TEXAS SUPPLEMENT.

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Location. — The State of Texas is located north and west
of the Gulf of Mexico between north latitude 25 degrees 51
minutes and 36 degrees 30 minutes and west longitude 93
degrees 27 minutes and 106 degrees 43 minutes. On the
north it is bounded by Oklahoma and New Mexico; on the
east by Oklahoma, Arkansas, and Louisiana; on the south
by the Mexican states of Tamaulipas, Coahuila, and Chihua-
hua; on the west by New Mexico and the just mentioned
Mexican states. With the exception of Florida it is the
most southerly State.

Area, Political Divisions, and Population. — Texas com-
prises 265,780 square miles, of which 262,780 square miles
are land surface and 3000 square miles are water sur-
face. The longest straight line that can be drawn within
the State is 825 miles, *i.e.* from the mouth of the Rio
Grande to the northwest corner. From northeast to south-
west (Texarkana to El Paso) the distance is 740 miles;
from north to south, 594 miles, and from east to west,
740 miles.

From a point near the town of Lampasas, in central Texas,
a circle of 400 miles in diameter ($=125,660$ square miles)
can be drawn wholly within the State. If the State should
be turned over on a hinge at its eastern border, it would

project about 70 miles into the Atlantic Ocean, and if turned over on its western border, it would project 180 miles into the Pacific Ocean. If turned over on its north line, it would reach to the center of North Dakota and be within 100 miles of the Canadian border. The State is divided into 251 counties, some of which are still unorganized. The counties vary a great deal in size, from 171 square miles (Rockwall county) to 5573 square miles (El Paso county).

According to the Census of 1910, Dallas, with 900 square miles, was the most populous county, having 135,748 inhabitants, and Cochran, with 959 square miles, was the most thinly settled county, having only 65 inhabitants. The total population of the State was 3,896,542, and of this number 1,973,816, or more than 50 per cent, lived in 13 counties, viz., Bell, Bexar, Collin, Dallas, Ellis, El Paso, Grayson, Harris, Hunt, McLennan, Navarro, Tarrant and Travis. Of the total population 938,104 lived in cities and towns of 2500 inhabitants or more, while 2,958,337 lived in the country and in villages.

The total area of these counties is 18,539 square miles, so that the density of population in the area comprising more than one half of the inhabitants is a trifle over 106 per square mile. The remainder of the land surface of the State, viz., 244,241 square miles, contained 1,922,726 inhabitants, or very nearly 8 per square mile. The State at large had 14.8 inhabitants per square mile and the United States 30.9. The most thickly settled state is Rhode Island, with 508 inhabitants per square mile, while Nevada has less than one inhabitant per square mile.

There are no large cities in Texas. By the Census of 1910 the ten largest cities were:

Cities	Population	Elevation, Feet
San Antonio	96,614	675
Dallas	92,104	425
Houston	78,800	38
Fort Worth	73,312	614
El Paso	39,279	3695
Galveston	36,981	4
Austin	29,860	466
Waco	26,425	400
Beaumont	20,640	21
Laredo	14,855	438

These ten cities had a population less than that of Pittsburgh, Pennsylvania. With the exception of El Paso there is no city or town in Texas of more than 14,000 population that has an elevation greater than 675 feet above sea level.

The Commission form of government is used in 15 Texas cities and towns, with a combined population of 376,462. Galveston was the first city in the United States to establish this form of municipal government, in 1901.

The capital of the State is Austin, Travis county, 190 miles northwest of Galveston. It is beautifully situated on the Colorado River, which, however, is not navigable so far inland. A line drawn due west from Austin touches no railroad for more than 300 miles.

Chief Physical Features. — Looked at in a broad way, Texas is a vast plain sloping towards the southeast and south, with the Panhandle and a part of the northern portion sloping toward the east. If a line were drawn from Galveston, at sea level, to the top of Baldy Peak, Jeff Davis county, a distance of 570 miles, it would touch the highest point in the State, 8382 feet, and would have an average slope of about 15 feet to the mile, south of east. A line drawn for 300 miles north of Galveston and reaching nearly to the Red River would slope about $1\frac{1}{2}$ feet to the mile, south. A line

drawn for 600 miles northwest of Galveston, to near the head-waters of the Brazos River, would reach an elevation of 4400 feet, and would slope about $7\frac{1}{3}$ feet to the mile, southeast.

The crescent shaped area that comprises the Gulf Coastal Plain and which extends inward about 100 miles has a mean average elevation of 170 feet. For the first 100 miles from the Gulf the average slope does not exceed 2 feet to the mile. For the next 100 miles the mean average slope is about 4 feet to the mile, and the slope gradually increases until an elevation of 4400 feet is reached, 600 miles northwest of Galveston.

The Llano Estacado, or Staked Plain, long known as a distinguishing physical feature of a large part of Texas lying east of New Mexico and south of the Panhandle, is a great plain, practically devoid of trees, and with an average elevation of 3000 feet. The greatest elevations are in what is known as trans-Pecos Texas, *i.e.* the area west of the Pecos river, a region embracing 29,655 square miles. In this part of the State there are twenty-one peaks that exceed 5000 feet in height, thirteen that exceed 6000 feet, eight that exceed 7000 feet, and one that exceeds 8000 feet. As already observed, the highest point in the State is Baldy Peak, Jeff Davis county, with an elevation of 8382 feet. The next highest point is Mount Emory, in the Chisos Mountains, southern part of Brewster county, 7835 feet. The highest town in the State is Fort Davis, Jeff Davis county, 170 miles southeast of El Paso, with an elevation of 4927 feet. At Paisano, Brewster county, there is reached the highest point on the Southern Pacific Railroad between the Gulf of Mexico and the Pacific Ocean, 5078 feet. The average elevation of trans-Pecos Texas is about 3500 feet.

A remarkable topographic feature of trans-Pecos Texas is the large number of old volcanic peaks that characterize the landscape in almost every direction. These volcanic, or igneous, rocks appear to have come up through the older limestones and shales of the Carboniferous and Cretaceous formations

and to have spread over very considerable areas. The erosion that has taken place has cut away the softer rocks, and in many localities the igneous rocks have been left to project to notable elevations above the surrounding country. Excellent illustrations of this process of intrusion and erosion may be seen on a large scale in the Franklin Mountains, near El Paso; in the Quitman Mountains, eastern part of El Paso county; in the Chinati Mountains, southern part of Presidio county; in the Mt. Ord Range, north-central part of Brewster county, and in the Chisos Mountains, southern part of Brewster county. Individual instances may be seen in San Jacinto Peak, southern part of Presidio county, Santiago Peak, south-central part of Brewster county, and in Pilot Knob, near Austin, Travis county.

In many places the intrusion of these vast masses of igneous rocks has been accomplished very gradually, so that there is not to be observed the violent shattering and displacement of the older formations that one might expect to find in regions that have been subjected to such disturbances.

The existence of mineral deposits in trans-Pecos Texas is intimately connected with such dislocations of the earth's crust, for the ores of copper, zinc, lead, tin, silver, quicksilver, etc., are not, as a rule, found outside of such areas.

River System. — As already observed, the general slope of Texas is southeast and south, with a part of the Panhandle and north Texas sloping towards the east. The general course of the rivers and lesser streams follows these directions. From east to west the principal streams are the Sabine, Neches, Trinity, Brazos, Colorado, Guadalupe, San Antonio, Nueces, Devil's River, Pecos. With the exception of the Devil's River and the Pecos, which empty into the Rio Grande, all of these streams flow into the Gulf of Mexico. Some of the principal streams in north Texas, such as the Sulphur Fork, the Wichita, Pease, Prairie Dog, etc., flow into the Red River, with an easterly and north-

easterly course. The Rio Grande is on the south and west border and the Red River is on the north border as far west as the eastern part of the Panhandle. There are but few navigable streams in Texas, under ordinary conditions. The Sabine and the Neches are navigable for some distance above Sabine Lake, and a little intermittent traffic is carried on along the lower part of the Brazos, Colorado, and Rio Grande. The United States Government is now engaged in improving the Trinity River, by a system of locks and dams, so that light draught boats may be able to reach Dallas.

The longest river in Texas whose waters are confined wholly within the State is the Colorado. In a direct line from its mouth in Matagorda Bay to its headwaters in Andrews and Gaines counties, next to the New Mexico border, the distance is 425 miles, but with the meanderings, the entire course is probably 700 miles. The Brazos River is much longer, but it rises in New Mexico, as does also the Pecos. This latter river, the Pecos, with a course of about 300 miles in Texas, is remarkable for the fact that, with the exception of a few favored spots, its banks are devoid of trees. In the lower part of its course, before it empties into the Rio Grande, it has cut its way down through heavy beds of limestone to a depth of 350 feet. The viaduct of the Southern Pacific Railroad is 328 feet above the bed of the Pecos. It was a noteworthy engineering accomplishment to raise the height of this viaduct five feet without interruption of traffic.

One of the most remarkable canyons in the United States is the Grand Canyon of the Rio Grande, on the southern border of Brewster county. Here the river has cut a gorge 1500 feet deep, with almost vertical walls, for a distance of 12 miles. The scenery is extremely rugged and picturesque, and when the river is in flood, the waters reach a height of 75 and 100 feet above low water level. This place is 100 miles south of Alpine in one of the wildest and most un-
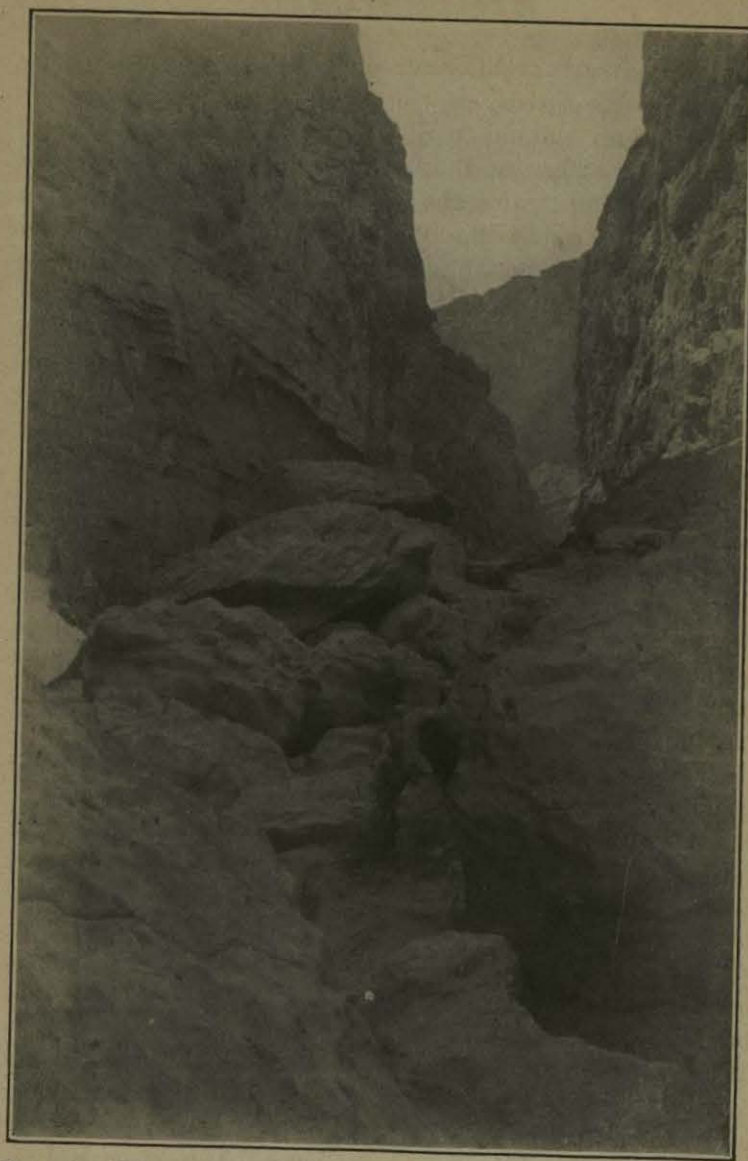
PLATE I. — Mouth of the Grand Canyon of the Rio Grande on the south border of Brewster County.

frequented parts of the State. Plate I gives a view of the mouth of this canyon.

From San Antonio to El Paso, by the Southern Pacific Railroad, is 620 miles, and in this entire distance one crosses but two living streams, the Devil's River and the Pecos, not far apart. As may be observed from a study of the river system in Texas, the State is not so flat a plain as one might think. It is a great plain, much dissected by drainage areas which conform in the main to the general southeast slope, but which present here and there contrary slopes and individual drainage areas. The Colorado River falls about 3500 feet from its source to its mouth, the Brazos River falls about 4500 feet, and the Rio Grande about 3700 feet, in Texas.

The Brazos River rises in Quay county, New Mexico, flows east and south of east until it reaches the southeast corner of Castro county, Texas. Here it turns southeast to the northwest part of Fisher county, and then turns northeast to the center of Baylor county, from which place it runs with a general southeast course into the Gulf of Mexico, 40 miles southwest of Galveston. Its total length, including the meanderings, is probably not far from 1200 miles.

The Rio Grande rises in Hinsdale county, Colorado, flows through New Mexico from north to south, and becomes the western border of Texas, about 20 miles north, a little west from El Paso. From this point it is the west and south border of Texas until it empties into the Gulf of Mexico, below Brownsville.

The Pecos River rises in San Miguel county, New Mexico, flows south until it reaches Texas, and then southwest into the Rio Grande. With the exception of the Rio Grande, the Pecos, the Brazos, and Canadian, all of the principal Texas rivers rise within the State and have their course within its borders.

The Canadian River rises in Colfax county, New Mexico, flows south and then east, and through the Panhandle of Texas

into Oklahoma. The rivers of Texas are subject to heavy floods, and these cause much damage to property, with loss of life now and then. The most notable instance of this is the destruction of the dam across the Colorado River at Austin, in 1900, which involved a financial loss of more than a million dollars, with the drowning of nine persons.

In order to provide against overflow, and to render the fertile lands along the Brazos, Trinity, Little River, Sulphur Fork, Neches, etc., available for farming purposes, the State has a Drainage and Levee Board whose duty it is to have accurate surveys and estimates made for the location and cost of levees, etc. This work had been in hand for more than three years, and it is stated that the results of the surveys made so far show that more than 10,000,000 acres of land can be recovered and made safe against the overflow. This land is so fertile, that its value is increased from $25 an acre to $150 an acre when once it is protected. The cost of such protection varies from $15 to $25 an acre, according to local conditions.

Some of the Texas rivers, viz., the Colorado, Guadalupe, Llano, San Antonio, Medina, Rio Grande, etc., are used as a source of water for irrigation purposes, and many large pumping plants are at work, in addition to gravity systems. The impounding of water by means of extensive dams contributes to the supply in the streams and some notable structures have been erected, the largest being in the Medina valley, west of San Antonio. It is likely that there will be seen within the next few years a considerable extension of plans for impounding and saving storm waters, to be used in time of drought. The various irrigation projects already established, and those in contemplation and under construction, are so intimately connected with the river and drainage system of the State that mention may be made of them here.

The latest statistics on the subject are contained in the Texas Almanac and State Industrial Guide for 1912, pub-

lished by the Galveston-Dallas News. According to this authority the number of acres irrigated in 1909 was 450,-971. In 1910 the acreage capable of irrigation was 693,496. In 1910 the number of independent irrigation enterprises was 2606; the total length of ditches was 2685 miles, of which 1473 miles were main ditches, and 1212 miles were laterals. The irrigation ditches in Texas, if considered as one long ditch, would extend from the eastern border of Maine entirely across the United States to the Pacific Ocean at Santa Barbara, California.

The number of reservoirs was 307, and they were capable of putting a foot of water on 91,141 acres. The total number of wells was 2011, of which 124 were flowing wells, and 1887 were pumping wells. The number of pumping plants was 2374, and the total engine horse power was 66,130. The number of acres irrigated from flowing wells was 3731, and from pumped wells, 351,761. The total cost of the irrigation systems was $13,406,831, and the average cost per acre was $19.33.

It must not be supposed that all of the irrigation projects in Texas depend on wells, for this is not the case. The acreage reported from wells alone was 355,512, and from streams alone, 251,350, while 7300 acres were irrigated from springs, and 12,000 acres from reservoirs. Projects now under way call for the irrigation of an additional amount of 252,000 acres from reservoirs. It is likely that within a short time the irrigated acreage in Texas will exceed one million, with a total investment of $30,000,000.

Waller county has the largest number of acres irrigated from wells, 5000; Jefferson county has the largest number irrigated from streams, 60,000; Hardeman county has the largest number irrigated from reservoirs, 10,000; Ward county has the largest number irrigated from wells and streams, 39,000, and Val Verde county has the largest number irrigated from springs, 7000.
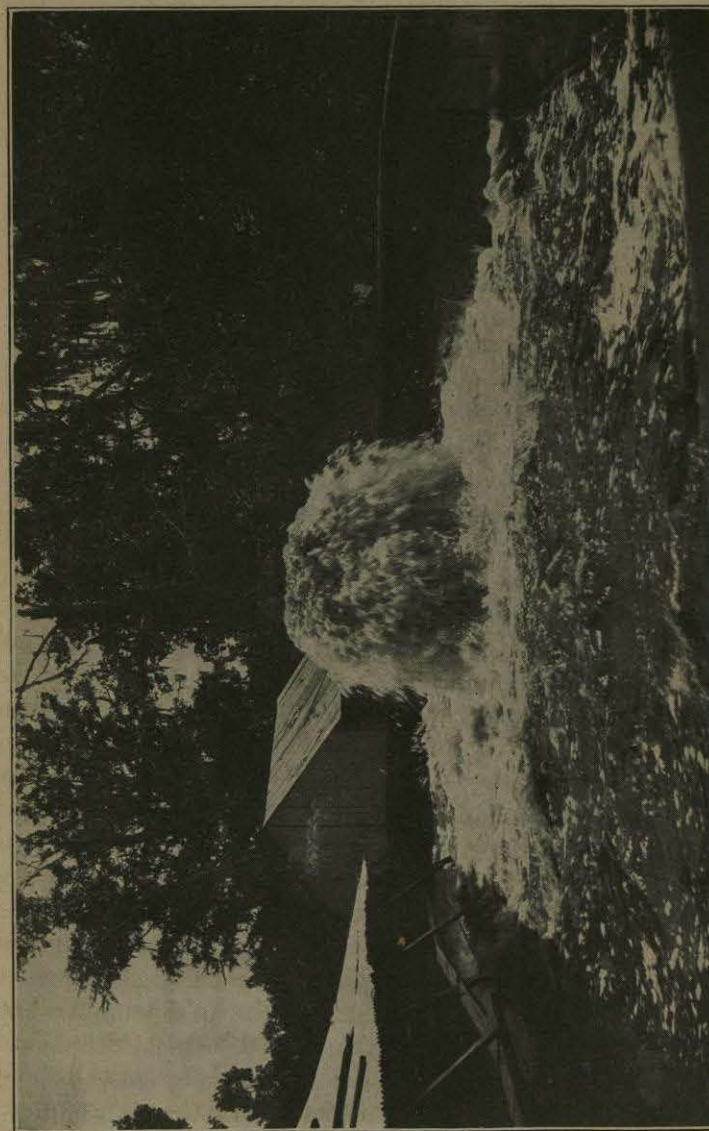
PLATE II. — An artesian well in the rice belt.

Plate II gives a view of an artesian well in the rice belt, below Houston.

Rainfall and Climate. — In the limits of this chapter it is not possible to do more than touch briefly upon the rainfall and climate of the State.

From east to west the rainfall diminishes steadily from 50 inches a year along the Sabine River, to a trifle over 9 inches at El Paso. Roughly speaking, about $\frac{1}{15}$ of the State, proceeding from east to west, has an average annual rainfall of 40 to 50 inches; about $\frac{1}{14}$ has from 30 to 40 inches; about $\frac{1}{10}$ has from 25 to 30 inches; about $\frac{1}{10}$ has from 20 to 25 inches, and about $\frac{1}{3}$ has from 15 to 20 inches.

In the extreme western part of the State there is an area of about 20,000 square miles in which the mean annual rainfall is from 10 to 15 inches, while in the El Paso district it is less than 10 inches. These figures may be compared with the 905 inches (= 75.4 feet) of rain which has fallen in one year at the wettest place in the world, Cherrapongee, in Assam, and with the 2 inches at Port Said, Suez Canal.

The distance across the State, from east to west, is 740 miles, and the difference in rainfall is approximately 41 inches. For the first 250 miles the diminution of rainfall is about 7 inches per 100 miles; for the next 250 miles it is about the same, while for the remaining distance the drop is from 15.50 to 9.16, or 2.64 inches per 100 miles. This ratio of 7 inches drop per 100 miles gives Austin an average annual rainfall of 32.96 inches, the Fort Stockton region, Pecos county, 15.50 inches, and El Paso 9.16 inches.

This rule must not be applied too rigorously, but in a general way it may be relied upon.

The highest and lowest temperature, the mean annual temperature, and the average annual rainfall at a number of places in Texas are given in the following Table, the figures being based on observations covering a number of years. Authority, H. Bunnemeyer, United States Weather Service, Houston.

	TEMPERATURE			AVERAGE ANNUAL RAINFALL.
	Highest	Lowest	Mean Annual	Inches
Abilene	110	−6	64.5	24.49
Amarillo	105	−16	55.9	21.90
Austin	104	−1	67.4	32.96
Brownsville	102	12	72.7	26.92
El Paso	113	−5	62.9	9.16
Fort Stockton	114	2	62.8	15.50
Fort Worth	112	−8	64.8	33.36
Galveston	98	8	69.4	46.31
Longview	110	−7	65.9	44.00
Nacogdoches	109	8	65.5	48.13
Palestine	108	−6	65.7	42.51
Paris	114	−13	64.0	35.08
San Antonio	107	4	67.9	27.95

Fort Stockton, in west Texas, and Paris, in north Texas, have recorded the highest temperatures, 114 degrees, while Amarillo, in the Panhandle, has recorded the lowest temperature, 16 degrees below zero, with Paris a close second with 13 degrees below zero. Nacogdoches, in east Texas, has the highest average rainfall, 48.13 inches, while El Paso has but 9.16 inches. The earliest date of a killing frost was October 12, at Austin, and the latest killing frost was May 23, at Amarillo.

Railroad Facilities. — On the 30th of June, 1911, there were 14,777 miles of railroad in Texas, giving it the first rank. Since that time about 600 miles have been added, so that the mileage at the close of 1912 was about 15,300. There were 85 railroads in the State, and of these the Galveston, Harrisburg, and San Antonio Railway (Southern Pacific) reported the greatest mileage — 1331, with the Missouri, Kansas and Texas Railway holding second place with

1119 miles. The shortest railroad wholly within the State is the Texas City Terminal, from Interurban to Texas City, Galveston county, 4.4 miles. Harris county had the greatest mileage — 389, while Castro county had the smallest mileage — 2.48. In the 13 counties which have been mentioned as having more than one half of the entire population there were 2702 miles of railroad, or 471 feet per square mile and 738 feet per 100 inhabitants. The remainder of the State, 244,241 square miles, with 1,922,726 inhabitants, had 11,594 miles of railroad, or 249 feet per square mile and 3132 feet per 100 inhabitants.

If we allow that the State has 4,000,000 inhabitants at the close of the year 1912 and 15,000 miles of railroad, there would be 1950 feet per 100 inhabitants, and 30 feet per square mile. It has been well observed that if Texas were as well supplied with railroads as Illinois, there would be 50,000 miles of track in the State instead of 15,000.

It must be remembered, however, that a large proportion of the present trackage is through the unsettled and sparsely settled portions of the State, and that there are many miles unproductive of revenue, especially along the Southern Pacific and the Texas & Pacific roads in West Texas.

In 1911 there were 34 counties in the State without a railroad. The population of these counties was 74,139 and the total area was 36,526 miles, while the assessed valuation of property was $82,482,438. These counties do not lie together, but are scattered throughout the State, most of them being west of the 98th degree of west longitude.

The railroad system of Texas, converging as it does towards the Gulf coast, has enabled Galveston to reach and maintain the second place in the value of exports. In 1912 the total value of exports from this port was (in round numbers) $288,000,000, of which the greater part was represented by cotton alone.

Farm Animals. — In 1910 the total number of cattle in Texas was 6,721,502, valued at $129,130,917. Of these 1,011,704 were dairy cows, valued at $27,597,000. Texas holds first rank as a producer of live stock in general and mules in particular. The total value of the live stock in 1910 was $313,764,263. Dallas county led in the number of horses and mules — 24,639; Crockett county in the number of cattle — 56,545; Collin county in the number of hogs — 27,460 — and Edwards county in the number of sheep and goats — 324,279.

The total number of horses and colts was 484,968, valued at $83,532,773; of mules of all ages 672,781, valued at $73,780,676; of hogs 2,329,723, valued at $11,605,195; of sheep and lambs 1,758,084, valued at $6,138,426; of goats and kids 1,177,277, valued at $2,397,684.

In 1910 the fowl industry was as follows:

	NUMBER	VALUE, $
Chickens	12,719,572	4,139,450
Turkeys	363,666	440,536
Ducks	74,910	30,241
Geese	214,991	126,791
Guinea fowls	170,107	47,042
Pigeons	95,625	14,536
Ostriches	———	6,000
Pea fowls	———	1,919
Pheasants	———	130
Wild geese	———	7
Total	13,669,645	$4,806,652

Agricultural Resources and Products. — This subject is so large and varied that it is very difficult to treat it in a satisfactory manner within the space allotted. It is probable that the total annual value of the farm and garden products of Texas is in excess of $650,000,000. The State captured

the Grand Prize for agricultural products at the St. Louis World's Fair. There is such a diversification of soils and climate in Texas that almost every known farm product within the United States can be successfully grown here.

According to the Texas Almanac and State Industrial Guide the most reliable statistics for the year 1910 are as follows:

	ACRES	PRODUCTION: BUSHELS UNLESS OTHERWISE STATED	VALUE, $
Corn	8,000,000	181,280,000	$114,206,000
Wheat	1,252,000	18,780,000	18,404,000
Oats	695,000	24,325,000	11,443,000
Barley	5,000	150,000	135,000
Rye	4,000	46,000	47,000
Rice	264,000	8,734,400	5,940,000
Emmer and spelt . .	5,000	52,000	30,000
Kaffir corn and milo maize	600,000	6,000,000	3,000,000
Peanuts	75,000	1,260,000	1,430,000
Other grains and seeds	———	422,000	750,000
Potatoes	60,000	3,060,000	3,336,000
Sweet potatoes and yams	52,000	2,000,000	2,600,000
Sugar cane	40,000	1,080,000 tons	4,360,000
Hay and forage . . .	1,450,000	1,400,000 tons	13,960,000
Broom corn	10,400	2,500,000	160,000
Tobacco	700	430,000 lb.	105,000
Cotton and cotton seed	10,094,000	3,049,409 bales	265,955,944
Truck	300,000	———	30,000,000
Total	23,707,700	———	$476,711,944

It is interesting to note that the total annual value of all of the agricultural products of Texas is about the same as the annual retail value of 15 chief food products consumed in New York city.

Texas leads the world in the production of cotton, but the yield per acre is considerably less than in most of the other cotton-producing states. Excluding California, which produces a small amount of cotton, the following Table gives the yield of lint cotton per acre in the several cotton-producing states:

YIELD OF COTTON, POUNDS PER ACRE

Missouri	285
North Carolina	227
South Carolina	216
Tennessee	206
Oklahoma	200
Mississippi	182
Arkansas	175
Georgia	173
Alabama	160
Texas	145
Louisiana	120
Florida	110

During the nine years ending with 1910 the total value of the Texas cotton crop was $1,636,376,194, or a yearly average of $181,819,577. In the year 1910 the cotton acreage in the United States was 32,403,000, of which Texas had 10,060,000, or a little less than one third. The production of cotton was 11,965,962 bales, of which Texas produced 3,072,932 bales, or a little more than one fourth. The greatest cotton-producing county in the United States is Ellis county, Texas — 106,384 bales in 1910. Cotton is produced in more than 175 counties in Texas.

The trucking industry in Texas is extensive, and rapidly increasing. Full statistics are not available, but it is thought that the following figures for the year 1911 taken from the Texas Almanac and State Industrial Guide, are approximately correct in so far as concerns railroad shipments by freight.

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