CATTLE RAISING AND ADAPTATIONS TO DROUGHT
BY CATTLEMEN IN THE ALTAR VALLEY
PIMA COUNTY, ARIZONA

by

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STATEMENT BY AUTHOR

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Date
Drought

Drought's tongue licks the ground
The grass and trees wither away
The earth burns

The cattle bawl at a dry water hole
The coyote pants with hungry thirst
The buzzards circle slowly overhead

The hot wind sears all in its path
Desiccating all that is left
There is no shade

Hot, hot, hotter
Dry, dry, drier
The sky is clear

High overhead a thunderhead forms
It billows and boils
Black now, blacker still

The lightning streaks earthward
The thunder booms and echoes
First one drop, then two

The burning ground turns them to steam
They seem to sizzle
It smells good

Then whoosh, it comes
The earth drinks deeply and cools
The trees sigh

The cattle stop bawling
The coyote rests peacefully
The buzzards have flown away
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ABSTRACT

This study of the Altar Valley in Arizona shows how man uses natural resources in an arid environment to raise cattle for commercial purposes.

Recurrent drought is a major problem to cattlemen in the Altar Valley. Cattlemen in the Altar Valley use various adaptations to lessen the effects of drought. These adaptations are reduction of cattle numbers, development of stock-watering places, control of woody-plant species, and supplemental feeding.
INTRODUCTION

Cattlemen in the arid Altar Valley of southern Arizona must adjust the management of their ranches to recurrent drought.

The Altar Valley is physically similar to other valleys in southern Arizona. The landforms are typical of the basin and range province. The yearly dry periods separating the two rainy seasons present a management problem to the cattlemen. Southern desert shrub and desert grassland, the two major vegetation types in the valley, offer an opportunity to compare differences in ranch management.

Man's primary use of the Altar Valley since the Spanish Period has been cattle raising. The control of stock-watering places was prerequisite to the control of grazing land in the Spanish and Mexican Periods. The lack of year-round surface water in the Altar Valley is reflected in the absence of Spanish and Mexican land grants.
The development of stock-watering places by drilling wells and constructing earthen reservoirs marked the beginning of large-scale cattle ranching in the Altar Valley. As more cattle grazed on the range, recurrent drought conditions presented a greater problem to the ranchers.

Drought is a major problem in the Altar Valley. Most of the management practices employed by the cattlemen are adaptations to drought. How cattlemen perceive drought not only determines how they manage their ranches, but may also significantly effect their chances of survival in the cattle business.

The woody species invasion of the desert grassland has changed the appearance of the Altar Valley since the Spanish and Mexican Periods. The cattlemen are attempting to control this invasion by various methods. The problem of burroweed and snakeweed encroachment remains a problem yet unsolved by Altar Valley ranchers.

The questions asked the cattlemen during interviews were designed to elicit information regarding cattlemen and the cattle business in the Altar Valley; the perception of the drought hazard by the
cattlemen; the adaptations to drought by the cattlemen; the attitude of the cattlemen towards the woody species invasion problem, and how they are attempting to solve the problem. There were also a few questions asked about the general nature of the ranching operations in the Altar Valley (see Appendix A for Questionnaire).

Seven ranchers were interviewed. The interviews accounted for all but two of the ranchers in the area. Continued attempts were made to contact the other two cattlemen until time did not permit further trips. Contacting the ranchers proved to be the greatest problem connected with the study. The small number of interviews tends to make the conclusions tentative and suggestive. The reader should bear in mind the small number of interviews in any attempt to generalize from the study findings. While the sample included all but two of the ranchers in the area, the author's personal experience would tend to minimize possible factual errors about the Altar Valley. The interviews were conducted during visits to the ranches, and, in one case, a meeting in Tucson. All the questioning of the ranchers was done during the winter of 1967.
CHAPTER I
THE PHYSICAL GEOGRAPHY OF THE ALTAR VALLEY

The Altar Valley is located in southwest Arizona (Figure 1) approximately twenty-five miles west of Tucson. The valley extends south from Three Points to the United States - Mexico international boundary, a distance of sixty-five miles. The Sierritas, Cerro Colorado, Las Guijas mountain chain is the eastern border. The Baboquivari, Quinlan, Coyote chain forms the western boundary (Figure 2).

**Landforms**

Physiographically the Altar Valley is part of the Sonoran desert section of the Basin and Range Province, which is characterized by broad alluvial basins, separated by short parallel north-south trending ranges of mountains (Fenneman, 1931, pp. 326-395).

The mountain ranges rise abruptly from the surrounding alluvium. Erosion has continued deep into
Figure No. 1

The Study Area.
Study Area

Fig. 1
Figure No. 2
The Altar Valley.
Source: U.S. Geological Survey

Fig. 2
bedrock forming steep canyons and formidable slopes.
The sharp declivity of the mountain slopes influences
the nature of the drainage. Large volumes of water
accumulate on the steep convergent slopes resulting in
rapid runoff.

The **bajadas** (bajada, Spanish: A piedmont alluvial
plain, Moore, W.G., 1949, p. 18) surrounding the mountain
ranges contain deep alluvium. The western alluvial plain
of the Sierritas, Cerro Colorado, Las Guijas chain meets
the eastern alluvial plain of the Baboquivari, Quinlan,
Coyote chain at the approximate center line of the Altar
Valley. This center line marks the course of the main
drainage--The Altar Wash (Figure 3).

**Climate**

The summer rainy season occurs during the months
of July, August, and September (see Appendix B for monthly
rainfall records). Winter rains usually start in October
or November and extend through February, April, May, and
June, with little or no rainfall, distinctly separate the
two rainy periods. October, November, and December are
sometimes dry and may also separate the summer and winter
Figure No. 3
The Altar Wash looking from south to north.
Figure No. 3

The Altar Wash
The rainy seasons are not only during different seasons of the year, but also have different characteristic storms and sources of moisture.

The summer storms are primarily convectional, deriving their moisture from air masses moving in from the Gulf of Mexico (Sauer, C.O., 1930, p. 342). Typical summer storms begin by "building" cumulus clouds in the morning. By afternoon these clouds churn their way skyward pushed by convective air currents. As they reach higher altitudes, the textures change and they begin to spread. Precipitation follows in the shadow of the thunderhead (Bataan, L.J., 1964, p. 34).

After the dry season the soil absorbs the greatest part of the early precipitation offering little runoff to the canyons. A vegetative cover starts its growth and protects the land from the later, more intensive rainfall. Excess precipitation runs off into the drainage system.

The winter storms are associated with the passage of continental cyclonic storms (Turnage & Mallery, 1941; Tannehill, 1947, and others). These
storms are characterized by gentle, intermittent rainfall and may have several days duration.

The summer rainfall maximum contributes from one-half to three-fourths of the annual rainfall total with one-fourth to one-fifth falling during the winter season.

**Vegetation in the Altar Valley**

Two major vegetative types (Figure 4) exist in the Altar Valley: southern desert shrub and desert grassland (Humphrey, R.R., 1960, pp. 32 and 52). (The latter type is often referred to as "mesquite grassland" and is sometimes included in steppe.)

The southern desert shrub vegetation type occurs in a wide geographical range with great differences in edaphic and rainfall conditions and holds a great variety of vegetation. Low-growing trees and shrubs dominate the landscape with open areas supporting grasses and annual weeds (Figure 5).

The southern desert shrub type in the Altar Valley occupies the northern lower elevations and extends into the eastern mountain chain (Figure 5).
Figure No. 4
Map of the two major vegetation zones in the Altar Valley
THE TWO MAJOR VEGETATION ZONES IN THE ALTAR VALLEY


Fig. 4
Figure No. 5

Southern desert shrub vegetation.
Figure No. 5

Southern desert shrub vegetation.
There is a long, narrow area of desert grassland which intrudes into the north reaches of the valley on the west side because the orographic effect of the Baboquivari Mountains causes greater amounts of precipitation to fall on areas close to and within the mountains. Southern desert shrub is an extensive type in southern Arizona roughly covering thirty-five percent of the total state area, or approximately 39,800 square miles (Humphrey, R.R., 1960, p. 52).

Many different plants are present in the desert shrub region of the Altar Valley. Velvet mesquite (Prosopis juliflora, var. velutina), foothill palo verde (Cercidium microphyllum), and blue palo verde (Cercidium floridum) are the more prevalent tree species. The shrubs vary from the larger species, catclaw (Acacia greggii), whitethorn (Acacia constricta), desert hackberry (Celtis pallida), to the low-growing burroweed (Haplopappus tenuisectus), snakeweed (Gutierrezia lucida), creosote bush (Larrea tridentata), and triangle bur-sage (Franseriadia deltoidea).

Near the main watercourses in the desert shrub type such species as Mormon tea (Ephedra trifurca),
desert broom (*Baccharis sarothroides*) and four-winged saltbush (*Atriplex canescens*) are found in scattered stands.

One low-growing shrub occurring in scattered stands on both eastern and western *bajadas* is guajilla (*Calliandra eriophylla*). It provides good browse for domestic livestock as well as deer.

Grasses in the lower elevations are primarily annual. The more prevalent are sixweeks needle grama (*Bouteloua aristidoides*), sixweeks threeawn (*Aristida adscensionis*), sixweeks grama (*Bouteloua barbata*), feather fingergrass (*Chloris virgata*), stinkgrass (*Eragrostis megastachya*), and fluffgrass (*Tridens pulchellus*).

Various perennial grasses occur in microenvironments but become important in density only in the higher elevations of the *bajadas* and in transition zones bordering the desert grassland. Those which deserve mention are Arizona cottongrass (*Trichachne californica*), bush muhly (*Muhlenbergia porteri*), curly mesquite (*Hilaria belangeri*), plains bristlegrass (*Setaria machroastachya*), vine mesquite grass (*Panicum obtusum*), wolftail (*Lycurus phleoides*), black grama
(Bouteloua eriopoda), hairy grama (B. hirsuta), Rothrock's grama (B. rothrockii), side-oats grama (B. curtipendula), slender grama (B. filiformia), and spruce-top grama (B. chondrosioides).

Annual weeds are abundant after sufficient winter precipitation. These spring weeds provide extra forage for domestic livestock and herbivorous wildlife. The most important of these annuals are Indian wheat (Plantago spp.), and Filaree (Erodium cicutarium).

The desert grassland type was described by Shantz and Zon (1924). The area is similar to the desert plains described by Clements (1920). Shreve (1917) stated that the desert grassland is similar to the short or mixed grass plains with many of the same genera and species dominant in both types. The center of the desert grassland is probably in Mexico (Clements, 1920) and extends northward into southern Arizona, south-central and southwestern New Mexico and southwestern Texas (Humphrey, R.R., 1958, p. 2). The southern part of the Altar Valley is dominated by desert grassland.

The grasses are dominated by three genera: Bouteloua, Aristida, and Hilaria. The perennial species
of *Bouteloua* occurring most frequently are *B. eriopoda*, *B. gracilis*, *B. curtipendula*, and *B. hirsuta*, while *Hilaria* is represented by *H. mutica*, *H. belangeri*, and *H. Jamesii*. The most common of *Aristida* are *A. divaricata*, *A. hamulosa*, *A. glabrata*, and *A. longiseta*. *Eragrostis*, *Heteropogon*, *Leptochloa*, and *Trichachne* have also been noted in the area (Humphrey, R.R., 1958, p. 3).

The woody species, often referred to as "invaders," are mesquite, catclaw, burroweed, and snakeweed.

The mountain vegetation varies with elevation. Because of greater precipitation, the higher elevations support pinyon (*Pinus spp.*), scrub oak (*Quercus turbinella*), and Emory oak (*Quercus emoryi*).
CHAPTER II
HISTORY

The Pimas of Pimería Alta avoided the Altar Valley because of the Apaches. The Altar Valley offered a source of acorns on the upper slopes of the mountains to the Papagos of neighboring Papaguería. The Apaches kept the Papagos confined to Papaguería and away from Spanish influence (Joseph, A., et al., 1949, p. 18). The mountains offered hiding places to the marauding Apaches after raids on the Santa Cruz Valley settlements and Aribaci. There were no missions or visitas (settlements visited but not staffed) established in the Altar Valley, Arizona.

The abundance of water in the Santa Cruz and San Pedro Valleys probably accounted for their early settlement by aboriginal populations and later by the black-robed Jesuits and gold-seeking Spaniards. Eusebio Francisco Kino established his early missions and visitas where water was available. This was necessary for the livestock operations and farming enterprises.
with which he hoped to win over the native populations. During his solitary journeys and those with Mange, Kino traveled to Pozo Verde Mission (Santa Eulalia). From there he saw Baboquivari Peak and named it "Noah's Ark" (Bolton, H.E., 1930, Vol. II, p. 313).

Pfefferkorn, Och, and the other German Black Robes were less venturesome than Kino and remained among the missions of the Pimería Alta (Treutlien, 1949, 1965). An exception is Sedelmayr, who traveled to the Gila River through Sonoidag.

**Early Descriptions of the Vegetation**

The *Camino Real* which connected the missions of the Altar district of Sonora went through Arivaca probably because of the permanent water in Arivaca Creek. From Arivaca the trail turned east to Tubac and eventually led to San Xavier del Bac. Juan Bautista de Anza chose to traverse this route on his first journey to San Francisco. His original plan to head north from Tubac to the Gila River was changed by an Apache raid at Bac which resulted in the loss of one hundred thirty-four head of horses. De Anza then decided to go by way of Altar and Caborca in
hopes of replenishing the remuda (horse herd). From Caborca he planned to traverse the Camino del Diablo across the barren deserts of Papaguería to Yuma country and the Colorado. The Camino del Diablo would also take him away from the danger of Apache raiders. De Anza described Arivaca in his diary: "It also has most beautiful and abundant pastures and a number of permanent springs in the interior of the mountains. The chief one where the settlement was is now running although not with great abundance" (Bolton, H.E., Vol. II, 1930, p. 4).

Raphael Pumpelly and Charles Poston, officials of the Sonora Mining and Exploration Company, made an expedition into Papaguería in 1861 for the purpose of prospecting for minerals. Upon reaching the Altar Valley, Pumpelly described it as a "wide expanse of grassy steppe and forests of mesquite and cacti" (Wallace, A., 1965, p. 73). Pumpelly also saw the "abundant growth of grass" growing in conjunction with "stunted acacias," noted that there was an extensive growth of mesquite on many of the bottom-lands of the valleys and concluded that the Altar
Valley was well adapted to grazing (Ibid.). Richard J. Hinton states in his Handbook to Arizona (1878):

The range for cattle and sheep is almost without limit, extending over a belt of grazing country as far south as the Arizuma mountains, west to the great peak of the Baboquivari, and north and east into the heart of the neighboring mountains. This goes far beyond the boundaries of the ranch (Arivaca); but in Arizona, as in California, the possession of water has been considered tantamount to the possession of the whole surrounding country (Hinton, R.J., 1878, p. 223).

W. J. McGee made similar observations while on his expedition into Seriland in 1895 and Papagoland in 1894.

The First Cattle Introduced to Southern Arizona and the Altar Valley

Cattle raising has been the dominant use to which man has put the Altar Valley since the days of the early Spaniards.

When Coronado made his entrada (entrance) into what is now Arizona, he drove a herd of one hundred fifty cattle with him. These cattle, probably the first to arrive in Arizona, were used for supplying the expedition
with beef (Hammond, G.P., and Rey, Agapito, 1940, p. 103).

After Coronado the next white man to reach the vicinity of the Altar Valley, Arizona, was Father Eusebio Francisco Kino, who has become accepted as Arizona's first cattleman. After founding the mission of Nuestra Señora de los Dolores in 1687 and establishing a breeding herd there, Kino furnished cattle (and other animals) to the other missions and visitas (Bolton, H.E., 1932, p. 64).

About the turn of the century Mission Santa Eulalia was located at Pozo Verde in today's Sonora, near the southern end of the Baboquivari Mountains. It is likely that these beef cattle were among the first to graze the grasslands of the Altar Valley, Arizona.

**Spanish and Mexican Land Grants and Early Settlements**

Spanish and Mexican land grants were less numerous in Arizona than in California and New Mexico. They were all located in Southern Arizona in what is now Pima, Santa Cruz, and Cochise Counties (Bancroft, H.H., 1889, p. 599).
Most of the haciendas (estates of land) on the Spanish land grants were originally established for mining purposes. The miners had to be fed, so rugged Andalusian cattle were imported from the south to thrive on the abundant and nutritious grasslands in the northern valleys. Livestock raising developed rapidly to become a dependable source of income from the haciendas (Haskett, B., 1935, p. 6).

Ranching became an important industry to southern Arizona and prospered until Apache depredations in 1818, 1819, and 1820 forced abandonment of the stock ranches. The settlements of Tucson and Bac, protected by soldiers, were the only remnants when the colonial government fell in 1827 (Bancroft, H.H., 1889, p. 406).

By the end of 1830 ranches were established again and expanded as far north as Tucson, and ranchers continued to petition Mexican officials for more pasture lands (Mattison, R.H., 1946, pp. 255-286). Mexican expansion in the early nineteenth century caused the visitas (small settlements visited by the Padres but not permanently staffed) that had been established in the eighteenth century to be reoccupied (Wagoner, J.J., 1949, p. 45).
Apache raiding in the late 1830's disrupted the growth of ranching. The settlers were again forced to seek refuge at Tucson and Bac leaving their homes to be burned and their herds to be scattered by the raiders. The Mexican War (1848) and the Gadsden Purchase (1854) brought an end to grants of land by Mexico, but the story of the old grants continued for many years in the Court of Private Land Claims of the United States, and it was not until after the end of the nineteenth century that the very complicated problems were solved (Wagoner, J.J., 1949, pp. 132-135).

When the Spanish came to the New World, they brought with them their own ideas of community organization—the encomienda and repartimiento and hacienda systems (McBride, G.M., 1923) (encomienda, repartimiento, and hacienda were semi-feudal systems designed for exploitation). As time went on, the towns or pueblos were established according to the Laws of the Indies (legal code under which Spanish colonies in the New World were governed). Four square leagues (one square league equals 4,338.464 acres) of land surrounding the town were granted and then subdivided among the
inhabitants (Mattison, R.H., 1946, p. 286). The lands outside the pueblo limits were used commonly by neighboring pueblos. A hacienda was usually left in the charge of a mayordomo (foreman) while the owner resided in town (Tucson and Tubac).

The presidios were settlements that came complete with a garrison of soldiers to protect the colonists. After the Pima Revolt of 1751, a presidio was established at Tubac, the first permanent white settlement in Arizona (Chapman, C.E., 1933). To foster permanent settlement by the soldiers, the government offered land as an inducement to the soldiers to marry native women.

The procedures for obtaining a land grant were often complicated by local politics. The first step was to obtain a petition specifying the use to which the grant was to be put, have it signed by sureties, and submitted to the commanding officer of the presidio who, in turn, forwarded it to the capital of the intendency where the attorney-general received it. The governor then ordered a survey of the land. The intention of the grant was then publically announced ("outcry") for thirty days, after which a public auction was held. There was customarily only one bidder--the
petitioner (Reynolds, M.G., 1895, and Nentuig, J., 1894).

The treasurer-general issued the title without the approval of the Supreme Government because the Constitution and Laws of 1824 gave the various states the power to grant lands to individuals. The new Constitution in 1836 took this power away from the states and vested it in the Supreme Government of Mexico (Mattison, R.H., 1946, p. 287).

The first grants were one sitio which was one square league or 4,338.464 acres (Mattison, R.H., 1946, p. 286). Soon the government recognized the aridity of the area and groups of sitios were granted (Perrigo, L.I., 1960, p. 80).

Not only did the Mexican cattlemen graze cattle on their grants, they also occupied lands in excess called tierras sobrantes. Under the existing Mexican law, the cattlemen were able to acquire these tierras sobrantes by paying the cost of survey and the prevailing price when the original grant was made (Mattison, R.H., 1946, p. 286).

The land grant called La Aribác was located near the present town of Arivaca. The grants of
San Ignacio de la Canoa, Tumacacori, Sopori, and Calabasas were in the Santa Cruz Valley. The use of the *tierras sobrantes* made possible the ranging of cattle over great distances from headquarters, and it is not unreasonable to assume that the cattle belonging to these early *haciendas* reached the grasslands of the Altar Valley, especially in the summer when water could have collected in natural *charcos* (depressions).

La Aribác was the grant nearest to the Altar Valley, and the terrain in between could have been easily crossed by the early Spanish cattle which were excellent foragers.

Two brothers, Tomás and Ignacio Ortíz, who had established a ranching operation at Canoa in the Santa Cruz Valley, expanded their land holdings in 1833 by acquiring La Aribác from the Alcade of Tubac--Atanacio Otero. Their father, Agustín Ortíz, had been granted two *sitios* for stock raising in 1812 (Wagoner, J.J., 1949, pp. 39-40).

The grantee was required to erect monuments on the grant boundaries. If the land were abandoned for three years, it reverted back to the public domain unless abandonment was caused by the Apaches or other
"hostile" Indians. The títulos (titles to land) conveyed riparian rights and other appurtenances (Mattison, R.H., 1946, p. 287).

The Mexican grants can be categorized into three types: (1) grants within specific boundaries, in which the grantee received title to all the land within the defined boundaries of the grant; (2) grants by quantity, in which the grantee was entitled to a specific amount of land, i.e., a number of sitios; and, (3) grants according to the limits as shown by its settlements and possession or other competent evidence, e.g., from one valley to another.

The grants which were made in what is now southern Arizona were of the last two types and, unfortunately, the two most ambiguous in their descriptions; one reason for the complicated and extended litigation which was to come after the Gadsden Purchase (Mattison, R.H., 1946, pp. 287-288).

According to the Gadsden Purchase, the American Government would approve land grant claims only if evidence of title was found in the Mexican archives (many records had been destroyed by fire in Guadalajara).
The surveyor-general would then investigate the claim and report to the secretary of the interior, who was then required to submit the case to Congress for final approval. The notoriously slow machinery of Congress and the obscurity of some of the titles caused delay and resulted in the establishment of the Court of Private Land Claims which lasted until 1904 (Report of Attorney-General, 1904). The litigation is a story in itself.

The histories of the separate grants are sometimes bloody stories of Apache depredation (Canoa) or cases of fraud (Reavis-Peralta) but most are chains of title to the lands. None escaped review before the Court of Private Claims; few were substantiated. (A suggested reference for the separate stories of the particular grants is Mattison, R.H., 1946).

Besides the tremendous amount of litigation and several cases of fraud, the Spanish and Mexican land grants have had more than one influence upon land tenure today. The procedure used to purchase lands of the State of Arizona is not unlike the procedure used to obtain título to a grant from Spain or Mexico (Arizona Revised Statutes, 1956).
Most of the old grants have remained cattle ranches with many of the same boundaries described by metes and bounds in their legal descriptions. (Some grants were expanded under the Enabling Act and Taylor Grazing Act.)

The "grants" still have the air of the hacienda about them. Much of the ranching vocabulary of southern Arizona, if not Spanish, is derived from Spanish.

The Pima Uprising in 1751 caused the destruction of haciendas and the livestock was killed or stampeded (Bolton, 1932, p. 78). After Kino died in 1711 in Magdalena, Sonora, there were no records of any Spaniards entering Arizona for twenty years (Bancroft, 1889, p. 361). Arivaca, an important cattle ranch and Spanish land grant, was abandoned during the Pima Uprising (Ewing, R.C., pp. 259-294).

Apache depredations were a continual setback to the operations of the various haciendas. The Spaniards hoped to solve this problem by exterminating the Apache through warfare (Bancroft, H.H., 1889, p. 648). Extermination proved unsuccessful and the Spaniards decided to try a different approach. They taught the Apaches how to drink. The Apaches were dependent upon
Spanish friendship for a supply of liquor; the raiding ceased and the haciendas began to flourish (Haskett, B., 1935, pp. 5-6).

This new "pacification" policy of the Spaniards remained effective for over thirty years until discipline relaxed and the Spanish became irregular in supplying the Apaches. The years of 1818-1820 saw the return of Apache raiding and the abandonment of all the settlements with the exception of Tucson and Bac. During the 1830's Apache raiding increased to such an extent that the early cattlemen all over southern Arizona were forced to abandon their ranches. The herds were left to run wild or be killed by Apaches (Ibid. p. 46).

The Gadsden Purchase in 1853 brought southern Arizona within the boundaries of the United States, but it was two years (February, 1856) before formal possession was taken with the raising of the American flag over Tucson.

Mining and ranching began to develop under the protection of the forts and army, but the cattle numbers were few, mainly around military posts. At this point in the history of southern Arizona both Apaches and Mexicans raided and stole, making any extensive development
of ranches next to impossible. In September, 1859, the Sonora Mining and Exploration Company's Arivaca Ranch lost sixty head of cattle and mules to the Apaches (Arizonian, October 6, 1859). The Civil War and the subsequent withdrawal of troops from southern Arizona gave the Apaches and Mexican bandits an open door to sweep down from the hills and plunder the ranches and settlements. Few survived and the countryside lay desolate (Wagoner, J.J., 1949, p. 59).

In 1869 H.E. Hooker's 4,000-head herd passed through the Altar Valley to the Baboquivari Valley, which Hooker had leased from the Papagos (Ibid. p. 62).

The 1880's brought expansion and extension of the cattle industry in southern Arizona and the Altar Valley. Isolated ranches along Arivaca Creek left the adjacent mesa lands and foothills unused before 1880. In the early 1870's Doctor Wilbur had about two hundred head and Pedro Aguirre ran a small herd, both in the vicinity of Arivaca. The store at Arivaca was run by N. W. Bernard, who also ran cattle on the near-by range. Bernard and John W. Bogen formed a partnership in 1878 which was to become the Arivaca
Land & Cattle Company. It was during the 1880's that the ranges filled up and The Southern Pacific Railroad was completed. It was not until the drought of 1892, 1893, and 1894 that cattle numbers were reduced.

During the 1900's, the Altar Valley was fenced into separate units. The dominant ranches in the Valley were La Osa Land and Cattle Company (Kinney family), Arivaca Ranch (Boice family), Anvil Ranch (King family), and Buenos Aires Ranch (Gill Cattle Company). A flurry of homesteading in the early 1900's ended in failures or sales to cattlemen, who were eager to add to their holdings. The Altar Valley has been used as a cattle range since the Spanish period.

**Mines and Mining**

Mining has only been important on the fringes of the Altar Valley, mainly in the Arivaca district. The Sonora Mining and Exploration Company, under Charles Poston, operated the Cerro Colorado Mine (Heintzleman Mine) until Apache depredations forced its close in 1861 (Gressinger, 1961, p. 73). Poston had purchased the Arivaca Ranch to raise beef to feed his miners in
1856 (Martin Chronology). The mines in the Arivaca district exist today but are of little consequence.

The Sierritas have seen sporadic mining activity from time to time beginning with the McGee prospects. The Copper Grantz Mine has been operated intermittently when copper prices have been high enough to warrant mining of low-grade ore from the shaft. The uranium boom of the 1950's resulted in some prospecting in the Sierritas, leaving the landscape pock-marked by prospect holes.
CHAPTER III
DROUGHT IN THE ALTAR VALLEY

Drought does not occur by chance circumstance but is determined by meteorological processes, and its effects are widely perceived by man. Although drought is one of the chief limiting factors for the cattle industry in the Southwest, there is much to learn about its causes and characteristics.

There have been many attempts to define drought (Saarinen, T.F., 1966, pp. 143-148). Drought is a natural phenomena that is relative areally and personally (Ibid. p. 9). A rainless period during April, May, and June would be considered a normal year by an Arizona cattleman, but an Illinois farmer would be faced with drought. There can be differences within the same meteorological regime. To a rancher depending on precipitation for forage and water for his cattle, a dry year would have different meanings than to a city dweller, who would perceive the condition only if water was rationed or if his business depended on the
Drought in the Southwest is characterized by the gradual buildup of the effects of deficient moisture instead of the quicker buildup in more humid climates (U.S. Dept. of Interior, 1951, p. 1). "The southwestern drought is superimposed upon the chronic drought conditions of an area where aridity is the rule." (Ibid. p. 1).

The Altar Valley is effected by a meteorological regime of two rainfall maximums. These two rainy seasons may have below-average rainfall. The months of April, May, and June are normally dry. The failure of winter precipitation does not mean drought to the Altar Valley unless the previous summer season is deficient. The forage produced by the winter precipitation is annual and short-lived but it provides a "bonanza" for the cattleman. The abundance of spring feed may mean no need to use supplemental feeds. The green spring feed provides Vitamin A, an essential to healthy calving, and if the cattleman sells his calves on the spring market, it can
make a difference of many pounds of beef. Good spring feed will carry the cow herd through the annual dry season of April, May, and June.

The summer maximum is critical for the growth of the perennial grasses and browse of the desert shrub and the desert grassland regions. The grasses cure after setting seed in the fall and provide forage during the winter as well as during the summer growing season. Drought in the Altar Valley is, therefore, mainly due to summer rainy season failure. The spotty nature of the convectional summer storms may bring about drought conditions on one ranch and lush feed on another close by. One part of a single ranch may have a dry summer while another part may receive normal amounts of summer precipitation.

Drought presents many problems to the cattleman. The most visible effect of drought on the land is the lowering of forage production. The quantitative effect of lowered forage production depends on the severity of the drought. Shortage of stock water becomes important when reservoirs and shallow wells dry up, lowering the efficiency of the ranch by concentrating the cattle. (The more widely dispersed the watering places, the better the distribution of livestock.) Future
composition of vegetation and forage production may be greatly affected by long periods of concentrated use (Reynolds, H.G., 1954, p. 37).

Drought over a widespread area effects the economic balance when cattlemen are forced to sell, flooding the market. Feed prices increase with the increased demand.

The major recorded droughts which have affected cattlemen in the Southwest (Arizona, New Mexico, and West Texas) began in the 1890's. Before this time there were not as many cattle on the range and the effects of drought were not as easily noticed. A drought started in 1891 and continued throughout the next three years. June, 1892, saw a barren land in the Southwest with water holes dried or drying and cattle losses heavy. When this drought ended in 1893, the loss in cattle was estimated at fifty percent and to some it was as high as seventy-five percent (Haskett, B., 1935, p. 42). The largest number died in May, June, and July of 1893 (Wagoner, J.J., 1949, p. 103). Low calf crops resulted from the loss of so many bulls. Cattlemen then oriented their ranches toward breeding operations (raising cows and calves) as opposed to steer-fattening (Speculating on price rise and weight gain),
and some cattlemen began to realize the grazing capacities of their ranges (Ibid. p. 104). Drought conditions again loomed in 1899 and 1900, but losses were held to a minimum and the cattlemen remained prosperous (Ibid. p. 107). The drought continued, however, and by 1902 economic losses were heavy, but ample forage and heavy calf crops in 1903 tended to compensate for these losses (Ibid. pp. 107-108). Development of permanent water by drilling wells and building earthen reservoirs became widespread with the advent of fenced ranges. Severe drought conditions existed from 1916 through 1921 with death losses high and cattlemen driving their herds far into Sonora where grass was more plentiful (Ibid. p. 112). Drought again in 1925 was coupled with poor economic conditions throughout the nation to add to the misery of the cattlemen (Ibid. p. 114).

During the drought of 1933-1934, grass was in short supply and the cattle were subsisting on browse. Arizona was declared a drought state. This drought affected two-thirds of the nation. Occasional dry years during the 1940's caused seasonal droughts until 1956 when a drought began that lasted until the spring of 1959.
The drought of the 1950's was widespread, including the Great Plains and parts of Canada and Mexico (Special Assistant to the President for Public Works Planning, 1958).

In Arizona range feed was scarce, reservoirs dried up and cattle prices plummeted downward with distress selling.

The situation in the Altar Valley was not unlike that in the rest of the state. Herds were reduced considerably, some cattle were moved to irrigated pasture and all ranchers were feeding heavily. One rancher in the Sierrita area sold his entire cow herd and waited for rain to end the drought. Death losses were held to a minimum by the feeding of cottonseed meal and the reduction of cattle numbers.

Fluctuations in weather conditions influence the prosperity of the cattle business in the Altar Valley. The history of drought is almost an economic history of the cattle business, but when drought strikes, the various adaptations (reducing cattle numbers, supplemental feeding, brush control, drilling wells and building earthen reservoirs) which have been devised by man tend to lessen the severity of the effects of the hazard.
CHAPTER IV

CATTLE, CATTLEMEN AND
RANCHING IN THE ALTAR VALLEY

The current adaptations of the Altar Valley cattlemen to drought are reflected in their answers to the field questionnaire.

Main topics were the general nature of cattle ranches in the valley, perception of the drought hazard by the cattlemen, the adaptations to drought employed by the ranchers and miscellaneous attitudes held by the cattlemen in the Altar Valley. Most of the information in this chapter is derived from the answers to the field questionnaire, but the paragraphs are sprinkled with information gleaned from the writer's personal experience and observations in the valley.

The ranchers were not informed about the nature of the study prior to the interviews and at no time did they see the questionnaire. Therefore, the interviewees could not anticipate the categories of the questionnaire. In constructing the questionnaire, an effort was made to
arrange the questions in such a way that the divisions of the study would not be obvious to the interviewees.

**Cattle, Cattlemen and their Ranches**

Part of the questionnaire was devoted to questions that would show the nature of the cattle operations in the valley. The ranches in the Altar Valley are owned and operated by men who, for the most part, have been in the cattle business a major portion of their lives. Most of the owners are over sixty years of age, but there are younger men beginning to assume ownership and management.

Six of the seven ranchers interviewed maintain breeding herds, selling calves or yearlings. The other rancher buys steers for growing out on the range and sells them after an anticipated weight gain. The breeding herds are Hereford with one exception, a registered Brangus herd, which had been established before the rancher moved to the Altar Valley.

Cattlemen, who maintain breeding herds, are reluctant to change breeds once they have started with a particular breed of cattle. It is not difficult to
understand the rancher who says: "Why should I change breeds? I'm doing fine with the cattle I've got."

The ranchers raising Herefords have spent years improving the quality of their herds, not only in their appearance, i.e., conformation and color, but in the genetic bloodline.

The ranchers raising Herefords are reluctant either to change breeds or cross-breed for several reasons. When another species is introduced, as in cross-breeding of European (Bos taurus) with Zebu cattle (Bos indicus), hybrid vigor is one result in the first generation. Succeeding generations do not exhibit the same hybrid vigor, so it is necessary to replenish breeding stock by purchase to continue the "first cross." Cattle raised on the ranch are sold rather than kept as replacements for old cows and death losses. A cowman's herd is something he has developed and improved by careful selection of replacement heifers and judicious introduction of bloodlines through the bulls he purchases. Cattlemen in the Altar Valley are strict in their culling of cows and do not keep cows for sentimental reasons. The choice of replacement heifers is important to the
future of the herd because these are the animals that will become breeding stock. When these animals are raised on the ranch from birth, the rancher has the advantage of being able to select a replacement, not only for her individual characteristics, but also for the characteristics of her mother. For example, adequate milk production is a desirable characteristic to have in a brood cow, and with this in mind, the rancher can select replacements by observing both the mother and the prospective replacement. Selection of replacement heifers is important to the future quality of the herd, and it is an advantage to raise one's own replacements because their selection can be made with better acquaintance. Cattle that are raised on a particular range know that range (in the cattle business the term used is "located"), while cattle that are purchased and imported to the ranch must go through a period of "getting located." Cattle native to an area are also less prone to poisoning by poisonous plants.

Ranchers in the Altar Valley farm for their cattle rather than farm for its own sake. Barley and Sudan grass are grown for supplemental pasture during the winter and summer, respectively. These
supplementing pastures are used mainly for calves that have been weaned or steers and heifers that are being held over from fall to spring (Figure 6).

Calf crops of eighty to ninety-five percent (of total number of mother cows) are expected in the Altar Valley. The higher percentages pertain to the ranches in the desert grassland zone probably because of better overall feed conditions. Weaning weights of calves vary from four hundred to five hundred twenty-five pounds and, again, the desert grassland area ranches claim the higher figures. Weaning time in the Altar Valley is fall, usually November, except during drought years when the ranchers often wean the calves as early as September in order to help the mother cows maintain better condition. The time of early weaning depends on the severity of the drought conditions.

Calves are sold in the fall of the year and generally go to feedlots in California or Arizona. On occasion, when feed is abundant and the cattlemen are optimistic, the calves are held over until spring in hope of better prices, but this is not a common
Figure No. 6
Supplemental pasture planted to barley for wintering yearling steers.
Figure No. 6

Supplemental Pasture.
practice in the Altar Valley. One ranch sells only
yearlings and the management is adjusted to the practice.

The rangeland in the Altar Valley is mostly owned
by the State of Arizona and leased to the ranchers on
the basis of its carrying capacity. Next in number of
acres is the deeded land which is held in fee simple
(it can be conveyed by deed) by the rancher. Some land
is controlled by the Bureau of Land Management, an agency
of the Federal Government. There is little opportunity
to increase the size of the individual ranches in the
Altar Valley, and most of the ranchers have maintained
the same acreage for many years. When the ranches in
the Altar Valley change ownership, they are generally
sold as units (with one past exception).

Perception of Drought by Cattlemen
in the Altar Valley

The questions in this part of the interviews
were designed to bring out the attitudes of the cattle-
men to drought and to compare these attitudes in the
two areas of distinct vegetation.

The leading question to inquire about the
perception of drought by the cattlemen was: "What
are the main advantages or disadvantages of this area?"
With no previous mention of the word, drought, there was no possible way that the spontaneity of the answer could have been distorted. All the ranchers interviewed mentioned dryness or drought in response to this question and five of the seven interviewees stressed disadvantages, especially drought. Saarinen (1966, p. 61) posed the identical question to wheat farmers on the Great Plains and eighty-four percent of the interviewees mentioned dryness or lack of moisture in their replies. One could conclude that cattlemen in Arizona, like wheat farmers in the Great Plains, are clearly aware of the drought hazard. All the ranchers within the desert grassland area mentioned woody species invasion as a disadvantage with one of the interviewees stressing it more than drought or dryness. This rancher had never experienced a drought (drought conditions have not existed since he moved to the valley in 1966), a fact which may have influenced his reply. One rancher in the desert shrub area did not consider the invasion of woody species a problem on his ranch, but he recognized the "invaders" to be a problem in the
desert grassland region. The answers to this question suggest that drought is the greatest problem confronting the ranchers in the Altar Valley.

Perennial grasses seemed to dominate the advantages of the Altar Valley. This feeling carried over to the answers to the question as to which part of the ranch would a rancher keep if the ranch were cut in half, separating the mountain country from the lowland. Perennial grasses are more prevalent in the mountains. All but one rancher preferred the mountain country because of the greater dependability of the feed conditions at higher elevations. The rancher who preferred the lowland country felt that it had farming potential. Perennial grass is more desirable than annual grass because it not only grows for a longer period of time, but it also characteristically "cures" (dries much like hay) at the end of the growing season to supply forage for the cattle until the next growing season. This is especially important if there is a marked deficiency of winter rains.

When questioned whether their ranches were larger would they feel that they could survive a
drought better, the ranchers did not feel that the size of a ranch made any difference in ability to survive a drought. They mentioned that if their ranches were larger, it would mean that there would be more cattle to move or feed in time of drought. The question of cash reserves was not mentioned in their replies. The cattlemen operating the smaller ranches (seven and fourteen sections) did complain that their ranches were too small and that they were forced to supplement their income with work away from the ranch.

The year 1965 was the last drought year in the Altar Valley according to ranchers who were ranching in the area at that time (six of the seven interviewed). With an absence of rainfall since the interviews, it was not surprising that they considered the period drier than usual, but their replies suggest that the ranchers expect winter rainfall. It would seem that this could be expected after examining the rainfall records of previous years (Appendix B).

Though they have no idea why, the cattlemen in the Altar Valley feel that it has become drier since they have been in the area. They were also consistent
in their answers to the question: "Are droughts becoming more or less frequent?" They all felt that droughts were becoming more frequent.

To measure their perception of the drought risk, the ranchers were asked: "If you were to live one hundred years, how many drought years would you expect?" The replies varied, averaging twenty-five years out of one hundred. The rancher who expected ten drought years in one hundred was the youngest interviewed, suggesting that drought experience influences expectation. There was no noticeable difference in answers between ranchers in the desert shrub area and those in the desert grassland.

When defining drought, all Altar Valley ranchers stressed the summer rainy season as the critical time of year for the production of forage. Failure of rainfall during this period could cause a drought even if the dry summer were followed by a wet winter. The cattlemen in the Altar Valley consider one dry year a drought, but on the other hand, the amount of precipitation is not the determining factor. Drought does not exist if the storms are spread over a long enough period of time so that the grass has
sufficient moisture available in the soil to grow to maturity. One dry year appears critical for most ranchers even though it does not necessarily mean complete disaster. One rancher mentioned that two dry years could mean having to mortgage heavily and three dry years would mean "paying for the ranch all over again."

Adaptations to Drought by Altar Valley Cattlemen

Reducing cattle numbers on the range is considered the most important adaptation to drought by the cattlemen in the Altar Valley. They are concerned about the land, and they are unanimous in their agreement that it is better to move the cattle in a drought rather than leave them alone and risk damage to the land. This would suggest that land is more important than cattle to the ranchers in the Altar Valley.

Water development, i.e., stock water (wells and earthen reservoirs) was considered the next most important adaptation to drought because well-located water development increases the carrying capacity of a ranch until the point is reached where one hundred percent of the ranch is utilized. As a result, the
water development in the Altar Valley has been carried out extensively. Altar Valley cattle walk one and one-half miles to water at the maximum and more often the distance is one mile or less. This would imply that there is close to one hundred percent utilization of the grazing land in the Altar Valley because cattle can go several miles to water if necessary (depending upon the nature of the topography).

The reasons for woody species invasion into the desert grassland suggests a combination of grazing and browsing of domestic livestock, short-term climatic fluctuations and the end of recurrent grassland fires (Harris, D.R., 1966, pp. 408-422). These are the major causes. There are minor factors involved such as the seed dispersal by rodents (Reynolds, H., 1950), wild animals and domestic livestock and food gathering by early man (Carter, G., 1950).

Controlling the Invasion of Woody Species in the Altar Valley

There are several methods being used today in the control of woody species in the desert grassland of the Altar Valley (Figures 7, 8, 9, 10, and 11).
Figure No. 7
Desert grassland showing invading woody species, mesquite, burroweed, and snakeweed. (Note the thin grass cover.)
Figure No. 7

Desert grassland.
Figure No. 8

Desert grassland vegetation before control methods attempted.
Figure No. 8

Desert grassland vegetation before control methods attempted.
Figure No. 9

Controlling mesquite by the "grubbing" method.

(Note "hoe" attachment mounted on the blade.)
Figure No. 9

Controlling mesquite.
Figure No. 10
Desert grassland vegetation two years after woody species have been removed.
Figure No. 10
Desert grassland vegetation.
Figure No. 11
Desert grassland, part of which has been "grubbed". (Note the encroachment by burroweed and snakeweed on either side.)
Figure No. 11
Desert grassland, part of which has been "grubbed".
Grubbing done by a caterpillar tractor with an attachment on the bulldozer blade called a hoe, which uproots the trees separately, is the most effective, but it is also expensive to use. Chaining by stretching an anchor chain between two caterpillar-type tractors and pulling this chain over the ground, uprooting the trees, is not the most popular in the Altar Valley. Aerial spraying has been tried on several ranches in the Altar Valley, but the major complaint issued by the ranchers is that the herbicides are too selective, and the time to spray during the growth period of the trees is very critical in order to kill the trees. If the rancher owns his own equipment (tractors and chain), he can generally cut the costs of chaining. Aerial spraying must be repeated; therefore, it may become too expensive.

Regardless of the method used to control mesquite, that method must be capable of uprooting the tree or killing it because of mesquite's ability to sprout from nodes beneath the ground surface (Parker and Martin, 1952).

Burroweed and snakeweeds are other invaders which have presented problems to the cattlemen of the
Altar Valley. However, the control of these two species is more difficult than that of mesquite or that of the acacia species. Chaining is ineffective; grubbing is impractical. Aerial spraying can be used but effective herbicides have not been developed. Fire is another alternative if there is enough fuel in the form of dried grass to carry a fire, but this, too, is ineffective if weather conditions are not favorable. Burroweed and snakeweed germinate readily from seed after a good winter rainy season. Burroweed and snakeweed will invade areas that have been chained or grubbed under the latter conditions. On one ranching operation in the Sierrita Mountains, the desert shrub has been chained for the control of cholla and palo verde and mesquite where it occurred; burroweed and snakeweed have taken over the landscape (Figure 12).

The problem of woody species invading the desert grassland is perceived by all the ranchers located within that zone and is also recognized by ranchers in the desert shrub zone. All the ranchers who consider woody species a problem on their own ranches are making attempts at control of the woody
Figure No. 12

Southern desert shrub.

(Note attempted brush removal on the left.)
Figure No. 12
Southern desert shrub.
species, setting up year-to-year programs for a certain number of acres. All are satisfied that their efforts have benefited the land and that their chances of drought survival are better after even partial removal of the undesirable woody species from the ranch has been accomplished. The future plans for brush removal in the Altar Valley by the ranchers interviewed are from six hundred forty acres per year to three thousand acres per year. The planned acreage figures appear to be governed by the size of the ranch rather than by the perception of the rancher of his ranch's needs because all realize the need for woody species eradication, as was noted previously. It is possible that a rancher's financial standing could effect his future plans, but this study did not inquire into the finances of the ranchers.

Costs for woody species control work vary from two dollars per acre to seven dollars per acre depending upon the method employed and whether the rancher did the work or contracted with someone else to do the work. The "grubbing" method is considered the most effective control, although the high expense is often the factor
which influences decisions to employ chaining or spraying methods.

Most ranchers first learned about the control of mesquite and other woody species from livestock periodicals, which carried articles on the work that was done in Texas during the 1940's. As far as can be determined, the innovator of woody species control in the Altar Valley is also the rancher who has lived in the valley the longest time. However, the latter is not necessarily the factor that made him the innovator.

The ranchers interviewed also felt that although woody species are taking over the grass, there are certain benefits derived from them—browse, shade, and firewood. They no longer consider mesquite valuable for fence posts.

Miscellaneous Attitudes of Cattlemen in the Altar Valley

It is not surprising that five of the seven ranchers interviewed speak Spanish as well as English because of the Altar Valley's close proximity to Mexico. The two ranchers who were not bilingual were not native to the area; one was a newcomer and the
other has ranced in the Altar Valley for seventeen years, but as a part-time absentee owner. Residence from youth seems to be the determinant of bilingualism in the Altar Valley. It was also noted that two ranchers who did not speak Spanish employed English-speaking foremen, while the bilingual ranchers employed "cowboys" who did not speak English. Certainly the ability to speak Spanish is helpful in procuring ranch labor.

Sharing work with neighbors is not the general rule in the Altar Valley. Before the range was fenced, cattlemen or their representatives (cowboys) would join in a common roundup to brand calves and ship steers. It was mostly a matter of looking after one's own interests, seeing that calves from his cows were branded with the proper brand, and that someone else wasn't shipping steers that didn't belong to him. In many places "neighboring" has continued with the idea in mind of helping and being helped. The ranches are fairly large in the Altar Valley, and they must keep a certain amount of hired help throughout the year to do the routine work of ranching so that "neighboring" is no longer deemed necessary. On the smaller
ranches it is still important and is still carried on.

All the ranchers interviewed during the study keep milk cows. This practice is possibly a relic of earlier subsistence-type ranching. Milk cows are kept in spite of the fact that there are stores at both ends of the Altar Valley where dairy products are available.

All but one of the ranchers feel that Government drought relief programs are bad. The one exception is a rancher who has never participated in one of these programs. The ranchers thought the feed offered by the Government was not the right kind, and that the programs tend to cause prices on other feeds to rise along with those offered under the program, resulting in higher prices on all feeds than had existed before the drought relief program was instituted. One rancher mentioned that he didn't like the Government "getting under my fingernails." The attitude of the ranchers towards Government intervention into business is one of independence and rejection for fear that the Government will end up telling them how to manage their affairs.

Livestock magazines are the principal sources for the diffusion of innovations among cattlemen in the
Altar Valley. Contacts through the cattlemen's associations are considered next in importance. One rancher thought that short courses held by colleges and other institutions were valuable because of the demonstrations available. Another regarded "field days" as an important source for new ideas. These "field days" are sponsored by livestock magazines, cattlemen's associations, and the American Society of Range Management. Even among cattlemen who have not attended college, there is agreement that college is important in today's society. A rancher who is a graduate of the College of Agriculture, University of Arizona, thinks that the practical nature of ranching can be learned on the ranch, and he also believes that a general business curriculum would have served him better in teaching him more about economics and business.

Most of the ranchers in the Altar Valley took a dim view towards programs of weather modification. Most had participated in a program that had failed. For this reason, they held strong doubts about the future possibilities of weather modification. One
man, who had not participated in the program, was in favor of continued experimentation. Six of the seven ranchers interviewed regarded improved weather forecasting as more valuable than weather modification.

One question asked the ranchers was: "Which of the following best describes your way of operating?

"1. If a man plays it safe in the present, the future will take care of itself;
"2. If a man takes chances when things look good, the future will take care of itself;
"3. A man should be cautious, but able to take advantage of opportunities when they come up;
"4. Too much long-range planning makes a man too careful;
"5. The man who plans ahead is the man who will succeed;
"6. It is good to plan ahead, but you also have to think about the big opportunities and have the courage to seize them."

The results of this question indicated that the ranchers are, for the most part, cautious in their business attitudes. "A man should be cautious, but able to
"take advantage of opportunities when they come up" was mentioned most in this self-evaluation. This conservative attitude is also reflected in the type of ranching carried on by the ranchers in the Altar Valley, namely, "cow-calf" operations, the most conservative of all cattle enterprises (steer-fattening is more speculative). One would think that these conservative operators would insure their cattle against death loss, but this is not the case. There are two factors which influence the rancher's decision not to insure--the premiums are very high and the limitations are stringent in livestock insurance policies, and with the low death loss percent, the ranchers do not feel that need to insure their cattle.

Lady luck has a lot of believers among cattlemen in the Altar Valley. Only one rancher of the seven interviewed did not believe in luck, and one other rancher was doubtful that luck was a success factor. All the other ranchers believe that luck is a factor in ranching success.

Throughout the interviews the ranchers volunteered their answers without having to be coaxed.
The interviewer was impressed with the overall awareness of the problems involved in ranching expressed by the ranchers. They are not only aware of the problems, but they are also attempting to solve the problems by better management of their ranching operations.
CHAPTER V
CONCLUSIONS

The cattlemen in the Altar Valley perceive drought as one or more dry years, the result of failure of the summer rainfall maximum. This perception of the drought hazard governs the management practices employed by the cattlemen. Ranchers anticipate recurrent drought conditions in the Altar Valley. Perception of drought among cattlemen in the Altar Valley does not vary to any noticeable extent with respect to geographic (more specifically vegetative) location. The ranchers in the desert grassland area of the Altar Valley use the same adaptations with respect to water development that are employed by those ranchers in the southern desert shrub region. Differences in the use of adaptations are only evident in the control of woody species. Mesquite and other woody species do not present the problem of invasion in the desert shrub region that they do in the desert grassland.
The dry months of April, May, and June are not regarded as a drought period in the Altar Valley, and the cattlemen anticipate this yearly dry period. Water development reflects this attitude in several ways—tanks are dug deep enough where possible to create water storage for an entire year, wells are drilled in preference to tanks because they are more reliable, and watering places are located for maximum utilization of the range.

The most important adaptation to drought is reducing the number of cattle on the range. Before the Southern Pacific Railroad was built in southern Arizona, it was difficult to move cattle in times of drought. In order to maintain their herds, cattlemen were forced to singe the spines from cactus plants or drive their herds to areas with better feed conditions. The railroad made the task of transportation easier and feasible to more ranchers, but the cattle still had to be driven to the nearest railhead. Truck transportation increased the efficiency as the cattle could be loaded at the ranch and trucked from there to the destination.
Before the railroad came to southern Arizona, many cattle died on the range from the effects of drought, but now with advanced technology in transportation, water development and supplemental feeding, death losses due to drought are negligible.

There is little natural surface water in the Altar Valley. The development of stock-watering places has been high on the priority list of ranch improvements since the first ranches were established. A few natural springs dot the two chains of mountains, but most of these springs dry up during drought. It has been necessary to dig or drill wells and construct earthen dams for storage in order to develop the Altar Valley for cattle raising.

Supplemental feeding is employed by the ranchers throughout the valley, not only as a supplement to the native range forage, but also as an adaptation to drought.

The control of the woody species invasion is being attempted on most of the ranches in the desert grassland area of the Altar Valley and has been tried on a more limited scale in the southern desert shrub zone. It is doubtful that the latter efforts are
worthwhile because of the inherently low potential of that particular vegetative type in forage production. Burroweed and snakeweed have increased rapidly on one of these controlled areas in the desert shrub zone and they have invaded controlled areas in the desert grassland type as well. In order to return the desert grassland to its former appearance, something must be developed to control the invasion of burroweed and snakeweed. Perhaps herbicidal spraying would solve the problem. There is also the possibility of controlled burning. The history of recurrent fires substantiates this conclusion. After the removal of the taller woody species, sufficient grass returns to supply the necessary fuel to support a hot enough fire to eradicate the burroweed and snakeweed. Perhaps the latter is the better method until more is known about the many effects of herbicidal sprays.

Some of the results of this study can only be tentative until further research is carried out in comparable areas.

Drought is a major problem, not only in the Altar Valley, but in many parts of the world, and how
man perceives the drought hazard and adapts to meet it may well determine his future in these areas.
APPENDIX A
QUESTIONNAIRE

The purpose of this questionnaire is to find out firsthand about what the cow business is like today in the Altar Valley.

1. How long have you been ranching in this area? ______years.

2. Do you speak Spanish? Yes _____ No _____

3. How old are you? _______years.

4. Are you the owner, part owner, tenant or manager?
   Owner_____Part owner____ Tenant____ Manager_____
   Other_________________________________________

5. What is the exact nature of your operation?
   Cow calf_______
   Steer___________
   Combination_____
   Registered_______
   Have you ever changed in the past? Yes____ No_____
   In what way?______________________________________

6. What breed do you use?
   Hereford_____Angus____Brangus____Santa Gertrudis____
   Crossbreds____Other_________________________________
Have you ever used a different breed? Yes____No____
If yes, which kind?_____________________________________
Do you plan to change breeds? Yes____No____
If yes, to which kind?_________________________________
Why?__________________________________________________

7. Do you farm any land? Yes____No____
If yes, how many acres?____________________
What crops?__________________________________________
Do you irrigate? Yes____No____
How?________________________________________________

8. How many sections do you run cattle on?______________

9. How are your land holdings divided?
Deeded_____State lease_____Federal lease_______
Private lease__________

10. Have you ever increased the size of your ranch in the past? Yes_____No_____
If yes, why?__________________________________________

11. What are the main advantages or disadvantages of this area?
Emphasizes advantages__________
Emphasizes disadvantages_________
Balanced treatment______________
Advantages:  Disadvantages:

good perennial grass  too dry
good mountain country  no perennials
generally good rains  droughts frequent
easy to work  hard to work
terrain not too rough  terrain too rough

12. Do you think you could come out of a drought better if your ranch was larger? Yes______No______

Don't know______None available______Cost too much______
No funds_______Other______________________________

13. When was the last drought in this country?_________

Have you experienced any others? Yes______No______

If yes, what years?_________________________________

What were they like?________________________________

14. What is your herd's death loss percent per year?

_____percent.

What are the causes?

disease____drought____tank drowning____calving____

15. What do you think of as a drought?

rainfall_________________________
less than average_________________
long dry spell (several mos.)_____ one dry year_____________________
two dry years____________________ other_____________________________

calf crops lower________________
cow herd thin__________________
bulls thin_______________________
grass cover_____________________ more disease in herd________________
16. Would you consider the past few months to have been:
   much wetter than usual
   wetter than usual
   average
   drier than usual
   much drier than usual

17. How often do you expect a good calf crop?
   percent wise
   average weight wise
   Is there a difference? Yes No
   If yes, what is the difference?
   What is a good calf crop?
   percent
   average weight

18. Since you have been here, has it become wetter or drier? wetter drier
   Why?

19. What does this country look like during a drought?
   no grass
   not enough grass to carry over
   tanks dry
   wells dry

20. Do you think droughts are becoming more or less frequent?
   more no difference less don't know

21. If you were to live 100 years, how many drought years would you expect?
   100 25 10 50 20 5 other
22. Is there any way to overcome droughts?
   Yes____ No____ don't know____

23. If a meeting were held and you were asked to give suggestions for reducing drought losses, what would you say?
   __________________________________________________________

24. What is the best way to survive a drought such as we had in the fifties?
   __________________________________________________________
   How did you survive the drought in the fifties?
   __________________________________________________________

25. Is winter drought or summer drought the worst?
   winter____ summer____ both____

26. Do you keep any reserve feed from year to year?
   Yes____ No____
   When do you use it?
   __________________________________________________________
   What class of cattle do you put on it?
   ___________

27. Would it be better to move your cattle off the range or risk damage to the land? move____ risk____
   Is your ranch worth more on the real estate market today than as a producing ranch? Yes____ No____
   Why?
   __________________________________________________________

28. When do you wean your calves?
   normal year____
   drought year____
   Do you ever hold over for a better price in the spring?
   Yes____ No____
If yes, how much weight do you estimate they gain or lose?__________________

29. Do you ever keep an old cow for sentimental reasons?  
Yes____No____

30. Do you share work with neighbors?  Yes____No____
If yes, more in drought years or less?  
more____less____never_____

31. Have you heard of any neighbors selling out recently?  
Yes____No____
If yes, why did they sell?__________________________
Why do most people in this area sell out?  
___________________________________________________________________________

32. Do you live on the ranch?  Yes____No____
Part time______

33. Have you ever thought of moving to town?  Yes____No____
If yes, why?__________________________________________

34. Do you sell calves or yearlings?________________________
If steer operation, how old are the steers when bought and when sold?  bought_____sold________

35. What will this ranch carry per section?________________________
Suppose you cut the ranch in half, which part would you keep?________________________
Why?__________________________________________

36. Do you keep a milk cow?  Yes____No____
37. What is the farthest distance your cattle have to walk or water?

1 mile____
2 miles____
1/2 mile____
3/4 mile____
1 1/2 mile____

38. How many years in a row could you hold out without serious problems?

indefinitely________
1 year______________
2 years______________
3 years______________
4 years______________
5 years______________
more than 5__________

39. What do you think of the Government drought relief programs?

good____bad____medium____too much red tape____

Have you ever participated? Yes____No____

40. Do you regularly keep written records in this ranch?

Yes____No____sometimes____

41. What are the main sources from which you obtain information about new practices in ranching?

Which is most important?_______________________

Which is second in importance?__________________

42. Some people say that a college degree is important and some people say it is not. How do you feel?
43. Which of the following best described your way of operating?

If a man plays it safe in the present, the future will take care of itself

If a man takes chances when things look good, the future will take care of itself

A man should be cautious, but able to take advantage of opportunities when they come up

Too much long-range planning makes a man too careful

The man who plans ahead, is the man who will succeed

It is good to plan ahead, but you also have to think about the big opportunities and have the courage to seize them

44. Do you have off-ranch income? Yes ___ No ___

If yes, what kind? investments ___ job ___

45. Do you carry livestock insurance? Yes ___ No ___

If yes, what kind?

46. Some say luck plays an important part in success here and some say it doesn't. What do you think?

strong belief ___
belief ___
maybe ___
disbelief ___
strong disbelief ___

47. What do you think of attempts at weather modification?

Are they effective?
48. Have you ever participated in a program for weather modification? Yes ____ No ______
Have you ever heard of any attempts at weather modification? Yes ____ No ______
Where? ____________________________ When? ________________
Was it successful? ____________________________

49. Would you prefer improved weather forecasting instead of weather modification? Yes ____ No ______
Is there any reason why? ____________________________

50. Do you consider mesquite to be a problem on your ranch? Yes ____ No ______

51. Have you done any mesquite control work? Yes ____ No ______
When? ____________________________
What kind or kinds? ____________________________
How many acres have you done?

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52. What were the results? ____________________________

53. Do you get through a drought better now? Yes ____ No ______
54. Do you plan to continue? Yes______No______
   At what rate? ______acres per year.

55. What were the costs per acre?

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56. What method is most effective?________

57. Where did you hear about mesquite control?

________________________________________

When?____________________

58. Who was first to try control methods in the Altar Valley?

_______________________________________

59. What are the benefits of mesquite?

________________________________________
List of Adaptations

Have you employed any of the following methods?

Yes______No_______

Why?___________________________________________

Range reseeding____________________
Range fertilization________________
Water development________________
Fences for distribution___________
Herd management___________________
   Adjust classes_______________
Supplemental feeding______________
Mesquite control_______________

When did you hear about these methods?___________
When did you employ it?________________________
Questions on Supplemental Feeding

Do you use supplement feed?  Yes____  No_____  
If yes, why?____________________________________
When?___________________________________________
What type?______________________________________
Why?____________________________________________
When did you first use supplements?____________________
Where did you hear about it?________________________
When?___________________________________________
**APPENDIX B**

**MONTHLY RAINFALL RECORDS FOR VARIOUS STATIONS IN AND NEAR THE ALTAR VALLEY**


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86
### Anvil Ranch

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LITERATURE CITED


Arizonian, October 6, 1859.


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Hopkins, R.C. *Grants of Land in Spanish America*, San Francisco: July 16, 1887.


