Item	State total	Size of herd				
		Less than 50 cows	50 to 79 cows	80 to 109 cows	110 to 139 cows	140 cows or more
		(percent of farms)				
Age of operator:						
Under 40	21.3	23.7	23.0	24.1	15.4	14.8
40 - 49	19.8	17.1	20.1	24.1	23.1	13.0
50 - 59	33.4	35.5	31.7	24.1	34.6	48.1
60 and over	25.5	23.7	25.2	27.7	26.9	24.1
Total	100.0	100.0	100.0	100.0	100.0	100.0
Experience as principal operator:						
Less than 10	22.5	27.8	27.1	20.3	16.3	13.0
10 - 19	21.9	12.5	21.7	26.5	28.6	22.2
20 - 29	18.5	15.3	13.2	24.0	22.4	24.1
30 - 39	28.7	38.9	26.4	20.3	26.6	35.2
40 or more	8.4	5.5	11.6	8.9	6.1	5.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
Education of operator:						
Not high school graduate	18.2	18.1	16.4	24.4	15.1	15.8
High school graduate	45.5	49.4	52.9	40.7	43.4	31.6
High school & tech. training	8.7	5.2	9.3	8.1	9.4	12.3
Some college	15.3	15.6	10.7	16.3	20.8	19.3
College graduate	12.3	11.7	10.7	10.5	11.3	21.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 8. Owners' net worth, by size of herd

Net worth	State total		Size of herd				
	No. farms reporting	Percent	Less than 50 cows	50 - 79 cows	80 - 109 cows	110 - 139 cows	140 cows or more
			(percent of farms)				
100 percent debt-free	106	26.4	45.5	23.5	26.2	17.6	14.8
75 - 99 percent	118	29.4	22.1	39.7	23.8	29.4	22.2
50 - 74 percent	79	19.7	10.4	14.7	26.2	17.6	37.0
25 - 49 percent	44	10.9	6.5	10.3	10.7	15.8	14.8
Less than 25 percent	55	13.6	15.6	11.8	13.1	19.6	11.2
Total reporting	402	100.0	100.0	100.0	100.0	100.0	100.0

One-fourth of the farms are now free of debt. Another 30 percent of the farm operators reported they would be able to retain between 75 and 99 percent of the sales value of the farm and herd. At the other extreme, 14 percent replied they would be able to retain less than 25 percent of the present value of the farm and herd. The largest proportion of debt-free herds were those with less than 50 cows. As herd size increased, the proportion free of debt decreased from 46 to 15 percent.

MILK PRODUCTION

Milking Facility

Milking parlors were used on 78 percent of the dairy farms in the sample. Herringbone parlors were reported on 47 percent of the farms, with side-opening or walk-through parlors used on 17 and 14 percent, respectively. Stanchion barns were used for milking on 21 percent of the farms, with pipelines installed on 18 percent and bucket systems used on less than 3 percent of all farms (Table 9).

The type of milking facilty used varied with size of herd. Pipeline milkers were reported by 30 percent of the operators with fewer than 50 cows and 28 percent of those with herds of 50 to 79 cows but were much less common on farms with larger herds. Nearly all bucket milking units were reported for herds with fewer than 50 cows. Herringbone milking parlors were found on less than 20 percent of the farms with the smallest herds, but use increased rapidly with herd size, reaching over 75 percent on farms with herds of 110 or more cows. Side-opening parlors were most common for herds in the middle of the size range. Walk-through parlors were most common among the small herds, but were used less frequently as herd size increased.

Milking Equipment

Milking parlor equipment varied with type of milking facility. In general, herringbone parlors were equipped with more mechanized equipment than other types of milking facilities. Two-thirds included mechanized feeders and one-fifth had power gates and automatic milker detachers. Mechanized feeders were employed on nearly half of all farms. Power gates and doors were reported by 23 percent of the farmers. Milker units equipped with automatic detachers were used on 17 percent of the herds. Other parlor equipment included crowd gates (12 percent), individual washing facilities (11 percent) and power feed gate covers (1 percent). Thirty-three percent of all farms reporting had none of these items of equipment.

The average capacity of bulk milk storage tanks was 1,171 gallons, with Mountain farmers reporting 892 gallons and Piedmont operators'

Table 9. Type of milking facility and mechanized parlor equipment

Item	All farms reporting	Milking parlor			Stanchion barn		Other
		Herringbone	Side-opening	Walk-through	Pipeline	Bucket	
		(number of farms)					
Farms reporting:							
Number	417	196	71	56	76	12	6
		(percent of farms)					
Percent	100.0	47.0	17.0	13.5	18.2	2.9	1.4
Size of herd:							
Less than 50 cows	100.0	17.5	15.0	23.7	30.0	13.8	0
50 - 79 cows	100.0	33.1	22.5	14.8	28.2	0.7	0.7
80 - 109 cows	100.0	60.9	16.2	9.2	10.3	0	3.4
110 - 139 cows	100.0	75.5	15.1	7.5	1.9	0	0
140 cows or more	100.0	77.2	8.8	7.0	3.5	0	3.5
Milking parlor equipment:							
Mechanized feeders	48.2	66.7	43.9	44.2	7.6	0	50.0
Power gates	23.1	32.8	24.2	7.7	1.5	0	100.0
Automatic detachers	17.4	25.5	13.6	9.6	0	0	83.3
Crowd gates	12.0	18.8	12.1	3.9	0	0	50.0
Individual wash	11.5	8.3	9.1	17.3	18.2	12.5	16.7
Group wash	2.1	2.6	3.0	1.9	0	0	0
Power feed gate covers	1.0	1.0	3.0	0	0	0	16.7
Other	.8	1.0	1.5	1.9	0	0	0
None of above	32.8	13.5	42.4	36.5	72.7	87.5	0

farms reporting 1,215 gallons. Larger herds in the Coastal Plain are reflected in the average bulk milk storage capacity of 1,814 gallons for that region.

Housing

Free-stall housing was the most common type, reported by 72 percent of all farmers. Loafing barns were used on 30 percent of the farms, whereas only 8 percent of all respondents reported stanchion barns used for housing. Enclosed or partially enclosed free-stall housing was most common in the Mountain region with roofed free-stall and loafing barns more common in the Coastal Plain. Since some farms have more than one type of housing, those with a single structure and those with two or more are shown separately (Table 10).

Manure-Handling System

Four out of five dairy farms were equipped with a manure spreader and front end loader. Earthen liquid manure storage tanks were in use on 14 percent of these farms. An additional 6 percent reported steel or concrete storage tanks. Mechanical alley scrapers were used on 9 percent of the farms and anaerobic lagoons on 6 percent of the farms. Flush systems were reported on seven farms, irrigation systems using liquid manure on six farms, liquid-solid separation of manure on three farms and slotted floors on one farm. Seven farmers reported none of the above items of equipment (Table 11).

Table 10. Types of dairy barns reported

Type of barn	Farms with single structure	Farms with two or more structures			
		Free-stall	Loafing barn	Stanchion barn	Total
	(number of farms)				
Free-stall barns:					
Partially enclosed	127	8	10	5	23[a]
Fully enclosed	55	12	9	6	27[b]
Roofed only	39	1	5	4	10[c]
Subtotal	221	21	24	15	60
Loafing barn	85	-	-	5	5[d]
Stanchion barn	18	-	-	-	0
Total reporting	324	21	24	20	65
	(percent of farms)				
Free-stall barns:					
Partially enclosed	32.0	2.0	2.6	1.3	5.9
Fully enclosed	14.2	3.1	2.3	1.5	6.9
Roofed only	10.0	.3	1.3	1.0	2.6
Subtotal	56.8	5.4	6.2	3.8	15.4
Loafing barn	21.9	-	-	1.3	1.3
Stanchion barn	4.6	-	-	-	-
Total reporting	83.3	5.4	6.2	5.2	16.7

Note: Excludes 31 farms with no dairy barn reported.

[a] Includes one farm reporting three barns (1 loafing barn).

[b] Includes three farms reporting three barns (2 free-stall and 1 loafing barn).

[c] Includes one farm reporting three barns (1 stanchion barn).

[d] Includes three farms reporting three barns (3 loafing barns).

Table 11. Manure handling equipment, by region

Type of equipment	State total		Region					
			Mountain		Piedmont		Coastal Plain	
	No. farms reporting	Percent	No. farms reporting	Percent	No. farms reporting	Percent	No. farms reporting	Percent
Manure spreader	337	80.8	85	81.7	236	81.4	16	69.6
Front end loader	331	79.4	84	80.8	228	78.6	19	82.6
Earth liquid tank	59	14.1	17	16.3	41	14.1	1	4.3
Steel liquid tank	25	6.0	3	2.9	18	6.2	4	17.4
Mech. alley scraper	37	8.9	5	4.8	31	10.7	1	4.3
Anaerobic lagoon	23	5.5	5	4.8	18	6.2	0	0
Liquid solid separation	2	0.5	1	1.0	1	0.3	0	0
Irrigation system	6	1.4	1	1.0	5	1.7	0	0
Flush system	7	1.7	2	1.9	5	1.7	0	0
Slotted floors	1	0.2	1	1.0	0	0	0	0
None of above	7	1.7	3	2.9	3	1.0	1	4.3
Total reporting	417	100.0	104	100.0	290	100.0	23	100.0

ROUGHAGE PRODUCTION

Land Use

The average dairy farm for which land use information was provided consisted of 208 acres used for cropland, 93 acres used for pasture and 63 acres of woodland, orchards and other uses, totalling 365 acres per farm. There were marked differences in farm size across regions, with Mountain farmers operating an average of 312 acres, Piedmont farms 400 acres, and Coastal Plain farms 504 acres (Table 12).

The cropland-pasture mix changed moderately between regions. In the Mountain region pasture represented 42 percent and cropland 33 percent of the average farm. In the Piedmont these proportions changed to 20 percent pasture and 58 percent cropland. In the Coastal Plain, pasture was 15 percent while cropland made up 70 percent of the average farm. Farms in each region with larger herds reported relatively less pasture.

Grazing

Permanent pasture for the dairy herd was reported on 85 percent of the sample farms, with 12 percent reporting small grain used for grazing. Average acreages on the farms reporting use of grazing land are reported in Table 13 by crop type. An average of 64 acres of land was used for grazing by the dairy herd on the sample farms reporting. Eleven percent reported no grazing land used. Permanent pastures were smaller and more small grains were pastured in the Coastal Plain.

Hay Production

An average of 54 acres of hay was harvested for feeding the dairy herd on 87 percent of the sample farms. Grasses were most commonly used for hay, followed by legumes, small grains, and sorghums (Table 13).

Three-fourths of these farms used small bale harvesting methods. Large bales were used on one-third of the farms. Field stackers were employed on less than 3 percent of the farms. No hay making was reported on 8 percent of the farms.

Table 12. Major land use, by region and size of herd

Region and size of herd	Land Use			
	Cropland	Pasture	Other[a]	Total
	(acres)			
Mountain:				
Less than 50 cows	46.8	96.3	67.8	210.9
50 - 79 cows	88.3	106.5	61.2	256.0
80 - 109 cows	125.3	181.7	99.2	406.2
110 - 139 cows	161.5	287.5	142.9	591.9
140 cows or more	249.1	145.9	67.9	462.9
Total	104.4	131.8	75.7	311.9
Piedmont:				
Less than 50 cows	116.3	67.6	55.3	239.2
50 - 79 cows	165.2	61.6	66.3	293.1
80 - 109 cows	229.7	72.4	93.2	395.3
110 - 139 cows	274.8	83.5	78.5	436.8
140 cows or more	482.7	156.8	167.3	806.8
Total	231.9	81.2	86.4	399.5
Coastal Plain:				
Less than 50 cows	None	-	-	-
50 - 79 cows	403.6	70.0	75.7	549.3
80 - 109 cows	214.4	64.0	74.0	352.4
110 - 139 cows	211.6	55.0	190.0	456.6
140 cows or more	484.2	106.7	61.7	652.6
Total	354.1	78.0	76.8	508.9
State total	208.1	93.1	63.4	364.6

[a]Includes orchards, woodland, roads, etc.

Table 13. Forage crops produced in 1982

Type of forage	Farms not producing (percent)	Farms reporting production	
		Percent producing (percent)	Acres per farm (acres)
Grazing for dairy herd:			
Perm. pasture	14.7	85.3	56.1
Small grains	88.4	11.6	32.5
Soybeans	94.7	5.3	22.7
Other	97.8	2.2	25.5
Total	11.1	89.9	64.0
Hay harvested:			
Grasses	36.6	63.4	38.5
Legumes	60.2	39.8	24.1
Small grains	71.3	28.7	25.1
Soybeans	83.9	16.1	23.3
Other	93.0	7.0	28.0
Total	12.8	87.2	53.8
Silage or green chop:			
Corn	6.8	93.2	93.3
Small grains	53.9	46.1	53.2
Sorghums	66.9	33.1	35.2
Legumes	79.7	20.3	33.8
Other	92.5	7.5	60.1
Total	5.1	94.9	143.5

Silage Production

An average of 144 acres of silage and green chop were grown on 95 percent of these farms. Corn silage was by far the most important, averaging 94 acres on 93 percent of the farms, followed by small grains (on 46 percent), sorghums (on 33 percent), and legumes (on 20 percent) (see Table 13).

The most common system of silage storage was trench or pit silos, reported by nearly two out of three dairymen. These were much less common in the Coastal Plain, however. Nearly half of all farms reported regular upright silos, and 6 percent reported use of upright, oxygen-limiting silos. Bunker silos were in use on 13 percent of these farms, and 7 percent used silage stacks without sides. Two farms reported using sealed plastic bag silos. Some farms used more than one type of storage facility, but only eight farms reported they had no silage storage facilities (Table 14).

Silage and Hay Purchases

Less than 2 percent of the silage fed on these farms was purchased from other farmers. However, more than 10 percent of the hay fed was bought from other growers (Table 15). In the Coastal Plain, farmers reported purchase of 20 percent of all hay fed the dairy herd. Silage purchase was most common in the Mountain region.

Table 14. Type of silage storage, by region

Type of storage	State total		Region					
			Mountain		Piedmont		Coastal Plain	
	No. of farms	Percent	No. of farms	Percent	No. of farms	Percent	No. of farms	Percent
Flat storage:								
Trench or pit	257	62.7	73	71.6	179	62.6	5	22.7
Bunker silo	55	13.4	20	19.6	29	10.1	6	27.3
Stack (no sides)	29	7.0	6	5.9	19	6.6	4	18.2
Sealed plastic bag	2	.5	0	0	2	.7	0	0
Upright silos:								
Regular	191	46.6	24	23.6	154	53.8	13	59.1
Oxygen-limiting	26	6.3	2	2.0	21	7.3	3	13.6
No silage storage:	11	2.7	2	2.0	7	2.4	2	9.1
Total farms reporting	410	-	102	-	286	-	22	-

Table 15. Source of roughage supply, by region

Roughage	State total	Region		
		Mountain	Piedmont	Coastal Plain
		(tons per farm)		
Silage:				
Produced	1,371	861	1,511	2,110
Purchased	21	41	13	74
Total	1,392	902	1,524	2,184
Hay:				
Produced	162	138	144	503
Purchased	20	12	15	138
Total	182	150	159	641

FEEDING SYSTEMS

Concentrates Fed

Commercial concentrate mixtures were fed on 359 of 365 reporting farms. An average of 218 tons was purchased in 1982. An average of 38 tons of protein supplements, such as soybean or cottonseed meal was purchased. An additional 27 tons of low-protein feeds, including grains and by-products such as molasses, were purchased in 1982. Feeding of home-grown grains averaged 81 tons per farm, making a total of 362 tons of concentrate feedstuffs fed per farm in 1982 (Table 16).

On half the farms concentrates were fed at milking time only. On 36 percent of the farms, part of the concentrate ration was fed at milking time and the balance was mixed with other feeds. A complete blended ration was fed on 9 percent of the farms (Table 17).

The method of feeding concentrates varied with herd size. On farms with less than 50 cows, 79 percent fed concentrates only at time of milking. Concentrates were also mixed with roughage on 46 percent of the farms with largest herds. A complete blended ration was used on 35 percent of the farms with herds with 140 or more cows.

Feed-Handling Equipment

Upright silo unloaders were used on 45 percent of the farms but were less common on small farms (Table 18). Front-end loaders were used in horizontal silos on two-thirds of the farms. On three large farms mechanical unloaders for horizontal silos were reported. Mechanized hay-feeding equipment was reported on only six farms, 1 percent of the total.

Feed milling and mixing equipment was reported by 27 percent of the farmers in the sample. Feed wagons equipped with auger mixers were used on 18 percent of the farms. Stationary feed mixers were used on 4 percent of the farms. All of these items were reported most frequently by large herd operators.

Self-unloading wagons were used for feeding the herd on 23 percent of the farms. Feed bunks equipped with mechanical conveyor systems were reported by 22 percent of all farmers. Individual magnetically controlled concentrate feeders were in use on 7 percent of the sample farms.

Table 16. Source of concentrate supply, by region

Source	State total	Region		
		Mountain	Piedmont	Coastal Plain
		(tons per farm)		
Purchases:				
Commercial mix	207.0	230.94	188.87	339.94
Protein supplements	38.9	20.60	42.80	76.83
Low-protein foods	28.5	6.99	37.43	15.00
Home-grown grain	79.8	15.57	98.62	143.05
Total tons fed	354.2	247.10	367.72	574.82

Table 17. Concentrate feeding system, by size of herd

Method of feeding	State total	Size of herd				
		Less than 50 cows	50-79 cows	80-109 cows	110-139 cows	140 or more
		(percent of farms)				
Fed only at milking:	50.4	78.8	63.6	37.7	28.3	17.5
Part fed at milking:						
Bal. w. roughage	36.4	17.5	28.6	45.9	60.4	45.6
Bal. separate from roughage	2.9	1.2	3.6	2.3	5.7	1.8
None fed at milking:						
Complete blended ration	9.2	1.2	2.8	11.8	5.7	35.1
Separate roughage concentrate feeding	1.1	1.2	1.4	2.3	0	0

Table 18. Feed-handling equipment, by size of herd

Type of equipment	State total	Size of herd				
		Less than 50 cows	50-79 cows	80-109 cows	110-119 cows	140 or more
		(percent of herd)				
Silo Unloading:						
Upright unloader	44.6	22.1	39.0	60.9	52.8	56.1
Horizontal silos:						
Front end loader	68.0	50.6	68.8	65.5	79.2	82.5
Unloader	.7	0	0	0	0	5.3
Feed Processing:						
Mixer-grinder	27.2	7.8	25.5	40.2	26.4	38.6
Auger mix wagon	17.8	1.3	9.2	25.3	22.6	45.6
Stationary mixer	3.9	0	.7	5.7	7.5	10.5
Feed Delivery:						
Self unload wagon	22.7	10.4	18.4	29.9	32.1	29.8
Mechanical feed bunker	21.7	11.7	14.5	31.0	24.5	35.1
Mechanical hay feeder	1.4	1.3	.7	0	1.9	5.3
Magnetic feeder	6.7	0	5.7	11.5	11.3	7.0
Other	2.9	5.2	2.9	2.3	3.8	0
None of the above	7.7	26.9	5.7	1.1	0	3.5

HERD MANAGEMENT

Herd Replacement

Eight out of ten cows and heifers in the current dairy herds were born and raised on that farm. Twenty percent were bought from other dairy farmers. Eleven percent of the replacements were purchased before freshening and the remaining 9 percent were purchased after freshening (Table 19). On Mountain dairy farms a slightly larger fraction of the animals were purchased before freshening (16 percent) and a smaller fraction (74 percent) were born and raised on the farm.

Herd Performance Testing

Dairy Herd Improvement (DHI) records were kept on 60 percent of these farms. Dairy Herd Improvement Association (DHIA) membership ranged from 36 percent of the smallest farms to 86 percent of the largest farms. The larger herds were more likely to use computer-processed records as a management tool. Other types of performance testing were in use on an additional 6 percent of the farms (Table 19).

Individual animal records of various types were kept on half of all farms. Less than 8 percent of the dairymen with small herds grouped cows by production level compared with over 20 percent of the largest herds.

Artificial Insemination

Artificial insemination was used in more than 75 percent of all matings on 60 percent of these farms. An additional 12 percent of the farms reported using artificial insemination in 51 to 75 percent of all matings. The remaining 28 percent of the farms used artificial insemination on less than half of all matings (Table 19).

Feed Controls

Forage quality testing on a regular basis was reported by 40 percent of the farmers. Again, the use of this practice was less frequent on small units (13 percent) than on farms with 80 or more cows, where over half reported testing forage on a regular basis.

Table 19. Management practices, by size of herd

Management practice	State total	Size of herd				
		Less than 50 cows	50-79 cows	80-109 cows	110-119 cows	140 or more
Herd replacements:			(percent of replacements)			
Born and raised on farm:	79.8	77.3	81.3	77.5	83.1	79.7
Purchased:						
Before freshening	11.6	15.2	10.2	11.0	10.6	12.5
After freshening	8.6	7.5	8.5	11.6	6.3	8.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Performance testing :			(percent of farms)			
Dairy herd improvement	59.9	36.4	49.3	69.4	77.4	86.0
Other	5.7	3.9	3.0	10.6	7.5	5.3
Individual animal records	50.9	51.9	47.0	57.6	49.1	50.9
Cows grouped by milk production level	8.4	7.8	3.7	5.9	11.3	21.1
Matings by artificial insemination:						
76 percent or more	60.8	55.8	58.2	64.7	66.0	63.2
51-75 percent	11.5	10.4	14.2	8.2	15.1	8.8
Forage quality testing	40.4	14.3	30.6	54.1	64.2	56.1
Relation formulation	31.3	7.8	26.1	43.5	39.6	49.1

Ration formulation on a regular basis was reported by 31 percent of all farms, ranging from 8 percent on the smallest units to 50 percent on the largest.

FUTURE DIRECTIONS

Adequacy of Present Facilities

Operators of the sample farms were asked to what extent they thought existing facilities would affect the future survival or growth of the dairy farm, either to expand or simply to stay in business. Responses to each question ranged from "Have an excellent system" to "Major problem area." The questions focused on the milking enterprise, on silage storage and handling, and on grain storage, mixing and feeding systems.

The major problem area identified by these dairymen was associated with their waste disposal system. Nearly one-fifth said this was a major problem and another one-third replied that it was a minor problem on their farm. Herd housing and holding facilities were a major problem area on less than 10 percent of these farms and a minor problem on another one-forth to one-third of the farms. Bulk milk storage capacity was mentioned as a minor problem area by 20 percent of the operators and a major problem for 6 percent (Table 20).

With respect to silage storage and handling, 19 percent reported silage handling to be a minor problem area and less than 4 percent indicated that silage storage capacity was a major problem. Even fewer dairymen reported that silage storage capacity was a problem.

Plans for New Facilities

To provide information on planned changes in operations over the next five years, four levels of response were provided for the same items described in the previous section. These responses included: a) plan to continue with the existing system making few or no alterations, b) plan to make major alterations in the existing system, c) plan to build a completely new system, and d) no plans to have the facilities listed.

As would be expected from the evaluations of present facilities, the largest number of farmers (12 percent) indicated that they plan to build a completely new waste disposal system (Table 21). Another 19 percent indicated that they plan to make major alterations in their present waste disposal systems. Major alterations in present housing and holding facilities are planned on 19 percent of these farms, with

Table 20. Operator evaluation of existing facilities

Type of facility	Have excellent system	Presents no problem	Minor problem area	Major problem area	Do not have or plan to have
		(percent of farms)			
Milk production:					
Housing/holding	12.5	38.5	37.9	8.9	2.2
Milking facilities	19.8	45.2	26.8	7.6	.6
Bulk milk storage	27.0	45.4	20.3	6.2	1.1
Waste disposal system	11.3	26.6	32.6	19.3	10.2
Silage storage capacity					
Horizontal	11.4	45.3	18.7	3.3	21.3
Upright, regular	7.7	30.6	12.2	2.6	46.9
Upright, oxygen limiting	4.3	8.7	1.4	1.1	84.5
Handling system	16.7	53.8	19.9	3.5	6.1
Concentrate system:					
Grain storage capacity	19.6	44.0	15.8	3.0	17.6
Feed mixing system	12.4	32.1	9.9	2.9	42.7
Conc. feeding system	12.5	50.8	17.7	2.2	16.8

Table 21. Operator plans for change

Type of facility	Continue existing system: Few or no alterations	Continue existing system: Major alterations	Build completely new system	Do not have or plan to have
	(percent of farms)			
Milk production:				
Housing/holding	69.2	19.2	5.7	5.9
Milking facilities	76.2	11.3	6.8	5.7
Bulk milk storage	76.4	12.4	5.2	6.0
Waste disposal system	55.7	18.6	12.1	13.6
Silage system:				
Horizontal silo cap.	63.0	9.0	4.2	23.8
Upright, regular cap.	42.5	3.8	0.7	53.0
Upright, airtight cap.	14.7	0.3	0.7	84.3
Handling system	78.9	8.8	2.6	9.7
Concentrate system:				
Grain storage cap.	64.8	8.1	2.4	24.7
Feed mixing system	52.4	6.0	2.6	39.0
Concentrate feeding system	69.0	7.7	2.9	20.4

another 6 percent planning completely new facilities. One farm in six planned to make major alterations in or build new milking facilities, and a similar number planned changes in bulk milk storage capacity.

Expansion of horizontal silo storage capacity by making major alterations was planned on 9 percent of the farms, and by installing completely new systems on another 4 percent. A similar number of farmers planned silage handling system changes. There was little interest in expanding upright silo capacity or in adding upright silos on farms currently without such structures.

Major alterations or completely new grain storage, feed mixing and concentrate handling systems were planned on one farm in ten.

Operator evaluations of existing milking facilities were related to the type of facilities presently in use, as shown in Table 22. Ratings given to herringbone parlors were much more favorable than those given to other types. More than 80 percent of the herringbone operators replied they have an excellent system or it presents no problem. Only 50 percent of those with side-opening or walk-through parlors or stanchion barns gave these favorable responses. Dairymen planning new milking facilities were concentrated in the group with stanchion barns, with fewer new facilities planned on farms with walk-through and side-opening systems.

Operator Plans for the Future

Several questions were posed concerning operator plans for the future as of January 1983. With regard to when the operator planned to cease being involved with the dairy unit, 42 percent responded they did not know. Of those who gave an approximate date, there were equal numbers who said within the next five years, between five and ten years from now, and more than ten years from now (Table 23). Responses were closely related to age of the principal operator. Forty-nine percent of those 60 or older plan to retire within 5 years.

When asked what the principal operator will do when giving up dairying, 35 percent replied that they plan to retire and 25 percent plan to remain in other farming activities. Less than 4 percent plan to seek off-farm work. One-third of the operators replied that they did not know at this time.

Table 22. Evaluation of existing milking facilities and plans for change, by present type of milking facilities

Item	All farms reporting	Milking parlor			Stanchion barn		Other
		Herringbone	Side-opening	Walk-through	Pipeline	Bucket	
	(number of farms)						
Existing facilities:							
Excellent system	70	50	8	5	1	1	5
Presents no problem	160	93	22	16	25	3	1
Minor problem area	95	28	19	20	26	2	0
Major problem area	27	3	9	4	9	2	0
Do not have	2	1	0	1	0	0	0
No response	64	22	13	10	15	4	0
Total	418	197	71	56	76	12	6
	(percent of farms reporting)						
Existing facilities:[a]							
Excellent system	19.9	28.7	13.8	11.1	1.6	12.5	83.3
Presents no problem	45.5	53.5	37.9	35.6	41.0	37.5	16.7
Minor problem area	27.0	16.1	32.8	44.4	42.6	25.0	0
Major problem area	7.6	1.7	15.5	8.9	14.8	25.0	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	(percent of farms reporting)						
Planned changes:[b]							
Few, none	76.2	88.1	62.6	65.2	58.7	100.0	100.0
Major alterations	11.3	5.7	19.6	19.6	15.9	0	0
New system	6.8	1.1	8.9	13.0	17.5	0	0
Do not plan to have	5.7	5.1	8.9	2.2	7.9	0	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a]Based on 352 responses to first four choices listed in Table 20.

[b]Based on 354 responses.

Table 23. Plans of principal owner to cease dairying

Plans of principal owner	Farms reporting		Age of operator (years)			
	Number (no.)	Percent (%)	Under 40	40 to 49	50 to 59	60 and older
			(percent of operators)			
Plans to cease dairying:						
Within 5 years	85	20.5	3.4	8.8	19.4	49.0
5 to 10 years	72	17.3	8.0	10.0	23.4	17.7
More than 10 years	83	20.0	35.6	27.5	21.0	2.9
Don't know	175	42.2	52.9	53.7	36.2	30.4
Total	415	100.0	100.0	100.0	100.0	100.0
Plans when no longer dairying:						
Retire	142	35.0	21.2	35.4	34.8	48.5
Remain in farming	103	25.4	15.3	24.1	28.9	30.3
Seek off-farm work	15	3.7	11.8	2.5	1.5	0
Don't know	146	35.9	51.7	38.0	34.8	21.2
Total	406	100.0	100.0	100.0	100.0	100.0

Questions were asked about plans for the disposition of the herd and disposition of the land. Half indicated the herd would be transferred to a member of the operator's family by sale, gift or other means. Another 13 percent said the herd would be sold to others. The remaining 37 percent responded they did not know what disposition would be made (Table 24). A larger proportion of farms held as family partnerships (58 percent) or family corporations (61 percent) planned to pass herds on to other family members than did those farms held by individual owners (46 percent).

Nearly half indicated they plan to retain ownership of the land when they retire. Transfer to other family members was planned by 32 percent of the operators, while only 2 percent planned to sell to other persons. Transfer of land to other family members was planned more often by operators now in family partnerships (38 percent) and family corporations (44 percent) than by those whose farms were owned individually (26 percent).

Table 24. Plans for disposal of herd and land

Plans for disposition	Farms reporting		Ownership status		
	Number	Percent	Individual owner	Family partnership	Family corporation
	(no.)	(%)	(percent of herds)		
Dairy herd:					
To family member	207	50.7	45.6	58.3	60.6
Sell to unrelated person	51	12.5	14.3	9.0	12.1
Don't know	150	36.8	40.1	32.7	27.3
Total	408	100.0	100.0	100.0	100.0
	(no.)	(%)	(percent of farms)		
Farm land:					
Retain ownership	193	47.2	50.2	45.6	38.2
To family member	130	31.8	26.1	38.1	44.1
Sell to unrelated person	6	1.5	.9	1.4	2.9
Don't know	80	19.5	22.8	14.9	14.8
Total	409	100.0	100.0	100.0	100.0

OPINIONS OF DAIRYMEN

Minimum Size of Herd

Dairymen were asked for their opinions about the minimum size herd needed for survival in dairying in the coming ten-year period. The responses to this question, together with the present size distribution of herds, are shown in Table 25. Although 19 percent of the herds in the sample contain fewer than 50 cows, only 8 percent of those responding felt herds of that size would be large enough to survive during the next ten years. Another 21 percent of the herds were in the 100-149 cow size, but 31 percent of the dairymen reported that this size would be needed for survival.

Opinions that larger sized herds are needed came from all three geographic regions. Nearly one-third of the Mountain herds currently contain less than 50 cows, but only 12 percent of the operators thought herds that small will be adequate. In the Mountain and Piedmont regions, herds of 50 to 99 cows were considered adequate by most producers, but in the Coastal Plain the most frequently recommended herd size was 100 to 149 cows. Only 2 percent of the Mountain and 4 percent of Piedmont dairymen thought herds of 200 or more cows would be needed, but in the Coastal Plain, one in six gave at least 200 cows as the minimum needed for survival.

Returns to Dairying

The dairymen were asked a series of questions concerning returns to dairying. When asked if their farms produced fair returns on their investments, the operators were about equally divided, with 45 percent checking Strongly Agree or Agree and 46 percent checking Disagree or Strongly Disagree (Table 26). When asked about their neighbors who are dairy farmers, 24 percent agreed and 40 percent disagreed that their neighbors received fair returns on their investments. However, more than one-third answered that they were uncertain about returns on neighboring farms.

Questions concerning difficulty in meeting family living expenses indicated that 31 percent of the operators currently are having such

Table 25. Comparison of present herd size with minimum size needed to survive in the next ten years, by region

Size of herd	State total		Region					
			Mountain		Piedmont		Coastal Plain	
	Present size	Minimum needed	Present size	Minimum needed	Present size	Minimum needed	Present size	Minimum needed
	(percent of farms)							
Less than 50	19.3	7.7	32.3	12.2	16.1	6.3	0	4.5
50 - 99 cows	48.1	47.4	42.8	56.1	50.0	46.3	47.8	22.7
100 - 149 cows	20.6	31.4	17.1	23.5	21.2	33.1	30.4	45.5
150 - 199 cows	4.8	8.2	2.9	6.1	5.8	8.8	0	9.1
200 - 299 cows	5.0	4.1	2.9	2.0	5.5	3.7	8.7	18.2
300 or more	2.2	1.3	2.0	0	1.4	1.8	13.1	0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 26. Opinions concerning returns to dairying

Statement	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
			(percent)		
1. My dairy farm produces a fair return on my investment	4.4	40.7	8.8	34.0	12.1
2. My neighbors who are dairy farmers receive a fair return on their investment	1.6	22.9	35.1	30.2	10.2
3. I am currently having difficulty meeting family living expenses	9.3	22.2	8.2	48.7	11.6
4. In the future, I expect to have difficulty meeting family living expenses	5.5	16.6	29.1	38.4	10.4
5. My farm will be debt free by the time I retire	20.8	34.9	26.3	12.3	5.7

difficulty, but this dropped to 22 percent when asked about expected difficulty in meeting these expenses in the future.

Over half of all respondents agreed or expressed strong agreement that their farm be debt-free by the time the present operator retires. Less than 20 percent expressed disagreement with the statement that their farm would be debt-free at that time. Farms with less than 80 cows were believed more likely to be debt-free (63 percent), and farms with larger herds were thought less likely to be debt-free when the operator retires.

Comparison with Other Enterprises

The participating dairymen were equally divided on the question of whether operating a dairy farm outside a major production area of the state increases the likelihood of failure (Table 27). Forty-two percent of the dairymen believed farms with only a dairy unit are more successful than farms with cash crops or other livestock, but 32 percent disagreed. More dairymen in the Coastal Plain disagreed with these statements, reflecting the fact that dairy farms in that region are more widely scattered and have more income from nondairy enterprises than do farms in the rest of the state.

When asked about future milk production within their home counties, 40 percent agreed and 26 percent disagreed that the amounts will increase. In the Coastal Plain, 46 percent disagreed that production will expand as compared with 24 percent in the Piedmont. That milk production is less likely to expand in the eastern part of the state is indicated by these responses.

There was general agreement with the statement that it is easier to borrow money to expand the dairy enterprises than either crop or other livestock enterprises. There was strong disagreement with the statement that neighbors who are crop farmers make higher returns on their investment than do neighbors who are dairy farmers.

The general tone of these responses in January 1983 was one of optimism for future growth of the dairy industry and general satisfaction with the rate of return they were receiving from their dairy enterprises as compared with other livestock or cash crop alternatives. Recent milk

Table 27. Opinions comparing dairying with other farm enterprises

Statement	Strongly agree	Agree	Uncertain	Disagree	Strongly disagree
			(percent)		
1. Having a dairy farm outside a major production area of the state increases the liklihood of failure	4.8	30.1	32.5	28.8	3.8
2. Milk production within my county will increase in the future	6.1	33.7	33.7	19.2	7.3
3. Farms with only a dairy unit are more successful than farms with cash crops and other livestock	9.5	32.1	26.4	28.7	3.3
4. It is easier to borrow money to expand the dairy than crop enterprises	8.9	48.7	31.5	8.0	2.9
5. It is easier to borrow money to expand the dairy than other livestock enterprises	7.5	47.5	34.4	9.3	1.3
6. My neighbors who are crop farmers make a higher return on their investment than my neighbors who are dairy farmers	1.3	9.6	39.1	40.1	9.9

prices and the new Milk Diversion Program may well have brought about changes in the attitudes of these dairymen since early 1983.

SUMMARY

This description of North Carolina dairy farming is based on information received in response to a mail inquiry conducted in January 1983. The 420 individuals who were producing milk reported substantial increases in herd size between 1978 and 1983 (19 percent) and planned further increases of 8 percent over the coming five-year period.

The average size of herd in January 1983 was 79 cows in the Mountain region, 93 cows in the Piedmont and 140 cows in the Coastal Plain. The state average for this sample of farms was 92 cows. Milk production in 1982 averaged 14,596 pounds per cow. Milk sales averaged 1,253,000 pounds per farm, ranging from 1,005,000 in the Mountain region to 2,023,000 in the Coastal Plain.

Land operated per farm also increased from west to east. The state average was 391 acres, of which 221 acres were owned and 170 acres rented in. Land was rented by 86 percent of these farmers, and averaged 43 percent of all land farmed. Mountain farms averaged 331 acres, Piedmont farms averaged 404 acres, and Coastal Plain farms averaged 581 acres in size. Acreage per cow averaged 4.2 acres, with very small differences among regions.

Total farm sales between $75,000 and $149,999 were reported by 37 percent of the farms, and another 32 percent reported sales between $150,000 and $299,999. Dairying provided more than 90 percent of total farm sales on three out of four farms, reflecting a high degree of specialization on the North Carolina dairy farms surveyed. Two-thirds of the farms had no nonfarm income, whereas 18 percent reported receiving less than $5,000 nonfarm income.

More than half the farms were operated as sole proprietorships, with another 38 percent operated as family partnerships. The average operator was 50 years old and had 22 years of experience managing the present unit. About 80 percent of the operators had completed high school and 38 percent had obtained additional education in a technical school or college. One-fourth of the operators are now debt-free, and another 29 percent reported net worth of more than 75 percent. However, 14 percent replied that they would be able to retain less than 25 percent of the sale value of the farm if they were to sell.

Roughly equal numbers of the dairymen indicated they planned to retire within the next 5 years, between 5 and 10 years and later than 10 years from the time of the survey. However, four out of ten said they did not know when they would retire or had no plans at this time. The majority of those responding indicated that the farm and herd would be transferred to another member of the family upon retirement.

Milking parlors were used on 78 percent of these farms. Herringbone parlors were found on half of all farms, with smaller numbers using side-opening and walk-through parlors. Stanchion barns with pipeline milking systems were used on 18 percent, and bucket milkers were used on less than 3 percent of these farms. Milking parlor equipment included mechanized feeders (48 percent), power gates and doors (23 percent), milkers with automatic detachers (17 percent), crowd gates (12 percent) and individual washing facilities (11 percent).

Free-stall housing was reported by 62 percent of the farms. The manure-handling system reported on 81 percent of all farms consisted of a manure spreader and front end loader. Liquid manure storage tanks were used on 20 percent of the farms. Smaller numbers reported mechanical alley scrapers, anaerobic lagoons, flush systems and irrigation systems.

An average of 64 acres of grazing land for the dairy herd was reported by nine out of ten farms. This was largely permanent pasture, with small acreages of supplemental pasture in small grains, soybeans and other crops. An average of 54 acres of hay was harvested for the dairy herd, with grass the most common hay crop, followed by legumes and small grains. Three out of four farms were using small bale harvesting methods. The use of large bales was reported by one-third of the farms. Of the average 144 acres used for silage production reported on all but 5 percent of the farms, 93 were in corn silage, with the remainder in small grains, soybeans and legumes. Supplemental hay purchases were made by ten percent of the farmers, but very few purchased silage.

Trench silos were the most common type in use, found on two out of three farms, but one in two dairymen reported upright silos. Silage handling equipment included unloaders in upright silos on 45 percent of the farms, and front end loaders for horizontal silos on two-thirds of the farms. Little mechanized hay feeding equipment was reported

Self-unloading wagons and feed bunks with mechanical conveyors were used on less than one-fourth of these farms.

Eighty percent of the operators raised all of their replacements from calves born on the farm. DHIA membership was reported by 60 percent of the dairymen. Artificial insemination was used for more than 75 percent of the matings on 60 percent of the farms and for 51 to 75 percent of the matings on another 12 percent of the farms. Forage quality testing was employed on a regular basis by 40 percent of the dairymen surveyed. Ration formulation was done regularly on 31 percent of the farms.

When asked about the adequacy of present facilities, the major problem area mentioned was the waste disposal system. Nearly one-fifth identified waste disposal as a major problem, while another one-third cited it as a minor problem area. Less than one-fifth of the operators with herringbone parlors but half of those with other types of milking facilities reported milking facilities as a problem area. Herd housing and herd-holding facilities were mentioned as major problems by 9 percent. Silage storage and handling was a minor problem area for 20 percent of the farms, a major problem for less than 4 percent.

Plans for new facilities reflect the problem areas reported above. About 19 percent of the operators plan major alterations in their present waste-handling systems, and another 12 percent plan completely new systems. Major housing and holding facility alterations were planned on 19 percent of the farms, and completely new facilities on another 6 percent.

Most producers felt that dairy farms must become larger to survive in the coming 10 years. The general tone of the responses was one of optimism about the future of the dairy industry. Most expressed general satisfaction with the present rate of return to milk production as compared with other farm enterprises. Recent milk prices and the new Milk Diversion Program may well have brought about changes in the attitudes of these dairymen since early 1983.

Agricultural Research Service

North Carolina State University
at Raleigh

D. F. Bateman, Director of Research