Best Management Practices for Southern Dairy Forages

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Warm season perennial forages can provide high yields . . . and high quality . . . with adequate fertilization and good forage management. Dairy producers can quickly benefit from improved forage quality.

WARM SEASON PERENNIAL GRASSES are noted for their low quality. Yields and quality of warm season perennials, however, can approach that of alfalfa with use of proper fertility inputs and management.

A system of best management practices (BMPs) that can maintain high quality and high yields of warm season perennial forages includes:

- a soil testing program
- a forage analysis program
- a timely and accurate fertilization schedule
- forage management techniques for maximizing leaf production.

Maximum Leaf Production Is a Key

Total mixed ration formulation for feedlot dairy cattle is much simpler than nutrient management of dairy cattle on pasture. Since pastures are growing plants, they are subject to continual change. Forage changes directly affecting animal performance can, however, be compensated for with BMPs to positively influence dairy production.

The milking herd needs high quality forage. Quality of warm season perennial grasses such as Coastal bermudagrass declines rapidly as the leaf-to-stem ratio decreases (**Figure 1**). As the plant grows, the leaf-to-stem ratio decreases, with a corresponding decline in protein and other quality factors. Cattle performance is highest when the proportion of leaves is 85 percent and greater.

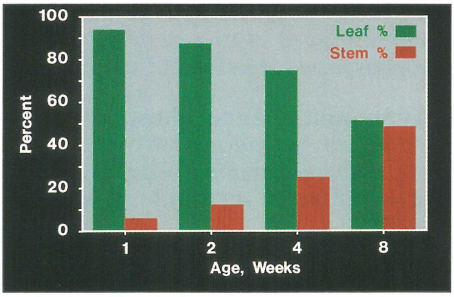

Figure 1. Leaf percent declines as stem increases with age of Coastal bermudagrass.
Source: Burton and Prine.

Figure 2 shows a simplified diagram of the differences between a leaf cell and a stem cell and their relative differences in digestibility. This difference in digestibility produced by increased plant maturity and a lower leaf-to-stem ratio significantly affects animal performance. A 1 percent increase in digestibility can produce as much as a 5 percent increase in milk production.

Pastures can be maintained in a lush, vegetative state by heavy grazing pressure and/or frequent mowings. This pressure keeps the grass short, breaking apical dominance and promoting growth of lateral buds and leaves. This produces a leafy, high quality forage with high digestibility.

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IMPROVED management of Coastal bermudagrass and other forages can be profitable for dairy producers.

Properly managed pastures have more the appearance of a lawn than a conventional pasture. The practice of keeping stem length to a minimum creates a higher leaf-to-stem ratio.

"Properly managed pastures should have more the appearance of a lawn than a conventional pasture."

Digestibility of bermudagrass leaf materials may be 65 percent or more, but once rapid stem growth begins, digestibility drops quickly. As the stem portion increases, digestibility may decrease to 50 percent or less. Cattle consume less of the stemmy, mature forage because the cell wall portion is less digestible and it stays in the rumen longer. This causes a serious decline in milk production.

Dairy Producers Demonstrate BMP Approach

A dairy forage management plan was designed by Texas A&M personnel based on previous regional research. Results of a long-term field trial established on the Clifford and Randall Davis Dairy in Wood County, TX, demonstrated the advantages of applying modest amounts of nitrogen (N) at 31-day intervals throughout the growing season and removing ungrazed forage when growth exceeded 3 inches in height. Records indicated that milk production began to decline 3 days prior to, and increased 3 days following the 31-day fertilizer application interval. A modified schedule was later developed for applying N,

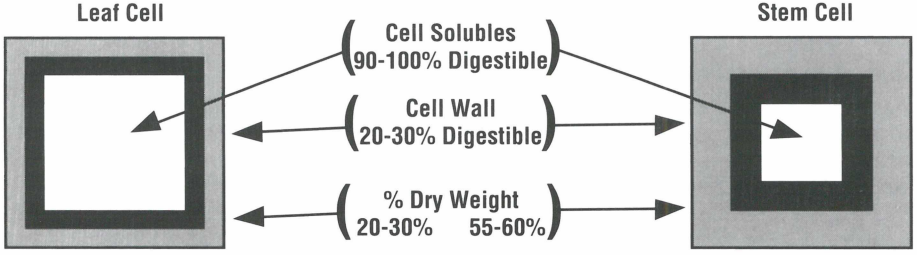

Figure 2. Relative differences in leaf and stem cells. Leaf cells contain more cell solubles, which are highly digestible. Source: McNeill

Table 1. Date, rate, and analysis of fertilizer application based on soil and plant analyses, Waller County, TX.

Date	Fertilizer Applied, lb/A	Fertilizer Analysis, % N-	P_2O_5-	K_2O-	S-	Mg-	Zn
May 2	200	0	0	60			
May 2	200	18	46	0			
May 2	200	0	0	22	22	11	
May 19	300	21	7	14	6	1	
June 8	300	21	7	14	6	1	
July 9	300	14	7	21	7	2	1.6
July 30	314	14	7	21	7	2	1.6
Aug 20	300	14	7	21	7	2	1.6
Sept 9	300	14	7	21	7	2	1.6
Sept 30	300	14	7	21	7	2	1.6
Total	2,714						

phosphorus (P) and potassium (K) every 24 to 26 days.

Results indicated that milk production equaled production from sorghum-sudangrass or millet forages during June through August and increased 5 to 8 lb per cow during September and October. Pasture costs per cow decreased from $0.25 to $0.11 per day. No hay was fed to the lactating herd until October. Other area demonstrations have also shown an average of 5 lb per cow per day increase over previous forage systems used.

Based on the success at the Davis Dairy, a similar project was initiated on the Silverwood Dairy in Waller County. Fertilizer was applied every 21 days and half of the Coastal bermudagrass pasture was shredded every 7 days. Initial fertilizer nutrient rates were based on soil tests. Forage samples were collected and analyzed every 7 days. As the season progressed, plant analyses showed that forage K was less than 2 percent, which is below optimum for this production system.

One of the important roles of K in animals is reduction of heat stress in lactating cows when humidity is high and the temperature exceeds 85°F.

Fertilizer practices were then modified to include higher rates of K (**Table 1**). Forage K levels improved for several sampling dates. As drought conditions continued during the summer, K levels fluctuated with climatic conditions and root activity.

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Forage protein and energy levels and milk production showed substantial increases over previous years with use of these BMPs. Based on plant analyses, soybean meal content in concentrate rations was reduced from 800 to 200 lb/ton of mixed feed, and milk production was maintained through the summer drought.

BMP Forage Roadmap for Southern Dairies

Several dairies in eastern Texas have initiated forage management programs which include the following BMPs:

A. Soil Testing Program. The soil test is the starting point for design of a basic fertility plan. Soil tests should be used to monitor and maintain adequate soil fertility.

B. Forage Analysis Program. Forage samples should be collected and analyzed weekly by a laboratory. The results can be used to monitor protein and other nutritional factors so that in-season adjustments in fertilizer and forage management can be made to keep dairy cows operating at peak performance.

Currently, dairy producers are applying 50 to 60 lb N/A plus other nutrients shown to be deficient at 21 day intervals.

C. Timely and Accurate Fertilization Schedule. Fertilization plays an important role for sustained plant growth and drought tolerance, helping insure the success of intensively managed warm season perennial dairy pastures in the South. The following guidelines should be helpful:

1. Provide adequate nutrition to meet the needs of the forage being grown. Warm

season perennial grasses are big nutrient users.

2. Balance N with P, K, S, Mg, and other nutrients to optimize yield and quality and to maintain high nutrient use efficiency.
3. Apply secondary and micronutrients as needed, using soil testing and plant analyses.
4. Apply nutrients at short, uniform intervals (21 to 24 days) to keep management simple and to stabilize milk production.
5. Keep soil pH in the range best suited for optimum forage production (pH 6.0 to 7.0).

D. Forage Management for Maximum Leaf Production. Managing for maximum leaf production is the objective of this system. Power fencing with small grazing cells where cattle are mob-grazed and rotated on short intervals will work best. With larger pastures, mowing each half of the pasture on a 7 to 10 day interval will keep the pasture at a 3 inch height or less.

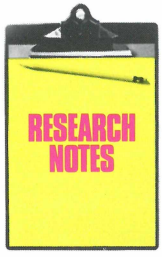
This system may require 5 to 7 cows per acre stocking rate to maintain the grass at minimum heights. If "manure spots" develop, they should be mowed along with a drag attachment to help scatter existing manure. Frequent removal of stemmy and excess forage will provide a constant source of high percentage leaf material with minimal stem.

Advantage of BMPs

The BMPs outlined here are agronomically, economically, and environmentally responsible management techniques that dairymen can integrate into their ongoing dairy enterprises. In this case, BMPs serve the farmer, the fertilizer dealer, and the environment.

The dairyman not only benefits from yield, quality, and economics of forage and milk production with BMPs, but labor is utilized more efficiently as well. The fertilizer dealer benefits by having his work load spread over a longer season. The environment is protected by split applications of fertilizer, and enhanced nutrient use efficiency. ■

Louisiana



Effect of Sulphur Fertilization on Yield, Copper Concentration and Copper Uptake in Coastal Bermudagrass

RESEARCH at the Louisiana Hill Farm Research Station has reported forage yield responses to sulphur (S) applied to Coastal bermudagrass at two locations over a 5-year period. Yield increases have been measured from S applications up to 96 lb S/A. Sulphur fertilization reduced copper (Cu) concentrations from 5 to 4 parts per million (ppm), but Cu uptake was not significantly affected at either site.

The table shows some effects of S fertilization. ■

Effects of S fertilization on Coastal bermudagrass yields, Cu and S concentrations and uptake.

	S		Cu		
Applied S	Conc.	Uptake	Conc.	Uptake	Yield
lb/A	%	lb/A	ppm	lb/A	lb/A
0	.13	16	5	.06	12,590
24	.16	22	4	.06	13,091
48	.20	28	4	.06	13,505
72	.24	34	4	.06	13,862
96	.28	42	4	.06	14,582

Mahan fine sandy loam;
Soil test (0-15 cm): S, 8 ppm; Cu, 0.2 ppm.

Source: Dr. Marcus Eichorn, Hill Farm Research Station, Louisiana State University.