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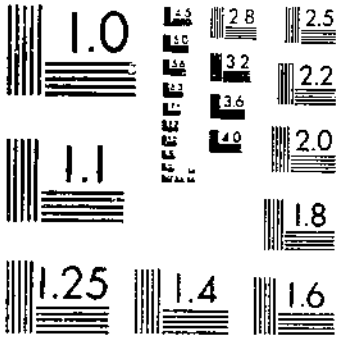

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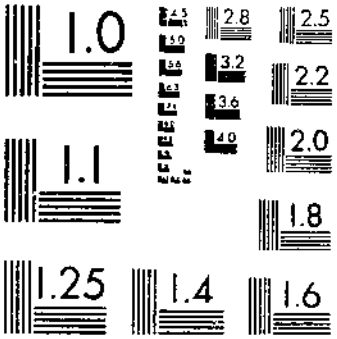

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NATIONAL BUREAU OF STANDARDS-1963-A

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UNITED STATES DEPARTMENT OF AGRICULTURE
WASHINGTON, D. C.

RANCH ORGANIZATION AND METHODS OF LIVESTOCK PRODUCTION IN THE SOUTHWEST

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THE UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE AGRICULTURAL EXPERIMENT STATIONS OF ARIZONA, NEW MEXICO, AND TEXAS.

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FOREWORD

This bulletin contains information on the organization and management of range-cattle, sheep, and goat ranches in the southwestern range region with a background of historical, climatic, and land factors that have influenced the ranching business in that region. The experience of ranchmen and the details of one year's business on 240 ranches were used as a basis for this report, together with experimental results and other evidence that were available. It is believed that the information will be useful to ranchmen and others in the region in setting forth the problems of operation and management of ranches; and to the general public in that the policy with regard to the use of public land is also of real concern to all.

OBJECTS AND METHODS OF STUDY

The southwestern range region in this study includes the States of Arizona and New Mexico and that part of Texas west of the Pecos River. The objects of a livestock study in this region were to study (1) the present systems of ranch organization with reference to the use of public-domain, national-forest, and available leased lands; (2) the advantages and disadvantages of operation under the various types of organization; (3) the prevailing financial condition of the industry; (4) the general systems of ranch management and details employed by various individuals in meeting production problems; (5) the factors that influence calf crops; and (6) the economic and

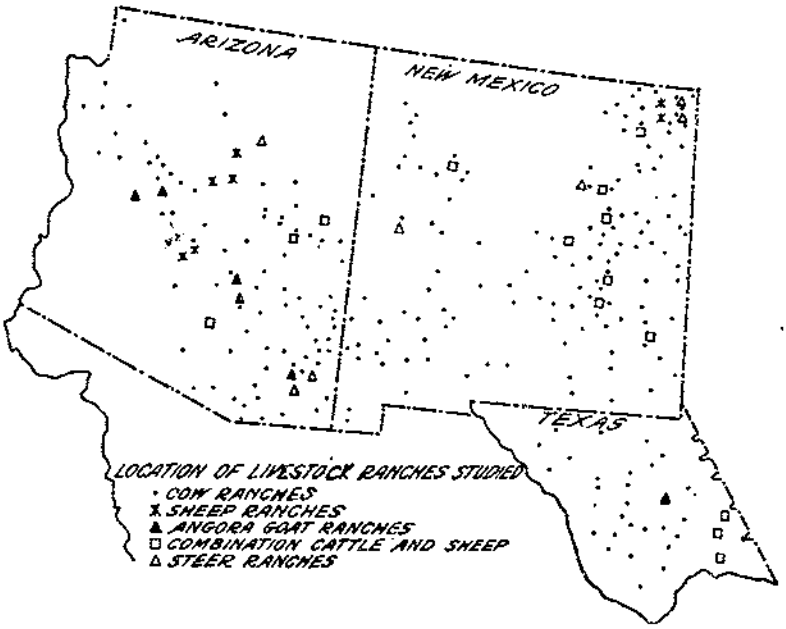

FIG. 1.—Location of livestock ranches studied

animal-husbandry problems that should be considered of such importance as to warrant further study.

The location of the 240 ranches on which a complete record of the ranch business for the year beginning January 1, 1925, was obtained is shown in Figure 1. A record of income, expenses, numbers and kinds of livestock, and details of management was obtained on these ranches by the survey method. There were approximately 366,000 cattle, 118,000 sheep, and 22,000 Angora goats on these ranches. The number of cattle on the ranches studied represents about 13 per cent of the total number of cattle in the region.

For the purpose of analyzing the data the ranches were first classified into five groups:

(1) 204 ranches running breeding cows exclusively.
(2) 7 steer ranches.
(3) 10 sheep ranches.
(4) 14 combination cattle and sheep ranches.
(5) Angora-goat ranches.

Because of differences in range conditions the 204 cow ranches were divided into four classes, as follows:

(a) 28 ranches in Texas west of the Pecos River.
(b) 45 ranches in northeastern New Mexico.
(c) 48 ranches in Arizona and New Mexico, other than the northeast quarter of New Mexico, where practically no public domain is used. (This group is described hereafter as "controlled range.")
(d) 83 ranches in Arizona and New Mexico, other than the northeast quarter of New Mexico, where the public domain is used to a large extent for grazing. (This group is described hereafter as "public domain.")

In presenting the data these 204 cow ranches are further subdivided into approximate size groups according to the number of breeding cows. There are six of these groups, beginning with 100 or less cows and ending with over 2,000 cows.

Before discussing the details of ranch management it seems desirable first to take up the physical, historical, and other factors that form the background for ranching in the Southwest.

PHYSICAL FACTORS AFFECTING LIVESTOCK PRODUCTION IN THE REGION

TOPOGRAPHY

The southwestern range region included in this study has a very diversified topography and climate. From an altitude of about 1,500 feet where the Pecos River joins the Rio Grande, it rises northward to about 5,000 feet in northeastern New Mexico and to 6,000 feet in northwestern New Mexico and northeastern Arizona. In the mountainous area in north-central New Mexico elevations vary from 6,000 to 10,000 feet, some peaks extending even higher. In the mountainous area extending diagonally across Arizona from the northwest to the southeast and into western New Mexico elevations are from 6,000 to 10,000 feet, the altitude decreasing toward the southwest. In the Davis Mountain district of Texas the altitude varies from 3,000 to 5,000 feet.

The entire region from the eastern boundary of New Mexico and the Pecos River westward to the California State line is very broken and shows great diversity of temperature, rainfall, and soil types. Western Texas and eastern New Mexico consist for the most part of rolling country, interrupted by broken areas of hills. The mountain ranges of north-central New Mexico and Arizona are largely included in the national forests. In southwestern Arizona is a part of the Great American Desert which is characterized by its scant precipitation, high temperatures, low humidity, and its distinctive types of vegetation. Northeastern Arizona and northwestern New Mexico consist principally of a high plateau with scattered peaks and ridges.

CLIMATE

The amount and distribution of rainfall throughout the year is perhaps the most important factor influencing ranch operations. In general, the annual rainfall varies directly with the elevation above sea level. Over the lower elevations of southern Arizona the average rainfall is less than 5 inches. For altitudes from 2,000 to 4,000 feet the average annual precipitation is about 12 inches. For elevations above this the annual rainfall ranges from 14 to 25 inches. (Fig. 2.)

The variation in rainfall annually at a given point is very wide. At Yuma, Ariz., the annual rainfall has varied from 0.6 inch in 1899

to 11.41 inches in 1905. At the Pinal ranch, Arizona, the variation has been from 11.84 inches in 1903 to 58.45 inches in 1905, and at Mesilla Park, N. Mex., there has been a range from the smallest amount recorded, 3.49 inches, in 1873, to almost five times that amount, 17.09 inches in 1905, the highest record for that weather station.

In the higher elevations of Arizona and northern New Mexico much of the winter precipitation is in the form of snow. Its gradual melting later in the year serves to maintain a moderate supply of water in the streams until the late summer rains come. Severe rainstorms, known as cloudbursts, occur occasionally in some areas,

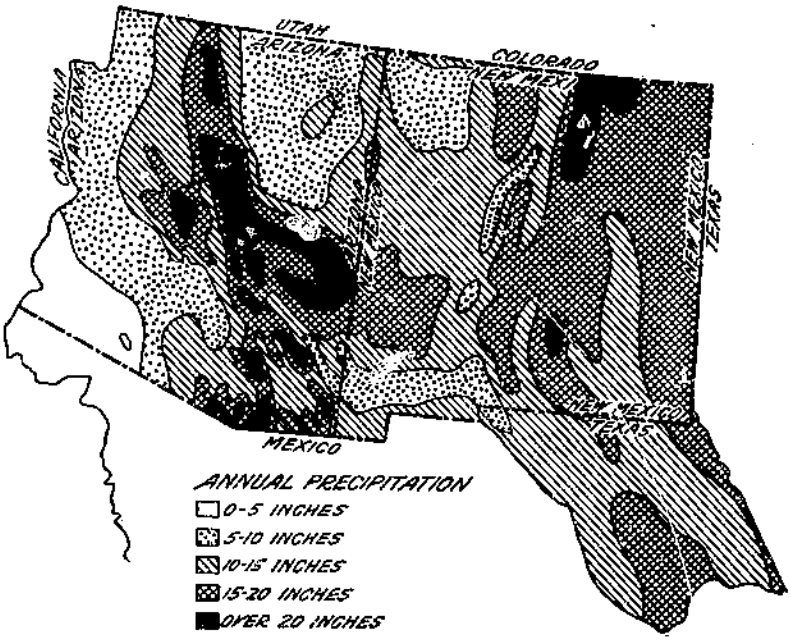

FIG. 2.—Average annual precipitation of the region. (Data supplied from U. S. Weather Bureau records covering more than 20 years)

especially in the mountain regions, and the resulting flood waters may cause serious destruction to property.

The distribution of rainfall throughout the year has a marked seasonal variation. Nearly 50 per cent of the total rainfall occurs during July, August, and September, while less than 10 per cent falls from April to June, except in northeastern New Mexico, where as much as 25 per cent of the rainfall occurs in the spring. Throughout the region the precipitation is smaller during the winter months except in southwestern Arizona, where there is usually more rainfall during the winter than during the summer.

Failure of the late summer rains invariably results in a short fall and winter range. Fall rains can hardly make up for a summer drought because they are too late to mature the range grasses properly. Winter rain and snow are valuable mostly to give a good start to spring feed. Since there is such a small amount of winter moisture over a large part of the Southwest, the usual unfavorable spring

range condition is more or less explained. Most of the supplementary feeding that is sometimes necessary is done during the late winter and early spring and often extends to June 1 or July 1 if the spring rainfall is very scant.

Other climatic factors which affect vegetative growth and the possibilities of farming and ranching operations are temperature, humidity, evaporation, and wind movement. The prevailing high temperatures, especially during the summer, account for the very high surface evaporation of from 50 to 75 inches annually. The increased evaporation in this area as compared with the northern Great Plains region is very marked. From an agricultural standpoint it would take 30 inches of rainfall in the Southwest to be equivalent to 20 inches in North Dakota or Montana.

There is a considerable wind movement over the plains and the lower portions of the area, especially in the spring and early summer. High wind and dust storms are rather common in those districts.

Arizona weather in 1925 was unusual in some respects, although the averages of temperature and precipitation indicate near-normal conditions. The mean annual temperature, 61.3° F., was with one exception the highest during the preceding 10 years, but was somewhat below the 29-year average. The mean annual precipitation, 12.77 inches, was 0.46 inch below the normal, but 4.09 inches in excess of the 1924 mean. Noteworthy features were an unusually early spring, caused by abnormally warm weather in February and March; a heat wave in July that established new high-temperature records in many counties; a drought that continued from the latter part of 1924 to September, 1925, in the southern and western counties, and excessive rains and damaging windstorms in September.

The year opened cold and dry with a marked shortage of stock water and very little snow. Drought conditions continued through February and March. The run-off from mountain snow was very light, but an unusually large amount of snow was reported from the high elevations of the Fort Apache, Ariz., locality. During April there were warm days which melted the snowcaps and caused a fair run-off of water. There were also soaking showers which alleviated the drought in Coconino and Yavapai Counties and improved conditions elsewhere, somewhat. Copious rains fell in October, even in the arid, southwestern sections. November and December were dry with temperatures about normal. The year closed with general precipitation throughout the State and with heavy rains in the Yuma section.

In New Mexico there was but little snow or rain during the winter of 1924–25 and hardly any rain until August, 1925. Many cattle had to be moved on account of lack of water and feed and death losses were heavy. During the fall there was plenty of rain that insured good range conditions in the spring of 1926.

The situation in western Texas was very similar to that in New Mexico.

SOILS

The soils of the river valleys consist mostly of sand or adobe. Those of the mountain valleys are a rich loam. The foothills of the mountains are generally composed of gravelly and rocky ridges with very little soil. The soils of the plains and large basins are largely

wind-blown sand or clay loam. In the bottoms of the basins such soils are sometimes deep but generally form only a thin layer. In the eastern part of the area the land is high in fertility but lacks humus. In these lands, especially in central-eastern and northeastern New Mexico where rainfall is more plentiful and regular, good grass and field crops are reasonably dependable.

In the southern part of the area the soil is principally reddish sand loam, of loose, wind-blown origin. In places there are flats of compact clay or adobe. In other places there is considerable alkali land. In open valleys are the salt plains and marshes, greasy sand, and rotten, crumbling soil composed mostly of chalk that powders and rises on the lightest winds. In some parts there are old lava beds of limited area where hardly any vegetation is able to grow.

When rainfall is sufficient, grain sorghums, wheat, and beans are grown under dry-farming conditions in certain parts of northeastern New Mexico. Most of the farming in the region is done close to the principal rivers and creeks under irrigated conditions. The most important irrigation projects are located along the Pecos, Rio Grande, Gila, Santa Cruz, and Salt Rivers. The irrigated land is largely devoted to the growing of cotton, alfalfa, truck crops, and fruits. However, all the hay and crop land in the region, according to the 1925 census, amounts to only 2 per cent of the total land area. On account of the limited possibilities of farming because of climatic, soil, and topographical conditions, it seems that range livestock production will continue to be the most important phase of agriculture in that region for many years.

TYPES OF RANGE AND KINDS OF FORAGE[1]

The wide variation in soil types, altitude, temperature, and rainfall accounts for the many species of native forage plants adapted to different parts of the region. The native ranges of the Southwest may be divided roughly according to the topography of the region into three general types—namely (1) plains or prairie-type range, (2) mountain range, and (3) desert and lower mesa type. Each of these types of range may be further divided into subtypes based on the predominating species of native forage that prevail in the different localities.

PLAINS OR PRAIRIE-TYPE RANGE

The plains or prairie-type of range is found principally in eastern New Mexico and western Texas. Much of the area consists of open, nearly level stretches that are called prairies, plains, or mesas. The range in elevation is from about 3,000 to 6,500 feet. Such plains are usually covered with a more or less dense covering of grasses, which in the northeastern part of the region forms a fairly thick sod. (Fig. 3.) In the southern part the grass covering is always less dense, and rarely, if ever, forms a true sod. In places the ground is absolutely bare over areas many acres in extent. This class of range according

[1] For detailed information concerning types of range and the most prevalent species of native forage plants the following publications are especially recommended: THORNBER, J. J. THE GRAZING RANGES OF ARIZONA. Agricultural Experiment Station, Tucson, Ariz. Bul. 65; WOOTON, E. O. THE GRASSES AND GRASSLIKE PLANTS OF NEW MEXICO. Agricultural Experiment Station, State College, N. Mex. Bul. 81.

to use is known as year-long, although the seasons of best grazing extend from March 15 to June 15, and from July 15 to January 1, under normal seasonal conditions. There is usually a seasonal shortage of feed from January 1 to March 15. Grama (*Bouteloua* spp.), mesquite (*Muhlenbergia porteri*), and buffalo grass (*Bulbilis dactyloides*) are the most important grasses in this type. Grama and curly mesquite (*Hilaria belangeri*) are especially valuable from November 1 to March or April for winter grazing, although they can be grazed at any season. On the foothills the bluestem grasses (*Agropyron* spp.) make good feed from July to November 1.

The grama grasses are by far the most important pasture plants in the Southwest and furnish good range feed during the growing season or when cured on the range. Blue grama (*B. oligostachya*), hairy

FIG. 3.—Plains type of range with good grass sod

grama (*B. hirsuta*), and side oats (*Atheropogon curtipendula*) are probably the most important species.

Buffalo grass is a low, creeping, perennial grass and forms a close sod. It is restricted to medium elevations. It is distinctly a plains and prairie species, and grows best in dry to medium-moist soils. It is one of the drought-enduring grasses and appears to an appreciable extent only in the eastern portion of this region.

Curly mesquite is of high importance as forage. It is a perennial and forms a sod of varying compactness. It is restricted to the lower elevations. The plant seldom attains a height of more than 8 inches; it cures well, and as winter forage is second to none.

Tobosa grass (*Hilaria mutica*) occurs generally in level, prairielike areas that are subject to flood waters. It can be grazed best while it is growing, for when cured it is not palatable. Galleta grass (*Hilaria jamesii*), which is of the same tribe as Tobosa, is important in the higher elevation of the plains type of range. Sacaton (*Sporobolus wrightii*) is also important at elevations of 4,000 to 6,000 feet.

MOUNTAIN RANGE

The areas to which the mountain type of range is common include north central and western New Mexico, limited areas in Texas, central Arizona, and certain scattered districts in southeastern Arizona and south central New Mexico. A large proportion of this mountain range is within the national forests, except in Texas, and under the administration of the Forest Service. Although primarily a year-long range, part of it is summer range only, with a six-months grazing season from May 1 to November 1. Many stockmen use the national forest in connection with the desert and plains ranges. This type of range is illustrated in Figure 4.

The principal kinds of grasses found are the grama grasses, especially blue grama, mountain bunch grass (*Festuca viridula*), the fescues (*Festuca*), and the wheatgrasses (*Agropyron* spp.). In some districts the grasses are thick enough to form a fairly dense sod. Over most of this range, however, there is only a thin covering of grass plants.

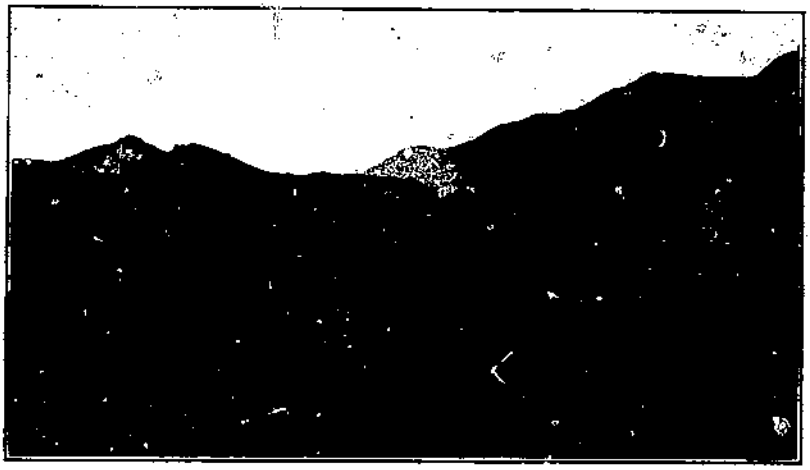

FIG. 4.—Mountainous range in Arizona

A large share of the grazing value of mountain range is derived from the use made of browse. The most important kinds of browse are oak, piñon, juniper, buckbrush (*Ceanothus fendleri*), and mountain mahogany (*cercocarpus pancidentatus*). Browse is very valuable as a reserve source of feed during a dry period. While it may not be fully utilized in seasons when there is plenty of other forage, it is a life-saver during periods of prolonged drought.

One of the difficulties of operation in mountainous districts is to secure range that will furnish year-long grazing of good quality. The use of foothills range in connection with that of higher elevation is perhaps the most satisfactory solution of the problem. Figure 5 shows typical range in southern New Mexico and western Texas.

DESERT AND LOWER MESA RANGE

At least one-third of the range in this region may be classified as desert or semidesert. (Fig. 6.) The principal desert and semidesert areas are in southwestern Arizona and southern New Mexico,

FIG. 5.—Typical range in southern New Mexico and western Texas

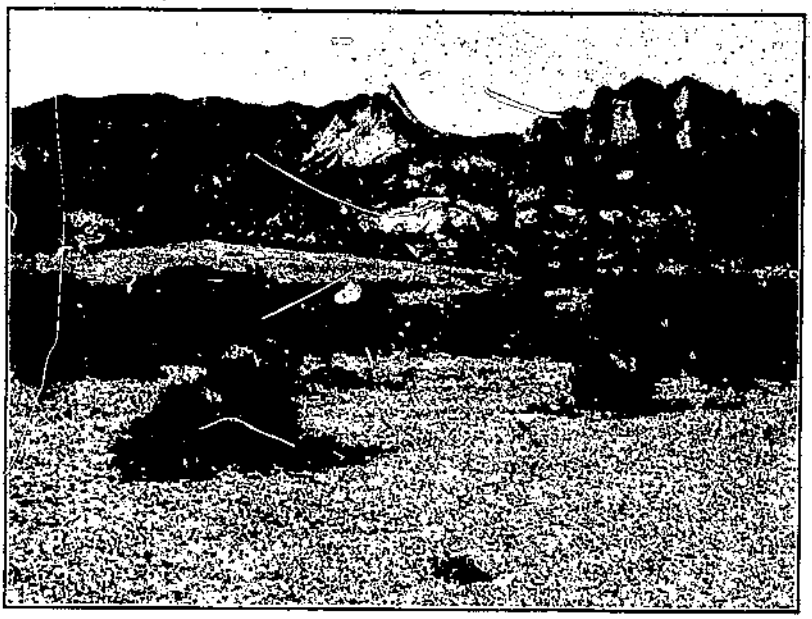

FIG. 6.—Semidesert type of range

although the extreme western part of Texas and the lower elevations between the mountains in southeastern Arizona are also of this type. The elevation of this type of range is usually less than 4,000 feet.

One important use of desert range in Arizona is for a wintering and lambing ground for sheep. Many cattle outfits use it extensively in connection with mountain range and some depend on it entirely throughout the year. Figure 7 shows a typical area of the desert type of range.

Various kinds of browse make up the principal type of forage. Mesquite (*Prosopisglandulosa* and *P. velutina*), cat claw (*Acacia greggii*), palo-verde (*Parkinsonia spp.*), greasewood (*Sarcobatus ver-*

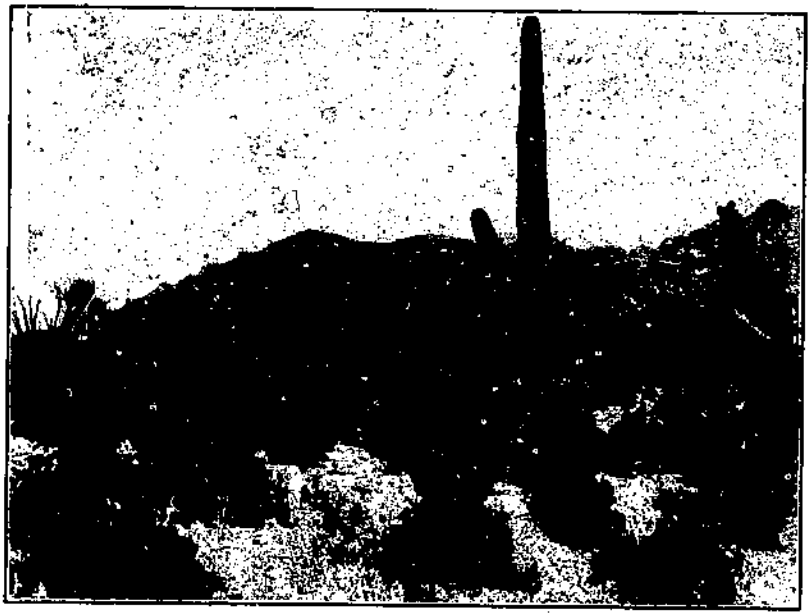

FIG. 7.—Desert range in Arizona

miculatus), coffee bush (*Simmondsia californica*), chamizo (*Atriplex canescens*), and yucca, besides the many varieties of cactus, are among the most important species of browse that are valuable for grazing. In many places the stand of vegetation is 90 per cent greasewood and creosote bush (*Covillea glutinosa*) and again it is low, scattering mesquite and palo-verde, while close to the rivers there is usually a very dense growth of mesquite trees. In other parts cactus and palo-verde make up the bulk of the growth while in still other places the yuccas and mesquite are most noticeable. Although the grasses may be relatively less important on the desert than on the mountain or prairie grass ranges, yet they are valuable at certain seasons of the year. The grama grasses are found especially in connection with the yucca type of range. Other important plants are alfilaria (*Erodium cicutarium*), Indian wheat (*Plantago spp.*), and many annual herbs and grasses.

In the Southwest, alfilaria is classed as a winter annual, because in wet seasons germination takes place in December and January. Throughout most of the winter and until about June the plant grows vigorously. It is relished by all classes of livestock, and in Arizona especially stockmen depend on it and Indian wheat more than any other plants to carry the stock through the winter and early spring. The protein content of alfilaria is very high and compares favorably with hay from the legumes. Stock are about as fond of the leafage when it is dry as when it is green. This plant makes its best growth at elevations of from 3,000 to 5,000 feet.

Very definite information concerning the prevalence of certain grass, grasslike, and browse plants is contained in Table 1. Among other questions asked the ranchmen were those pertaining to the most important grass and browse plants on their ranges. In some instances several species of grama grass named have been combined into the one group shown. Numerous other plants of lesser importance than those shown were reported in addition.

TABLE 1.—*Important forage plants reported on 240 ranches, southwestern range region, 1925*

State	Ranches reporting	Number of ranches reporting—													
		Grass and grasslike plants						Weeds		Browse plants					
		Grama	Sacaton	Tobosa	Wheat grass	Mesquite grass	Galleta	Alfilaria	Indian wheat	Oak	Mesquite	Sage	Mountain mahogany	Chamizo	Cat claw
Texas (western)	33	23	4	13	3	9	----	4	----	4	4	----	----	----	4
New Mexico	123	115	28	30	21	----	----	3	----	28	11	28	8	11	----
Arizona	84	65	13	1	15	21	19	34	24	34	29	11	10	5	10
Total	240	203	45	44	39	30	19	41	24	66	44	39	18	16	14

Loco weeds (certain species of *Astragalus* and *Oxytropis*) were the most common poisonous plants reported by the ranchmen interviewed. Its greatest growth follows seasonable winter rains, and losses are usually heaviest during the early grazing season.

Throughout the region natural stock-watering places are limited and the development of a permanent water supply is an important item in ranch operation. There are more natural sources of water supply, such as springs and streams, on mountain range than on the plains or desert types, but when these sources fail, more difficulty in obtaining stock water is experienced than on any other type of range. To develop a permanent supply of water it is often necessary to drill wells to a great depth, sometimes through rock, which becomes very expensive. On the plains type of range wells are not usually so deep, and surface tanks are more commonly used than on mountain range, where they are harder to maintain on account of the swift action of flood water down the mountain sides after heavy rains.

DEVELOPMENT OF THE LIVESTOCK INDUSTRY IN THE REGION

The first cattle native to the southwestern part of the United States were descended from stock introduced into Mexico by the Spaniards, probably about 1525. Before 1849 the influence of Spanish and Mexican cattle was predominant in the range cattle of the Southwest. With the discovery of gold in California, cattle were driven through western Texas, New Mexico, and Arizona, to supply meat to the mining camps on the western coast. Most of the livestock reaching California during that period probably came from Old Mexico. There were also some driven from the Middle Western States and eastern Texas. No doubt these cattle from the midwest had their influence in improving the native stock of the southwestern range.

With the passing of so many immigrants through the Southwest, certain trails were used more generally than others. Coming from Texas some followed a trail which is now the route of the Southern Pacific Railroad. Another trail left the Pecos River near Roswell, N. Mex., and went up the Hondo River, over the mountains past Fort Stanton, crossed the Rio Grande at Los Lunas, N. Mex., over to and down the little Colorado, through Flagstaff, Ariz., to a point near Needles, Calif., across the desert and over the Sierra Nevada Mountains. Other trails ran from Chihuahua, Mexico, through southern Arizona to Los Angeles, and from southwestern Texas up the Pecos Valley through Fort Sumner, N. Mex., and north to Colorado, Wyoming, and Montana. Droves of sheep and cattle in large numbers were reported between the years 1849 and 1870.

About 1869 cattle became quite numerous on the range. Indian and Mexican depredations retarded livestock development considerably until 1873, when the Indians were placed on reservations. This afforded a number of ranchmen Government contracts for supplying Indian reservations and military posts with beef.

Construction of railroads in the eighties and early nineties, connecting New Mexico, Arizona, and western Texas with the principal meat and wool markets, resulted in an inmovement of stock from adjoining States. The severe drought of 1892 to 1894 reduced numbers materially in some districts and many big outfits went out of business.

The range was free except for small blocks of patented land that controlled water. Agreements usually prevailed concerning division lines between ranges used by different stockmen. The principal cost of operation was for labor and provisions. The cash expenses varied from 90 cents to $1.50 per head of cattle per year.

While the cattle business was generally regarded as more certain than sheep raising, many claimed a larger profit from the latter. The yield from native sheep was estimated at 1 pound of wool per head, while sheep of improved breeding sheared about 6 pounds per head. The half-breed grades averaged somewhere between these extremes.

During the early days only the natural water sources, springs, streams, and water holes were used to water stock. Consequently, large tracts of the best grazing lands were used only during seasons of sufficient rain. With the open range becoming more and more crowded, and with the added competition between sheep and cattle for its use, it was only a matter of time until encroachment upon each

others' ranges occurred. The continuous use of range necessitated the development of a water supply.

The trends in numbers of cattle and sheep in New Mexico and Arizona, according to the Division of Crop and Livestock Estimates of the United States Department of Agriculture since 1883, are shown graphically in Figure 8. In 1883, 155,000 cattle were recorded in Arizona, and 391,000 in New Mexico. In 1920 the department estimated that there were 1,150,000 cattle in Arizona and 1,700,000 in New Mexico. Since 1920 there has been a considerable reduction in the numbers of cattle in those States. On January 1, 1926, the number of cattle in Arizona was estimated to be 919,000 and in New Mexico 1,161,000. This reduction was due largely to the losses during the droughts of 1922 and 1924, and to the liquidation necessary to

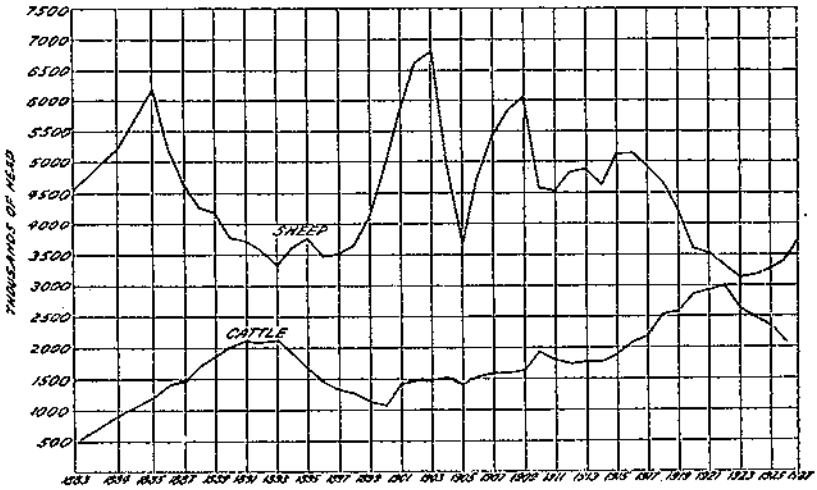

FIG. 8.—Number of sheep and cattle in Arizona and New Mexico, 1883–1927

meet indebtedness, interest payments, and current expenses at a time when the prices of cattle were very low.

The number of sheep in Arizona and New Mexico was at its maximum in 1903. From 1900 to 1917 the number in those two States averaged about 5,000,000 head. From 1916 to 1923, however, the trend was downward, only 3,120,000 being reported in the latter year. Since 1923 the number of sheep in that region has been gradually increasing.

In Figure 9 the numbers of cattle and sheep grazed under permit on the national forests in Arizona and New Mexico from 1910 to 1925 are shown. It must be kept in mind that the increases and decreases under permit on the national-forest ranges of these two States need not comply exactly with the increases or decreases that may occur on ranges of other ownership or control. Figure 9 shows that the greatest number of cattle under permit on the national-forest ranges of New Mexico and Arizona occurred in 1919 and that the estimated peak number for the two States was in 1922. The largest number of sheep carried under permit on the national-forest ranges of Arizona and New Mexico since 1910 occurred in 1918, since which time the number has decreased steadily.

The development of the Angora-goat industry to its present standard has been very recent as compared to the sheep and cattle industries in the region. During the very early days of settlement of the region goats were introduced, principally by Mexicans, and many of the high-grade herds of to-day owe their establishment to improvement by the use of Angora bucks. Before the common Mexican goats were used for the foundation of grade Angora herds, their greatest value outside of this region was as "brushers." This term was adopted from the use to which the common goats were put, that of killing out brush by grazing. The goat industry at present is of considerable importance as a range livestock enterprise in this region.

The dot maps, Figures 10, 11, and 12, give the number of cattle, sheep, and goats on ranches January 1, 1925, according to the 1925

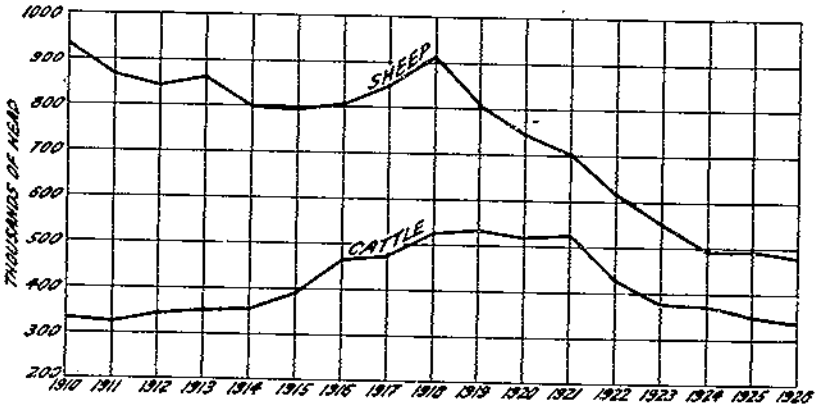

FIG. 9.—Number of cattle and sheep grazed on national forests in Arizona and New Mexico, 1910–1925

agricultural census, the approximate density of distribution being shown by counties. These maps indicate that the central and southeastern parts of Arizona, the southwestern, southeastern, and northeastern corners of New Mexico, and the central portion of western Texas are most heavily stocked with cattle, while the northern and northwestern parts of Arizona, central, northern, and northeastern parts of New Mexico, and the eastern part of the Texas district are most heavily stocked with sheep. The principal sheep-and-goat producing areas of Texas are east of the Pecos River.

OWNERSHIP AND CONTROL OF LAND

One of the most difficult problems of range livestock men in the Southwest is to obtain control of grazing land during a period long enough to stabilize their operations, and to realize the benefits of approved methods of ranch management made practicable by such control. There is little or no incentive to improve the range, reserve pastures for drought emergencies, or develop permanent sources of water supply under the competitive system of free range that now prevails in a large portion of the region. In good seasons, when grass is plentiful, the range is invariably overstocked in an attempt to utilize as much of the grass as possible, and consequently

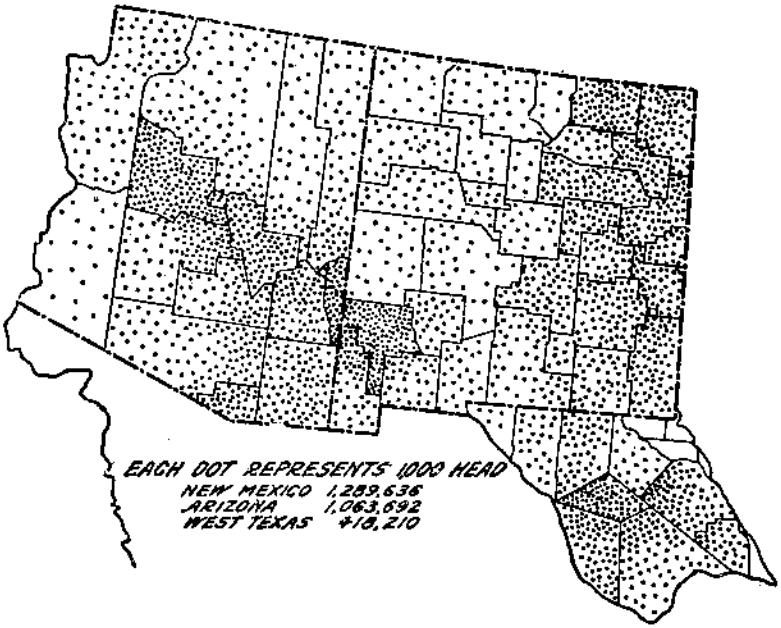

FIG. 10.—Number of cattle on ranches January 1, 1925

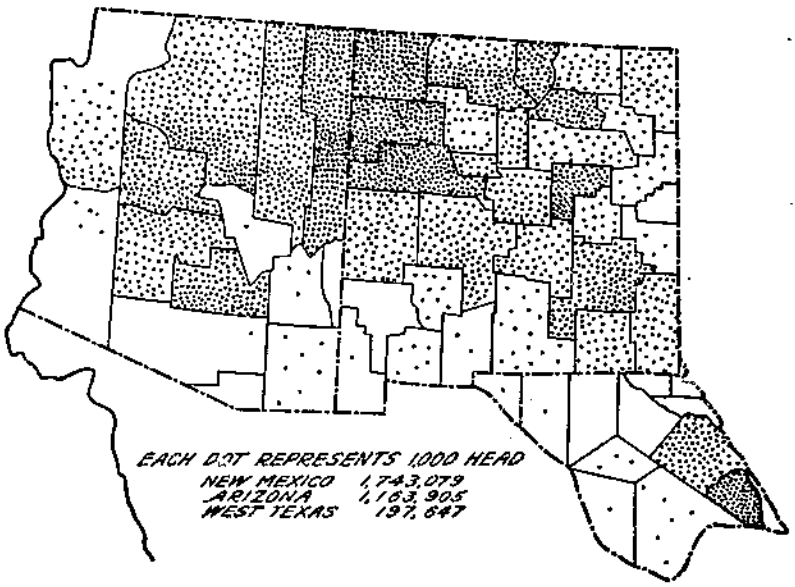

FIG. 11.—Number of sheep on ranches January 1, 1925

during the periods of drought stockmen incur heavy death losses and high feed costs. It is futile for an individual to purchase good-quality bulls at high prices for use on the open range when inferior bulls of other operators graze on the same range.

The area of public domain in Arizona and New Mexico together with the status of other land in those States is given in Table 2. The area of privately and corporately owned land in 1925 made up only 17 per cent of the land in Arizona and 51 per cent of the land in New Mexico. Of the 73,000,000 acres of land in Arizona, nearly 20,000,000 acres are in Indian reservations, over 12,000,000 acres are in national forests, almost 10,000,000 acres are State land, and 18,000,000 acres are unreserved public domain. New Mexico, with an area of 78,000,000 acres, has about 10,000,000 acres in national forests, 10,000,000 acres of State land, about 2,400,000 acres in Indian reservations, and over 16,000,000 acres of public domain. The location and extent of Indian reservations and national-forest range are shown in Figure 13.

TABLE 2.—*Ownership and administration of land in the southwestern range region, 1925* [1]

Ownership and administration	Arizona	New Mexico	Texas (western)
	Acres	*Acres*	*Acres*
Private and corporate	12,450,000	39,707,000	(2)
State land	9,672,000	9,923,000	(2)
National forests	12,306,000	9,948,000	
Indian reservations	19,672,000	2,403,000	
National parks	641,000	22,000	
Unappropriated public domain	18,091,000	16,399,000	
Total	72,838,000	78,402,000	16,750,000

[1] Taken from the annual report of the Commissioner of the General Land Office, Department of the Interior, and from the reports of the commissioner of public lands of New Mexico, of the State land department of Arizona, and the land commissioner of Texas.
[2] Data unavailable.

The part of Texas included in this study consists of approximately 16,750,000 acres of land west of the Pecos River. The exact figures relating to ownership were not available. It is known, however, that a part of the land in this area is owned by State institutions and is available to lease for grazing purposes. From the best information available the amount owned by the various State institutions is much less than 10 per cent of the total acreage stated.

The uncertainty of operations on the public domain is shown in Table 3, where a few of the conditions of operation in different districts are compared. Including the estimated acreage of public domain used by various ranchmen the rate of stocking on the ranches using public domain in Arizona and southwestern New Mexico was the lowest of all the groups. The ranchmen using public domain owned only 8 per cent of the land they used, while the western Texas ranchmen owned 73 per cent of the land on which they operated. With a branded calf crop of only 34 per cent and a death loss of 15 per cent, the ranches using public domain made the least favorable showing when measured by these two standards of efficiency.

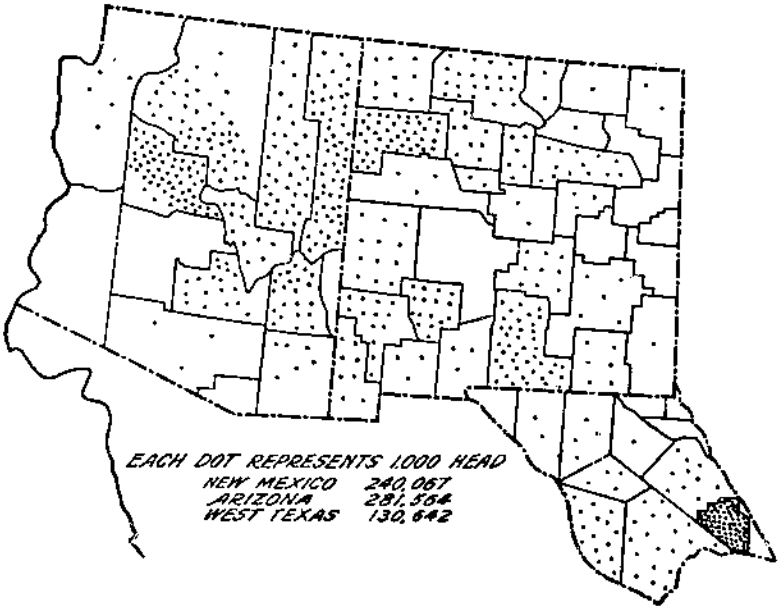

FIG. 12.—Number of goats on ranches January 1, 1925

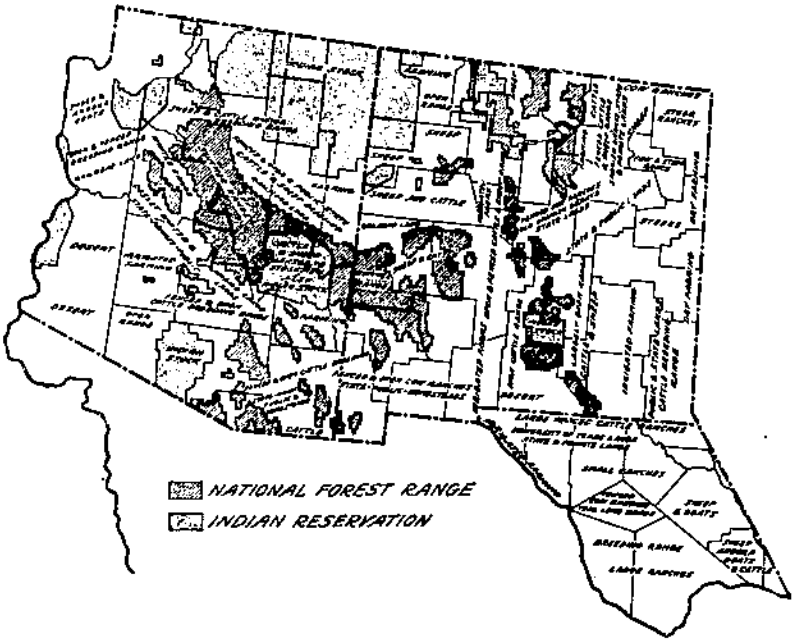

FIG. 13.—Location and extent of national forests and Indian reservations, New Mexico and Arizona, 1925

TABLE 3.—*Comparative features of ranch operation, 204 cow ranches, southwestern range region, 1925*

Item	Western Texas	Northeastern New Mexico	Arizona, southern and western New Mexico	
			Controlled range	Using public domain
	Number	*Number*	*Number*	*Number*
Cattle per ranch	2,305	807	1,115	2,087
Sections per ranch	112	20	45	124
Cattle per section	21	28	25	17
	Per cent	*Per cent*	*Per cent*	*Per cent*
Land owned	73	47	17	8
Investment in land	64	52	32	25
Calf crop	50	64	43	34
Death loss of breeding cows	6.9	5.3	8.7	15.0
Return or loss on capital	+2.5	+2.0	0.0	−4.8

The return on capital invested by the group of cow ranches using the public domain was the lowest of all during 1925. When no value was allowed for changes in market prices of cattle during the year, the loss on capital invested in ranches using public domain was 4.8 per cent. In extremely favorable seasons the ranches that suffer such losses may make returns as high as or higher than ranches on owned or leased land, because of their smaller expense for taxes and leases. The ranches using public domain would probably make a smaller return on capital in unfavorable years, even if the domain were under control, than ranches using other types of range until such range is improved above its present condition. Their losses during droughts should not be so great, however, if they are able to reserve pastures and to use other approved methods of management that are made practicable by such control. (Fig. 14.)

In a few cases ranchmen have been able to obtain control of a free range unit by purchasing "key" land which controls strategic points on the range. In some instances drift fences are so placed as partly to exclude outside stock. Sometimes key land is little more than ownership of springs, streams, or where water can be developed by the use of dirt tanks or wells. In many cases livestock men have paid comparatively high prices for small areas which controlled either accessibility to a certain range area or its water supply. Stockmen have purchased mining claims and other small holdings and paid several times the value of such land for grazing purposes in order to get control of a range unit. Stockmen in many cases now have control of the open range in one way or another but this control is legally insecure because others may homestead or develop water and have the same privilege of use.

The present methods of control of open range are of the hit-and-miss type and do not permit the stockman to reserve special areas or types of range for certain seasonal use. Under the present system it is almost impossible to prevent heavy loss from poisonous plants on the public domain in certain areas. Ranchmen do not feel justified in developing water on the open range in order to make better use of the forage. For instance, a ranchman in Arizona spent $20,000 developing water several years ago in order to use certain areas of free range. This range is now being used by others

without compensation to the one who placed the improvements on the land. As the result of these conditions the number of livestock on one range which supported 6,500 head in 1919 has been reduced to 2,000 head. This lack of control has resulted in a tremendous economic loss both to livestock producers and the States.

Stockmen when asked whether they desired control of the range were practically unanimous in replying that they desired control of some sort. Most of those interviewed on the subject were in favor of leases of 10 years or more, subject to renewal on an area basis, which would permit the control of the range by means of drift fences, and would allow them to develop water and otherwise make better

FIG. 14.—Losses are heavy on the public domain unless proper attention is given to water development and rate of stocking

use of the forage. It was suggested by the stockmen that such long-time leases be based on a careful land appraisal which would take into consideration the type of forage, water facilities, rainfall, distance from market and accessibility of the range. It was their opinion that the cost of these leases should be in accordance with the actual grazing value of the range. In many cases it is doubtful whether it would pay to put up division fences owing to the low grazing capacity of the free range and because of the spotted character of the rainfall.

Considerable dissatisfaction was expressed in connection with the methods of leasing Indian lands. These lands are leased to the highest bidder and usually the leases run for five years. In subsequent years the original lessee was given an opportunity to renew his lease at the highest bid should his own bid be exceeded by some other bidder. If a lessee develops water or places other improvements on the range he may lose the value of these improvements if some one else outbids him. Because of this situation it is the policy of stockmen who lease

Indian lands to forego improvements, because other operators can outbid them to the extent of the value of their improvements and they will have no recourse. With no incentive to sink wells or make other water improvements on the reservations ranchmen must depend on natural sources for their water supply. There is usually plenty of water in normal years, but stockmen who operate on the reservation are badly handicapped during dry seasons. There is no inducement to make improvements to remedy this condition, as improvements can not be sold to the Government nor can a subsequent lessee be forced to buy the improvements constructed.

The utilization of grazing land on the national forest in connection with the foothills or more level range in the valleys is an arrangement that has proved to be advantageous to many stockmen. With two types of range available, both are not so likely to suffer from drought at the same time, and in many cases the browse on the forest range has enabled the stockmen to save their herds in times of drought.

Some forest ranges have been overstocked during the dry years. Differences between the stockmen and the Forest Service in some districts are being overcome through becoming acquainted with the administrators, by the establishment of 10-year permits, fenced allotments, and the segregation of cattle and sheep. This is bringing about an improvement by adding stability to the livestock business. Stockmen are now assured of 10 years to operate on a given allotment with a minimum number below which the number of cattle or sheep can not be reduced. This will permit the improvement and development of the range and care of the herds in a more businesslike manner.

The Forest Service is endeavoring to use the best methods in handling the ranges, that is, to have the proper number and class of livestock on a given range in the proper season and handled according to approved practices. It is encouraging the building of fences by stockmen by returning this investment to the stockmen in the form of reduced grazing fees. One of the big problems is to provide the stockmen with a well-balanced range, one that will provide both winter and summer forage.

The remitting of grazing fees during the last two years when value received could not be given to ranchmen for fees paid, has helped the livestock situation considerably.

The railroad lands are situated in western New Mexico, extend across Arizona, and represent a grant of land given to the Atlantic & Pacific Railroad (now the Sante Fe), covering approximately 3,000,000 acres, intermingled with public domain. The average lease prices of railroad land shown in Table 5 represent a cheap source of grazing land.

Considerable criticism of the State administration of land was heard because of its failure to cancel or reduce fees for State leases at a time when, owing to the drought, there was no grass. A considerable number of leases were dropped because of inability to pay the fees. Many ranchmen stated that a lease of from 3 to 5 cents an acre on State land during the drought and recent depression was unfair and should have been waived or a reappraisal made of the range land and the lease rate based on the quantity of forage available. In order that an individual may be able to operate a cattle outfit and pay the present lease rate on the poorer State lands it is necessary for the State land to control or adjoin an equal area of public domain. It would be much more equitable to establish the lease price on the

basis of the grazing capacity of the land rather than to set a flat rate which disregards the grazing value of the land. Considerable speculation on State land leases by persons other than bona fide stockmen has occurred during recent years.

State lands are subject to lease for grazing or agricultural purposes. Grazing lands are leased for from 3 cents per acre per annum upward, and agricultural lands at from 10 cents per acre upward, depending on location, character, and condition of the lands applied for. Rates for leases on State lands are subject to change, but not until after due notice to the lessee. Leases are made for five years, subject to sale of the land at any time during the life of the lease, possession to be given on the first day of October following date of such sale.

A lessee of State land has the same right as any other person to bid on such land should it be offered for sale following an application to purchase. Should improvements have been placed on the land, they are appraised and the buyer of the land is required to pay to the owner of such improvements their cash value as shown by the appraisement.

Arizona State lands are sold at a minimum of $3 an acre and leased for 3 cents an acre. New Mexico State lands are sold at a minimum of $3 an acre and were leased for 5 cents before 1921. Since that time they have been leased at 3 cents an acre. In Texas no minimum sale price has been fixed by the State. Arizona lands may be purchased for 1 per cent in cash, 4 per cent on execution of the sale, the remainder being due in 38 annual payments, or entire amount payable at any time. The details of the laws and regulations governing the sale and leasing of State lands may be had from the land commissioners of the various States.

RANGE-CATTLE PRODUCTION—COW RANCHES

USE OF LAND

The area of owned and leased land per ranch and the source of leased land on 204 cow ranches is shown in Table 4. The largest cow ranches studied were those in the Texas district west of the Pecos River. The average area of these ranches was 112 sections of owned or leased land. The smallest cow ranches were found in northeastern New Mexico, where the average size of ranch was 29 sections. In Arizona and southwestern New Mexico the cow ranches with controlled grazing land averaged 45 sections in area, while the ranches operating on public domain owned or leased 57 sections in addition to an estimated average of 67 sections of public domain per ranch.

TABLE 4.—*Area of owned and leased land per ranch, with sources of land operated, 204 cow ranches, southwestern range region, 1925*

District	Number of ranches	Total land [1]		Owned land		
		Area		Total	Grazing land	Hay and crop land
		Acres	*Sections*	*Acres*	*Acres*	*Acres*
Western Texas	28	71,705	112.0	52,604	52,574	30
Northeastern New Mexico	45	18,392	28.7	8,649	8,436	213
Arizona and southern and western New Mexico:						
Controlled range	48	28,678	44.8	4,917	4,885	32
Using public domain	83	36,681	57.1	6,227	6,165	62
Total or average	204	35,689	55.8	12,819	12,735	84

[1] Not including estimated public domain.

TABLE 4.—*Area of owned and leased land per ranch, with sources of land operated, 204 cow ranches, southwestern range region, 1925*—Continued

District	Leased land					National forest	Public domain [1]
	Total	State	Railroad	Private	Indian reservation		
	Acres	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*	*Acres*
Western Texas	19,101	8,089	1,990	9,022			
Northeastern New Mexico	9,743	4,050	14	5,679			83
Arizona and southern and western New Mexico:							
Controlled range	10,222	6,700	370	3,143		13,539	282
Using public domain	22,852	15,324	3,904	2,421	1,203	7,602	42,645
Total or average	16,591	9,932	1,954	4,210	495	6,279	10,084

[1] Average estimate of those reporting.

Almost three-fourths of the entire land area operated by the 204 cow ranches was either leased land or public domain, 28 per cent being owned, 50 per cent leased and 22 per cent public domain. Although there is a small area of State-owned unoccupied land in Texas there is no public domain in that State. The percentage of public domain as represented is conservative, since it was impossible to obtain an accurate estimate on many ranches operating in Arizona.

The value of land and the lease rate paid on the cow ranches in different districts are shown in Table 5. The land value includes the value of control of water and public domain in some cases, which makes the per-acre value of the land rather high on individual ranches. This land is considered valuable as "key" land and its value is partly based on the fact that it controls water or on its accessibility to public domain, rather than on the actual grazing value of the land alone. For example, a 40-acre tract with a spring or water hole on it may control 20 or 30 sections of public domain, which would be worthless to any one else without the water to make the range usable.

TABLE 5.—*Value of land and cost of leases on 204 cow ranches in different districts, southwestern range region, 1925*

District	Number of ranches	Value per acre of owned land		Cost per acre of leased land [1]				
		Grazing land	Hay and crop land	State	Railroad	Private	Indian reservation	Average
		Dollars	*Dollars*	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
Western Texas	28	4.70	22.25	6.0	3.8	8.8		7.4
Northeastern New Mexico	45	4.37	35.21	4.9	5.0	9.8		7.6
Arizona and southern and western New Mexico:								
Controlled range	48	5.91	59.78	3.3	2.5	5.1		3.8
Using public domain	83	5.76	50.09	3.0	3.1	4.8	5.4	3.5
All districts	204	4.97	43.22	3.6	3.1	7.7	5.4	4.6

[1] Grazing fees on most of the national forests were waived during 1925 on account of drought.

The presence of dry-land farmers in some parts of the region has had its influence on the value of grazing land. After an occasional good grain or bean crop men have been encouraged to homestead land for dry-farming purposes that probably should never have been used for this purpose. Although most of the dry farms in the less

desirable districts have now been abandoned they have had a detrimental influence on the interests of the stockmen. Good varieties of grasses once plowed up become reseeded very slowly and it generally takes many years before they are reestablished under even the most favorable conditions. Many stockmen have found it necessary to buy out homesteaders at high prices in order to keep their ranges intact. Taxes and interest payments on high-priced land in those instances have reacted against profitable operation. Most stockmen at the present time do not expect to benefit from increased land values, but are looking for conditions that will give them opportunities for profitable ranching rather than gain through land speculation.

The average value of owned grazing land on the 204 cow ranches in the entire region was $4.97 an acre. The average value of hay and crop land, a part of which was irrigated, was reported as $43.28 an acre. The value of owned grazing land in Arizona and southwestern New Mexico was higher than in Texas and northeastern New Mexico, because a much smaller proportion of the land used in the western part of the region was owned and most of the improvements used in the utilization of leased land and public domain were on owned land.

The value of hay and crop land depended on whether it was irrigated or nonirrigated. The values of these lands averaged about the same as this kind of land in other areas of the Western States, varying from $5 to several hundred dollars an acre. There were less than 50 acres of hay land per ranch. The average of approximately 50 acres of hay per ranch was made from a few ranches which had a large acreage of hay. Only 84 of the 204 ranches reported cutting any hay at all. The hay produced is ordinarily sufficient only for horses and as a reserve for weak cows in periods of drought. The crop acreage was very small, averaging less than 40 acres per ranch, the small ranches in northeastern New Mexico having the largest acreage in crops. No crops whatever are produced in the southern part of the region except on the irrigated lands in connection with certain ranches.

The average cost of leased land, on the cow ranches, not including grazing permits on the national forest, was 4.6 cents an acre for the entire region. In Texas the average lease rate on 28 cow ranches was 7.4 cents an acre, and in northeastern New Mexico 45 ranches paid an average of 7.6 cents an acre for leased land. (Table 5.) The district with the lowest average lease rate was in Arizona and southwestern New Mexico, where ranchmen who used the public domain in addition to other lands paid 3.3 cents an acre for their leased land.

DISTRIBUTION OF INVESTMENT

The distribution of various items of investment on cow ranches of various sizes in the different districts is given in Table 6. The number of breeding cows was used as the comparative unit of size of ranch in this region. The ranches could not be classified according to the area of range used because there was so much difference in the carrying capacity per unit of area in different parts of the region, and because of the use of public domain in many instances, of which only estimated acreages could be obtained.

TABLE 6.—*Distribution on investment on 204 cow ranches of different sizes in different districts, southwestern range region, 1925*

District and number of breeding cows per ranch	Number of reports	Number of cattle	Total investment	Investment in— Land	Buildings	Water development	Fences	Cattle	Other livestock	Equipment, feed, and supplies	Total indebtedness	Net worth
			Dollars	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Dollars*	*Dollars*
Western Texas:												
Less than 100	1	78	22,405	54	5	18	8	13	1	1	8,000	14,405
101 to 200	1	217	39,763	60	5	12	13	7	2	1	7,500	32,263
201 to 500	8	502	79,364	47	5	14	3	26	3	2	21,548	57,816
501 to 1,000	5	935	204,620	73	2	5	2	16	1	1	31,488	173,132
1,001 to 2,000	3	1,471	256,524	63	1	9	2	23	1	1	113,601	142,923
Over 2,000	10	5,114	716,524	65	1	4	1	27	1	1	174,219	542,305
Total or average	28	2,305	344,821	64	2	5	2	25	1	1	86,726	258,095
Northeastern New Mexico:												
Less than 100	8	144	18,843	59	7	2	4	21	2	5	3,394	15,449
101 to 200	11	496	46,009	47	4	3	2	38	2	4	14,379	31,630
201 to 500	11	582	59,925	54	5	2	3	32	1	3	25,505	34,420
501 to 1,000	10	1,015	67,443	33	7	2	5	48	2	3	25,279	42,164
1,001 to 2,000	4	2,375	218,315	57	5	1	3	31	1	2	83,550	134,765
Over 2,000	1	3,677	448,514	74	1	1	3	18	1	2	30,000	418,514
Total or average	45	807	73,605	52	5	2	3	33	2	3	24,063	49,542
Arizona and southern and western New Mexico:												
Controlled range—												
Less than 100												
101 to 200	7	191	13,958	22	13	9	4	44	3	5	2,186	11,772
201 to 500	17	483	30,304	30	9	6	7	42	2	4	3,861	26,443
501 to 1,000	16	982	67,264	41	4	3	6	39	2	2	14,130	53,134
1,001 to 2,000	5	2,135	116,746	43	3	3	6	41	2	2	19,000	97,746
Over 2,000	3	5,858	310,239	16	7	4	7	61	3	2	46,500	263,739
Total or average	48	1,115	66,740	32	6	5	6	47	2	2	11,282	55,458

Using public domain—												
Less than 100												
101 to 200	2	316	20,168	20	12	12	6	43	6	1	19,000	1,168
201 to 500	23	472	22,918	23	6	7	7	51	3	3	6,711	15,207
501 to 1,000	24	1,124	58,183	21	8	8	7	49	4	3	17,928	40,255
1,001 to 2,000	14	2,216	107,235	22	8	10	4	52	2	2	35,666	71,569
Over 2,000	20	5,187	231,910	28	5	4	4	56	2	1	79,416	152,494
Total or average	83	2,087	97,631	25	6	6	5	54	2	2	32,654	64,977
Average investment per head of cattle:				*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*		
Western Texas			149.59	96.42	2.53	7.30	2.50	38.42	1.47	0.95	37.62	111.97
Northeastern New Mexico			91.21	47.68	4.67	1.38	2.93	30.47	1.31	2.77	29.82	61.39
Arizona and southern and western New Mexico—												
Controlled range			59.86	19.00	3.62	2.85	3.90	27.74	1.40	1.35	[1] 10.12	49.74
Using public domain			46.78	11.81	2.95	2.85	2.16	25.02	1.13	.86	[1] 15.65	31.13

[1] Indebtedness on some ranches lacking.

The western Texas ranches had the largest total investment because they had the largest area of land under control and owned a higher proportion of land operated than any other group. Besides having a larger number of cattle per ranch, the ranchmen in the Texas district valued their cattle at a higher figure than those in any other district. Although the ranches using public domain had less owned land than those in northeastern New Mexico, their total investment was greater on account of the greater number of cattle which utilized leased land, national forests, and public domain to a greater extent.

The differences in investment in the various districts are better shown by the investment per head of cattle. The highest investment per head was found in the western Texas district where $149.59 for each head of cattle on hand at the beginning of the year was invested in improved land, equipment, and livestock. On the ranches using public domain in Arizona and southwestern New Mexico the total investment per head of cattle on 83 ranches averaged $46.78. On the ranches using public domain 54 per cent of the investment was in cattle, while in the western Texas district only 25 per cent of the investment was in cattle. The ranches in northeastern New Mexico, where a few crops are grown and more hay is cut than in other parts of the region, had the largest investment per head of cattle in buildings and equipment.

The smallest investment per ranch was found on those ranches with less than 200 breeding cows on controlled grazing land in Arizona and southwestern New Mexico, where the average investment was about $14,000. Ten ranches in the western Texas district having more than 2,000 breeding cows had an average investment of approximately $717,000.

There was some tendency for the investment in improvements and equipment per head of cattle to be less on the larger ranches. For example, in northeastern New Mexico, Table 7 shows that the investment in water development on the ranches with less than 100 breeding cows was $2.38 per head of cattle as compared with 95 cents per head on the largest ranch in that district. The investment in buildings, fences, and equipment shows the same tendency. The fact that the investment in windmills, wells, and tanks is more efficiently utilized by a large number of cattle than by a few, is a handicap in the operation of small ranches as compared with those carrying a larger number of cattle. The investment in land per head of cattle varied with the percentage of land owned rather than the size of ranch.

TABLE 7.—*Distribution of investment per head of cattle on 45 cow ranches of different sizes in northeastern New Mexico, 1925*

Number of breeding cows	Number of ranches	Total investment	Land	Buildings	Water development	Fences	Cattle	Work stock	Other stock	Feed and supplies	Equipment
		Dolls.	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*	*Dolls.*
Less than 100	8	130.85	77.56	9.23	2.38	4.68	27.28	2.08	0.42	2.36	4.86
101 to 200	11	92.76	43.63	3.73	2.67	2.23	35.40	1.31	.42	1.40	1.97
201 to 500	11	102.96	55.35	5.59	1.83	2.84	32.49	.97	.33	1.95	1.61
501 to 1,000	10	66.45	21.83	4.68	1.10	3.03	31.80	1.05	.43	1.16	1.37
1,001 to 2,000	4	91.92	52.79	4.54	.67	2.73	28.41	.09	.11	1.17	.81
Over 2,000	1	121.97	90.31	1.77	.95	3.81	22.16	1.21	-------	1.22	.54
Total or average	45	91.21	47.68	4.67	1.38	2.93	30.47	1.03	.28	1.38	1.39

WATER DEVELOPMENT

The cost of water development was also variable in different districts. It was most expensive in western Texas, where an investment of $7.30 per head of cattle was necessary to cover the value of windmills, wells, reservoirs, and other equipment used in supplying water to livestock. This is explained largely by the great depth to which it is necessary to drill wells in that district.

The dependability of the supply of water has a very important influence on the use that can be made of the range and on the possibility of avoiding death losses or movement of livestock during times of drought. (Fig. 15.) There are more natural sources of water, such

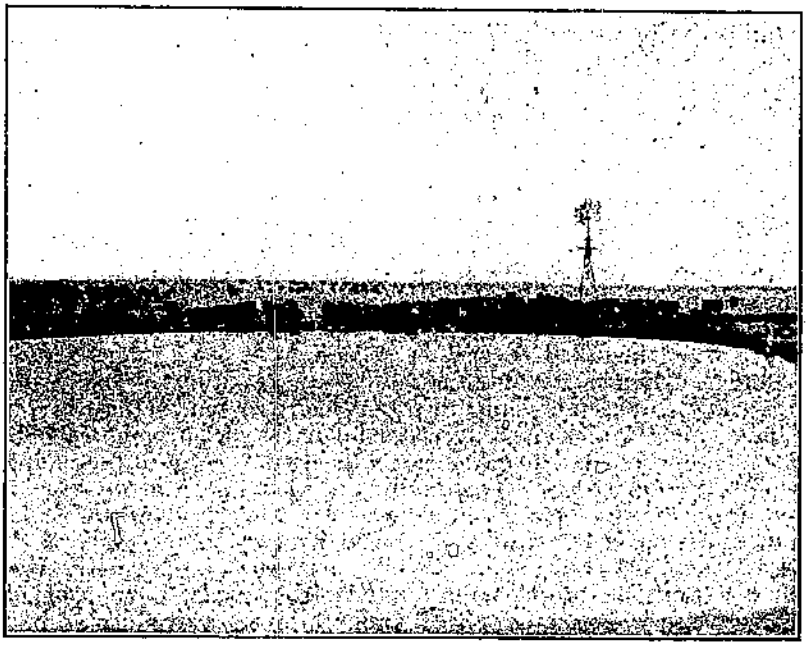

FIG. 15.—Large surface tank common in the Southwest

as springs, streams, and natural reservoirs in the forested mountain districts than on the plains, but during a protracted drought when these sources fail, ranchmen in the mountain districts oftentimes suffer a greater loss than ranchmen in districts having fewer natural sources of supply but a better developed permanent water supply.

It is not always possible to obtain a good, permanent water supply. On one ranch in east central New Mexico 80 dry holes were drilled in an endeavor to find a permanent supply of good water. The ranchman obtained only 2 wells out of the 80, 1 of which had a capacity of only 4 barrels a day. This man was forced to depend on a temporary water supply from a large dirt tank and in dry years it was necessary for him to move his cattle to a well-watered range at great expense. On one ranch in Arizona which depended largely on surface tanks, the ranchman had to haul water from the railroad, paying $17.50 per 8,000

gallons. This was an extreme case, since continuous operations under this condition would scarcely be possible.

During the early period of range use only those ranges with natural water were used. The development of water has come with the passage of range to private ownership. Temporary water supplies, such as springs, dirt tanks, shallow wells, and natural water holes are valuable in supplementing a permanent supply and ordinarily are used when possible to reduce the cost of operating the more expensive deep wells. Some of the most expensive wells are 1,100 feet in depth, and the cost for gas, oil, repairs, and labor to operate them is an item of considerable expense. These wells require powerful, stationary gas engines to pump water from them. Some ranchmen have reduced their costs of operating wells by replacing gas engines with large windmills during a large portion of the year. On some of the larger ranches it requires the full time of one or more men to keep the windmills or engine pumps running, which represents a considerable percentage of the expense of operating the ranches. In some instances wells are equipped with both windmills and gasoline pumps in order that one may be used when the other is out of order.

In districts where well drilling is especially uncertain and expensive, pipe lines are being used quite extensively. One ranch had 65 miles of pipe line from the central water supply to various watering places over the range. On one Texas ranch water was pumped from springs in the mountain for 6 miles across a valley range that was formerly unwatered. The cost of 1½-inch pipe was 10 cents a foot in this instance when installed several years ago.

Where the chances for obtaining an adequate supply of good water from wells are uncertain, ranchmen have constructed earth reservoirs or tanks which furnish the only water for livestock on many ranches. Large, well-constructed dirt tanks are expensive. Some of these tanks were constructed across a channel while others were in depressions which drained rather large watersheds. However, where the soil is porous and sandy, dirt tanks are unsatisfactory on account of the excessive loss from seepage. Some ranchmen who formerly used small dirt tanks to store water pumped from wells, have replaced them with steel, concrete, or rock tanks in order to reduce seepage losses and thereby reduce the cost of pumping.

To give an idea of the cost of water development the following examples of actual cost taken from records are given. This ranch operates on public domain and the water investment is as follows:

(1)	25-foot windmill and tower	$1,000
	Drilling well, 400 feet	1,500
	400 feet 10-inch casing	908
	300 feet 4-inch pipe	248
	300 feet sucker rods	157
	300 feet 3¾-inch cylinder	30
	60,000-gallon steel storage tank with concrete bottom	700
	2 steel drinking troughs	250
	1 pump jack	187
	Total cost complete	4,980

(2) Double wells pumping into three tanks:	
One 25-foot windmill and tower	$1,000
One 20-foot windmill and tower	700
Two wells drilled 300 feet	2,000
Two wells cased with 10-inch casing, 300 feet	1,560
Two wells with 250 feet 4-inch pipe	415
Two wells with 250 feet sucker rods	261
Two wells with 250 feet 3¾-inch cylinders	60
One large earthen storage tank	500
One steel drinking trough, 1,500 gallons	150
	6,646
In addition, there are 3½ miles of 2½-inch black-pipe line serving two tanks, cost	4,684
Two 30,000-gallon steel storage tanks with concrete bottoms at $350 each	700
Two steel drinking troughs, capacity 1,500 gallons each	250
Total cost complete	12,280

COST OF FENCING

The cost of fencing varies considerably throughout the region. In the localities that are nearly level the labor of construction is much less than in the rougher parts, but posts are often very scarce and must be shipped in. In timbered districts the cost of posts is a smaller item, but the labor of building fence is usually much more expensive on account of the rough topography. With barbed wire at $5 per 100 pounds, and posts at from 20 to 40 cents each, the cost of fencing usually amounts to from $125 to $200 a mile, although it sometimes varies from $75 a mile for a cheap fence of used wire to $300 a mile for a first-class, four-wire fence.

The investment in fences was greatest on the ranches using controlled range in Arizona and southwestern New Mexico. This district has more rough mountain land than any other part of the region, and fences there are much more expensive to build and maintain than in other places. The ranches using public domain naturally had the smallest investment in fences per head of cattle although they, too, used a considerable amount of rough mountain range.

MANAGEMENT OF THE RANGE

Since range livestock production in the Southwest is only a means of marketing range grasses, a consideration of the utilization and improvement of the range is a vital one in a study of this kind. The general type of production best suited to the region, the types of range best utilized by the various kinds and classes of livestock, seasonal use, and the possible means of improvement of the range are important items in this connection.

The special adaptation of the region for range livestock production is for breeding purposes. The lack of suitable range for fattening, except during the few very favorable years, largely determines that fact. Some special situations prevail that permit the production of aged steers for slaughter, but the latter do not attain the degree of finish necessary to compete with steers or other fat cattle from the more favorable ranges adapted to this purpose.

The comparatively mild winters and long growing seasons do not eliminate all the problems of carrying breeding herds. The usually unfavorable range conditions in the spring and early summer, when

most of the calves, kids, and lambs are born, together with the attendant shortage of stock water, constitutes what is probably the most important problem in range utilization in the region. The sale of calves, yearlings, and lambs results in a high ratio of breeding animals to total numbers of stock carried. Even though the range may be stocked conservatively for normal conditions, the occurrence of several subnormal years in succession often necessitates reduction in the breeding herd to meet critical situations. Prolonged subnormal conditions sometimes result in forced removal or sale of entire herds under conditions unfavorable to satisfactory prices. To lease additional range in such emergencies is very difficult and expensive on account of the greater demand for grass and the advantage afforded by the unfortunate situation of the lessee.

An old rule of the range and one that probably merits the attention of cattlemen especially, and of sheepmen under some circumstances, is that it does not pay to move stock cattle and return them to their former range. In addition to the cost of transportation and feed bills, other unfavorable influences must be considered. High death losses, lower calf crops, additional labor, and relatively high pasture charges are the usual results of moving stock cattle from range to range. There seems to be merit in a policy practiced by some ranchmen, when conditions are such that stock cattle have to be moved to other than near-by ranges, of selling the cattle outright, in which case they move as the property of another operator. Many operators believe this from past experiences, yet are reluctant to practice it on account of a hope for better range conditions and higher prices.

The inauguration of a system of range use and management that will minimize the necessity of moving livestock or undergoing forced sale because of range conditions is important, not only from the standpoint of the cost of ranch operation but also from the possibility of range improvement. Undoubtedly the greatest handicap to the operation of various means of range improvement is the lack of permanent control of the public domain and the short-time leases of other land which do not permit an attempt to improve the range by more permanent water development and systematic plant propagation.

To bring about any improvement of the range it is absolutely necessary to maintain control over a sufficient length of time that the individual ranchmen may realize the benefits from his efforts. A system of refunding an equitable proportion of expenditures for water development, fencing, and similar improvements that can not be removed economically from the State and Federal lands that are subject to grazing leases, would be an incentive to provide needed range improvements. Long-time control of the range is just as important from the standpoint of the care and management of the range grasses as it is to other improvement, such as water development and fencing.

A minimum amount of range improvement, if any, may be expected from leases of less than five years' duration, even with renewal privileges. Under such a lease an operator has no incentive to stock, equip, and operate a ranch, because of the possibility that he may be forced into a competitive bid to continue operation or lose a portion of the value of his improvements. Longer leases with added stipulations as to refunds on improvements at the expiration of lease would have a tendency to eliminate speculation and stabilize ranch

operations. There is little doubt that material benefits could be derived by this policy and that the added cost of administration would be returned through the increased value of the range which would in time increase the lease and sale value of the land. In some cases the lack of stability has resulted in a refusal to lend money on cattle.

In any system of range improvement as applied to plant propagation the proper consideration of the predominating range plants is essential. Aside from the ability to identify the most valuable plants, some knowledge of the seeding and maturing season and conditions to growth is desirable. It must be considered that there are no pure stands of any one kind of grass over any considerable area of range, and that the most important grasses merely designate the general type. The minor range plants are very important in carrying livestock between the growing seasons of the most important forage plants.

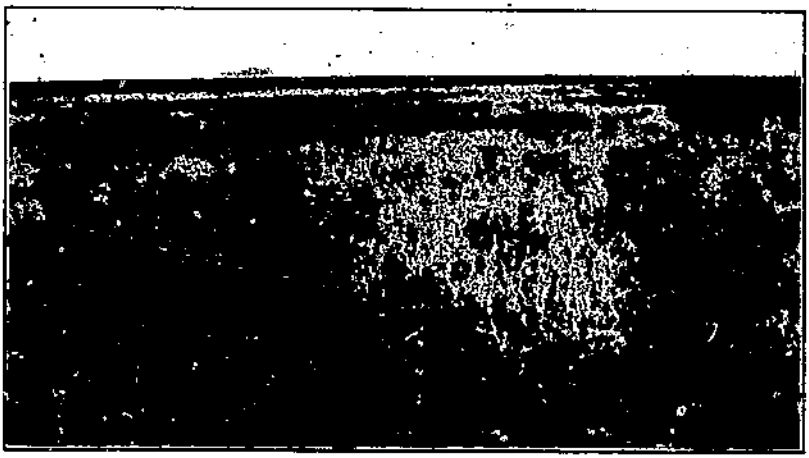

FIG. 16.—Tobosa grass is most valuable if grazed before it has matured

Practical means of range improvement should interest especially those livestock producers who are operating on owned or controlled range where the length of lease or other form of control will justify improvement. The best results can not ordinarily be expected from a system of year-long use of the same range in this region. In general, the number of varieties of forage plants that may be depended on for most of the grazing during the growing season is limited to a few of exceptional palatability, and livestock will graze those plants in preference to all others, thereby limiting the probability of reseeding or development of the best plants.

Seasonal use of the different varieties and species of range plants according to their palatability and season of maturity will give better results than will be obtained if a consideration of these characteristics is neglected. For example, Tobosa grass is practically unfit for grazing after the plants have become mature because it is so coarse and unpalatable, yet it may be grazed heavily during the early season of its growth. (Fig. 16.) Grama grass, while very palatable at all seasons, is damaged by close early grazing, and is most valuable at maturity or thereafter. Ordinarily grama grass may be reserved on the range for six months or more and retain a high per-

centage of its nutritive value. In some cases grama-grass ranges are reserved for periods longer than six months and ranchmen report the palatability of the grass to be very slightly impaired. (Fig. 17.) Other grasses may have other special seasonal values.

While it is realized that there are few ranges that are ideally balanced with the proper proportion of the various plants for seasonal use, yet consideration should be given to the possibilities of an individual range and to the class of livestock to utilize it. The use of range by the class of livestock to which it is best adapted is one of the most important phases of range utilization and one that should be considered in any contemplated plan of changing from one kind of livestock to another or of expanding operations by adding another kind of livestock. Good grass range is ordinarily utilized by cattle rather

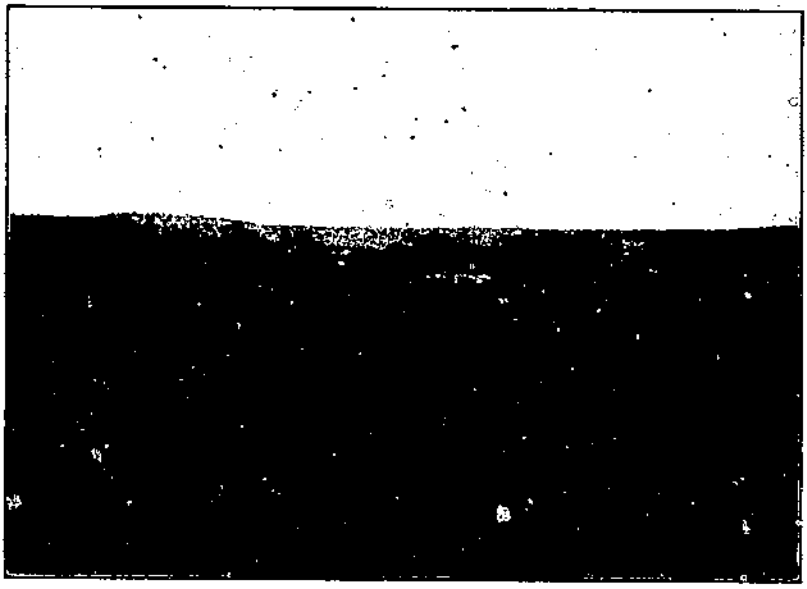

FIG. 17.—Grama grass is the most valuable species in a large part of the region

than by sheep or goats. Grass, of course, is not objectionable to any kind of range livestock, and where the stand of grass is thin and weeds are numerous, sheep can probably be grazed more advantageously than cattle. Browse can be well utilized with goats, especially if a sufficient amount of it remains green or palatable during the winter. Some grass during all seasons is highly desirable for all classes of livestock, and other kinds of range plants, such as herbs and browse, together with the factors of climate and topography, may determine the desirability of running sheep or goats.

Probably the best means of range improvement, where a permanent system of range control makes it possible, is deferred grazing. This is being practiced in some form by many ranchmen who are making a practice of reserving part of their range for winter use. The practice of deferring grazing on different divisions of the range each year, or two years in succession to form a definite rotation is not being applied generally. The usual policy is to reserve a certain portion of the range, depending on the vegetation, winter protection, and available

water, for use during the winter. Year-long use of the same range is very common, however, especially in the southern portions of the region. Most ranchmen appreciate the value of allowing a range to remain ungrazed during an occasional growing season, to permit seed maturity and reseeding. The lack of range control, the lack of sufficient permanent water, and the great variation in seasonal conditions from year to year are factors that have retarded the application of systematic methods of range improvement that are recognized as being practical and applicable under less variable conditions.

Results that may be expected from systematic range maintenance or improvement are exemplified by the improvements and management of a 220 section ranch in western Texas that was studied in this survey. The ranch is cross-fenced into two main divisions, each of which is further divided into several pastures. A permanent water unit is developed on each of the main divisions at a cost of approximately $10,000 each. This makes an expensive investment, but insures a plentiful supply of water during droughts when the temporary supply from surface tanks usually fails.

The plan of the operator has been to reserve one division of the ranch for emergencies, regardless of the season in which they may occur. The reserved areas have not been completely alternated from year to year as would have been done in a definite system of deferred and rotation grazing, but needed pastures have been used seasonally as required. An attempt has been made to avoid overstocking any part of the range and during normal years the grass has matured on the reserved portions. During the period of subnormal rainfall in 1924 and 1925, the situation became very critical and the reserved range was grazed. In fact, the gates were opened and the fences lowered to allow cattle the run of the entire ranch. As a result of the modified system of deferred grazing, this man was one of three ranchmen within a very large area who were not forced to move their breeding herds to other ranges. The movement of cattle by the other operators in this locality was so great that this particular community was almost devoid of cattle July 1, 1925.

An important fact to be kept in mind in connection with deferred grazing is that the best results are usually obtained if the deferred range is grazed shortly after the seed of the most valuable range plants has matured, instead of allowing the range to lie idle for a year or two. Two principal advantages are derived from deferred grazing, namely, good, strong plants are allowed to grow and reseeding is permitted. Neither of these operations is retarded by the use of the range after seed maturity. On the contrary, revegetation is encouraged by having the seed trampled into the ground by livestock. Grazing to the extent of injury to plant roots would be detrimental, but conservative grazing is wholly desirable.

In applying a plan of deferred grazing in this region, interruptions may be expected because of the frequency of subnormal years. In these instances the plan may be more important from the standpoint of emergency range than from that of range improvement.

Range improvement under a system of year-long use is especially difficult in this region. By stocking the range lightly enough it is possible to realize some of the same benefits that come to the ranchman who reserves a portion of his range each year. There is always

the tendency to carry a few more cattle, however, and during times of drought ranchmen attempt to avoid decreasing the numbers of livestock, and serious damage to the range results.

Range control is as essential to water development as a phase of range improvement as in the case of plant propagation. Not only is control of the range necessary to permit any large investment in a permanent water supply, but still more water development is necessary to put in practice the plan of deferring grazing with some regularity over portions of practically the entire ranch. This tends to remedy the serious overgrazing that ordinarily occurs around watering places. (Fig. 18.) Water and grass are absolutely essential to range

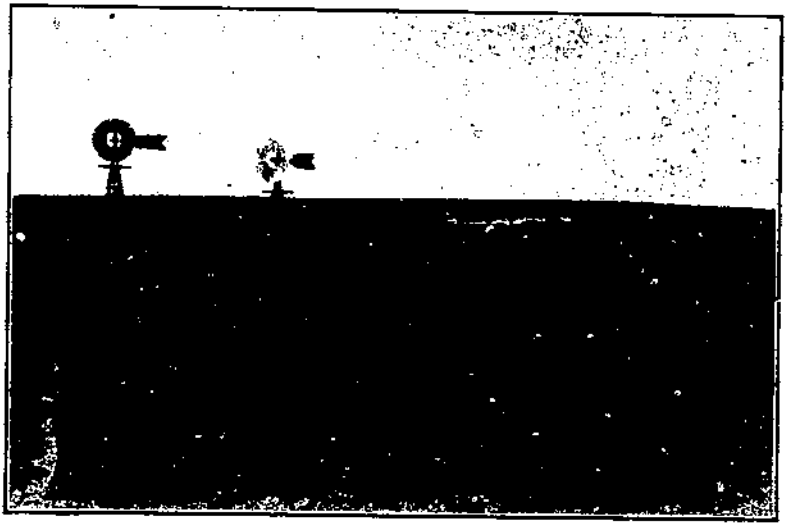

FIG. 18.—Overgrazed range around a watering place

livestock production and no system of range improvement is complete without an arrangement for a sufficient reserve of both.

MANAGEMENT OF CATTLE

The management of the range and the management of cattle are almost inseparably related. A system of range management which utilizes the range grasses at the proper season and at the same time maintains or increases the plant growth of the most valuable varieties may still fall short of good ranch management if consideration is not given to means of efficient and economic handling of cattle and the quality of the product marketed.

The general methods of cattle management are very much the same throughout the region. However, variable situations such as operating on owned land, national forest, or public domain, necessitate the application of details in management to meet those situations. In western Texas and northeastern New Mexico, where operations are confined largely to fenced range, many advantages are offered over situations necessitating the use of public domain or other unfenced range. Operation on the open range and national forests has an advantage in the smaller investment in land and improvements but

does not allow for the possibility of complete herd control and desired range improvement which are important factors in range-cattle production.

CATTLE INVENTORIES

The numbers of different classes of cattle on cow ranches of different sizes at the beginning and end of the year 1925 are given in Tables 8 and 9. In the group with 100 or less breeding cows there were only 9 ranches, 8 of which were in northeastern New Mexico. The largest proportion of small ranches was found in northeastern New Mexico, where 45 ranches had an average of 456 cows and 351 other cattle, making a total of 807 head. Forty-eight ranches operating on controlled range in Arizona and southwestern New Mexico had an average of 1,115 cattle, while 83 ranches using public domain in the same territory had an average of 2,087 cattle in the opening inventory. The 28 Texas ranches with an average of 2,305 cattle per ranch were the largest group.

TABLE 8.—*Opening cattle inventory, 204 cow ranches, southwestern range region, 1925*

District and number of cows	Number of ranches	Cows	Heifers		Bulls	Steers			All cattle
			Yearlings	Two years old		Yearlings	Two years old	Three years old	
Western Texas:		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100	1	75			3				78
101 to 200	1	137	30		19	31			217
201 to 500	8	323	55	11	24	21	12	56	502
501 to 1,000	5	757	64	35	34	44	1		935
1,001 to 2,000	3	1,192	53		49	177			1,471
Over 2,000	10	3,222	601	261	163	549	79	49	5,114
Total and average	28	1,513	281	103	77	266	32	33	2,305
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value per head		32.07	26.20	31.49	121.03	28.93	34.48	45.28	33.98
Northeastern New Mexico:		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100	8	58	13	5	1	67			144
101 to 200	11	149	36	10	5	99	108	80	496
201 to 500	11	309	66	33	17	94	51	12	582
501 to 1,000	10	683	152	72	23	85			1,015
1,001 to 2,000	4	1,507	251	252	61	318	6		2,375
Over 2,000	1	2,207	415	448	102	467	38		3,677
Total and average	45	456	93	60	19	117	40	22	807
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollar*	*Dollars*
Value per head		26.32	19.26	22.10	83.87	22.78	31.48	51.27	26.96
Arizona and southern and western New Mexico:									
Controlled range—		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100									
101 to 200	7	140	9	4	7	18	13		191
201 to 500	17	293	61	22	20	69	13	5	483
501 to 1,000	16	639	109	57	33	104	29	11	982
1,001 to 2,000	5	1,542	125	84	51	233	89	11	2,135
Over 2,000	3	4,337	447	241	196	437	200		5,858
Total and average	48	700	100	51	37	113	38	7	1,115
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value per head		22.20	16.10	19.71	82.64	18.56	24.30	35.79	23.30
Using public domain—		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100									
101 to 200	2	125	44	25	22	68	17	15	316
201 to 500	23	304	49	27	15	55	15	7	472
501 to 1,000	24	713	87	68	36	156	40	24	1,124
1,001 to 2,000	14	1,371	264	132	69	311	50	19	2,216
Over 2,000	20	3,505	505	182	160	581	183	71	5,187
Total and average	83	1,369	206	94	66	255	68	29	2,087
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value per head		23.02	16.55	19.26	72.26	18.56	25.45	31.02	23.41

TABLE 9.—*Closing cattle inventory, 204 cow ranches, southwestern range region, 1925*

District and number of cows	Number of ranches	Cows	Heifers		Bulls	Steers			All cattle
			Yearlings	Two years old		Yearlings	Two years old	Three years old	
Western Texas:		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100	1	138	7	-------	5	8	-------	-------	158
101 to 200	1	-------	-------	-------	15	-------	-------	-------	15
201 to 500	8	320	37	6	20	48	9	31	471
501 to 1,000	5	652	80	24	30	46	28	1	861
1,001 to 2,000	3	1,288	87	-------	51	184	17	-------	1,607
Over 2,000	10	2,997	502	296	149	673	75	75	4,767
Total and average	28	1,380	244	112	71	282	36	35	2,169
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value per head	-------	46.25	34.36	37.52	124.54	33.90	44.48	50.47	45.55
Northeastern New Mexico:		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100	8	48	33	8	1	41	20	-------	151
101 to 200	11	186	49	30	8	132	36	85	535
201 to 500	11	281	73	41	12	109	47	23	586
501 to 1,000	10	582	121	65	21	76	-------	-------	865
1,001 to 2,000	4	1,468	165	224	54	176	-------	-------	2,087
Over 2,000	1	2,496	410	310	105	110	2	-------	3,451
Total and average	45	437	87	62	17	101	24	27	755
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value per head	-------	37.01	25.24	31.94	86.01	30.68	35.86	60.50	36.31
Arizona and southern and western New Mexico:									
Controlled range—		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100	-------	-------	-------	-------	-------	-------	-------	-------	-------
101 to 200	7	134	29	9	7	13	5	-------	197
201 to 500	17	278	64	37	19	52	17	1	468
501 to 1,000	16	581	101	64	31	91	21	12	901
1,001 to 2,000	5	1,214	175	103	52	143	53	22	1,762
Over 2,000	3	4,394	789	416	215	733	83	150	6,780
Total and average	48	713	128	73	36	111	25	16	1,102
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value per head	-------	32.80	23.11	20.06	86.23	25.26	31.40	41.90	32.55
Using public domain—		*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
Less than 100	-------	-------	-------	-------	-------	-------	-------	-------	-------
101 to 200	2	150	57	25	21	50	5	8	316
201 to 500	23	255	48	36	15	44	7	2	407
501 to 1,000	24	594	105	84	35	104	31	5	958
1,001 to 2,000	14	1,141	190	183	61	168	81	10	1,834
Over 2,000	20	2,826	441	344	146	338	116	53	4,264
Total and average	83	1,120	183	149	60	153	53	17	1,735
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Value per head	-------	32.77	21.91	28.51	76.82	24.77	20.86	37.08	32.04

The cows on the Texas ranches were valued at approximately $32 a head on January 1, 1925, as compared with $26 in northeastern New Mexico and about $23 in Arizona and southwestern New Mexico. The average value of bulls varied from $121 in western Texas to $72 on the ranches using public domain in the Arizona-southwestern New Mexico district. These variations in price were due to differences in the quality of the cattle. The advantage of the Texas cattle in quality may be attributed in part to the better type of range in that district resulting from its having been under control for a longer period than other parts of the region, and partly also to concerted effort by some of the cattlemen to produce choice feeder cattle.

The average value of cattle increased by more than $10 a head during 1925. At the end of the year, cows were valued at $46 in

western Texas, $37 in northeastern New Mexico, and about $33 in Arizona and southwestern New Mexico. This was due to improved market conditions, and to the abundance of feed on the range caused by the heavy rains during the fall and winter of 1925 and early spring of 1926, which eliminated forced movements of cattle after July, 1925.

In all the districts studied there were fewer cattle on hand at the end of the year than at the beginning. This was due to the drought of 1924–25, which caused comparatively heavy movements of cattle in the spring and early summer of 1925, as well as greater death losses and lower calf crops than usual. More cows and calves were sold than under normal conditions, partly due to the drought, and partly to meet financial obligations. Some ranchmen said that the improved market conditions in the late summer and fall enabled them to sell cull cows for the first time in five years. During the

FIG. 19.—Good-type yearling bulls in southern Arizona

previous five years many such cows were allowed to die on the range because they were not worth enough to pay marketing expenses. The greatest reduction in the number of cattle was on the 83 ranches using public domain in Arizona and southwestern New Mexico, where there were 17 per cent fewer cattle on hand at the end of the year than at the beginning. This circumstance is characteristic of operations on public-domain areas and results from inability to reserve range for drought emergencies.

QUALITY OF CATTLE

There is wide variation in the quality of cattle produced in the region. Certain herds that have been improved for a number of years have reached as high a standard of excellence as seems practical to produce under range conditions for market purposes. In these instances the chief breeding problem confronting ranchmen is the selection of bulls to maintain the high standard of quality and type. A drove of good quality bulls is shown in Figure 19.

There are many other herds that are not far removed from the poorly bred cattle common in Mexico. (Fig. 20.) Some of the herds of poor quality, especially in southern Arizona and New Mexico, may be accounted for by periodic droughts which necessitated the removal of cattle to avoid starvation on the range. When range conditions were again favorable, cattle of Mexican origin were used for restocking on account of the low prices at which they could be purchased, their adaptation to the prevailing types of range, and the scarcity of well-bred cattle of known adaptation to semidesert ranges. There are examples throughout the region, however, of good cow herds that have been built up from cows of Mexican origin by the use of good bulls properly cared for, and the selection of the most desirable heifers for replacement.

The principal incentive for improving the quality of cattle in the Southwest, as elsewhere, is in the higher prices received for cattle

FIG. 20.—Undersized 3-year-old steers of poor conformation

sold. Yearling steers sold in May, 1926, varied in price from $31.50 to $37.50 a head in the same county in Arizona. This difference represents the premium paid for good quality cattle.

Another important factor which has prevented any greater improvement in quality of cattle in this region is the lack of control of the public domain. A ranchman can not afford to use well-bred bulls to improve the quality of his herd when other users of the same range are furnishing bulls of a poor type or none at all. Well-bred bulls are expensive, and unless a man controls most of his range or can cooperate with other users of common range in the number and quality of bulls furnished, he probably can not afford to use high-priced bulls.

In a number of the outstandingly good herds in the western Texas and northeastern New Mexico districts, special effort has been made to maintain uniformity of type. The most careful selection has been made of replacement heifers from year to year, and registered bulls of excellent breeding and the accepted type have been used consistently. The result has been that the producers have established themselves in the feeder-cattle trade as an extensive source of as good-quality cattle as can be found in the Western States.

CALF-CROP PERCENTAGE

The proportion of calves branded from a given number of breeding cows varied widely among the different districts and among ranches within the same district. The type of range and the condition of the range during the breeding season were the principal factors causing this variation. Other factors that influenced the calf-crop percentage in this region were the number of cows per bull, condition of bulls, proportion of two-year-old heifers bred, closeness of culling of old cows, and the size of ranch.

The number of ranches with different calf-crop percentages in the four districts is given in Table 10. The largest group of ranches in northeastern New Mexico fell in the class with a 70 to 85 per cent calf crop. A calf crop of from 40 to 55 per cent was most frequent on the controlled range in Arizona and southwestern New Mexico, and that from 25 to 40 per cent for those operating on public domain. In Texas the ranches were almost equally divided among all the percentage groups.

TABLE 10.—*Distribution of 204 cow ranches by calf-crop percentage, southwestern range region, 1925*

Calf-crop percentage	Western Texas	Northeastern New Mexico	Arizona, southern and western New Mexico	
			Controlled range	Using public domain
	Number of ranches	*Number of ranches*	*Number of ranches*	*Number of ranches*
Less than 25	3	1	3	20
25 to 40	6	1	14	23
40 to 55	4	9	16	18
55 to 70	6	7	8	10
70 to 85	5	22	6	9
85 and over	4	5	1	3
Total	28	45	48	83
Average, per cent	49.9	63.6	43.3	33.9

The average calf-crop percentages on ranches of different sizes in the various districts is shown in Table 11. The small ranches had a quite consistently larger calf-crop percentage in all the districts than the larger ones. Most of the inconsistencies in this respect are explained by the small number of ranches in the group.

TABLE 11.—*Calf-crop percentage on 204 cow ranches of different sizes, southwestern range region, 1925*

Number of breeding cows	Western Texas	Northeastern New Mexico	Arizona, southern and western New Mexico	
			Controlled range	Using public domain
	Per cent	*Per cent*	*Per cent*	*Per cent*
Less than 100	20.0	72.6	----------	----------
101 to 200	62.0	76.1	58.9	77.0
201 to 500	68.7	66.9	51.8	53.6
501 to 1,000	63.5	61.9	49.4	40.3
1,001 to 2,000	41.7	55.1	33.1	34.3
Over 2,000	47.8	75.0	40.0	30.2
Average	49.9	63.6	43.3	33.9

In Texas one ranch with less than 100 cows, located on range that normally carries only 10 head of cattle per section, obtained a calf crop of only 20 per cent. Poor range conditions were probably responsible for the unfavorable showing. In northeastern New Mexico only one ranch in the group of more than 2,000 cows had a calf crop as high as 75 per cent.

The men on the smaller ranches were usually able to get a somewhat higher percentage calf crop. With a smaller area of range to work, a larger proportion of the breeding herd was usually given some supplemental feeding than on the larger ranches. The men on the small ranches were also able to give more individual attention to weak cows at calving time. There was some indication that many of the small ranches were located on better-quality range than the larger outfits.

With regard to the breeding of heifers to calve at 2 years of age, most ranchmen have reported that it would be much more desirable to have them drop their first calves a year later, but that it was impractical to maintain pastures that would separate the yearling heifers from the bulls effectively. Calves from 2-year-old heifers in this region are apt to be small and, without much milk from their mothers, are very likely to be stunted. There is a rather large percentage of mortality among 2-year-old heifers that occurs mostly at calving time or during extremely dry seasons. Many heifers that drop calves at 2 years of age are likely to skip the following season. The general opinion is usually that such heifers will not grow into as large cows as they would if they calved at 3 years of age. Certain ranchmen insist that they did not suffer more than normal losses among 2-year-old heifers with calves, and that the practice was not injurious to the growth of the animal. These men, however, were usually located on good range where heifers matured somewhat more rapidly and were rather large for their age. A general practice that is important where yearling heifers are bred to calve at 2 years of age is to reserve a pasture with good grass and convenient water for use during the few months before and after calving. The practice of shipping calves from 2-year-old heifers as light veal calves was reported in several instances.

CARE AND HANDLING OF BULLS

The number of cows per bull depends largely on the topography and type of range. There are some rough ranges where not more than 15 cows per bull is advisable on account of the difficulty of movement over the range. On level range where watering places are not very frequent, and where there is no brush, not nearly so many bulls per 100 cows are needed. Where bulls are apt to become bunched, especially in mountain range, it is often necessary to keep them distributed over the range.

Full service is expected from bulls at 2 years of age in this region. A common practice is to buy them as yearlings and give them special care during the first year until they become acclimated. They are often kept in good pastures and fed cottonseed cake or perhaps grain in addition, so that they may be fairly well matured for service the following year. Acclimating them to range conditions is very essential to the best results from range bulls because so many of them are

produced in other regions very different from this region. Some ranchmen prefer to buy bulls raised in their own locality. Certain cattlemen in a western Texas district buy many bulls outside of the State, but purchase from breeders located at about the same altitude as the ranges on which the bulls are to be used.

The practice of removing bulls from the cow herd in an effort to control the breeding season and to condition the bulls is practiced by some ranchmen in all parts of the region. Of 193 ranchmen reporting on this practice, 68, or about 35 per cent, practice the removal of bulls from the breeding herd during the fall and winter. One of the reasons was to control the breeding season so that the calf crop

FIG. 21.—Rounding up a breeding herd

would be more nearly uniform in age than if dropped during all months of the year.

Many of the ranchmen separated their bulls from the breeding herd to condition them rather than to control the breeding season. The usual means of conditioning bulls for the following breeding season was to provide an especially good pasture for use during the winter and spring months. Under other conditions pastures were reserved and cottonseed cake fed in addition. More instances were noted of grain being fed to young bulls during their first winter on the range than of its being used to condition older bulls.

There was considerable variation in the length of time bulls were fed and in the daily ration given them. A common practice was to feed 1½ pounds of cottonseed cake daily from January 1 to May 1. Others fed 3 pounds of cake per bull daily throughout March, or 2 pounds per day for 60 days during the spring. A common ration fed to young bulls was composed of 1 pound of cottonseed cake and 5 pounds of grain daily for 100 days during the late winter and spring. Few of the ranches reported the use of hay in conditioning

bulls. In those cases where hay was reported to be fed to bulls, it was usually in limited quantities, probably to supplement short range.

Some stockmen fed only the weak bulls, and most of them considered the feeding of the bulls as more important than their separation from the breeding herd.

In this region climatic and feed conditions regulate the breeding season rather definitely. Most of the bulls segregate during the winter and are not active until grass gets good later in the spring. On the rough ranges it is usually impractical either to pack feed up to where the bulls are, or to work the range thoroughly enough to move them to a reserve pasture where they may be fed. Another objection given is that they will drift back to their feed pasture the following summer and that it is hard enough to keep them scattered ordinarily without having this extra difficulty to contend with.

About two-thirds of the ranchmen reported that bulls were kept in the breeding herd during the entire year. They claim that this practice necessitates fewer bulls per 100 cows and that they will average a larger calf crop in a period of years. When the calves are dropped within a short time and it happens to be dry at that time, there is much greater loss than if the calves are scattered throughout the year. Very often there is better weather for calves in January than in the spring months, and a cow will ordinarily be in better condition at that time, but the succeeding four months of poor range are severe for cows with calves at foot.

By establishing certain months as a breeding season, there is likelihood of poor range conditions prevailing at the time which would prevent cows from coming in heat and result in a later calf crop than usual, or, perhaps, in missing a calf crop entirely, depending on the length and severity of the drought. Ranchmen justify the nonremoval of bulls on the basis that range conditions determine the breeding season and that the best results are received from a system of management that permits breeding at any time that the range is good. Probably the only situations that justify a controlled breeding season in this region are those where reserve pastures are maintained and an ample supply of good grass to be used before the breeding season is assured.

DEATH LOSSES

The death losses shown in Table 12 for the year 1925 were reported higher than normal, owing to the poor range conditions prevailing over most of the region in the last half of 1924 and the first half of 1925. Poisonous plants, lightning, bog holes, theft, predatory animals, and blackleg are contributing agencies to losses among cattle, but the most important one is starvation, caused by the lack of feed on the range. Most of this loss is usually among weak cows, 2-year-old heifers, and calves. The percentage of death loss among steers and yearling heifers is much lower than among cows. The average death loss of cows on 204 cow ranches was 9.7 per cent.

TABLE 12.—*Death losses in different districts, 204 cow ranches, southwestern range region, 1925*

Number of breeding cows	Western Texas		Northeastern New Mexico		Arizona and southern and western New Mexico			
					Controlled range		Public domain	
	Cows	Other cattle	Cows	Other cattle	Cows	Other cattle	Cows	Other cattle
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Less than 100			4.1	0.7				
101 to 200	21.9	5.0	6.3	1.6	9.7	2.2	14.0	4.5
201 to 500	6.5		5.9	2.2	9.1	3.4	12.1	3.1
501 to 1,000	4.5	3.4	3.3	1.1	10.3	1.6	16.1	4.2
1,001 to 2,000	3.4	1.2	7.9	2.2	11.0	2.0	17.4	3.1
Over 2,000	7.6	.8	2.6	1.5	6.0	4.8	14.4	3.4
Average	6.9	.9	5.3	1.6	8.7	2.8	15.0	3.5

The loss of cattle from poisonous plants may sometimes be avoided by not using certain parts of the range during the seasons when certain plants found there are fatal if grazed by cattle. This may be in the early spring for some plants or just after frost in the fall in the case of others. Some poisonous plants that are not ordinarily eaten by cattle cause losses at times when the range grasses are very short.

The percentages of death losses in 1925 varied considerably among the districts as Table 12 shows. In northeastern New Mexico 5.3 per cent of the cows on hand January 1 died during the year. In western Texas the corresponding percentage was 6.9, while on the controlled range in Arizona and southwestern New Mexico 8.7 per cent of the cows died. As already pointed out the ranches operating on public domain had the largest percentage of death losses of the groups. On these ranches 15 per cent of the cows died during the year.

The percentage of death loss is closely related to the management of the range and the wintering of the cattle. The high percentage of cows lost on the public domain emphasizes the need for control of the range by the individual ranchmen, so that reserve pastures for emergencies may be maintained.

The proper rate of stocking is an important consideration in the southwestern range States. There is no doubt that the death losses suffered by ranchmen during the dry years were greater than they would have been if the range had not been stocked according to the amount of feed available in good years. In a region of uncertain rainfall, it is hard to be prepared for as many as four consecutive dry years, but knowing variations to be so great, one should be prepared for the first one or two of them at least. The best way to do it is to keep the range seemingly understocked all the time and to reserve pastures for use in an emergency. One man remarked that the lesson of proper stocking that cowmen learned from seven years of drought was usually forgotten after seven months of good grass.

WINTERING CATTLE

A problem that is constantly confronting the ranchman in this region is whether it is less expensive to have a high feed bill to reduce his death loss or whether it is more economical to lose a few more of the weak cows and save considerable feed expense. This will depend largely on the conditions prevailing in different districts with respect to type and condition of range, the amount of feed crops raised, and the cost of purchased feed.

The number of acres and quantity of feed crops per ranch and the quantity of cottonseed cake purchased in the different districts is given in Table 13. The ranchmen in northeastern New Mexico, with an average of 99 tons of roughage and 40 bushels of grain per ranch, and purchasing 42 pounds of cottonseed cake per head of cattle, used more feed per head in wintering their cattle than the ranchmen in any other district. This, together with the character of summer range, may account for the fact that their ranches had the lowest percentage of death loss and the highest calf-crop percentage in the region. All the other districts had less than 2 acres of crops per 100 head of cattle.

TABLE 13.—*Feed crops raised and cottonseed cake purchased, per ranch, 204-cow ranches, southwestern range region, 1925*

Kind of feed	Unit	Western Texas	Northeastern New Mexico	Arizona and southern and western New Mexico	
				Controlled range	Public domain
Wild hay	Acres	8	101	4	11
	Tons	3	45	4	8
Alfalfa	Acres	1	15	1	22
	Tons	4	23	2	16
Grain hay	Acres		7	5	1
	Tons		7	9	1
Grain sorghum fodder [1]	Acres		27	2	3
	Tons		19	8	2
Grain	Acres		4	2	2
	Bushels		40	8	51
Total crops	Acres	9	154	14	39
Crops per 100 head cattle	Acres		19	1	2
Total roughage per ranch	Tons	7	99	15	25
Cottonseed cake purchased	Tons	18	17	10	10
Purchased cake per head of cattle	Pounds	16	42	18	10
Cost per ton of cake	Dollars	43.18	46.57	47.62	44.89

[1] Stalk and grain.

Wintering cows does not ordinarily necessitate feeding the entire herd. In fact the instances in which all the cows are fed are usually limited to small herds in extremely critical condition. Most ranchmen in the region feed approximately 15 per cent of their cows during a normal winter. In 1924-25 some fed as high as 75 per cent of their cows and the average was much higher than 15 per cent. During the following winter, with good range conditions, very few cattle were fed. The cows that are fed are usually those with late calves at side and other thin cows. Thrifty cows that drop their calves early and wean them in the fall can be wintered on the range without feed in a normal season.

On the rougher mountain ranges, many ranchmen do not feed any of their cattle because it is impractical to haul or pack feed to the cattle, or to move the cattle to ranges where feed can be supplied. Several stockmen said that a cow which needs feed is too weak to be moved to a reserve pasture or range where she may be fed. Consequently, cowmen in rough sections leave the weak animals to die on the range. In the latter cases the important thing is to stock the range lightly enough so that losses will not be excessive in times of drought.

Ordinarily it seems advisable to winter cattle on grass as far as possible (fig. 22), rather than to stock the range more heavily and more nearly utilize the grass during the growing season, thus making it necessary to feed a considerable number during the winter and spring. On a level range, however, there are usually some thin cows

FIG. 22.—Grama grass winter range in northeastern New Mexico

and 2-year-old heifers with calf that will pay for some extra attention with a little hay or cottonseed cake during the spring. A reserve pasture that has not been grazed during the previous summer and in which cattle will not have to walk far to water is an ideal place for thin cows and 2-year-old heifers that are with calf.

Cottonseed cake is the most important feed used to supplement the range. One to two pounds of cake per head per day for 60 to 90 days is the ordinary requirement. In contracting for winter feed, the amount of cake necessary for wintering is commonly estimated to be 100 pounds per cow fed if range and weather conditions are normal. An unusually mild winter may result in their not using all the feed purchased, leaving a reserve at the close of winter. On the other hand, additional purchases may be necessary if the season is unusually severe. Two general methods of supplying feed prevail. Probably the most common is that of feeding 1 to 2 pounds of cake each day. Under the other method 2 to 4 pounds are fed every second day. The criticism made of the latter system by those who

practice the former is that cows receiving heavy rations of cake become sluggish, will not rustle for grass, and often suffer digestive disorders. The statement is also made that better results may be expected from smaller quantities of cake supplied regularly each day.

Another variation having to do with the place as well as the time the feed was supplied was observed in the course of the survey. Some ranchmen take the feed to the cows on the range and distribute it to them where found. Others observe "feed lines," or certain feeding places that are changed rather frequently, bunch the cattle by calling or driving, and distribute the feed to them. Another system that gives practically individual attention to each cow is as follows: Feed is stored at watering corrals where small feed bunks are maintained. The feeder spends his time at the watering places. As the cows congregate at the watering places the amount of feed they are to receive is distributed in the various bunks and the feeder is present to see that each cow receives her share. The amount of feed distributed each time depends entirely on the number of cows there to receive it. Little difficulty is experienced in getting cows to the bunks after they are put into the corrals once or twice, as the cows are allowed to drink their fill before feeding. The ranchmen with whom this system was discussed reported very satisfactory results from the standpoint of the smaller quantity of feed required and regularity of feeding, since cows rarely water oftener than every second day during cool weather.

The method of wintering calves depends on whether or not they have been weaned in the fall. Concerning the advisability of weaning calves there is a great variation in opinion. Some have suggested that it would cost as much to wean the calves in the fall as to gather the steers the following spring. In the recent dry years the calves have been too weak to wean in some districts, and in any year they make better appearing yearlings if they have not been weaned.

As a rule a cow that suckles her calf more than six to seven months will be in thin condition unless the grass is very good, and if she does get with calf it is likely that she will need feeding before it is dropped. Now that there is more fenced range than ever before, it should be possible for an increasing number of ranchmen to wean their calves and separate their yearling heifers in the future.

Of those who do wean their calves, some do it in November or December and others in February or March. Special weaning pastures with extra-tight fences, having four to six wires spaced to hold calves, are usually provided. (Fig. 23.) These pastures are generally some distance from the range on which the cows are to be held, especially during the first few weeks after weaning. Some ranchmen prefer to hold calves in corrals several days after taking them from the cows and teach them to eat.

A little alfalfa and some cottonseed cake will usually add from $3 to $5 a head to the value of a yearling in the spring. Good, growthy yearlings sell much more readily than the poorer type that weigh less as yearlings than as 8-months-old calves the fall before. From ¾ to 1¼ pounds of cake per calf daily for 90 to 120 days on good grass will keep the animals growing continuously and cause them to come out of the winter in good shape under ordinary conditions. (Fig. 24.)

MARKETING CATTLE

The numbers of cattle sold on different-sized ranches, and the average price received per head, together with the average estimated weight of different classes of cattle in the various districts, are given

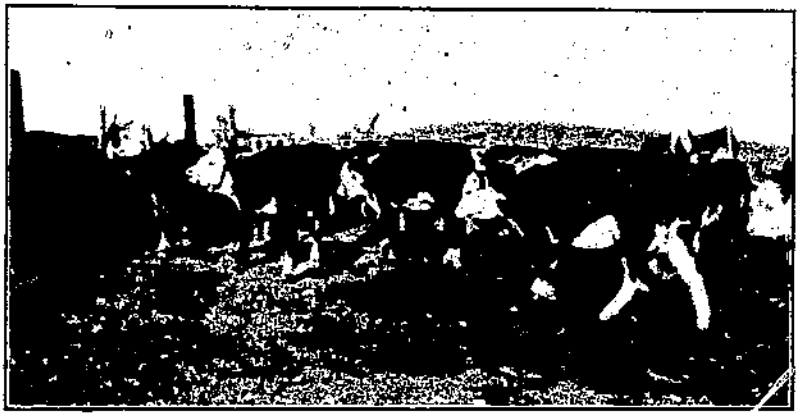

FIG. 23.—Weaning calves in western Texas. Courtesy of L. C. Brito, Marfa, Tex.

in Table 14. Calves from the western Texas ranches brought an average of $26.70 a head, as compared with $22.85 in northeastern New Mexico, $18.97 on the ranches with controlled range in Arizona and southern and western New Mexico, and $18.83 on the ranches

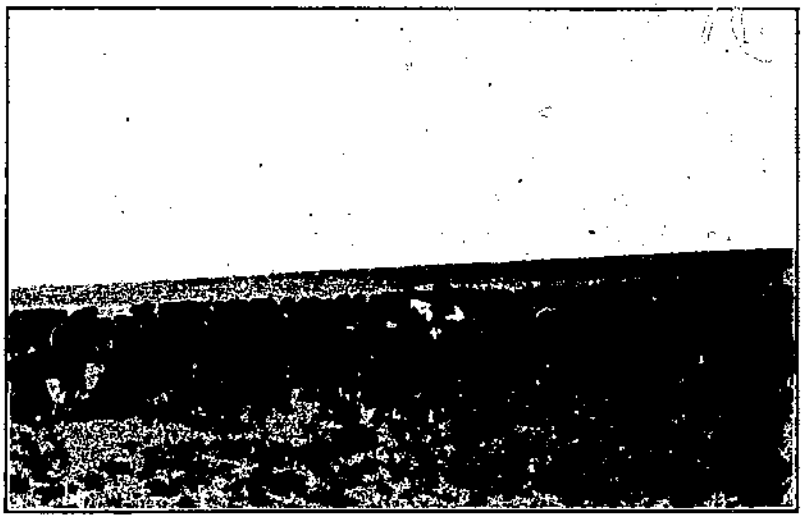

FIG. 24.—Feeding cottonseed cake to steer calves during the winter

using public domain. Yearling steers sold for over $32 a head in western Texas and northeastern New Mexico, and about $25 in both groups located in Arizona and southwestern New Mexico. These comparisons are typical of the differences in quality of cattle sold from the different districts.

TABLE 14.—*Cattle sales, 204 cow ranches, southwestern range region, 1925*

District and number of cows	Number of ranches	Cows	Yearling heifers	Bulls	Calves	Steers			Total
						Yearlings	Two years old	Three years old	
Western Texas:									
Less than 100 ... number	1				60				60
101 to 200 ... do	1	107	30		47	31			215
201 to 500 ... do	8	38	22	15	108	20		38	241
501 to 1,000 ... do	5	144		6	310	163	70		702
1,001 to 2,000 ... do	3	143	7		232	159			541
Over 2,000 ... do	10	641	176	26	330	569	4	49	1,804
Total or average ... do	28	285	71	15	238	250	14	28	907
Weight per head ... pounds		852	645	1,350	380	548	850	850	
Value per head ... dollars		23.84	30.45	51.26	26.70	32.73	47.12	53.19	29.34
Northeastern New Mexico:									
Less than 100 ... number	8	31	4		15	91			141
101 to 200 ... do	11	38	3	1	61	72	69	58	302
201 to 500 ... do	11	41	23	8	73	43		30	227
501 to 1,000 ... do	10	161	73	6	291	84			555
1,001 to 2,000 ... do	4	198	20	7	485	312	6		1,028
Over 2,000 ... do	1	101	98	11	1,106	456	31		1,803
Total or average ... do	45	81	27	4	154	101	18	24	400
Weight per head ... pounds		762	479	1,151	336	513	606	960	
Value per head ... dollars		27.82	25.22	41.96	22.85	32.40	41.21	58.41	29.45
Arizona and southern and western New Mexico:									
Controlled range—									
Less than 100									
101 to 200 ... number	7	24		1	41	12	13		91
201 to 500 ... do	17	27	7	3	41	53	10	6	147
501 to 1,000 ... do	16	94	18	4	156	86	18	13	380
1,001 to 2,000 ... do	5	470	13	4	246	154	87	11	985
Over 2,000 ... do	3	47	173	4	347	315	33	16	935
Total or average ... do	48	96	21	3	119	85	23	9	350
Weight per head ... pounds		764	510	1,049	312	439	606	908	
Value per head ... dollars		27.58	19.98	37.03	18.97	24.87	32.73	46.14	24.49
Using public domain—									
Less than 100									
101 to 200 ... number	2					63	8	15	86
201 to 500 ... do	23	43	10	4	76	48	10	5	196
501 to 1,000 ... do	24	72	5	4	85	136	27	23	352
1,001 to 2,000 ... do	14	147	32	8	151	220	45	13	616
Over 2,000 ... do	20	436	50	25	327	467	135	56	1,505
Total or average ... do	83	103	24	9	150	204	51	24	625
Weight per head ... pounds		743	458	1,091	289	434	680	745	
Value per head ... dollars		21.72	20.95	30.58	18.83	25.04	32.55	38.07	23.72

Estimated weights of cattle from the different districts show the same tendency as the price comparisons. The lightest calves were sold from the ranches using public domain, where their average weight was estimated to be 289 pounds. On the ranches with controlled range in Arizona and southwestern New Mexico the average weight of calves sold was 312 pounds as compared with 336 pounds in northeastern New Mexico and 380 pounds in western Texas. The estimated average weight of yearling steers sold was highest in western Texas at 548 pounds and lowest on the ranches using public domain, where the estimate was 434 pounds. The cows sold from the western Texas ranches averaged 852 pounds in weight as compared with 743 pounds per cow sold from ranches using free range. The average weight of bulls sold was also greatest in the western Texas district.

Aside from cull cows and bulls, most of the cattle from this region are sold as calves or yearlings. Less than 10 per cent of the cattle sold on the ranches studied were steers 2 years old or older. (Table 15.) There were slightly more yearling steers sold than calves. Of the calves raised in northeastern New Mexico in 1925, 52 per cent were sold during that year. In Arizona and southwestern New Mexico

and also in western Texas, only about 32 per cent of the calves raised were sold, over two-thirds of them being held over into 1926.

TABLE 15.—*Percentage of cattle sold, by classes, 204 cow ranches, southwestern range region, 1925*

District	Cows	Yearling heifers	Bulls	Calves	Steers		
					Yearlings	Two years old	Three years old
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Western Texas	31.4	7.8	1.7	26.2	28.2	1.6	3.1
Northeastern New Mexico	19.8	6.0	1.0	37.6	24.7	4.4	5.0
Arizona and southern and western New Mexico:							
Controlled range	27.0	5.9	.8	33.4	23.9	6.5	2.5
Using public domain	26.1	3.9	1.4	24.0	32.0	8.2	3.8
Average	26.4	5.5	1.3	28.2	29.0	5.8	3.8

A larger proportion of cows were sold during 1925 than is normal for the area. In Texas almost one-fifth of the cows on hand at the beginning of the year were sold, largely on account of range conditions. In northeastern New Mexico about one-sixth of the cows in the opening inventory were sold during the year. The proportion was slightly smaller in Arizona and southwestern New Mexico than in the other districts, since many cows were too thin to be driven to the loading point, or if they were able to survive the trip to market, could not be sold advantageously. For instance, 70 head of cows with calves in Arizona that were shipped to market netted only $4.70 on the two carloads, many of the cattle being dead on arrival. The best cattle shipped by this same stockman, who utilized free range extensively, returned only $10 to $12 a head after paying freight and other charges.

The cost of marketing is a problem over which the stockman as an individual has very little control but which affects him very seriously. Rail transportation alone is an item which in past years of depression in the cattle industry has determined whether or not it was profitable to ship certain classes of cattle. Freight charges from different points in New Mexico to Kansas City vary from $3 to $5.50 per head of cattle, which together with feed charges, commission, and yardage make up from 10 to 30 per cent of the gross returns from livestock shipped. Cattle of poor quality or in poor condition suffer most from these charges because they make up a much higher percentage of their value.

Most of the cattle that are sold in this region are marketed in two distinct seasons, one in the spring and the other in the fall. About 75 per cent of the shipments of cattle in New Mexico and Arizona during the seven years, 1919 to 1925, occurred during the spring and fall months, 28 per cent being sold in April, May, and June and 47 per cent in October, November, and December. The monthly movement of cattle from New Mexico for 1925 and the average monthly movement for the period 1919 to 1925 is shown in Figure 25.

The spring movement consists largely of stocker steers of various ages, mostly yearlings. In the fall shipments, steers also predominate, although cows and calves make up a much larger proportion of the total movement than in the spring. (Fig. 26.) The practice in

many places is to contract steers for spring delivery during the previous fall and winter, and to a lesser extent, cattle are contracted about June 1 for fall delivery. The steers that are sold in the spring usually go to Texas Panhandle, Colorado, Kansas, and Oklahoma. In the fall a much larger proportion go to California and Missouri River markets, especially Kansas City. Corn-Belt feeders buy a number of the fall-marketed steers, some of them directly from the ranch but mostly through the central markets.

Many prefer to sell heifers as calves and only the steers as yearlings. Selling steers in the spring enables the ranchmen to keep a larger breeding herd than if they were sold the following fall, and it meets a strong demand for light cattle for grazing purposes from districts that are especially adapted to grazing steers. However, steers that

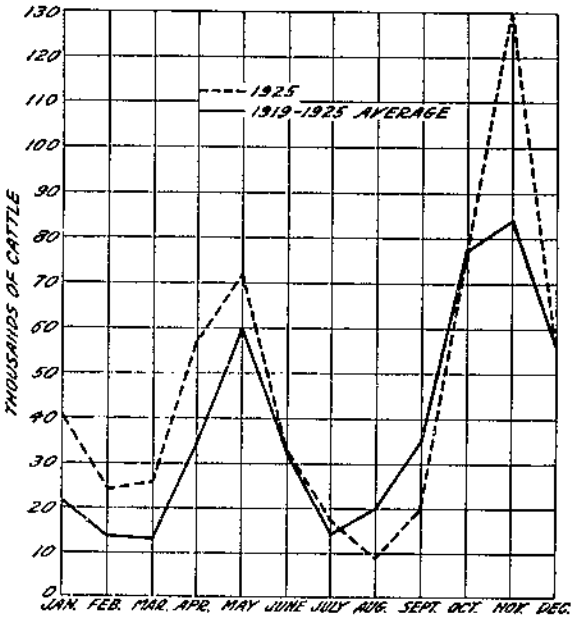

FIG. 25.—New Mexico monthly cattle movement, 1919 to 1925

are marketed during the fall have a more thrifty appearance, and can be worked more easily. Moreover no feed other than grass is needed for the horses used to gather the steers in the fall, whereas grain must be purchased for them if gathering takes place in the spring, according to some Arizona stockmen.

During recent years there has been a considerable summer movement of veal calves which is likely to be maintained or increased in the future. Most of the veal calves from this region have been marketed in Los Angeles. Ranchmen have become interested in this new market demand, especially as applied to heifer calves, which are discounted considerably as compared with steer calves when they get a little older.

The problem of the age at which cattle should be sold is one that confronts all operators in the region. Cattle were formerly marketed at older ages than at present. Many ranchmen reported that

the cattle formerly shipped out of this region were almost entirely 2 and 3 year old steers whereas they have been mostly calves and yearlings in the last few years. No doubt there has been a larger proportion of calves sold in the last few years than there will be when financial and range conditions are more nearly normal. It has not been entirely on account of drought conditions and financial difficulties, however, that ranchmen have sold their cattle at younger ages than formerly. As some have expressed it, "Yearlings sell better than twos or threes." In other words the feeder demand has been for an animal that will finish out at a lighter weight.

It was impossible for some ranchmen located 65 miles from the nearest shipping point to sell calves because the animals could not

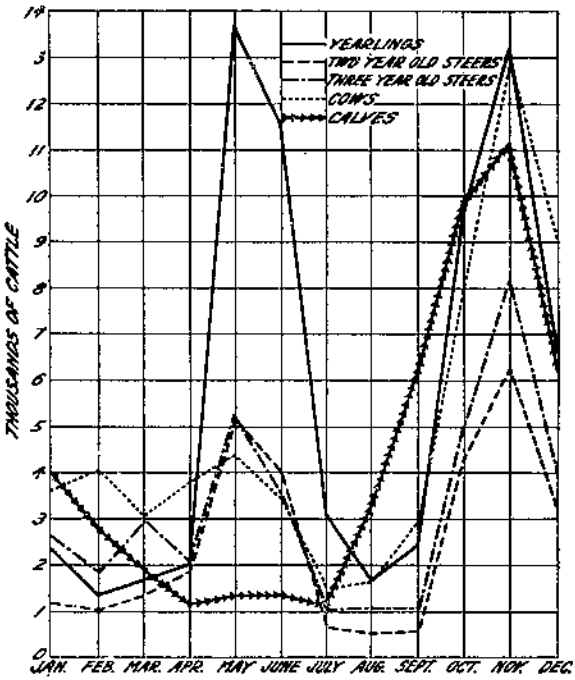

FIG. 26.—Monthly shipments from Arizona by classes of cattle, 1923–1925, three year average

endure the hardship of being driven that distance with the additional strain of the freight trip and stockyard handling. Consequently, most ranchmen operating on rough range and some distance from a railroad marketed their cattle as yearlings, 2 and 3 year old steers. As a rule these men planned to sell nearly all of them as yearlings.

To produce either good stocker or grass-fat, aged steers successfully requires continuously good range conditions. The seasons of drought in this region interrupt continuous gains on growing cattle, which is detrimental to the maturing of a desirable kind of aged steers regardless of how well bred they may be. A common comment among steer buyers concerning aged steers produced under the conditions prevailing in this region is that such steers ordinarily show

the effect of having undergone a drought at some time of their life. Considering the natural conditions of the region, both as to types of range and climate, it would seem that the region is best adapted to the production of calves and yearlings, although there are special conditions within the region where older steers may be handled advantageously. Well-bred young cattle taken from the ranges of the Southwest to the northern and eastern ranges usually develop and fatten well, and that is probably the best means of maturing the class of cattle produced in this region.

RECEIPTS, EXPENSES, AND INCOME

DISTRIBUTION OF RECEIPTS

More than 95 per cent of the receipts on the 204 cow ranches came from the sale of cattle. The other 5 per cent represent miscellaneous sales of hides, alfalfa, horses, eggs, outside work, and pasture rent. The distribution of cash receipts on the various-sized ranches in the different districts is shown in Table 16.

TABLE 16.—*Distribution of receipts, 204 ranches, classified by numbers of breeding cows, in southwestern range region, 1925*

District and number of cows	Number of ranches	Sales						Increase in inventory		Ranch receipts
		Cattle	Other livestock	Livestock products	Crops	Miscellaneous	Total	Cattle	Feed and supplies	
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Western Texas:										
Less than 100	1	1,500					1,500	1,871		3,371
101 to 200	1	4,100				50	4,150			4,150
201 to 500	8	9,219		8		[2] 505	11,732			11,732
501 to 1,000	5	24,460		10			24,470		235	24,705
1,001 to 2,000	3	11,838					11,838	7,466	200	19,504
Over 2,000	10	50,705				11,800	52,505		781	53,286
Total or average	28	26,579		4		1,360	27,943	807	343	29,153
Northeastern New Mexico:										
Less than 100	8	3,880	20	144	45	18	4,107	287		4,394
101 to 200	11	10,713	80	152	106	124	11,175		42	11,217
201 to 500	11	7,577	50	36	505	18	8,186	142	297	8,625
501 to 1,000	10	15,005	167	115	140	43	15,470			15,470
1,001 to 2,000	4	27,697		159			27,856			27,856
Over 2,000	1	40,360		20	4,414	484	51,278		490	51,768
Total or average	45	11,987	72	112	287	58	12,516	86	94	12,696
Arizona, and southern and western New Mexico:										
Controlled range—										
Less than 100										
101 to 200	7	2,245	116	6	7		2,374			2,374
201 to 500	17	3,530	16	22	94	22	3,684		92	3,776
501 to 1,000	16	9,488		35		580	10,103		37	10,140
1,001 to 2,000	5	25,937	29	20			25,986		349	26,335
Over 2,000	3	20,375	60	100		367	20,908	24,485	37	45,430
Total or average	48	8,716	30	31	34	224	9,035	1,530	84	10,649
Public domain—										
Less than 100										
101 to 200	2	2,322	60	12			2,394			2,394
201 to 500	23	4,699	30	19		17	4,765			4,765
501 to 1,000	24	7,996	30	24	13	37	8,100			8,100
1,001 to 2,000	14	14,784	50	51		492	15,383			15,383
Over 2,000	20	36,079	138	61	115	105	36,498			36,498
Total or average	83	14,857	61	36	32	124	15,110			15,110

[1] From pasture rented out.

The total receipts averaged $12,696 per ranch in northeastern New Mexico, as compared with $10,649 per ranch on the controlled range in Arizona and southern and western New Mexico; $15,110 per ranch on public domain, and $29,153 per ranch in western Texas. The receipts per head of cattle in the opening inventory were greater in northeastern New Mexico than in any other district due to their lower death loss and higher calf-crop percentage.

DISTRIBUTION OF EXPENSES

The amount expended for various items on the 204 cow ranches is shown in Table 17. In all the groups, hired labor was the largest item of expense. Purchased feed was usually the next largest item, followed closely by taxes and leases.

A clearer idea of the proportion which each item of expense is of the total current expense is given in Table 18. The smaller share which taxes and leases are of the total expense in Arizona and southern and western New Mexico is especially noticeable. In western Texas and northeastern New Mexico taxes and leases made up from 33 to 35 per cent of the total cost of operation, while in Arizona and southern and western New Mexico, where there was a large amount of public domain and national-forest range which was free in 1925, these items were only about 25 per cent of the total cost. Averaging the expense for all the 204 ranches 35.8 per cent of the total current expense was for hired labor, 16.5 per cent for purchased feed and salt, 15.9 per cent for taxes, 11.9 per cent for leases, and 10.2 per cent for repairs.

TABLE 18.—*Distribution of current expenses, 204 cow ranches, southwestern range region, 1925*

District	Feed	Leases	Labor	Taxes	Repairs	Miscellaneous	Total current expenses
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Western Texas	15.9	15.0	20.7	20.1	14.4	4.9	100
Northeastern New Mexico	18.3	15.1	30.3	18.2	6.9	11.2	100
Arizona and southern and western New Mexico:							
Controlled range	20.7	8.8	34.1	15.4	9.9	11.1	100
Using public domain	14.4	10.3	41.5	13.2	9.8	10.8	100
Average	16.5	11.9	35.8	15.9	10.2	9.7	100

Expressing current expenses on a per-head basis illustrates the variation between districts and different-sized ranches. The ranches in the northeastern New Mexico district had the greatest amount of current expense per head of cattle of all parts of the region as shown in Table 19. The 45 ranches in this district averaged $6.30 of current expense per head as compared with $3.25 per head on the ranches using public domain, which had the lowest operating cost per head of the groups. All items of expense per head on public domain were lower than in northeastern New Mexico, but the greatest difference occurred in the item of taxes, which was $0.72 a head more in the latter district owing to the greater proportion of owned land.

TABLE 17.—*Distribution of expenses on 204 ranches, classified by number of breeding cows, in southwestern range region, 1925*

District and number of cows	Number of ranches	Current cash expenses							Livestock purchases	Decrease in inventory		Depreciation [1]	Total ranch expenses
		Purchased feed and salt	Leases	Hired labor	Taxes	Repairs	Miscellaneous	Total		Cattle	Feed and supplies		
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Western Texas:													
Less than 100	1	294			275	250		819	1,500			378	2,697
101 to 200	1	415	51	1,473	504	570	112	3,125		4,010		677	7,812
201 to 500	8	523	1,221	625	488	1,393	148	4,398	1,114	1,716	56	785	8,069
501 to 1,000	5	1,557		1,091	1,418	891	262	5,219	7,200	1,982		779	15,180
1,001 to 2,000	3	2,359	623	907	1,194	1,067	335	6,485	7,833			1,847	16,165
Over 2,000	10	2,201	2,774	6,382	3,776	1,834	943	17,910	8,608	6,173		2,454	35,145
Total or average	28	1,492	1,408	2,802	1,897	1,356	466	9,421	5,571	3,192	15	1,476	19,675
Northeastern New Mexico:													
Less than 100	8	228	221	117	261	180	98	1,105	2,332		52	315	3,804
101 to 200	11	934	948	634	432	386	155	3,489	6,276	688		491	10,944
201 to 500	11	488	444	933	549	272	363	3,049	1,081			444	4,574
501 to 1,000	10	1,027	1,201	1,506	822	544	1,068	6,168	541	6,061	107	776	13,653
1,001 to 2,000	4	3,011	1,358	3,417	3,135	412	507	11,840	2,500	6,365	1,053	1,081	22,839
Over 2,000	1	2,128		22,421	8,004		6,487	39,040	2,400	2,590		960	44,990
Total or average	45	931	767	1,540	926	350	571	5,085	2,609	2,138	128	575	10,535
Arizona and southern and western New Mexico:													
Controlled range—													
Less than 100													
101 to 200	7	234	98	406	107	225	222	1,292	804	305	62	249	2,719
201 to 500	17	491	272	796	373	345	170	2,447	391	620		469	3,927
501 to 1,000	16	1,346	493	1,465	736	438	396	4,874	1,589	2,140		785	9,388
1,001 to 2,000	5	1,472	440	3,096	1,374	459	305	7,146	8,330	14,670		1,083	31,229
Over 2,000	3	1,796	1,207	5,886	2,407	1,451	3,824	16,571	10,988			3,142	30,701
Total or average	48	923	396	1,520	687	440	495	4,461	2,340	2,505	9	773	10,088
Using public domain—													
Less than 100													
101 to 200	2	203	170		181	358	120	1,032		212	75	303	1,622
201 to 500	23	323	283	584	257	230	123	1,800	343	1,737	46	477	4,403
501 to 1,000	24	1,073	650	1,743	620	594	374	5,054	1,082	4,791	36	844	11,807
1,001 to 2,000	14	1,285	906	3,064	777	714	416	7,162	574	10,731	100	1,437	20,004
Over 2,000	20	1,482	1,148	6,748	2,112	1,243	2,134	14,867	2,680	26,396	277	1,997	46,217
Total or average	83	979	700	2,808	895	664	730	6,776	1,150	10,044	109	1,107	19,186

[1] Buildings and equipment.

TABLE 19.—*Distribution of current expenses per head, 204 cow ranches, southwestern range region, 1925*

District and number of cows	Purchased feed and salt	Leases	Hired labor	Taxes	Repairs	Miscellaneous	Total current expense
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Western Texas:							
Less than 100	3.77	-------	-------	3.53	3.20	-------	10.50
101 to 200	1.91	0.23	6.79	2.32	2.63	0.52	14.40
201 to 500	1.04	2.43	1.24	.97	2.78	.30	8.76
501 to 1,000	1.66	-------	1.17	1.52	.95	.28	5.58
1,001 to 2,000	1.60	.42	.62	.81	.73	.23	4.41
Over 2,000	.43	.54	1.25	.74	.36	.18	3.50
Average	.65	.61	1.22	.82	.59	.20	4.09
Northeastern New Mexico:							
Less than 100	1.58	1.54	.81	1.81	1.25	.68	7.67
101 to 200	1.88	1.91	1.28	.87	.78	.31	7.03
201 to 500	.84	.76	1.60	.94	.47	.62	5.23
501 to 1,000	1.01	1.18	1.48	.81	.54	1.05	6.07
1,001 to 2,000	1.27	.57	1.44	1.32	.17	.21	4.98
Over 2,000	.58	-------	6.10	2.18	-------	1.76	10.62
Average	1.15	.95	1.91	1.15	.43	.71	6.30
Arizona and southern and western New Mexico:							
Controlled range—							
Less than 100	-------	-------	-------	-------	-------	-------	-------
101 to 200	1.26	.51	2.13	.56	1.18	1.16	6.80
201 to 500	1.01	.56	1.65	.77	.72	.35	5.06
501 to 1,000	1.37	.50	1.49	.75	.45	.40	4.96
1,001 to 2,000	.69	.21	1.45	.64	.21	.14	3.34
Over 2,000	.31	.20	1.01	.41	.25	.65	2.83
Average	.83	.35	1.36	.62	.40	.44	4.00
Using public domain—							
Less than 100	-------	-------	-------	-------	-------	-------	-------
101 to 200	.64	.54	-------	.57	1.13	.38	3.26
201 to 500	.68	.60	1.24	.54	.49	.26	3.81
501 to 1,000	.95	.58	1.55	.55	.53	.33	4.49
1,001 to 2,000	.58	.41	1.38	.35	.32	.19	3.23
Over 2,000	.29	.22	1.30	.41	.24	.41	2.87
Average	.47	.34	1.34	.43	.32	.35	3.25

The cost of operation on the various-sized ranches was significant. The total expense per head was usually greater on the small ranches than on the larger ones. Hired-labor cost per head was less on some of the small ranches because the operator and his family performed such a large share of it. In other cases, however, the labor cost per head was greater on small ranches than on large ones because of the smaller number of cattle handled per man. As a rule the small ranches purchased more feed per head while the cattle on the larger ranches depended more largely on range.

Taxes, leases, and repairs per head were also higher on the small ranches. Although some of the differences in these items are due to variations in the percentage of land owned and leased, yet they also signify an advantage of the larger ranches in economy of operation. In the Texas district for instance, where the development and maintaining of water systems are very expensive, it does not pay to develop a permanent supply for a small number of cattle. With a larger number of cattle to utilize expensive water systems, corrals, and so forth, the upkeep and overhead per animal are not so great as on the small ranches.

LABOR

Although hired labor is still the largest single item of operating expense, not nearly so much labor is required under the present system of handling cattle under fences as was necessary under the

old method of handling cattle on the open range. In most cases neighbors cooperate in the spring and fall round-ups, although sometimes all the extra labor is hired. The average monthly wage paid to hired labor on the ranches running breeding cows was about $70. This figure includes the cost of groceries, which amounts to about $15 a month. There was a great deal of variation in the wages paid, some getting little more than their board. Ranch foremen were paid considerably more than the average wage rate. Considering, on a 12-month basis, the large amount of seasonal labor employed, there was an average of three men per ranch for the whole year, besides the operator, on the 204 cow ranches studied.

The usual seasonal workings are in the spring and fall. At the spring working the calves are branded, castrated, vaccinated, and in some cases dehorned. (Fig. 27.) In the Arizona and southwestern

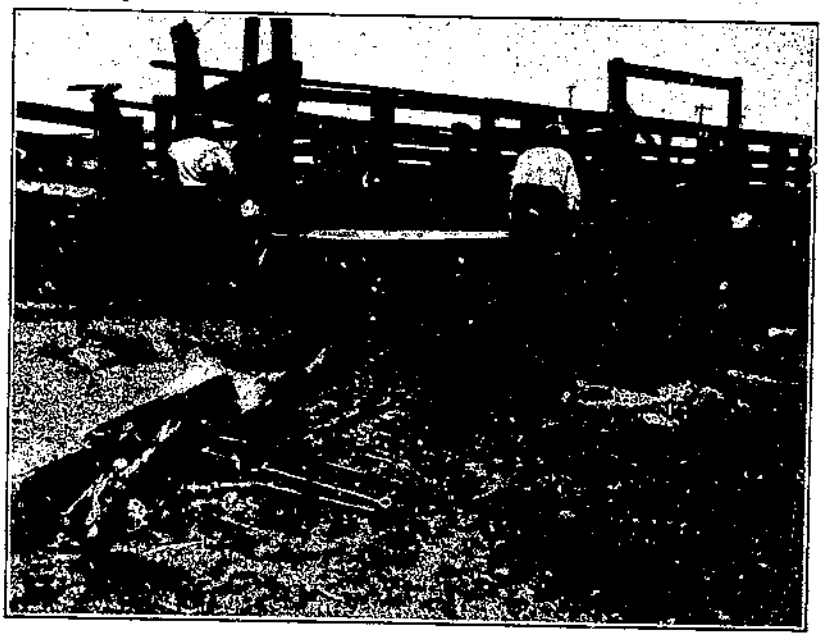

FIG. 27.—Dehorning and branding calves in chute

New Mexico districts the time of the spring working is commonly made to correspond to the delivery date of steers or other cattle sold for spring delivery. In all cases efforts are made to accomplish as much as possible with the least number of workings. In those districts crews from neighboring outfits are sometimes thrown together to work a certain range on which both operators have cattle. Under fenced-pasture conditions such as prevail quite generally in the western Texas and northeastern New Mexico districts, working in either the spring or fall season is not so difficult, considering the number of cattle, and can usually be accomplished with fewer men.

At the time of the fall working the younger calves are branded and castrated and preparation made for delivery of sales cattle. The fall is the usual season of culling cows and disposal of old or undesirable bulls.

On the smaller ranches regular crews for cattle work are rarely employed. Large ranches necessitate the continuous employment of

reliable labor in addition to the operator. The best managers plan their ranch work of all kinds into a more or less elastic schedule in which seasonal cattle work is considered of most importance.

TAXES

Taxes, making up nearly 16 per cent of the total cost of operation in the region, amounted to $1.26 for each $100 of ranch valuation in northeastern New Mexico, $1.03 per $100 invested in the ranches on controlled range in Arizona and southwestern New Mexico, and $0.92 per $100 in ranches using free range in the latter district. Although the Texas ranches owned the largest proportion of their grazing land of the groups considered, their taxes amounted to only $0.55 per $100 invested.

Although the advantages of operating on controlled range were evident, some ranchmen reported that it was too expensive to run cattle entirely on owned land on account of high taxes. Some found it more profitable to sell their land or have it revert to the State and lease it rather than own it. In one case it cost 23 cents an acre in taxes and interest to own land that has since reverted to the State and is now being leased for 3 cents an acre. In certain school districts taxes were as high as $70 a section of grazing land. Either the assessed value of grazing land must be decreased in some localities or the land must be used in a more intensive way than by grazing cattle. It is obviously to the best interests of ranchmen to place a conservative value on range lands for taxation purposes and when voting on local tax issues to consider whether the payments to be met are reasonable in view of the income of the community.

COST OF PRODUCTION

The cost of maintaining a cow and of producing a calf in 1925 is given in Table 20 for the various districts of the region. The number of cows used includes that proportion of 2-year-old heifers which the ranchmen considered in the breeding herd. In cases where an attempt was made to keep the 2-year-old heifers from dropping calves the following year, they were not considered as being in the breeding herd. That proportion of the expense chargeable to the bulls has been added to the cost of maintaining the breeding herd.

The current cash expense per cow was highest in northeastern New Mexico and lowest on the ranches operating on public domain. This figure amounted to $6.19 a cow in northeastern New Mexico, $4.21 in western Texas, $4.15 on controlled range in Arizona and southern and western New Mexico, and $3.38 a cow on the ranches using public domain. The charge per head for hired labor was highest in northeastern New Mexico and lowest in western Texas. The charges for purchased feed, taxes, and leases were higher in northeastern New Mexico than in any other district and were lowest on the ranches using public domain.

The calf crop had more influence on the cost per calf than did the cost of carrying a breeding cow. Although the ranches using public domain had the lowest cost per cow, their low calf-crop percentage caused them to have the highest cost per calf of all groups, when interest charges are not considered, and next to the highest cost when interest is included in the cost statement. The cash expense per calf averaged between $8 and $10 in all districts.

TABLE 20.—*Cost of maintaining a cow and of producing a calf in different districts of the southwestern range region, 1925*

Item	Western Texas	Northeastern New Mexico	Arizona, southern, and western New Mexico	
			Controlled range	Public domain
	Number	*Number*	*Number*	*Number*
Total cattle in herd	2,305	807	1,115	2,087
Cows in breeding herd	1,572	463	804	1,440
Calves raised	784	295	349	489
	Per cent	*Per cent*	*Per cent*	*Per cent*
Calf crop	49.9	63.7	43.4	33.9
	Dollars	*Dollars*	*Dollars*	*Dollars*
Hired labor	1.27	1.99	1.43	1.41
Purchased feed	.68	1.29	.87	.49
Taxes	.86	1.19	.64	.45
Leases	.64	.99	.37	.35
Repairs	.62	.45	.41	.33
Miscellaneous	.21	.37	.43	.35
Current cash expense per cow	4.28	6.19	4.15	3.38
Depreciation (buildings and equipment) [1]	.67	.74	.72	.50
Death loss	1.59	1.53	1.83	2.86
Operator's labor	.45	.92	.53	.31
Total cost excluding interest	6.99	9.38	7.23	7.11
Interest paid	1.83	2.15	.83	1.24
Interest on equity at 6 per cent	7.06	3.83	3.12	1.96
Total cost per cow [2]	15.88	15.36	11.18	10.31
Cash expense per calf	8.44	8.15	9.54	9.97
Cost per calf excluding interest	13.87	13.10	16.66	20.97
Total cost per calf	31.68	24.11	25.82	30.41

[1] Depreciation of breeding herd was not calculated. In some districts the high death loss among the old and weak cows covered depreciation.

[2] Except for the death loss, the cost items listed were apportioned to the breeding herd on a per head basis rather than by attempting to use a system of animal units. Inasmuch as the older steers would tend to make up for the yearling steers and heifers, it is doubtful whether a cost figure calculated by apportioning the various charges on an animal-unit basis would be materially different from the one given. No doubt the breeding herd should rightly bear somewhat more expense per head than steers, especially for certain items, such as labor and purchased feed. The statement given is approximately correct for all practical purposes, however.

The noncash items of cost consisted of depreciation of buildings and equipment, death losses, and operator's labor. The death loss was highest on the ranches using public domain. Interest on equity was greatest in the western Texas district on account of the higher cattle values in that district and the greater proportion of owned grazing land. The value of including a charge for interest on equity, in a cost statement, is quite limited in comparing different areas, due to the fact that the comparative advantage of a ranch for production is usually capitalized by the operator in his valuation of the ranch.

The depreciation of the breeding herd was not calculated on account of the difficulty of determining the depreciation that has already been charged as death loss of old cows that were not culled out and marketed on account of unfavorable range conditions and market prices. That there should be an additional charge for the depreciation of bulls and breeding cows is unquestioned, but the difficulty is to determine what this figure should be. It is estimated that depreciation of the breeding herd ordinarily amounts to from $1 to $3 per cow per year.

The costs given in Table 20 were probably somewhat higher in 1925 than for a more nearly normal season. The grazing fees on most of the national forests were waived during 1925, but the low

calf crop and the higher-than-normal death loss and feed bills probably more than offset that factor.

STATEMENT OF RETURNS

The financial returns on the ranches of different sizes in the various districts are summarized in Table 21. The ranch receipts and expenses have been carried forward from Tables 16 and 17. Operator's labor represents the value of the labor of the operator and his family at the rate paid for hired labor. The percentage return to capital was obtained by dividing the ranch income by the total valuation of the ranch, including improved land, livestock, and equipment at the beginning of the year. It does not include the increase in values of cattle resulting from improved market conditions that occurred during the year.

Perhaps the most significant point in Table 21 is that none of the groups of ranches operating on public domain made any return on capital invested. These 83 ranches lacked $4,699 on the average, or 4.8 per cent of the investment, of meeting ranch expenses plus the value of the operator's labor. This unfavorable showing is attributed to the adverse range conditions prevailing in 1924 and 1925, which caused low calf crops, high death losses, and large feed bills, especially on those ranches which depended on free and uncontrolled range. The western Texas ranches returned 2.5 per cent on investment, those in northeastern New Mexico 2 per cent, and the 48 ranches on controlled range in Arizona and southwestern New Mexico broke even without making any return on capital.

In all the districts considered, the groups of ranches with less than 200 breeding cows, made a smaller return, or suffered a greater percentage loss than larger ranches. This has occurred in a year of adverse range conditions, when a man with a few cattle can withstand drought better supposedly than the ranchman with a large herd. Therefore it would seem that 200 breeding cows is the minimum number with which it is advisable to operate in any part of this region, unless a large part of the income is to come from some enterprise other than cattle.

In parts of northeastern New Mexico, where range conditions are uniformly good and where farming can be done with some degree of certainty, the minimum number of breeding cows may be smaller than farther south and west. With the sparse vegetation and uncertain rainfall prevalent in Arizona and southwestern New Mexico, the ranchman can not afford to buy feed to keep his losses at the minimum. Consequently he must keep a larger number of cows, and expect a lower calf crop and a higher death loss than is typical of more favored districts. This does not mean that death losses can not be reduced under such conditions. If the stockman is given control of the public domain for a sufficient length of time, there are possibilities of increasing considerably the carrying capacity of the range and otherwise stabilizing his business. With the possibility of reserving pastures and developing a permanent water supply which range control should make possible, there is no reason why the calf crops now obtained can not be increased and the death losses decreased materially.

While death losses and calf crops were abnormally unfavorable in 1925 the market price of beef cattle improved sufficiently to increase the value of cows on the range by about $10 a head. The increased

TABLE 21.—*Income and return on investment, 204 cow ranches in southwestern range region, 1925*

District and number of breeding cows	Number of ranches	Ranch receipts	Ranch expenses	Receipts less expenses [1]	Value of operator's labor [2]	Ranch income [1]	Return to total capital [1]	Interest paid	Return to operator's equity [1]	Total value of ranch	Value of operator's equity	Cash receipts less cash expenditures [1]	Increased value of herd due to improved market conditions during the year
		Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*	*Dollars*	*Per cent*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
Western Texas:													
Less than 100	1	5,371	2,697	674	720	−46	−0.2	240	−2.0	22,405	14,405	−1,059	1,598
101 to 200	1	4,150	7,812	−3,662	725	−4,387	−11.0	532	−15.2	39,763	32,263	493	----------
201 to 500	8	11,732	8,069	3,663	1,196	2,467	3.1	1,050	2.5	79,364	57,816	5,170	4,716
501 to 1,000	5	24,705	15,180	9,525	1,356	8,169	4.0	1,292	4.0	204,620	173,132	10,758	11,756
1,001 to 2,000	3	19,504	16,165	3,339	1,260	2,079	.8	5,[illegible]	−2.4	256,524	142,923	−7,942	23,732
Over 2,000	10	53,286	35,145	18,141	644	17,497	2.4	8,[illegible]	1.7	716,524	542,305	17,911	48,197
Total or average	28	29,153	19,675	9,478	1,000	8,478	2.5	4,[illegible]	1.7	344,818	258,093	8,923	23,260
Northeastern New Mexico:													
Less than 100	8	4,394	3,804	590	563	27	.1	278	−1.6	18,843	15,449	392	1,189
101 to 200	11	11,217	10,944	273	758	−485	−1.1	1,057	−4.9	46,009	31,630	353	6,704
201 to 500	11	8,625	4,574	4,051	549	3,502	5.8	1,695	5.2	59,925	34,420	2,361	5,357
501 to 1,000	10	15,470	13,653	1,817	823	994	1.5	1,944	−2.3	67,443	42,164	6,817	11,602
1,001 to 2,000	4	27,856	22,839	5,017	1,245	3,772	1.7	5,109	−1.0	218,315	134,765	8,407	22,177
Over 2,000	1	51,768	44,990	6,778	----------	6,778	1.5	2,697	1.0	448,514	418,514	7,141	----------
Total or average	45	12,696	10,535	2,161	713	1,448	2.0	1,668	−.4	73,605	49,541	3,149	7,709
Arizona and southern and western New Mexico:													
Controlled range—													
Less than 100	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
101 to 200	7	2,374	2,719	−345	504	−849	−6.1	178	−8.7	13,958	11,772	100	2,560
201 to 500	17	3,776	3,927	−151	667	−818	−2.7	339	−4.4	30,304	26,443	507	4,725
501 to 1,000	16	10,140	9,388	752	588	164	.2	1,093	−1.7	67,344	53,134	2,547	8,409
1,001 to 2,000	5	26,335	31,229	−4,894	492	−5,386	−4.6	1,530	−7.1	116,746	97,746	8,980	22,632
Over 2,000	3	45,430	30,701	14,729	200	14,529	4.7	3,488	4.2	310,239	263,739	−10,139	57,573
Total or average	48	10,649	10,088	561	570	−9	0.0	888	−1.6	66,740	55,458	1,346	10,806
Using public domain—													
Less than 100	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
101 to 200	2	2,394	1,622	772	768	+4	0.0	1,930	−164.9	20,168	1,168	−568	2,113
201 to 500	23	4,765	4,403	362	656	−294	−1.3	570	−5.3	22,918	16,207	2,052	3,879
501 to 1,000	24	8,100	11,807	−3,707	825	−4,532	−7.8	1,421	−14.8	58,183	40,255	543	9,457
1,001 to 2,000	14	15,383	20,004	−4,621	570	−5,191	−4.8	2,455	−10.7	107,235	71,569	5,192	18,544
Over 2,000	20	36,498	46,217	−9,719	367	−10,086	−4.3	5,960	−10.5	231,910	152,494	12,991	40,504
Total or average	83	15,110	19,186	−4,076	623	−4,699	−4.8	2,466	−11.0	97,631	64,977	4,718	16,749

[1] Minus sign preceding figures indicates a loss.

[2] Includes a small amount of unpaid family labor.

value of the herd resulting from improved market conditions during the year is shown in Table 21. This increased value of the herd often amounted to 20 or 25 per cent of the total investment at the beginning of the year and improved the operator's credit situation considerably.

The gross sales for the year are compared in Table 21 with the cash paid out during the year for current expenses, livestock purchases, and interest on borrowed money. (See column "Cash receipts less cash expenditures.") This gives the amount of cash available to meet living expenses, depreciation of equipment, and return on capital. It will be noticed that $493 is the largest amount available for these purposes on ranches with fewer than 200 breeding cows in any of the districts.

INDEBTEDNESS AND CREDIT

The average indebtedness reported on 204 ranches with breeding cows was $33,275 on a valuation of $118,950 at the beginning of the year. In other words the average ranchman had a 72 per cent equity in his business. The credit situation in the Southwest at the time of making this study was greatly improved by the increase in cattle prices in the fall of 1925. Many of those heavily indebted had been eliminated in the preceding five years of adverse price and weather conditions. With a few exceptions the stockmen who were able to survive these difficulties were in fairly good financial condition.

A large number of ranches and banks in this region failed during the five years before 1925, however. Many of the cattlemen spent thousands of dollars in moving cattle to other ranges, or in feeding large quantities of purchased feed. Cattle were poor, and there was no profitable market for them. The added expense equaled the value of the cattle in many cases. A few men were heavily involved by buying steers before the price decline in 1920, since they sold them, after carrying them two or three years, for less than they had paid.

The proportion of ranches with various degrees of indebtedness is shown in Table 22 for the different districts studied. There were a few ranches whose indebtedness was greater than the capitalization. Some of these ranches were being carried along on liberal credit terms by the banks in the hope that cattle-price conditions would soon improve. These ranches were included with those with less than 10 per cent equity in capital. About one-fourth of the cow ranches had no indebtedness on them.

TABLE 22.—*Percentage of equity in capital, 204 cow ranches, southwestern range region, 1925*

Percentage equity	Western Texas	Northeastern New Mexico	Arizona, and southern and western New Mexico		Total
			Controlled range	Using public domain	
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Less than 10	3	4		12	6
10 to 19		2	2	1	2
20 to 29		4	2	1	2
30 to 39	7	4	6	6	5
40 to 49	4	11	4	6	6
50 to 59	11	16	6	5	8
60 to 69	14	9	13	10	11
70 to 79	25	9	8	16	14
80 to 89	14	14	4	11	10
90 to 99	11	11	21	6	11
100	11	16	34	26	24
Total	100	100	100	100	100

The amount of interest paid on the various size ranches in the different districts may be seen in Table 21. The ranches in northeastern New Mexico paid $1,668 in interest, or 6.9 per cent on $24,063 of indebtedness. Paid interest amounted to more than the ranch income in all districts except Texas, in which case $4,450 was returned to the owner's equity in the ranch. Interest rates on land loans averaged 5.2 per cent while the interest rate on cattle loans was 7.5 per cent.

Of the cattle loans outstanding, 26 per cent were made by local, State, and national banks, 22 per cent by the War Finance Corporation, 17 per cent by private individuals, 10 per cent by Federal intermediate credit banks, 8 per cent by mortgage-loan companies, and 17 per cent came from miscellaneous sources. Almost half of the loans on land were for contract land purchased from the State. Private individuals, Federal farm loan and joint-stock land banks furnished the remainder of the money lent on land.

RANCH LAYOUT

The ranches for which layout maps are shown illustrate situations that are typical of certain districts of the southwestern range region, although they are somewhat larger than the average and both of them use public domain to a large extent, which is not characteristic of all ranches in the region. They picture rather clearly, however, some of the problems peculiar to ranch management in the Southwest.

Ranch A has 1.6 sections of owned land, 1.6 sections of leased land, and an individual allotment of 27 sections of national-forest range. (Fig. 28.) In addition it was estimated that it had the use of approximately 10 sections of public domain. The forest range is mountainous and the public domain is rolling. The diversified kinds of forage of the two types of range reduce the drought hazard because both types are not apt to be equally dry at the same time, and because the oak and mahogany brush on the forest range represents a sort of reserve after the grasses have been grazed rather closely.

There were 900 cattle on this ranch January 1, 1926, consisting of 515 cows, 165 yearling heifers, 32 bulls, and 188 steers. Cattle are ordinarily sold as yearlings in the spring, usually during May. The total investment in land, improvements, and livestock amounted to $37,000. No crops were raised and only enough feed was purchased to provide a little hay for saddle horses and calves, some corn and bran for the horses, milk cows, and chickens, and a little cottonseed cake for the weak cows.

This ranchman competes with a sheepman on one side and with another cattle operator on the other for the use of the public domain. In case a lease law or some other plan which would give him control of a portion of this free range were inaugurated, he would be interested principally in not being cut off from his best well, 4 miles east of his headquarters. He expressed himself as being very favorable to a law which would permit him to keep stock horses off his land and to fence additional pastures for use in emergencies. He reserves small pastures in which he weans his calves in February and March and for the weaker cows and heifers due to calve in the early spring.

In spite of the unfavorable range conditions prevailing during a large part of 1925, this ranchman had a calf crop of 85 per cent and a death loss of 6.6 per cent. The financial statement for this ranch

showed a return of 8.3 per cent on capital invested, which was considerably higher than the average of the ranches studied.

The ranch shown in Figure 29 is typical of the ranches that operate almost entirely on public domain. In this case about 90 per cent of the range utilized is public domain. Most of the sections numbered 2, 16, 32, and 36 are leased from the State although their grazing value is very low. The use of these sections would probably not be

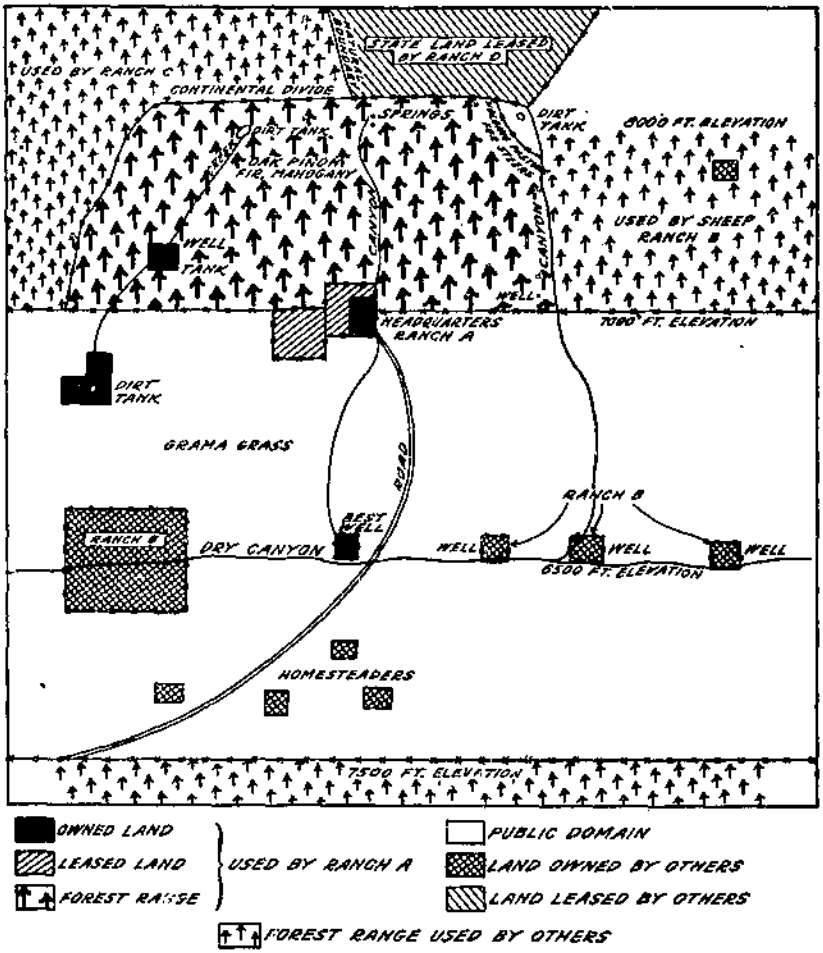

FIG. 28.—A layout map of ranch A, operating largely on national forest range and public domain

worth so much as the grazing fee if they did not control the free range around them.

On the semidesert type of range found on this ranch it is more difficult to get a high percentage calf crop than on types of range where climatic conditions are more uniform. In 1925 conditions were so unfavorable that 24 per cent of the breeding cows on this ranch died, and the branded calf crop amounted to only 30 per cent. The ranch receipts were not sufficient to cover the decrease in inventory and the current expenses for the year. This ranchman lost 4.1 per cent on his invested capital during 1925.

On the eastern boundary of this ranch a range of mountains forms a natural barrier which protects this ranchman from the competitive use of his range. On the other three sides, however, the lack of any fence or natural boundary allows the livestock of other ranchmen to graze on the range that he uses and prevents him from reserving any part of it for times of drought and other emergencies. The principal

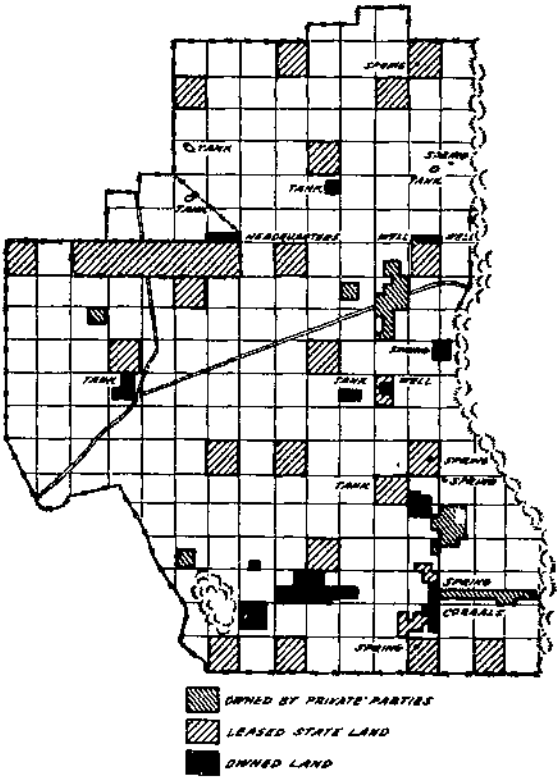

FIG. 29.—Layout of a ranch operating largely on public domain, which is represented by the white area

purpose of this map is to illustrate the need of some sort of control of the public domain by ranchmen in the southwestern range area.

OPERATION OF STEER RANCHES

The practice of aging or maturing steers in this region is confined largely to communities in the northern parts of Arizona and New Mexico. In that portion of Texas included in the survey the percentage of steers in 1925 was abnormally high because of the heavy movement of stock cattle out of that section during the drought of 1924 and 1925 which were replaced with steers during the fall of 1925.

Facilities pertaining to acquirement of range, type of range, and the prevailing system of livestock finance are promoting factors in the steer business. Leased range is a commonly expressed reason for handling steers. Other reasons are smaller requirement of labor, ease of financing steers, greater possibilities of quick profits, and natural preference for steers as a class of cattle and for the methods of conducting the steer business as compared to a breeding business.

From the standpoint of type of range, northeastern New Mexico offers a larger area especially adapted to the steer business than any other portion of the region. That district is more or less level table-land, with breaks that furnish protection during the winter. The grasses are principally grama and buffalo, both of which are very nutritious and have good curing qualities. Other desirable features of this particular section are its proximity to the recognized steer center—the Panhandle of Texas—its location with reference to obtaining supplies of young steers from other sections of New Mexico and Arizona, and favorable facilities for disposing of steers to Colorado and Kansas feeder and stocker buyers and movement into the Kansas Flint Hills district for fattening on grass.

USE OF LAND

The acreage, ownership, and values of the owned land, together with the uses of national forest and public domain, are shown in Table 23. In only one instance was public domain used by a steer ranch. Two of the ranches used national forest.

TABLE 23.—*Area of owned and leased land per ranch, with value per acre of owned land and cost per acre of leased land and use of other range, seven steer ranches, southwestern range region, 1925*

Ranch No.[1]	Total area	Owned grazing land		Leased grazing land		Other range used	
		Area	Value per acre	Area	Cost per acre	Public domain	National forest
	Acres	*Acres*	*Dollars*	*Acres*	*Dollars*	*Acres*	*Acres*
1	13,600	1,440	7.56	640	0.03	None.	11,520
2	8,960	3,200	9.38	5,760	.03	None.	None.
3	51,320	320	9.00	51,000	.13	None.	None.
4	4,360	4,360	5.83			None.	None.
5	88,000	8,000	6.31	80,000	.03	None.	None.
6	65,000			65,000	.15	None.	None.
7	98,440	85,000	4.43	13,440	.03	Yes.	[2] Yes.
Average	47,097	14,617	4.75	30,829	.09		

[1] Ranches arranged in order of total ranch investment, smallest first. [2] Acreage unknown.

It is very evident that farming is not general in connection with the steer business in northern New Mexico and Arizona, the locations of which are shown in Figure 1. Excluding the acreage of national-forest range shown, the area of owned land is only 30 per cent of the total operated. Operation on a high percentage of leased land is a common situation among steer men.

INVESTMENT

The condition of individual ranches with respect to distribution of investment is shown in Table 24. Combining the average investments in steers and other livestock and comparing it to the average total investment, 52 per cent of the investment is found to be in livestock and the remaining 48 per cent in improved land, equipment, and supplies. The amount of leased land used, of course, tends to lower that phase of investment and increase the percentage in livestock. The distribution of investment on the steer ranches may be compared to that in Table 6 which shows similar date on cow ranches requiring a comparable amount of capital.

TABLE 24.—*Distribution of investment and operator's equity, seven steer ranches, southwestern range region, 1925*

Ranch No.	Total investment	Land	Buildings	Water development	Fences	Equipment and supplies	Livestock		Total debt	Operator's equity
							Steers	Other livestock		
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*
1	19,400	2,880	0,500	480	3,000	1,000	5,120	500		100
2	38,228	26,125	1,575	1,400	900	3,825	1,452	2,951	6,000	84
3	62,345	2,880				250	57,460	1,755	29,706	52
4	73,860	20,900	3,200	500	800	2,100	46,090	210	47,361	36
5	116,700	24,000	4,000	8,500	14,000	1,905	63,970	325	118,500	2
6	145,300					893	143,585	822		100
7	632,178	357,000	6,550	2,000	11,250	8,300	239,028	8,050	15,715	98
Average	155,421	61,969	3,118	1,829	4,279	2,610	79,529	2,087	31,053	80

Operators' equities on the whole showed a very sound financial condition to exist on the steer ranches, with the exception of one ranch and the possible exception of a second ranch, depending on whether the indebtedness is distributed between cattle and land in

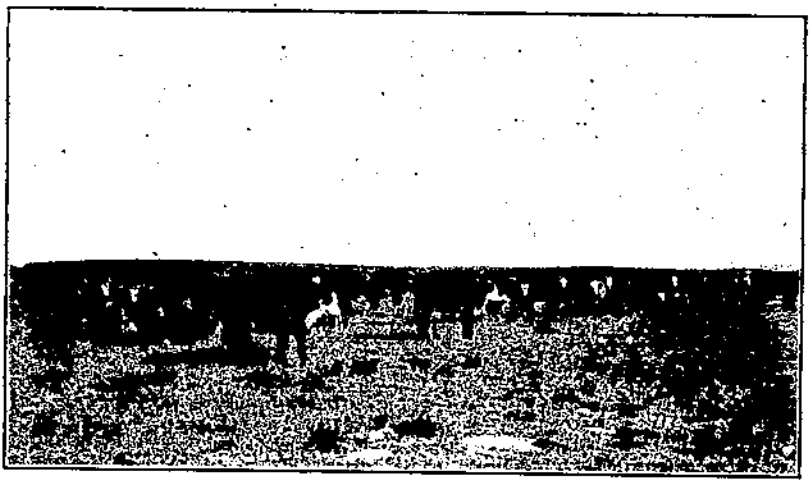

FIG. 30.—Yearling steers are the most common class of cattle purchased on steer ranches

such a manner as to permit meeting payment on short-time paper and carrying the possible long-time indebtedness on land. A very agreeable condition is a margin of 33 per cent in the purchase price of steers and a relatively high percentage of equity in land on a long-time-payment plan.

OPENING INVENTORY, PURCHASE, AND SALE OF CATTLE

The opening inventory, purchases, and sales of cattle on the seven steer ranches are given in Table 25. The average number of cattle per ranch in the opening inventory was 2,001, the average number purchased 1,206, and the average number sold during the year 1,582. Seventy-seven per cent of the steers bought were yearlings (fig. 30) and approximately the same proportion of the steers sold were 3

years old and older. The average price paid for yearlings was $28.20 a head, while the average price received for 3-year-old steers was $49.14, and for 4-year-old steers, $53.22.

TABLE 25.—*Opening inventory, purchases, and sales of different classes of cattle, and average price paid per head, seven steer ranches, southwestern range region, 1925*

OPENING INVENTORY

Ranch No.	1-year steers	2-year steers	3-year steers	4-year steers	5-year steers	Cows	Bulls	Heifers	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
1		248							248
2									
3	450	175	605						1,299
4			4	1,390		3			1,397
5	86	453	804						1,343
6		300	1,060	1,110		71		8	2,489
7	25	387	1,442	3,933	1,078	349	8	8	7,230
Average	82	223	559	919	154	61	1	2	2,001

PURCHASES

1									
2	650								650
3	1,665								1,665
4			300	101		475			975
5	1,881	284	121						2,286
6	65						2		67
7	1,860	940							2,800
Average	875	175	74	14		68			1,206
Value per head, dollars	28.20	28.70	55.84	51.93		28.02	75.00		30.28

SALES

1			230						230
2	574								574
3	1,047	175	605						1,887
4				1,882		3			1,885
5	80	453	789						1,322
6				1,100					1,100
7				3,705	1,078	72	6	5	4,866
Average	243	90	241	841	154	11	1	1	1,582
Value per head, dollars	41.99	37.03	49.14	53.22	55.00	27.30	30.00	24.00	49.95

A prescribed system of handling steers in northeastern New Mexico and adjacent portions of Texas and Arizona, which tends to eliminate the speculative practice of buying steers near 3 years of age with the expectation of quick sale, is to buy them as calves in the fall, yearlings in the spring, or long yearlings in the fall. Fall purchases are becoming popular because buyers are not so numerous at that season, and better values, therefore, can be had, and also because the spread in price between the fall and the following spring is usually very pronounced. Provision for wintering is essential when fall purchases are made, and this is generally done in the form of reserved range. Purchase of calves in the fall is hardly as popular a practice as the purchase of yearlings in the spring because of the winter requirement of calves in feed and care. The age of the purchased classes is shown in Table 25. The tendency to buy yearlings is very pronounced, both as to number of ranches and size of lots purchased. The prices paid for the 2-year-old steers purchased were not up to the prevailing prices

of good steers at the time, and the indication is that the purchased steers were of poor quality. Most likely they were from some locality that had suffered from the drought and the steers had not made normal growth.

The purchase of cows was confined to one ranch.

The increased price of steers as compared with that of 20 to 25 years ago, the division of the large into smaller tracts of fenced range, and the better prices that have been paid in the spring during the last few years for stocker steers that have been wintered well as compared to those wintered in extremely poor condition, have encouraged steermen to winter their cattle in better condition both to avoid death loss and to receive better prices in the spring. A common winter ration for calves consists of three-fourths to 1 pound of cottonseed cake from December until about April 1 to 15. It is rather common to supply roughage in varying quantities, according to the condition of the range. Long yearlings are usually fed 1 to 1½ pounds of cottonseed cake daily from January 1 to 15 until good grass is available. Older steers are fed about the same rations as yearlings for ordinary wintering.

Some operators who expect to finish their 3-year-old steers on Kansas grass make a practice of feeding 2 pounds of cake daily for 75 to 100 days immediately before shipment, about April 15, to the Flint Hills region. The opinion is that steers going on to Kansas grass in good condition will finish for shipment to market for the early run which is desired in preference to late markets that commonly break because of heavy supplies.

Various opinions prevail among cattlemen in these centers of steer operations as to whether it pays to winter steers by feeding them roughage, as to the rations of cottonseed cake that may be used for the different-aged steers, and, finally, as to what influence the condition of the steer at the opening of spring has on the length of time required for finishing on grass in the Flint Hills district of Kansas.

Dehorning steers is generally done in this district. Demands during recent years have forced the practice. The steermen prefer to buy young steers dehorned as calves, but they are not always available. Dehorning is generally done in April and under favorable weather conditions results are good.

Judging from instances observed in other sections of the region the steer business has not become so highly specialized as discussed above. There is little probability of its becoming so. The representative plan of operation is to use minimum quantities of supplemental feed and to make extensive use of native range for wintering.

The general opinion is that death losses are not so heavy on steer ranches as on those ranches carrying breeding herds. The basis for that belief is sound when it is considered that usually a high percentage of the cows which have raised calves go into the winter in poor condition. Steers on the identical range used by mother cows would normally gain in weight and probably reach their best condition just before the winter season. For that reason steers in this region do not usually need feed until late in the winter season.

In considering the death losses of the various classes of steers, those purchased during the year must be included in arriving at the percentages. According to the opening inventory the average number of yearlings per ranch was 81 head. The purchases per ranch averaged 874 head, which gives a maximum of 955 yearlings per ranch.

Compared with the 17 head lost the percentage is 1.6 per cent loss on yearlings. By the same methods the losses on 2-year-old steers were 3.1 per cent and on 3-year-old steers 2.3 per cent. The death losses on 4-year-old steers was less than 1 per cent.

Ordinarily losses among thin steers are heavier within a short time after they are moved to a new range than later, when they have become accustomed to the new surroundings. The tendency among steers to stray from a new range diminishes as they become located.

The fact that steers will survive under more adverse conditions than cows does not justify taking chances on heavy death losses. Since steers are usually handled on a narrow margin and volume of operation is considered a means of large income rather than big profits per head the loss of a few head may materially decrease the profit on 100 steers.

A comparison of the numbers of steers of each age in the opening inventory and the purchases of any particular class during the year, with the sales from the various classes, gives a clear conception of the turnover of steers on the ranches in this study. For example, ranch No. 3 began the year with 459 short-aged yearlings valued at $20 a head. In the spring 1,665 yearlings were purchased at $32.68 each. In the fall 1,047 head of long yearlings were sold at $44.01 a head, leaving 1,041 2-year-old steers in the closing inventory after accounting for the death loss of 16 head and the ranch consumption of 20 head. This illustrates the purchase and sale of steers within the year.

Greater numbers of yearlings and 2-year-old steers are bought and sold within the year ordinarily because of the greater possibility of resale at a profit by holding them over a longer period of time for requirement of growth and more favorable market prices. In addition, the feeder and stocker demand for 3-year-old and older steers is not so widespread as for the younger ages.

RECEIPTS, EXPENSES, AND INCOME

It will be noted in Table 26 that practically all the receipts came from the sales of cattle which are given in detail in Table 25. Steers represented the principal kind of cattle sold. The total cash receipts per ranch varied from $12,270 to $266,269 and averaged $85,300 for the seven ranches.

TABLE 26.—*Distribution of receipts, seven steer ranches, southwestern range region, 1925*

Ranch No.	Sales			Increase in inventory		Total ranch receipts
	Cattle	Other products	Total	Cattle	Other stock and feed	
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	$12,270		$12,270			$12,270
2	22,960	$170	23,130	$2,325	$350	25,805
3	88,534	50	88,584	39,160		127,744
4	91,308	40	91,348			91,348
5	54,075		54,075	40,180	250	94,505
6	60,912	512	61,424			61,424
7	266,269		266,269			266,269
Average	85,190	110	85,300	11,666	86	97,052

EXPENSES

Labor, including groceries, land leases, and feed represented the greatest expenditures in the order mentioned, as shown in Table 27. The labor charge of $17,960 on ranch No. 7 apparently is excessive. When it is understood that the total number of steers on hand at the beginning of the year plus the purchases and sales, all of which require labor in handling, was 12,948 head, and that the labor charge was $1.38 a head, this charge does not seem so excessive as when considered in a lump sum. It is just as essential in the steer business to maintain sufficient labor as on cow ranches. Usually, however, one man looks after a greater number of cattle on steer ranches.

TABLE 27.—*Distribution of expenses, seven steer ranches, southwestern range region, 1925*

Ranch No.	Cash expenditures								Decrease in inventory		Depreciation [1]	Total ranch expense
	Feed and salt	Land leases	Hired labor	Taxes	Repairs	Miscellaneous	Livestock purchases	Total	Cattle	Other stock and feed		
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	750	00	800	350	250	107	-------	2,326	9,600	-------	595	12,521
2	309	173	8	105	398	67	15,574	16,634	-------	-------	389	17,023
3	4,552	6,690	3,578	216	300	-------	87,842	103,238	-------	-------	25	103,263
4	7,114	-------	1,182	923	488	876	44,912	55,495	47,295	20	424	103,234
5	686	2,400	2,425	768	1,200	1,857	62,427	71,763	-------	-------	1,625	73,388
6	2,265	9,750	1,000	700	150	373	1,775	15,953	20,495	303	104	36,855
7	3,757	2,564	17,960	6,153	3,168	5,340	78,400	117,282	137,755	300	3,810	259,147
Av.	2,768	3,084	3,850	1,316	860	1,231	41,561	54,670	30,735	89	996	86,490

[1] Building and equipment.

On an average the feed expense was $1.46 per head of cattle shown in the opening inventory, including the cows and bulls. In some instances steers intended for movement to Kansas grass were fed rather liberal allowances of cake as compared to the usual ration for wintering only. These instances reflect, of course, in the feed expense of those ranches.

It will be recalled that approximately 70 per cent of the controlled range, excluding the national forest, is leased, which accounts for the cash expenses shown in that item.

INCOME

The incomes on individual ranches, as shown in Table 28, give a better insight into the results of operation after the situation as to land ownership, numbers of cattle, sales and purchases, and operation expenses is considered. On those ranches that carried cows in addition to steers the average value of cows throughout the year has been considered in determining the income, and increases in prices have been eliminated. Increases in the prices of steers have been included and are justified by the fact that steers gain in weight and sell at higher prices locally, as well as on the market, as they advance a year in age, within certain limits.

TABLE 28.—*Income and return on investment, seven steer ranches, southwestern range region, 1925*

Ranch No.	Ranch receipts	Ranch expenses	Receipts less expenses[1]	Value of operator's labor	Ranch income[1]	Return to capital [1]	Interest paid	Return on operator's equity[1]	Total value of ranch	Value of operator's equity	Cash receipts less cash expenditures [1]
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*	*Dollars*	*Per cent*	*Dollars*	*Dollars*	*Dollars*
1	12,270	12,521	−251	600	−851	−4.4		−4.4	19,400	19,400	9,944
2	25,805	17,023	8,782	1,200	7,582	19.8	320	22.5	38,228	32,228	6,496
3	127,744	103,263	24,481	300	24,181	38.8	2,384	67.0	62,345	32,549	−14,654
4	91,348	103,234	−11,886	480	−12,366	−16.8	3,076	−58.4	73,800	26,439	35,853
5	94,505	73,388	21,117	1,200	19,917	17.1	5,841	(2)	116,700	−41,800	−17,688
6	61,424	36,855	24,569	600	23,969	16.5		16.5	145,300	145,300	45,471
7	266,269	259,147	7,122	1,800	5,322	.8	1,100	.7	632,178	616,463	148,987
Av	97,052	86,490	10,562	883	9,679	6.2	1,817	6.3	155,421	124,368	30,630

[1] The minus sign before figures indicates a loss.
[2] In this case the debts of the ranchman exceeded the value of his property.

After subtracting the value of operator's labor from the difference between receipts and expenses the amount remaining is the ranch income or return on capital. Of the seven ranches, two showed a minus return on the capital. Study of the ranch showing the greatest loss reveals that 4-year-old steers were handled and that the sale prices were insufficient to overcome the narrow margin between the average sale price and the opening inventory price. The latter was representative of current prices at the time. The balance represents a loss in this case of approximately $1,500 more than the total operating expense, which means an additional $1,500 loss above the actual cash expenses for operation.

Returns on the investment were favorable on four of the seven ranches. The high percentage of leased land is reflected in the return on the investment. The owner of the ranch showing the highest return owns only 320 acres of land. The other ranches showing high returns lease comparatively high percentages also.

Buying and selling ability is reflected in the returns shown on some of the ranches.

The statement is often advanced by steermen that the possibility of a profit depends more on judgment in purchasing than in lessening normal operation expenses. The ability to determine the outcome of a large number of thin steers at a time of poor condition and to avoid overestimating them if they are in good condition can be gained only by experience in the business.

If the steer business is conducted on a conservative basis there is little need for the prevalent impression that it is a highly speculative system of cattle operation. A policy of buying well-bred young cattle and of providing them with sufficient feed and water to keep them growing is a type of business that is as sound in principle as the maintenance of a cow herd and raising calves. However, such a business has basic requirements as to type of range and ability of the operator with special regard to knowing the possibilities with steer cattle and of judging values.

The average cash expense for the seven steer ranches amounted to $13,109 per ranch. The average number of cattle on these ranches when calculated on a year-equivalent basis, was 2,114 head. On this

basis the total cash expense per head was $6.20. The itemized cost per head was as follows:

Hired labor	$1.82
Land leases	1.46
Feed and salt	1.31
Taxes	.62
Repairs	.41
Miscellaneous	.58
Total cash expense	6.20
Depreciation of buildings and equipment	.47
Death loss	.73
Paid interest	.86
Interest on equity at 6 per cent	3.52
Total cost per head	11.78

SHEEP PRODUCTION

At the outset the study was intended to cover cattle production within the region and to include a limited number of ranches carrying other classes of range livestock. A complete economic analysis of sheep or goat production from a small number of records was not contemplated. The data are presented for the principal purpose of determining the important and general problems of production and making possible comparisons among ranches engaged in the various enterprises. Both the sheep and goat industries merit special studies confined to them alone.

Records were obtained on 14 ranches that were running both sheep and cattle, and on 10 sheep ranches that had no other productive livestock to an extent worthy of consideration. The following tables compiled from the data show the ranches in detail because of the lack of sufficient numbers of ranches to give representative group averages.

In New Mexico and Arizona sheep production is confined principally to the northern and central parts of the States. The higher elevations in those sections are used for summer range. The extreme heat and the characteristic dry ranges in the southern portions of those States are not wholly desirable as summer ranges, especially since feeder lambs constitute such an important phase of the sheep industry and droughty conditions are not favorable to their development. However, certain sections of the southern ranges are very desirable and important in connection with wintering. The central part of eastern New Mexico—Chaves and adjoining counties—have become important in sheep production and the trend has been toward replacement of cattle to a considerable extent since the more favorable market position of sheep developed.

The principal sheep-producing district in Texas lies east of the Pecos River, but sheep are being produced in several communities west of it on such a scale as to be of considerable importance both as to numbers and extent of range land thus utilized. The interest expressed indicates expansion of sheep production in the Davis Mountains locality, especially. In that event, it is probable that sheep will be produced in connection with cattle on the same ranches, which conforms to the more general practice in Texas. It is apparent that the most practical means of meeting the advance in price of grazing lands is the institution of diversity in the kinds of range livestock to be produced, where conditions are favorable to diversity.

In New Mexico both classes of production—that is, sheep alone and sheep with cattle—are represented. In Arizona either sheep or cattle alone are produced. If a ranchman engages in both, the two enterprises are usually entirely separated as to organization and range. There are exceptions, however, to the general rule in each State.

USE OF LAND

The land acreage operated by the individual ranches of each type of operation, together with the value per acre and a notation of the use of other than owned or leased land, is shown in Table 29. In some instances it was possible to obtain a reliable estimate on the acreage of public domain used, and in those instances the acreage has been shown. However, the acreage of public domain has not been included in stating the total acreage of the ranch because of the possible use variation that may occur from year to year by the appearance of other producers and possible error in the estimated acreage. The acreages given in the column showing the use of national-forest ranges are more reliable and are included in the statement of total acreage operated. In several instances these acreages represent allotments of known acreage made to individual operators. In other instances the permitted number of livestock was given by the ranchman and the usual rate of stocking on that particular national forest was applied to give the acreage operated. The justification of using the national-forest acreage in stating the size of the ranch is in the security of operation under the present permit system, which is, for the most part, a stable organization.

TABLE 29.—*Area of owned and leased land per ranch, with value per acre of owned grazing and crop land, cost per acre of leased land, and the use of other range for 10 sheep ranches and 14 sheep and cattle ranches in the southwestern range region, 1925*

10 SHEEP RANCHES

Ranch No.[1]	Area of ranch [2]	Owned				Leased		Other range used	
		Grazing land		Crop land		Grazing land		Public domain	National forest
		Area	Value per acre	Area	Value per acre	Area	Cost per acre		
	Acres	*Acres*	*Dollars*	*Acres*	*Dollars*	*Acres*	*Dollars*	*Acres*	*Acres*
1	6,400					6,400	$0.47	None.	None.
2	16,325	290	81.80			3,561	.03	(3)	12,474
3	20,819	160	144.38			4,480	.08	(3)	16,170
4	14,806	160	51.88			1,280	.03	(3)	13,366
5	26,324	380	25.92			8,640	.07	(3)	17,304
6	16,200	6,200	5.00			10,000	.11	None.	None.
7	32,693	580	81.50			7,123	.03	(3)	24,990
8	25,370	370	144.60					(3)	25,000
9	35,327	1,407	17.77			33,920	.04	(3)	None.
10	42,000	21,760	5.00	240	5.00	20,000	.07	None.	None.
Average	23,625	3,131	10.56	24	5.00	9,540	.08		10,930

[1] Of the 10 sheep ranches No. 1 is in Texas, Nos. 6 and 10 are in New Mexico, and the others in Arizona. Of the 14 sheep and cattle ranches Nos. 15, 19, and 20 are in Arizona, Nos. 11, 16, and 22 are in western Texas, and the others in New Mexico.

[2] Not including public domain.

[3] Use winter pasturage and unknown areas of public domain incidental to trailing them between summer and winter ranges.

TABLE 29.—*Area of owned and leased land per ranch, with value per acre of owned grazing and crop land, cost per acre of leased land, and the use of other range for 10 sheep ranches and 14 sheep and cattle ranches in the southwestern range region, 1925*—Continued

14 SHEEP AND CATTLE RANCHES

Ranch No.	Area of ranch	Owned				Leased		Other range used	
		Grazing land		Grazing land		Grazing land		Public domain	National forest
		Area	Value per acre	Area	Value per acre	Area	Cost per acre		
	Acres	*Acres*	*Dollars*	*Acres*	*Dollars*	*Acres*	*Dollars*	*Acres*	*Acres*
11	11,520	11,520	4.96					None.	None.
12	15,000	7,960	5.00	40	43.42	7,000	0.05	None.	None.
13	37,500	7,500	5.00			30,000	.04	None.	None.
14	25,980	4,860	15.43			1,920	.03	None.	19,200
15	77,000	900	39.76			76,160	.03	30,000	(3)
16	20,000	20,000	5.00					None.	None.
17	14,300	2,200	22.30	100	15.04	12,000	.03	30,000	None.
18	47,680	34,580	5.00	100	7.00	13,000	.10	None.	None.
19	166,160	3,680	6.79	320	150.00	151,280	.06	None.	10,880
20	189,658	15,360	2.57			143,680	.04	12,000	39,618
21	56,440	26,600	9.32	400	5.00	29,440	.04	8,000	None.
22	33,280	33,280	10.00					None.	None.
23	64,000	43,900	6.88	100	50.00	20,000	.05	None.	None.
24	241,470	195,340	1.65			32,480	.04	50,000	13,650
Average	71,431	29,120	4.50	75	55.66	36,926	.04	9,643	5,310

[1] Use winter pastures and unknown areas of public domain incidental to trailing them between summer and winter ranges.

The values per acre of grazing land shown in the tables include the value of buildings, water development, and fences as improvements. This fact explains in part the different valuations given to owned grazing land.

With few exceptions operators who did not use public domain or national forest were rather consistent in their valuations of improved grazing land and placed those valuations at $5 to $10 an acre. The higher valuations placed on the owned grazing land by ranchmen who operated on the public domain and national forest are explained by the placing of improvements on owned land that are used in the operation of the additional classes of range. Sheep ranch No. 8 is an extreme case of this kind, as the 370 acres of land owned are not crop land. One special instance of high-priced crop land used as a base of operation is represented by ranch No. 19 of the sheep and cattle ranches. The tendency toward high valuation of the comparatively small acreages of owned land is much more pronounced on the sheep ranches than on the sheep and cattle ranches. A further significant feature is the greater tendency on the part of sheepmen as compared with operators running both sheep and cattle to lease smaller acreages.

It is most likely that the sheep ranches have remained distinctly as such throughout their existence. Recent years have brought a waning of the former strong prejudice against combination sheep and cattle ranching that previously existed in the minds of range livestock men.

All the lease prices of grazing lands shown in the tables are upward of 3 cents an acre. The same sources and usual lease prices of grazing land shown in Table 5 for cow ranches apply also in the present case.

The situation of an individual operator with respect to use of national-forest range or utilization of commercially leased land is a matter of vital importance to that individual. In any locality the wider the ownership of land within a locality the greater is the difficulty of large livestock operators in maintaining a constant organization during a period of years because of the greater number of avenues of approach open to those who would become competitors for the use of the range. Every ranchman has basis for his views or wishes on such subjects as control of the public domain.

During this survey sheepmen and cattlemen alike expressed approval and disapproval of all proposals yet made. There was no recorded disapproval of the economic principle that security of operation is one of the most determining influences in range livestock production regardless of the kind of livestock being produced. The reasoning on the subject must take into consideration the vast acreages of range lands not subject to taxation at present. This condition necessitates a heavier taxation on land in a taxable status and on the products of those nontaxable lands. For the most part those products are cattle, sheep and wool, goats and mohair. It would seem that an equitable policy tending to secure the rights of individual cattle, sheep, and goat producers to certain designated areas of range and to guarantee those rights over a period of years, would help to stabilize the range livestock industry, eliminate competition which often necessitates expensive operation methods, and discourage speculative systems. If such improvement occurred, the benefits would be shared in the form of equitable taxation as well as in a more inviting field for livestock finance.

INVESTMENT

The total capital invested per ranch and the distribution to the various items of investment on the 10 sheep ranches and the 14 sheep and cattle ranches are shown in Table 30. In spite of the fact that a high percentage of the land operated is leased, forest range, and public domain, the investment in land is the greatest single item, on an average, on the sheep and cattle ranches. However, the combined average investment in sheep and cattle is greater by $8,186 than the single item of land. The investment in the unit in condition for operation, that is, improved land, is shown by adding the investments in buildings, water development, and fences to the land. The average given on the combination ranches is $140,677, which is 55 per cent of the total capital per ranch. The investment in sheep and cattle is 42 per cent of the total. Equipment, supplies, and other livestock make up the remaining 3 per cent. "Other livestock" in this instance represents principally saddle horses, with few exceptions, and can not be considered as contributing to the income from the property by reproduction. However, saddle horses are an important item in ranch operation.

TABLE 30.—*Investment and indebtedness, 10 sheep ranches and 14 sheep and cattle ranches, southwestern range region, 1925*

10 SHEEP RANCHES

Ranch No.	Total investment	Land	Buildings	Water development	Fences	Equipment and supplies	Livestock			Total debt	Operator's equity
							Sheep	Cattle	Other livestock		
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*
1	17,036					296	16,710		80		100
2	45,725	13,340	9,355	625	400	1,210	20,373		422	29,926	35
3	46,033	4,800	17,900		400	900	22,208		425	10,000	79
4	50,082	1,600	8,900	500	1,300	750	46,782		250		100
5	65,210	1,900	7,700	250		1,625	53,585		150		100
6	80,978	31,000	10,500		1,500	3,000	34,978			20,473	75
7	91,221	26,080	18,535	1,250	800	2,420	40,734		802	7,900	91
8	105,526	10,500	39,000		4,000	4,125	45,451		2,450	20,000	81
9	128,809	5,000	10,000			8,850	102,484		2,475	77,287	40
10	164,092	100,000	7,000	1,000	2,000	2,210	51,682		800	102,527	38
Average	80,596	19,482	12,889	362	1,040	2,539	43,499		785	26,811	67

14 SHEEP AND CATTLE RANCHES

11	89,511	29,700	5,500	13,000	9,600	650	6,375	15,500	9,786		100
12	90,205	40,000	2,200	150	1,121	1,324	17,225	27,675	597		100
13	96,481	22,850	5,500	5,650	6,000	4,450	22,608	28,358	975	40,364	58
14	113,158	49,300	2,450	21,250	2,000	2,800	22,102	12,150	1,106	17,785	84
15	121,228	4,500	12,000	10,505	8,775	5,274	34,112	45,212	850	30,000	75
16	102,224	46,000	8,000	25,000	21,000	530	46,772	13,862	1,060		100
17	177,456	36,400	5,600	22,000	2,000	2,035	72,685	40,592	1,244	85,710	52
18	260,554	155,910	5,750	5,600	6,500	4,012	63,457	27,385	940	56,129	79
19	320,053	22,500	28,000		22,500	4,500	147,375	85,240	9,938	87,500	73
20	341,988	23,040	6,500	5,000	5,000	8,000	220,800	69,428	4,200		100
21	360,321	188,450	14,750	34,300	12,500	4,650	38,644	59,480	7,547	146,000	60
22	403,896	288,984	8,500	10,700	18,616	1,490	61,696	6,080	900		100
23	511,127	295,400	63,000	11,100	7,500	8,785	61,808	65,512	8,022	153,020	70
24	541,183	195,340	22,800	39,800	64,000	13,140	91,051	101,902	12,250	11,000	98
Average	257,029	99,455	12,896	15,004	13,322	4,467	64,830	42,805	4,244	44,865	83

Considering the three largest sheep and cattle ranches, Nos. 19, 20, and 24, 36 and 59 per cent, respectively, of the investment is in improved land and in sheep and cattle. It was not possible to apportion the investment in improved land to the sheep and cattle enterprises. However, a comparison shows that for every $179 invested in sheep there was $100 invested in cattle.

By grouping four of the next largest ranches (Nos. 15, 16, 22, and 23), the investment in improved land is 69 per cent of the total capital and the investment in sheep and cattle is 28 per cent of the capital. For each $155 invested in sheep $100 is invested in cattle.

The seven smaller ranches show 58 per cent of their investment to be in land and 38 per cent in cattle and sheep. The proportion of the investment in sheep and cattle bears the ratio of $115 to $100.

The influence of uses of other than owned land is very marked in this comparison. There is a lower percentage of the investment in land and a correspondingly higher investment in cattle and sheep on those ranches using the national forest and public domain.

Operator's equities indicate a very sound financial condition of the combination ranches. Of the ranches known to be free of debt three were in Texas. Credit for the financial condition is attributable largely to the sheep enterprise, which has had the effect of offsetting the unfavorable position of cattle since 1920.

The average total investment per sheep ranch, as shown in Table 30, is approximately one-third of that shown in the combination ranches. In the case of the sheep ranches, improved land represents 42 per cent of the average capital per ranch. The investment in sheep is 54 per cent of the total per ranch. The remaining 4 per cent is made up of equipment, supplies, and other livestock.

There is no great difference between the large and small sheep ranches with respect to the percentage of the investment in improved land. This item is approximately 40 per cent in each instance. Those ranches having less than 3,000 mature ewes own only approximately 2 per cent of the land operated and those with more than 3,000 mature ewes own approximately 20 per cent of the land operated.

Operator's equities in the sheep ranches averaged 67 per cent, and individually ranged as low as 38 per cent. The average is 16 per cent lower than that shown on the combination ranches. Taking into consideration the average investment and operator's equity the net worth of the operator on the sheep ranches was $53,785 as compared to $212,164 for the sheep and cattle operator.

LIVESTOCK INVENTORIES

The opening inventories together with value per head of sheep and cattle on the combination and on the sheep ranches are shown in Tables 31 and 32. A comparison of the tables shows that the sheep enterprise of the combination ranches is somewhat larger than that of the distinctly sheep ranches. The combination ranches have an average of 1,386 more mature ewes than the strictly sheep ranches. Also there are 671 more yearling ewes per ranch in the first-mentioned group, which indicates that the sheep and cattle ranches are increasing the size of their herds more than the strictly sheep ranches.

TABLE 31.—*Opening inventory, number and value per head of different classes of sheep, 10 sheep ranches, southwestern range region, 1925*

Ranch No.	Mature ewes	Yearling ewes	Rams	Wethers	Total
	Number	*Number*	*Number*	*Number*	*Number*
1	1,600	450	52		2,102
2	2,000		37		2,037
3	1,970		45		2,015
4	1,800	500	565		2,865
5	3,100	508	60		3,668
6	3,058		100	55	3,213
7	4,000		73		4,073
8	2,540	1,548	135	1,211	5,434
9	6,400	1,200	600		8,200
10	3,687		205		3,082
Average	3,015	421	196	127	3,759
Value per head, dollars	10.43	9.66	23.81	6.17	11.10

TABLE 32.—*Opening inventory, number and value per head of different classes of sheep and cattle, 14 sheep and cattle ranches, southwestern range region, 1925*

Ranch No.	Sheep					Cattle				
	Mature ewes	Yearling ewes	Rams	Wethers	Total	Cows	Heifers	Bulls	Steers	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
11	900	200	30	250	1,380	370		10		380
12	1,075	350	30		1,455	390	320	20	150	880
13	(1)					458	338	18	2	816
14	1,550	305			1,855	395	100	8		413
15	4,925		50		4,975	1,290	125	45	161	1,621
16	3,830	900	120		4,850	305		16		321
17	2,320	4,126	110		6,556	524	200	14	362	1,100
18	1,897	1,980	152	700	4,729	328	66	9		403
19	12,150		308		12,458	1,550	620	80	230	2,480
20	12,000	4,400	400	200	17,000	1,595	295	87	325	2,302
21	718	2,100	39	964	3,821	1,257	320	31	402	2,010
22	4,100	930	98	10	5,138	200		8		208
23	3,714		88		3,799	1,161	239	52	244	1,696
24	12,436		238		12,674	2,640	600	233		2,873
Average	4,401	1,092	119	152	5,764	841	230	45	134	1,250
Value per head, dollars	10.53	9.56	33.20	12.72	10.78	29.60	22.22	100.76	24.55	32.06

[1] No sheep were on hand at the beginning of the year, but 3,445 head were purchased during the year.

The cattle enterprise on the combination ranches adds a factor of safety or stability and materially increases the possibilities in livestock production. The greater numbers of sheep and cattle account for the greater acreages of land operated by the combination ranches as shown in Table 29. Using either land or livestock as a measure of size the combination ranches are, with some exceptions, the larger.

Comparatively few wethers are being carried on the ranches. This is due to the feeder-lamb market which has developed principally during the last 10 years. An almost parallel case has occurred in the cattle business in that the demand for feeder calves has tended to discontinue carrying steers to long ages on the southwestern ranges.

The number of rams and bulls shown in the inventories do not represent a true ratio of rams to ewes or bulls to cows that may occur during the breeding season because of the date of the inventories. The fall is the usual time of disposing of cull rams and bulls to avoid the necessity of wintering them, and such culls are not replaced ordinarily as early as January 1.

By comparing Tables 32 and 34 with Tables 31 and 33, the net change in inventories and average values may be determined. Lambs and calves do not appear on either inventory. This is explained by the 12-months advance in age of young classes between the two inventory dates. Yearling ewes shown in the opening inventory and not disposed of during the year occur in the closing inventory as mature ewes. Likewise yearling steers and heifers of the opening inventory appear as 2-year-olds in the closing inventory. Lambs and calves kept out of the 1925 crop appear in the yearling class in the closing inventories.

Purchases, sales, death losses, ranch consumption, and calf and lamb crops have been taken into account and are responsible for the inventory changes.

By comparing Table 33 with Table 31 it will be noted that the total net change in the sheep enterprise on the combination ranches was an increase of 219 head. The increase in mature ewes was 222 head, and there was a decrease of 33 yearling ewes. The other classes contributed to the net change. The productive power of the ranches as a whole was, therefore, increased an average of 189 breeding ewes. The sheep and cattle ranch No. 13 went into sheep to the extent of 3,445 head during the year and ranch No. 11 went out of sheep to the extent of 1,380, excluding the 1925 lamb crop.

TABLE 33.—*Closing inventory, number and value per head of different classes of sheep, 10 sheep ranches, southwestern range region, 1925*

Ranch No.	Mature ewes	Yearling ewes	Rams	Wethers	Total
	Number	*Number*	*Number*	*Number*	*Number*
1	1,910	250	50		2,210
2	1,775	208	21		2,004
3	1,600				1,600
4	1,846	200	546		2,592
5	3,200	140	70		3,410
6	3,964	38	112	55	4,150
7	3,550	417	42		4,000
8	3,042		125	1,606	4,773
9	6,141	1,100	415	100	7,756
10	8,374		275		8,649
Average	3,530	235	166	176	4,116
Value per head, dollars	10.50	11.02	24.57	6.48	11.00

TABLE 34.—*Closing inventory, number and value per head of different classes of sheep and cattle, 14 sheep and cattle ranches, southwestern range region, 1925*

Ranch No.[1]	Sheep					Cattle				
	Mature ewes	Yearling ewes	Rams	Wethers	Total	Cows	Heifers	Bulls	Steers	Total
	Number	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*	*Number*
11	(2)					350	121	10	322	803
12	1,300	350	40		1,690	430	295	20	135	880
13	2,150	1,220	75		3,445	550	75	23	60	708
14	1,100	365	30		1,495	300	200	8	20	528
15	3,500		40		3,540	1,155	220	45	185	1,605
16	4,000	600	125		4,725	500	14	15		529
17	5,447	1,033	100		6,580	610	194	24	156	994
18	3,700	500	87	500	4,787	350	220	11	10	591
19	10,000	1,000	250	1,000	12,250	1,500	650	80	400	2,630
20	14,000	4,500	400	200	19,100	1,500	200	100	275	2,075
21	500	2,000	43	750	3,293	1,350	338	37	212	1,937
22	5,000	1,000	150	56	6,206	200		8		208
23	3,530	550	110	40	4,230	800	485	55	15	1,445
24	10,500	1,700	220		12,420	2,000	600	156	60	2,816
Average	4,623	1,059	119	182	5,983	835	258	42	133	1,268
Value per head, dollars	11.00	10.19	35.80	9.05	11.29	38.26	29.18	104.92	28.44	37.61

[1] Ranches arranged in order of total investment, smallest investment first.
[2] Ranch No. 11 went out of the sheep business during the year.

There was only a slight change in the cattle enterprise of the sheep and cattle ranches, as shown by a comparison of Tables 32 and 34. The net increase was only 18 head per ranch. Considering the cows and heifers on the six ranches shown in the opening inventory that were carrying 1,000 or more breeding cows the increase of cows and heifers per ranch was 132 head. The eight smaller ranches showed a decrease of 62 cows and heifers per ranch. Applying this grouping to the sheep enterprise on these ranches, the six large ranches showed an average decrease of 110 ewes and the smaller ranches an increase of 662 ewes per ranch. The indication, therefore, is that the shift from cattle to sheep is much more pronounced on the smaller than on the larger ranches.

The average price of cows shown in the opening inventory was $29.60 and in the closing inventory was $38.26, which represents a spread of $8.66 a head, due to the more favorable prices prevailing at the close of the year.

Comparing the opening and closing inventories of the sheep ranches as shown in Tables 31 and 33, the average increase in total numbers of all classes per ranch was from 3,759 to 4,116, or 357 head. Seven out of the ten sheep ranches had a smaller number of sheep on hand at the end of the year than at the beginning. The other three ranchmen increased the number of sheep in their herds so that the average number of sheep on all the ranches was greater at the end of the year.

At the time of the survey there was no general tendency toward extensive expansion of sheep production or toward changing from cattle to sheep. Some producers considered that their individual situation with reference to available range would permit carrying more sheep. In those instances the preference to increase their numbers from their own production seemed to prevail instead of the desire to expand by purchase and the incurrence of heavy indebtedness.

METHODS OF OPERATION

The lack of public domain and national-forest range makes Texas conditions differ from those prevailing in other Southwestern States. The outstanding feature of the Texas system of operation is complete range control through ownership or lease. The common method is to use no herders but fenced pastures instead. The practice of using the same range for year-long grazing, except limited acreages reserved for winter, is widely applied. In addition, the use of range for common grazing of sheep and cattle, and oftentimes goats, is decidedly confined to the western Texas system of ranching.

Since all Texas lands are operated under ownership or lease the greatest detriment to a well-organized system of operation is thereby removed. The construction of woven-wire, wolf-proof fences has been made possible by the above facilities for range control. It is true that fences of this type are expensive, the cost ranging from $200 to $350 a mile complete, but ranchmen prefer apparently to make the investment rather than to depend on hired labor for herding. These fences prevent trespassing, permit carrying smaller numbers of sheep than ordinarily constitute a band, which would materially increase the labor cost per head, and otherwise contribute to the conveniences of ranch operation. One of the Texas ranches included in this tabulation is partly fenced wolf-proof.

A pertinent question among ranchmen in other districts of the region where conditions seemed favorable, is whether they can afford to construct wolf-proof sheep fences instead of using herders. The density of the forage on some ranges that have been well cared for will no doubt permit fencing. On the sparse ranges the possibilities of range improvement, cost of construction and upkeep of fences, and probable labor expense for herding will have to be considered as well as losses under the various systems. The above applies especially to central-eastern New Mexico, where fencing the ranges for sheep is being considered very favorably.

In New Mexico various classes of range are used seasonally. The national-forest range is used to its capacity. The higher elevations are especially desirable in midsummer. Succulent forage is extremely desirable from both standpoints of lamb and wool production, especially the former. The public domain is used to a considerable extent by sheepmen in New Mexico. The situation of the individual ranch with reference to owned or leased land and national forest largely determines the extent of use of the public domain. In

FIG. 31.—Ewes are ordinarily herded in bands of from 1,000 to 1,500

some localities, however, the use of public domain has become rather insignificant in the extent of grazing furnished. A rather prevalent system is to use owned or leased land for wintering and the public domain or national forests for summer. Under some favorable situations the public domain is used almost entirely, which is made possible by ownership of land controlling water. The different conditions present many combinations. In general, however, the seasonal movements of bands of sheep are limited to adjacent localities or ranges within distances rather easily traveled. (Fig. 31.)

Arizona presents two well-defined general systems of operation: (1) Operators located permanently in the northern part of the State, and (2) those who carry sheep in the northern part in the summer and move them to the southern part of the State for the winter. Sheep that are moved to the south for wintering are either grazed on the desert ranges or pastured on farms in the Salt River Valley, or both facilities for wintering are combined. The small percentage of the land that is owned by private individuals makes it necessary for

sheepmen generally to depend very largely on public domain, national forest, and State lands. The land situation is of special importance to those operators who remain in the north the year round because of provision for wintering facilities. This usually necessitates ownership or lease of some land to be used for a base of operations during the winter in connection with public domain that may be utilized. Comparatively few operators of this class winter entirely on owned range. In addition winter and summer ranges are in closer proximity than those operating under the other system mentioned.

The use of summer range in the northern and winter range in the southern part of the State necessitates a rather extended movement of sheep either by railroad or trail. Trail conditions influence the numbers of bands that move that way each year. Droughty conditions, especially along the trail to the Salt River Valley, generally mean an increased movement by rail. The movement south begins late in the fall or early winter and the return movement in the spring. Again the conditions along the trail influence the method of movement. It is estimated that approximately 50 per cent of the sheep are handled under each of the above systems.

From the best information available it seems that the practice of year-long operation in the north is on the increase. Wintering facilities, available feed at cheap prices, conditions on the northern ranges, and the price of sheep and wool are factors that may cause wide variation in the practice from year to year. Desirable features of wintering in the southern part of the State are possibilities of early lambing, shearing, and wintering facilities that make operation possible. The disadvantages of this practice are the expense of moving the sheep between winter and summer range and the expense for winter feed when desert vegetation is inadequate for wintering. It is evident that the wintering facilities in the northern part of the State are not sufficient for all sheep that can be carried on the summer range in that locality. It seems that the possibility of expanding wintering facilities in the northern part of the State has its limitations because of insufficient winter range and the limitations of feed production.

Apparently the practice of coming south for the winter is more general among those who are distinctly sheepmen than among those who produce sheep and cattle. The footnotes under Table 29 designate those ranches that use winter pasturage, which is the system of wintering in the southern part of the State.

LAMB PRODUCTION

The popular lambing season in New Mexico is in May, with some ewes lambing in April. Lambing facilities in the form of sheds, tents, or well-protected ranges are provided for the early lambs. A number of the New Mexico producers expressed a preference for April lambs, but stated as reasons for not producing them the necessity of shelter and unsuitable range conditions at that early season. The additional 30 days' age on the lamb was considered, however, a desirable feature, especially to meet the feeder demand.

April lambs were the most commonly produced on the Texas ranches. March lambs were of second importance. Special situations in the way of facilities for extra care are responsible for the

earlier lambing seasons. In this instance, all the Texas ranches used natural shelter.

From the records received from Arizona sheepmen, three different practices with reference to lamb production are exemplified. Two of these methods conform to the movement or nonmovement to the southern part of the State, and the third is a specialized method of early lamb production.

The practices among those operators who remain in the northern part of the State are very much like those used in northern New Mexico. May is the most active season of lambing which extends into June in some cases. Earlier lambing than May necessitates other than natural protection unless the operator is willing to take chances on unfavorable weather. Operators who are accepted as being successful in their respective communities do not usually overlook precautions that tend to decrease losses and promote good results during the lambing season.

February is a desirable season of lambing of the ewes that move to the Salt River Valley or adjacent desert range for wintering. The lambing of some bands extends into March, but the previous month seems preferable. The mild winters and available feed permit the early lambing which is one of the most desirable features of the southern movement. It is highly desirable that the bands be lambed out early in order that the lambs may acquire age and condition for the movement back to the summer range, either by trail or railroad transportation.

The specialized system of winter lamb production is for the early spring market. Old ewes are generally used for this purpose and it is very desirable that they lamb in November and December, the former month preferably, in order that the best possible weight on the lamb may be attained. Lambing is done in the Salt River Valley and extra care and attention are given to the ewes and lambs to better the condition of both. The greatest difficulty experienced in this specialty is obtaining a high percentage lamb crop. It is usually conceded that the entire financial success of the enterprise depends on the percentage lamb crop, because in the event of their failure to lamb, the age of the ewes rarely permits resale at the original cost plus the expense of breeding, moving, and maintenance until lambing is due. The condition resulting from the difficulty of obtaining a high percentage lamb crop is that many of the old ewes do not breed readily in June and July, which is necessary to get early lambs. Feeding and use of exceptionally good range or pasture are methods usually employed in an effort to overcome the difficulty. A decided preference among some operators seems to be for ewes from dry bands for this special system of production.

Whether lambing takes place on the range, in pastures, or under the conditions prevalent on the irrigated farms in the Salt River Valley, the lambing season is one in which close supervision is necessary. Nearly every operator arranges his operations so that his work at that particular time fits into his individual situation or condition. Extra labor is usually employed at lambing time and the very general comment among sheepmen was to the effect that sufficient responsible labor was rarely available then.

An unusual system of handling the ewes during lambing was reported by a New Mexico ranchman. Certain reliable Mexican

families who live in the community are each given charge of from 500 to 600 ewes for about 90 days and lamb them out during that time. On return of the ewes the owner pays 50 cents for each lamb delivered to him, which covers the entire charge of handling the ewes during the time. The system in this particular case has been very advantageous as compared with the camp system formerly employed and has been a means of decreasing losses of lambs.

Climatic and range conditions largely determine the extent of special care that must be given immediately after lambing. Some operators feed the weakest ewes even though range conditions are good. It is generally recognized that the condition of ewes at this particular time largely determines the results to be had with the lambs. Cottonseed cake fed at the rate of one-third of a pound per ewe for 30 days is the customary practice. Another operator used the same ration of cottonseed cake and added half a pound of corn chops per ewe. In other instances no concentrated feed was fed, but the best range available was reserved for the lambing season and immediately thereafter.

MANAGEMENT DURING THE BREEDING SEASON

From the lambing dates mentioned the breeding seasons may be determined. It is observed that the earliest breeding season is for the Easter lambs, namely, June and July. Under the most general systems of production the breeding seasons in Arizona are in September in the bands that move southward for winter and in November, December, and early in January for the other ranges, including New Mexico and Texas. Throughout the region the duration of the breeding season is about 35 days. Details of the system of management during the breeding season vary. Under the usual conditions in Texas some of the difficulties are eliminated by the use of pastures for breeding purposes, but constant attention is given flocks at this time, and rams are turned in or removed from the breeding pasture according to the system employed. In some sheep sections of Texas the pen or corral system of breeding is preferred to pasture breeding.

In New Mexico and Arizona a common practice is to use a special range for breeding purposes. The best range available from the standpoint of feed is desired, and reservation of such range is not uncommon. Available water is necessary. One operator reported an unusual system of watering. The rams once on the breeding range are not allowed to leave it, but water is hauled to them. However, the ewes are trailed to water as necessary.

In two instances among the 24 ranches the giving of supplemental feed to the ewes before breeding was reported. The object of giving this feed was to flush the ewes. Those who flushed their ewes in 1925 stated that it was customary with them. In general, however, ewes are not flushed for breeding except so far as flushing results from carrying them on good range.

Approximately 50 per cent of the ranchmen reported conditioning rams for the breeding season as a regular practice. Cottonseed cake, oats, and corn were the feeds used. From 30 to 60 days were the periods reported for conditioning purposes. Among those producers who do not supply feed for conditioning rams the customary method is to have them in the best possible condition by using good range.

Reports from those who use feed to condition their rams are favorable to the practice.

Progressive sheep producers in this region have acquired good rams during the last few years. In addition to purchasing rams from producers of breeding stock within this region, many have gone to other States and bought the best available. This has resulted in an improvement in their own flocks, and the supply of range rams thus made available within their own communities has been an incentive for improvement among the smaller operators who were not financially able to make importations. One concern has two specially selected bands of ewes from which selected range rams are produced and sold. The production from these two bands amounts approximately to 750 range rams a year.

Among the larger ranchmen the usual practice is to run the rams in special bands under their own herders during other than breeding seasons. In those instances the ram bands are handled as a part of the general organization. Among the smaller producers who do not have rams enough to constitute a band the contract system, which provides for a certain cash fee plus all the wool produced by the rams, is a common method of handling them. Some of the smaller producers maintain special ram pastures that are used for this purpose instead of working under the contract system of herding.

The practice of exchanging rams has not become general. It may be possible to increase the period of use of rams to some extent, but the wide preference among producers is to purchase rams as needed. The system of exchanging presents difficulties, such as previous care of rams, quality, and other factors that are of great concern to sheepmen. The preference is to buy young rams and mature them under the conditions in which they are expected to be used.

DOCKING, CASTRATING, AND BRANDING

The general practice is to dock all lambs and castrate the ram lambs when they are about 2 weeks old. It was noted, however, that some sheepmen preferred to wait three weeks, while others reported docking and castrating at from 5 to 7 days of age. No bad results were reported from the practices.

In general, branding is delayed until later in the season. However, a number of ranchmen reported marking at the time of docking. Fire brands and earmarks are used as means of permanent identification and most of the producers delay the former, where practiced, to the time of culling or shipment and apply it to those lambs held for replacement only. Others used earmarks only as a means of permanent identification, and employed marking fluid for temporary purposes.

WOOL PRODUCTION

Throughout the entire area the general policy of breeders is to give equally as much consideration to the quality of wool produced as to any other product of the business. In fact, from the limited number of records taken during this survey, the indication is that the quality of the wool is primary and the feeder lamb is secondary. This condition applies throughout the entire region, and is indicated from the stress laid upon the quality of the fleece of replacement ewe lambs and the more general use of fine-wool rams in preference

to those of breeds especially adapted to lamb production. However, in those instances in which specialized lamb production is being followed some interest was expressed in the use of rams that are usually considered of special merit for lamb production.

In most cases ranchmen reported that the quality of the fleece was given first consideration in the selection of replacement ewes with size a secondary consideration. The usual undesirable features, such as open fleeces and naked bellies, were the characteristics not desired. In culling aged ewes, broken mouths were considered first and the quality of the fleece of an otherwise good ewe was often the point determining whether she would be kept longer. Many of the ranchmen, by careful selection of replacement ewes and by use of heavy-shearing rams, have improved their flocks so that culling old ewes on the quality of the fleece is hardly necessary. However, each shearing season directs attention to this important factor.

As shown in Table 39, the average weights of fleeces from the entire shearing varied considerably in individual ranches, although the combined average for the 14 combination ranches was identical with that of the 10 strictly sheep ranches, namely, 8.1 pounds. A number of the ranchmen reported that selected ewes of their flocks have yielded 15 or 16 pounds of wool from a 12-month clip.

On all the ranches studied shearing occurs once a year. The seasons of shearing vary in the different sections of the region. On the Texas ranches the time of shearing is in May. Practically all the New Mexico ranchmen shear in June and some in July. In Arizona there is wide variation that is determined largely by the place of wintering. The ewes that are taken to the southern ranges are sheared before being returned to the northern range in the spring, some producers preferring to shear before and others after lambing. June and July are the months of shearing among the producers who remain on the northern ranges during the winter. Arrangements for sheep shearing are similar to those used in other sections of the western range area.

LAMB AND CALF CROPS

The lamb and calf crops on the 24 ranches reported in this study are shown in Table 35. With the limited number of records covering only one year's operation it was not possible to determine definitely the various factors that influenced the lamb and calf crops or the definite systems of management under the various conditions conducive to increases above the average calf or lamb crop.

TABLE 35.—*Lamb and calf crops, 10 sheep ranches, 14 sheep and cattle ranches, southwestern range region, 1925*

TEN SHEEP RANCHES

Ranch No.	Lamb crop[1]	Ranch No.	Lamb crop[1]
	Per cent		*Per cent*
1	91	7	74
2	74	8	86
3	86	9	86
4	72	10	65
5	68		
6	74	Average	75

[1] Lamb and calf crops are expressed in percentages which are based on the number of breeding ewes or breeding cows.

TABLE 35.—*Lamb and calf crops, 10 sheep ranches, 14 sheep and cattle ranches, southwestern range region, 1925*—Continued

FOURTEEN SHEEP AND CATTLE RANCHES

Ranch No.	Calf crop[1]	Lamb crop[1]	Ranch No.	Calf crop[1]	Lamb crop[1]
	Per cent	*Per cent*		*Per cent*	*Per cent*
11	69	72	19	48	58
12	64	65	20	40	80
13	73	71	21	53	58
14	76	56	22	52	84
15	32	48	23	53	58
16	68	84	24	65	72
17	63	86			
18	63	54	Average	54	70

[1] Lamb and calf crops are expressed in percentages which are based on the number of breeding ewes or breeding cows.

The general opinion of sheep and cattle men is that range conditions during the breeding season constitute the most vital factor affecting either crop. Efforts to improve bad range conditions among sheepmen consist in reserving good range areas for the ewe band to utilize immediately before and during the breeding season.

The average lamp crop on the 10 sheep ranches was 75 per cent, and on the 14 combination ranches 70 per cent. On the three Texas ranches that carried sheep and cattle on the same range the lamb crop was 69 per cent, and the calf crop 65 per cent. These percentages, compared to the average, do not indicate that the presence of sheep tends to lower the calf crop, or vice versa. There is no doubt, however, that overstocking with both classes of livestock, or either class, may bring out the bad effects of a poor range condition as determining lamb or calf crops.

The lamb crops on the various-sized combination ranches, as determined by the number of mature ewes in the opening inventory, were as follows: On 3 ranches carrying above 10,000 ewes each, 73 per cent; on 4 ranches carrying from 3,000 to 5,000 ewes, 69 per cent; and on 7 ranches carrying less than 3,000 ewes, 66 per cent. On the 5 distinctly sheep ranches that were carrying more than 3,000 ewes each the lamb crop was 73 per cent; and on the 5 sheep ranches carrying less than 3,000 ewes the lamb crop was 80 per cent.

On the 8 ranches that used the Salt River Valley during the wintering season the average lamb crop was 73 per cent. On the remaining 16 ranches the lamb crop was 77 per cent. In the light of this comparison an increase in the lamb crop due to wintering conditions may or may not occur, since breeding occurs under conditions similar to those of other operators who winter under entirely different conditions. Poor trail conditions may offset the more favorable wintering conditions of the Salt River Valley as compared to the northern ranges.

The average calf crop on the combination ranches was 54 per cent. On the six ranches on which more than 1,000 breeding cows per ranch were carried the average calf crop was 50 per cent. On the eight smaller ranches the calf crop was 69 per cent, which is in general accord with the trend shown under the discussion of cow ranches. The larger group had an average of 1,482 breeding cows and the smaller one 385 breeding cows. These may be compared to the corresponding groups shown under the cattle ranches.

DEATH LOSSES

Certain groupings of the sheep ranches were made to determine the death losses on the various-sized ranches. Those ranches carrying more than 10,000 ewes reported 10 per cent death loss among mature ewes. Ranches carrying from 3,000 to 5,000 ewes lost 7 per cent of the same class. The smallest ranches carrying less than 3,000 ewes lost 8 per cent of the mature ewes shown in the opening inventory.

The loss of lambs reported on representative combination ranches was 17 per cent of the entire crop. The largest individual loss was 2,238 head, which was 40 per cent of the entire lamb crop. Another heavy loss was 1,000 head, which was 42 per cent of the total crop. The causes stated for these heavy losses were loss of ewes from bloat and drying up of ewes on poor range. A heavy loss was also reported from grubs. On the 10 sheep ranches the exact losses of lambs were not obtained in some cases owing to the system of reporting the lamb crop. Taking into consideration the number of ewes involved, these ranches showed somewhat heavier losses than the others.

The death losses among cattle were generally attributable to the drought. It is very probable that during a period of years poor range conditions take a greater toll from all classes of livestock in this region than any other one factor. The drought losses among cattle were high compared to those suffered under normal range conditions.

PURCHASES AND SALES

With the exception of rams there were no other purchases of any classes of sheep except on ranch No. 13, which, it will be recalled, had no sheep on hand at the date of the opening inventory. The average number of rams purchased was 37 head per ranch at an average price of $36.52. The required number of breeding rams for replacement during the year was approximately 25 per cent. The average period of use of rams as reported by the ranchmen was approximately four years, which indicates that the purchases of rams during the year 1925 were in accord with complete turnover in four years. It is further indicated that the ratio of rams to breeding ewes was 1 to 35.

The cattle enterprise was not expanded materially by the purchase of cattle of any class. If these ranches were not normally stocked, heavy purchases could not have been expected under the drought conditions that prevailed. The total number of bulls purchased by the 14 ranches was 119. That number added to the total shown in the opening inventory indicates an annual replacement of 16 per cent in bulls. Considering that bulls are used approximately five years, the indication is that the purchases were slightly below the probable normal requirement. The ratio of bulls to cows and heifers of breeding age was about 1 to 18.

The purchases of sheep were somewhat heavier on the sheep ranches than on the combination ranches, although the purchases of rams were more general on the latter ranches. Probably the small number of purchases of sheep other than rams was due to the general tendency among sheepmen at the time to expand their business by saving ewe lambs of their own raising.

The sales of the various classes of sheep and cattle, together with the average prices per head received therefor, are shown in Tables 36 and 37. On the combination ranches the sale of mature ewes was very general. These represented cull ewes in practically every instance except ranch No. 11, which sold out entirely.

TABLE 36.—*Number and value per head of different classes of sheep sold, 10 sheep ranches, southwestern range region, 1925*

Ranch No.	Mature ewes	Rams	Wethers	Lambs	Total
	Number	*Number*	*Number*	*Number*	*Number*
1				1,000	1,000
2				1,200	1,200
3		20		1,600	1,620
4		175		500	675
5				1,505	1,505
6	936			2,134	3,070
7				2,400	2,400
8	400			3,236	3,636
9	765	161	6	5,470	6,402
10				5,697	5,697
Average	210	36	1	2,474	2,721
Value per head, dollars	6.47	19.57	8.83	8.21	8.22

TABLE 37.—*Number and value per head of different classes of sheep and cattle sold, 14 sheep and cattle ranches, southwestern range region, 1925*

Ranch No.	Sheep						Cattle					
	Mature ewes	Yearling ewes	Rams	Wethers	Lambs	Total	Cows	Heifers	Bulls	Steers	Calves	Total
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*	*No.*
11	900	200	30	250	650	2,030						
12	100				350	450	60			150		210
13	500				680	1,180	38	198			278	514
14	680				500	1,180					100	100
15	675		56		1,371	2,102	15	75		126	58	274
16	300		35		2,400	2,735					181	181
17	712				980	1,692	24	71	9	276	5	385
18			60	700		760	26			20	82	128
19	750		50		4,000	4,800	300		12	180		492
20	1,000				6,000	7,000	250		25	250	200	725
21	170			959	586	1,715				400		400
22					3,000	3,000					99	99
23					1,567	1,567	253		21	240	325	839
24	500		18		5,000	5,518	500		77		600	1,177
Average	440	14	18	136	1,935	2,552	105	25	10	117	138	395
Value per head, dollars	7.42	12.00	15.38	8.78	7.25	7.73	24.32	24.17	42.10	34.31	22.51	27.11

Sales of lambs which were larger than the sales of any other class of sheep averaged $7.25 a head. Some of the lowest prices are probable indications of the poor range conditions that prevailed. The necessity of good, succulent, range feed for lambs is common knowledge among sheepmen.

Sales of other classes than lambs were not so general from the 10 sheep ranches, as shown in Table 36. The average sale price of lambs from these ranches was $8.21 which compares with an average price of $7.25 from the 14 combination ranches. By referring to Table 29 it will be noted that 7 of the 10 sheep ranches used additional winter pasturage, which in this instance was in the Salt River Valley, Ariz., one of the purposes of which was for earlier lambs.

The greatest movement of Texas and New Mexico lambs is in October and November. The top wether lambs usually go into the feeder trade. This statement applies to Arizona on those lambs that are dropped in the northern part of the State. The earlier lambs from Arizona generally go to market in September and October. Some of the choice fat lambs go directly into the killer trade.

From New Mexico and Arizona lambs are moved into California, Colorado, and the Corn-Belt States. Feeders in the beet-producing areas of Colorado are usually heavy buyers. For the most part, Texas lambs go to Corn-Belt feeders. However, Colorado feeders have come into that field for feeder lambs during the last few years.

MARKETING WOOL

Most of the wool produced in the region is sold on contract or consigned to commission houses. Buyers come into the production centers before the shearing season, take samples, look conditions over, and make contracts for the entire clip or special clips. Cooperative organizations have not yet become general enough to handle the bulk of the production. Prices are stated either on a scoured or grease basis, but the shrink is always considered in the stating of a price. The shrink ranges from 55 to 65 per cent. Various opinions are expressed as to the profitableness of the different systems of selling wool. It is very likely that the system of advances allowed is instrumental in hindering cooperative projects in wool marketing that have been proposed from time to time.

The cost of marketing wool in Boston averages about 5 cents a pound in the grease. Movements to eastern points are by rail all the way or by rail to Gulf coast and Pacific coast points and then by water.

RECEIPTS, EXPENSES, AND INCOME

RECEIPTS

A much clearer conception of the actual results of operation of the several ranches will be gained by studying the individual statements of receipts and expenses rather than considering the averages as determined. To get the best possible picture from the limited number of ranches it will be well to refer to the tables showing the acreage and ownership of land, numbers of livestock carried, sales of livestock and other products, and investment.

The receipts shown in Table 38 are made up of actual sales of livestock, livestock products, and the increase in inventory of livestock and feed. The impossibility of dividing the investment proportionately between the sheep and cattle enterprises of the combination ranches makes it also impossible to apportion the profit or loss to either enterprise individually. On those ranches that apparently culled a normal number of old ewes and sold lambs in accordance with what seemed to be a normal proportion of the entire lamb crop, the returns from wool were approximately 25 per cent less than the returns from the sale of sheep.

The receipts from "other" products are sales of pelts, hides, etc. In the case of ranch No. 11 (Table 38) the receipts from other products were from the sale of mohair.

The yields and sale prices of wool from each of the ranches carrying sheep are shown in Table 39. In arriving at the number of head sheared the opening inventory plus purchases of sheep that occurred prior to shearing time were considered with relation to the number of pounds sold. On the whole the per head yield arrived at in this manner checked very closely with the estimates given by ranchmen on the average yields of their own flocks. Yields from best-shearing ewes, of course, were considerably above the averages shown.

TABLE 38.—*Distribution of receipts, 10 sheep ranches 14 sheep and cattle ranches, southwestern range region, 1925*

10 SHEEP RANCHES

Ranch No.	Sales					Increase in inventory			Total ranch receipts
	Sheep	Wool	Cattle	Other products	Total	Sheep	Cattle	Other stock and feed	
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	6,000	4,235			10,235	2,640		42	12,917
2	10,176	7,000			17,176				17,176
3	13,689	6,426		500	20,615				20,615
4	7,525	8,188		608	16,321				16,321
5	10,936	13,294		188	24,418				24,418
6	22,413	9,746		450	32,609	16,927			49,436
7	20,353	14,000			34,353				34,353
8	27,600	16,000		220	43,820				43,820
9	63,776	39,222		785	103,783				103,783
10	41,266	29,903		525	71,694	44,370		720	116,784
Average	22,363	14,801		328	37,492	6,394		76	43,962

14 SHEEP AND CATTLE RANCHES

11	20,425	3,856		9,800	34,081		9,900	2,334	46,315
12	2,416	3,500	6,315	80	12,311	2,950	750	55	16,066
13	8,212	7,000	9,036	368	25,216	45,395			70,611
14	12,656	7,800	2,500	5	22,965		3,275		26,230
15	17,350	13,447	6,619	132	37,548				37,548
16	20,325	13,394	3,268		36,987	4,805	6,128	160	48,060
17	9,401	21,866	12,137	150	43,644			50	43,694
18	7,714	14,885	3,965	150	26,624	13,306	7,324		47,254
19	33,600	42,357	14,798	525	91,280		3,030		94,310
20	52,500	54,400	29,100	875	127,875	25,200			153,075
21	14,268	12,184	12,500	2,075	41,027	5,153			47,080
22	23,300	18,562	1,782		43,644	18,093		500	62,237
23	11,676	16,100	28,134		55,910	4,385		2,325	62,620
24	42,144	24,960	28,080	200	95,384				95,384
Average	19,719	18,162	10,698	1,090	49,669	8,514	2,171	394	60,748

TABLE 39.—*Yields and prices of wool, 10 sheep ranches, 14 sheep and cattle ranches, southwestern range region, 1925*

10 SHEEP RANCHES

Ranch No.	Sheep sheared	Wool per head	Price received per pound	Returns per head from wool	Ranch No.	Sheep sheared	Wool per head	Price received per pound	Returns per head from wool
	Number	*Pounds*	*Dollars*	*Dollars*		*Number*	*Pounds*	*Dollars*	*Dollars*
1	2,102	5.8	0.35	2.03	7	4,073	7.9	.44	3.48
2	2,037	7.5	.46	3.45	8	5,434	7.9	.37	2.92
3	2,018	7.6	.42	3.19	9	8,200	10.6	.45	4.77
4	2,865	6.3	.45	2.87	10	9,001	7.6	.44	3.34
5	3,608	7.9	.46	3.63					
6	3,213	7.3	.42	3.07	Average	4,261	8.1	.43	3.48

14 SHEEP AND CATTLE RANCHES

11	1,380	7.0	0.40	2.80	10	12,458	8.5	.40	3.40
12	1,455	6.9	.35	2.42	20	17,000	8.0	.40	3.20
13	3,375	7.4	.28	2.07	21	3,821	9.1	.35	3.18
14	1,855	14.0	.30	4.20	22	5,138	8.0	.45	3.60
15	4,075	5.2	.52	2.70	23	3,790	12.1	.35	4.24
16	4,350	6.6	.42	2.77	24	12,674	6.2	.32	1.98
17	6,556	10.4	.32	3.33					
18	4,720	9.5	.33	3.14	Average	6,005	8.1	.37	3.02

In a number of instances the average yields per head tend to bear out the practices of close culling on the quality of the fleece, size, and thriftiness of the ewes. Some of the highest yields are from bands of ewes kept for range lambs as well as wool production.

EXPENSES

Labor, including the groceries furnished, feed, and salt purchases are the items of heaviest expense as shown in Table 40. In 11 out of the 14 comparisons offered the cost of labor was greater than any other item. It will be noted that wide variations occur when the items are considered on the individual ranches.

The same comparison may be made for the sheep ranches from Table 40. In 7 out of 10 instances feed and salt are greater items of expense than labor. It will be recalled that 7 of the 10 sheep ranches used pasturage in the Salt River Valley during the winter. The inclusion of wintering charges which consist of feed and pasturage explains the heavier expenses in feed. However, Texas ranch No. 1 also showed feed purchase greater than the cost of labor, but most of the labor was performed by the owner. In only one instance of ranches that used winter pasturage in Salt River Valley was the labor heavier than the feed charge.

On the three sheep ranches shown in Table 40 that do not use Salt River Valley pasturage the annual cash carrying expense was approximately $2.75 a head, considering the average number carried from the opening and closing inventories. On the other seven ranches that did use Salt River Valley pasturage the annual cash carrying charge was approximately $8.55 a head. It will be recalled that ranchmen in the latter group usually owned small tracts of highly improved land and depended for summer range on other sources than owned land. The small number of ranches involved does not permit conclusions that would tend to establish definite statements on such comparisons, but it serves as an indication.

Indications are that situations necessitating cash expenditures for land leases, pasturage, and feed purchases as compared to those in which operators use their own facilities made possible through investment of capital are less likely to yield a profit during a period of long-time operation. A 5 or 6 per cent return on the investment in land is similar to depreciation, in that it does not have to be taken out of the business each year nor does depreciation have to be overcome by cash expenditure each year. Throughout a period of years, however, each should be paid. But the choice allowed the operator as to when these items will be met is much more favorable to operation than if occurring as an annual demand in the form of cash paid out.

INCOME

The income and return on investment in each of the ranches are shown in Table 41. At the beginning of the year the average stated price of breeding cows was $29.60 a head, as shown in Table 32. At the close of the year the prices stated averaged $38.26, as shown in Table 34, which was an increase of $8.66 a head during the year. The returns on the combination ranches in the column showing an average return on investment of 8 per cent were arrived at by using the average valuation of cows throughout the year and excluding

TABLE 40.—*Distribution of expenses, 10 sheep ranches, and 14 sheep cattle ranches, southwestern range region, 1925*

Ranch No.	Cash expenditures										Decrease in inventory			Depreciation [1]	Total ranch expense
	Feed and salt	Land leases	Hired labor	Taxes	Repairs	Miscellaneous	Livestock purchases			Total	Sheep	Cattle	Other stock and feed		
							Sheep	Cattle	Other livestock						
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
10 SHEEP RANCHES															
1	2,300	3,000	261	175		450			60	6,245				55	6,301
2	9,462	107	5,945	220		2,294				18,028	698		95	799	19,620
3	9,095	350	6,508	482		2,758				19,193	6,015			1,080	26,288
4	7,581	38	5,200	448		1,746				15,013	3,685			610	19,308
5	8,758	642	11,729	312	65	2,398	500			24,404	3,470			654	28,528
6	4,907	1,112	4,996	1,154	859	1,263	20,686			34,977				550	35,527
7	15,591	214	13,049	441		4,889				34,184	1,451		75	1,588	37,298
8	26,503		17,769	431	467	6,507				51,677	5,790		100	3,056	60,623
9	38,998	4,290	19,887	1,367	564	5,816				70,922	7,433			2,030	80,385
10	675	1,400	6,995	2,600		1,349	72,776			85,795				467	86,262
Average	12,387	1,115	9,234	763	196	2,947	9,396		6	36,044	2,854		27	1,089	40,014
14 SHEEP AND CATTLE RANCHES															
11	710		1,275	916	500	700		4,400		8,501	12,750			1,707	22,958
12	514	210	3,105	802	65	430	500	1,350		6,976			50	479	7,505
13	735	1,150	6,855	737		600	41,625	250	150	52,102		655	5,000	1,050	58,807
14	11,379	58	3,455	600	300	545	1,200			7,537	5,905		27	1,675	15,144
15	18,712	2,285	8,465	677	150	2,885	1,120			34,294	3,225	1,020		2,527	41,066
16	1,725		2,494	1,525	500	900	2,500	5,000		14,644				2,990	17,634
17	4,780	360	15,963	1,494		4,193	780	1,860	25	29,455	7,324	485		2,051	39,315
18	4,272	6,533	9,956	2,546	457	3,859		3,116		30,739			140	1,789	32,668
19	770	8,780	21,539	3,000	600	1,431	2,625	1,500	500	40,745	12,250		325	3,005	56,325
20	2,040	5,031	62,620	5,000	2,700	4,145	3,000	2,400	300	87,236		4,974		2,060	94,270
21	10,675	1,088	6,200	2,500	725	1,991	513	750		24,442		1,473	3,105	2,785	31,805
22	4,546		2,084	3,266	800	845	5,025			16,500				2,935	19,435
23	1,560	1,600	10,436	4,236	1,565	533	410	4,375	75	24,790		7,802		1,823	34,415
24	3,800	614	31,927	14,000		4,941				55,282	2,102	10,095	3,480	10,045	81,004
Average	4,016	1,979	13,312	2,945	597	2,000	4,236	1,786	75	30,946	3,110	1,893	866	2,637	39,452

[1] Buildings and equipment.

the increased value of cows due to improved market conditions. In the last column of Table 41 the amount of this increased value is given. Although this increase represents no actual cash in hand, it indicates a considerably improved financial position of the operator. The usual increase in the prices of other classes of cattle, such as yearlings, is included as a receipt and can be justified in such cases by the actual gains in weight that can ordinarily be received by sale.

No increase in prices of sheep other than those justified by growth were included. These prices are shown in Tables 32 and 34.

The returns shown on the 14 combination ranches indicate a rather favorable condition generally. Cash receipts were generally above cash expenses and only one ranch failed to make a return on the capital invested.

The incomes on the 10 sheep ranches were not so favorable as those of the combination enterprises. A comparison of cash receipts and expenses indicates that the sale of sheep to the extent of lessening the inventory was scarcely sufficient to meet the cash expenses in several instances.

TABLE 41.—*Income and return on investment, 10 sheep ranches, 14 sheep and cattle ranches, southwestern range region, 1925*

10 SHEEP RANCHES

Ranch No.[1]	Ranch receipts	Ranch expense	Receipts less expenses [2]	Value operator's labor	Ranch income [2]	Return on capital [2]
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*
1	12,917	6,301	6,616	1,440	5,176	30.3
2	17,170	19,620	−2,444		−2,444	−5.3
3	20,615	26,288	−5,673	600	−6,273	−13.5
4	16,321	19,308	−2,987	1,020	−4,007	−6.7
5	24,418	28,528	−4,110	720	−4,830	−7.4
6	49,430	35,527	13,909	600	13,309	16.4
7	34,353	37,298	−2,945		−2,945	−3.2
8	43,820	60,623	−16,803	1,800	−18,603	−17.6
9	103,783	80,385	23,398		23,398	18.2
10	116,784	86,262	30,522	540	29,982	18.2
Average	43,902	40,014	3,948	672	3,276	4.1

Ranch No.[1]	Interest paid	Return on operator's equity [2]	Total value of ranch	Value of operator's equity	Cash receipts less cash expenses [2]
	Dollars	*Per cent*	*Dollars*	*Dollars*	*Dollars*
1		30.3	17,086	17,086	3,989
2	2,394	−30.6	45,735	15,709	−852
3	800	−19.3	40,633	36,633	1,422
4		−6.7	60,082	60,082	1,308
5		−7.4	65,210	65,210	14
6	1,638	19.3	80,978	60,505	−2,468
7	632	−4.3	91,221	93,221	169
8	1,500	−23.5	105,526	85,526	−7,857
9	5,883	34.0	128,809	51,522	32,861
10	6,539	37.7	164,692	62,165	−14,101
Average	1,939	2.5	80,590	53,785	1,348

[1] Ranches arranged in order of total investment, smallest first.
[2] Minus sign preceding figures indicates a loss.

TABLE 41.—*Income and return on investment, 10 sheep ranches, 14 sheep and cattle ranches, southwestern range region, 1925*—Continued

14 SHEEP AND CATTLE RANCHES

Ranch No.[1]	Ranch receipts	Ranch expense	Receipts less expenses [2]	Value operator's labor	Ranch income [2]	Return on capital [2]
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*
11	46,315	22,958	23,357	720	22,637	25.3
12	16,066	7,505	8,561	1,200	7,361	8.2
13	70,611	58,807	11,804	240	11,564	12.0
14	26,230	15,144	11,086	960	10,126	8.9
15	37,548	41,066	−3,518	1,800	−5,318	−4.4
16	48,060	17,634	30,426	720	29,706	18.3
17	43,694	39,315	4,379		4,379	2.5
18	47,254	32,668	14,586	480	14,106	5.2
19	94,310	56,325	37,985	900	37,085	11.6
20	153,075	94,270	58,805	900	57,905	16.9
21	37,080	31,805	15,275	560	14,715	4.1
22	62,237	19,435	42,802	720	42,082	10.4
23	62,620	34,415	28,205	1,800	26,405	5.2
24	95,384	81,004	14,380		14,380	2.7
Average	60,748	39,452	21,296	786	20,510	8.0

Ranch No.[1]	Interest paid	Return on operator's equity [2]	Total value of ranch	Value of operator's equity	Cash receipts less cash expenses [2]	Increase in market value of cattle
	Dollars	*Per cent*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
11		25.3	89,511	89,511	25,580	1,750
12		8.2	90,205	90,205	5,335	9,850
13	3,440	-14.5	96,481	56,117	26,886	6,850
14	1,218	9.3	113,158	95,373	15,418	4,000
15	2,400	−8.5	121,228	91,228	3,254	11,375
16		18.3	162,224	162,224	22,323	4,925
17	7,451	−3.3	177,456	91,746	14,189	0
18	2,215	5.6	269,554	213,425	−4,115	0
19	7,000	12.9	320,083	232,553	50,535	15,200
20		16.9	341,968	341,968	40,639	4,345
21	11,180	1.6	360,321	214,321	17,485	31,866
22		10.4	403,866	403,866	27,144	1,000
23	7,160	5.4	511,127	357,507	31,120	26,700
24	880	2.5	541,183	530,183	40,102	1,500
Average	3,070	8.4	257,030	212,165	18,723	8,526

[1] Ranches arranged in order of total investment, smallest first.
[2] Minus sign preceding figures indicate a loss.

Sheep ranches Nos. 1, 6, and 10, were those previously referred to as carrying sheep at an average cash expenditure of $2.75 a head. Their returns, after making all deductions, were favorable. The cash carrying charge per head was $8.55 on the seven remaining ranches, as previously stated. Six of the seven failed to make a return on the investment.

ANGORA-GOAT PRODUCTION

The production of Angora goats for mohair in the southwestern range region is a small industry as compared to sheep and cattle, but it has a distinct place in the livestock industry of this region.

The center of mohair production in Texas is approximately 175 miles east of that part of the State included in this survey. In New

Mexico goat ranches are located principally in the southern half of the State. In Arizona goat production is confined almost entirely to that part of the State lying south and west of the mountains that practically divide the State from the northwest to the southeast. Including the central production locality of Texas with New Mexico and Arizona the total amount of mohair produced is approximately 85 per cent of the total production of the United States.

During the survey records were obtained on five ranches located in Arizona that were producing goats for mohair as a major enterprise.

USE OF LAND

The situation of operators with respect to land ownership and uses of additional range on the five goat ranches is shown in Table 42. The small acreages of owned and leased land are noticeable. Public domain was used by all the ranches but no reliable estimates of acreage were obtainable.

TABLE 42.—*Area of owned and leased land per ranch, with value of owned land and cost of leases, and use of other range, five goat ranches, southwestern range region, 1925*

Ranch No.[1]	Area of ranch	Owned grazing land		Leased grazing land		Other range used	
		Area	Value per acre	Area	Cost per acre	Public domain [2]	National forest
	Acres	*Acres*	*Dollars*	*Acres*	*Dollars*		*Acres*
1	300			300	0.37	Yes.	None.
2	12,440			640	.03	Yes.	11,800
3	1,000	1,000	2.50			Yes.	None.
4	240	240	83.33			Yes.	None.
5	320	160	126.75	160	.03	Yes.	None.
Average	2,860	280	30.56	220	.12		

[1] Ranches arranged in order of total investment, smallest first. [2] Area unknown.

It is improbable that the general situation of goat producers in New Mexico and Arizona is represented in these figures of land ownership; certainly not in Texas, where the ownership of land is usual and very often a combination enterprise of livestock production. The poor quality of much of the public-domain range in the first-mentioned States permits its utilization with goats owing to the more thrifty nature of goats to utilize poor-quality browse ranges where sheep and cattle could scarcely be carried except at great risks.

A well-established goat ranch demands as much in the form of range ownership or control as any other kind of range livestock enterprise to insure its stability.

INVESTMENT

Under the conditions that prevail on the five ranches here considered, approximately 60 per cent of the total average investment is represented by the goats on hand, as shown in Table 43. In this instance the use of public domain, which tends to decrease the land investment, is reflected.

TABLE 43.—*Distribution of investment and operator's equity, five goat ranches, southwestern range region, 1925*

Ranch No.[1]	Total investment	Land	Buildings	Water development	Fences	Feed and supplies	Livestock		Total debt	Operator's equity
							Goats	Other livestock		
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*
1	9,388		600			620	8,168			100
2	15,893		1,050	1,150	525	900	11,868	400		100
3	16,596	2,500	725	25	200	285	12,280	600	2,500	85
4	33,815	7,000	12,500		500	1,000	12,475	340		100
5	76,075	480	10,600	6,200	3,000	4,405	40,910	1,480		100
Average	30,353	1,996	5,095	1,475	845	1,438	18,040	564	500	98

[1] Ranches arranged in order of total investment, smallest first.

The small amount of indebtedness of ranch No. 3, and freedom from debt of the other four, indicate that these particular ranches have been in the business for many years and have been content to operate principally on the public domain by control of water instead of attempting to acquire range land for their use. Although ranch No. 3 has some indebtedness, the operator's equity is very favorable to the financial soundness of his ranch.

SIZE OF HERDS

The classes, numbers, and average values of the goats on each ranch, as recorded in the opening inventories are shown in Table 44. Of particular note is the fact that approximately 33 per cent of the average number carried per ranch are wethers. This condition prevails because of the greater value of goats for producing mohair than for slaughter purposes. Compared to the total numbers per ranch shown in the opening inventory the gain in numbers per ranch was only 40 during the year. The total sales from all ranches amounted to only 500 wethers at $3.50 a head, which were sold from ranch No. 2. The total purchases of all ranches were 200 yearling does at $5 a head and 9 bucks at $40 each. The total number of kids born was 3,760, or an average of 752 per ranch, and the total death losses were 2,951, or an average of 590 of all classes per ranch.

TABLE 44.—*Opening inventory, number and value per head of different classes of goats, five goat ranches, southwestern range region, 1925*

Ranch No.[1]	Mature does	Yearling does	Bucks	Wethers	Total
	Number	*Number*	*Number*	*Number*	*Number*
1	840		15	1,360	2,215
2	1,350	800	22	600	2,772
3	790		15	500	1,305
4	1,690		36	350	2,300
5	5,500	2,300	115	5,000	12,915
Average	2,092	620	41	1,562	4,315
Value per head	$4.77	$3.37	$45.42	$2.73	$4.42

[1] Ranches arranged in order of total investment, smallest first.

GENERAL SYSTEM OF HANDLING GOATS

Except in Texas, goats in the Southwest are handled under herders in all seasons of the year, especially where the business is big enough to be the main source of income. To avoid loss caused by storms which frequently occur in the spring, it is customary in this region to provide some sort of shelter.

Bucks are usually put into the herd from October to December, depending on the date preferred for kidding.

Spring shearing takes place shortly before kidding begins. The spring shearing date is as early as February on some of the ranches in the southern part of the region, whereas it is not begun until April in some places not so favorably located.

At kidding time, particularly if range feed is short, the does are usually divided into several units. On the largest ranches the units are from 1,000 to 1,500 head. As the kids are dropped, each doe and

FIG. 32.—Kid boxes for handling kids during day

her kid are given the same mark of identification. About 600 kids are handled in a unit. Because the kids can not travel for the first few weeks and are sensitive to hot sun and to rainstorms which come up suddenly at that time of the year, they are toggled. Fastening them to a short stake with a swivel and a 2-foot length of rope enables them to move in and out of their respective shelter boxes at will. (Fig. 32.) After two or three weeks the kids are released from the stakes and held in corrals for three or four days, when they are old enough to go out on the range with the does.

Dry does and wethers are usually held in a separate herd from the does and their kids. As shown in Figure 33, the does which have kidded are herded out on the range during the day and brought back to their kids at night. Range near the kid corral is reserved for use at kidding time and for a few weeks thereafter. Castrating and ear-marking or branding are done when the kids are about 3 weeks old.

Bucks are run separately from the herd when summer feed develops and are put back with the does at breeding time in the fall.

The hot weather, brushy character of the range in this area, and the probability of shedding make it advisable to shear twice a year. The date of fall shearing varies from August to November in the different localities. Two shearings a year probably result in a greater total weight of mohair than one shearing, though the lesser length of mohair makes it somewhat less desirable for particular purposes. Droughts also reduce the quantity and quality of the clip. It is commonly known among producers that aged goats do not yield so good a quality of mohair as the young, thrifty animals.

The annual yield of mohair per head reported averaged about 4½ pounds, with a variation of from 3 to 7 pounds in the different herds.

FIG. 33.—Until kids are about 3 weeks old does are brought in at the end of day to suckle them

Buyers usually pay a flat rate per pound for all classes of mohair, but prefer that the kid clip be bagged separately. Producers whose mohair has been bagged separately by classes report that they are able to obtain a higher flat rate, which more than compensates for the special effort required.

Increase in the quantity and improvement of the quality of mohair may be brought about by the use of high-shearing bucks and by culling out light-shearing does and their kids. The limited market for surplus and cull stock during recent years has been something of a handicap to the mohair producers.

Four of the ranchmen reported that all their herd bucks were registered Angoras. Although recognizing the importance of using good-quality, high-shearing bucks in order to increase the mohair clip in the herd, some experienced ranchmen contend that hardiness of the stock is as important as the weight of mohair. A large operator,

maintains that lack of hardiness results in greater death loss, smaller kid crops, and decreased size of mature goats.

The range on which these goats have been herded produces sufficient forage at all seasons of the year so that it has not been considered profitable or necessary to provide very much supplemental feed. Two men reported that they did condition their bucks and that this practice resulted in an increased kid crop.

Although it appears from this survey that the exchange of registered bucks is not a general practice among goat men, it would seem that it might be used advantageously both in order to avoid inbreeding with resultant loss of vigor and as a means of reducing the cash outlay for high-quality bucks.

With one exception the goat men were experienced operators, having spent from 6 to 24 years handling goat herds. The difficulty of obtaining competent herders should be given serious consideration

FIG. 34.—Typical Angora-goat range

by anyone contemplating the production of mohair. Contrary to popular opinion, this is a technical business and success in it requires an accurate knowledge of numerous details and experienced, reliable herders.

Using the opening inventory as a basis, the death losses by classes were approximately as follows: Mature does, 14 per cent; yearling does, 11 per cent; bucks, 17 per cent; and wethers, 12 per cent. High death losses may be expected in any system of production where the older animals are not culled out of the herds regularly. In this respect the sheep business offers a distinct advantage over goat production, in that flocks may be culled regularly and the culls disposed of on the markets at considerably higher prices than are usually paid for cull goats.

Unfavorable climatic conditions were reported as the cause of heaviest losses. Although goats are hardy and thrifty in utilizing scant range, they are very delicate when subjected to storms, especially just after having been sheared. Probably the heaviest losses

incurred throughout the southwestern range region are from cold rains that usually prevail about the time of shearing. Shed facilities are desirable at that time. Some ranchmen in the Texas area of production are using a waterproof cover for each goat as a means of decreasing death losses from storms and to protect the fleece.

The kid crops were very low for the year 1925, varying from 0 to 66 per cent of the number of breeding does. Ranch No. 3 reported a complete loss of the kid crop because of the extremely poor condition of the range. On the whole, the reports tend to show that only the kids actually saved were considered the crop. General comment was that the crop was low and that a normal kid crop is usually about 80 per cent.

RECEIPTS, EXPENSES, AND INCOME

Receipts from other sources than mohair were rather insignificant, as shown in Table 45. Since the yield and quality of the mohair are factors that have great influence on cash receipts, the average return from sale of mohair per head of goats carried becomes an important detail. Data pertaining to yields and prices received for the mohair are shown in Table 46. Returns from mohair averaged $2.02 a head of goats carried. It will be recalled that the return per sheep from wool, as shown in Table 39, was $3.02 and $3.48 a head, respectively, on the combination and sheep ranches.

TABLE 45.—*Receipts, expenses, and income, five goat ranches, southwestern range region, 1925*

DISTRIBUTION OF RECEIPTS

Ranch No.[1]	Sales		Other products	Total	Increase in inventory	Total receipts
	Goats	Mohair				
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1		3,758		3,758	2,515	6,273
2	1,750	7,050		8,800		8,800
3	105	1,987		2,092		2,092
4		4,000	1,250	5,250		5,250
5		26,836		26,836		26,836
Average	371	8,726	250	9,347	503	9,850

DISTRIBUTION OF EXPENSE

Ranch No.[1]	Cash expenditures								Decrease in inventory	Depreciation (buildings and equipment)	Total expenses
	Feed and salt	Land leases	Hired labor	Taxes	Repairs	Miscellaneous	Purchases of livestock	Total			
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Dollars*
1	25	140	486	56			1,000	1,677		154	1,831
2	204	19	2,036	135	150	385		2,989	905	226	4,120
3	43		850	100	700	12		1,705	740	63	2,508
4	1,366		2,092	381	435	123	360	4,757	550	850	6,157
5	924	5	13,600	260	660	480		15,920	1,779	1,681	19,389
Average	524	27	3,813	186	389	200	272	5,411	795	595	6,801

[1] Ranches arranged in order of total investment, smallest first.

TABLE 45.—*Receipts, expenses, and income, five goat ranches, southwestern range region, 1925*—Continued

INCOME AND RETURN TO INVESTMENT

Ranch No.[1]	Ranch receipts	Ranch expenses	Receipts less expenses[2]	Value of operator's labor	Ranch income[2]	Return on capital	Interest paid	Return on operator's equity[2]	Total value of ranch	Value of operator's equity	Cash receipts less cash expenses
	Dollars	*Dollars*	*Dollars*	*Dollars*	*Dollars*	*Per cent*	*Dollars*	*Per cent*	*Dollars*	*Dollars*	*Dollars*
1	6,273	1,831	4,442	1,200	3,242	34.5	--------	34.5	9,388	9,388	2,681
2	8,800	4,120	4,680	200	4,480	28.2	--------	28.2	15,803	15,803	5,811
3	2,092	2,508	−416	600	−1,016	−5.1	175	−6.8	20,000	17,500	387
4	5,250	6,157	−907	600	−1,507	−4.5	--------	−4.5	33,815	33,815	403
5	20,836	19,389	7,447	600	6,847	9.0	--------	9.0	76,075	76,075	10,907
Average	9,850	6,801	3,049	640	2,409	7.8	35	7.8	31,634	30,534	3,038

[1] Ranches arranged in order of total investment, smallest first.
[2] Minus sign preceding figures indicates loss.

TABLE 46.—*Yields and prices of mohair, five goat ranches, southwestern range region, 1925*

Ranch No.[1]	Goats sheared	Mohair per head	Price received per pound	Returns per head from mohair
	Number	*Pounds*	*Dollars*	*Dollars*
1	2,215	3.8	0.45	1.70
2	2,772	5.1	.50	2.54
3	1,305	3.7	.41	1.52
4	2,366	4.2	.40	1.69
5	12,915	4.2	.49	2.08
Average	4,315	4.3	.48	2.02

[1] Ranches arranged in order of total investment, smallest first.

On those ranches where the yield of mohair was above 4 pounds a head the operators made a practice of culling out the light-shearing does. Those on ranch No. 2 are also culled with regard to vigor and thriftiness.

The heaviest operation expense is for labor, and the relatively small amount of feed purchased was second to labor. Considering the total cash expense of all the ranches and the total number of goats in the opening inventory the cash operation expense per head was approximately $1.20. It will be recalled that the cash operating expense per head on 3 of the 10 sheep ranches was approximately $2.75 and that on the other 7 ranches was approximately $8.55. Considering the small returns from goats the operating expenses would have to be materially smaller to permit satisfactory comparisons of the two industries as to profits. Fortunately there seems to be little or no reason to consider the enterprises on a competitive basis, but there are numerous reasons why they may be considered as two industries applicable to single organization, and handled as diversified ranching.

The income and return on investment for each ranch are shown in Table 45. In no instance were the cash expenses above the cash receipts. The wide variations shown in the return on the investment are influenced largely in some instances by the valuations

placed on the herds. With that in mind and the additional fact that approximately 60 per cent of the total capital is in goats, the item influenced so heavily by valuation, it is very probable that the better figure to accept in the measuring of returns is the ranch income, or that amount remaining after the deduction of unpaid labor. To give an acceptable figure on the return on investment in goat ranches, a greater number of ranches would be desirable and would be representative of a wider range of conditions than is exemplified by only five.

The increased use of mohair in the United States in recent years and the comparatively small dimensions of the Angora-goat industry in this country, tend to favor its expansion. Moreover, parts of the area studied where cattle or sheep are raised at present, appear to be well suited to goat production. It is very likely that more attention will be and should be given to goat production on those ranges having considerable browse and in connection with the production of other range livestock.

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