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Chapter 11

FORAGE AND ANIMAL PRODUCTION PROGRAMS FOR SOUTHEAST TEXAS

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Chapter 11

FORAGE AND ANIMAL PRODUCTION PROGRAMS FOR SOUTHEAST TEXAS

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Beef cattle are an important source of agricultural income in Southeast Texas. In a number of counties, they constitute the major source of agricultural income (Texas Crop and Livestock Reporting Service, 1974).

Production of calves for sale immediately at weaning is the principal form of beef production in the region. Grazing stocker cattle is of limited importance in the western part of the region.

The dense cattle population of Southeast Texas (Figure 11-1) is concentrated in an area bounded by Brazoria, Fort Bend, Waller, Grimes, Brazos, Burleson, Lee, Bastrop, Caldwell, Guadulape, Gonzales, Victoria, Dewitt, and Calhoun Counties (Texas Crop and Livestock Reporting Service, 1974). Cattle density is greatest in counties (Austin, Brazos, Grimes, Waller, and Washington) having smaller acreages in cultivated crop production.

CHARACTERISTICS OF THE REGION

Southeast Texas is unique among cattle producing areas in the United States with respect to its combination of climate, soils and soil conditions, and breeds of cattle.

A long growing season with usually favorable rainfall makes it possible to grow an abundance of forage for the resident cattle population. The length of the growing season (Figure 11-2) is about 260 days on the eastern side (Jefferson, Hardin, Polk counties) but exceeds 290 days in the southwest corner of the region (Matagorda, Jackson, Victoria, and Calhoun counties). The growing season is 275 days or longer in the area of greatest cattle density.

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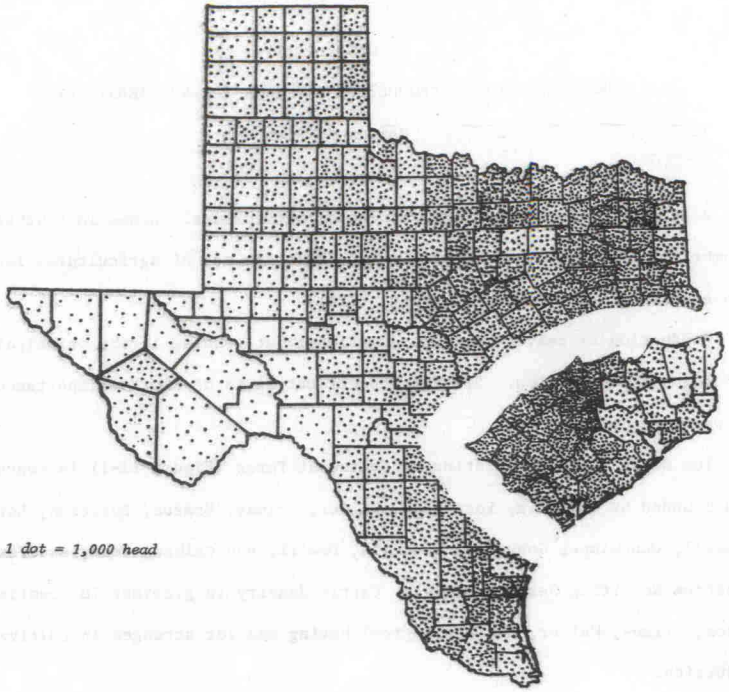

Figure 11-1. Number of beef cows that have calved, January 1, 1974

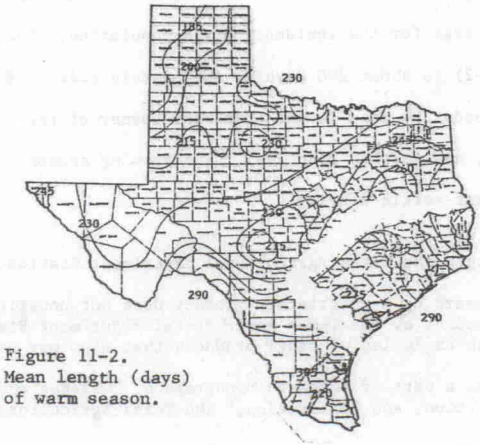

Figure 11-2.
Mean length (days)
of warm season.

Rainfall is heaviest on the eastern side of the region, averaging 58 inches in the southeast corner (Figure 11-3). The average annual rainfall ranges from 32 inches to 36 inches on the western side of the region.

The elevation of the first two tiers of counties along the Gulf of Mexico varies from sea level to 100 feet. This encompasses most of the rice producing soils as well as the cultivated croplands of the Brazos and Colorado River bottomlands. The slope of the land along the Gulf Coast is generally flat. Frequently, surface drainage is a problem. The prairie soils are well suited for rice production. Considerable acreage, particularly in Jefferson, Harris, Galveston, and Brazoria counties, is devoted to urban use.

The soils of the region are varied (Godfrey et al., 1972). The prairie soils of the Gulf Coast are generally poorly drained, cracking, clayey soils with either clay or loamy surface layers. Leaving the Gulf Coast Prairie, soils with loamy surface layers and mottled gray and red or yellow cracking clayey subsoils interchange with dark, calcareous, mostly cracking, clayey soils. The bottomlands of the Brazos and Colorado River flood plains are dominated by cracking clayey and friable loamy soils.

CHARACTERISTICS OF THE CATTLE

An important advance in beef cattle production in the past 30 years in the region has been the widespread acceptance of beef cattle crossbreeding. The mating of bulls of European (predominantly British) breeds to cows of principally Brahman breeding is common. Brahman cattle gained in popularity rapidly following their introduction in numbers in the early 1900's (a limited number of Brahman cattle were introduced before 1900).

Considerable control of diseases that can plague cattle in the region has been achieved. The importance of proper management and the need to meet the nutritional requirement of cattle to lessen the effects of internal parasites is widely recognized.

ADAPTED FORAGES

Several kinds of productive forages are adapted to the varying soil and climatic conditions of Southeast Texas. These can be used to develop pasture forage systems that produce quality forage more abundantly than native ranges. Or they may be used

with native ranges to overcome deficiencies of native ranges.

Warm-Season Perennial Grasses

Warm-season perennial grass pastures form the base for most beef cow-calf operations in Southeast Texas. These pastures are expected to furnish grazing from early spring to late fall or early winter.

Originally, little bluestem with some big bluestem, indiangrass, switchgrass, and eastern gamagrass dominated the native ranges on the upland soils of Southeast Texas. Much of this land has been or is now devoted to the growing of cultivated crops. Most of that not cultivated has been so overgrazed that the climax grasses no longer exist or are very weak. Invaders, such as carpetgrass (Axonopus Compressus), are less productive. Smutgrass (Sporobolus poirettii), an unpalatable species, dominates many unimproved pastures.

The important introduced warm-season perennial grasses in Southeast Texas fall into four categories. Dallisgrass and to some extent bahiagrass (Paspalum sp.) are important in the higher rainfall area. The bermudagrasses (Cynodon dactylon) are important on the loams and sandy soils. Kleingrass (Panicum coloratum) is becoming increasingly important, particularly in areas with less than 40-44 inches average annual rainfall. The so called "old world" bluestems (Dicanthium sp.), which include Angletongrass, Pretoria 90, Gordo, and Medio bluestem, have found some favor on heavy soils with less than 44 inches average annual rainfall.

Dallisgrass, Paspalum dilatatum (Figure 11-4), is the most important Paspalum sp. in Southeast Texas pastures. It is well adapted to the adequately drained but moist clay and loam soils east of the 40-inch rainfall line. It grows mostly as a bunchgrass and is compatible with common bermudagrass and white clover (Holt, 1956). With a thick stand, it can be managed to approach almost solid sod conditions, but this is rare. Seed florets of dallisgrass are subject to infestation by ergot, a fungus. Ergot is poisonous to livestock, but this has presented a problem only infrequently with cattle grazing dallisgrass pastures or fed dallisgrass hay.

When properly fertilized and grown with La. S-1 white clover, dallisgrass has demonstrated the capacity to produce sufficient forage (Table 11-1) of adequate quality

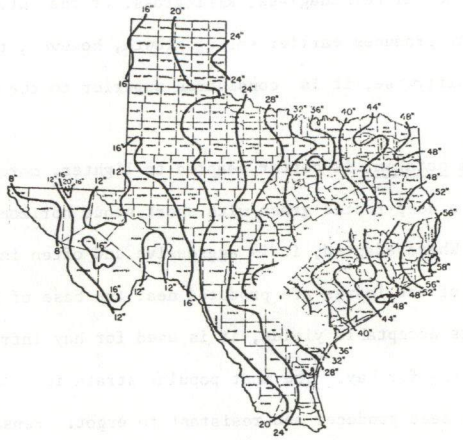

Figure 11-3. Average annual rainfall, inches.

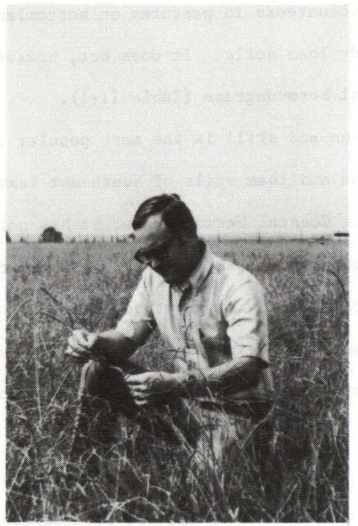

Figure 11-4. Dallisgrass pasture at Beaumont.

for cows nursing calves to produce weaning weights up to 600 pounds per calf with 1½ acres of pasture per cow and her calf. With heavy fertilization, it does not produce as much total forage as Coastal bermudagrass, kleingrass, or the introduced bluestems (Figure 11-5). It usually produces earlier spring growth, however, than most adapted warm-season grasses. Qualitywise, it is considered superior to the bermudagrasses or introduced bluestems.

Bahiagrass, Paspalum notatum, is better adapted to lighter, more drouthy soils than dallisgrass. It is a deep-rooted grass with short, stout horizonal rhizomes which form a dense tough sod. Where adapted, it is aggressive and often invades and crowds out other grasses. Most of the leaves are produced near the base of the stems. Therefore, although it produces acceptable yields, it is used for hay infrequently because of the difficulty in cutting for hay. The most popular strain is known as Pensacola bahiagrass. It is a good seed producer and resistant to ergot. Pensacola bahiagrass is best adapted to high rainfall areas but will not perform as well on wet, poorly drained clays as dallisgrass. On sandy or sandy loam soils where moisture may at times become limited, Coastal bermudagrass may be expected to perform better (Novosad, 1968).

The bermudagrasses are important warm-season perennial grasses in Southeast Texas. Common bermudagrass frequently volunteers in pastures on bottomland and rice soils. It is well adapted to loam and sandy loam soils. It does not, however, yield as well with adequate fertilization as Coastal bermudagrass (Table 11-1).

Coastal bermudagrass has been and still is the most popular improved warm-season perennial grass on the sandy loam and loam soils of Southeast Texas. Primarily because of the difficulty in establishing Coastal bermudagrass, it has not been particularly popular on heavy soils. Coastal bermudagrass does not begin growth as early in the spring as dallisgrass or kleingrass, but once growth commences it will, with proper fertilization, produce an abundance of forage in the spring and summer months. If fertilization and moisture are adequate, forage production is also good in the late summer and early fall.

Because Coastal bermudagrass responds markedly to fertilization and moisture, its growth rate during the year may vary more than that of dallisgrass, kleingrass, or

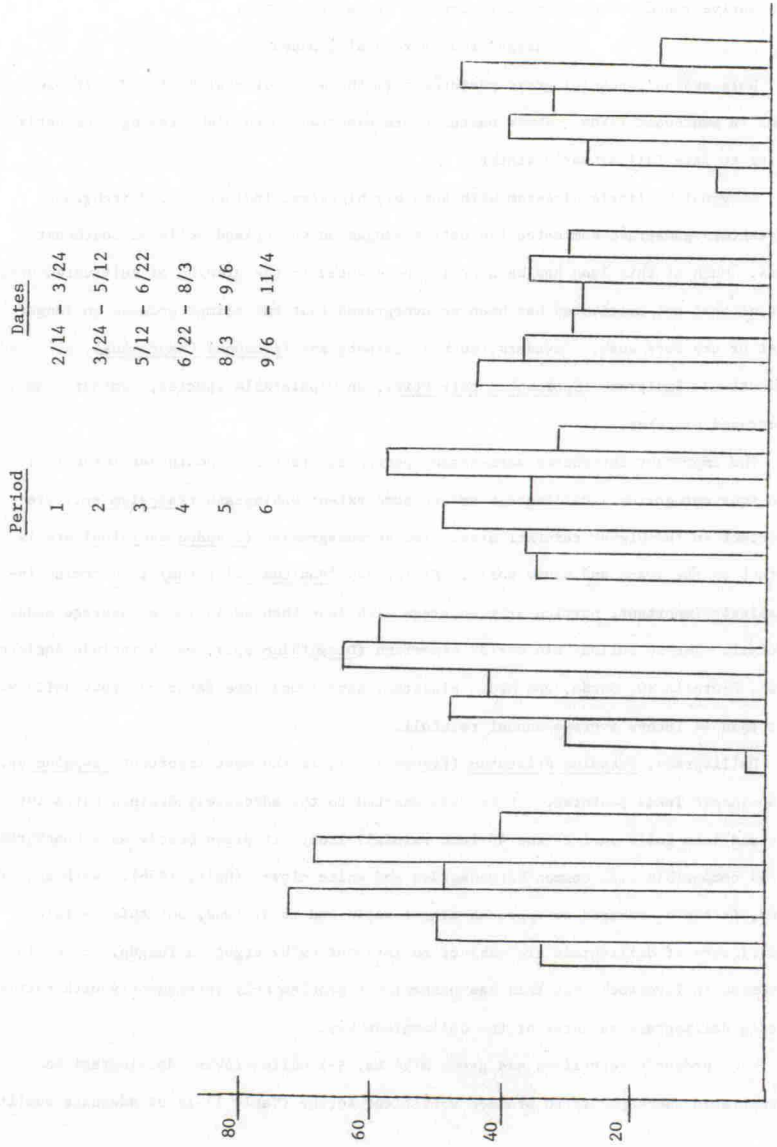

Figure 11-5. Seasonal dry matter yield for several warm-season perennial grasses, Angleton, three-year average.

Table 11-1. Effect of fertilizer treatments on the three-year average annual dry forage yields of four grasses at Angleton, Lake Charles Clay. (Riewe and Smith, 1961).

Fertilizer (lb./acre) $N-P_2O_5-K_2O$	Average annual yields, Lb./acre of dry forage			
	Coastal bermuda	Common bermuda	Dallis	Angleton
		With La. S-1 white clover		
0-80-0	10,540	7,810	7,220	7,680
100-80-0	11,550	9,590	7,860	7,630
100-80-80	12,810	8,850	7,830	7,490
		Without clover		
100-80-0	10,990	7,890	7,689	12,410
200-80-0	15,350	10,580	9,420	11,730
Average	12,250	8,940	8,000	9,390

common bermudagrass. This tends to make grazing management somewhat more difficult. To a significant degree, the variation in growth rate can be controlled by fertilization. Varying amounts of excess forage can be utilized by increasing the acreage set aside for hay production during periods of rapid growth.

Kleingrass is a widely adapted warm-season perennial bunchgrass. It appears better adapted, however, in areas with less than 40 inches average annual rainfall and where common bermudagrass is not expected to be competitive.

Kleingrass begins growth in the spring about as early as dallisgrass. Its quality is considered to be at least equal to that of dallisgrass. Kleingrass likely will find favor on clay and loam soils where dallisgrass is not well adapted; i.e., generally west of the Colorado River.

Limited use of the introduced bluestems has been made on heavy soils in areas with less than 44 inches annual rainfall. As a group, they begin growth later in the spring than dallisgrass or kleingrass and usually later than the bermudagrasses. They produce well in the summer and early fall. Because of this characteristic they can fill a unique niche in some production systems. Pretoria 90 bluestem begins growth earlier in the spring than Medio or Gordo bluestem. Angletongrass commences growth

later in the spring than most warm-season perennial grass--frequently not until after May 1.

Seasonal production of forage can vary considerably from year to year (Figure 11-6), depending primarily on earliness of spring-like weather conditions and rainfall during the year. Nevertheless, the management of grazing should strive to reduce the effect on cattle of a short forage supply at times and yet utilize effectively and economically truly surplus forage production (see Chapter 5: Principles of Grazing Management).

Cool-Season Grasses

Tall fescue (Kentucky 31 is the variety most commonly used) is limited in adaptation to the Colorado and Brazos River bottomlands and flat woods of the Trinity River flood plain. When grown with white clover, its nutritive value is adequate to meet the needs of cows nursing calves. On occasions, toxicity syndrome manifests itself in cattle grazing fescue pastures by loss of the tailswitch or extreme soreness of the hoof. This occurs infrequently in Southeast Texas and does not appear to otherwise interfere with the reproductive performance of cows.

Gulf ryegrass, Lolium multiflorum, is the most popular cool-season grass used for winter pasture in Southeast Texas. Although some small grains produce more forage early in the season than ryegrass (Evers, 1973 and 1974), the clear superiority of Gulf ryegrass for total season production, as exemplified by data from Beaumont (Table 11-2), has made it the favorite cool-season annual grass in Southeast Texas. Gulf ryegrass possesses marked resistance to prevalent diseases, particularly leaf rust. It is more tolerant to poor drainage than oats, wheat, or rye. It is more cold tolerant than adapted oat varieties. It consistently produces more forage on prairie soils than the small grains--wheat, oats, barley, or rye. However, adapted wheat varieties have performed satisfactorily on well-drained bottomland soils.

If early grazing of ryegrass is desired, certain cultural requirements must normally be met. These include an adequately prepared seedbed, early seeding (before October 15), and proper fertilization. Gulf ryegrass responds well to nitrogen fertilization. If the soil is deficient in phosphorus and/or potash, as indicated by analysis of soil samples taken to a 2-inch depth, ryegrass will respond to fertilization

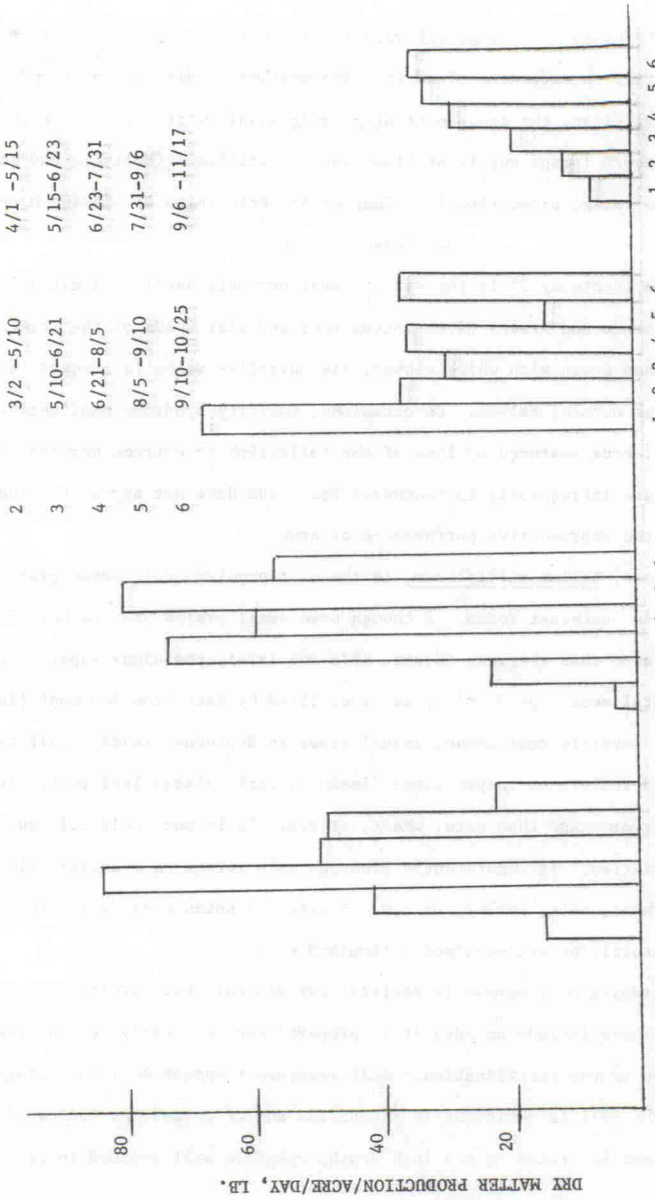

Figure 11-6. Variation between two different years in seasonal dry matter yield for Coastal bermudagrass and dallisgrass, Angleton.

Table 11-2. Dry matter yields of varieties of cool season annual forages, Beaumont, two-year average. (Evers, 1973 and 1974).

Variety	Pounds/acre dry forage			
	Jan. 17	March 6	April 9	Total
Gulf ryegrass	2200	1460	2900	6560
New Nortex oats	2530	500	1880	4910
Florida 501 oats	3290	480	910	4680
Cortez oats	2180	560	1110	3850
Vitagraze rye	1910	1380	520	3810
Fox wheat	1500	1170	990	3660
Acco 811 rye	1540	1010	930	3480
Fas Gro 204 triticale	2060	500	890	3450
Wintergrazer rye	1400	1240	750	3430
Milam wheat	1470	970	890	3330
Florida 102 barley	2280	600	370	3250
Era wheat	1750	500	610	2850

with these nutrients.

The expected response to nitrogen by ryegrass is shown by data obtained from a 2-year study at Angleton (Table 11-3). This study was conducted on an area that had been summer fallowed each year of the study. Applying 90 to 120 pounds of nitrogen per acre in split applications produced near maximum forage yields. If abundant residue remains following the summer crop, 30 to 60 pounds additional nitrogen may be required even though the seedbed is well prepared. Clean summer fallow is a method of reducing the amount of nitrogen required to produce near maximum forage yields. For cultural practices required for the proper production of ryegrass pastures see Chapter 3: Establishment, Management and Seed Production.

Recently, considerable interest has developed in the seeding of Gulf ryegrass in warm-season perennial grass pasture sod. Without the use of a chemical to retard the growth of the warm-season sod in the fall, sod seeding almost never provides early winter grazing. Recent research has indicated, however, that the use of chemicals to

Table 11-3. The effect of rate and time of nitrogen application on two-year average dry matter yield on Gulf ryegrass, Angleton, Lake Charles clay.

Pounds N/acre		Pounds/acre dry forage		
At planting[1]	Top dressed	2/8	4/13	Total
0	0	920	1960	2880
	30	850	3910	4760
	60	930	4550	5480
	90	840	4550	5390
30	0	1320	2070	3390
	30	1380	3910	5290
	60	1450	4460	5910
	90	1370	4610	5980
60	0	1690	2230	3920
	30	1480	4010	5490
	60	1750	4440	6190
	90	1640	4550	6190
90	0	1790	2830	4610
	30	1890	4020	5910
	60	1740	4360	6100
	90	1850	4230	6080

[1]All treatments received 45 pounds P_2O_5 per acre at planting.

retard fall growth of warm-season grass sod may allow for the early establishment and growth of the Gulf ryegrass. The results of research so far are encouraging but not conclusive.

The interest in the sod seeding of winter pastures on warm-season perennial grass sods lies in the fact that it eliminates or reduces the need for mechanical seedbed preparation and, to a considerable degree, alleviates the problem of bogging by cattle on pastures during the normally wet winter months.

Legumes

White clover, Trifolium repens, (La. S-1 is the variety that has been most popular) plays an important role in pastures on the clay and loam soils east of the Colorado River (Figure 11-7). Its utility lies not only in its ability to supply nitrogen to grasses grown in association with it but particularly in its production of highly digestible forage.

Because the soils in the area of adaptation are usually phosphorus deficient, phosphorus fertilization is most frequently required for good clover growth. Potash

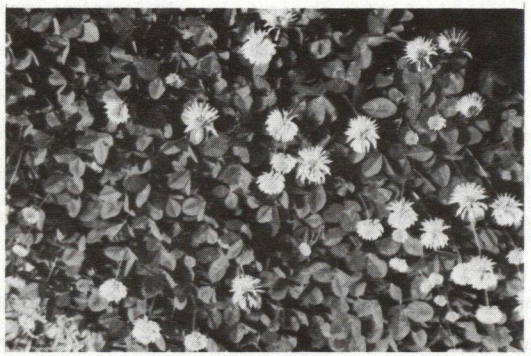

Figure 11-7. La. S-1 white clover showing dense leafy growth.

and lime are required if soils are deficient.

Where adapted, La. S-1 white clover is compatible with dallisgrass and the bermudagrasses (Table 11-1). It is readily established with fall seeding on well-prepared seedbeds and in rice stubbles. It can be established by overseeding existing grass sods provided the sod is managed to allow the development of clover seedlings. Establishment by overseeding in an existing sod is usually slow, resulting in reduced production the first and second years. Thereafter, if adequate soil phosphorus levels are maintained, yields are usually good. Seeding rates of 2 to 3 pounds per acre have been generally adequate.

Summer survival of white clover is heavily dependent upon moisture conditions, competition from other species, and perhaps other factors. Year after year forage production of white clover is frequently too low during the summer months to contribute to the nutrient requirement of grazing cattle. On the other hand, La. S-1 white clover, when sown in a pure stand with little or no competition from other species, has shown good survival the first summer, furnishing an abundance of grazing the second fall and winter.

Some interest has been shown in giant Ladino clovers adapted to southern conditions. In trials at Beaumont (Table 11-4) two Ladino clover varieties produced less early spring growth but more summer growth than the intermediate types represented by La. S-1 or Nolin's white clover. Total forage production for the several varieties was about equal.

Burclover is frequently found growing in Colorado and Brazos River and creek bottomlands. Frequently, burclover produces more abundant forage earlier than white clover but matures more rapidly. It supplies an abundance of grazing for only a short period of time. Cattle grazing burclover pasture seem more subject to bloat than when grazing other clovers.

Crimson clover has been used in the region on lighter soils. It furnishes grazing somewhat later than burclover but also matures somewhat later. Nevertheless, it furnishes grazing for only a short period of time and has not become an important clover in pastures in Southeast Texas.

Table 11-4. Average dry matter yield (lb./acre) of several varieties of white clover, Beaumont, 1964-67. (Craigmiles and Weihing, 1971).

Variety	Pounds/acre dry forage by clipping dates					
	Feb.	March	April	June	July	Total
Intermediate types:						
La. S-1 white	730	1790	2380	1120	600	6630
Nolins	800	1690	2290	1190	710	6580
Giant Ladino types:						
Regal	220	1140	2110	2210	100	6680
Tillman	650	980	2310	1110	1120	6170

Bloat in cattle grazing clover pastures can be a problem but can be fairly well controlled with the use of poloxalene. This material is available on the market as a premix and as a salt-molasses block. The animals must consume an adequate amount (10 to 20 grams) daily to achieve bloat control. This method, obviously, does not afford protection for those few animals that, for one reason or another, fail to consume the needed amount of poloxalene daily.

CULTURAL REQUIREMENTS

Adapted grasses and legumes are most easily established on firm seedbeds free from other competing vegetation. Most frequently, this requires plowing and/or thorough disking to eliminate existing competition. Sometimes existing competition is eliminated by frost as, for example, in seeding into existing rice stubble in the fall. (For requirements for the establishment of forages, see Chapter 3: Establishment, Management, and Seed Production).

Optimum forage production requires at least some fertilizer on most soils in Southeast Texas. Legumes nearly always require fertilization with phosphorus and sometimes with potash and/or lime. Likewise, grasses have requirements for phosphorus and potash but have an additional requirement for nitrogen. The nitrogen can be supplied by either legume nitrogen or fertilizer nitrogen. The response of different grasses to nitrogen fertilization varies (Tables 11-1 and 11-3).

PASTURE PROGRAMS FOR BEEF CATTLE

In developing an economically sound pasture program, a producer must consider both the nutrient requirement of the cattle and the kinds of forage required to meet the cattle's requirements. He makes a choice of adapted varieties, considering their characteristics with respect to season of growth, yielding ability, and quality of the forage produced. Insofar as possible, he develops a schedule of forage production that provides ample amounts of quality forage when the cattle's nutrient requirements are greatest. Forage production can be less and quality lower when the cattle requirements are less.

Cow-Nursing Calf

A brood cow is required to perform different productive functions throughout the year. Consequently, the quality and/or amount of forage consumed by the cow may also vary. A dry cow, in good condition, requires digestible energy only for maintenance and fetal development. Her requirement for digestible energy rises sharply with the birth of the calf. Twenty days after the calf is born the daily digestible energy requirement of the cow and her calf has increased 30 percent. There is a significant requirement for milk production. A beef cow will generally reach maximum milk production about 75 days after calving and then level off during the next 60 days. Thus, the beef cow's highest requirement for digestible energy occurs 75 to 90 days after calving. At this time, she must also be in a gaining condition to allow her to rebreed on schedule. Quality forage is extremely important from shortly after birth of the calf until the cow is rebred. A cow will likely fail to rebreed if the need for digestible energy, protein, and minerals is not met during this period.

The digestible energy requirement for a 1000-pound cow and her calf weighing 500 pounds at 7 months of age is 90 percent greater than that for a dry cow alone. A 1000-pound cow and her calf weighing 600 pounds at 9 months of age together have a requirement for digestible energy 110 percent greater than that for a dry cow alone. Thus, when calves are weaned and sold, the nutrients required from a pasture are reduced to less than one-half.

Pastures producing a relatively high quality forage are essential at breeding, if

cows are to rebreed. The ease with which such pastures can be produced at this critical time largely determines whether a producer practices fall calving or late winter and early spring calving. If the nutrient requirements of the cow can be met, weaning weights are usually heavier with fall or early winter calving. However, the requirement for winter feed is greater. If meeting the nutrient requirement for fall or winter calving is physically or economically difficult, spring calving is favored. But breeding the cows during the summer months is also often difficult.

For a number of years The Texas Agricultural Experiment Station at Angleton has followed a program of calving from mid-December to mid-March. Hay (approximately one ton per cow) or an equivalent amount of silage supplemented with protein and mineral is provided during January, February, and until mid-March in a lax confinement feeding system.

The cows sustain a loss of approximately 150 pounds from the time calving begins in mid-December until the beginning of the pasture season in mid-March. The cows are moved to pastures of dallisgrass and common bermudagrass with white clover in mid-March. They normally remain on pasture without any supplemental feeding until the end of December. One and one-half acres of pasture provide grazing for a cow and her calf from mid-March to the end of December. A high level of production has been sustained on these pastures for up to 20 years with annual applications of 45 to 60 pounds phosphoric acid (100 to 133 pounds triple superphosphate) per acre. Figure 11-8 shows gains of calves from mid-March until weaning in mid-October. Gain of calves is highest from March to June, a time when temperatures are moderate and white clover contributes significantly to the available forage. Calf gains are somewhat lower thereafter. From mid-March until mid-October, F_1-Hereford-Brahman calves nursing Brahman cows (Figure 11-9 gain an average of 342 pounds with weaning weights of 522 pounds per calf. Similarly, 3/4-Hereford 1/4-Brahman calves nursing F_1-Hereford-Brahman cows gain 349 pounds with average weaning weights of 555 pounds per calf.

After grazing begins, cows make good weight gains until the end of June. After June, until weaning time, cow weights generally remain fairly constant but sometimes show some weight loss. Cows generally gain weight after weaning and before calving.

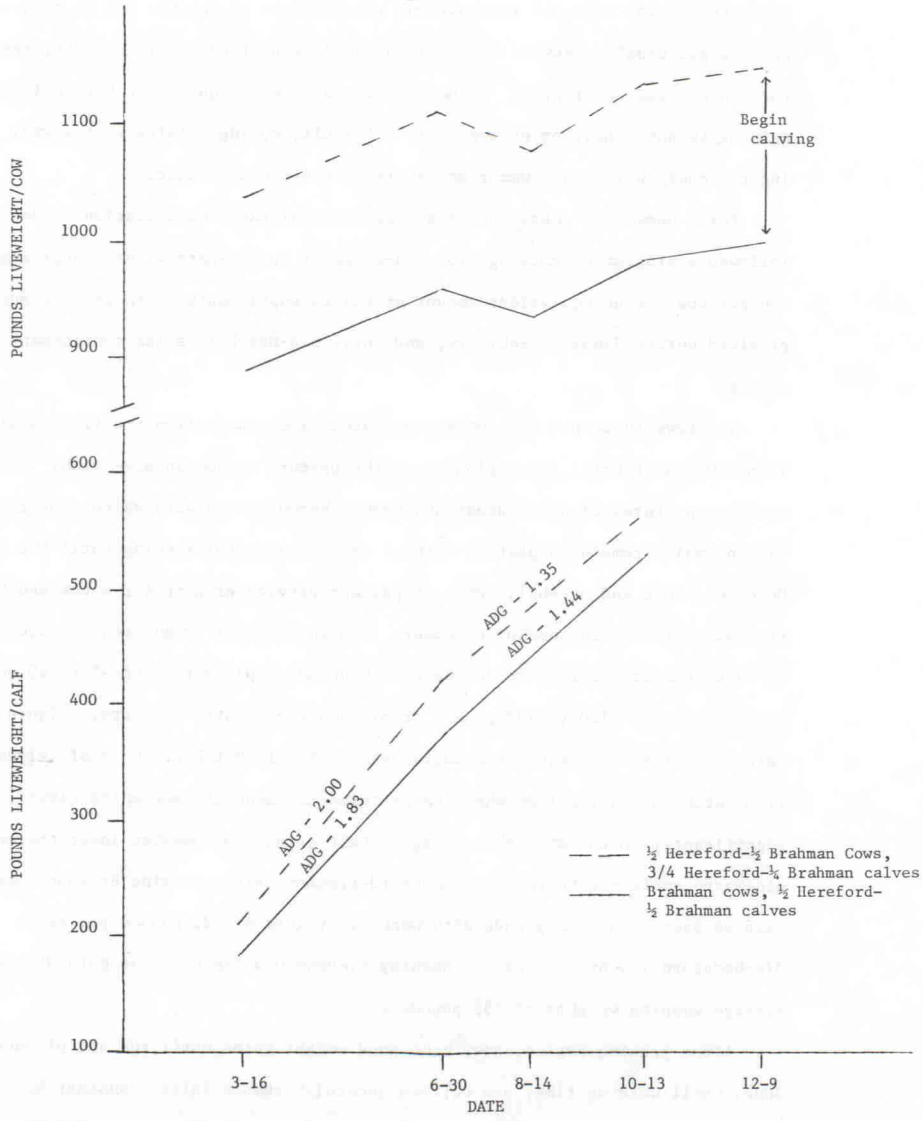

Figure 11-8. Liveweight gain of cows and their calves grazing dallisgrass and common bermudagrass with white clover at stocking rate of one cow-calf pair/1 ½ acres pasture, Angleton.

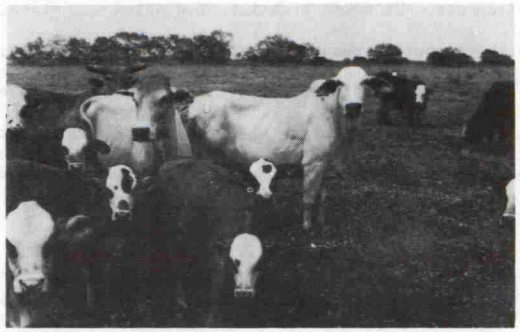

Figure 11-9. Brahman cows with F_1 Hereford-Brahman calves on Dallisgrass-La. S-1 white clover pastures at Angleton.

Figure 11-10. Stocker steers grazing ryegrass pasture at Angleton.

This makes it less difficult to sustain acceptable cow weights during the winter period.

This system provides a high level of nutrition during the breeding season from March through May. At this time, the cow's requirement for nutrients is greatest. Eighty-five to 90 percent of the cows exposed to bulls wean heavy calves.

The average weaning weights at 9 months of age from calves from several crosses for several years at Angleton are given in Table 11-5. The practice has been, as previously described, to allow 1½ acres of dallisgrass and common bermudagrass with white clover pasture for each cow/calf pair. Depending upon the cross involved, average weaning weights range from 517 to 622 pounds per calf.

Table 11-5. Average weaning weights at nine months of age[1] for calves from several crosses for the years 1967-68 through 1971-72, Angleton.

Breed			Pounds/ calf
Dam	Bull	Calf	
Brahman (B)	Hereford (H)	1H1B	517
1H1B[2]	Hereford	3H1B	547
1H1B	Angus (A)	2A1H1B	546
2A1H1B[3]	Santa Gertrudis (SG)	4SG2A1H1B	622
4SG2A1H1B[4]	Charolais (C)	8C4SG2A1H1B[5]	585

[1] Actual weights of heifer and steer calves; heifer calf weights were not adjusted to steer calf weights.

[2] ½ Hereford - ½ Brahman

[3] ½ Angus - ¼ Hereford - ¼ Brahman

[4] ½ Santa Gertrudis - ¼ Angus - 1/8 Hereford - 1/8 Brahman

[5] ½ Charolais - ¼ Santa Gertrudis - 1/8 Angus - 1/6 Hereford - 1/16 Brahman

Gulf ryegrass and tall fescue with or without clover have been used successfully for meeting the requirements of cows nursing calves in the last fall and winter months. The adaptability of these grasses to the soil and climatic condition prevailing, as well as the prevailing economics, will dictate whether such winter pasture or feeding is more profitable for late fall and winter calving.

Good producing winter pastures, such as ryegrass or small grains, are ideally

suited for meeting the nutrient requirements of 2-year old heifers calving for the first time so that they can be successfully rebred to calve as 3-year olds. Such pastures have met the requirements of 2-year old heifers more readily than silage or hay supplemented with protein and minerals.

Stocker Calves

Pasture forage programs for young stocker cattle are generally intended to provide economical growth prior to a fattening period in the feedlot. A successful stocker program requires young cattle to gain, on the average, a minimum of 1.5 pounds per head per day. In some instances, as with an upswing in a cattle price cycle or with extremely light calves, lower gains are acceptable. On the down side of a cattle price cycle, average daily gains of 2 pounds or more or extremely cheap pasture or feed may be required. Only a few classes of forage contain digestible energy sufficiently concentrated to supply the amount required for young cattle to gain 1.5 pounds per head per day or more. Certain legumes (clover and alfalfa) and cool season annual grasses (ryegrass, wheat, etc.) are ideal forages. Gains on warm-season annual grasses, such as the sorghum-sudan hybrids, are expected to be less but may be acceptable in some instances.

Perennial grasses, such as the bermudagrass, dallisgrass, kleingrass, and tall fescue, when grown in pure stands, are usually unacceptable as a base pasture for young stocker cattle. They may, however, be used for limited periods until cool-season annual grass pastures are available.

Weaned calves have been grown out successfully on ryegrass pastures (Figure 11-10) at the Texas Agricultural Experiment Station at Angleton (Table 11-6). In a 4-year study, weaned crossbred Hereford x Brahman steer calves grazed either Gulf ryegrass alone and fertilized with 30-45-0, or Gulf ryegrass grown alone and fertilized with 90-45-0, or Gulf ryegrass grown with Abon Persian clover. The average initial weight of the steer calves was 455 pounds per calf. With a light rate of nitrogen, 30 pounds per acre, the daily gain of the calves was at a minimum acceptable level only with the light stocking rate. As the stocking rate increased, daily gains dropped to unacceptable low levels for calves of this weight for most economic situations. The use of Abon Persian clover with Gulf ryegrass or a higher rate of nitrogen fertilization

Table 11-6. Effect of stocking rate on gain of steers grazing Gulf ryegrass grown alone and fertilized with 30 or 90 pounds nitrogen per acre or grown with Abon Persian clover, Angleton, 1962-65.

Ryegrass alone 30 lb. N/acre			Ryegrass - Abon Persian clover			Ryegrass alone 90 lb. N/acre		
No. steers/ acre	Gain/ steer, lb. Total	ADG[1]	No. steers/ acre	Gain/ steer, lb. Total	ADG	No. steers/ acre	Gain/ steer, lb. Total	ADG
1.08	183	1.53	1.08	228	1.91	1.53	209	1.75
1.64	151	1.27	1.64	189	1.58	2.12	168	1.41
2.14	117	.98	2.14	154	1.29	2.69	131	1.10

Stocking rate (no. steers per acre) times total liveweight gain/steer equals liveweight gain/acre.

[1] Average daily gain, lb.

improved daily gain of the calves. In either case, as the stocking rate was increased, gain per animal decreased. (The economic significance of decreasing animal gain with increased stocking rate is discussed in Chapter 5: Principles of Grazing Management.)

Figure 11-11 shows the effect of season on gains of calves grazing ryegrass pastures. There is generally an initial period of adjustment as calves begin grazing lush ryegrass pastures. During this time, usually 3 to 6 weeks, gains are low and rarely exceed 1 pound per head per day. Thereafter, until the ryegrass matures, average daily gains often exceed 2 pounds per head. Clover grown with ryegrass, although it may not exceed 20 percent of the total available forage, improves daily gain early in the season. Difference in daily gain becomes more pronounced in April as the ryegrass begins to mature and clover contributes significantly more to the total available forage. La. S-1 white clover, when grown with ryegrass, is expected to perform equally as well or better than Abon Persian clover.

Lighter weight calves, because of their significantly lower requirement for maintenance, utilize high quality pasture more efficiently. On high quality pastures such as ryegrass, light calves produce more saleable liveweight gain than heavier calves on the same pasture. This is demonstrated with data from a 2-year study conducted at Angleton (Table 11-7). The average initial weight in Group I was 491 pounds per animal, while the initial weight for Group II was 355 pounds. Group I grazed Gulf ryegrass fertilized with 90-45-0 per acre at a stocking rate of 1.25 steers per acre, while Group II grazed a similar pasture at a rate of 1.75 calves per acre. Stocking rate expressed as liveweight per acre was essentially the same at the beginning of the grazing trial, 613 pounds vs. 621 pounds.

While the heavier calves had a higher average daily gain per head, 1.70 pounds, than the lighter calves, 1.53 pounds, more saleable liveweight was produced with the lighter calves. Lighter calves have a lower daily maintenance requirement but are also expected to have a slightly lower average daily gain. The final stocking rate, expressed as liveweight per acre, was also slightly higher in this study and may have had a small depressing effect on daily gain. Total liveweight gain produced per acre was 322 pounds for the heavier calves (Group I) and 406 pounds for the lighter calves

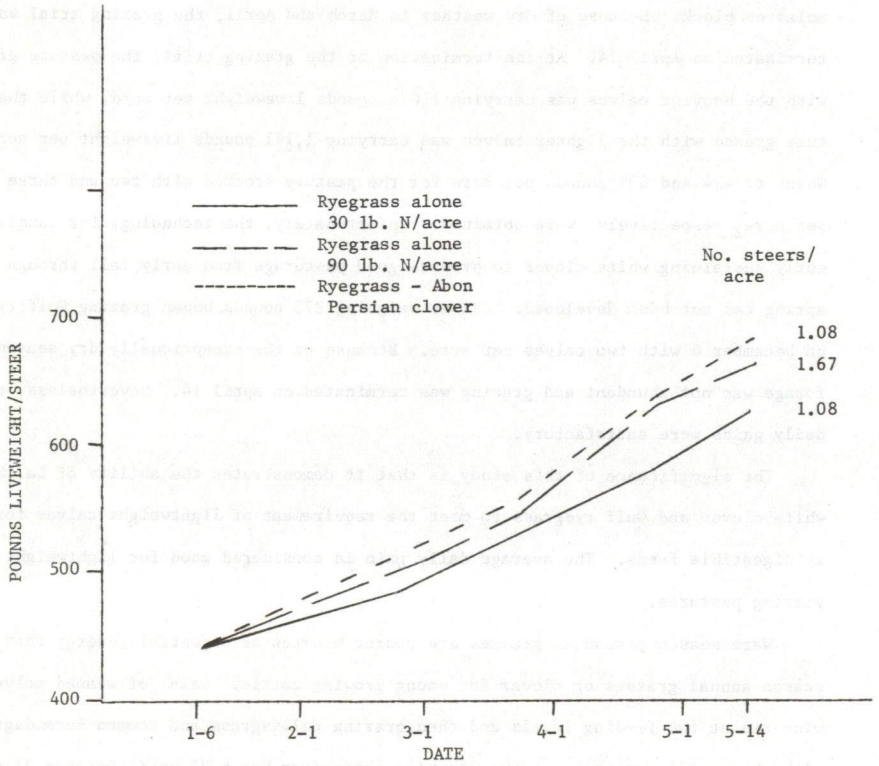

Figure 11-11. Seasonal effect on gain of steers grazing Gulf ryegrass grown with either nitrogen or Abon Persian clover, Angleton.

Table 11-7. The effect of initial weight of weaned steer calves grazing Gulf ryegrass on gain per steer and per acre when stocking rate expressed as liveweight per acre was similar, two-year average, Angleton.

	Group I	Group II
Grazing period:		
Date grazing began	12-16	12-16
Date grazing terminated	5-14	5-14
No. days grazed	152	152
Pounds/animal:		
Initial weight	491	355
Final weight	749	587
Total gain	258	232
Average daily gain	1.70	1.53
Stocking rate:		
No. calves/acre	1.25	1.75
Initial liveweight/acre	613	621
Final liveweight/acre	936	1027
Pounds/acre:		
Total season gain	322	406
Average daily gain	2.12	2.67

(Group II). These data illustrate the reason for the desirability of lighter stocker calves for grazing cool-season annual pastures. However, successful handling of lightweight calves, particularly calves weighing less than 300 pounds, requires considerable managerial ability. Severe health problems may be encountered frequently.

Weaned, exceptionally lightweight calves must have a highly digestible feed to grow satisfactorily. In a study at Angleton (Figure 11-12), La. S-1 white clover and Gulf ryegrass were demonstrated to provide a level of nutrition adequate for very lightweaned calves. In this instance, extremely lightweight calves, weighing 185 pounds

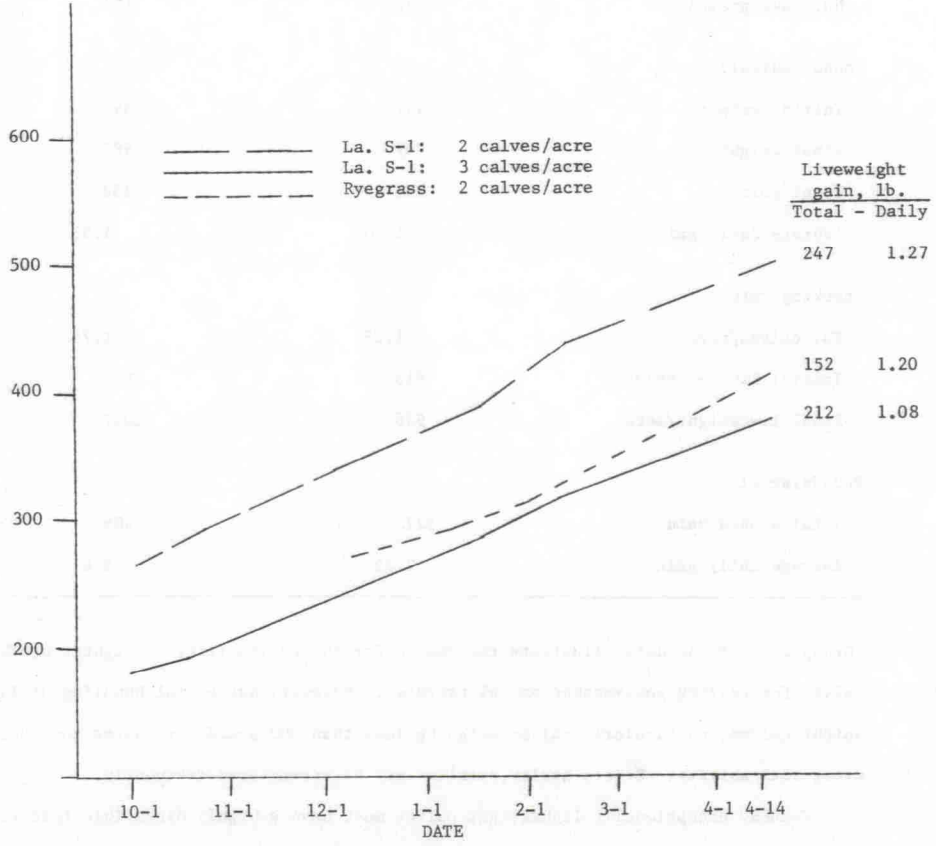

Figure 11-12. Liveweight gains of lightweight calves on La. S-1 white clover or Gulf ryegrass pastures, Angleton.

and 265 pounds per head, respectively, were placed on second year La. S-1 white clover pastures on September 30. The pastures were essentially pure stands of white clover. The group averaging 185 pounds per head grazed the clover pasture at a stocking rate of three calves or 555 pounds liveweight per acre. Meanwhile, calves averaging 265 pounds per calf grazed the white clover pasture at a stocking rate of two calves or 535 pounds liveweight per acre. Clover bloat was controlled with poloxalene in a salt-molasses block. Because of dry weather in March and April, the grazing trial was terminated on April 14. At the termination of the grazing trial, the pasture grazed with the heavier calves was carrying 1,024 pounds liveweight per acre, while the pasture grazed with the lighter calves was carrying 1,191 pounds liveweight per acre. Gains of 494 and 636 pounds per acre for the pasture stocked with two and three calves per acre, respectively, were obtained. Unfortunately, the technology for consistently sustaining white clover to produce good pasturage from early fall through late spring has not been developed. Calves weighing 275 pounds began grazing Gulf ryegrass on December 6 with two calves per acre. Because of the exceptionally dry season, forage was not abundant and grazing was terminated on April 14. Nevertheless, calf daily gains were satisfactory.

The significance of this study is that it demonstrates the ability of La. S-1 white clover and Gulf ryegrass to meet the requirement of lightweight calves for highly digestible feeds. The average daily gain is considered good for lightweight calves grazing pastures.

Warm-season perennial grasses are poorer sources of digestible energy than cool-season annual grasses or clover for young growing cattle. Gain of weaned calves wintered at two feeding levels and then grazing dallisgrass and common bermudagrass with white clover pasture at two stocking rates from March 23 until October 21 are shown in Figure 11-13. The pastures were fertilized with 0-45-0 per acre annually. During the wintering period, December 15 to March 23, one group was fed to gain 1.22 pounds per head per day. A second group was fed to maintain body weight. Both groups were divided at the beginning of the grazing season on March 23. One-half of each group grazed dallisgrass and common bermudagrass with white clover pasture at a stock-

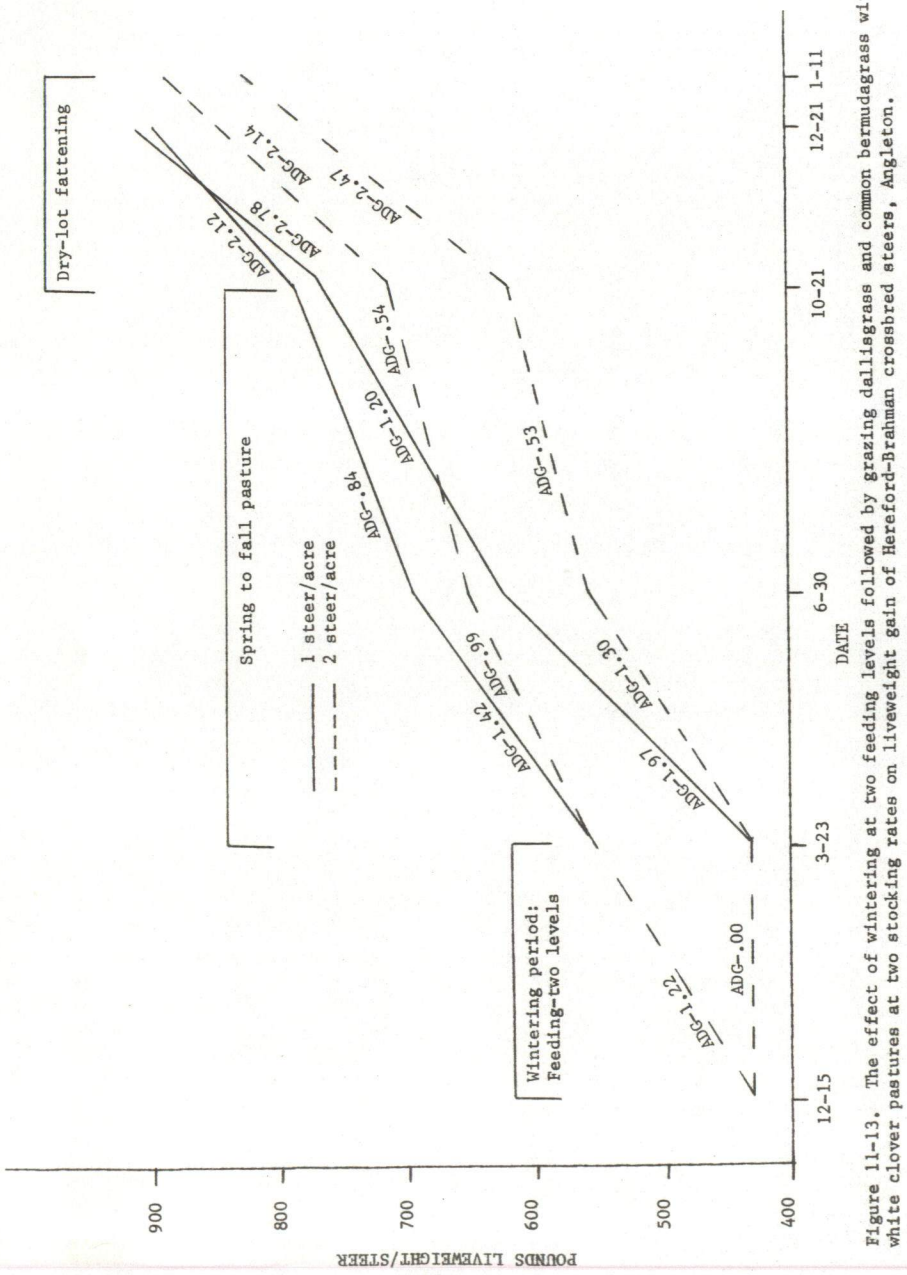

Figure 11-13. The effect of wintering at two feeding levels followed by grazing dallisgrass and common bermudagrass with white clover pastures at two stocking rates on liveweight gain of Hereford-Brahman crossbred steers, Angleton.

ing rate of one steer per acre. The other half grazed the pasture at a rate of two steers per acre.

The group wintered to maintain body weight and then graze dallisgrass-white clover pasture at one steer per acre exhibited considerable compensatory growth, gaining 1.97 pounds per head per day until June 30. The average daily gain for the entire grazing season was 1.56 pounds for this group. It was the only group that approached the daily gain expected from calves nursing cows on similar pasture. Even so, the average daily gain for this group was less than for calves nursing cows on similar pasture (Figure 11-5). Other groups gained considerably less during the grazing season. The group wintered to maintain body weight and then grazing pasture at a stocking rate of two steers per acre exhibited some compensatory growth until June 30 but little thereafter while on pasture.

The use of warm-season perennial grass pastures as the major source of feed for growing stocker cattle is justified only if (1) the cattle market is on the upswing of a price cycle, (2) the pasture is extremely cheap, or (3) the possibility exists to capitalize on compensatory growth with cheap feed in the feedlot following the grazing period. This is the case even though the gain per acre may be good.

Higher fertilization rates on warm-season perennial grass pastures may result in increased forage production, increased carrying capacity, and increased liveweight gain per acre, yet almost always fail to allow stocker cattle to produce economically profitable daily gains. Such pastures are useful, however, for growing out replacement heifers where the requirement for a high daily gain is not so great.

SUMMARY

The income derived from the production of range and pasture forage, harvested by and sold through cattle, exceeds the income derived from all crops produced in the 33 most Southeastern Texas counties. The area considered is bounded by Calhoun to Guadulape counties on the west and Bastrop to Jefferson counties on the north. The income from crops exceeds the income from livestock only in 13 of the 18 rice producing counties. Thus, the importance of pasture and range forage as a source of agricultural income in Southeast Texas is underscored.

Southeast Texas sustains a dense cattle population. Essentially 20 percent of the beef cows in Texas are found in this area. Few other areas of similar size in the United States have as many beef cows. But, production per cow is low. The percentage of cows weaning a calf each year is low, particularly in counties adjacant to the Gulf of Mexico, and weaning weights are generally light.

Even with the increased emphasis on crop production, the potential exists for an increase in the production of red meat in Southeast Texas. Most of the region has a long growing season with usually favorable rainfall. It is possible to grow an abundance of forage.

The most obvious opportunity lies in developing pastures with greater carrying capacity that provide the level of nutrition required by a cow to calve regularly and to wean heavy calves (550-600 pounds). Practical establishment, fertilization, weed control, and pasture management schemes plus sound beef cattle crossbreeding programs have been developed to accomplish this.

Another alternative for Southeast Texas is growing out light stocker calves to feeder or slaughter weights. This option has never really been exercised in Southeast Texas because of certain problems. These problems are being resolved by research, and the growing and perhaps fattening of calves on improved pastures should become a viable option for cattle producers.

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