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The Changing Picture in Hawaiian Range Management

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Cattle ranching is changing in Hawaii as it is all over the world. From native or wild cattle, poor grass, inadequate water supplies, and limited management, the cattle industry is becoming a highly specialized business. For example, on Kealakekua ranch, here are a few changes: native low-producing grasses, many acres of jungle, a little water, and almost wild cattle, demanding 10 to 15 acres per animal-month of grazing, to what we consider well-developed, fast-gaining long 2-year-olds, grazing on improved pastures carrying 1 animal per acre-month for a 5 or 6 month period, and 2½ big steers per month for a like period on introduced grass and legume paddocks. We pump and store water at 400 to 800 pounds pressure in stages 6000 feet up Mauna Loa's sides; carry on a weed, shrub and tree eradication program; introduce new bulls with fast-gaining ancestral histories on rotated and deferred grazing programs.

The jeep, truck, tractor, and jackhammer are fast replacing the donkey, horse, pick and shovel. But, in so doing, I am reminded—looking world-wide—that probably more than three-fourths of our future grazing land will be in the tropics—land much like ours with varying soil, moisture, and elevation conditions, whereas, today, most of our commercial grazing lands are in the temperate zones. Probably that is the reason I weakened and agreed, when approached by the Journal of Range Management, to tell about our operation here at Kealakekua.

I was enthusiastic about the organization of our Soil Conservation District. We have one of the first cooperative agreements. SCS technicians have assisted us in soil surveys, grass and legume selections for pasture mixtures, renovations, ground preparation, and seeding methods. We believe the District has been of assistance to us.

Early History

Cattle ranching in Hawaii has an interesting history. We have much of the traditions of long-time Hawaiian livestock business since cattle were first brought to the Islands by Captain Geo. Vancouver, an English navigator, in 1793. The original cattle came from California, and it was the descendants of these cattle, bred with Shorthorns, that were on the ranch when purchased by my grandfather in 1881, operated by him, followed by my father, and since his death, by me. In 1881, locally beef had little or no value. The Honolulu market was limited and transportation difficult. Seven dollars and fifty cents was a good price in Honolulu for a big steer.

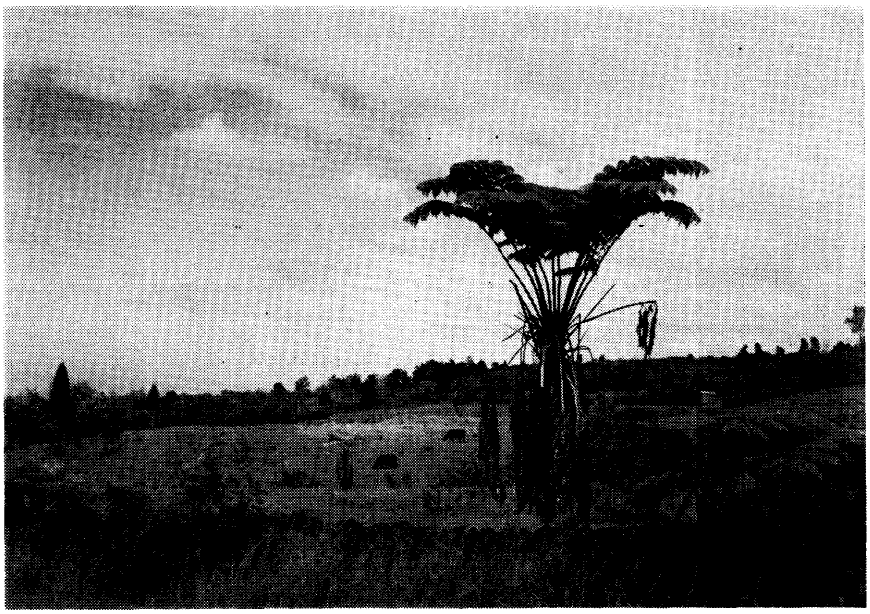

FIGURE 1. Representative Hawaiian pasture scene with old stone fence and tree fern against the horizon. *(Photo Soil Conservation Service, USDA)*

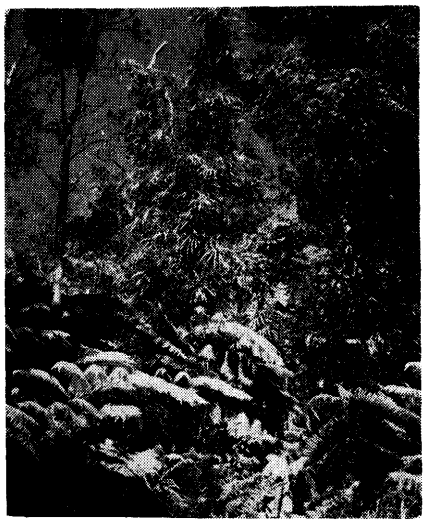

FIGURE 2. An example of the heavy tropical vegetation of ohai and fern trees with ieie vines climbing high on the trees. This vegetation must be removed when clearing for the development of new pastures. *(Photo Soil Conservation Service, USDA)*

Consequently, dairies were the rule of the day, and our ranch, Kaelakekua, had four. Saint Antone was located at the 2,300-foot level, Pawaena, Pauahi and Papaaloa, the uppermost, at an elevation of 5,100 feet, with an average annual rainfall of 85-120 inches. Because of necessity, all were above the today valuable lower land, subject to seasonal droughts. These lower areas had little or no tropical forage plants to support livestock.

Grandfather had no fences other than boundary walls built of stones. The calves were kept at the dairies, so the cows usually grazed within a mile of the dairy pens, returning each morning to their calves and to be milked. The land farther out was a thick growth of trees up to 70 feet in height. The forests at these elevations were bedded with brush and a variety of ferns, some 40 feet high. This tangled tropical vegetation was so thick that the sun seldom reached the ground. When it was very dry, or very cold, the ferns died back. It was during these periods that the cattle pushed their way into the jungled forest for the leaves of the ieie *(Freycinetia arborea)* and fern.

Ponds and springs lasted only a few days beyond the rainy season. There would be no water at the dairies. The livestock water or moisture came from the plants eaten by the cows.

Sherwood Greenwell was born in 1919 on the ranch where he is now manager, with the ownership shared with his mother, his sister, and himself. This dynamic young man is active not only in the management of the ranch but also in community enterprises. He was one of the organizers of the Kona Soil Conservation District and is a director of the district. He is a charter member of the Kona Rotary Club and was its president at the age of 34. He was active in the Junior Chamber of Commerce of Kona until age eliminated him. He was elected to the Board of County Supervisors for three terms.

During the years 1956-58 he was president of the Hawaii Cattlemen's Association. He is a member of Hawaii's Territorial Cattlemen's Council advisory committee to the University of Hawaii, director of the Hawaii Meat Company, and member of the advisory committee on noxious weeds to the Territorial Board of Agriculture and Forestry.

Mr. Greenwell has installed scales and weighs as many calves as he can at regular intervals, with the idea of selecting a breeding stock carrying the ability for fast gains. His leading cattle breed is a Hereford-Shorthorn cross. He also maintains a small herd of registered Shorthorns and is experimenting with the Santa Gertrudis.

The blazing summer suns, the howling northers, the drifts and banks of snow, and marrow-chilling, below-zero weather of the temperate zones, were more easily met and conquered by the early livestock operators than were the jungles. Now with new insecticides, breeding for tropical disease resistance, vaccines, shrub and tree eradication methods, coupled with new grasses and legumes, a whole new world of opportunity is coming into being for the livestock man. With modern transportation facilities, an ever-increasing world population, and higher standards of living, I believe we livestock men, and our sons to follow, stand on the threshold of a great new opportunity.

First Improvement Work

Our success at the ranch has not been phenomenal, but it has, like many other livestock operations in Hawaii, been progressive, consistent and rewarding.

As nearly as family history tells us, simultaneously with the start of the beef herd just prior to 1890, work was started toward the development of better ranges and pastures between elevations of 2,500 and 6,600 feet. After the seasonal foraging of the cattle into the forest, the seeds of a number of grasses were sown. As time went on, many acres of the former tree and shrub lands became more and more productive with, as we might say, a minimum of work. These so-called planted areas were given a helping hand by "weed men" stationed at the former dairies, who ranged out into the grasslands, slashing out the ferns and pulling down the ever-invading guava tree.

The grasses planted during these early years were those of the temperate zones—Kentucky bluegrass, orchard, and mesquite grass (Yorkshire fog) — all of which did well under the circumstances.

Somewhere near the turn of the century we believe the first California ricegrass *(Microlaena stipoides)* was imported. It was found growing many years later at Puulehua, the mountain headquarters of grandfather's first ranch. During the years following its discovery at Puulehua, it became, along with Kentucky bluegrass, the best grass for the newly-opened forest areas. I say, opened, because here at Kaelakekua we never really clear pasture lands. We open them up;

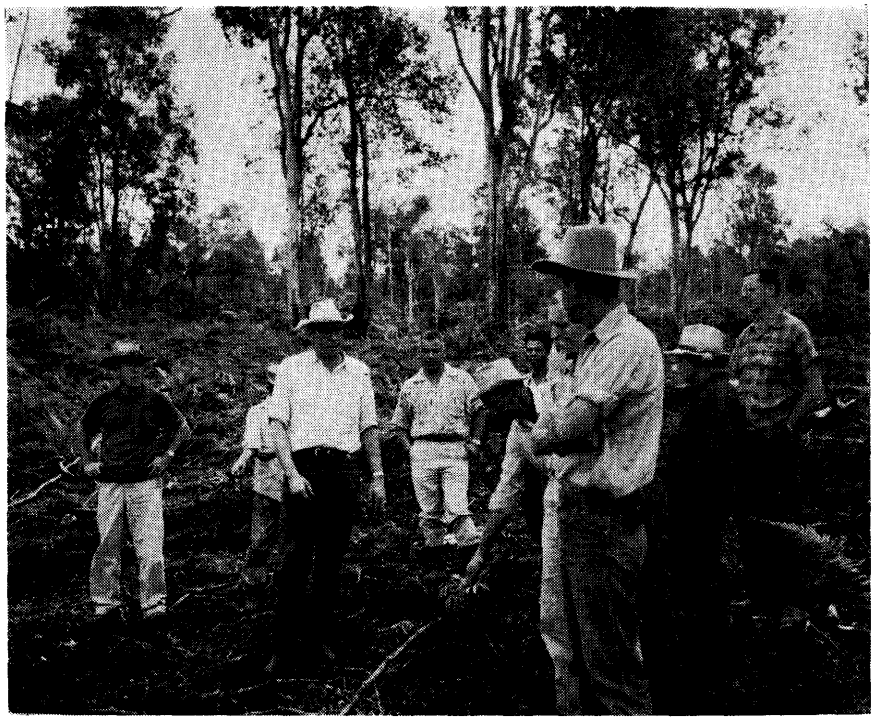

FIGURE 3. Sherwood Greenwell (in white hat and white shirt) explaining his pasture renovation and management program to member of a Kona SCD tour. The kikuyu cuttings are chopped and spread, a disk harrow covers the kikuyu, and then big trefoil and fertilizer are broadcast with a power machine. *(Photo Soil Conservation Service, USDA)*

many large trees are left for livestock and grass protection from the intensely hot, dry days of winter. We have always tried to keep as many trees as possible without interfering with grass growth.

Some logging and wood cutting opened certain areas to a grass start. Also, some landowners burned over large areas so that grass might get a start. Indications are that grandfather and father both recognized the value of trees and shrubs as soil and water preservatives, and allowed no wild burning of any kind. We try to keep certain water-producing areas in jungle.

Tropical Forages

The late twenties and early thirties brought the tropical forages to the ranch. Guinea and elephant grass *(Pennisetum purpureum)* and ekoa *(Leucaena glauca)*, a bush legume, were planted in the hot, humid pasture areas below the 1,200-foot elevation, and kikuyu *(Pennisetum clandestinum)* from Africa, for almost any elevation providing there is enough moisture. These plants have given us our highest producing pastures. It is on the lower pastures of guinea, elephant grass and ekoa during our summers (rainy season), when we have hot morning and rainy afternoons, that we get the best production. The carrying capacity runs to 2½ head and up per acre-month when fattening steers. Kikuyu is our major feed on the upper pastures, fenced into paddocks for the different types of cattle. Kikuyu's start was slow — hand sprigging just takes time and many, many hands.

In 1938 we had one of our real surprises during all the years of grass culture. Kikuyu plants were coming up everywhere. The grass was producing viable seed, and they were being spread from the droppings of the cattle. This is unusual, and the first time, we have been told, it has produced viable seeds outside of its native Africa. Kikuyu produces long runners, going away out, covering completely loose rocks and bare surface stone and soil.

This gives a false impression of the ground below it and has produced some rather amazing episodes. A few years ago the U. S. Soil Conservation Service was making their soil survey of the ranch. One of the men testing the depth of the soil, held his probe high above his head ready to force it deep into the thick grass at his feet only to have it stop short after going only an inch or two below the top of the grass. I don't know when I have seen a more surprised expression. This type of lava is known as pahoehoe and looks a great deal like the burnt remains of cherry pie filling on the oven floor.

Lava Creates Problems

This lava also produces other problems. Today the fastest and cheapest fence to build is one where 2-inch holes are drilled for studded iron fence posts with compressed air jackhammers and the posts then set with cement. The rock is so hard that all gate post holes must be made with paving breakers or blasted. Local woods, koa *(Acacia koa)*, ohia *(Metrosideros collina)*, and mamani *(Sophora chrysophylla)*, are used in some areas and are practical for different purposes. Koa, when dry, makes a very good post, lasting some 10 years in most areas and is our best for gates and bar pens. Ohia, when green, is easily worked and is best for pole sheds or covered areas. This wood when dry is very hard, and nails set in greenwood must be cut out when the wood dries.

Mamani, above the 4,000-foot elevation, is our best wood post, lasting up to 25 years. It is very hard, and special staples must be used in securing the fence. In the wet areas imported redwood is, along with steel, the best post

FIGURE 4. An example of open forest land planted to kikuyu grass with ohai trees as cover for shade to the livestock and to the grass during the extremely hot winter weather. *(Photo Soil Conservation Service, USDA)*

FIGURE 5. Part of the Greenwell breeding herd. This open pasture land is almost pure kikuyu grass. The trees and shrubs have been removed from this pasture during its renovation. *(Photo Soil Conservation Service, USDA)*

material. With this in mind, 550 *Sequoia sempervirens*, the redwood most used for lumber, have been planted to produce future redwood needs.

Water run-off is not the problem it could be on this steep land because of the porosity of the lava. Many holes and cracks on the surface open into lava tubes, from 2 to 12 feet in diameter below, which act as natural storm drains. In two areas these natural drainage ways have been used to great advantage in controlling storm waters, coming at times as heavily as 9 inches within a 3-hour period. Both locations have diversion dams of soil and rock, planted with eucalyptus trees to give added strength to divert the storm waters into the natural drains, protecting lower pastures and coffee farms from damage.

Clearing and Seeding

Clearing land today is done mostly with a large bulldozer taking off the heavy cover of trees and fern, with later follow-ups of basic applications of 2,4-D, or 2,4,5-T, depending upon the weeds encountered. Planting of these areas is done after the ground has been rolled with a 5½-ton surplus sugar mill roller pulled behind the tractor. This smooths the ground by forcing loose stones below the surface. Kikuyu grass cuttings are then made by putting the grass runners through a feed chopper. They are distributed by means of a modified lime spreader and lightly disked into the soil. This is followed, when the cuttings develop root, with 100 pounds of Ammo-phos 21-48 fertilizer and 2½ pounds of big trefoil *(Lotus uliginosus)* per acre. This completes the present planting practice, which has proven very satisfactory. Fertilizers are used to maintain the legume-grass balance — phosphates should the grass become dominant, or urea if the legumes take over.

The best pastures are below the 1,200-foot level, where there are normally 40 inches of rain a year, coming mostly during the

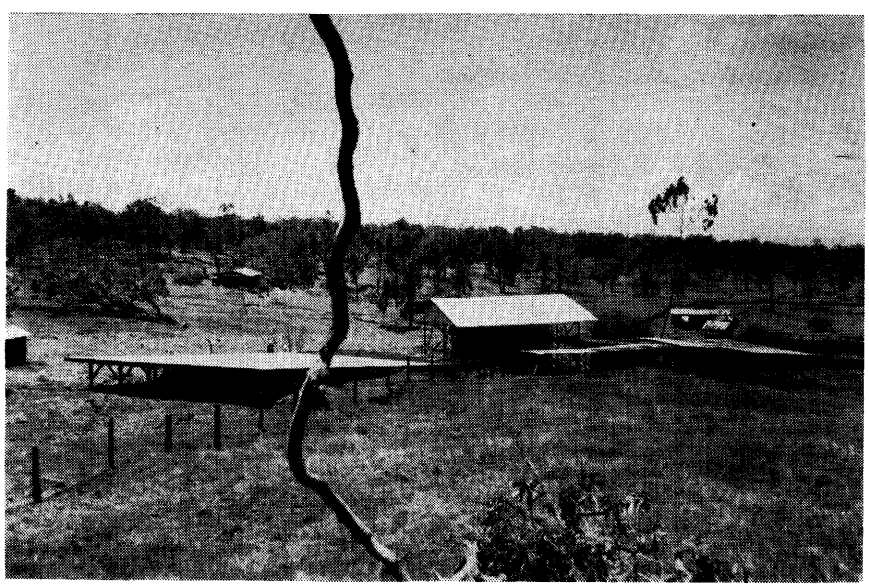

FIGURE 6. The catchment tanks at Pauahi under galvanized steel roofs, which gather the water during the rainy season and carry it to the tanks which are covered by the roofs. *(Photo Soil Conservation Service, USDA)*

summer, our wet season, and then in the late afternoons. Very hot mornings of about 80° with the preceding evening's rain, give ideal growing conditions. And so during the normal summers we have carrying capacities of 2½ head per acre.

Solving the Water Problem

Water has always been a problem, as our new volcanic ground is so porous that no water is held in underground dykes or seams producing springs. Pond and seepage areas dry as soon as the rains stop, so all water gathered in this manner and on corrugated iron roofs must be stored in wood or steel tanks. In the past, during the winters, the cattle were rationed water, only a couple of gallons apiece, and then watered again two days later. This meant that they were never satisfied and remained around the pens from one watering to the next, not going far to eat. This was our bad season. We just expected to lose at least 20 cows each season.

In 1953, to augment the rainwater and to guarantee an adequate supply of water, a pumping system made up of four high-pressure pumps was put into service. The system lifted water of 130 grains chloride from sea level, the only sure source of water, to Papaaloa, a camp 9½ miles up the slope of Mauna Loa at an elevation of 5,000 feet. This has given us an unlimited supply of drinking water for the cattle and has cut our season losses to zero. The pressures vary from 400 to 800 pounds. This year the line is being extended another 2½ miles to the 6,000-foot elevation, and through its distribution, we will better utilize the higher elevation pastures.

Future Prospects

Looking to the future, a system of rotation pastures are on the drawing board. Two areas are already in the planning stage, one incorporating six 17½-acre lots with a central water and feed pen, and another of four 75-acre paddocks. These will be high production pastures where fertilizer will play an important part. Through the use of new legumes, fertilizer, smaller pastures, and, rotation practices, we should, within the next five years, double our output.

Program for:

SUMMER FIELD MEETING

American Society of Range Management

and

The Colorado Section

Gunnison, Colorado, July 30-Aug. 1, 1959

July 30 (Thursday):

Board of Directors Meeting
Banquet for Society members and guests
Evening program of slide lectures on areas to be visited

July 31 (Friday):

Trip to Black Mesa Experiment Station

August 1 (Saturday):

Half-day field trip in the Gunnison area to inspect Woods Gulch Pilot Project, range reseeding, sagebrush eradication, and other improvement work

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Requests for hotel and motel reservations should be addressed to:

E. W. STEIN
U. S. Forest Service
Gunnison, Colorado