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- *Some Economic Effects*
- *of Drouth*
- *on Ranch Resources*

*March 1955*

TEXAS AGRICULTURAL EXPERIMENT STATION

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## SUMMARY

Most of the 162 ranches on which data were obtained for this study are on the Edwards Plateau within 100 miles south and west of San Angelo. Data on ranch operations were obtained from the Texas Production Credit Association and the Farmers Home Administration at San Angelo, and from the Ozona National Bank.

The current drouth over most of West Texas is the worst within the memory of persons now living. A deficiency of soil moisture has been accumulating for 11 years, or since 1943. At San Angelo, this deficiency amounted to 60 inches of rainfall by the end of 1953.

Since 1943, the number of animal units of livestock on the range in the Edwards Plateau and the Trans-Pecos areas has decreased about one-half. The range deteriorated to the point that little new forage was being produced and the quality of the forage, as indicated by changes in plant composition, was only fair in the fall of 1950 and poor in 1953-54.

Feed purchases on a group of 45 representative ranches in an area where normally little supplemental feeding is done averaged almost \$25 per animal unit (1 cow or 5 sheep or 6 goats) per year during the 3-year period, 1950-53.

This same group of ranches lost 37.5 percent of their net worth during this 3-year period. At the end of the period, their short-term debts amounted to 103 percent of the value of their livestock. They had reduced their livestock 20 percent, cash 50 percent, city real estate (mostly homes) 10 percent, stocks and bonds 30 percent and total assets were down 20 percent, while liabilities, including a 10 percent rise in land mortgages, were up 38 percent and life insurance 42 percent.

A group of 92 ranches receiving special livestock loans from the Farmers Home Administration, and presumed to represent the more extreme financial conditions among ranchmen, owed in short-term debts 206 percent of the value of their livestock. If this group liquidated all of their assets, including land at listed prices, and paid off all debts, they could barely buy back their livestock and equipment with the remaining cash.

Twenty-two borrowers out of 60 livestock loan accounts at the Ozona National Bank had resorted to the special livestock loan in their efforts to survive the drouth. At this bank, however, only 25 of the 60 were continuous borrowers during the 3-year period, 1950-53.

Sharp changes in prices of livestock during the period greatly complicated the drouth problems for both ranchmen and credit agencies. As prices rose, ranchmen were reluctant to reduce stocking rates, probably speculating on a break in the drouth. This led to heavy use of high-priced feed in anticipation of continued high prices and, of course, expanded borrowing when the anticipated prices were not realized.

The 45 Production Credit Association borrowers were divided into three groups of 15 each on the basis of the amount of decrease in net worth during the period 1950-53. Group 1 lost only 15 percent in net worth, whereas group 3, at the other extreme, lost 73 percent.

The ranches averaged 13,300 acres in group 1, of which the operators owned almost half. The ranches in group 3 decreased from 17,600 acres in 1950 to 16,160 acres in 1953 and only about 10 percent of the land was owned by the operators.

Judging from the value placed on it, group 1 owned the best land. In 1950, the average value per acre was \$23 in group 1 and \$18 in group 3.

Group 1 ranches were stocked lighter but maintained about the same rate of stocking throughout the 3-year period.

Group 3 ranches were carrying about 6 more animal units per section than group 1 in 1950 and waited until after prices broke sharply before liquidating surplus stock. In 1953, the stocking rate per section was the same (21 units) in both groups.

Group 1 fed consistently heavy throughout the period, while group 3 was erratic in feeding, with relatively light feeding in the first and third years of the period but extremely heavy feeding in 1951-52.

These practices apparently affected production since sales in group 3 fell to 43 percent of 1950-51 sales, despite the fact that they were liquidating heavily during 1952-53. Sales in group 1 in 1952-53 were 61 percent of 1950-51.

Group 1 apparently had the higher grade livestock. The value per animal unit was \$15 higher in 1950 and \$12 higher in 1953 than for group 3.

Group 1 had more cattle and goats and fewer sheep than did group 3. Of the total animal units in group 1 ranches, 27 percent were cattle, 64 percent sheep and 6 percent goats. On group 3 ranches, the distribution was 22 percent cattle, 74 percent sheep and 2 percent goats.

While outside income helped many individuals, it was not a deciding factor for success or failure between the two groups. Ten of group 1 averaged \$4,200 per year, while 5 in group 3 averaged \$6,400 per year.

Total life insurance increased 28 percent among group 1 ranchmen and 71 percent among those in group 3 during the 3 years covered by the study. There seemed to be a direct correlation between the amount of short-term debt and the amount of insurance.

The principal features of a management program looking to recurring periods of drouth include: (1) moderate rates of stocking (maintenance of good ground cover conserves moisture and increases yields); (2) deferred grazing of pastures to insure reseeding of the better grasses; (3) close culling to eliminate non-productive livestock (aim at high percent calf and lamb crops); (4) conservative use of credit; (5) moderation in standards of living; (6) adequate insurance for protection of family and to strengthen credit standing; and (7) reserves developed for the rainless days.

The time to prepare for drouth is during periods of normal or above-normal rainfall. To be prepared for drouth, one must keep in mind each year that drouth conditions may prevail during the years just ahead.

# Some Economic Effects of Drouth on Ranch Resources

C. A. BONNEN and J. M. WARD\*

*Most of the data on which this study is based were obtained from the Texas Production Credit Association and the Farmers Home Administration at San Angelo, and from the Ozona National Bank. Dependence on the credit institutions for data was necessary in order to obtain continuous records over the period of the drouth. Most of the 162 ranches for which data were obtained lie within a radius of 100 miles of San Angelo, mostly on the Edwards Plateau to the south and west, and within the heart of the drouth area.*

## NATURE AND EXTENT OF THE DROUTH

The current drouth, which began in the fall and winter of 1950, is reportedly the worst within the memory of persons now living. Official rainfall data support this conclusion (Figure 1). In comparison, the 1934 drouth was of relatively short duration. It began in the spring of 1933 and ended in the spring of 1935. The drouth of 1917 and 1918 may have equaled the present one in duration but not in intensity. The current drouth might be considered part of an 11-year drouth which was interrupted only by the heavy rains of 1949.

Rainfall records for Sonora, Ozona and San Angelo reveal subnormal precipitation 8 of the 11 years from 1943 through 1953. The average rainfall for this 11-year period was 15.6 inches at San Angelo, as compared with 24 inches for the preceding 11-year period and a 30-year normal of almost 20 inches. Rainfall during the 8 dry years averaged almost 7 inches below normal. The accumulated deficit at San Angelo over the 11-year period is the equivalent of 60 inches of rainfall. These periods of favorable and unfavorable moisture conditions are shown in Figure 2 by a 5-year moving average of rainfall at San Angelo.

Temperatures tend to be abnormally high during periods of prolonged drouth. The high inverse correlation between annual rainfall and mean annual temperature is shown in Figure 3. High temperatures intensify the effect of low rainfall through increased rates of evaporation and transpiration.

The extent of the drouth, areawise, is difficult to describe with precision. The entire western half of Texas has been affected severely. Over much of the area, very little new grass was produced during the 3-year period. Clipping studies at the Ranch Experiment Station near Sonora show 20 pounds per acre of air-dry grass produced in 1951 and none in 1952 or 1953.

During the latter part of this period, ranges have been relatively bare of palatable grass. Range feed has been mainly dry tobosa grass, browse, burned pear and sotol plus some annual weeds. Year-around feeding has been common on many ranches.

The rains have been ineffective because of the bareness of the range and the consequent excessive runoff. San Angelo had above-normal rainfall in 1953 but it was highly localized and poorly distributed. Most of it fell during intense storms at wide intervals. Because of the local nature of the rain, temperatures remained abnormally high and, with hot winds, resulted in high rates of evaporation.

To break the drouth, rainfall must be general and occur at frequent intervals. To overcome the effects of this long period of deficient moisture, several years of above-normal rainfall will be required.

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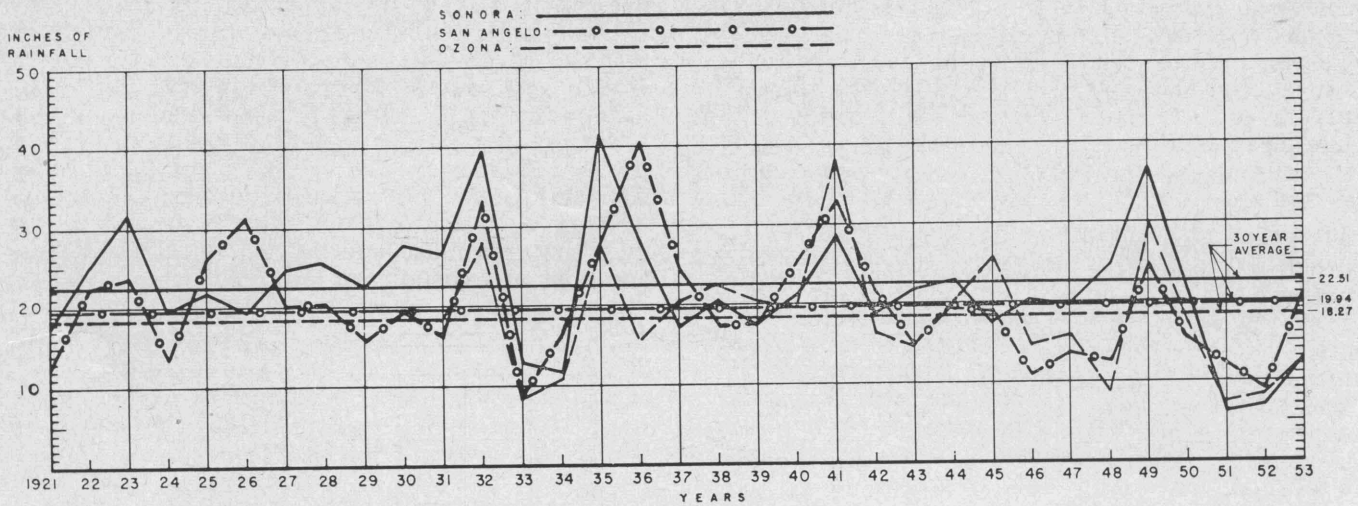


Figure 1. During the period 1943-53, rainfall was below normal 8 of the 11 years.

### SOURCES OF DATA

The most complete and probably the most representative data were obtained on 45 ranches from the files of the Production Credit Association. These data included land organization and tenure, livestock organization, a net worth statement, records of sales and purchases, outside sources of income and condition of livestock and range.

Less complete data were obtained for 25 ranches from the Ozona National Bank. Mainly, these data lacked net worth statements and records of purchases.

The data obtained from these two institutions cover a period of 3 years, beginning in the fall and winter of 1950 and ending on the same dates in 1953. The drought, of course, continued into 1954, but its effects were somewhat relieved by government subsidies in feed and transportation costs. Some benefit was obtained during the

last few weeks of the period covered by these data.

Data from the Farmers Home Administration relate to ranches obtaining emergency or special livestock loans and are useful as a description of the more extreme conditions to be found among ranchmen after 3 or more years of drought.

### EFFECT OF DROUTH ON LIVESTOCK NUMBERS

Livestock numbers reached a peak in 1943 just as the long period of dry years began and have decreased about 50 percent during the 11-year period (Figure 4). The only interruption in this trend came following the one wet year (1949). The same upturn in numbers may be noted in the individual ranch data to be shown later.

An associated factor contributing to the upturn in numbers was the sharp rise in prices

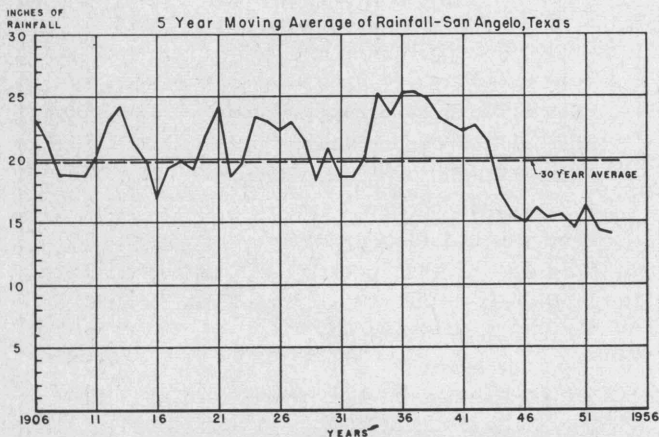


Figure 2. The extreme nature of the current drought is shown by means of a 5-year moving average of rainfall at San Angelo. Note also that it was preceded by a period of favorable moisture conditions of equal length which undoubtedly led to the high rate of stocking reached in 1943.

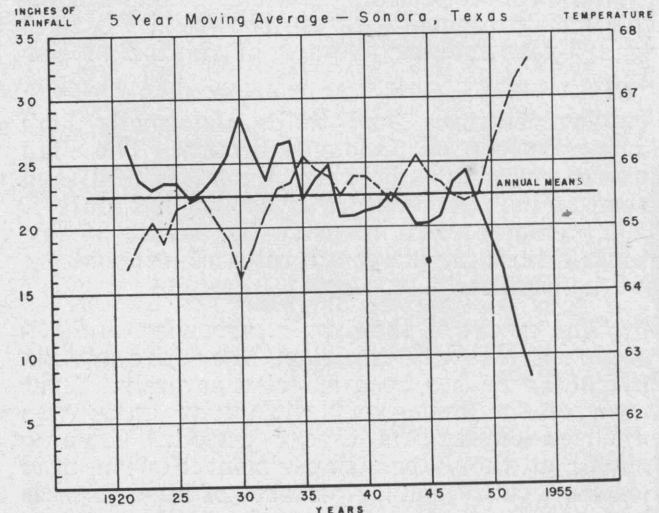


Figure 3. During periods of low rainfall (solid line), temperatures (broken line) rise and intensify the effects of lack of moisture.



following 1949 (Figure 4). This was due largely to the outbreak of war in Korea. The rise in prices, coupled with optimism over improved range conditions led to efforts on the part of ranchmen to expand herds. This resulted in livestock being kept from the market which otherwise would have been sold. The effect was to add to the upward pressure on prices.

This was the situation when the current drouth started in the winter of 1950-51. Anticipating a continuation of the peak prices prevailing in the spring of 1951, most ranchmen made strenuous efforts to maintain and, in some cases, to increase stocking rates despite the rapidly decreasing range feed supply. This led to heavy expenditures for feed during 1951-52. The financial position of ranchmen generally was greatly weakened when anticipated prices were not realized.

The prices shown in Figure 4 are not the peak prices obtained but the average price for all sales during the calendar year. The price of all livestock and livestock products reached a peak in the spring of 1951. The price of wool and mohair broke sharply and continued to fall to a new low by the spring of 1952. Calf and lamb prices declined some after reaching the peak in March 1951, but the big break did not occur until the summer of 1952 and the low was reached in October 1953. Thus, price changes intensified the effects of the drouth for both ranchmen and credit institutions. The decline in numbers of livestock resulted from the effects of the drouth on range feed, and the effect of price, if any, made ranchmen reluctant to liquidate while prices were rising.

A summary of the data obtained from the Texas Production Credit Association on 45 ranches reflects the same trend in numbers as that shown in Figure 4. Numbers rose slightly during 1949 and 1950 and then continued to decline for the rest of the period. By the fall and winter of 1953, the number of animal units (1 cow or 5 sheep or 6 goats) had fallen to 80 percent of the 1950 number. This may be compared with a decline for the same period to 76 percent for the whole Edwards Plateau and Trans-Pecos areas. Figure 4 suggests that liquidation continued on into 1953-54 and the same trend occurred on this group of ranches.

#### EFFECT OF DROUTH ON THE RANGE

Although ranges deteriorated during the drouth, data indicating the nature and extent of deterioration of the range are scarce and difficult to obtain. One crude measure of the effect of the drouth on forage yields is the trend in livestock numbers and in the size of the feed bill. Despite almost continuously rising prices from the mid-thirties until 1952, livestock numbers in the Edwards Plateau and Trans-Pecos areas decreased about 50 percent from January 1944 to January 1954. As has been shown, this period was one

of almost continuous subnormal rainfall. The extreme bareness of the range during the winter and spring of 1954 suggests that adjustments in livestock numbers did not keep step with the decline in forage yields. Further evidence of this lack of adjustment is the large amount of feed purchased from the fall of 1950 to the fall of 1953. An average of \$25 was spent for feed per animal unit on 45 ranches which were well distributed over the area most affected by the drouth, while the normal expenditure is approximately \$3.

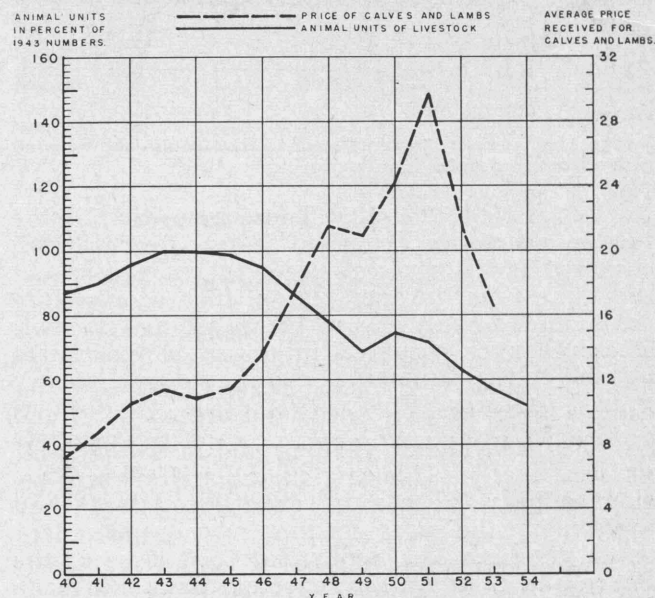


Figure 4. Livestock numbers have decreased since 1944 despite an almost continuous rise in prices (cents per pound weighted by the number of animal units of calves and lambs). (An animal unit is 1 cow or 5 sheep or 6 goats.) The number of livestock maintained on ranches in the Edwards Plateau and Trans-Pecos areas is closely related to moisture conditions (also see Figure 2). (This chart is based on data supplied by the Office of Agricultural Estimate, Agricultural Marketing Service, U. S. Department of Agriculture, Austin, Texas.)

The quality of the forage on the range, as indicated by plant composition, also deteriorated. Range management specialists base the classification of range conditions mainly on the extent to which climax species make up the plant population. Climax species are those species of plants that are most productive under a given set of soil and climatic conditions. Excellent range is made up of 75 to 100 percent of plants of the climax species. Good range contains 50-75 percent; fair range 25-50 percent and poor range 0-25 percent plants of the climax species. According to studies made on 8 of these 45 ranches by the Soil Conservation Service, the general condition of the range was "fair" in 1950 and "poor" by 1954.

At the Texas Range Station near Barnhart, where range management practices are being studied intensively, it was reported in Texas Agricultural Experiment Station Bulletin No. 786 that forage production was extremely low and plant density was seriously reduced during the low



Figure 5. This picture, taken in a pasture on the Texas Range Station near Barnhart prior to the drouth, shows good ground cover despite heavy grazing.

rainfall period 1951-53. The composition of the forage also was changed. High death losses occurred in all grasses except tobosa grass. At the same time, invader plants, such as mesquite trees and prickly pear, increased in number. These changes occurred in ungrazed exclosures but not to the same extent as they did in heavily grazed pastures (Figures 5 and 6).

The tall, higher yielding and more palatable grasses, such as side-oats grama and silver bluestem, appear to be more drouth resistant than are some of the lower yielding but more abundant short grasses. The September 1953 issue of the *Sheep and Goat Raiser* reported that tests made during the summer of 1953 at the Ranch Experiment Station near Sonora, after 21½ years of intense drouth, indicated that only 12 percent of the curly mesquite plants were alive while 97 percent of the side-oats grama and 87 percent of the silver bluestem plants survived. Some desirable but sparsely distributed grasses, such as

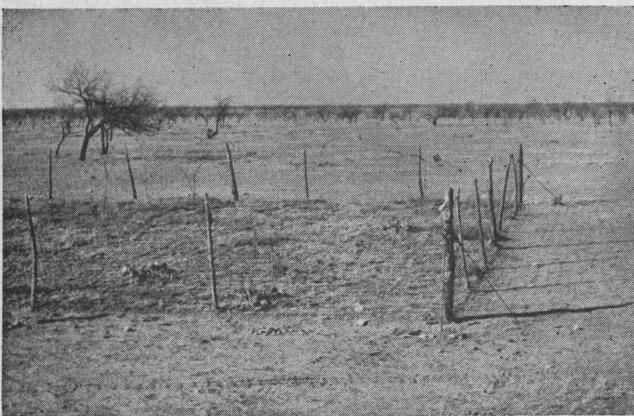


Figure 6. The effects of 3 years of extreme drouth and heavy grazing is shown in the above picture taken in November 1953 at the same site but from the opposite direction as Figure 5. Note the tire tracks in the foreground. Most of the short vegetation in the enclosure is dead despite the fact that it had not been grazed since 1940. This picture describes more accurately than can be done with words the appearance of most of the range in the north and western portions of the Edwards Plateau in the late winter and early spring of 1954.

little bluestem, pinhole bluestem, Texas wintergrass and fall witchgrass, also responded vigorously in the tests.

These tests were made by watering small plots which were established on all pastures of the station. Since different rates of stocking and systems of management are practiced on these pastures, the tests throw some light on the effect of these practices on the rates of survival of the various grasses. During normal years, curly mesquite has comprised three-fourths of the grass ground cover on the Sonora station. On heavily stocked pastures (48 animal units per section), only 9 percent of the curly mesquite survived. On moderately stocked pastures (32 animal units per section), 12 percent survived, while on rotated pastures which were moderately stocked, 22 percent survived. The heaviest loss in curly mesquite was on the pasture stocked heavily with sheep only (Figures 7 and 8).

Three-awn grass (sometimes called needlegrass) suffered heavy death losses on all pastures but the kill was greatest on the pasture stocked heavily with cattle only.

These tests suggest the importance of management in determining the extent and rate of recovery of range productivity when the drouth is relieved.

#### EFFECT OF DROUTH ON FINANCIAL RESOURCES

Changes occurring on the ranches of the 45 Production Credit Association borrowers during 3 years of drouth include a decrease of 2¼ million dollars, or 37.5 percent, in net worth. Out of total assets of more than 8 million dollars, real estate (including mainly ranch lands and city residences of ranchmen) made up more than 50 percent and livestock more than 40 percent in 1950. All other assets, including cash, feed, wool and mohair in storage, equipment and stocks and bonds, made up less than 6 percent of the total. By the fall and winter of 1953, total assets had dropped in value to about 6½ million dollars and real estate, on which prices were held constant during the 3-year period, represented almost 65 percent of the total, while livestock, which had decreased in both numbers and price, made up only 26 percent.

While total assets were decreasing 20 percent, liabilities were increasing 37 percent. Most of this increase in liabilities was in chattel mortgages. Debts other than real estate mortgages in 1950 represented only 30 percent of the total value of livestock, or \$47 per animal unit, but by 1953 these debts amounted to 103 percent of the value of the livestock, or \$90 per animal unit.

Incomes fell sharply during the 3-year period. In 1952-53, the dollar sale of livestock and livestock products was only 48 percent of such sales in 1950-51. This decline stems directly from the 20 percent decrease in livestock numbers and the



sharp break in prices shown in Figure 4 and was reflected in the average prices received on the 45 ranches. In 1952-53, average price received for calves was only 43 percent of the average price in 1950-51, and lambs sold at 56 percent of the 1950-51 average. Average prices received for wool indicate that most growers missed the peak prices reached in the early spring of 1951. The average price received for the 1950-51 wool crop was 85 cents per pound compared with 63 cents in 1952-53 and a mid-month peak of \$1.25 reached in March 1951. A few sales were reported as high as \$1.50 per pound. An increasing number reported income from outside sources, but the amount of such income per ranch did not increase substantially. In 1950, 21 of the 45 ranchmen expected outside income averaging \$3,800. By 1953, the number had increased to 25 and the average amount was \$3,865. Most of this outside income was from mineral leases, rentals and royalties and from wages but the source was not always specified.

Some relief was obtained through substantial income tax rebates, but such items were not reported consistently and it was not possible to arrive at the amount of income thus obtained.

Since livestock constitute the principal collateral for production credit, it was not surprising to find a tightening of credit arrangements as the drouth became more intense and prices fell. Total disbursements or advances to these 45 ranches by the Texas Production Credit Association decreased in almost direct proportion to the decreases in livestock values and in net worth. Disbursements which decreased 36 percent from 1950-51 to 1952-53 ranged narrowly around 30 percent of net worth and 61 percent of the total value of livestock at the beginning of each year or loan period. In addition to closer scrutiny of credit demands by credit agencies, lower prices for feed and livestock served to reduce the credit needs.

It was expected that large amounts of production credit had been shifted by owner-operators to long-term land mortgages. Actually, the amount of land mortgages was being reduced until 1953 when an increase of 10 percent occurred. The value of the land (\$3,789,000 or \$20 per acre) was still almost five times the amount of the mortgages (\$791,000) and represented a comparatively untapped means of covering over-extended short-term credit.

Life insurance is a factor for stability in credit operations. The cash value of insurance represents a liquid asset, the amount of which may be borrowed from any credit institution. At the same time, the insurance itself may be used to assure the credit agency of payment in case of death of the borrower. Thirty-six of the 45 Production Credit Association borrowers reported life insurance totaling \$670,000 in 1950. In 1953, 37 reported insurance totaling \$951,000, an increase of 42 percent. This is an average, per



Figure 7. This picture, taken in July 1949 on the Ranch Experiment Station near Sonora, shows good range on rocky soils of a deferred rotation pasture stocked with 32 animal units per section. Approximately 45 percent of the grass pictured was lost during the drouth. However, with good rains in the fall of 1953 and spring of 1954, this recovered rapidly to near its pre-drouth condition.

person reporting, of \$18,600 in 1950 and \$25,700 in 1953. It is significant that the big increase in insurance came in 1952-53 as short-term debts approached or exceeded the value of the collateral. Borrowers, probably encouraged by the credit agency, recognized the possibilities of strengthening their credit position through insurance.

There was little change in the average size of these ranches during the 3-year period. The range was from 12,200 acres in 1952 to 12,900 in 1953. These fluctuations were largely the result of shifting leases. The average cost of leases fell from 53 cents per acre in 1950 to 48 cents in



Figure 8. This picture, also taken on the Ranch Experiment Station on the same type of soil and near the site pictured in Figure 7, shows the effects of heavy grazing with 1 year of intense drouth. Approximately 75 percent of the grasses on this area were lost during the drouth and this site remained in about the same condition shown above despite the good rains in the fall of 1953 and spring of 1954. By April 1954, most of the range from Fredericksburg west to the Pecos river appeared to be in worse condition than the range pictured here.



1953. There was some adjustment in rates, but individual cases indicate that the shifting of leases to lower grade land was the main cause of the decrease.

On these 45 ranches, almost 70 percent of the land was leased and 30 percent owned. There was no significant change in this proportion during the 3-year period. Also, there was little change in the tenure status of these operators. In 1950, 8 of the 45 owned all land operated, while 17 leased all of their land and 20 operated both owned and leased land. In 1953, there still were 8 strictly owner-operators, but 2 of those operating on leases had acquired some land and were classed as part-owners.

The average size of owner-operated ranches remained the same, 5,800 acres, while mortgages on the land increased \$12,944 per ranch. Part-owners had 7,064 acres and leased an additional 11,786 acres in 1950. In 1953, they owned 7,245 acres and leased only 10,700 acres. The average amount of land mortgage decreased almost \$5,200. Lease holders increased their holdings from 11,300 acres to 13,360 for which they paid an average of 50.5 cents in 1950 and 48 cents in 1953. The decrease in average cost of leases was largely the result of shifting leases.

The owner-operator decreased his livestock from 258 animal units, or 28 units per section, to 203, or 22 units per section. The part-owners decreased from 690 animal units, or 23 per section, to 546, or 20 units per section. Lease operators, while increasing the acreage leased by more than 2,000 acres per ranch, reduced their livestock from an average of 500 units, or 28 per section, to 390 units, or 19 per section.

Owners remained in strong financial condition, dropping only 28 percent in net worth. They could increase the mortgage on their land, pay all of their short-term debts and retain a 50 percent equity in their land (assuming no change in the value of land).

The part-owners dropped 38 percent in net worth. If they shifted all debts to land they still would have a 47 percent equity in the land.

Tenants lost 69 percent of their net worth, or almost \$40,000 per ranch, largely as the result of decreases in the number and value of livestock.

If the data obtained from the 45 Production Credit Association borrowers err in any direction, it probably presents a too optimistic picture of actual conditions in the drouth-stricken portions of the range country. This is not to say that the ranches themselves are not representative but that the tendency of credit agencies to avoid following extreme changes in prices, et cetera, introduces a natural bias. In this case, prices and values were somewhat below market prices in 1950 and somewhat above the market in 1953.

The data on 25 ranches obtained from the Ozona National Bank substantiate the foregoing

information. Livestock inventories decreased and short-term debts increased until they about equaled the value of the productive livestock. Eighteen of the 25 ranches had obtained special livestock loans from the Farmers Home Administration, which suggests that this group was probably the less substantial of the ranch patrons of the bank. This conclusion is further suggested since, of a total of 60 livestock loans, only these 25 were continuous borrowers during the 3-year period and only 22 of the 60 had resorted to special livestock loans. The sale of mineral rights and other sources of outside income purportedly were a determining factor in keeping down the amount of credit used during the period of extended drouth.

These 25 ranches averaged about 7,500 acres as compared with the more than 12,000 acres for the Production Credit Association borrowers. Fifteen of the 25 were operating on leased land. The average cost of their leases was 55 cents an acre in 1950-51 and 53 cents in 1952-53.

These ranches were carrying about one-third more animal units of livestock per section throughout the 3-year period than were reported on the ranches of the Production Credit Association borrowers.

#### A LOOK AT THE EXTREME

To obtain a view of the more extreme conditions as they existed during the fall and winter of 1953-54, the special livestock loans being administered by the San Angelo office of the Farmers Home Administration were studied in detail. The recipients of these loans are considered to have reached the practical limits of the usual sources of credit. The geographic distribution of these ranches is similar to the distribution of the Production Credit Association borrowers but with more concentration in Sutton, Crockett and Reagan counties.

These ranches average smaller than those of the PCA borrowers, having slightly more than 7,600 acres. Only 28 of 92 ranchmen owned any of the land operated. Another 39 owned real estate, mostly city homes, but including some business property as well as farm and ranch lands owned but not operated. Thus, 67 of the 92, or 73 percent, owned some type of real estate. This real estate made up about 65 percent of the total assets of the group and livestock made up 26 percent. This distribution is identical with the distribution of assets of the PCA borrowers at the end of the 3-year period. The real estate was mortgaged to the extent of 28 percent of its value, 55 percent higher than in the case of the PCA borrowers. Ranch lands were valued at \$25 per acre as compared with \$20 on the ranches of PCA borrowers.

Indebtedness other than real estate mortgages (\$3,928,000), but including the special loans, was more than twice the value of the livestock.

The net worth of the group was only 30 percent of the assets as compared with 61 percent in the case of the PCA borrowers. If all property was sold at the prices at which it was valued and all debts were paid, these operators would have barely enough cash left to buy back the livestock and equipment listed. They would own no real estate or other property.

Under the same conditions, the PCA borrowers could buy their livestock and equipment and retain better than a 50 percent equity in the land they now own.

Fifty-five of the 92 special loan recipients expected to receive an average of \$2,200 of outside income during 1954. About 30 percent would come from oil leases, rentals and royalties, 30 percent from wages for work off the ranch and 40 percent from rentals of real estate of various kinds.

These 92 ranches were stocked heavier than were the PCA borrowers and at about the same level as were the 25 customers of the Ozona National Bank. This relatively heavy rate of stocking may explain in part at least the comparatively weak position of these ranches with the credit agencies. Attempts to maintain numbers far above the capacity of the range usually leads to high feed costs, heavy death loss or low market quality.

#### MANAGEMENT DURING DROUTH

The 45 ranches for which data were obtained from the Texas Production Credit Association were divided into three groups on the basis of degree of change in net worth. In other words, ability to maintain net worth was selected as the best available measure of success in combating the effects of the drouth. Group 1 includes the 15 ranches that had the least loss in net worth between the falls of 1950 and 1953. Group 3 is composed of the 15 ranches having the greatest loss in net worth during the same period, while group 2 includes those between the two extremes. To simplify the discussion, these groups will be referred to by number hereafter. Most of the discussion will center on groups 1 and 3.

Group 1 had an average drop of 15 percent in net worth, group 2, 35 percent and group 3, 73 percent.

#### Land

There was no change in the size of the ranches in group 1 during the period. The average size was 13,300 acres both in 1950 and 1953, and in each year slightly less than half of the land was owned. The group 3 ranches decreased in size from 17,600 to 16,160 acres and approximately 10 percent of the land was owned by the operator.

The land owned by group 1 apparently was better than that owned by group 3. The value placed on land was affected somewhat for both

groups by transactions. These transactions made little difference in group 1 but in group 3 a large land deal apparently lowered the quality of land owned by that group. The average value of the land in group 1 was \$23 in 1950 and \$22 in 1953. In group 3, the average value fell from \$18 to less than \$15 per acre.

All except 2 ranchmen in group 1 owned some of the land they operated, while 10 of group 3 owned none of the land operated. Conversely, 4 in group 1 owned all of the land operated, while only 1 in group 3 owned all land operated. Furthermore, most of the land owned by group 3 (95 percent) was in the hands of 2 men so that for the most part group 3 was made up of lease operators. This tenure difference between the two groups may explain a substantial part of the greater decrease in net worth by group 3.

If land values and land mortgages are excluded and only short-term debts in relation to all assets other than land are considered, group 3 still compares unfavorably with group 1. The net value of such assets decreased 35 percent in group 1 and 85 percent in group 3. In relating short-term debts to the value of livestock in the two groups, group 1 owed 47 percent of the value of its livestock in 1950 and 79 percent in 1953; whereas group 3 owed only 35 percent of the value of its livestock in 1950 but had borrowed to the extent of 132 percent by 1953.

While group 1 owned better land than group 3, they paid, on the average, about 10 cents per acre less for leased land than did group 3. Rentals in group 1 averaged slightly above 40 cents per acre and group 3 slightly above 50 cents. There was no significant change in rates during the 3-year period. Close family ties may have influenced rates among the group 1 operators.

#### Livestock

Group 1 had almost (98.5 percent) as many units of livestock (6,359) in 1953 as in 1950 (6,451), while group 3 had lost 30 percent of the 11,242 units on hand in 1950. From a management standpoint, this is perhaps the most significant difference between the two groups. Although supposedly having the better land, group 1, or the group with the smallest decreases in net worth, was relatively lightly stocked in 1950, having 21 animal units, or 6 less units per section than group 3—the ranches having the largest decreases in net worth. By 1953, there was no significant difference between these groups in the rate of stocking, both having about 21 units per section.

Group 1 apparently had adjusted early to deteriorating ranges or had not restocked immediately following favorable moisture conditions in 1949. Except for a brief speculative flurry in 1950-51, probably in response to peak prices, this group maintained livestock numbers at near the same level throughout the 3-year period. Group 3 adjusted slower. It was not until 1952-53 that the major adjustment was made.



Further evidence that group 3 was heavier stocked than group 1 is found in comparing actual rates of stocking with estimates of normal carrying capacity. Each year, the loan inspectors from the Texas Production Credit Association visit these ranches, count the livestock, report on the condition of the range and the livestock and estimate the normal carrying capacity of the range. While these estimates may not be comparable from year to year because of changing weather and range conditions, they are reasonably comparable from ranch to ranch during the same year. In 1950, the number of livestock on group 1 ranches was 68 percent of normal capacity and on group 3 ranches it was 82 percent of normal. In 1953, group 1 was stocked at the rate of 78 percent of estimated normal capacity, while group 3 still stood at 82 percent of normal capacity. Group 1 had taken advantage of rapidly rising prices to reduce inventories and to adjust livestock to range conditions and thus was prepared to meet the problems arising out of the current drouth. Group 3 waited until prices broke and liquidation was forced under unfavorable conditions. These conditions are reflected in the sale of livestock and livestock products. Despite the fact that group 3 was liquidating during the latter part of the 3-year period, 1952-53 sales were only 43 percent of 1950-51 sales; whereas on group 1 ranches, sales in 1952-53 were 61 percent of 1950-51 sales.

Group 1 apparently had a better grade of livestock than did group 3. The value of livestock per animal unit in group 1 averaged \$15 more in 1950 and \$12 more in 1953 than did the livestock in group 3.

Similarly, group 1 had more cattle and goats and fewer sheep than did group 3. Both tended to increase the number of cattle relative to the number of sheep, but group 1 averaged 27 percent cattle and 64 percent sheep, while group 3 averaged 22 percent cattle and 74 percent sheep. In group 1, 6 percent of the animal units were goats, while in group 3 only 2 percent were goats.

#### **Supplemental Feeding**

The group (1) with the least loss in net worth fed heavily and consistently throughout the 3-year period. Feed purchases ranged from \$23 per animal unit in 1950-51 to \$27 per unit in 1952-53. The group (3) having the greatest loss in net worth fed relatively lightly (\$16) in 1950-51, went to the extreme of \$34 per unit in 1951-52 and fell back to \$17 per unit in 1952-53. Heavy feeding by this group in 1951-52 may be attributed partly to heavy stocking and partly to the anticipation of high prices. When these anticipated prices were not realized, the rate of stocking and the rate of feeding were reduced. Probably another important factor was the weakened financial condition of the group.

The severity of the drouth is reflected in these feed expenses. When range conditions are normal, very little supplemental feeding is done.

Sheep may not receive any feed, while cattle feeding may be limited to thin cows and bulls for short periods before the breeding and calving seasons. An average of \$3 per animal unit usually will buy the feed used. This means that feeding rates during these 3 years of drouth averaged from 5 to 10 times the usual rate of feeding.

The importance of supplemental feeding to the size of the lamb and calf crop was shown during the drouth. Ranchmen and bankers seem to be of the opinion that in future years there will be more feeding of ewes and cows to increase the size of the calf and lamb crops. Faced with large feed bills and tightening credit, ranchmen culled closely to eliminate nonproducers and gave special care to mother stock. With this combination of practices, the percent lamb crop in Texas rose from a low of 57 in 1952 to 77 in 1954, despite continuous drouth.

#### **Outside Income**

It was expected that outside income, especially income from mineral rights, would be an important factor in the success of ranchmen in combating the effects of the drouth. It undoubtedly helped many individuals and since any large amount of outside income was associated in some way with land, group 1, which controlled more land than did group 3, profited most. Oil and gas operations also helped leaseholders and small owner-operators by providing employment opportunities that otherwise would not have been available. However, it was not a determining factor in explaining differences in success between the two groups. Group 1 expected a total of \$42,000 of outside income per year and group 3, \$32,000 per year. This \$42,000 in group 1 was divided among 10 ranches; whereas an average of only 5 participated in the \$32,000 going to group 3. The average for the 15 ranches in each group was \$2,800 per year for group 1 and \$2,100 for group 3.

#### **Life Insurance**

A comparison of these two groups also throws more light on the place of life insurance in the management of ranch finances. Twelve of the 15 ranch operators in group 1 carried \$292,500 of life insurance in 1950, or an average of \$24,375. By 1953, the average amount of insurance had increased 28 percent, or to \$31,250 for each of the 12 men. In group 3, 13 men had an average of \$18,673 in insurance in 1950, but with the worsening of financial conditions during the current drouth, these men added 71 percent to their insurance to bring it to \$31,885 each. Most of this increase came during the last year of the 3-year period.

#### **Emergency Practices**

Numerous emergency practices were being followed, but it was not possible to measure their effects as means of overcoming drouth conditions. Burning prickly pear, "knocking" sotol and cutting liveoak brush were most common on the group 3, or poorly financed, ranches. These



practices may, along with restrictions on credit, explain the sharp reduction in feed purchases on the group 3 ranches in 1952-53. Judging from the light sales reported by this group, production also was sharply off.

A few individuals moved cattle to grass in other states and regions. The consensus of opinion in regard to this practice seemed to be as follows: The size of the operation needs to be large enough to permit the employment of efficient management. Otherwise it is best to let someone living near the grass own the cattle. As one small ranchman tersely put it, "the next time cattle leave my place they will belong to the other fellow." One of the unforeseen difficulties encountered with this practice was the spreading of the drouth. After the cattle were moved, drouth spread into the new area, again making it necessary to feed. In many cases, this proved to be more expensive than it would have been had the cattle been kept at the home ranch.

**Conclusions on Management**

There is no magic by means of which the effects of drouth may be overcome. In some instances, a substantial oil lease may appear like magic to fill the income gap caused by drouth. In other cases, outside employment may be the answer. But to the greater number of ranchmen there is no alternative to good ranch management.

The principal features of a management program looking to recurring periods of drouth include:

1. *Moderate rates of stocking (maintenance of good ground cover conserves moisture and increases yields).*
2. *Deferred grazing of pastures to insure reseeding of the better grasses.*
3. *Close culling to eliminate nonproductive livestock (aim at high percent calf and lamb crops).*

4. *Conservative use of credit.*
5. *Moderation in standards of living.*
6. *Adequate insurance for protection of family and to strengthen credit standing.*
7. *Reserves developed for the rainless days.*

The time to prepare for drouth is during periods of normal or above-normal rainfall. To be prepared for drouth, one must keep in mind each year that drouth conditions may prevail during the years just ahead.

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