

More Income for the Polacca Stockgrowers Through Good Range Management

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We are proud of the progress we have made in this business of livestock production. In the last sixteen years the condition of our range and the quality of livestock has increased tremendously. We are probably most impressed, since it affects our pocketbooks, by the fact that from a lesser number of livestock we are producing four times as many units of livestock products now as we did before 1940.

Description of Area

The Hopi grazing area is contained within District Six of the Hopi Reservation,¹ which is located approximately 75 miles north of both Holbrook and Winslow, Arizona. District Six comprises 631,194 acres of which approximately 12,000 acres are dry farm land. The northern topography is characterized by three principal projections of the black mesa, which makes up from east to west,

the first, second and third mesas. These three mesas are the principal subdivisions of the Hopi community. The breaks between the

This article tells the story of 16 years of range improvement on the Hopi grazing area in Arizona. Planned range management has been the principal tool through which range improvement has been obtained. Along with improvement of the range has come increased production of livestock products, although numbers of animals have been reduced. The greater production of livestock products has meant increased income for the Polacca Stockgrowers Association.

mesas develop into deep alluvial valleys and form the three main drainages in the District. The southern portion exhibits a rolling topography about 500 feet lower than the mesa area to the north. The elevation varies from 6,800 feet in the northeast corner to 5,030 feet in the southwest corner. The average maximum temperature is 98° F, and the average minimum temperature is -15° F. The growing season ranges from 140 to 150 days with the average

limits of this season being from May 16 to October 4.

All the soils are very susceptible to erosion unless well protected by vegetation. Sandy soils formed from the Mesa Verde formation comprise the major portion, while shale soils formed from the Mancos shale formation are next in importance. The strong southwesterly winds do excessive damage to the sandy soil when it is exposed, while the torrential summer rains may cut deep gullies through the shale soils during one summer rainfall.

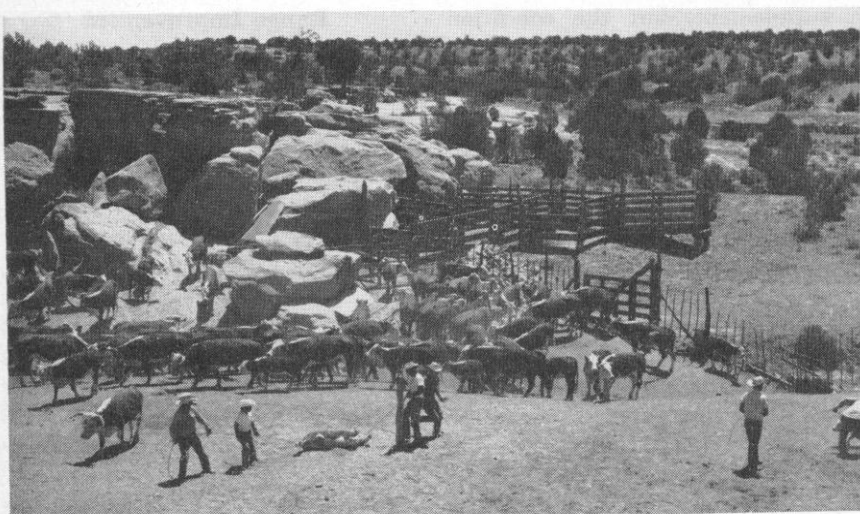
Vegetation

The principal types of vegetation in District Six of the Hopi Reservation are in order of predominance, grassland, saltbush, piñon-juniper, sagebrush, greasewood, and browse-shrubs. Galleta (*Hilaria Jamesii*), blue grama (*Bouteloua gracilis*), alkali sacaton (*Sporobolus airoides*), and other dropseeds (*Sporobolus* spp.) are the major grasses. Indian ricegrass (*Oryzopsis hymenoides*), black grama (*Bouteloua eriopoda*), needle-and-thread grass (*Stipa comata*), comprise the remnants of the climax vegetation considered important in range management goals. The principal species of shrubs and browse are four-winged saltbush (*Atriplex canescens*), greasewood (*Sarcobatus vermiculatus*), Mormon tea (*Ephedra* spp.), sagebrush (*Artemisia tridentata*), and rabbitbrush (*Chrysothamnus* spp.).

Livestock

Domestic livestock came into the "Hopi Country" along with the

¹ In 1936, District Six, a small portion of the original Reservation of 2,472,320 acres, was set aside as the Hopi grazing unit. In the years since this action the Hopi people have been trying to get jurisdiction for the remainder of the Executive Order Reservation. At the present time a bill is before Congress which will help settle this dispute.



In most cases the Hopi cattle are gentle and can be worked on foot. These calves averaged 380 pounds at sale time after being on dry feed almost all spring and summer.

first visit of the Spaniards. In the face of many hardships these animals increased rapidly, and the usable range was soon depleted. The Hopis were forced to graze their livestock close to the three mesas to protect them from the depredations of neighboring tribes, and to take advantage of the permanent water which was located at springs and at some dug wells in the drainage bottoms. There were a number of isolated attempts at grazing farther from the mesas during the snow season, but they were not too successful, due to the lack of a constant snow source. At least two severe droughts occurred before the late 1930's and early 40's that almost exterminated the Hopi livestock. Apparently the range was able to recover as the herds were rebuilt.

In 1940 there were 12,000 breeding ewes, 870 head of breeding cows, and 1,600 head of horses. These figures do not reflect the production of these breeders, and it has been estimated that there were approximately 5,000 head of various aged wethers, goats, and home-grown rams, 400 head of 2 to 5 year old steers and home-grown bulls, and about 400 head of young horses, mules, and burros less than two years old. These animals were characterized by red and white

spotted cattle, long-haired, shaggy sheep and small horses. Since most of the cattlemen had previously been sheep owners, they managed their cattle herds in much the same manner. The herds were corralled at night and herded during day, usually on foot. Salting and supplemental feeding was practically non-existent prior to the 1940's. A sire was usually chosen because of certain distinctive markings, or the owner may have developed a romantic attachment for him. Before 1940 nearly all the livestock were marketed either to the Government schools or to the local traders.

Reduction in Numbers

In the middle 1930's the Soil Conservation Service began range surveys in this area. It was from this survey that the basic changes in management began. Their recommendation on stock reduction, management practices, and concepts of carrying capacities were the initial step in a long educa-

tion program that began to pay off in the early 1940's. We in the Polacca Stockgrowers Association were rather hesitant to accept these changes, but as the years passed we began to understand a few of the reasons for them. We saw our ranges and cattle improve, and we looked for other ways to improve our livestock industry. By 1942-43 we were well on our way to reducing the number of livestock to the carrying capacity established by the previous range survey. By the end of 1943 permits had been issued to cover the carrying capacity. Some of us, and other Hopi stockmen, fought this idea for many years. Now it is an accepted restriction, and most of us think it is a good idea. We have been able to see for ourselves what can be accomplished by correct management.

Livestock Management

The Hopi livestock inventory today is somewhat less than it was in 1940 (Table 1). There are only 5,800 ewes, 2,100 breeding cows, and 490 horses. These 2,100 head of cattle are all good grade Herefords sired by purebred Hereford bulls. We operate a cow and calf operation with practically no hold-over of calves. We try to keep our cows culled out as soon as they miss a calf. This way we can usually get enough from the cow to pay for a replacement heifer. Our bulls are usually kept for five years of active service, but this is dependent on his activity rather than age. We have and support regulations that require that all bulls purchased be registered Hereford bulls. Our sources of bulls are the purebred ranchers in Arizona, Colorado, and New Mexico. These purchases are financed through breeding fees charged by the Association to each

Table 1. Changes in livestock numbers in District Six from 1940 to 1956.

| Type of Livestock | Number 1940 | Number 1956 | Total Change |
|---------------------|-------------|-------------|----------------|
| Sheep (ewes) | 12,000 | 6,085 | 5,915 decrease |
| Cattle (cows) | 870 | 2,121 | 1,251 increase |
| Horses (all) | 1,600 | 498 | 1,102 decrease |

member, according to the number of cows he or she runs. We try to purchase our bulls as yearlings, and hold them over in our sire pasture so that they will be acclimated by the time they are two years old. All our bulls are fed a 30 percent salt supplement from the first of January until the first of May. They are turned out with the cows on the thirtieth of May and returned on the fifteenth of September. Each member uses the same bull for two years, and then receives one from another breeding line. This practice eliminates inbreeding in our herds, and maintains the cross-line vigor. In some cases we exchange bulls with other associations and private bull owners to maintain the program. Each member is required to have no more than twenty-five cows with any one bull. This ratio has proven quite successful, as we have been able to keep our calf crop above 90 percent for the last four or five years. We try to keep only those heifers with the right conformation and color for replacements.

Our disease eradication program has proven very successful. Our calves are all branded, castrated, dehorned, and vaccinated for black leg and hemorrhagic septicemia by July 15. We have just completed testing all our cows and bulls for Brucellosis. District Six of the Hopi Reservation was the first "Modified-Certified Brucellosis Free Area" in the State of Arizona. Several species of poisonous plants are present in our area, but only whorled milkweed (*Asclepias galioides*) can be classed as serious. We have fenced two of these colonies, and are eradicating them. In years of extreme drought we have quite a few cases of selenium poisoning. We hope a range site classification survey will be able to delineate these areas of highest concentration so we can manage for this condition.

Supplemental feeding has helped us carry our livestock through the winter season and has helped to reduce the effects of selenium poisoning. Not all of us are using

a supplement, but the condition of the cattle receiving the supplement has encouraged a gradual change over to the practice. This is especially true in some of the areas lacking in four-wing saltbush to supplement the leached grass.

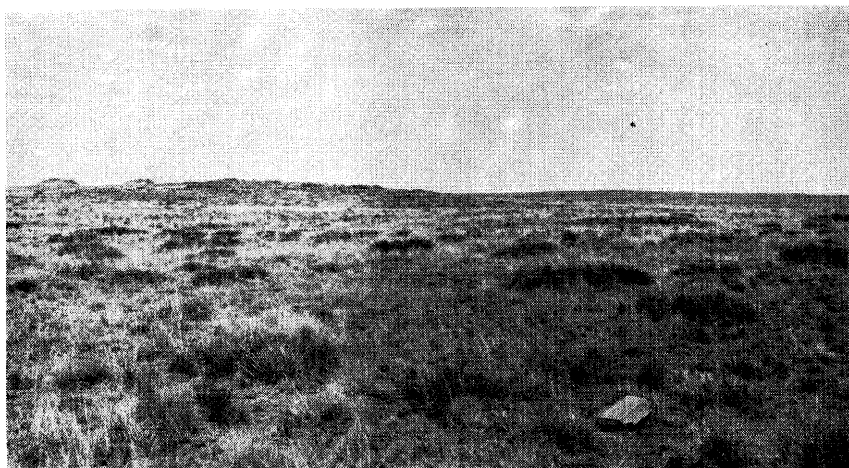
Grazing Management

District Six of the Hopi Reservation has been divided into three mesa sub-units. Each of the three sub-units are subdivided into range use units. The permittees are assigned to the range use unit according to past use and guides established by the carrying capacities. We Polacca Stockgrowers operate in five range areas. In the northern use areas some of us practice seasonal rotation grazing by using the mesa tops for our summer pasture, and the lower country in the winter. This has proven beneficial to the range and livestock. The blue grama on the mesa top is a good summer forage and the galleta and four-wing saltbush provide good forage for our cattle in the winter. This practice also allows a portion of the range to rest during the growing season. The lower areas receive a good rest except for some sheep use. The northern blue grama area must be watched to give a different portion a chance to mature and make seed each year.

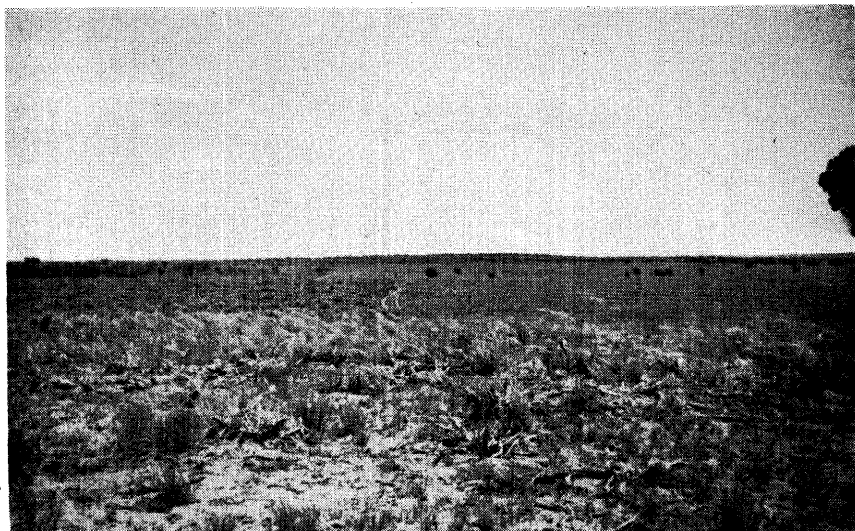
Range Improvement

We stockmen are proud of our range improvements. Most of these are accomplished through cooperative projects. We have recently completed the planning stages of a long-range stock-water development program. The plan calls for permanent water every three miles, which will insure water within one and one-half miles of every head of livestock on our ranges. This is in keeping with the latest range management standards, and will be accomplished through windmills, deep charcos, and pipelines. By having water placed in this manner we will be able to make better use of our grazing resources. It will be possible to defer certain parts of our range by turning off the water in the critical portions of the grazing area.

With the exception of stock-water development, range ripping, shrub control, and water spreading are probably the most important range improvement practices. Good recoveries have been made by native grasses on some of the ripped areas. The re-establishment is dependent on good precipitation the same year it is ripped. If good rainfall is not received the soil crusts over, and much of the beneficial result is lost. Our sagebrush eradication program has shown excellent results. Approximately 800 acres have been treated



In the southern range areas of District Six there is a good forage reserve even after three years of extreme drought.



Needle-and-thread, probably one of the dominant climax grass species, is making a good showing in this area where the sagebrush has been removed by rotobating.

with a "rotobeater" at an average cost of \$3.75 per acre. The kill will average about 85 percent. (This figure represents vegetation removal.) After the vegetation is removed, it takes the plant at least four years to begin any appreciable recovery. The recovery is characterized by the greening up of the plant remnant and survival is usually determined within three years. As yet we have not been able to determine how long it will require for the sagebrush to reach its original density. The initial volume of blue grama was 460 pounds per acre, and the second year it had increased to 805 pounds per acre. Since the last sample in 1954, there has been only enough moisture to maintain the stand. A definite increase in seedling emergence was apparent the second and third years, but without the needed moisture to become established the seedlings did not survive.

Water spreading projects in District Six of the Hopi Reservation are reducing erosion, and increasing forage production. The Polacca spreader system, though it isn't used by our Association, is a good example of what can be accomplished. This system covers 16,000 acres, has increased the forage production by 300 percent, and the total vegetation by 700 percent. This may appear to be excessive,

but when it is realized that much of the area was barren and overgrazed in the 1940's, and now is well covered by grass, four-wing saltbush, and many weeds and shrubs, it is quite logical. There are many smaller systems in our area that help increase our forage resource. In certain instances it has been beneficial to rip some areas in the systems, but in most cases the silt load deposited makes this practice impractical.

Condition Improves

In the utilization checks made each year, and the range condition analysis made every four years, there has been a constant upward trend in all portions of the District, except in one small area where improper distribution has caused overuse. We are getting an increase in galleta, Indian ricegrass, and black grama with a decrease in spiny muhly (*Muhlenbergia pungens*) and three-awn grasses (*Aristida* spp.). The areas with sagebrush and piñon-juniper do not appear to respond to correct grazing practices alone. There is an increase in the understory of blue grama, but there is no re-

duction in the number of seedlings from these three invading species. It is estimated that in most piñon-juniper areas over 20 percent of the trees are less than 15 years old.

District Six of the Hopi Reservation, located in the high desert country, experiences a drought every five to seven years, which may last as long. We have just completed our third year without appreciable moisture, however, our forage reserve has been such that there has not been a critical shortage of forage during this drought period. During the past winter of 1956-57 there was some damage to livestock on the selenium areas, but there was no death loss. We will probably experience a slightly lower calf crop, and calf weight average, because of this condition.

Marketing Cattle

Over 95 percent of the cattle marketed in District Six are sold through public auction. We in this Association, along with two other associations and the majority of the independent cattlemen, hold an auction near Keams Canyon, Arizona every year in October. We have been able to draw buyers from most of the western states. The sale consists chiefly of six- and seven-month-old calves, a few yearling steers and heifers, and old cows culled from our herds. The calves have averaged about 390 pounds the last few years. Last year our sale totaled over 800 head.

Probably the surest and most exact measurement of range management practices is the amount of livestock products produced from a range over a long period of time. A continual increase in these products points to an advancing range economy. The total amount of livestock products produced in our District has increased about four times since 1940 (Table 2). The most significant increase has come

Table 2. Increase in total livestock production from 1940 to 1956.

| | |
|--|----------------|
| Total pounds of livestock products produced in 1940..... | 242,580 pounds |
| Total pounds of livestock products produced in 1956..... | 991,629 pounds |

in the percent calf crop and calf weight at sale time (Table 3). These increases are principally the result of increased forage quality and quantity, better water distribution, and better handling and breeding practices.

Livestock Associations

Almost all the cattlemen in District Six of the Hopi Reservation can be classified as progressive livestock men. These owners are organized into four associations, the main purposes of which are to members, and to provide an organization to initiate and promote improved range management practices. These associations do not manage the individual members' livestock. Each owner takes care of his own animals, and helps in cooperative projects affecting more than one owner, such as water development, branding, vaccinating, juniper eradication, and fence construction. The Polacca Stockgrowers Association is probably the best organized of all the Hopi associations. They were the principal recipients of the Department of Interior's Conservation Award for 1953, and have been instrumental in putting across to other ranchers progressive ranching ideas.

Since the co-authors of this article are cattlemen, the actual management practices of the sheepmen have purposely been omitted. The



The Polacca spreader system covers approximately 16,000 acres. The vegetation in this area has increased over 700 percent since the system was installed.

increases shown in sheep production (Table 3) were caused almost entirely by range improvements alone. These are mainly increased forage quality and quantity, and better water distribution. Some credit should be given to the use of purebred rams, now used by about one-half of the sheepmen. There are a few good sheepmen who tend to pull up the averages shown in Table 3. These sheepmen get well over 100 percent lamb crops, and average 10 pounds of wool per sheep. As the older sheepmen go out of business, they are being replaced by the younger generation who tend to go to cattle

or an improved type of sheep ranching.

Future Plans

The above information illustrates how a deteriorated and undeveloped range can be put back into economic production. Over a period of sixteen years the Hopi cattlemen have made tremendous advances in range and livestock management. They are not content to stand still in this line of progress, but plan to further increase their production by better distribution, made possible by the planned range water supply system, increased forage resulting from water spreading and range ripping, and a better breeding herd through an improved grade of cows and closer surveillance of the breeding herd during breeding and calving. We are making preliminary plans to apply these management practices to the remainder of the Executive Order should we be awarded its jurisdiction.

Table 3. Increase in calf and sheep production from 1940 to 1956.

| | 1940 | 1956 | Increase |
|-------------------------|----------|----------|----------|
| Percent calf crop | 48% | 90% | 42% |
| Average calf wt..... | 210 lbs. | 384 lbs. | 174 lbs. |
| Percent lamb crop | 30% | 50% | 20% |
| Average lamb wt. | 43 lbs. | 70 lbs. | 27 lbs. |
| Average fleece wt. | 3.5 lbs. | 7.5 lbs. | 4 lbs. |

Plan Now to Attend the 11th Annual Meeting!

Your friends will be looking for you in Phoenix, Arizona, January 28 to February 1, 1958, when they meet at the Hotel Westward Ho to help make the 11th Annual Meeting of the Society the best yet. Don't disappoint them—make your plans now to be there.