CIR1049

UNIVERSITY OF FLORIDA
IFAS EXTENSION

Forage Production Practices by Dairy Producers in the Suwannee Valley [1]

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The information in this publication was obtained through a survey taken by personal interview. Forty-eight dairies located in Lafayette, Suwannee, Columbia, Hamilton, and Gilchrist counties agreed to participate. The purpose of the survey was to obtain information on the current practices of production and purchasing of forages in the Suwannee River Valley.

Background of the dairies

1. With the exception of Lafayette county, which contains the most and the oldest dairies, the dairy industry is a relatively new one to the Suwannee River Valley. Individuals from both south Florida and the northern U.S. are initiators of these dairies. (Table 1)

2. With the exception of the one farm in Gilchrist county, the average farm has 396 cows. The number of cows included in the survey totaled 18,592. According to the Dairy Summary of Florida Agricultural Statistics, there are 25,215 cows in these five counties. Most of the "missing" cows were in Gilchrist county and further away from the Suwannee River. (Table 2)

3. Fifty-five percent of the dairies (26 out of 47) raised some of their own replacement heifers with the average number of heifers per farm at 95 with the exception of the farm in Gilchrist. (Table 3)

4. The anticipated costs of having to comply with probable upcoming environmental regulations was rated the top challenge to successful dairying in the future. Other responses are listed below. Interviewees could respond with more than one answer so the total answers were greater than 47. (Table 4)

General forage background

5. The potential of each of these forages to fit into the dairy forage program were rated by 43 dairy producers. Dwarf elephantgrass, perennial peanut, and winter clovers were essentially an unknown (no opinion was held). Alfalfa was rated the highest and hairy indigo the lowest of the more well-known forages. (Table 5)

6. Sixty-nine percent of the dairies planted and harvested some forages. The other dairies purchased all of their forage needs.

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7. The amount of land used for crop production was similar among the counties, averaging about 200 acres per farm. (Figure 1)

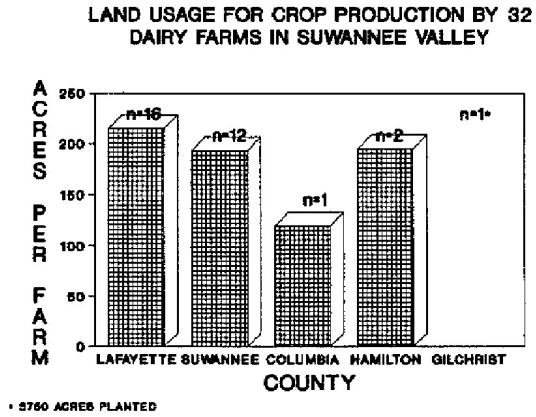

Figure 1.

8. Twenty-two out of 47 dairies moved manure water to their land. Spreaders and irrigation guns were the most common methods used. Only 9 producers had irrigation equipment in place and operating for crop production. (Figure 2)

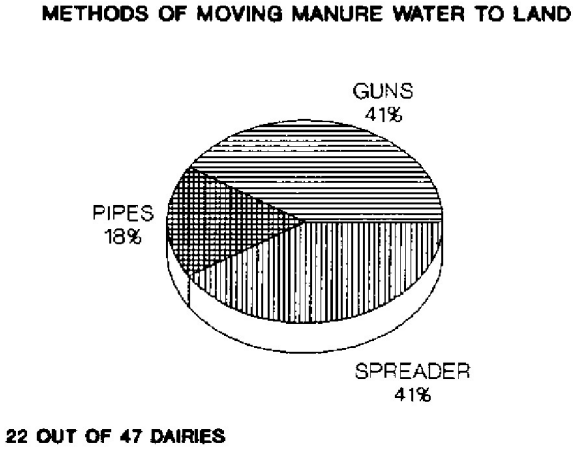

Figure 2.

9.Thirty-six percent of the dairies indicated that they were not able to grow enough forage to meet the demand on their own farm. A lack of land was the primary reason but labor, equipment, and capital limitations were stated also. (Figure 3)

10.On the average, producers thought that a **17 percent savings** (range from 0 to 75 percent) could be obtained on their feed bill if they grew their own forages rather than buying them. Eight farms had no opinion.

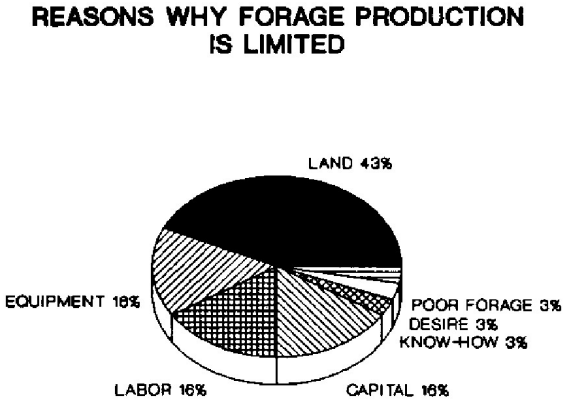

Figure 3.

11.Thirty-three dairies purchased forage for their cows. Coastal bermudagrass hay was by far the most popular. (Figure 4)

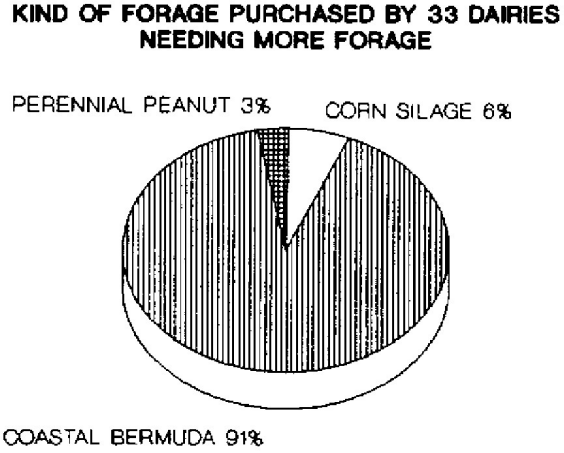

Figure 4.

12.Forty percent of the dairies purchased hay from local dealers.

13. The range and average cost of coastal bermudagrass hay, corn silage, and perennial peanut hay are listed below. (Table 6)

14.Twenty-five out of 27 producers bought their hay based upon its weight, with no regard for water, protein, or energy content of the hay.

HAY PRODUCTION

1. Hay production was practiced on 25 dairies. The number of acres dedicated to hay ranged from 20 to 250 per farm with an average of 82 acres. Breakdown by county is listed below. (Table 7)

2. Coastal bermudagrass was, by far, the most commonly grown forage for hay. (Figure 5)

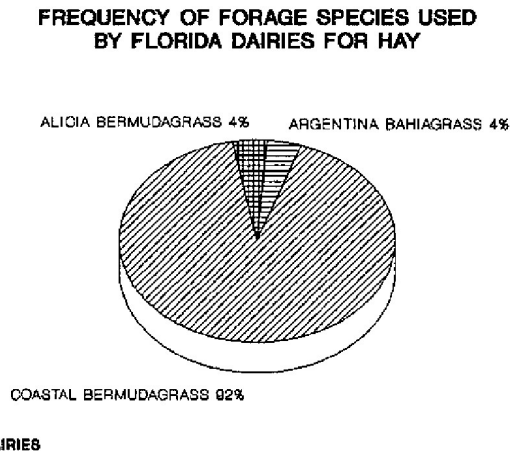

Figure 5.

3. Sixty-four percent of those surveyed tested their soils at least once every three years.

4. Most producers fertilized their hay fields only once or twice a year. (Figure 6)

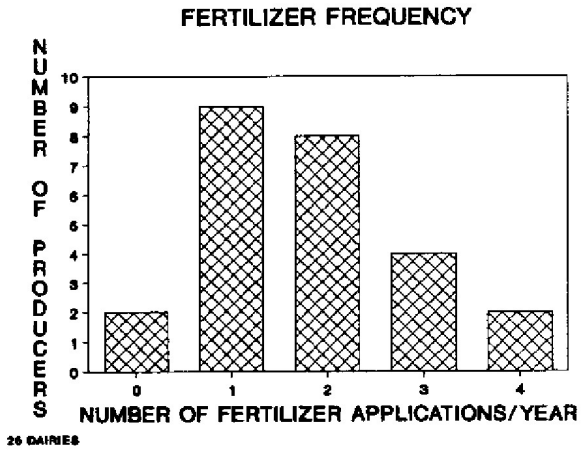

Figure 6.

5. The average amounts of nitrogen, phosphorus, and potassium applied per acre are listed in Table 8 .

6.The amount of nitrogen applied per acre varied widely among producers. About as many producers applied <100 pounds/acre as those that applied >400 pounds/acre. Fourteen out of the 25 hay producers applied nitrogen after every harvest. The amount of nitrogen applied per acre tended to increase the amount of forage estimated to be harvested per acre. Estimated yield ranged from 3.5 to 10.0 tons/acre with an average of 6.7. (Table 9)

7. The frequency of adding other chemicals to the forage or soil were as shown in Figure 7 .

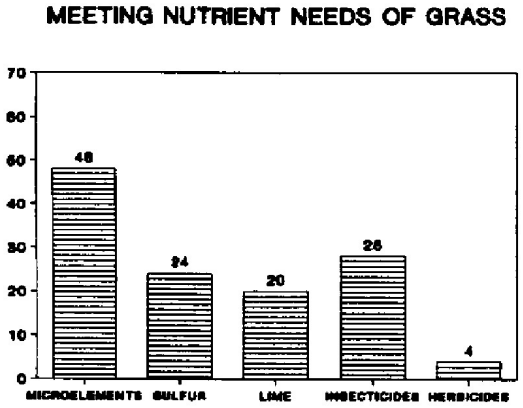

Figure 7.

8. Most producers harvested their hay three to four times a year. (Figure 8)

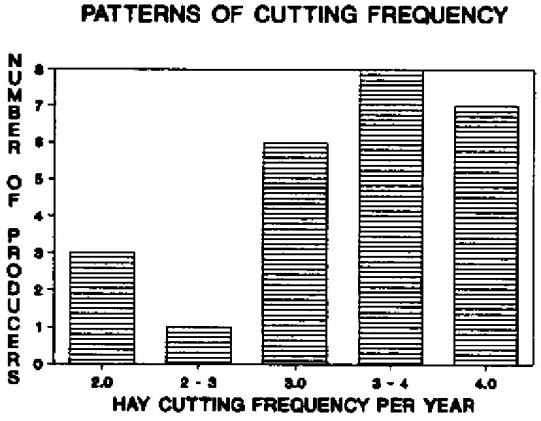

Figure 8.

9. Additives were used on 12 percent of the dairy farms to try to help improve quality.

10. Hay was stored outside by 88 percent of the producers.

11. Forty-four percent of the hay producers tested their forage for quality. Recollection of crude protein contents ranged from 6.0 to 15.5 percent with an average of 11.9 percent. No one could recall the energy content of their hay.

12. Weather was cited by most hay producers as the biggest problem to quality production with other problems being of lesser concern. (Table 10)

13. Eight producers stated that they were interested in trying a new forage in the near future. Tifton 78 bermudagrass was mentioned the most often. (Table 11)

SILAGE PRODUCTION

1. Ten dairy producers (21 percent of those surveyed) stored their forage as silage.

2. Corn silage was twice as popular as sorghum silage. Bermudagrass silage was made by one producer. In addition, one farm followed corn silage with sorghum silage. Another farm planted sorghum and soybeans together. (Table 12)

3.Minimum tillage techniques were used on one third of the corn silage and sorghum crops grown.

4.Seventy percent tested their soils in order to obtain fertilizer application recommendations.

5.The amounts of fertilizer applied varied widely among producers. (Table 13)

6.Seven out of nine producers growing row crops fertilized only once during the growing season.

7.Irrigation was used by five out of six crops of corn silage and by one out of three crops of sorghum.

8.The frequency of applying other chemicals to the crops is shown in Figure 9 .

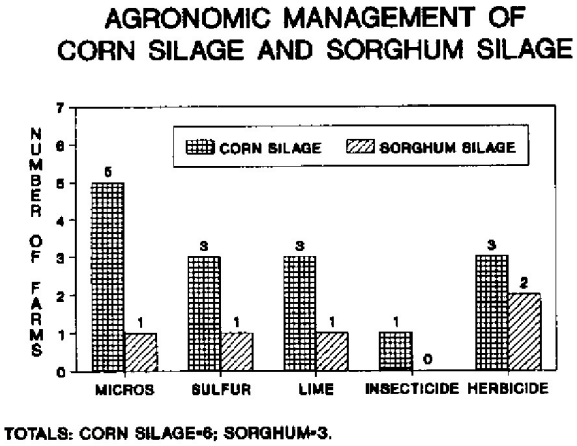

Figure 9.

9.Corn was harvested for silage when it reached "maturity." Criteria used to time the harvest of sorghum varied from "experience" to "boot stage" to "dough stage" to "maturity."

10.A silage inoculant was used on two out of three sorghum fields but only on one out of six corn fields.

11.A variety of structures were used to store the forage. A majority of those harvesting corn silage stacked it on the ground with little protection from the environment.(Table 14)

12.More than 14 days were required on the average to fill a horizontal silo and seal it.

13.Silages were analyzed for chemical composition by 100 percent of those growing sorghum but only by 50 percent of those growing corn.

14.Weather was cited as the biggest problem to optimum harvest of forage for silage with equipment problems a close second. (Table 15)

PASTURE UTILIZATION

1.Twenty-one dairies utilized pasture to house and graze their animals. One third of those planted higher quality annuals for grazing. Forage species and number of acres of each are listed in Table 16 .

2. Those 21 producers used their pastures mainly for their dry cows and heifers although lactating cows also were routinely kept on pasture. (Figure 10)

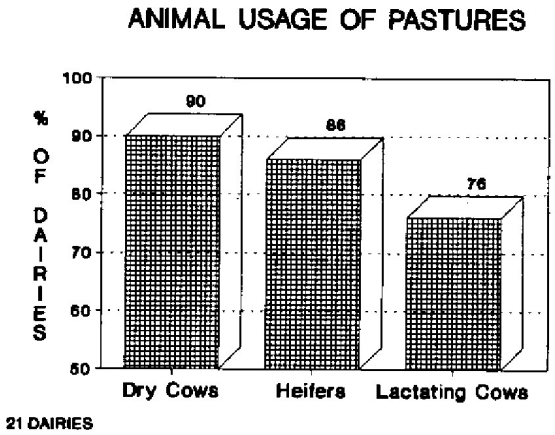

Figure 10.

3.The average number of animals per acre was 2.7.

4.Only five out of 21 producers tested their soils prior to the spreading of fertilizer.

5.The amounts of fertilizer applied to each forage was highest for bermudagrass and lowest for bahiagrass. The approximate ratio of N-P-K for bahiagrass and bermudagrass was 3-1-3 and for annuals was 6-1-4. (Table 17)

6.Fifty-eight percent (7 ÷ 12) of bahiagrass pastures were not fertilized and 33 percent (4 ÷ 12) were fertilized only once during the year. Fertilizer was usually applied twice to pastures planted with annuals. (Figure 11)

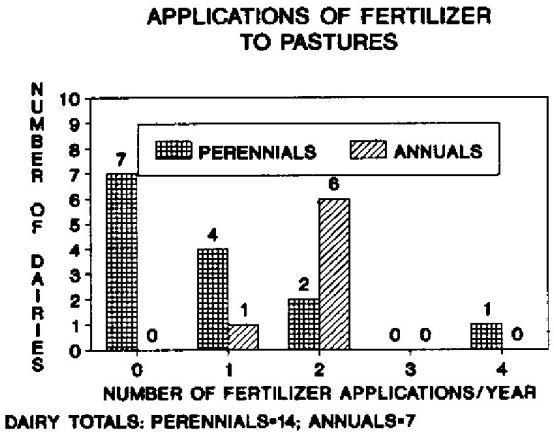

Figure 11.

7.Applying microelements to the pastures was common while use of lime, herbicides, and insecticides was uncommon. (Figure 12)

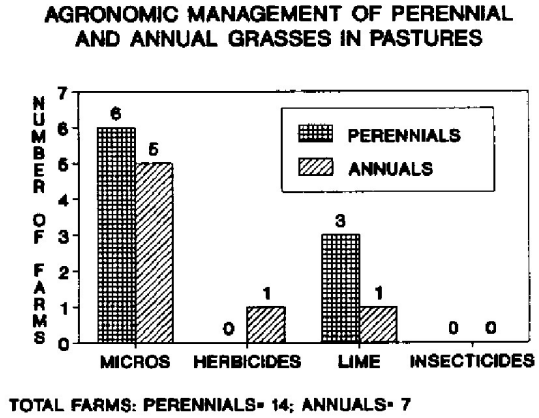

Figure 12.

8. Rotational grazing of pastures was practiced by 100 percent of those growing annuals but only by 29 percent (4 ÷ 14) of those growing bahiagrass or bermudagrass.

9. Supplementation of pastures with trace minerals was common, with salt being used frequently and molasses being used infrequently as shown below. (Figure 13)

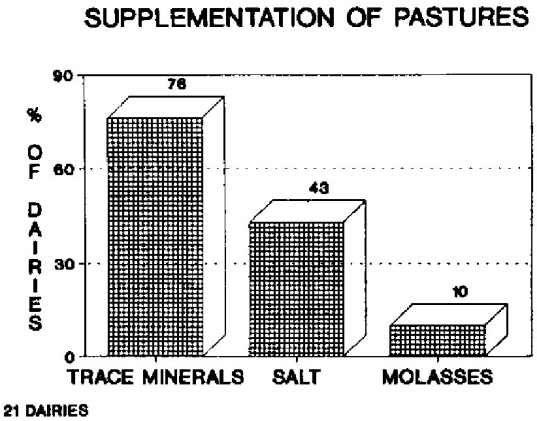

Figure 13.

10. Fencing and lack of land were the most common problems faced by those managing pastures with weed control a significant challenge as well. Other concerns are listed in Table 18 .

QUALITY MEASUREMENTS OF FORAGES FED ON DAIRIES

On a return visit to many of the dairies surveyed, a sample of forage was collected and chemically analyzed. The objective was to determine the quality of the forage being fed on the dairy.

1.COASTAL BERMUDAGRASS HAY.

A.Quality index.

Sixty-two separate lots of coastal bermudagrass hay were core sampled and analyzed using NIR technology at the Agricultural Research and Education Center at Ona, Florida. A quality index (QI) rating was assigned to each sample based upon its chemical composition. A QI of 1.0 indicates the forage will maintain the body weight of a mature cow when eaten without any supplementation. In other words, the forage does not contain enough nutrients to support any production (body weight gain or milk yield) by the animal. The higher the QI, the better the quality of the hay.

In our survey, only 19 percent of the sampled hay which was being fed to cows had any potential to

support production (QI's > 1.0). In addition, 31 percent of the hay (QI's of < 1.0) would cause the cow to lose weight if she received no supplementation.

B. Total digestible nutrients (TDN).

The total digestible nutrient contents of the hays are listed in Table 19 and arranged according to their QI.

C.Crude Protein.

The crude protein (CP) contents of the hays ranged from 2.9 to 13.7 percent (dry matter basis). As QI increased from 0.9 to 1.2, the average CP content increased from 7.0 to 13.4 percent. However, Table 20 illustrates that a forage's CP content is not a good indicator of quality. Some forages which had a QI of 0.9 contained 11.2 percent CP which is a concentration suggesting a forage of higher quality. Likewise, some forages which had a QI of 1.1 contained 8.1 percent CP, suggesting a lower quality than actual. While a forage's CP is important information when formulating a diet, it is a poor indicator by itself of quality. The amount of nitrogen used to fertilize and the frequency of spreading it has a greater influence on a plant's CP content than its maturity.

D.Neutral Detergent Fiber.

The neutral detergent fiber (NDF) content of a forage is a measure of its total fiber content. As NDF content increases, quality decreases because the fiber portion of the plant is less digestible than the nonfiber portion. Average NDF content decreased from 84.8 percent to 78.3 percent as QI increased from .8 to 1.2. Only 19 percent of the samples were < 80 percent NDF. (Table 21)

E. Harvesting Practices.

Thirty-two producers responded to the question "How often do you cut for hay?" 19 percent of the producers (6 ÷ 32) worked at making hay at less than six week frequencies. This is the same percentage of producers who possessed hay which had a QI > 1.0. Fifty percent of the producers (16 ÷ 32) made hay that was older than 6 weeks of age. This practice is likely responsible for the poor quality of hay fed on the dairies surveyed. A major reason for this delay in harvest is regular summer rains. Most producers indicated that weather was the major problem encountered in making hay. However, if producers attempt to make hay at four week intervals instead of at six week intervals, they should be able to get the grass stored within six weeks of regrowth most of the time. (Table 22)

2.CORN AND SORGHUM SILAGES.

Only a few samples of corn and sorghum silages were collected. The corn silage appears to have been harvested at about the right maturity based upon their average moisture content. The CP content is similar to that reported in the feed composition tables of the National Research Council. TDN of corn silage was lower than that normally seen for corn silage grown in cooler areas of the U.S. This is usually due to the higher NDF content of corn silage grown in Florida.

Sorghum appears to have been harvested on the immature side based upon its chemical composition. As the plant matures, it dries out and the grain content increases. Although it depends somewhat on the variety, sorghum should be harvested and stored at a moisture content about 72 percent. At this maturity, its TDN should be closer to 60 percent and its CP content closer to 7 percent. (Table 23)

SUMMARY OF SURVEY RESULTS

INDUSTRY CHARACTERIZATION.

1. The dairy industry in the Suwannee River Valley is relatively young. The average farm has been operating 15 years and is smaller in size than the state average (396 vs. 545 cows per farm).

2. Although over two-thirds of the dairies grow some forage for their cows, over three-fourths of the dairies purchase some forage to meet their forage needs, primarily Coastal bermudagrass hay.

HAY PRODUCTION.

1. Nearly sixty percent of farms produce Coastal bermudagrass hay.

2. Average amount of nitrogen applied per acre generally matches the University of Florida's recommendations (80 pounds of nitrogen per cutting).

3. Over 70 percent of Coastal bermudagrass hay used as feed on Suwannee Valley dairies was of poor quality; characterized as a "maintenance" hay, at best.

4. Management steps suggested by university personnel to improve hay production and utilization based upon currently reported practices include:

    1. chemically analyze hays (only 44 percent tested hays) and

    2. store hay off of soil to reduce hay losses (88 percent stored on soil).

SILAGE PRODUCTION.

1. Only about 20 percent of farms made silage; irrigated corn silage was the most popular.

2. Average amount of fertilizer applied per acre was less than that recommended by University of Florida.

3. Management steps suggested by university personnel to improve silage production and utilization based upon currently reported practices include:

    1. cover and seal forage after packing in silo and

    2. chemical testing of silage after opening.

PASTURE MANAGEMENT.

1. Although nearly 50 percent of farms grazed animals on pasture, majority of nutrients for diets came from feed bunk. Bahiagrass was the most common pasture grass.

2. Rotational grazing was practiced only with annual forage crops, not with perennial forage crops.

3. Management steps suggested by university personnel to improve pasture utilization based upon currently reported practices include:

    1. applying fertilizer to soils,

    2. testing soils prior to fertilization, and

    3. providing free access salt to all grazing animals.

Table 1. Number of dairies and average years of operation by county.

County	Number of dairies	Average years of operation
Lafayette	24	20.6
Suwannee	18	10.5
Hamilton	2	3.0
Columbia	2	7.0
Gilchrist	1	9.0
Total	47	15

Table 2. Average number of cows per farm by county.

County	Average number of cows/farm	Range in cow numbers/farm	Total number of cows
Lafayette	398	78-1200	9552
Suwannee	308	145-725	5544
Hamilton	508	340-675	1016
Columbia	240	130-350	480
Gilchrist	2000	2000	2000
Summation	396*	78-2000	18,592
*Not counting the one dairy in Gilchrist county			

Table 3. Average number of heifers by county.

County	Number of herds raising heifers/total	Average number of heifers raised/farm	Total number of heifers
Lafayette	9 of 24	85	765
Suwannee	13 of 18	110	1430
Hamilton	1 of 2	60	60

Table 3. Average number of heifers by county.

Columbia	2 of 2	58	115
Gilchrist	1 of 1	1700	1700
Total	26 of 47	95*	4070
*Adjusted for number of herds per county and without Gilchrist.			

Table 4. Biggest challenges to successful dairying.

1.	Costs to comply with environmental regulations	13
2.	Economic squeeze (milk, feed and cow prices, debt)	9
3.	Heat stress conditions	8
4.	Lack of high quality forages	5
5.	Lack of land	3
6.	Lack of quality labor	3
7.	Excessive mud	2
8.	Negative public opinion	1
9.	Investor dairies	1
10.	Milk imports	1
11.	Personal stress	1
12.	Wants more university help	1
13.	Present facilities	1
14.	Poor breeding in the summer	1
15.	Finding replacement heifers	1
16.	Increasing number of dairies in the area	1

Table 5. Rating of forage species by 43 Florida dairymen.

Forage	Responses	Avg. Rating *
Small grains	37	2.9
Callie bermuda	35	2.9
Pearl millet	35	3.0
Tifton 78 bermuda	33	3.3
Sudan sudax	32	3.0
Alfalfa	29	3.8
Hairy indigo	23	2.3
Grain sorghum	21	2.6
Tropical corn	17	2.5
Perennial peanut	10	3.2
Winter clovers	10	3.3
Dwarf elephantgrass	7	4.0
*5=High and 1=Low		

Table 6. Cost of purchasing forages ($/ton).

Forage	Range	Average
Coastal Bermudagrass	$ 39 to $ 60	$ 50.00
Corn Silage	$ 35 to $ 40	$ 37.50
Perennial Peanut Hay	$ 100	$ 100.00

Table 7. Farm acreage by county.

County	Number of farms	Acres/farm	Total acres
Suwannee	8	65	520

Table 7. Farm acreage by county.

Columbia	1	60	60
Lafayette	14	83	1162
Hamilton	2	155	310
Total/Average	25	82	2052

Table 8. Average amounts of fertilizer applied per acre.

Fertilizer	Lbs./Acre
Nitrogen	236
Phosphorus	36
Potassium	135

Table 9. Percentage of producers using different amounts of nitrogen and their estimated hay yields. *

Producers	Lbs. of Nitrogen	Estimated Yield
(%)	(Lbs./Acre)	(Tons/Acre)
16	< 100	4.2
24	100-199	7.0
28	200-299	6.2
12	300-399	7.3
20	400-500	8.1

Table 10. Biggest problems in production and feeding of hay.

Problem	% of Responses
Weather	20

Table 10. Biggest problems in production and feeding of hay.

Equipment upkeep	2
Low quality	1
Wastage	1
Time to do it	1
Army worms	1
Poor intake in summer	1

Table 11. New forages to be planned in the future.

Forage	Number of Producers
Tifton 78 Bermudagrass	5
Perennial Peanut	2
FL501 Oats	1

Table 12. Types, amounts, and estimated yields of forages grown for silage.

Silage	No. of Producers	Range Acres per Farm	Average Acres per Farm	Yield Tons per Acre
Corn silage	6	44-2800	166*	17.5
Sorghum	3	60-250	134	25.0
Bermudagrass	1	20	20	?
*Excludes the farm growing 2800 acres.				

Table 13. Average amount of N-P-K application to forages used for silage.

	Nitrogen (lb/A)		P_2O_5 (lb/A)		K_20 (lb/A)	
Crop	Range	Average	Range	Average	Range	Average
Corn silage	50-300	202	40-108	63	40-300	150

Table 13. Average amount of N-P-K application to forages used for silage.

Sorghum	63-300	163	28-150	71	63-280	152
Bermuda	-	295	-	25	-	95

Table 14. Silage storage structures used on Florida dairies.

	Silo Type			
Crop	Bunker	Trench	Stack	Plastic Bag
Corn Silage	1	1	4	1
Sorghum	1	1	0	1
Bermuda	0	0	0	1

Table 15. Biggest problems in producing high quality silage.

Problem	Responses
Weather	4/10
Equipment upkeep	3/10
Timely harvests	1/10
Better varieties	1/10

Table 16. Types and amounts of forages used as pasture.

Forages	Number of Farms	Acres (average)	Acres (range)
Bahia	12	166	22-550
Coastal Bermuda	2	385	20-750
Bahia + Rye	1	770	770
Rye + Millet	4	60	40-150
Rye + Oats	1	400	400

Table 16. Types and amounts of forages used as pasture.

Millet	1	60	60

Table 17. Average application of N-P-K to pastures of different forage species.

Forage	Number of Farms	Nitrogen (lb/A)	P_2O_5 (lb/A)	K_20 (lb/A)
Bahiagrass	5	79	25	67
Bermudagrass	2	300	115	290
Millet, Rye, & Oats	7	149	25	89

Table 18. Biggest problems in managing animals on pasture.

Problem	Responses
1. Fencing	4
2. Lack of land	4
3. Weed control	3
4. Shade	2
5. Weather	2
7. Keeping grazed	1

Table 19. Total digestible nutrients (dry matter basis) of hay sampled on dairies.

Quality Index	Average(%)	Range(%)	% of Total Samples
0.8	44.3	43.3-45.4	3
0.9	48.5	46.1-50.6	28
1.0	52.4	46.6-53.0	50
1.1	53.3	50.0-55.9	16
1.2	56.7	56.5-57.0	3

Table 19. Total digestible nutrients (dry matter basis) of hay sampled on dairies.

1Based on 62 samples of Coastal bermudagrass sampled from October and November of 1990.

Table 20. Crude protein content (dry matter basis) of hay sampled on dairies.

Quality Index	Average (%)	Range (%)	% of Total Samples
0.8	8.0	7.8-8.2	3
0.9	7.0	2.9-11.2	28
1.0	8.7	5.4-12.6	50
1.1	11.4	8.1-13.2	16
1.2	13.4	13.2-13.7	3
1Based on 62 samples of coastal bermudagrass sampled from October and November of 1990.			

Table 21. Neutral detergent fiber content (dry matter basis) of hay sampled on dairies.

Quality Index	Average(%)	Range(%)	% of Total Samples
0.8	84.8	84.2-85.4	3
0.9	83.8	79.7-86.4	28
1.0	81.1	72.8-84.0	50
1.1	79.3	74.9-80.3	16
1.2	78.3	77.8-78.9	3
1Based on 62 samples of coastal bermudagrass sampled from October and November of 1990.			

Table 22. Hay-cutting frequency reported by Florida dairy managers.

	Weeks of Regrowth									
	4	4-5	5	5-6	6	6-7	7	6-8	8	8-10
Responses	1	1	3	1	9	3	1	11	3	1

Table 23. Chemical composition of corn silage and sorghum silage sampled on dairies.

Forage	Number of Samples	Moisture (%)	Crude Protein (% DM)	Total Digestible Nutrients, (%)
Corn silage	4	67.3	7.9	57.8
Sorghum silage	3	78.3	10.7	56.6