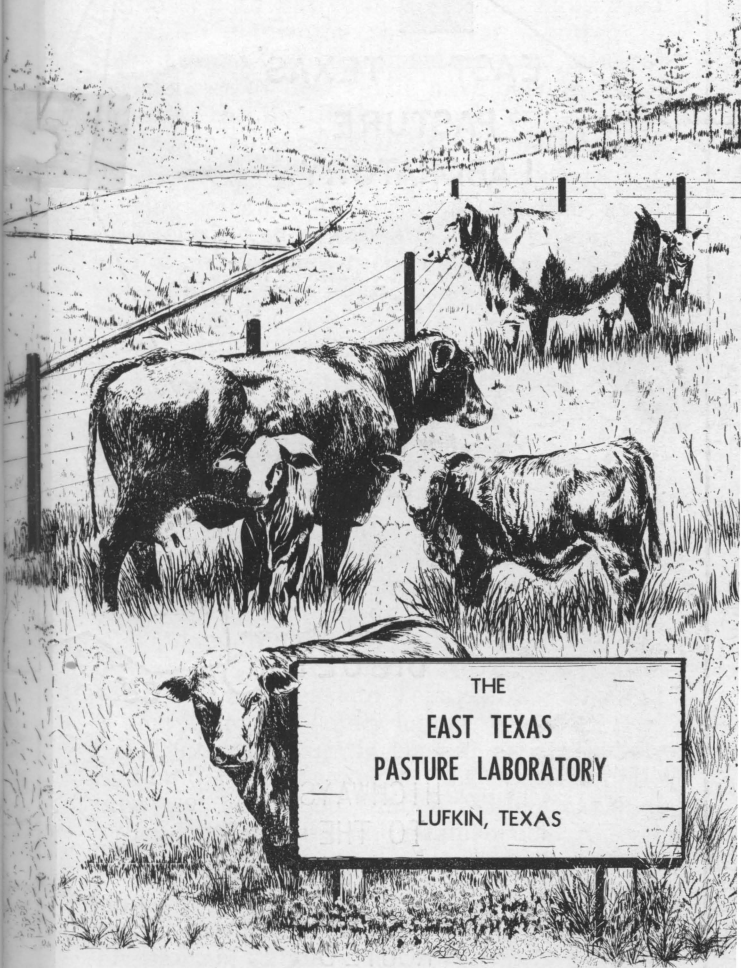
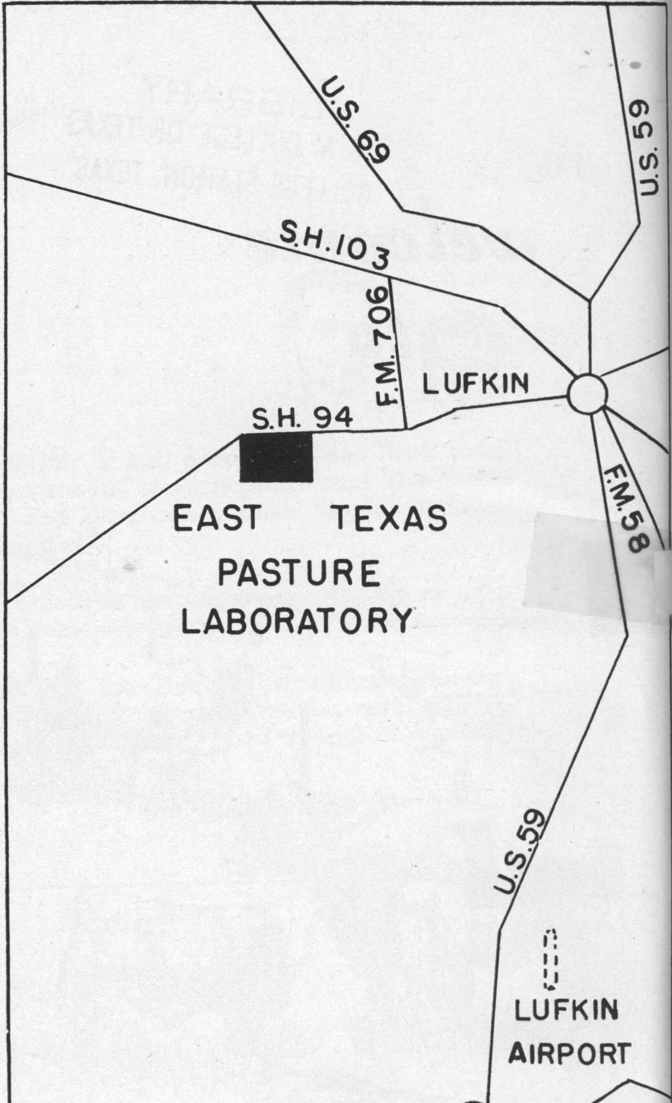
MP-219 AUGUST 1957

welcome to



TEXAS AGRICULTURAL EXPERIMENT STATION



HIGHWAYS
TO THE
EAST TEXAS
PASTURE LABORATORY
ROUTE 5
LUFKIN, TEXAS

Welcome

to the

EAST TEXAS PASTURE LABORATORY

Lufkin, Texas

The East Texas Pasture Laboratory was established on November 16, 1933, 6 miles southwest of Lufkin on State Highway 94, to study methods for establishing better pastures on cutover timberland.

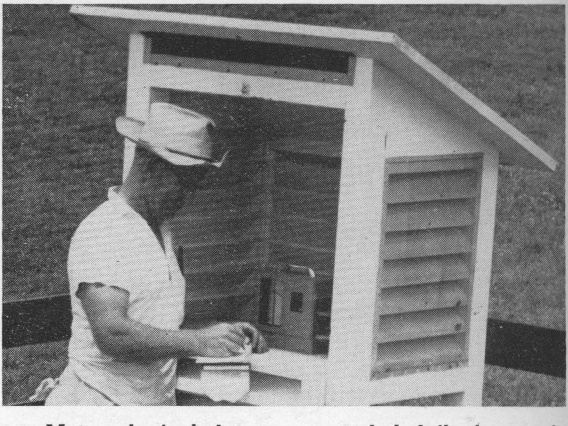
Hundreds of forage plants, grasses and legumes, both native and foreign, have been tested to determine those best adapted to East Texas. Timbered pastures and mineral deficiencies of beef cattle have been studied. In fact, the original livestock project was related to mineral and protein deficiencies in the East Texas forest region.

Sugar cane for syrup production as a cash crop, and sheep and goat production also were included in the early stages of the research program at the East Texas Pasture Laboratory.

Production of milk-fat slaughter calves with heavy weaning weight, through crossbreeding Brahman and Hereford cattle, and methods of improving East Texas pastures probably are the outstanding contributions of this laboratory so far.

This experimental laboratory consists of 211 acres, representative of 15 to 20 million acres of East Texas upland and creek bottom. The piney woods area of East Texas is bounded roughly by a line from Orange to west of Conroe, north to Crockett and Tyler and northeast to Texarkana. The soil is very fine gray sandy loam. About 12 percent of the acreage is classed as creek bottom-land. Native vegetation is principally pine and hardwood timber, with occasional bunch-type grasses and underbrush.

The average annual rainfall during the 23 years of records at this laboratory is 47.6 inches, with extremes of 29.0 and 71.1 inches. The normal January temperature is 50.2 degrees F. and the normal July temperature is 83.7 degrees F. Temperatures as low as -2 degrees to as high as 110 degrees F., have



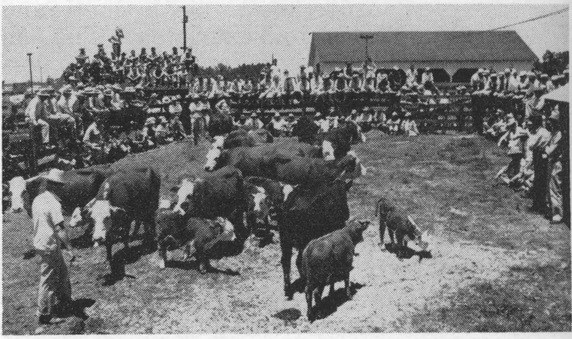
Meteorological data are recorded daily for use in agricultural research.

been recorded. The average first killing frost is November 20 and the last is March 18, allowing a 235-day growing season. The elevation ranges from 220 feet in the creek bottom to 270 feet on upland, from nearly flat to undulating terrain.

Several projects are in cooperation with other substations and with the agronomists, animal husbandmen and veterinarians at the Main Station. A reforestation project is conducted in cooperation with the Texas Forest Service.

Visitors always are welcome to the East Texas Pasture Laboratory. From 2,000 to 3,000 persons visit here annually, including those at regular and special field days. The address is Route 5, Box 181, Lufkin, and the telephone number is Lufkin 2-9672.

E. K. CROUCH, *Superintendent*
L. A. GIBSON, *Foreman*



Field days are well attended and much interest is shown in East Texas beef production.

Agricultural Research Projects at the East Texas Pasture Laboratory

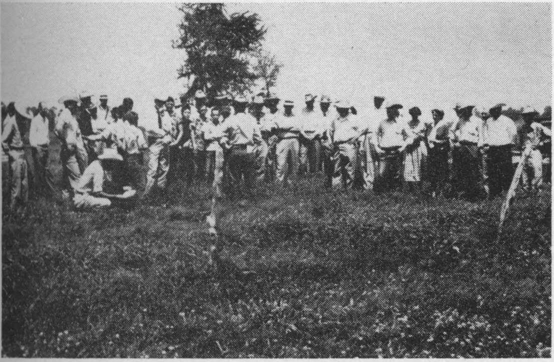
PASTURES

The East Texas Pasture Laboratory has for more than 20 years established and maintained permanent pastures on creek-bottom land. For the past several years these pastures have produced 250 pounds of calf gain per acre in contrast with 5 to 15 pounds of gain per acre on unimproved pastures. This type of land comprises about 12 percent of the total land area in the East Texas timber country.

Similar improved pastures, established about 10 years later on the gray, sandy upland, which makes up most of the land in this area, produce approximately 200 pounds of calf gain per acre annually.

Cattle production is based on a carrying capacity of 1.5 acres per large cow (1,100 pounds) the year-round and a 75 percent calf crop weaned. If the calf crop can be increased to 90 percent and the weaning weight to 500-525 pounds by using crossbred cows only, the acre yield of calf gain can be increased to 300-325 pounds on pastures improved according to findings on this laboratory.

Grasses and legumes which provide most of the forage at Lufkin are Bermuda, Dallis,



Creek bottom pastures produce around 250 pounds of calf gain per acre per year.

carpet and Bahia grasses, and white, hop, Persian and crimson clovers. Among the grasses Bermuda and Dallis are preferred—Dallis dominating the bottomland and Bermuda the upland. Coastal is preferred to common Bermuda for starting new pastures but is not recommended for introducing into existing common Bermuda sod. White and hop have been the most reliable clovers—white on the heavier bottomland soils and hop on lighter upland soils.

The present cost of establishing pasture would be $30 to $40 per acre for seed and fertilizer, over a 2 to 3-year period, providing the land is clear of timber. The establishment practice includes the use of 60 pounds of phosphoric acid and potash annually, and 20 to 50 pounds of nitrogen along with an initial seeding operation. The cost of fences and watering places is not included. The cost of maintaining the pasture is $8 to $12 per acre annually, mainly for fertilizer since little or no reseeding is required. Annual fertilizer applications are based on needs established from soil tests, and has involved the use of lime as well as nitrogen, phosphorus and potash.

For 1.5 acres of pasture to carry a cow year-round the surplus forage should be cut and stored as silage or hay for winter roughage. This involves additional expense. Leaving the surplus for the cow to harvest during the winter, as is practiced in drier regions, is unsatisfactory in this area. Dampness after the first killing frost causes rapid

Extra forage is cut and stored as hay or silage for winter roughage.

deterioration of forage. Also, a heavy growth of warm-season forage left on the pasture decreases the subsequent stands of clover and other cool-season plant growth.

Many different forage plants, both native and introduced, have been tested and observed on this station in the past 23 years. Plants were first grown in prepared seedbeds, cultivated and protected from competition and grazing. As plants showed promise, cultivation was stopped and competitive vegetation allowed to invade the plots. Plants which showed resistance to invasion by competitive vegetation were subjected to grazing. In these tests the most dependable are Dallis and Bermuda grasses and white and hop clovers.

In the past few years, introduced plants have been seeded or sprigged directly into the pasture in competition with plants already growing. Some that were tried and found to be unsatisfactory under these conditions include Alta, Alta 144 and Ky 31 fescues, Harding and orchard, which are cool-season grasses; K. R. Bluestem, buffel, blue panic, Rhodes and one or two strains of lovegrass, which are warm-season grasses; common, Kobe, Korean and Serecia lespedezas. None has been ruled out completely, but each has had at least one chance.

Reseeding crimson, rose, bur, subterranean and cluster clovers grow fairly well, but are not dependable from the standpoint of production and reseeding.

Planting small grains and other cool-season plants in the sod for December, January and February grazing shows promise in 3 years of testing. This practice results in less cattle bogging than where a seed bed is prepared for winter crops, and also reduces soil erosion by winter rains. A trial seeding of Sudangrass and cattail millet in sod for summer grazing was a failure.

Forage plants in pastures here need frequent rain, especially in hot weather, for maximum production. Failure to get rain in the summer causes damage in a few weeks.

Fertilizers and Limes

Research conducted on the sandy, gray upland soils of East Texas shows that these soils are generally very low in both nitrogen and phosphorus and that they are rather acid. Occasionally some need for potash is shown. These data indicate a sound liming program must be followed along with the use of a complete fertilizer if a good improved pasture is to be developed. During the first 2 to 3 years of the program each nutrient should be applied at a rate of about 60 pounds per acre, with one half of the nitrogen being applied in the fall or early spring and one half in May. All the phosphorous and potash should be applied in the fall to stimulate legume growth. After the legumes are well established, only the May application of nitrogen may be required.

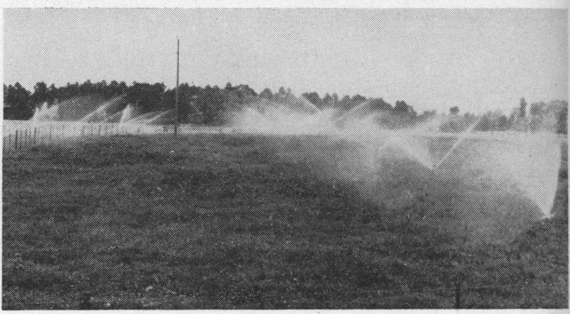
The fertility requirement of the bottomland soils is the same as the upland except that the potash requirement is generally lower.

"Renovation" by Tillage

Two mechanical pasture renovation studies, made several years apart, produced similar results. For 2 to 3 years after the sod was disturbed, weeds were about the only vegetation on the scars, and the yield of palatable forage was decreased. After the scars healed with a cover of grass, there were no benefits from these mechanical attempts at renovation.

Irrigation

Dry years, beginning in 1950, prompted many questions on irrigation of pastures, whereas in the 1930's and 1940's the concern had been for proper drainage. Irrigation tests had to be delayed until 1956 because of unfilled reservoirs. After 105 days of irri-



Dry years led to initiation of studies of supplemental irrigation on pastures.

gation in 1956 the reservoirs were dry and the study had to be discontinued. During the winter the reservoirs were filled again and the study was resumed in 1957.

Four levels of fertilization are being applied, with cattle used to measure the forage production. Full tests are required to determine final results. However, in summer 50,000 pounds of cattle (58 head) are being maintained on 24 irrigated acres in 1957.

Unpalatable Plants

In this region of fast-growing vegetation, unpalatable plants must be controlled to avoid their crowding-out desirable plants. This is particularly true in new pastures. Control in tests here has been by mowing two or three times a year in new pastures, and once or more in older, well-sodded pastures. The mowed forage generally can be used for hay, thereby offsetting the cost of mowing.

Other Results of Pasture Studies

Other findings in pasture improvement of value to landowners include:

Under our system of management, lespedezas and clovers are incompatible, with the clovers crowding out the lespedezas.

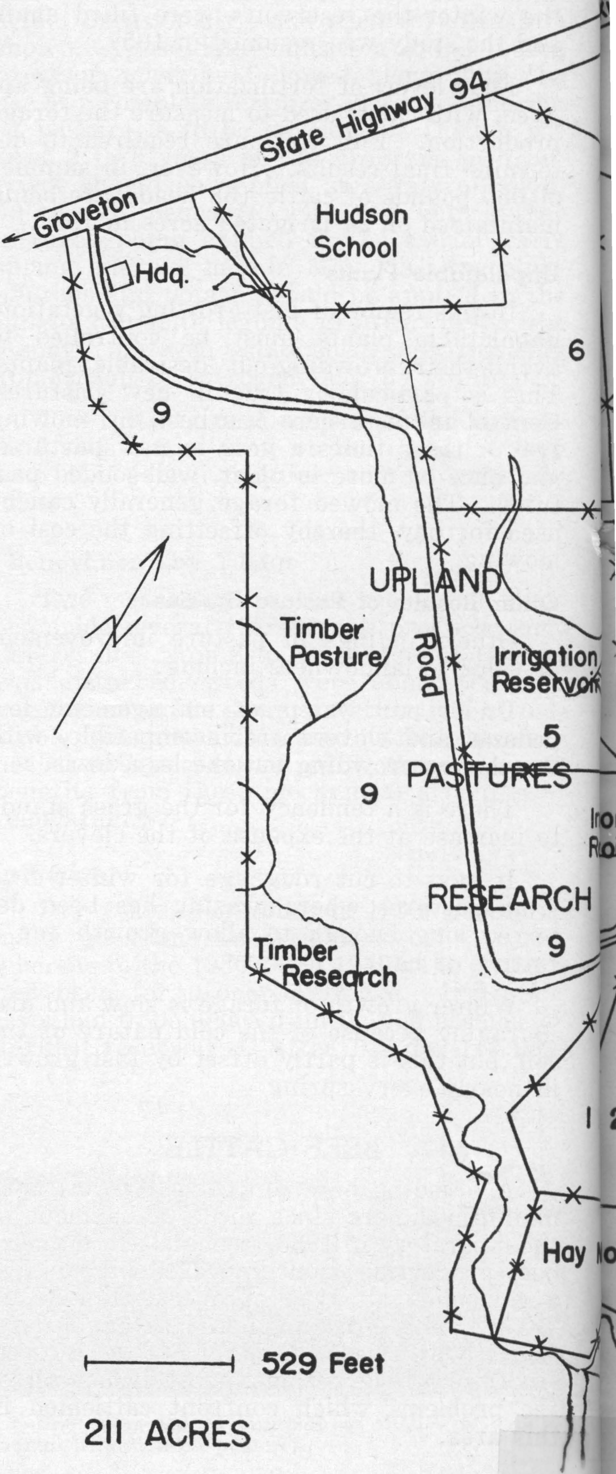
There is a tendency for the grass stands to increase at the expense of the clovers.

It pays to cut roughage for winter feed from pastures where grazing has been deferred long enough to allow growth for a cutting of hay.

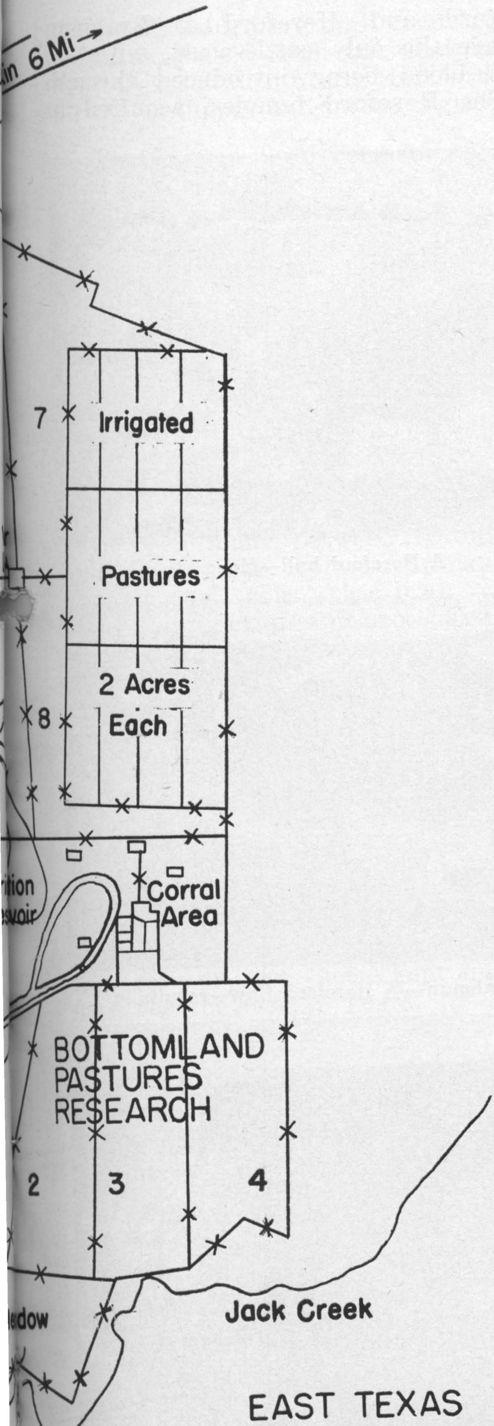
Winter growth of forage is slow and discouraging because of the cold nature of the soil, but this is partly offset by fast growth in nearly every spring.

BEEF CATTLE

A breeding herd of beef cattle has been maintained here since the establishment of the laboratory in 1933, primarily to measure beef production from improved pastures in a cow and calf type of operation in East Texas. This breeding herd has enabled research workers at the Main Station and the laboratory to experience most if not all of the problems which confront cattlemen in this area.

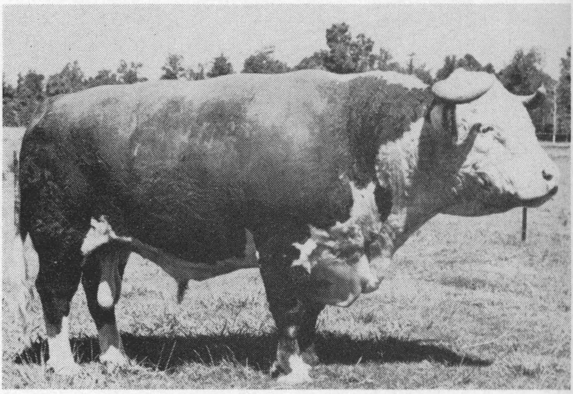


State Highway 94
Groveton
Hudson School
Hdq.
6
9
UPLAND
Timber Pasture
Road
Irrigation Reservoi
5
PASTURES
9
RESEARCH
9
Timber Research
1
Hay
529 Feet
211 ACRES

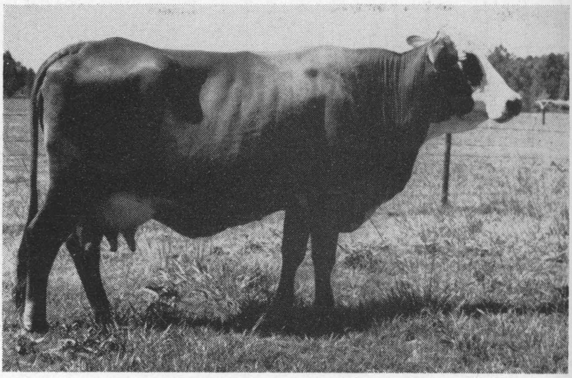


EAST TEXAS
PASTURE LABORATORY
LUFKIN, TEXAS

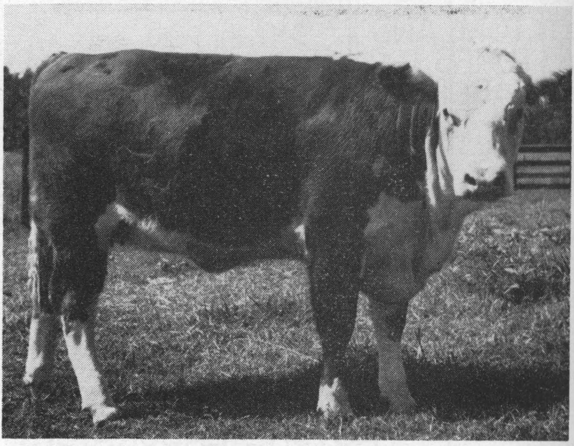
Hereford and Hereford x Brahman crosses are the only cattle used, with the Brahman blood being introduced through bulls. The Hereford females, acquired in



A Hereford bull—plus



A ½ Brahman—½ Hereford Cow—results in



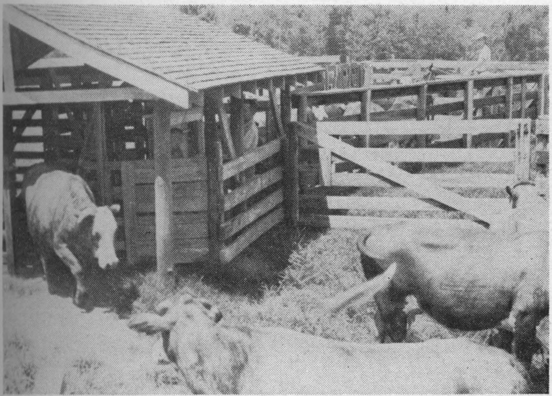
A ¾ Hereford—¼ Brahman—the heaviest calf at weaning.

1934 and 1946, were high grade commercial cattle purchased from outstanding herds in West Texas. Most of the Hereford bulls and all the Brahman bulls were registered.

The present herd consists of about 100 cows plus nearly 100 calves, bulls, replacement heifers and steers. All are carried on the 211 acres, of which only 143 acres are in improved pastures. There was a total of 148,000 pounds of cattle on the 143 acres (1,040 pounds per acre) on May 1, 1957.

In addition to use in measuring pasture production, the cattle have been used in studies of mineral and protein deficiencies, the effect of trace elements (copper, cobalt and iron) and/or organic vs. inorganic sources of calcium and phosphorus. Comparisons have been made between cottonseed hulls and silage made from sugar cane bagasse. Ground corn cobs, rice bran, wheat, molasses, meat scraps and urea have been studied as sources of winter feed supplemental to pasture and grass hay produced on the laboratory. A search has been made for methods of producing better milk-fat slaughter calves through breeding, management and investigation of slaughter and carcass characteristics at the Meats Laboratory at the Main Station. Studies have been made of ox warble control and control of internal parasites in suckling calves.

Complete weight, breeding and production records have been kept on the cattle herd for the last 23 years.



Weights, taken every 30 days for 23 years, are part of the extensive records of this laboratory.

Steers are used sometimes to harvest the "extra" forage during peak growing season of improved pastures.

Steers have been used in two tests on lush pastures during peak growing seasons.

Beef cattle numbers have made a phenomenal increase in the East Texas timber country since 1940. The 22 counties surrounding this laboratory show an increase of 70 percent in number of head from 1940 to 1954. Because of the comparable increase in the quality of cattle during this period, it is estimated that on the basis of weight rather than number of head another 15 percent can be added.

Results of research at the East Texas Pasture Laboratory have influenced the increase in both quality and quantity of cattle in East Texas.

Some of the following outstanding studies at the laboratory during the past 23 years can be of even greater benefit to the cattle industry of East Texas:

1. Annual applications of 20 to 30 pounds of nitrogen, 50 to 60 pounds of phosphorus and 30 to 60 pounds of potash per acre seem to satisfy fully the mineral requirements. When this is done there appears to be no mineral deficiency for cattle on these fertilized pastures because cows born and raised on this laboratory have reached weights of 1,000 to 1,300 pounds and have produced calves weighing 500 to 700 pounds at 7 months of age. If any other mineral deficiency does exist it does not affect growth rate nor mature weights of cattle. Current cost of the maintenance applications of fertilizer is $8 to $12 per acre annually to maintain production of 200 pounds of calf weight per acre.

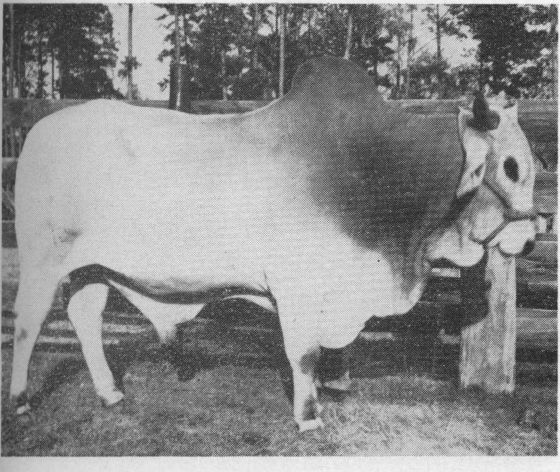
2. Even on fertilized, seeded and otherwise highly improved pastures, some Brah-

man blood in the cows results in heavier and fatter calves at 7 months weaning age in September or October. The best calves have been consistenly produced by ½ Brahman—½ Hereford cows mater to Hereford bulls. Their calves have averaged 516 pounds at weaning with little if any creep feeding. Hereford calves at the same age and under the same conditions have averaged 407 pounds. Calves from ¾ Hereford—¼ Brahman cows and sired by Hereford bulls have averaged 473 pounds, while calves sired by Brahman bulls from Hereford cows averaged 440 pounds at weaning.

3. Winters here are hard on cattle because the cold air usually is damp, which requires additional feed, especially where many cattle are pastured on small acreages. About 1.5 acres of grazing per cow year-round, plus about 200 pounds of protein-rich supplement feed and 1,000 to 1,200 pounds of low quality roughage, prevents large losses in weight.

4. There are occasional deaths due to prolonged bleeding following surgical wounds. It is thought this condition is a result of intensive grazing on clover.

5. Cattle with Brahman blood apparently do not suffer from the humid summer heat to the degree that British breeds do.



This outstanding Brahman bull sired many of the brood cows now used in the herd here to produce the ¼ Brahman—¾ Hereford calves recommended for East Texas slaughter calf production.

6. Bloat in cattle has not been serious, even though clovers may grow rank in the spring.

7. The herd is vaccinated regularly for blackleg, and has been tested and found free of brucellosis, tuberculosis and leptospirosis. Physical examinations of breeding cows have revealed no abnormal conditions.

8. Screwworms are not as serious here as in some of the drier areas where cattle are produced. It has been shown that the screwworm fly is most active when the weather is neither too wet or too dry. Normal weather in this area seems to be too wet for the fly, for screwworm activity is highest in East Texas during the drier years.

9. Internal parasites, especially stomach worms, never have been serious during many years of heavy stocking. Experimental work with the past 6 calf crops shows that calves drenched regularly with phenothiazine did

Tests have shown that suckling calves treated for internal parasites do not gain any more than untreated calves when all are out of good cows and graze good pasture.

not gain any more weight than untreated calves. Therefore, it appears that cattle raisers in the region need not bother drenching their calves as long as they are on good mothers and these mothers are on good pasture.

10. The calf crop at weaning age is rather low, averaging about 75 percent. Approximately 10 percent of the calves are born dead or die shortly after birth. Many of these calves showed definite physical malformations such as hydrocephalus, improperly formed hearts and defective tooth formation. In other calves the actual cause of death could not be determined. Some of the surviving calves were so-called dummies, and possibly were affected with hydrocephalus to some degree.

SUGAR CANE

Sugar cane for syrup production once ranked second to cotton as a cash crop in much of East Texas but it's production was declining, partly because of a mosaic disease, when this laboratory was established. Louisiana canebelt varieties and strains resistant to mosaic were tested. The tests were terminated after the introduced canes consistently doubled the yield of syrup per acre over old varieties. However, sugar cane production in East Texas has about ceased.

SHEEP

Sheep were produced on the East Texas Pasture Laboratory from 1940 through 1945 in tests to increase wool and lamb yield on native range. The tests were begun with East Texas ewes which on native range produced about 3 pounds of poor quality wool annually and a low percent lamb crop.

By breeding them to good Rambouillet rams the pounds of wool soon almost doubled, its quality improved and in one small test flock the lamb crop jumped to 100 percent. Spring lambs weighed 60 to 80 pounds by September or October.

West Texas Rambouillet ewes brought in later fared as well as the native x Rambouillet crosses. It is believed that owners of improved pastures in East Texas can make additional profit by grazing sheep part of the year—primarily wintering lambs and selling them fat off clover in the spring.

Dogs which were very numerous in the thickly populated community and internal parasites proved the worst enemies of sheep. These can be controlled.

GOATS

Goats were used here as early as 1934 to determine their ability to control underbrush in this region of heavy rainfall and fast growth. A small flock of Spanish-type (short-hair) were used in the beginning.

Since the only income from goats was an occasional sale for barbecue a flock of Angoras was brought from the Sonora substation in 1937 in hopes they would do a job of brush control equal to the Spanish goats and at the same time give an income from mohair. With Angora bucks, Angroa and Angora x Spanish-type kids were produced.

The Angora does had much difficulty withstanding the adverse climate and in producing kids, but they did fairly well when they went through a year without producing kids. This indicated that shipped-in, grown, rugged Angora wethers might have been used successfully in brush control as well as producing mohair.

In 1945 the goats here became part of an overall project conducted by the Texas Agricultural Experiment Station on the transfer of fineness of fiber, often found in the Spanish-type goats with a downy undercoat, to the mohair of the Angora. This project is showing much promise in the goat research at the McGregor substation.

STATE-WIDE RESEARCH

The Texas Agricultural Experiment Station is the public agricultural research agency of the State of Texas, and is one of ten coordinated parts of the Texas A. and M. College System.

The Main Station and headquarters are located at College Station, with 21 substations and 9 field laboratories located throughout major agricultural areas of Texas. In addition research is conducted at other locations in cooperation with the Texas Forest Service, Game and Fish Commission of Texas, Texas Prison System, the U. S. Department of Agriculture, University of Texas, Texas Technological College, Texas College of Arts and Industries and King Ranch. Some experiments are conducted on farms and ranches and in rural homes.

The Texas Agricultural Experiment Station is conducting about 400 active research projects, grouped in 25 programs which include all phases of agriculture in Texas.

Research results are carried to Texas farm and ranch owners and homemakers by specialists and county agents of the Texas Agricultural Extension Service.

ADMINISTRATION

R. D. LEWIS
Director

R. E. PATTERSON
Vice Director

College Station, Texas

AGRICULTURAL RESEARCH seeks the WHATS, the WHYS, the WHENS, the WHERES and the HOWS of hundreds of problems which confront operators of farms and ranches, and the many industries depending on or serving agriculture. The workers of this substation, along with those of the Main Station and other field units of the Texas Agricultural Experiment Station, diligently seek to find solutions to these problems.

AHM9585

FOR BETTER LIVING

Today all people have a stake in agricultural research. The quality and quantity of food, feed and fiber available for their welfare are dependent on the information developed through organized research.

The Texas Agricultural Experiment Station concerns itself with problems confronting, and likely to confront, farmers and ranchmen, rural homemakers, farm groups and representatives of other organizations depending on or serving agriculture.

Agriculture up to now usually has kept abreast of demand. But continued agricultural research is necessary to point the way toward maintaining and improving our productive resources, lowering cost of production, improving quality, expanding markets, devising new and better methods for growing, processing, distributing and utilizing farm and ranch products, and toward better city and country living.

Researchers of the Texas Agricultural Experiment Station are dedicated to that aim. *Today's Research is Tomorrow's Progress.*