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No. 5

A Survey of
Livestock in Hawaii

BY

L. A. HENKE



AUGUST, 1929

Published by the
University of Hawaii
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INTRODUCTION

Production of livestock has long been a big factor in the commercial and industrial life of the people of Hawaii. The livestock in the territory is conservatively valued at \$11,600,000 at the present time and the animals and animal products marketed by the ranchers and dairymen of Hawaii in 1928 were valued at about \$5,250,000.

The purpose of this investigation was to gather the outstanding facts concerning livestock in Hawaii from the time of the first introductions to the present time. Published information on these points is meager and what little does exist is scattered through various publications of early days, of which only a few copies exist and these are not readily accessible to the public.

This survey was started a year ago and during this time the writer has had an opportunity to visit many of the leading ranches and ranchmen in the territory and thus get much first hand information from them which has never before been published. Without the cooperation of these men, some of whom are still engaged in ranching and others retired, the information presented here could not have been secured and I wish to express my great appreciation to them for their generous help. Their names appear scattered through the pages of this publication as managers or former managers of ranches, or government officials of Hawaii.

Practically all of the information pertaining to the period before 1860 was secured from the Archives of Hawaii, largely from letters in the files of the Interior Department of the Kingdom of Hawaii and news stories appearing in publications of that time, chiefly "The Polynesian" and "The Advertiser." I owe thanks to Mr. A. P. Taylor and his staff for their help in making this material available. Much valuable information was secured from the Transactions of the Royal Hawaiian Agricultural Society and I am greatly indebted to the members of this society, who in the early fifties recorded so interestingly the story of the agriculture of that time.

The first section deals in a general way with the introduction of the various classes of animals and breeds, and with miscellaneous items of interest concerning ranches and livestock in Hawaii at different periods.

In the second section, an attempt has been made to describe the larger ranches of the Territory in sufficient detail to give at least a fair picture of each of them. Forty-one ranches having approximately five hundred or more head of cattle are described in this section.

The last section is something of a summary of Section Two and also includes some more or less statistical information about livestock and livestock products in Hawaii at the present time, and importations of such products to Hawaii.

Every effort has been made to use only information from authentic sources in this bulletin. Nevertheless some few errors may have crept in and the writer will appreciate corrections. Furthermore, many readers of this bulletin will be able to add other important facts relative to matters discussed herein and such additional information or corrections are desired so that they can be included in a possible later bulletin on the same or similar subject.

L. A. HENKE,
University of Hawaii.

June 15, 1929.

"The pastures are becoming smaller, more numerous and better fenced; the tractor is turning acres of shrub-infested lands into stretches of rich feed with many times the carrying capacity; the wild racy steer may gaze with contempt on his thick, sleek coated cousin, but he's feeling pretty lonesome, and even the old cowboy has lost a little of the reckless twinkle in his eye. The change had to come, quality everywhere in everything had to improve, and in the fading picture of the old time ranch with its color, its freedom, its reckless love of the wild life,—in place of this we are getting better beef. It sounds flat, doesn't it? It is. Many of us would go back to the old days if we could, but we wouldn't last. I would be one of the first to start, and I would start just far enough ahead, so that I could sneak along, without anyone seeing them, a couple of thickset, low down, sleek coated friends of mine that I couldn't have the heart to leave behind."

Harold K. Castle in Aberdeen-Angus Journal, Jan. 2, 1928.

A Survey of Livestock in Hawaii

SECTION ONE

HORSES IN HAWAII

Hawaii has long been famous for its outstanding horses some of which have made notable records not only in island competition but in mainland contests, as well. Horse breeding and racing, often called the "sport of kings," has long been very popular in Hawaii particularly during the latter part of the nineteenth century. Hawaii's polo players and horses are favorably known wherever the game is played.

We have an excellent record of the first horses brought to Hawaii but after that only occasional references are found, which, nevertheless, give a general insight into the horse situation at different periods.

*First Horses to Hawaii*¹

"Richard J. Cleveland, American, brought the first horses to Hawaii on board his merchant-vessel, the Lelia Byrd, in the year 1803. They were California horses. The Lelia Byrd visited a small California Bay sixty miles from the Mission of San Borgia. Here Cleveland procured a mare and a horse as a present to the King of the Sandwich Islands. They were taken on board the 19th of May. Arriving at St. Joseph's Mission a week later, Cleveland purchased a mare and foal and sailed on the 28th for the Hawaiian Islands.

"Hawaii was sighted on June 19, 1803. Sailed from Kealakekua Bay on the 23rd and anchored next morning in Kawaihae Bay for the purpose of landing the mare with foal, for which John Young was very urgent. Cleveland landed the mare (and foal) in safety near this place, writing that this was the first horse that ever trod the soil of Owhyhee (Hawaii). The Lelia Byrd proceeded to Lahaina, where Cleveland landed the horse and mare safely and in perfect health.

"Kamehameha I visited Cleveland on board the Lelia Byrd near Lahaina, Maui, before the horse and mare were landed. The King viewed the horse but could not be betrayed into any expression of wonder or surprise. This 'want of appreciation of the value of the present which they had taken so much pains to procure was naturally a disappointment to the donors.'"

*Too Many Horses in 1854*²

"In making up a report on horses the first thing we wish particularly to call attention to, is the lamentable increase of the miserable creatures to be seen every day in the streets of Honolulu and in all the horse breeding districts on the Islands. Horses are evidently fast becoming a curse and nuisance to the country and to most of their owners, especially to the lower classes of natives.

¹ Edward North McClellan in Honolulu Advertiser—February 5, 1927.

² Report Committee on Horses, Trans. Royal Hawaiian Agricultural Society, Vol. 2, No. 1, pages 105-106 (1854).

"About one-half of the horses on the Island are never used for any purpose but multiplication—are never bitted or backed—are born, live and die without being of any advantage to anyone, or having served any purpose, useful or ornamental, but the impoverishment of the land, and the propagation of the nuisance."

Thoroughbred Horse Presented to the Emperor of Japan

C. A. Rice recalls that his father, William Hyde Rice, imported thoroughbred horses from England, probably by way of Australia and in the eighties presented a stallion to the Emperor of Japan, who sent him two beautiful vases in return.

Arabian Horses Imported in 1884

Makaweli Ranch and the Island of Niihau have part Arabian horses descended from Arabians imported from Arabia and India in 1884 by Aubrey Robinson. They report this breed as being very satisfactory.

Horse Racing in Honolulu Fifty Years Ago

In an article in "The Advertiser"¹ Julian Monsarrat states that his first recollection of racing was at a track on "the plains" about two miles from town on a site now covered by lovely homes. The race was under the patronage of King Kamehameha V and the race track was marked by two plowed furrows. Captain Cummings and Captain Meek had the largest string of horses.

About 1872 Kapiolani track near Diamond Head was laid out and racing was very popular for many years under the patronage of King Kalakaua and men like Mr. Dowsett, Meek Brothers, and Captain Cummings.

Later, unscrupulous people got interested in racing and killed the sport by their methods.

Horse Racing at Waimanalo

George Chalmers, Jr., manager of Waimanalo Sugar Company, has supplied the following interesting history:

Waimanalo was famous in the old days for its race horses, a stud of fine animals imported from Kentucky being maintained and there were several mainland jockeys attached to the establishment. In the days of King Kalakaua a race track was also maintained and some important races were run off in the presence of the King. His Majesty and the invited guests were conveyed on the steamer "J. A. Cummins" from Honolulu in gala style.

Some Men Who Fostered Horse Raising in Early Days

In an article presented to the Livestock Association on "Horses of the Islands, Past and Present"² Julian Monsarrat mentions Captain Thomas Cummings, Captain John Meek, Mr. Moffett, J. I. Dowsett, C. H. Judd, A. F. Judd, Jules Richardson, James Campbell, J. A. Cummins, Z. S. Spalding, Horner Brothers, William Hyde Rice, Mr. Sinclair and H. J. Crabbe as men who were interested in and fostered and encouraged horse raising.

Some Early Famous Horses

Among some of the famous horses of those days were the standard bred stallion "Oregon," purchased in Kentucky by Captain John Meek, and "Governor Stanford," a gray thoroughbred stallion foaled in 1868, bred by Leland

¹ January 19, 1913.

² Pacific Commercial Advertiser—December 23, 1903.

Stanford of Palo Alto, California, and imported by Captain Thomas Cummings of Waimanalo. "Governor Stanford" is credited with having sired some of the finest saddle and cattle horses in the Islands.

"Kealea," a bay thoroughbred stallion foaled in 1881, also bred by Leland Stanford, was imported by Z. S. Spalding.

"Hawaii" and "Joe Stacey," foaled in 1888 and 1889 respectively, were imported by the Horner Ranch (now Kukaiau Ranch).

William Hyde Rice owned a famous horse "Spraydon," and "Traducer" was imported by Mr. Sinclair from Australia.

Horner Ranch Importations

Eight volumes of the herd books of the Horner Ranch (now Kukaiau Ranch), dating back to the eighties, give a wealth of information about early cattle and horse importations by the Horner family. It is regrettable that similar detailed information concerning other importations in Hawaii has not been procurable at this time.

Many of the importations of the Horner Ranch trace back to "Hambletonian 10" blood and through him to the Charles Kent mare, Imported Bell-founder, Mambrino and Messenger,—horses that rank high in the history of trotters in America.

"Orion," a Standard bred trotting stallion dropped August 2, 1880, carried $12\frac{1}{2}$ per cent "Hambletonian 10" blood; "Impecatuer" carried 25 per cent; "Adrian," dropped March 19, 1895, carried $18\frac{3}{4}$ per cent, was purchased for \$500 and produced 95 colts on the Horner Ranch.

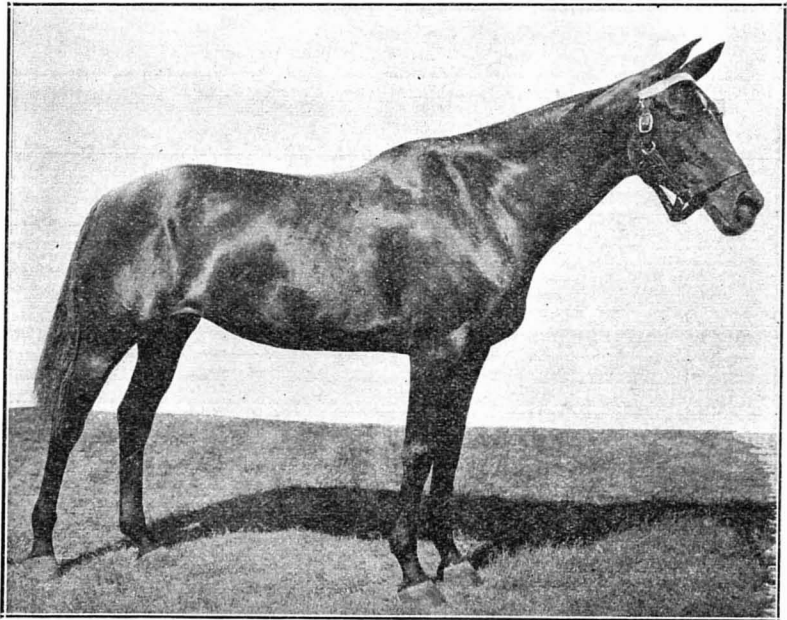


Fig. 1

Polo pony, Helen C, owned by W. F. Dillingham.

"Indra," a thoroughbred line bred stallion carrying 31¼ per cent of the blood of "Lexington," was offered for breeding for a \$35 service fee.

"Hollywood," carrying 9.37½ per cent "Hambletonian 10" blood, was imported by William Hyde Rice and his get were bred to the get of "Impecatuer," producing excellent horses which, according to Robert Horner, unfortunately were never properly developed as racing animals.

Other famous stallions described in the stud book were "Hawaii," out of "Lizzie Brown," by "Wildidle;" "Sea Breeze;" "Potrero," purchased for \$600 and carrying 12½ per cent "Hambletonian 10" blood; "Tamaki," imported from Australia by Robert Hind and Eben Low of Puuwaawaa Ranch about 1898; "Joe Stacey," dropped in 1889 and "Sam Lazarus, Esq.," dropped in 1896.

Ranches Raising Light Horses

Practically all cattle ranches in Hawaii raise light horses for their own use and some have a surplus for sale. The Parker Ranch, the largest, has approximately 2,200 horses and mules. Further details are given in the description of the various ranches in another section of this bulletin.

Some Winners at Recent Hawaii Fairs

Although horse races are less frequent in Hawaii than formerly, interest in light horses continues and polo is more popular than ever. "Helen C," owned by W. F. Dillingham, was one of the most famous polo ponies ever developed in Hawaii.

Some of the outstanding thoroughbreds at recent fairs are "Lord Brighton" and "Peg o' My Heart," stallion and mare owned by W. F. Dillingham; "Dunbar," owned by Hawaiian Agricultural Company and "His Lordship," owned by Mrs. H. K. L. Castle. The thoroughbred stallion "Advance Guard," owned by Haleakala Ranch Company, was a winner at fairs ten years ago.

"Miss Springtime," a half bred mare owned by Brig. Gen. George C. Barnhardt and "General Rich," a saddle bred stallion owned by Laie Plantation, were outstanding animals at the 1928 Territorial Fair.

Among other organizations and individuals who have consistently shown good light horses in recent fairs are Hawaiian Commercial and Sugar Company, Oahu Railroad and Land Company, Kualoa Ranch, H. A. Baldwin, S. A. Baldwin, H. W. Rice, H. K. Castle, and L. E. Case.

Heavy Horses and Mules

William Hyde Rice in the eighties imported Clydesdale, Belgian and Percheron horses to Hawaii. Percheron proved most popular and continue to be the leading draft breed in Hawaii, although the interest in heavy horses in Hawaii is somewhat eclipsed by the great popularity of the mule for work on the sugar and pineapple plantations. Many ranches have a number of Percheron mares which are largely bred to jacks for the production of large mules. These details are given in the description of the different ranches.

FIRST CATTLE IN HAWAII

Cattle were unknown in Hawaii at the time of the discovery of the Islands by Captain Cook, but were introduced by Vancouver in 1793. The following accounts which agree in the main essentials at least give in an interesting manner the story of the first introduction of cattle into Hawaii.

Account by Mr. Wyllie¹

"On the 19th of February, 1793, he (Vancouver) landed a bull and cow from California for Kamehameha I in the canoe of Krimamahoo, off the coast of Hawaii. On the 22nd of February, 1793, he landed five cows, two ewes and a ram, in the bay of Kealakekua for Kamehameha I; on the 15th of January, 1794, he landed a bull, two cows, two bull calves, five rams and five ewe sheep from California in Kealakekua Bay for Kamehameha I."

Reminiscences by Stephen Reynolds, Esq.²

"Cattle—The first cattle were landed by Captain Vancouver, from California. He landed first a bull and a cow, they were too weak to stand up; he hired a canoe to take them on shore where they could get grass. The bull died in a few days; the remaining cattle, healthy but thin, were landed at Kealakekua. The loss of the bull was a misfortune which prevented any increase. He had but one hope. Two of the young cows proved to be with calf and if one should bring forth a male, the increase might be effected. Fortunately his hopes were realized. At the request of Vancouver, Kamehameha tabooed the killing of cattle for ten years—except the males should become too numerous."

First Cattle to Hawaii³

First cattle in Hawaii were brought by Vancouver, English navigator, from California in the year 1793 during his second voyage around the world. They were committed to the care of Kamehameha I and were by him and his successors put under a strict tabu for a long time,—the natives say thirty years. They were first landed at Kealakekua Bay and turned loose, a bull and a cow, on the upland slopes of Hualalai. Here they rapidly increased and becoming a flock were removed to the Waimea plains, from whence breeding very fast, they spread inland and wandered off among the hills and valleys of Mauna Kea and became so numerous that when the tabu was removed about 1830, the interior plain and three mountains of Hawaii were full of them, and they were in some seasons hard pushed for feed, though generally very fat. A large part of the country over which these flocks roamed was entirely destitute of water three-quarters of the year and during the time when there was water, it poured down from the mountain side in an impetuous torrent, sinking at once and disappearing in the sandy plains.

First Cattle Were Longhorns

These first cattle introduced to Hawaii apparently were of the longhorn Spanish type, similar to those that once were prevalent in the Western ranges of the United States in early days. Indeed some of the descendants of these early cattle are found occasionally even today, although they are becoming scarcer each year, for only bulls of the improved modern breeds have been used on the ranches in recent times.

Angus Cattle in Hawaii

The first record of Aberdeen-Angus cattle being imported to Hawaii is found in a report of John Meek on Neat Cattle made to the Royal Hawaiian Agricultural Society in 1851 in which he states:

¹ Address delivered before Royal Hawaiian Agricultural Society, August 12, 1850, reported in *Trans. Royal Hawaiian Agricultural Society*, Vol. I, No. 1, page 46 (1850).

² Reynolds, Stephen—*Trans. Royal Hawaiian Agricultural Society*, Vol. I, No. 1, page 51 (1850).

³ From account in *Advertiser*—August 11, 1859.

"Within the last twelve months a very valuable accession has been made to the stock already here by the arrival from V. Dieman's Land of a pure breed Angus bull, originally imported from Scotland to V. Dieman's Land, a young Hereford bull, and two well bred cows in calf at the time of their arrival to the Angus bull. The cows have already since their arrival here, produced three calves, one male and two females, to the Angus bull and the great and obvious superiority of these over any of the native cattle, although running over the same land and treated in the same manner is a sufficient proof that so far as soil and climate go, these islands are capable of producing beef equal to any in the world."¹

This record, unfortunately, does not state who imported these animals and where they were taken.

W. L. Lee, President of the Royal Hawaiian Agricultural Society, two years later in reporting on Neat Cattle to members of the Society, states:² "Graziers are improving their cattle by crossing with previous importations from Australia. The best breeds yet introduced are those of Messrs. Hopkins and Moffatt, the Hereford and the Angus."

In 1881, J. I. Dowsett imported four Angus bulls and four cows from Aberdeen, Scotland, at a cost of approximately \$11,000.

The details of this importation are related in a letter from W. H. Purvis of Carphin, Cupar, Fife, Scotland, dated March 31, 1926:³

"In 1881 Mr. Dowsett commissioned a young Scotsman, Mr. Hugh Fergusson, who had come to Honolulu on a visit, to purchase cattle for him in Scotland. Mr. Fergusson, who was a grandson of Hugh Watson of Keillor, one of the original breeders and improvers of these cattle, bought a number (I forget how many) from the herd of J. Ferguson of Kinnochtry, near Perth, and returned with them direct to Honolulu across America by rail."

Sam Damon, about 1889, imported more Angus cattle from Scotland, probably two bulls and four cows and these were probably shipped around Cape Horn, according to A. C. Dowsett.

Robert Hind reports that Frank Spencer, previous to 1893, had some Angus cattle on lands now part of Puuwaawaa Ranch and that they did well, but because Herefords were most common on Hawaii and two breeds were a bother, the Angus cattle were not continued.

Importation from the United States started in 1894 with a shipment of fifty-four head from the state of Washington, and scattered importations in small lots have continued to the present time.

Among these later importations, ten males and forty females from San River Stock and Land Company at Helena, Montana, went to Honolulu Ranch on Maui about 1912 and later Damon Ranch imported Kielinger II, who achieved some fame through his get, notably his daughter, Queen's Viola K, International Grand Champion in 1925. Kaneohe Ranch has imported a number of excellent animals, including a bull rich in the blood of Black Woodlawn, six heifers from Iowa breeders, Blackcap Revolution blood from the Harrison Stock Farms in California, and more recently the bull Barbarian of Rosemere was imported from Congdon and Battles at North Yakima, Washington. Other recent importers of Aberdeen-Angus cattle include Grove Ranch on Maui, Wawamalu Ranch on Oahu and Kamehameha Schools of Honolulu.

Keaau Ranch on Hawaii has had some Angus cattle in the past and still has one paddock of this breed. They state that they find the Angus harder to drive than the Herefords.

Kekaha Sugar Company Ranch imported four Angus bulls and eight

¹ Trans. Royal Hawaiian Agricultural Society. Vol. I, No. 2, page 76 (1851).

² Trans. Royal Hawaiian Agricultural Society. Vol. I, No. 4, page 9 (1853).

³ Honolulu Advertiser—April 22, 1926.

cows, but state they did not seem to have milk enough for their calves in the poorer pasture and when put in the better lowland they contracted liver fluke.

Ayrshire Cattle

Ayrshire cattle are found to a limited extent in the Territory, but they have never become numerous enough to be classified as one of the leading dairy breeds of the Islands.

Charles A. Rice recalls that his father, William Hyde Rice, imported Ayrshire cattle from the British Isles forty or more years ago, these probably being brought around Cape Horn.

The College of Hawaii formerly had a small Ayrshire herd secured largely from Mr. J. W. Clise of Redmond, Washington, about 1910.

Lihue Plantation, about 1918, imported forty beautiful Ayrshire cows selected in Eastern states. Sixteen of these original Ayrshires are still at Lihue Dairy.

Among recent or present owners of Ayrshire cattle in the Territory are Lihue Plantation dairy, Pioneer Mill Company dairy, Waimea Sugar Mill Company dairy, Messrs. C. A. Rice, H. W. Rice and George P. Cooke.

Brown Swiss Cattle

In a letter from the Brown Swiss Cattle Breeders' Association dated September 11, 1923, they state that G. F. Straut of Honolulu imported twelve Brown Swiss females into Hawaii from the continental part of the United States in 1913. They have no further record of what happened to these cattle, and no record has been found locally concerning them.

Devon Cattle Introductions

The first record of a Devon importation to Hawaii appears in the *Polyesian* of February 10, 1855, a summary of which follows:

The first Devons arrived January 27, 1855, by the ship "Vancouver," 134 days from Boston around the Cape, and consist of a fine red cow called Edith not yet three years old costing \$350 in Westchester County, New York; a young ten months old bull of same color named Herod and costing \$150 and a bull calf born to the cow January 6, 1855. These animals are pure-bred and pedigreed. They were imported by the Royal Hawaiian Agricultural Society which owns half interest in them, J. Montgomery, Esq., who owns one-quarter and Dr. R. W. Wood who owns the other quarter.

Captain Jenkins commanded the ship and they will be under the charge of R. H. Bowlin, Esq., of Koloa.

With transportation the total cost was about \$765 and much gratuitous labor and free freight on ship.

Sometime after 1880, according to H. D. Sloggett, Mr. Wilcox and his brother A. S. Wilcox imported four Devon bulls from New Zealand.

The late Francis Gay reported buying two Devon bulls from George Wilcox for use on a ranch at Makaweli and he stated that these Devons were probably imported from New Zealand by Mr. Wilcox. He also mentioned that Devons were widely used as work animals in early days on sugar plantations.

Knudsen Bros. of Kauai introduced some Devon bulls in the present Kekaha Sugar Company Ranch about 1898.

James G. Munro reports that the American Sugar Company about 1898 imported twenty-five Devon bulls and ten cows from California where they proved very adaptable and Molokai Ranch was for many years a Devon Ranch.

There was a Devon bull on the Parker Ranch in 1899.

George P. Cooke, the present manager, reports importing Devons from New Hampshire about 1920. Hereford bulls have been used on Molokai Ranch since 1923. Devons were quite satisfactory but it was rather difficult to secure new stock.

The cattle of the Koloa Sugar Company for a long time previous to 1920 were more or less pure Devons.

H. D. Sloggett, Lihue, Kauai, reports importing five Devon bulls in 1921 at a cost of \$3,750. These were secured from Giltner Brothers of Kentucky and two of them are still in service in Grove Farm Company, Ltd., pastures.

Dexter Cattle

Dexter cattle or Tom Thumb cattle as they are often called locally, were introduced to Kauai at quite an early date. H. D. Sloggett reports that W. H. Rice was the first to import this breed to Kauai and that Mr. Moffatt, then manager of Kahuku Ranch, was the first to import them to Oahu. The late Francis Gay reported seeing a herd of 100 or more of them at Waimea, Kauai, about 1868, the ancestors of which were probably introduced by J. B. Rowell, a missionary of Waimea, Kauai. They were probably brought directly from Ireland around Cape Horn. Mr. Gay stated that these cattle appeared to be doing well and were probably mostly grades with perhaps some purebreds among them.

Mr. Gay further stated that these Dexter cattle were quite prepotent, stamping their characteristics on their offspring to quite a degree. They were not generally kept pure but a few grade Dexter bulls are probably still around. Most people considered them too small.

E. A. Knudsen reports introducing Tom Thumb bulls to what is now Kekaha Sugar Company Ranch about 1902.

Dutch Belted Cattle

According to available records, six Dutch Belted cattle were introduced by Robinson A. McWayne about 1915 and taken to the McWayne Ranch in Kau, Hawaii. Here they became crossed with other cattle, and probably no purebreds of this breed are found in the Islands at present.

Herefords in Hawaii

Herefords are by far the most popular breed of beef cattle in Hawaii at the present time but apparently were not introduced in numbers until after 1890.

John Meek, in his report on Neat Cattle made before the Royal Hawaiian Agricultural Society in 1851, mentions the introduction of a Hereford bull during the preceding year (page 9 of this publication) and W. L. Lee, President of the Royal Hawaiian Agricultural Society, in his report in 1853 states:¹ "The best breeds yet introduced are those of Messrs. Hopkins and Moffat, the Hereford and the Angus."

No published records of earlier importations of Herefords to Hawaii have been found. W. H. Shipman is of the impression that William H. Johnson brought Herefords to Kona in the fifties but that they soon lost their identity by being crossed with other cattle. Frank Greenwell believes that cattle resembling Herefords, in color at least, were seen in Kona about 1880.

C. A. Rice recalls that W. J. Irvin and Company, predecessors to C. Brewer and Company, brought in forty or fifty Hereford cattle from England perhaps forty or more years ago, and that his father, William Hyde Rice, shipped Hereford cattle from Hawaii to California.

¹ Trans. Royal Hawaiian Agricultural Society, Vol. I, No. 4, page 9 (1853).

G. N. Wilcox, W. H. Rice and Lihue Plantation imported three Hereford bulls from Australia about 1880, according to H. D. Sloggett.

Robert Hind and Eben Low imported a number of Hereford bulls and cows from New Zealand about 1895 shortly after they started Puuwaawaa Ranch and Mr. Low recalls that these animals cost \$115 each. Later they imported Hereford bulls from Gudgell and Simpson of Independence, Mo.

Alfred W. Carter, manager of the Parker Ranch, has imported a number of Herefords, among which are "Oddfellow," from the middle West about 1900, and "Kamiakin," a bull sired by Beau Donald 31st was imported from the State of Washington soon after this. In 1909 he selected ten cows from the Gudgell-Simpson herd and about the same time Prince Rupert 17th and Prince Rupert 26th were selected. Later some bulls from the W. H. and J. M. Curtis herds in Kentucky and Missouri were selected. Among the last bulls brought over from the mainland by the Parker Ranch were Paragon 12th and Bonnie Lad 24th.

The entire eight volumes of herd books of Kukaiiau Ranch were made available to the writer, giving a wealth of information about their importations since the beginning of the ranch. Many of their Hereford bulls were imported early in 1900 and include Beau Alexis, Beau Grampus, Roseland Almo 3rd, Antonius and Godolphin. Many of their importations were rich in the blood of Beau Brummel, Don Carlos, Lamplighter and Anxiety 4th,—all outstanding animals in Hereford breed history. Godolphin was purchased for \$500 but prices paid were not given in most of the records. These animals were purchased largely from Gudgell and Simpson of Independence, Mo., F. Rockefeller of Belvedere, Mo., John Sparks of Reno, Nevada, James Whitaker of Galt, California, K. B. Armour Estate of Kansas City, O. Harris of Harris, Mo., A. J. Splawn of North Yakima, Washington and Robert A. Steel of Richland, Kansas. It is regrettable that such detailed records of importations of other important Hereford ranches are not available.

In 1908 A. Mason of Puakea Ranch imported eight Hereford bulls and

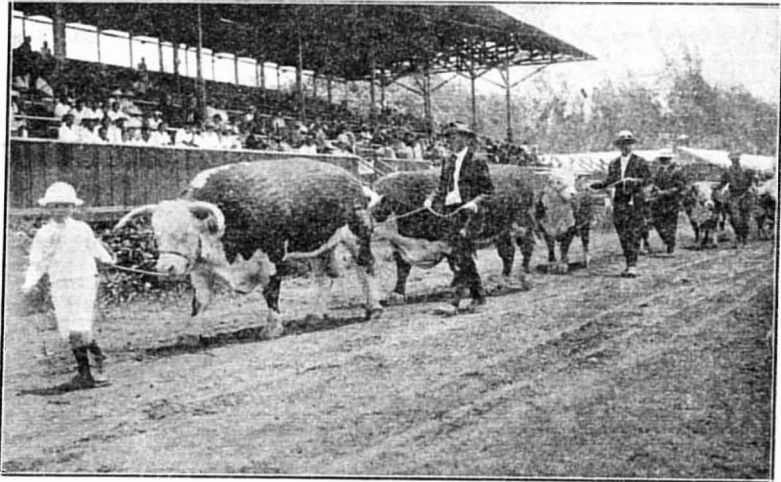


Fig. 2
Hereford cattle on parade.

ten cows from Joe M. Flaherty of Plainview, Oregon, paying \$130 each for them. In 1920 he imported five Hereford bulls from Giltner Bros., of Eminence, Kentucky, paying \$500 each for them.

Sam Baldwin of Haleakala Ranch in 1919 imported one bull and ten cows from the middle West at an average cost of \$1,200.

Holstein Cattle

Holstein cattle are by far the most numerous of the dairy breeds in Hawaii, and importations of bulls and some cows of this popular breed continue to be made by the leading dairymen in the Islands.

No record of the first Holstein imported to Hawaii has been found. Eric A. Knudsen recalls that about 1883 his father, Valdemar Knudsen, purchased two large Holstein bulls and that the blood of these animals became quite widely spread through the herd at Kekaha, Kauai.

In 1889 H. N. Greenwell of Kona purchased a Holstein bull from Judge McCully, who conducted a dairy near Honolulu. This was probably the first Holstein introduced to Kona.

Kukaiaiu Ranch in the nineties began importing Holsteins from California. A bull imported by them about a dozen years ago, Matador Segis Walker, was resold to the Carnation Stock Farms at a great increase in price after some cows closely related to him had made some outstanding production records.

When the Parker Ranch started their purebred Holstein herd about eight years ago, many of their excellent foundation animals were purchased from the Field herd and the Mount Hermon School in Massachusetts.

The Hind-Clarke dairy have imported a number of Holsteins from the Carnation Stock Farm in Washington and more recently from the Lazears of Wyoming.

Prices ranging between \$500 and \$2,000 are frequently paid by local dairymen for good imported Holstein sires.

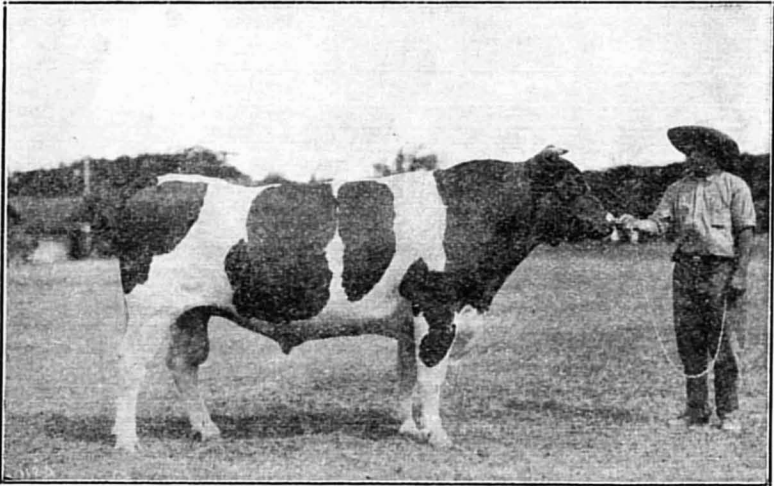


Fig. 3

Holstein bull owned by Hawaiian Agricultural Company.

Shorthorn Cattle

The committee on cattle of the Royal Hawaiian Agricultural Society in 1854¹ reported awarding \$20 or Silver Cup to Thomas Cummins of Honolulu for an imported short-horned Durham bull. This seems to be the first published record of Shorthorns in Hawaii.

Numerous Shorthorns were imported during the next fifty years. The following are some of the introductions recalled by men still engaged in ranching, or who formerly were interested in the livestock industry of Hawaii.

Niihau Ranch has had Shorthorns since the ranch was first started in the early sixties and about 600 to 700 Shorthorn cattle are found there today.

H. D. Sloggett reports that G. N. Wilcox purchased a Shorthorn cow from Paul Isenberg about 1864, this cow being the first of the present Grove Farm herd on Kauai.

Dr. Trousseau and William H. Johnson had Shorthorn cattle in Kona previous to 1875 and good Shorthorns were found on Kahuku Ranch in Kau about 1870, according to Frank Greenwell.

The late Francis Gay recalled that his uncle, Francis Sinclair, imported a Shorthorn bull from New Zealand about 1875 and that Aubrey Robinson also imported Shorthorns from New Zealand about that time.

Shorthorn blood was found on Waiawa Ranch (now Kekaha Ranch) before 1875, according to E. A. Knudsen.

A. C. Dowsett remembers that his father, J. C. Dowsett, brought Shorthorns to Hawaii from Oregon about 1878, but that they were mixed with other cattle and soon lost their identity.

James Wood about 1880 imported a famous Shorthorn bull, "Cherry Prince," from England and put him on Puuhue Ranch, according to Eben Low.

J. H. McKenzie states that Shorthorns were found on Puakea Ranch in the eighties and predominated until 1901, after which Herefords introduced to Puakea as early as 1889 gradually replaced the Shorthorns.

A small Shorthorn breeding herd was maintained on Kukaiaiu Ranch until about 1912, according to Robert Horner. The Shorthorn bull, "Laurel Duke," was purchased from J. A. Brewer of Irvington, California, by Albert Horner about 1889 and brought to Kukaiaiu Ranch.

Alfred W. Carter secured Shorthorn bulls and cows from California about 1901 and a small purebred Shorthorn herd was maintained on the Parker Ranch for a few years, but they were soon replaced by Herefords because, according to Mr. Carter, under conditions prevailing at Waimea at that time—long distances to walk to water and only fair grazing—the Herefords did better.

Robert Hind reports that Frank Spencer previous to 1893 had some Shorthorn cattle on some lands now included in Puuwaawaa Ranch but that under adverse conditions Shorthorns did not do as well as the Herefords.

H. M. Von Holt introduced Shorthorns to the Oahu Railroad and Land Company ranches on Oahu about 1890 and they have continued with Shorthorns to the present time, now having about 2800 head of Shorthorn grades and some purebreds.

The Vredenburg Ranch in Kau has used Shorthorn bulls since 1920 and now has a nice herd of about 300 head of Shorthorn grades.

¹ Trans. Royal Hawaiian Agricultural Society, Vol. 2, No. 1, page 79 (1854).

INTRODUCTION OF SHEEP TO HAWAII

Various records of the introduction of sheep to Hawaii are found in the Archives of Hawaii. These records are not by any means complete or continuous but they give some interesting information on sheep importations to Hawaii and early day problems.

*First Sheep Introduced*¹

Mr. Wyllie in an address delivered before the Royal Hawaiian Agricultural Society Aug. 12, 1850, states that "on the 22nd of February, 1793, he (Vancouver) landed five cows, two ewes and a ram, in the bay of Kealakekua for Kamehameha I; on the 15th of January, 1794 he landed a bull, two cows, two bull calves, five rams and five ewe sheep from California in Kealakekua Bay for Kamehameha I."

*Report of Minister of Interior, G. P. Judd, in 1845*²

"Through the enterprise of Mr. French, a few rams of the Merino breed have been introduced into his flock on the Island of Hawaii. As yet little attention has been paid to the growing of wool for export, but the Islands present some scope for sheep, and with the improvement of the breed a corresponding improvement of the fleeces is to be expected. The advantage of a small flock of sheep or goats to the common farmer is not fully appreciated, and I believe in many cases they have been prevented the use of waste pasture by the interference of the head-men."

Government Sheep in 1845

That the government of Hawaii was the owner of sheep is indicated in a letter³ by Joseph Gardner of Koulou, Kauai, to Minister of Interior G. P. Judd dated May 23, 1845, requesting permission to take care of government sheep for another year as well as to take charge of the other part of the government flock which he says he hears are dying fast, while of those under his charge only one has died since he took charge. For compensation he requests the wool and a portion of the increase.

His request was granted by G. P. Judd, with the additional privilege of killing one ram a month until such time as the number of rams decreased to a reasonable number.

Mr. Gardner further states that if wool made into girthing would sell in Honolulu he could make same for fifty cents per yard.

Report of G. S. Kenway on Sheep Situation in 1852

In his report before the Royal Hawaiian Agricultural Society⁴ Mr. Kenway states that two Merino ewes imported from Sydney were exhibited at a fair and "two large black beasts of a foreign breed and very mysterious pedigree."

He made a plea for producing wool as well as mutton. "Are we going to raise sheep on these Islands for mutton alone or for mutton and wool? That is the question. For we can have good wool, and good mutton,—first rate mutton inside it. And we can raise enough sheep on these Islands to make mutton a drug which wool never can be."

¹ Trans. Royal Hawaiian Agricultural Society, Vol. I, No. I, page 46 (1850).

² Report of Minister of Interior to Nobles and Representatives of Hawaiian Islands in Legislative Council assembled—year 1845—page 13.

³ Archives of Hawaii, Letter Book No. 1. Local correspondence 1844-1846, pages 53-57.

⁴ Trans. Royal Hawaiian Agricultural Society, Vol. I, No. 3, pages 126-127 (1852).

South Down Sheep Introduced

In his report on sheep to the members of the Royal Hawaiian Agricultural Society, President W. L. Lee of the Society states,¹ "Our breeds, however, which were originally the Saxon and Merino, imported I believe by the late William French, have been sadly deteriorated by in and in breeding.

"Steps have been taken to regenerate our breed by an importation of fresh stock. Messrs. Hopkins and Moffat have imported some fine Merinos from Australia and Mr. Thomas Cummins has on the way to the Islands two fine ewes with lamb and two fine rams of the pure South Down breed which raise good wool, and are unequalled for their mutton."

He reports that great losses occur from packs of worthless dogs that constantly prowl like so many hordes of wolves in the woods bordering the best sheep districts.

Sheep Ranch on Waimea Plains in 1856

According to Eben Low, his uncle, Frederick Low, started a sheep ranch on the Waimea plains of Hawaii about 1856, the ranch being located between the lands of J. P. Parker and the Waimea Grazing Company. About 1859 he left the Islands with his Merino sheep and took them to California on a sailing vessel.

Saxon-Merino Sheep Introduced²

"Six pure blooded sheep of above breed have just arrived per bark Harburgh from Germany to the order of Mr. L. Smith of Waimea, Hawaii, for the farm of Messrs. Louzoda and Spencer. They were ordered two years ago—were 180 days on the ship but arrived in good condition. The whole six are of finest quality and of no affinity to each other. They are the first pure Saxon-Merinos that have been imported from Germany to these Islands."

Merino Sheep from Germany³

"The Bark R. W. Wood brought from Germany six fine pure-blooded Merino rams, all of which appear to be in the best of condition and are noble looking animals. They are engaged by various parties, Messrs. Cornwell & Company taking three, Wm. Webster one and S. N. Emerson of Waialua one. These added to the late importations from Germany by Messrs. Hoffschlaeger and Stapenhorst and the four now on the way out from Emperor Napoleon, will be an acquisition to our Islands and must result in greatly increasing our wool which is becoming a noticeable item of export."

Gift of Sheep From Emperor of France⁴

"The Emperor of the French has presented four picked rams from the Royal flock at Rambouillet to the King of Hawaii. They are now in the care of Mr. S. Spencer, an officer of the Hawaiian Government, who has brought them to England en route to their destination, where fine wool growing is becoming a very profitable business; the King himself having established a large flock in order to encourage others in this useful branch of productive industry."

¹ Trans. Royal Hawaiian Agricultural Society, Vol. I, No. 4, pages 10, 11 (1853).

² Pacific Commercial Advertiser—October 21, 1858.

³ Pacific Commercial Advertiser, March 6, 1862.

⁴ Pacific Commercial Advertiser, March 6, 1862.

Sheep to Niihau by British Vessel

In the letters of the Interior Department¹ is one from Charles Gordon Hopkins of the Home Office to Hoffschlaeger and Stapenhorst, agents for Captain Thomas Gray, Commander of the British Barque "Bessie" under date of April 2, 1864, in which permission is granted to carry 3,000 sheep from Molokai to Niihau. This apparently was quite unusual to permit a foreign vessel to interfere with the inter-island carrying trade, but was granted because of the likelihood of sheep getting disease or scab from inter-island vessels as well as to encourage the industry just as sugar had been encouraged.

Tunis Sheep Introduced

The British ship "Restorer" early in 1900 carrying Tunis sheep from the Mediterranean countries for food, exchanged some of them for mutton from the American Sugar Company of Molokai. These Tunis sheep did very well and about 1904 G. C. Munro, Manager of Molokai Ranch, imported more of them from Charles Roundtree of Crawfordsville, Indiana. About 1910 George P. Cooke, then manager of Molokai Ranch imported fifty more Tunis sheep selected by E. V. Wilcox, Director of the Federal Experiment Station in Honolulu.

Both Mr. Munro and Mr. Cooke agree that Tunis sheep did very well in Hawaii and they were not continued only because of reduced grazing areas and a poor wool market. They were considered excellent mutton sheep.

First Goats to Hawaii²

"First goats were introduced to Hawaii by Captain Cook Feb. 1, 1778 leaving one ram and two ewes on island of Niihau. Also left a pair of English breed pigs at same time."

Early Records of Swine in Hawaii

Swine seemingly were found in the Hawaiian Islands when Cook made his voyage in 1773³ but no record as to how they got to Hawaii is available. Captain Cook left a pair of English breed pigs February 1, 1778.⁴

Government Hogs

Under date of December 26, 1849, P. Kanoa of Kolaa, addresses a letter to his highness John Young, Minister of the Interior, stating his belief that the wild pigs in Kauai belong to the government and advising the minister that _____ is slaughtering the pigs in the Waimea mountains by chasing them with dogs and killing them. P. Kanoa desires to know what he should do about it?

Hogs Shipped to California in 1853⁵

"The demand for live hogs for exportation to California exceeds the production and hardly a vessel leaves for San Francisco that does not carry a deck load of grunTERS. They are worth 4 to 6 cents per pound on foot and the business of raising them is within the scope of the natives and pays well."

¹ Archives of Hawaii. Interior Department Letters No. 7, June 12, 1857, to June 16, 1866, page 538.

² Thrum's Annual, 1909, page 128.

³ Krauss, F. G., in Pacific Commercial Advertiser, Dec. 24, 1903.

⁴ Thrum's Annual, 1909, page 128.

⁵ Report on Swine by Pres. W. L. Lee to Royal Hawaiian Agricultural Society in Trans. Royal Hawaiian Agr. Soc. Vol. 1, No. 4, page 11 (1853).

Berkshires in Hawaii in 1855¹

"The black Berkshire Boar, imported No. 135, was a very fine specimen and we consider him well entitled to the first prize."

GOVERNMENT CATTLE, HORSES AND SHEEP

That the Government of Hawaii was the owner of cattle, horses and sheep is indicated by various letters found in the Archives of Hawaii of which the following are illustrative:

Government Sheep in 1845

In a letter dated May 23, 1845, Joseph Gardner of Koulou, Kauai, writes to the Minister of Interior G. P. Judd and requests permission to take care of the government sheep for another year. For compensation he requests the wool and a portion of the increase. His request was granted.

Cattle at Wailuku in 1845

Under date of October 18, 1845, G. P. Judd writing for his Majesty to the owners of cattle at Wailuku advises them that permission to pasture cattle on the Wailuku plains expires soon and requests that they appoint a committee to come to Honolulu to renew the permit. The letter implies that the government receives the one-tenth increase in cattle for pasturing privileges.

Government Cattle at Waimea in 1847

Under date of January 7, 1847, William Beckley of Waimea writes to Minister of Interior G. P. Judd stating that he has branded 300 cattle for the Government.

Offer of Sale of Cattle to Government in 1847

In a letter dated February 13, 1847 addressed to the Minister of the Interior, a rancher desires to sell to the Government all of his cattle on Kauai on the following basis:

"From large to ones where the horns have appeared—males and females—200 head at \$8.00 a head.

All yearlings and young calves—\$3.00 a head.

Four working oxen at \$50.00 a pair."

Care of Government Cattle in 1848

August 1, 1848, Miguel entered into an agreement to care for Government cattle at Waialua, Kauai, the government to furnish him a house for himself, pens for cattle and calves, and a house for milk storage. The Government was also to furnish horses.

Miguel was to take good care of the cattle and calves, castrate all young males and brand all cattle with the Government brand. Upon the arrival of any vessel to procure cattle, he was to assist in shipping.

Miguel was also to keep in good repair all buildings and fences and keep a record of all cattle.

¹ Report Committee on Sheep and Swine before Royal Hawaiian Agricultural Society in Trans. Royal Hawaiian Agr. Soc. Vol. 2, No. 2, page 13 (1855).

The above agreement was between the Minister of Finance of the King and Miguel.

Use of Government Horses Requested

Under date of November 28, 1850, Huanu Paniola writes to His Highness John Young asking to be employed to look after cattle, particularly rounding up wild cattle belonging to John Young and sisters, requesting that some of the Government horses at Waimea be assigned to him for this purpose.

Request to Purchase Government Horses on Kauai

Honolulu
July 21, 1851

Dear Sir:

I desire to purchase all of the Government horses on Kauai and I will pay \$3000 within one year from this date.

Respectfully yours

G. P. JUDD.

His Excellency
John Young
Minister of Interior
Honolulu

Request to Purchase Government Cattle at Waimea

August 6, 1851, Charles G. Hopkins applied to the Minister of the Interior to purchase the Government cattle in Waimea, Hawaii, for \$7000.

Sale of Government Cattle¹

The King writes a letter to Isaac Davis advising him that the Government has sold to Mr. Van Houten the cattle on the Mountain of Waimea, numbering about 588 yokes. He appoints Davis herder of Government cattle and requests him to appoint a suitable person to assist Mr. Van Houten in securing these cattle.

Wild Cattle Rights Leased in 1870

Under date of August 13, 1869, Theo. H. Davies, agent for Waimea Grazing and Agricultural Company, asks the Minister of the Interior to renew the lease of wild cattle on the Island of Hawaii. He states he has just received renewal of lease for ten years of the lands for the Crown Commissioners and now desires renewal of lease of Government half interest in the wild cattle.

Under date of April 5, 1870, F. W. Hutchison writing to Theo. H. Davies advises him that for \$2000 per annum he may have the privilege of killing the wild cattle running on the Island of Hawaii—those cattle being the joint property of the crown and government,—and he is writing for both.

Mountain Land Leases Much in Demand

Charles T. Gulick, Chief Clerk, writing to W. L. Green, Esq. Honolulu, who desires to lease mountain lands and wild cattle on Mauna Kea, states that Commissioners of Crown lands have decided to lease these to Waimea Grazing Company for five years at a rental of \$1600 per annum.

¹ Interior Department Letters, June 12, 1852-June 12, 1857. No. 6, page 438.

GLIMPSES OF HAWAII COWBOYS, RANCHES AND LIVESTOCK SINCE 1793

Cattle were first introduced to Hawaii in 1793. Nothing like a complete and continuous history of the changes that have taken place through the one hundred and thirty-five years that have elapsed since then is available but sufficient scattered records can be found in the Archives of Hawaii and in the private records of former cattlemen to give a fairly comprehensive view of the industry at different stages, particularly so when these records are supplemented with other details and recollections drawn from the memories of former ranchers still living in Hawaii.

Such records as relate to breed introductions or individual ranches will be found under the proper headings in this bulletin, but other general observations that do not properly classify under these heads but which are nevertheless of great interest and value will be noted here.

Wall Built in Kona to Confine Cattle

Several ranchers recall hearing that a big stone wall, high and wide, was built in Kona above Kealakekua, enclosing perhaps four hundred to five hundred acres for the purpose, according to one story, of keeping the cattle, which had greatly multiplied since their introduction, out of the taro patches. This wall was built at the order of Kamehameha I who ordered the whole population of this section to this task. Another story which implies an earlier building of the wall, was to the effect that the wall was built to confine Vancouver's original cattle which were lost but were thought to be in the area which was enclosed by the wall, but were later found outside.

Cowboys Introduced

According to Eben Low, three celebrated Mexican cowboys, Kossuth, Lozuida and Ramon were brought to Hawaii and sent to Waimea about 1832. Among the wild longhorned cattle, descendants of Vancouver's original importation, they found their home and occupation.

Curtis J. Lyons in a paper presented to the Historical Society interestingly describes them. They brought with them the saddle, richly adorned, of stamped bull hide leather and brood winged stirrups. They brought along the jingling spurs, the hand wrought bit and the hair rope with alternate strands of black and white. They made the lasso or lariat evenly braided from four strands of well chosen hide. They taught their worthy successors, the Hawaiian cowboys, how to throw the lasso, guide the horse by causing the rein to bear on the horse's neck and how to conquer the wild herds on the slopes of Mauna Kea.

Longhorns on Oahu About 1840

According to John Manini of Waianae, Oahu, his granduncle, Paul Marin, a Spaniard, had a Longhorn cattle ranch in the Waianae region eighty to one hundred years ago. He was also credited with having brought Bermuda grass and the cactus to Hawaii.

First Beef Exported

According to a record in Thrum's Annual¹ the first beef, 158 barrels, was exported from Hawaii in 1849.

¹ Thrum's Annual, 1909, page 108.

*The Grazing Situation in 1851*¹

"One of the most important interests under the care of the society, is that of grazing. Our high lands are peculiarly well adapted to pasturage; and I doubt if the graziers in any part of the world have been more successful than in these islands. With no winters to contend against, their labors are comparatively light, the increase of their flocks certain and rapid, and the owner of a small herd is sure, with a reasonable degree of care and attention, to become wealthy in a few years. Beyond question the raising of cattle, has, thus far, been the most successful pursuit connected with the soil, yet undertaken in the islands. The several members of our committees on neat cattle, horses, sheep and swine, have made creditable exertions to improve our stock, by the purchase of animals imported from the British Colonies and the United States, and I trust our exhibitions of animals will show with some success. It is a source of great pleasure to me to be able to say that some of our best graziers have begun to introduce the English and American system of penning and domesticating our cattle, and training them for labor and for the dairy. This is the commencement of a most desirable reform, and I hope ere many years to witness the entire abolition of the brutal Spanish system of hunting our cattle to death with the horse and lasso. Another great evil in connection with this subject, both as regards graziers and planters, is the overstocking of our pastures and the almost universal want of fences. Instead of keeping our herds reduced to a reasonable number, they are in some instances allowed to increase to an alarming extent, and thousands of half starved creatures are seen ranging over the country destroying everything within their reach. All interests suffer from this evil, and he who shall discover a remedy by introducing some cheap and durable fence, or otherwise, will prove a public benefactor."

*Estimate of Livestock in 1851*²

	Cattle	Horses	Sheep
Hawaii (tame)	8,000		
Hawaii (wild)	12,000	1,200	3,000
Maui	3,500	2,500	1,000
Molokai	200	200	
Oahu	12,000	6,500	5,500
Kauai and Niihau	5,000	1,300	700
	<hr/> 40,700	<hr/> 11,700	<hr/> 10,200

*Cattle Industry of Hawaiian Islands in 1852*³

Graziers estimate the cattle population of Islands at 40,700 in 1851. The natural increase should amount to thirty percent or 12,210 annually. Judging from hides exported only 3210 were slaughtered, leaving an increase of 9000. He estimates that unless there is a decided check put on the increase, or large quantities packed for export, the cattle together with the large herds of horses will soon overrun the Islands, put an end to the cultivation of the soil and render the herds themselves of little value.

¹ Lee, William H. Address before Royal Hawaiian Agricultural Society, in Trans. Royal Hawaiian Agricultural Society. Vol. I, No. 2, page 6 (1851).

² Bishop, Charles R. In Trans. Royal Hawaiian Agricultural Society, Vol. I, No. 3, page 91 (1852).

³ Bishop, Charles R. Summary of report in Polynesian, Aug. 14, 1852.

Cattle Worth Five Dollars in 1853

In an address W. H. Lee, President of the Royal Hawaiian Agricultural Society reports¹ that cattle are worth five dollars per head on Oahu and only half as much on the other Islands owing to difficulty of transporting them to market.

Hawaiian Beef for Sale

The following advertisement was carried in the Pacific Commercial Advertiser of October 14, 1858:

"Hawaiian Beef—The undersigned agent for the sale of Louzada, Spencer & Company's and R. C. Janion's Hawaiian packed beef has constantly on hand beef of the above well known and approved brands which he offers for sale at market rates.

"P. S. This beef is packed at Waimea, Hawaii, at an elevation of several thousand feet above sea level where the climate is cool and well adapted to the purpose. It is packed in salt by experienced packers and is warranted to keep for 12 months in any climate. Honolulu, Aug. 25 1858—Alex. J. Cartwright."

Bullock Catchers²

"The Bullock Catchers came from Monterey, California, to teach the Hawaiian to lasso, to jerk beef and cure hides. At the same time were imported a cargo of California horses, superior in size and spirit and whose descendants still continue in demand (1859) among the herds of Waimea to which place they were principally sent on their arrival in the Islands.

"But the imported cowboys have disappeared (1859) and in their place has sprung up a class of Hawaiian mountaineers, equally as skillful horsemen as their foreign predecessors but leading a vagabond life alternating between hardships and privations on the mountains and plenty and lavish expenditures on their return to the settlements."

Cattle Hunting³

The Government and King jointly were owners of the wild unmarked cattle on Hawaii and sold or leased the right to slaughter to private parties who have an agent at Waimea who engages the hunters, agreeing to pay them at the rate of \$1.25 for each bull hide and \$1.00 for each cow hide, properly dried and delivered at a certain point on the mountains. From thence they are conveyed to Waimea in carts, salted and shipped to Honolulu. During the first half of 1859, 222,170 pounds of hides were exported, mostly to the United States, the price being about twenty-five cents per pound.

"The wild cattle are hunted almost solely for their hides, and being unbranded the hides have a greater value than tame hides. The wild cattle have greatly diminished in numbers, and in a few years will be very rare.

"The country over which they roam is excellent grazing land and would grow wheat except for scarcity of water and the depredation of the wild hogs which would have to be exterminated.

"Why has not someone purchased the Government right in these hogs and set up a lard factory in the mountains. Would it not pay at 12½¢ a pound or even for soap grease?"

A Cattle Hunting Camp⁴

"The cattle hunter's camp was situated on a side hill among Koa trees, sheltered from trade winds which blow cold and fresh there, and trees fur-

¹ Trans. Royal Hawaiian Agric. Society, Vol. I, No. 4, page 9 (1853).

² Pacific Commercial Advertiser, August 11, 1859.

³ Pacific Commercial Advertiser, August 11, 1859.

⁴ Pacific Commercial Advertiser, August 11, 1859.

nished firewood, no small consideration at that elevation. The hut was built of three walls of stone, open to the south, roof of koa wood logs and plastered over with grass and mud. The floor was the ground covered with hides. There were many flies. A large fire was constantly kept burning in front, and for an acre or so around the ground was covered with drying hides.

"The hut fifteen by twenty feet furnished a sleeping place for twenty-five to thirty cowboys. The corral made of sticks and hides had about sixty horses.

"The pen into which cattle were to be driven was about a half acre, built of strong posts and rails and had an entrance like the upper part of Y opening toward the side from which cattle were to come.

"The cowboys drove about 200 cattle of all sizes which they had assembled on the mountain side in with a great roar. With them were perhaps 1000 wild hogs which had got into the trap by being in the cow country. The next day and later at their leisure the cattle were lassoed, taken out of the pen and slaughtered."

Longhorns on Kauai in 1860

According to Eric A. Knudsen, his father, Valdemar, reported that there were many Longhorn cattle on Kauai when he started his ranch at Kekaha about 1860.

Tallow Plant at Kawaihae

According to Eben Low there was a tallow plant at Kawaihae about 1875 which later was removed to Waimea.

Meat had little value at that time but hides and the tallow were of value and sometimes after the hide was removed, the whole animal was put in the tallow vat.

Many Cattle on Oahu Before Annexation

According to A. C. Dowsett, shortly before annexation many cattle roamed over the central part of Oahu, including the areas now occupied as a military post and the pineapple and some sugar cane fields. Many of these were grade Angus cattle. In 1878 J. I. Dowsett shipped butcher cattle to Tahiti and half bred Angus cattle were shipped to California about 1885.

The cattle population of Oahu was 15,261 in 1879, 19,625 in 1884, 27,599¹ in 1895, 21,714 in 1905, according to tax records.¹ The last official census (1920) credits Oahu with 16,266 cattle.

Livestock in Hawaii at Different Periods Preceding and After Annexation

	Cattle	Horses	Sheep
1851 ²	40,700	11,700	10,200
1879 ³	97,239	29,454	101,726
1884 ³	117,613	30,640	121,683
1895 ³	125,416	18,913	93,312
1905 ³	132,720	19,694	90,750
1920 ⁴	142,058	24,307	44,042
1928 ⁵	157,756	12,073	⁶ 15,318

¹ Pacific Commercial Advertiser, July 2, 1906.

² Bishop, Charles R. Trans. Royal Hawaiian Agricultural Society, Vol. I, No. 3, page 91 (1852).

³ Taxation returns reported in Pacific Commercial Advertiser, July 2, 1906.

⁴ 1920 U. S. Census.

⁵ Report Animal Industry Division, Board of Agriculture and Forestry, Hawaiian Forester and Agriculturist, Vol. XXV, No. 3, page 101 (1928).

⁶ Another estimate is 25,000.

*Livestock Exports from Hawaii Before 1900*¹

Period	Hides	Tallow lbs.	Goat skin	Wool lbs.
1844-53	20,540	73,856	245,862	12,824
1860-70	118,637	1,635,940	491,696	1,765,002
1870-80	209,082	3,294,036	565,497	4,068,131
1880-90	261,447	630,000	207,138	4,137,642
1890-1900	241,860	338,698	71,078	2,560,785
Average annual export 1860-1900.....	20,775	147,466	33,385	364,164

Cattle and Sheep Slaughtered in Honolulu 1895, 1899² and in 1928³

	Cattle	Calves	Sheep
1895	7,681	1,551	7,596
1896	7,373	1,570	7,473
1897	8,225	1,852	8,316
1898	9,115	1,815	10,698
1899	8,651	1,528	13,220
Year Ending June 30, 1928	15,078	1,283	1,905

Summary of an Address by E. P. Low at the Graziers' Meeting in Honolulu, March 17, 1902

The purpose of this meeting is to adjust grievances and dissensions should any exist between ranchers, and between ranchers and sugar planters; to devise ways and means of developing pasture lands by introduction of grasses; to conserve water by preservation of all water sources and springs; and to elect good officers to look out for our affairs and interests.

Cattle breeding has not been developed to its fullest possibilities in Hawaii. The average dressed weight of cattle killed is only 300 pounds, the average age is five years. Our cattle should average at least 400 pounds dressed weight when three years old.

Some graziers have kept up their herds by importing good bulls and have demonstrated that good stock can be raised here. However, there is ample room for improvement left.

We need to exercise strict vigilance against foreign diseases. Tuberculosis is too prevalent in the Islands and we must check its further spread. Horn flies have recently gained entrance and are doing much damage. We need to exercise great care to keep out other contagious diseases as Texas fever, Mange and Rinderpest.

¹ Pacific Commercial Advertiser, July 2, 1906.
² Report by Mr. Eben Low.
³ Report by Dr. J. R. Mahaffy.

SECTION TWO

THE LEADING BEEF RANCHES OF THE TERRITORY

ISLAND OF HAWAII

GREENWELL RANCH

The Greenwell Ranch is located in the Districts of North and South Kona, Island of Hawaii. Among those early interested in the cattle business in Kona, were the Reverend John Paris, William H. Johnson, A. A. Todd and later Dr. Trousseau. The Johnson and Trousseau herds were of Shorthorn strain, the Todd herd was Devon. H. N. Greenwell became interested in the cattle industry about the year 1875 and shortly after purchased the Trousseau herd and bought cattle from Todd and others. With these as a nucleus Greenwell embarked in the dairy business and imported pure bred Jersey bulls from time to time until his death in 1891. These activities were in the main carried on under partnership agreements with others and were profitable. Little was done in the sale of beef, as production far exceeded demand, but business in the sale of hides and tallow was good. In 1889, Greenwell added a Holstein bull (dairy strain) to his herd; this was probably the first Holstein brought to Kona; the purchase was made of Judge McCully, who conducted a dairy near Honolulu. Shortly after Greenwell's death the entire ranch came under the management of his oldest son, William H. No Jersey stock was added to the herd after 1891; two years later Hereford and Shorthorn bulls were added to the herd and later a Devon. In 1898 came annexation, the price of beef rose; the price of butter declined. In 1910 butter making on the ranch was stopped and the raising of beef cattle was taken up in earnest. The types selected were Shorthorns and Herefords, purchases of purebred bulls being made at frequent intervals, largely from the Parker ranch and abroad. All cattle are range fed.

Water for stock purposes is conserved in tanks from which it is delivered at various parts of the ranch by gravity.

Plant pests abound; lantana (*Lantana camera*), guava (*Psidium guajava*) and the common ivy seem to spring up over night and as the ground in general is rocky the expense of keeping the same in control is large.

Considerable attention is given to the planting of grass seed and Buffalo Grass (*Stenotaphrum americanum*) and *Paspalum dilatatum* are abundant in certain sections. Bermuda grass (*Cynodon dactylon*), Kentucky blue grass (*Poa pratensis*) and red top (*Tricholaena rosea*) are also found.

At present the ranch is divided into three separate parts.

FRANK GREENWELL RANCH

This lies entirely within North Kona and is also known as Honokohau Ranch and Hualalai Ranch. The total area is about 20,000 acres, one-half of which is suitable for grazing; it stretches from the sea to an elevation of 5400 feet. Four thousand acres of this area are fee simple, the remainder is leased land.

The herd on this ranch is approximately 1500 head. Between 300-350 cattle averaging three to four years of age with an average weight of 525

pounds are marketed annually in Honolulu. In addition ninety head are annually slaughtered locally. The cattle for Honolulu are loaded at Napoopoo. The ranch is well fenced into fifteen paddocks by 20 miles of stone wall and 12 miles of wire fencing.

The ranch now carries 9 Hereford and 3 Shorthorn bulls. Cattle are bred from June to February. From November to April only about one-half of the paddocks are used, the others being too dry over these months. September is perhaps the wettest month in Kona. Only enough horses for use on the ranch are raised.

HENRY GREENWELL RANCH

This lies in North and South Kona; its area is about 80,000 acres, one-fourth of which is suitable for grazing; it extends from the sea to the top of Mauna Loa. Ten thousand acres are held in fee simple, the remainder is leased land. The herd on this ranch numbers approximately 3500 head. Between 600-700 cattle averaging three to four years of age with an average weight of 525 pounds are marketed in Honolulu annually. In addition about 150 head are annually slaughtered locally. The ranch is divided into paddocks; about 30 purebred Herefords are carried. Mr. Baybrook is the present manager.

ARTHUR GREENWELL RANCH

This ranch is in South Kona; its total area is about 12,000 acres all fee simple land; about one-half is suitable for grazing. The herd on this ranch numbers approximately 1500 head. Between 300-400 head are annually marketed in Honolulu. This ranch carries 10 purebred Hereford bulls and is well fenced into paddocks. It is managed by Arthur L. Greenwell, its owner.

HONOKAA SUGAR COMPANY RANCH

The ranch division of the Honokaa Sugar Company consists of about twenty-six hundred acres of grazing lands above the sugar cane fields at an elevation of 1500 to 2000 feet. At this elevation there is generally enough rainfall for pastures, the principal grasses being Bermuda (*Cynodon dactylon*), Natal redtop (*Tricholaena rosea*) and Hilo grass (*Paspalum conjugatum*).

This ranch carries about 600 cattle which originally were Holsteins, but Hereford bulls have been used for a number of years and most of the cattle now have about three-quarter Hereford blood. The cattle are slaughtered at 1½ to 2½ years of age when they average about 350 lbs. dressed weight. About 150 are slaughtered each year and the meat is consumed locally.

The ranch has from 150-175 breeding cows and about 125 calves are raised annually. They have no definite breeding season.

Water is secured from the Kohala Mountains.

Much experimental work has been done along the line of feeding sifted cane bagasse, cane molasses and a soy bean meal mixture to the work animals on this plantation, going so far as to feed nothing else but the above mixture to them and the results to date are reported by the manager as being very satisfactory.

W. P. Naquin is the manager of the Honokaa Sugar Co., of which the ranch started in 1916 is a division.

HUEHUE RANCH

Huehue Ranch owned by the John A. Maguire Estate is located in North Kona south of Puuwaawaa Ranch and extends from sea level to about 6,000 feet, with most of the lands above 1,600 feet elevation. The ranch has a total area of about 40,000 acres, only about 12,000 of which have any great value as grazing lands. Fifteen thousand acres are held in fee simple and the balance is leased land from private owners. Huehue Ranch has no government lands.

The ranch carries about 2,000 grade Herefords, twenty purebred cows and some twenty purebred Hereford bulls. About 350-400 head are marketed annually, averaging between 450 and 500 pounds dressed weight. The cattle are marketed at about 3-4 years of age and practically all of them are shipped to the Honolulu market, the cattle being loaded on the steamers at Kailua.

The ranch has seven miles of pipe line which lead from tanks near a natural spring to various parts of the ranch. Huehue Ranch is fairly well supplied with fences and paddocks.

Large areas of the ranch are overgrown with ferns and lantana and lava flows have rendered much of the land useless.

Forage grass includes Hilo grass (*Paspalum conjugatum*), some mesquite (*Holcus lanatus*), at higher elevations, rattail (*Sporobolus elongatus*) and other grasses found in this part of Kona.

Huehue Ranch, also known as the Maguire Ranch, was started about 1885 by John Maguire with native cattle and he was personally manager of the ranch till he died about 1920. Since then the affairs of the ranch have been conducted by a board of directors consisting at present of Robert Hind, John Clarke, Robert Wallace, Frank Greenwell and Walter Ackerman. John Lind was manager from 1920 to 1926 and Arthur Stillman is the present manager.

KAALUALU RANCH

Kaalualu Ranch is located in Kau in the southernmost part of the Island of Hawaii and about three-quarters of the total area of the ranch is in the region extending from south point to the government road. All but 2200 acres are below 1500 feet elevation and the highest area has an elevation of only 2200 feet. In this respect the ranch differs radically from the other ranches of the island of Hawaii; practically all of which, while many start at sea level, extend to much higher elevations.

The ranch has 22,561 acres of grazing lands and in addition about 34,000 acres of waste land. Six thousand five hundred acres are held in fee simple, 8,500 acres are government lease lands, and 7330 acres are Bishop Estate lease lands.

The rainfall in the lower section ranges from only a few inches in the extreme south point region to about 60 inches at the higher elevations.

The ranch has about 5,000 Hereford cattle with 36 purebred Parker ranch Hereford bulls. There are 1,400 breeding cows at the present time and the calf crop ranges between 60 to 75% of the number of cows. Cattle are bred from February to July, which brings the calves along about the time the feed is in the best condition.

About 800 cattle are marketed each year, about 100 of these being slaughtered locally and the balance shipped to Honolulu, the loading point being at Kaalualu. The cattle at present are marketed at 3-4 years of age, at which time they dress out at about 600 to 650 pounds. It is planned to market them at an earlier age in the future, 2½ to 3 years, at which age it is expected they will weigh 550 pounds dressed weight.

The ranch has 50 Percheron horses, 44 light horses and 55 mules. There are no sheep and the number of swine is negligible.

The ranch is well fenced with 15 miles of wire fences and 135 miles of stone fences. The latter are preferred because of their durability. Wooden posts last only about six years and wire rusts rather rapidly. Water is secured from the mountain, and 20 miles of pipe lines serve to distribute it to the pastures.

Here Bermuda grass (*Cynodon dactylon*) is the prevailing forage at sea level and this extends well over the ranch constituting about 90% or more of the total forage. Pili grass (*Andropogon contortus*) is found at the lower elevations and is considered a fair feed. Hilo grass (*Paspalum conjugatum*) is found at the higher elevations, but practically none near sea level lands. Rhodes grass (*Chloris gayana*) does best at about 1600 feet where it seems to spread faster than at the 2,000 feet elevation. *Paspalum dilatatum* does well in the mauka pastures. Koa haole (*Leucaena glauca*) is being planted in the lower pastures.

The forage crop of outstanding success in the upper fields is the pigeon pea (*Cajanus indicus*) first introduced in this section of Hawaii on this ranch by Wm. Campsie in 1925. It grows best at 1,600-2,200 feet elevation on this ranch although good stands are found as low as 900 feet. The very best stands are found between 1,800 and 2,000 feet elevation. At lower elevations their growth is not as high. The pigeon peas are planted in rows spaced about eight feet apart with excellent growths of Rhodes grass, *Paspalum dilatatum* and Hilo grass between the rows. At Kaaualu they prefer a mixture of grasses and pigeon peas and the rather wide spacing between the rows makes this possible. Pigeon peas are often planted by merely plowing furrows at the desired places for the rows and planting the seed.

About 300 acres are in pigeon peas at present and more are being planted. The cattle are put in the pigeon pea pastures about four months before selling them and during this time, with about one head to 1½ acres, they gain at least 75 pounds more per head than they would if kept on ordinary grasses. The pigeon peas are proving very helpful in increasing the dressing percentage, as well as making it possible to market the steers at an earlier age.

Wm. Campsie has general charge of the ranch and W. Vredenberg is manager.

This ranch once belonged to Princess Ruth, half sister of Kamehameha IV. As late as 1873 it is reported that white cattle with black necks ending in white spots were found on this ranch and that this color characteristic was prepotent enough to continue for a number of years, and still occasionally crops out.

Geo. Campbell was for many years closely identified with the earlier development of this ranch.

KAHUA RANCH

Kahua Ranch, located in the Kohala mountains, is about midway between Waimea and Kohala, being slightly nearer to Kohala, and is crossed by the government road between these two places.

The ranch consists of about 38,000 acres, about 10,000 of which are held in fee simple by the present owners, 15,000 acres are leased from the government and the balance from private owners. The ranch lands extend from the sea to an elevation of 4,000 feet, the lands lying between Puuhue and Puakea ranches on the Kohala side and the Parker ranch on the Waimea side. The ranch house is beautifully located about a quarter of a mile mauka of the government road.

The ranch is carrying 4,000 Herefords at the present time, and 300 horses. It is planned to reduce the number of horses and increase the cattle to 6,000 in the next ten years, carrying on a development program of fencing, etc., which will make it possible to carry that number which will then be a ratio of one head to 6 acres. Fifty-five miles of fences and 25 miles of pipe and 1,000,000 gallons of storage tank for water are in the course of construction at the present time.

The cattle for Honolulu are loaded on the boats at Kawaihae, but few or none are shipped at the present time while the expansion program is under way. Perhaps 200 are being slaughtered annually now for consumption in Kohala. Eventually they plan to market about 1,200 per year.

Paspalum dilatatum does very well in the upper lands and Koa haole (*Leucaena glauca*) is being planted in some of the lower sections. Bermuda grass (*Cynodon dactylon*) is abundant in many parts of the ranch and brome grass (*Bromus unioloides*), perennial rye (*Lolium perenne*) and buffalo grass (*Stenotaphrum americanum*) are common. Redtop (*Tricholaena rosea*) and Rhodes grass (*Chloris gayana*) do well at the intermediate elevations and white clover (*Trifolium repens*), bur clover (*Medicago denticulata*) and red clover (*Trifolium pratense*) are found in the upper lands. A large amount of Hilo grass (*Paspalum conjugatum*) is also found in these upper lands.

A number of good imported Hereford bulls are found and purchase of new blood lines is being contemplated. An area is devoted to experimental grasses and various other crops before they are tried out on a large scale on the big pastures of the ranch. The fencing program will be continued until about eighteen well-fenced pastures are available for proper segregation of the different classes and ages of the animals.

Ample water for the cattle comes from the Kohala mountains, although some additional development is necessary to properly distribute it to all needed places on the ranch.

Cattle have probably been found on the lands of Kahua ranch for 100 years or more. About 1880 the lands were owned by Allen and Stackpole, who sold it to George Holmes, an Englishman, about 1883. He, in turn, sold it to the Burckhardt brothers, Godfrey, Ernest and Fred, about 1886, the price being about \$40,000. After about five years they sold the ranch to John Maguire, who managed Kahua and Huehue Ranch in Kona as well. Mr. Maguire sold a half interest in Kahua ranch to Frank Woods about 1895, who then assumed the managership of the property and later he purchased the half interest in Kahua that John Maguire still held, Mr. Woods thus becoming sole owner of the ranch and he continued as owner and manager till 1928, when the ranch was purchased by the Theodore Richards family from Ronald K. von Holt, the latter being the present manager.

KAHUKU RANCH

This ranch, located in Kau near Waiohinu, has a total area of about 184,000 acres all held in fee simple, but only about 15,000 acres can be used for grazing purposes. Large areas of good grazing land have been destroyed by successive lava flows from Mauna Loa. The grazing lands consist of irregular shaped pastures between lava flows.

This is an old ranch. Captain Brown had some 500 head of cattle on this ranch before the 1868 lava flow. He sold out to a group of men among whom were W. H. Reed, C. E. Richardson, George Jones and Mr. Kina. At a later period the ranch was purchased by Col. Norris. Chas. MacComber was the next owner and he sold the ranch to the Parker Ranch in 1914, who are operating same at the present time. Martin Martinson is the resident manager.

The ranch carries about 1,200 Herefords of good type, and the cattle are loaded on the steamers for Honolulu at Kaalualu.

Two hundred acres have been planted to pigeon peas in the section near the ranch house which is located near the government road at about 1,800 feet elevation. These pigeon peas are proving very satisfactory in this section.

KEAUHOU RANCH

Keauhou Ranch, with its headquarters near the Military Camp, one mile from the Volcano House, has an area of 35,000 acres, all leased from private owners, about 20,000 of which have fair to good grazing value. The ranch extends from sea level to about 7,800 feet elevation.

Water for the cattle must be caught from roofs and held in tanks. The tanks have a life of about ten years, the iron rods holding the staves together being the first to break. The storage capacity of these tanks is sufficient to carry the cattle through an eight months' drought period.

The ranch has six large paddocks, four being used for fattening and two for weaning. About 30 miles of wire fence are found on the ranch.

The ranch headquarters are at an elevation of 4,000 feet. Rainfall at the Volcano House nearly averaged 104 inches during the past fifteen years.

The ranch has 55 saddle horses for ranch use and horses are rented to guests at the Volcano House and Military Camp. Horses and pack mules and guides are furnished for parties who desire to go to the top of Mauna Loa.

Thirteen hundred grade Herefords, including 23 purebred bulls are found on the ranch at present. The breeding herd run over an area of some 10,000 acres of rough country necessitating more bulls than would otherwise be necessary. Five hundred and fifty cows averaged a 65% calf crop last year. All non-breeding females are spayed, this being necessary because of lack of a large enough number of paddocks to effect proper segregation.

The ranch markets about 225 cattle per year, weighing about 450 pounds dressed weight at two years of age. All are marketed on Hawaii and three-fourths of them are slaughtered on the ranch for the Military Camp and the Volcano House.

The ranch has about 250 pigs, using a purebred Chester White boar. The sows are rather mixed as to breed but Chester White blood predominates. One hog feed unique to this place is steamed tree ferns, which are steamed for one week over natural steam rifts found in the ground of this volcanic region. The only cost for these cooked tree ferns is the labor cost of cutting and bringing them in, which amounts to about \$5 a ton.

Garbage is also used as a hog feed, this being obtained from the military camp.

The ranch carries some hundred hens, mostly of the White Leghorn breed.

No cattle have been kept on the lower land for some years, efforts having been made to first eliminate the goats. This has been fairly well accomplished and some fifty head are being put there now.

Paspalum compressum is preferred to *dilatatum* on the ranch because it starts more easily on unprepared or poorly prepared soil and stands up well under heavy pasturing and drought. *Compressum* does well at both low and high elevations while *dilatatum* appears rather better suited for upland regions.

On the lower lands Bermuda grass (*Cynodon dactylon*) and Kukaipuaa grass (*Panicum pruriens*) are found and are considered excellent for fattening cattle. Redtop (*Tricholaena rosea*) does quite well. Buffalo

grass (*Stenotaphrum americanum*) is found around the paddocks near the stables. The horses seem to like it better than the cows.

Kentucky blue grass (*Poa pratensis*) and white clover (*Trifolium repens*) are found on the mauka lands. Pili grass (*Koeleria glomerata*) is also present. Mesquite (*Holcus lanatus*), also known as Yorkshire fog grass, is considered a good pasture grass. A scattering of Ohia lehua trees is found over large parts of the ranch and they are considered something of a pest.

Pigeon peas (*Cajanus indicus*) have never gotten started here. It seems too cold on the high lands and too rocky on the lower elevations.

Koa haole (*Leucaena glauca*) is being tried at the ranch house. Pouring boiling water over seeds and letting same soak over night is reported to soften the seed coat and hasten germination.

Keauhou ranch was started about 1900 by D. T. Shipman and purchased by A. M. Brown about 1923. W. H. Shipman managed the ranch from about 1913 to 1923. A. M. Brown, Jr., is the present manager.

KEAAU RANCH

Keauu Ranch, with an area of about 50,000 acres, 40,000 held in fee simple and 10,000 leased from the Government and private parties, extends from the sea to an elevation of 1,800 feet. The ranch formerly included lands in the Waiakea and Keauu sections now planted to sugar cane.

Much of this land is pahoehoe and aa lava (undated flows) sufficiently decomposed and covered with thin soil in many places to afford mediocre pasturage. Fruit trees do particularly well in these partially decomposed aa flows.

The ranch carries about 4,000 grade Herefords with about 100 bulls, 25 purebred and the other high grade. All cows except those kept for breeding cows are spayed. The rough character of many parts of the ranch necessitates more bulls than would otherwise be needed.

The ranch has about 70 miles of fences, both stone and wire. Holes for posts have to be blasted in the lava. The region has a rather heavy rainfall, 106 inches in 1925, 85 inches in 1926 and 196 in 1927 at the ranch headquarters on the sea at Haena and this provides sufficient streams and pools of water for the cattle.

Cattle from Keauu ranch are often sent to a higher ranch, Puu Oo, belonging to the same owner, when about one year old and only about 150 are marketed annually direct from Keauu. The combined ranches with about 8,000 head market about 1,200 a year when 2 to 2½ years old, when they dress out at about 550 pounds. About 300 head a year are shipped to Honolulu, often driving them over the slopes of Mauna Kea to Kawaihae, where they are loaded on the steamers. The balance are slaughtered at the slaughter house of the Hilo Meat Company in Keauu.

Carpet grass (*Paspalum compressum*) is considered very good on this ranch because it crowds out other less desirable grasses and does not dry out so badly during dry spells. Pili grass (*Andropogon contortus*) is considered a fair feed but it has been largely crowded out by other grasses, particularly by rice grass (*Paspalum obiculare*), which probably was introduced accidentally by packing material or otherwise and is considered more or less of a pest as the cattle do not eat it when rank. The best way to eradicate same is by burning and planting carpet grass.

Hilo grass (*Paspalum conjugatum*) used to be abundant but has also been largely crowded out by *Paspalum obiculare*.

Redtop (*Tricholaena rosea*) has not done very well on this ranch. Rhodes grass (*Chloris gayana*) and elephant grass (*Pennisetum purpureum*) grow luxuriantly near the ranch house and are used as soiling crops for the small Guernsey and Holstein dairy herd.

Bermuda grass (*Cynodon dactylon*) is found only near the sea. It does not seem to do well on the pahoehoe lava flows possibly because of an acid soil condition, and pigeon peas (*Cajanus indicus*) at 300 feet elevation also did not do well, possibly because of acidity or temporary excess moisture in the lower places. Guava (*Psidium guayava*) grows well and is considered a pest. Cattle eat the ripe guavas and thus widely spread the seed. Practically no lantana (*Lantana camara*) is found. Puhala (*Pandanus odoratissimus*) is abundant in some sections.

At the present time there are fifty acres planted to Pigeon peas and koa haole (*Leucaena glauca*) and by the end of this year there will be over two hundred acres planted to the same crops. This planting is on a cane field recently withdrawn from Olaa Sugar Co., Ltd.

About ten tons of cane molasses are being fed per month in troughs along the road. Ten pounds of a mineral mixture is added to each 30 gallons of molasses.

The ranch is owned by W. H. Shipman, Ltd., and managed by W. H. Shipman and his son, H. C. Shipman. W. H. Shipman purchased the ranch in 1877. It was started about 1875 by Rufus Lyman, C. R. Bishop, P. C. Jones, John Paty and others.

Some Angus cattle have been kept and they do well, the ranch still having one paddock of the Angus breed. They find the Angus harder to drive than the Herefords and since two breeds on one ranch are extra bother, Keaau ranch is specializing on Hereford cattle now.

A total of about 200 horses are kept on the two ranches.

KUKAIAU RANCH

Kukaiau Ranch is located above Kukaiau Plantation and the headquarters of the ranch are reached by an automobile road leading seven miles mauka from the government road.

Kukaiau Plantation was started about 1886 by John M. Horner and Kukaiau Ranch was started about 1887 by Chas. Notley above the sugar belt. The ranch lands begin mauka of the sugar plantation at the 2,300 foot elevation and extend up to 7,600 feet. The ranch headquarters are located at 3,513 feet elevation.

The area at present consists of about 35,000 acres, about 2,000 of which are lava flows and 1,000 acres are so heavily wooded with blue gum trees that no grass is found between them. In May, 1928, the ranch carried 5,063 cattle, about 500 of which are Holsteins and the balance well bred Herefords. The ranch also had 294 horses, 100 mules and 3 jacks at that time. Forty-nine of the horses are heavy brood mares of the Percheron breed, which are largely bred to jacks to produce mules. No sheep and practically no swine are kept at the present time.

The aim is to carry about one animal to seven acres. On this basis the ranch is slightly overstocked at the present time. The forage consists of native and imported grasses. *Paspalum dilatatum* does very well and buffalo grass (*Stenotaphrum americanum*) cocks foot (*Dactylis glomerata*) and mesquite (*Holcus lanatus*) are among the other leading forage grasses found on the ranch. Hilo grass (*Paspalum conjugatum*) is also found to some extent on parts of the ranch. Cultivated crops have been grown to some extent in days gone by but none are being produced at present.

The ranch is divided into about 30 large pastures with a total of about 150 miles of wire fencing, and a few stone fences.

Beef cattle are marketed at about 3 to 3½ years of age, at which time they weigh about 1,200 pounds and dress out slightly in excess of 50%. Calves are branded with the number of the year when born. About 1,000 to 1,100 are marketed annually, about 50% being sent to Honolulu, being

driven to Kūkaiāu Station, thence by train to Hilo and steamer to Honolulu. About 30% of those marketed annually are slaughtered locally and 20% are slaughtered in Hilo.

The Holstein male calves are sold as steers and at a given weight are as large as the Herefords but do not dress out quite as well. A few cross-breeds occur and at a given age these in the first generation are larger than either the Herefords or Holsteins. Holstein females are sold as dairy cows, locally and in Honolulu. No dairy products are produced except for local consumption.

The ranch has 52 Hereford bulls, 8 of which are imported and practically all are purebred. They have five purebred Holstein sires, one of which, Matador Segis Walker, originally purchased from a mainland Holstein breeder was later sold back to the same breeder for \$5,000, a price many times greater than the purchase price.

Mules are raised and sold to local sugar plantations.

Perhaps the biggest problem is to get enough drinking water for the cattle. The rainfall averaged about 79.5 inches annually during thirty years at Umikoa, the station at the ranch headquarters. However, the rainfall varies greatly from year to year, being as low as 19.3 inches in 1897 and as high as 180.59 inches in 1902. A severe drought was experienced in 1920 and about 1,000 head were lost due to drought at that time.

Roofs are built in the various paddocks for catching the only water that can be secured, and the smallest of these roofs has an area of 10,000 square feet, and supplies about 600 cattle. Tanks are used to store this water, the total tank capacity at present being 2,140,000 gallons. This includes a 640,000-gallon reinforced concrete cistern. Additional water storage facilities are contemplated. Something in excess of 3,000,000 gallons storage capacity is desired.

The climate is cool, 34° F. being the record low temperature on the ranch.

About 18 men are required to take care of the livestock on the ranch with additional men needed from time to time for special work.

The ranch consists of about 2,000 acres held in fee simple by the owners, 20,000 acres are leased from the government and the balance is leased from other private owners.

Kūkaiāu Ranch interests were sold by Mr. Notley to J. M. Horner soon after he started same and Robert Horner was the manager for many years till 1912. The herd books of those early days (about 1890 to 1910) show that many Hereford bulls were purchased from Gudgell and Simpson, noted Hereford breeders of Independence, Mo., and these bulls were rich in the blood of Don Carlos, Beau Brummel, Lamplighter and Anxiety 4th, all outstanding animals in Hereford breed history. Excellent light horses, both standard breeds and thoroughbreds rich in the blood of Hambletonian X were imported and raised in the nineties and thereabouts when horse racing was more popular in Hawaii than it is at the present time. A small Short-horn herd was also maintained in the early days of the ranch. Good butter was made in the nineties but difficulty in marketing same caused this work to be abandoned. Good cattle giving 20-25 quarts of milk were sold at that time for about \$75 each.

Mr. D. S. Macalister has been manager of the ranch since 1912. T. H. Davies & Co., Ltd., are the Honolulu agents.

McWAYNE RANCH

The McWayne Ranch in the Kau district of Hawaii has a total area of about 40,000 acres, practically all of which is leased land either from the government or private parties.

Large areas of this ranch have little grazing value as they have been

repeatedly covered by lava flows from Mauna Loa. The recent flow in 1919 and the Hoopuloa flow in 1926 both did much damage. The Hoopuloa flow ruined some 2,000 acres, including some of the best pastures in the ranch where many imported grasses had been introduced. Some cattle were also lost in this recent flow.

The ranch lands run from sea level to an elevation of about 5,000 feet.

The usual grasses prevalent in this section of Hawaii are found on this ranch, including some of the Paspalums, Rhodes grass (*Chloris gayana*) Redtop (*Tricholaena rosea*) and others. Koa haole (*Leucaena glauca*) and Keawe trees (*Prosopis juliflora*) have been introduced in the lowlands and are doing well. The cactus (*Opuntia* spp.) is found on parts of the ranch and is of value in droughty seasons.

Water is secured from roofs built for this purpose and collected in tanks.

The ranch carries about 1,500 cattle, with the Hereford strain predominating. Six Dutch Belted cattle were introduced in 1915 but have not been kept pure.

The cattle are marketed when about 2½ to 4 years of age, when they dress out at about 450-500 pounds. Cattle for Honolulu are loaded at Kapua landing.

Robinson A. McWayne has been owner and manager of this ranch since 1907. Previous to that Barney Monsarrat had a ranch on part of this land for a time.

OLELOMOANA RANCH

Olelomoana Ranch, located in South Kona, Hawaii, has a total area of about 8,000 acres. The ranch carries 900 beef cattle with Hereford and Shorthorn blood predominating, 25 Holstein cows, 35 heavy and 10 light horses of mixed breeding and 5 mules.

Cattle are marketed at about three years of age, when they average about 700 to 850 pounds live weight. About 120 are marketed annually.

This ranch was started in 1907, and James On Tai has been associated with the ranch since its beginning. Carl On Tai was connected with the ranch from 1907 to 1916 and C. Q. Yee Hop from then until the present time.

KAPAPALA RANCH

The headquarters of Kapapala Ranch are located mauka of the government road about six miles on the Hilo side of Pahala. The ranch has a total area of about 75,000 acres, about 40,000 of which have good to fair grazing. The ranch extends from sea level to about 6,500 feet elevation. The bulk of the lands is leased from the government.

Some 47 miles of fencing are being built now. A water head from mountain sources has been established at 3,750 feet elevation and 25 miles of pipe lines distribute the water to the lower pastures. Above this, water is collected from roofs and stored in tanks.

The rainfall at the ranch house, about 2,500 feet elevation, was 90 inches in 1927, 47 inches in 1926, 37 inches in 1925 and 66 inches in 1924, which somewhat indicates the variation in rainfall from year to year. Strong winds blowing up from the south across the pahoehoe lava flows often do quite serious damage to the vegetation, especially when same is fresh and lush from previous rains. These winds seem to have a very drying action on the vegetation. They come at infrequent intervals, perhaps twice a year.

The ranch at present has only about 3,000 Herefords with 40 bulls, but it is planned to increase this number to 4,500 as soon as fences are completed and better forage is available.

At present about 700 head, three to five years old, are marketed annually. The average weight of the steers sold in 1927 was 535 pounds dressed weight. The cattle for Honolulu are loaded on the steamers at Kaalualu or shipped by train from Glenwood and loaded at Hilo. Quite a number are marketed in Hilo. When the present development plans are completed they expect to market about 1,000 head a year.

On the lower elevations Bermuda grass (*Cynodon dactylon*) and Pili grass (*Andropogon contortus*) are common. *Paspalum dilatatum* is found as low as 500 feet and up to 5,000 feet elevation. Rhodes grass (*Chloris gayana*) does well at 1,000 feet and above. Redtop (*Tricholaena rosea*) and buffalo grass (*Stenotaphrum americanum*) are found to only a slight extent. Kukuju grass (*Pennisetum clandestinum*) is being tried experimentally and does very well at 2,100 feet and fairly well at 3,000 feet elevation. Other grasses are also under observation for possible future planting. Hilo grass (*Paspalum conjugatum*) is found scattered over various parts of the ranch.

Pigeon peas (*Cajanus indicus*) have been a great asset to the ranch and more pastures are being added to the 600 acres of pigeon peas already growing on the ranch. Pigeon peas have been planted from near sea level to about 3,000 feet elevation but they make their best growth at about 2,000 feet elevation. At 3,000 feet some of the plants were doing well but others scattered indiscriminately over the same field were rather yellow, indicating a lack of uniformity in soil conditions.

At present cattle are bred more or less throughout the year but a change is planned in this regard.

The ranch has about 250 horses and mules, 10 Percheron mares and one Kentucky jack for breeding to the mares for mule production.

The ranch has long carried cattle, being started about 1860 by W. H. Reed and Chas. Richardson, who got their cattle from Harry Purdy, then one of the owners of the Parker Ranch. Mr. Reed bought out Mr. Rich-

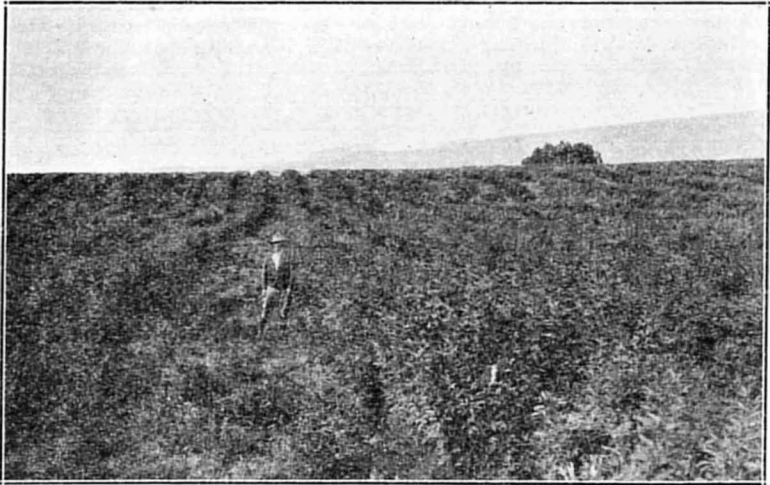


Fig. 4

Pigeon pea pasture on Kapapala Ranch at about 1,600 feet elevation.
(Photo by F. G. Krauss.)

ardson's interest in 1873, and W. H. Shipman, Mr. Reed's son-in-law, was manager from 1873-1876. In 1876 the ranch was purchased by the Hawaiian Agricultural Co., Ltd., who are still the owners. Julian Monsarrat was manager for forty years preceding the present manager, B. M. Summers. Among other previous managers are Mr. Conrad and Harry Webb.

PARKER RANCH

Historical

The Parker Ranch is by far the largest of the Hawaiian ranches. The Parker Ranch proper (excluding the Kahuku Ranch owned by the Parker Ranch) has a total area of about 230,000 acres, about 155,000 of which are held in fee simple and the balance is leased, mostly from the government.

The beginnings of the Parker Ranch go back one century.

Wild cattle were abundant in the Waimea plains (then largely forested) about 1820, these cattle being descendants of those brought in by Vancouver.

The present Parker Ranch is the combination by purchase or lease at various times of smaller ranches which existed in this region, the Humuula sheep station consisting of 50,000 acres being acquired as late as 1914. The ranch derives its name from John P. Parker of Newton, Massachusetts, who was the original owner of the ranch (then much smaller than now) about 1830. He had two sons, John and Eben and one daughter, Mary, who married a Mr. Fuller. John P. Parker, Jr., succeeded his father as manager. Samuel Parker, a son of Eben Parker, was manager for a time. Following this Paul Jarrett was manager from about 1887 to 1899, when Alfred W. Carter became manager and has continued to the present time, his son Hartwell now acting as assistant manager.

Previous to 1901 the bulls used were range calves, selected because they showed perhaps a little better type than the average. However, not much progress was possible without the use of purebred well selected bulls and 30 years ago the cattle from the Parker Ranch were marketed at five to six years of age, and 500 pounds were considered a good dressed weight. Now they are sent to the market when two to three years old and the steers average 650 pounds dressed weight, dressing out at about 60 percent of their live weight. The average of all cattle marketed in 1928 was 583 pounds. This tremendous improvement is not due to better cattle alone. Better feed resulting from the introduction of better forage grasses, a system of paddocks making segregation and forage improvement possible, and bringing water to the cattle rather than making the cattle walk long weary miles to water, have all played an important role in making possible the progress that has been accomplished.

There was a Devon bull on the Parker Ranch in 1899, the only bull introduced from the mainland before that time, and some Shorthorn bulls and cows were introduced in 1901 from California and a small purebred Shorthorn herd was maintained for a short time but abandoned for Herefords because the latter did better under the conditions prevailing at that time when the cattle had to hustle for their feed and walk long distances for water. Up to 1899 there were large bands of wild inbred cattle,—perhaps 5000—from Vancouver stock, and it took many years to eliminate them.

The Herefords

Three good Hereford bulls were introduced in 1900, 1901 and 1902, respectively. These bulls were strong in Anxiety 4th breeding. About

1906 a carload of each, bulls and heifers, all registered, were purchased, and importation of good Herefords on a large scale continued until 1913, after which only occasional bulls have been brought to the ranch. Among prominent Hereford breeders on the mainland from whom cattle were purchased were J. M. Curtis and W. H. Curtis of Independence, Missouri, and Eminence, Kentucky; Gudgell and Simpson, formerly of Missouri but later of Kansas; Mr. Robinson of Wisconsin; Mr. Vanatta of Indiana, and Mr. Hazlett of Eldorado, Kansas, and Giltner Brothers of Kentucky. Anxiety 4th blood predominates among the Herefords on the Parker Ranch.

The ranch now carries some 26,000 Herefords, which include 400 bulls. All the bulls and about 2500 of the females are purebred. Five thousand cattle were marketed in Honolulu last year and about 250 were slaughtered locally. Cattle for Honolulu are loaded on the steamers at Kawaihae, twelve miles from Kamuela, the headquarters of the ranch.

The lands of the Parker Ranch extend from the sea to the slopes of Mauna Kea about 7500 feet elevation. Soil, rainfall, wind and temperature conditions vary widely in the different sections of the ranch. Some areas are not capable of carrying more than one steer to fifty acres while other more favored sections of the ranch may carry one head on about three acres.

The number of bulls required per hundred cows also varies in the different sections. A larger number of bulls insures a better calf crop which is about 80-85 per cent at the present time. Five to six bulls per 100 cows are considered about the right number.

The bulls are put with the cows about the middle of March and left for four months. The calves start coming the following January and they are weaned and put in separate paddocks about August when they are six to seven months old.

A good many of the bulls on the leading ranches of Hawaii are Parker Ranch bulls. About 75 are sold per year.

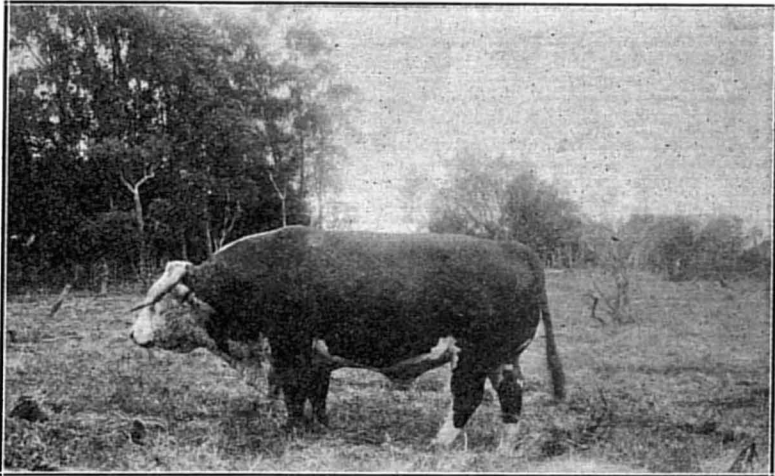


Fig. 5
Hereford bull on Parker Ranch.



Fig. 6
Holstein bull on Parker Ranch.

The Holsteins

Holstein bulls were introduced as early as 1901 and bull introductions continued, resulting in high grades by 1921. About that time a registered herd was imported, most of them purchased from the Mount Hermon School and Field Herd in Massachusetts and in Wisconsin and Minnesota. These foundation purebred animals were largely selected by Dr. Williams of the Veterinary Department of Cornell University and have now increased to 300 registered animals. Forty-five of the original imported cows are still in the herd. Most of the milk is made into butter and cheese.

The Holstein herd, purebreds and grades, now numbers about 1000 head. Only the bull calves from the very best cows are raised as breeding bulls, the balance are made into Holstein steers.

Horses and Mules

The Parker Ranch carries about 2200 horses and mules. During the days when the Army had the cavalry in Hawaii many horses were sold to the Army and a considerable number are still sold to them. Mules, from Percheron mares, are sold to sugar plantations. Race horses are produced and trained and sold to the mainland.

The Humuulu Sheep Station

The sheep ranch headquarters are high up on the slopes of Mauna Kea, 32 miles from Kamuela. These lands, having an area of about 50,000 acres, became a part of the Parker Ranch in 1914 and have an elevation ranging between 6600 and 9500 feet. Twelve thousand Merinos are kept, all the rams being purebred.

The wethers average about a seven pound fleece and the ewes five pounds, the total wool production being about 70,000.

Dressed two year old wethers weigh about 48 pounds. Present day demand is largely for lamb, but marketing lambs interferes with the wool production program.

This is a region of heavy dews and much fog and the sheep get all their water from the vegetation.

Berkshires

The ranch carries about 1000 swine of the Berkshire breed.

Water and Fences

All the water for the ranch comes by pipelines across the Waimea plains from the Kohala mountains, the water being lifted by pumps where necessary. About one hundred and thirty-five miles of pipe line are necessary to properly distribute the water to the various pastures.

The ranch has a total of about 140 miles of fence, mostly wire on mani or eucalyptus posts.

Forage Grasses and Crops

Notable work has been done in the past thirty years in improving the carrying and fattening capacity of the pastures by the introduction of desirable forage grasses from various parts of the world.

Rescue brome grass (*Bromus unioloides*) is considered a very valuable and desirable grass, doing particularly well during the winter months at elevations of 2500 feet and above. Perennial rye grass (*Lolium perenne*) is considered of second importance only to rescue brome grass. Among other important grasses and legumes are cocksfoot (*Dactylis glomerata*), Kentucky blue grass (*Poa pratensis*), Rhodes grass (*Chloris gayana*), Natal red top (*Tricholaena rosea*), Australian water grass (*Paspalum dilatatum*), Bermuda grass (*Cynodon dactylon*), white clover (*Trifolium repens*), alsike clover (*Trifolium hybridum*), and yellow sweet clover (*Melilotus officinalis*).

Bur clover (*Medicago denticulata*) and purple vetch (*Vicia sativa*) do well on sections of the ranch. The Pigeon pea (*Cajanus indicus*) has not podded well where tried. Koa haole (*Leucaena glauca*) may do well on some of the lower, wind swept rocky land. Kukuyu grass (*Pennisetum clandestinum*) has been planted at 5000 feet elevation and is doing well.

Hilo grass (*Paspalum conjugatum*) does not fatten cattle well and is being gradually replaced by more valuable grasses.

About 1000 to 1500 acres at 5000 feet elevation are planted to corn each year, which yields from 30 to 35 bushels per acre. A special variety of corn has been developed by the Parker Ranch for this region.

Oats harvested just before the dough stage makes an excellent hay.

PUAKEA AND PUUHUE RANCHES

Puakea Ranch as at present operated also includes the area formerly known as Puuhue Ranch. The headquarters of the Puakea Ranch are on the government road leading from Mahukona to Kohala at an elevation of about 600 feet. The nearest port is Mahukona, about seven miles away.

The headquarters of the Puuhue Ranch operated as a separate ranch previous to about 1906 when an amalgamation with Puakea Ranch was effected which will expire in 1930 are located about a mile makai of the Waimea-Kohala road on a road leading to the pineapple cannery, which leaves the main road near the golf course about ten miles on the Waimea side of Kohala.

These combined ranches run from the sea to an elevation of about 4000 feet and have a total area of about 25,000 acres and at present have about 5000 Herefords, 350 light horses and 10 Berkshire sows.

Good Hereford bulls as well as females have been imported from time to time and the ranches at present have 85 range bulls and 75 selected females that are bred to specially good bulls for the production of the range bulls. The range bulls are segregated from the cattle from July to February.

The rainfall at the Puakea Ranch headquarters has varied between 30 and 63 inches since 1920. The water needed for the cattle comes from the Kohala mountains.

Paspalum dilatatum has been planted quite extensively and has done very well. *Koa haole* (*Leucaena glauca*) is being experimented with as a promising low land forage crop. Pigeon peas (*Cajanus indicus*) have not been extensively tried, although results of such attempts as have been made with this legume have not been too encouraging. Plenty of Bermuda grass (*Cynodon dactylon*) and some red top (*Tricholaena rosea*) is found on the lower and intermediate elevations and Hilo grass (*Paspalum conjugatum*) is quite abundant on the upper lands. A scattering of Ohia lehua trees is found over the upper section with practically all their branches on the leeward side of the tree, which is indicative of the strong winds that prevail much of the time.

The ranches are in need of more fences and paddocks to facilitate segregation and control of the animals at different ages and to give newly planted grasses an opportunity to get started while the cattle are kept out of certain sections for a time. These paddocks are included in the plans for the development of the ranches.

Cattle are marketed from two years of age to about five, at which time they weigh about 450 to 650 pounds dressed weight. About 500 to 600 are shipped to Honolulu annually, with an additional 180 slaughtered on the ranch for consumption in the Kohala district. Cattle for Honolulu are loaded at Kawaihae. The Mahukona beach is not suitable for loading cattle on the Inter-Island boats.

It is planned to reduce the number of horses which are kept for sale to various parties. No mules are produced on the ranch at the present time.

History of Puakea Ranch

Henry Christiansen had a sheep ranch on the Puakea land in the early seventies. He also planted some sugar cane, the milling of which was apparently not too successful with the crude equipment of that time.

Dr. James Wight acquired the Puakea Ranch lands about 1875 and continued with the sheep ranch, the sheep at that time numbering about 7000 head of the Merino breed. Robert Mason acted as manager from about 1875 to 1882 and was followed by Hans Martinsen, who continued till 1886, when J. H. MacKenzie became manager for Dr. Wight and continued to 1901.

Dr. Wight about 1886 imported two Maltese jacks at a cost of \$1400 and he was probably one of the first men to breed mules in Hawaii.

Since the sheep suffered from scab, and wild dogs killed many, cattle were substituted for the sheep in the eighties and there were few or no sheep left after 1890. Two Shorthorn bulls were imported from California and bred to the native cattle and Shorthorn blood predominated on Puakea Ranch till 1901, although some Hereford blood was introduced as early as 1889. Beef had little value at this time and many cattle were sold as work oxen for the cane fields.

While Mr. MacKenzie was manager water was brought eight miles from the Kohala mountains, some wells were dug near the beach and some fences built.

When Arthur Mason became manager in 1901 the ranch had about 3000 cattle. During the next twenty years Hereford blood gradually replaced the Shorthorns. Eighteen Herefords, eight bulls and ten cows were imported from Oregon in 1908 at a cost of \$130 each and five bulls were imported from Kentucky in 1920 at a cost of \$500 each.

Dr. James Wight, owner of Puakea Ranch, died in 1905, and the ranch has since been operated by the trustees for the James Wight Estate,—Messrs. Robert W. Shingle, E. H. Wodehouse, and A. W. T. Bottomley. James Wight succeeded Arthur Mason as manager about 1920 and continued till 1928, when Leighton Hind became manager of the combined Puakea and Puuhue ranches.

History of Puuhue Ranch

Puuhue was a cattle ranch as early as 1880, James Woods then being the owner and manager. According to reports of cattlemen of that day, Puuhue had 4000-5000 cattle at that time, which roamed over much of the Puakea section on a rental arrangement and many cattle were marketed in Honolulu. After the death of Mr. Woods in 1882, John Maguire became manager. He was followed by Eben Low for a few years and then Palmer Woods, son of James Woods, became manager and continued till about 1906, when the amalgamation of Puuhue with Puakea ranches was effected, which is to continue till 1930.

PUU OO RANCH

Puu Oo Ranch, largely on the slopes of Mauna Kea on a line between Hilo and the top of the mountain, has an area of 23,000 acres, 40 of which are held in fee simple, 13,000 are leased from the government and the balance from private parties. The ranch is located at an elevation ranging between 5,000 and 6,500 feet, and can be reached by an auto trail through Waikii and by horse trail from Hilo. The soil is good except for about 3,000 acres of rocky land between Mauna Kea and Mauna Loa. It is mostly an open forest country with Ohia lehua, koa (*Acacia koa*) and mamani (*Sophora chrysophylla*) trees.

This region has an annual rainfall of 92.48 inches based on eighteen years' records and the temperature has been observed to drop as low as 19° F. Water is secured from springs which lead to tanks and this ordinarily is an ample supply for the cattle. It is estimated that an average bullock drinks about 15 gallons per day. Puu Oo Ranch has about 75 miles of fence.

This ranch carries about 4,000 high grade Herefords, 100 of the Hereford cows being registered animals. Forty-five bulls, all registered, are in service. All of the herd bulls except three from the Parker Ranch are Puu Oo raised. A total of about 1200 head are marketed annually from Keaau and Puu Oo Ranches, cattle from Keaau, the lower ranch, often being brought to Puu Oo for a year or more before marketing them.

Kentucky Blue Grass (*Poa pratensis*) with white clover (*Trifolium repens*) mixed in predominates as a forage grass in this section, and mesquite (*Holcus lanatus*) is considered very good. A wide variety of forage grasses are found, including cocksfoot (*Dactylis glomerata*), *Paspalum dilatatum*, carpet grass (*Paspalum compressum*), redbud or Herd's grass (*Agrostis alba*), perennial rye (*Lolium perenne*), sweet vernal grass (*An-*

thoxanthum odoratum), Phalaris bulbosa, Bermuda grass (Cynodon dactylon), tall meadow oat grass (Arrhenatherum elatins), brome grass (Bromus unioloides), Panicum pruriens, native sedges, creeping bent grass (Agrostis alba var. maritima), bird's foot trefoil clover (Lotus corniculatus), sheep sorrel (Rumex acetosella) and Hop vine clover (Trifolium agrarium), etc.

The lease on Puu Oo Ranch was purchased in 1899 by W. H. Shipman from John Baker, who started the ranch about 1896. He had built some fences, and about 600 head of mixed cattle, including some Longhorns, were found on the ranch at that time. Hereford bulls have been used on this ranch since 1900 and the cattle are well bred.

The ranch is still owned by W. H. Shipman, Ltd., and managed by W. H. Shipman and his son, H. C. Shipman.

PUUWAAWAA RANCH

Puuwaawaa Ranch in North Kona, with the ranch headquarters beautifully located three miles above the government road, consists of a total of about 128,000 acres, but about 100,000 are waste lands covered with lava flows. Of the remaining 28,000 acres only 1,500 are really good grazing lands. About 100 acres are planted to cultivated crops. All but 300 acres held in fee simple are government leased lands. These lands run from sea level to an elevation of 6,000 feet. Some of the best grazing lands are found at 5,000 feet elevation.

For many years there was practically no water on the ranch other than what the cattle could get from the dew and succulent vegetation. However, as the vegetation became scarcer water was required in all but a few paddocks well supplied with cactus where the cattle still grow to maturity without ever having access to free water. The limited water now available is secured from roofs, and a pipe line from Huehue Ranch.

A total of about thirty miles of fences, half stone and half wire, are found on the ranch.

At present the ranch carries about 2,000 Herefords. All the bulls and thirty of the females are purebred.

About 500 head, ranging between two and three years of age and dressing out at 500 pounds are marketed annually,—practically all are sent to Honolulu, being loaded on the steamers at Kailua.

Only rarely are the bulls left with the breeding herd throughout the year. Usually they are turned out only during the seasons when grazing conditions are good, for the owner does not like to risk losing valuable bulls during adverse seasons. The good and bad seasons do not follow the same schedule year after year, so a definite pre-arranged breeding schedule, which would be preferable to get calves at the same time, is impossible.

Calves are weaned at about six months of age, depending on the season. In bad seasons they are weaned earlier and taken to the best paddocks, which helps both the calf and the cow. An 85% calf crop was secured in 1928, but such a good percentage is not always secured.

When bulls range with the cows throughout the year they average about one bull to thirty cows. For restricted breeding seasons more bulls are needed.

The ranch carries about sixty light horses and raises about ten mules per year. Practically no swine and no sheep are kept.

About two hundred dairy cattle of the Holstein and Guernsey breeds, ranging in age from four months to about two years, can be found on the ranch at all times. These are the young calves from the Hind-Clarke dairy in Honolulu which are carried to the calving age at Puuwaawaa Ranch and then sent back to the dairy in Honolulu again.

Bermuda grass (*Cynodon dactylon*) is considered one of the best grasses. Other grasses that do well are Kukaipuaa or crab grass (*Panicum pruriens*), Kentucky blue grass (*Poa pratensis*), Spanish needles (*Bidens pilosa*), Rhodes grass (*Chloris gayana*), Mesquite or Yorkshire fog (*Holcus lanatus*) on high elevations, orchard grass or cocksfoot (*Dactylis glomerata*), *Paspalum compressum*, bur clover (*Medicago denticulata*) and red top (*Agrostis stolonifera*). Native weeds supply some forage and in droughty seasons the cactus (*Opuntia* spp.) is a great asset for the cattle eat not only the young leaves but also manage to break off the spines with their feet and survive. Rat tail or New Zealand timothy (*Sporobolus elongatus*) has also been introduced and seems to be spreading.

The real beginning of Puuwaawaa Ranch was about 1892 when Robert Hind and Eben Low leased about 45,000 acres from the government and purchased about 2,000 head of cattle,—a mixture of Shorthorn, Angus and Devon breeds, from Frank Spencer, who had previously leased the lands of Puuanahulu, consisting of approximately 83,000 acres from the government. In 1893 Hind and Low acquired the lease on 12,000 acres of this area, and in about 1917 Hind acquired the lease on the other 71,000 acres formerly in the Spencer lease. No cattle were carried on these 71,000 acres during the period 1893-1917, but the land was pretty well overrun with goats.

Hereford bulls and cows, six of each, were imported from New Zealand soon after Puuwaawaa Ranch was started in 1892 and only Hereford bulls have been used on the ranch since then,—some secured from Gudgell and Simpson of Independence, Mo., and more recently from the Parker Ranch.

According to Mr. Hind's observation, Shorthorn cattle did not do as well as the Herefords on Puuwaawaa Ranch when conditions were adverse. The Angus cattle did very well, but because of the problem of mixing breeds, the ranch was continued with only Herefords.

Since 1902 Robert Hind has been the sole owner of Puuwaawaa Ranch and he is still general manager of the ranch.

ISLAND OF KAHOOLAWA

KAHOOLAWA RANCH

The Island of Kahoolawe has an area of 28,700 acres and rises to a height of about 1,400 feet above the sea. About 10,000 acres are covered with scrubby Keawe trees (*Prosopis juliflora*) which attain a little larger size in the gulches. The soil is red and where vegetation has been destroyed, blows badly.

A number of people have held leases or been otherwise interested in Kahoolawe at various times, among whom were Mr. Allen, Wm. Daniels, Wm. Cummins, Kinnersley Bros., Thos. Gay and C. C. Conrad. Eben Low held the lease from 1906 to 1918, when Angus McPhee bought a twenty-one year lease on the island and he was joined in 1921 by Harry Baldwin.

Kahoolawe at this time was badly overrun by goats, which had destroyed much of the vegetation. In the ten years preceding 1928 the present owner of the lease destroyed 13,000 goats on this island and it is believed that the goats are all gone now.

One thousand pounds of Australian salt bush (*Atriplex semibaccata*) have been planted and does well, and Pili grass (*Andropogon contortus*) and Bermuda grass (*Cynodon dactylon*) are found. Pigeon peas (*Cajanus indicus*) have been planted and are growing well.

The rainfall averages about 24 inches per year and no water other than rain water is available at the present time. Wells which, according to reports, once yielded fresh water, now run 400 grains of salt to the gallon, according to Mr. McPhee.

The trade winds bring little or no rain to the island and Kona rains are depended upon to furnish the supply which fills the tanks totalling 1,400,000 gallons and this supply usually has to last one year. The pahoehoe lava flows furnish a natural water shed from which the rain, by ditches, is carried to the storage tanks, and cisterns ten feet deep in the ditch serve to settle much of the soil out of the water before it is delivered to the tanks.

At present while the process of getting the grasses established is going on, the island carries only 250 Aberdeen Angus cattle and 100 horses, with one man in charge. The island is divided into two parts by a fence and the windward side, which is most barren, has no cattle at the present time. Eventually, perhaps ten years hence, when the grasses become well established again, Kahoolawe will probably carry 500 cattle and 200 horses without danger of overstocking.

ISLAND OF KAUAI

GROVE FARM COMPANY CATTLE RANCH

Grove Farm on Kauai has an area of 7,500 acres of ranch lands, extending from 400 to 1,000 feet elevation. Part of this area is fallow cane land; the balance is used exclusively for pasturage.

Streams running down the valleys from the hills provide readily accessible drinking water for the cattle at all times. Liver fluke is found in most of the cattle slaughtered. It is believed that they become infected by feeding on the vegetation growing near the streams.

The present herd numbers between eight and nine hundred head, largely of the Devon breed. This breed was originally favored because of their value as work oxen and it was also found that they suffered less than some other breeds from sore eyes caused by dust.

Five registered Devon bulls were imported as late as 1921 from Giltner Bros. of Kentucky. In 1926 four Parker Ranch Hereford bulls were introduced. It is believed that the change from Devons to Herefords will result in a material gain in weight in beef cattle between the ages of three and four years. About two hundred head are slaughtered each year, all consumed locally. Over a period of eleven years the average weight of dressed beef was 404 pounds.

Liki grass was the common pasture grass prior to 1892 when yellow foxtail (*Chaetochloa glauca*) began to crowd it out. *Paspalum dilatatum* was broadcasted over one hundred acres of the pastures and made a favorable showing till in 1913 it was discovered that *Paspalum compressum* had made its appearance on the hills and was crowding it out. Later yellow foxtail continued to spread and is now the predominating grass and a very poor feed. Foxtail cuts the tongues of cattle and horses, interfering seriously with the growth of young stock. Best results for feeding are obtained after burning off the stand.

Para grass (*Panicum barbinode*) has been planted experimentally recently by plowing long furrows, placing the cuttings in them and covering with soil.

Kikuyu grass (*Pennisetum clandestinum*) has been tried without success. Elephant grass (*Pennisetum purpureum*) has been found of great

value for fattening beef cattle,—especially when fenced in so that the cattle can be allowed to graze on it for a limited period and then taken off again.

G. N. Wilcox purchased Grove Farm from H. A. Wideman in 1864 and borrowed a Shorthorn cow from his neighbor, Paul Isenberg. Later he purchased this cow and this was the beginning of the herd. About 1880 Mr. Wilcox, W. H. Rice and Lihue Plantation imported three Hereford bulls from Australia and still later Mr. Wilcox and his brother, A. S. Wilcox, imported four Devon bulls from New Zealand.

Tom Thumb cattle or Dexter or Kerry Dexter cattle, as they were once known, were imported by W. H. Rice and a bull of this breed was procured for Grove Farm and this strain is still very much in evidence on Grove Farm and has proved a very successful type of animal both for work and for beef.

S. W. Wilcox, a brother of the owner, was the first manager of the ranch and was succeeded by his sons, R. L. and C. H. Wilcox. Grove Farm Company, Ltd., was incorporated in 1921, and became the owner of the present herd. H. D. Sloggett has been the manager of the company's ranch since 1920.

KEKAHA SUGAR COMPANY RANCH

Kekaha Sugar Company Ranch at present consists of a total of 27,000 acres ranging from sea level to 3,500 feet elevation. When the company acquired the lease of these government lands in 1923 the understanding was that all lands suitable for cane cultivation should be reclaimed and during the past five years, some 1400 acres of the best pasture lands have been brought under cultivation, consequently making it impossible to enlarge the herd, which totals about 500 head. Much of the total area has little grazing value, due chiefly to long and severe droughts each year.

Hereford blood predominates. Four Angus bulls and eight cows imported a few years ago did not do well, the cows seemingly not having enough milk for their calves under the prevailing conditions. When pastured in the lower lands, in the best pastures, they contracted liver fluke.

About 100 head of three to four year old cattle are marketed locally each year for local consumption only. The dressed weight averages 350-500 pounds per head.

The principal forage grasses are Pili grass (*Andropogon contortus*) and a grass known locally as Mahiki. Quite a quantity of haole koa (*Leucaena glauca*) is found in the valleys.

Mr. Valdemar Knudsen started this ranch some 60 years ago. The cattle then were the Longhorn type. Some Durham blood was introduced at an early date and by 1883 two Holstein bulls were brought in and their blood became spread through the herd.

Eric A. Knudsen and his brother Augustus took over the cattle in 1898 and brought in Devon bulls and in 1902 introduced Tom Thumb (Dexter) bulls and shortly after part Hereford bulls. In 1916 two Hereford bulls were introduced from the Parker Ranch and fifteen of their offspring turned in the herd and by 1920 the whole herd had a decided Hereford appearance and the weights of animals had almost doubled. The ranch was known as Waiawa Ranch at that time.

When the Kekaha Sugar Company acquired the lease of these lands in 1923 they purchased the balance of the Knudsen Brothers cattle, numbering about 500 head.

Mr. William Danford is manager of the Kekaha Sugar Company, Ltd., and Jose Manoa is superintendent of the ranch division.

KILAUEA RANCH

Kilauea Ranch in the northeast part of Kauai is part of the Kilauea Sugar Plantation Company, and is operated chiefly for the convenience of the plantation employees. The ranch carries approximately 800 Hereford cattle and about twenty-five Holsteins. The dairy cattle supply the plantation employees with milk, cream and butter. Usually a surplus of beef over plantation needs is produced and this is sold elsewhere on the Island of Kauai. About two hundred head are marketed each year.

There are some thousand acres of pasture lands in the gulches between the cane fields, and in small areas above and below the cane fields. Besides this a considerable area of fallow cane lands are pastured each year but this area is indefinite and varies from year to year.

Horses are raised for plantation use. The ranch now has a large Percheron stallion for producing heavy draft animals and a part Arabian stallion is used for the saddle animals.

Bermuda grass (*Cynodon dactylon*) predominates in the lower pastures. In the pastures above the cane fields Hilo grass (*Paspalum conjugatum*), *Paspalum compressum* and foxtail (*Chaetochloa glauca*) are common. The *Paspalum compressum* was broadcast among the native grasses six years ago and is now well established. Pigeon peas (*Cajanus indicus*) are used in paddocks for the dairy stock.

Mr. David Larsen, manager of Kilauea Sugar Plantation Company is also manager of the ranch department.

THE KOLOA SUGAR COMPANY RANCH

The area used for pasturage on The Koloa Sugar Company consists of approximately 2,500 acres. A small part of this is rocky land between sea level and 200 feet elevation, but the bulk of the ranch lands lie between 200 and 600 feet elevation. All the better lands are used for cane culture, only waste lands, idle cane field and the lower slopes of the surrounding foothills being used for pasturage.

The bulk of the cattle, numbering 749 head, are Devon-Hereford crosses, but this number also includes some 75 to 100 cows used for milk production, the dairy cows merely being the better milk producers of the range cattle. Since four years ago a purebred Ayrshire bull has been used on the Devon-Hereford cattle selected for dairy purposes and a very noticeable improvement in quantity and quality of milk is apparent in the young cows resulting from this cross which are now coming into the dairy.

Originally the cattle were more or less pure Devons, but since about 1920 only purebred Hereford bulls have been used. This cross seems to suit the sparse rough pastures very well. Bulls range with the breeding cows continuously except for certain periodic intervals, when they are brought in to the home paddock and given a ration of grain in addition to the forage, which helps materially in maintaining the health and vigor of the bulls. One hundred and fifty to 200 calves are born annually.

Around 150 head, averaging three to three and one-half years, are slaughtered annually on the ranch, all the beef being consumed locally. The dressed weight averages between 400 and 450 pounds.

All riding stock used on the plantation and some of the heavier work horses are raised,—the plantation having a grade Percheron stallion as well as a grade stallion for riding stock breeding. In addition the better type riding stock brood mares have during the past two years been sent to the thoroughbred stud maintained at Waipouli jointly by J. Spalding and C. A. Baggot and to the U. S. Remount Association stallion located at the same establishment.

The lower rocky lands are covered with cactus (*Opuntia* spp.) and haole koa (*Laucaena glauca*). During the winter and early spring months an excellent growth of native grasses springs up in the more open stretches but fast disappears as the rainfall decreases. On the lands above 200 feet elevation, foxtail (*Chaetochloa glauca*) and Hilo grass (*Paspalum conjugatum*) predominate, both of which furnish rather poor pasturage. The present manager of the plantation and ranch, John T. Moir, Jr., has recently planted *Paspalum dilatatum* and *P. compressum* and these are beginning to make their appearance.

Authentic facts concerning the beginnings of the ranch are unavailable, but apparently at some early date, even before the founding of the sugar corporation in 1835, beef cattle were pastured on the lands now used for growing cane.

LIHUE PLANTATION RANCH

Lihue Plantation on Kauai has had cattle since about 1850 and in those early days butter was made there and shipped to California. The ranch was known as Brown's Dairy for a time. About 1865 William Hyde Rice took charge of the cattle on Lihue Plantation.

Lihue Plantation Ranch has an area of about 5,000 acres, ranging from sea level to about 1,000 feet elevation, and at present carries about 1,400 Herefords, about 300 of which are slaughtered annually, all on Kauai. The quality of the cattle has been materially improved since 1916, when fourteen good purebred Hereford bulls were introduced and the most inferior breeding cows weeded out. Previous to 1916 the cattle were rather mixed and when slaughtered dressed out at only 300 pounds each, while the present average is about 600 pounds. The use of only purebred Hereford bulls has continued since 1916 and this, combined with better feed, is responsible for the great improvement brought about.

On Lihue Plantation Ranch cattle are largely fattened on fallow cane lands which, with ample rainfall, will carry one animal per acre. Some of the cane lands are allowed to lie fallow for one or two years following the last ratoon crop and the residual effects of the fertilizer used on the cane crop produces an excellent growth of forage. The cattle are often put in the fallow cane fields at two years of age and left there about six months, when they are in good condition for slaughter.

Lihue Plantation has an excellent dairy. Forty purebred Ayrshire cows, imported about ten years ago from the Eastern States, were the foundation animals of this Ayrshire herd.

The principal range grasses are *Paspalum dilatatum* and *Paspalum compressum*.

Mr. R. D. Moler, manager of Lihue Plantation, is in general charge of the sugar and ranch interests and Mr. Theodore Blackstad is superintendent of the ranch division.

MAKAWELI RANCH

Makaweli Ranch is located on the southwest side of the Island of Kauai and consists of lands extending from the Waimea Canyon on the west to Wahiawa on the east and from the sea coast back into the mountains. The mountain lands include much that is forest or waste land, while the lowland pastures consist mostly of rocky valleys interspersed between the Makaweli cane fields. Owing to the very rough character of much of the ranch country, no detailed surveys have been made and it is not possible to state exact areas. A small branch of the ranch is maintained on

the Napali or northwest coast of Kauai where the Kalalau valley is used for pasturage of a few head of cattle.

There are great variations of rainfall in the several sections of the ranch, but in general it may be stated to be ample during the winter months but insufficient in summer.

Before a portion of the land was leased to the Hawaiian Sugar Company about 1889 the ranch carried about 3,000 head of cattle. Subsequent to the development of the plantation, the consequent decrease in area available for ranching, coupled with the increase of the lantana (*Lantana camara*) pest caused the ranch to decrease heavily in numbers of stock maintained, until fifteen to twenty years ago the number was only a few hundred. Since then a careful reorganization of fences, the clearing of lantana and planting of improved grasses has made it possible to increase the number to about 1,000 head at present, which number may be increased from time to time as conditions warrant. The cattle are mostly a cross between Shorthorns and Devons, the Devon stock giving the hardiness and good travelling qualities necessary for the rough type of country pastured. Most of the cattle are marketed locally, cattle being sold at about two years, at which age they average about 1,000 pounds live weight.

The late Mr. Francis Gay, a former part owner of Makaweli Ranch, stated that in the early years some 1,500 cattle were lost in two or three years' time due to excessive and continuous drought. In those early days beef had little value, the tallow having more value than beef. Cattle were sold as low as \$12.00 per head in those days.

Horses are raised chiefly for ranch purposes and are partly of Arabian stock.

Bee apiaries are also maintained with an annual output equivalent to some 600 to 800 cases of honey.

Many imported varieties of grass do well at Makaweli, especially *Paspalum dilatatum*, *Paspalum compressum*, Buffalo grass (*Stenotaphrum americanum*) and Para grass (*Panicum barbinode*) considerable areas of which have been established. Experiments conducted with Kikuyu grass (*Pennisetum clandestinum*) in moist valleys promise very favorable results. Among other grasses being tested are Natal redbtop (*Tricholaena rosea*) Guinea grass (*Panicum maximum*) Elephant grass (*Pennisetum purpureum*) and others.

The Makaweli Ranch is controlled by the co-partnership of Gay & Robinson, the fee simple title to the land being held by Mr. and Mrs. Aubrey Robinson, the senior partners in the firm. The land was originally purchased mostly from Hawaiian Chiefs and the Monarchy, although it also occupies some leased lands in the Waimea, Mokiha and Hanapepe sections. Under the present owners it dates back to about 1865, when the Ahupuaa of Makaweli was purchased from Princess Victoria Kamamalu by the Sinclair family. Ownership then went to Mrs. Robinson and Mrs. Gay, mothers respectively of Aubrey Robinson and Francis Gay, who long conducted the ranch under the name of Gay & Robinson or Makaweli Ranch.

Selwyn A. Robinson is the present manager of the ranch.

PRINCEVILLE PLANTATION COMPANY

Princeville Plantation Company is located in the northern part of Kauai with headquarters at Hanalei. The lands extend from sea level to an elevation of about 1,200 feet. The total area is about 10,000 acres, of which 3,000 acres afford good grazing, 3,000 acres are in forest reserve, and 1,000 acres are leased for the growing of rice and pineapples. The balance of the area consists of gulches, ridges, etc., of only fair grazing value.

Most of the lands are held in fee simple by the Company but there are some leased lands, partly from the government and partly from private owners.

Rainfall averages about 100 inches per year, which indicates a rather wet climate. Rain falls through most of the year but occasional dry spells lasting for several months do occur.

The Hereford breed predominates at the present time and the herd now numbers about 1,700 head. The former method was to run the bulls with the breeding herd through the whole year, but this method has been changed the past year to seasonal breeding.

The bulk of the market cattle are sold on Kauai, being slaughtered on the Ranch. The larger animals are generally shipped to Honolulu, the average dressed weight of those shipped in 1928 being 555 pounds. About 300 head are marketed each year and as planned improvements are effected, this number will be increased to 450 annually.

The raising of horses has been found unsatisfactory and this practice is being abandoned.

Buffalo grass (*Stenotaphrum americanum*) was introduced a number of years ago and did so well that a great deal of it was planted. It was later found that the cattle did not do so well on it. *Paspalum compressum* and *Paspalum dilatatum* were introduced in 1910 and these two grasses comprise the bulk of the pasture grasses now. *Paspalum compressum* (Carpet grass) particularly is prevalent everywhere on the ranch and is considered very desirable because it stands heavy grazing, and recovers quickly when rested, does well on wet lands, is very hardy and retards the growth of noxious weeds. It is considered somewhat inferior to *Paspalum dilatatum* as a fattening grass.

Elephant grass (*Pennisetum purpureum*), introduced in 1918, was found to be very satisfactory as a pasture grass on this ranch, several hundred acres having been planted and the manager plans to increase this area to 1,000 acres or more. They consider it a good fattening grass which stands heavy grazing and recovers rapidly when rested.

Pigeon peas (*Cajanus indicus*) will be tried later, according to present plans.

Princeville Plantation Company was originally started as a coffee plantation. This evidently was unsuccessful. Sugar cane growing was tried next and this too was abandoned in 1872, and all efforts concentrated on the raising of cattle.

Cattle have been run on these lands for many years. They were first brought to Hanalei in 1831 by Richard Charlton, then British Consul. The cattle increased in numbers and many strayed into the surrounding country and became wild.

Albert Wilcox eventually bought out the original owners and, in 1905, began improvements such as clearing and plowing lands, introducing better grasses and Hereford cattle.

Princeville Plantation Company was sold by Albert Wilcox in 1916 to Lihue Plantation Company, Ltd., who are the present owners.

Former managers include Mr. Radway, Mr. Willis and W. F. Sanborn. F. B. Conant has been manager since July, 1927.

WILLIAM HYDE RICE RANCH

William Hyde Rice, Ltd., Ranch at Lihue, Kauai, was formerly known as Lihue Ranch and was started in 1872 by William Hyde Rice. The 3,000 acres, more or less, composing this ranch are scattered, have a varied rainfall ranging from 20 to nearly 600 inches and range in elevation from sea level to 1,000 feet.

The ranch carries about 900 Herefords and 80 Ayrshires at the present time. About 200 head are slaughtered annually, which, when two to three years old, dress out at about 550 pounds. No cattle are shipped to Honolulu, all are slaughtered on Kauai.

Elephant grass (*Pennisetum purpureum*), Kukuyu grass (*Pennisetum clandestinum*), and alfalfa (*Medicago sativa*) are the chief forage crops for the dairy cattle and the range grasses for the beef cattle include *Paspalum dilatatum*, *Paspalum compressum*, Bermuda grass (*Cynodon dactylon*), Hilo grass (*Paspalum conjugatum*), and some Pigeon peas (*Cajanus indicus*). Fox tail (*Chaetochloa glauca*) is found to some extent and is considered a pest. Some lantana (*Lantana camara*) is also found and as the men dig out lantana they carry along cuttings of good economic grasses and plant them in the loose soil where the lantana was removed.

Streams from gulches provide ample water for the cattle.

Only purebred Hereford bulls are used on the range and the beef herd includes 26 purebred Hereford females, and a total of 200 breeding cows with about one bull for each 25 cows. The bulls are out with the cows only from February to May and a 90% calf crop is secured. Calves are segregated from the cows before the succeeding calf crop arrives.

Charles Rice is in general charge of the William Hyde Rice, Ltd., Ranch.

ISLAND OF LANAI

LANAI RANCH

The Island of Lanai, while primarily given over to the growing of pineapples since 1924, still has an area of 55,000 acres of fairly well grassed but rocky and rather arid country extending in a belt around the 55 miles of coast line of Lanai, that are utilized as ranch lands and carry about 2,000 Herefords and 180 horses. This belt is from two to four miles wide and extends from the sea to about 1,000 feet elevation.

The total area of the Island is about 140 square miles and it ranges in height from sea level to about 3,376 feet elevation, with an average annual rainfall on a great part of the uplands of about 34 inches.

In 1922 before the upper lands were given over to the more profitable pineapples an area of some 2,000 acres had been planted to Pigeon peas (*Cajanus indicus*) and *Paspalum dilatatum*. On the lower, rather rocky, present ranch lands the algaroba tree (*Prosopis juliflora*) is valuable because of its bean crop, and Koa haole (*Leucaena glauca*) and Australian salt bush (*Atriplex semibaccata*) are considered desirable forage crops. It is planned to further improve the lower pastures by additional planting of the above crops and by light stocking and resting present pastures.

In the future the ranch will not do much more than raise beef and saddle horses for the pineapple plantation needs. The ranch, though a part of the Hawaiian Pineapple Company's property, still operates as The Lanai Company, Ltd.

The Hawaiians formerly herded goats, probably for their skins, on the uplands of Lanai, and some agricultural work was done by Walter Murry Gibson, who arrived in 1861, in connection with the Mormon church. Gibson acquired considerable land and when he died in 1888 his daughter, Talula Lucy Hayselden, became the owner. Gibson and the Hayseldens developed a sheep ranch on the Island, much of which was then owned by the Government and by W. G. Irwin. Irwin later acquired the Government lands and the Hayseldens about 1902 sold out to Charles Gay and nearly the whole Island of 89,600 acres was combined under the ownership of Charles Gay, which passed to Irwin in 1910 and from him to John D. McCrosson and

associates in the same year, when the Lanai Company, Ltd., was formed. Their interests were sold in 1917 to H. A. and F. F. Baldwin, who in turn sold the property to the Hawaiian Pineapple Co., Ltd., in December, 1922, who are the present owners.

Mr. Gay continued with the sheep ranch started by Gibson and Hayselden, probably carrying as high as 50,000 at times, but when the Lanai Company, Ltd., was started in 1910 they changed to cattle and put in extensive provisions for water and fences, and a count in April, 1911, gave 20,588 sheep and 799 head of cattle. At the end of 1920 there were only 860 sheep and early in 1923 a count showed that the number of cattle had increased to 5,536 and besides 4,462 had been sold during the previous five years. Reduction of the herd to make room for pineapples was started on a large scale in 1924, and from the end of 1922 to October 1928, 6,764 head of cattle were sold.

Mr. Moorhead was manager for the Hayseldens, Mr. Gay managed his own property for a time, Lt. Barnard was manager for the Lanai Company in 1910, and G. C. Munro, the present manager, took charge in 1911.

ISLAND OF MOLOKAI

HAWAIIAN HOMES COMMISSION LIVESTOCK

The Hawaiian Homes Commission on Molokai is emphasizing livestock in their rehabilitation program and data supplied by R. M. Duncan, executive officer and secretary of the commission, show that at present 358 head of cattle, 106 horses, fifteen mules and six jacks owned by 54 different homesteaders are under the control of the Commission.

Ninety percent of the cattle at present would have to be classified as ordinary scrub cattle but the commission has two grade Hereford bulls in the pastures and during the year hopes to encourage the purchase of more bulls.

MOLOKAI RANCH

Molokai Ranch has a total area of 68,000 acres, all fee simple lands. About 10,000 acres are leased for pineapple growing and 8,000 for forest reserves, leaving about 50,000 acres for the ranch proper. The ranch headquarters are at Malehua, eight miles from Kaunakakai, where the ranch office is located. The lands range in elevation from sea level to about 2,000 feet.

Water is secured from the mountains of East Molokai, ranging from about 2,600 to 3,700 feet in height and the water is carried by gravity to a 1,000,000-gallon concrete reservoir at 2,300 feet elevation and from there by pipes to the lands below. The flow of water to the reservoir averages 250,000 gallons daily and is used for other purposes besides merely supplying the ranch cattle with water. The ranch alone has about seventy-five miles of water pipe and over one hundred miles of smooth wire fences. Kiawe posts (algaroba) are largely used and are soaked in ocean water for three months, which greatly prolongs their life in the dry sections of the ranch. Redwood posts are used in the wet sections. Some Kiawe posts erected in 1907 are still in service.

Since 1923 Hereford bulls from the Parker Ranch have been used and the beef herd, which at present numbers 4,500, carries about three-quarters Hereford blood. Devon cattle were introduced to Molokai in 1898, about twenty-five bulls and ten cows being imported from California at that time. C. A. Hartwell in 1907, when manager, brought in some Herefords but the

ranch continued as a Devon ranch till 1920, when the last Devon importations were made from New Hampshire, these being more of the dairy type and costing \$750 each. Parker Ranch Hereford bulls were purchased in 1923 and the policy since then has been to purchase about fifteen Hereford bulls each year, a total of sixty-five range bulls being required for the herd.

The breeding season begins at the end of March and continues for three months. The season is short and this necessitates about one bull for each twenty cows. At the end of the breeding season (late June) the Kiawe beans are ripe and the cattle are turned in the Kiawe pastures, and the cattle are out of the Kiawe pastures by October, some time before the calves begin to arrive—usually in January, when the feed from annual grasses is good. Calves are weaned in October, when the cattle come out of the Kiawe pastures. A 70 to 75% calf crop is secured.

Molokai Ranch formerly had about 6,000 head of cattle, but this number was necessarily reduced as some grazing lands were utilized for other purposes. At present they average one head to thirteen acres. Approximately 900 head averaging three years of age are marketed annually and they average about 500 pounds dressed weight. About 200 are marketed in Honolulu each year, 600 at the Leper settlement and the balance slaughtered locally on the ranch.

The ranch has 400 swine, largely of the Duroc-Jersey breed. They find that Duroc sows crossed with Tamworth boars make excellent market hogs. Some twenty acres planted to alfalfa furnish green feed for the hogs.

Approximately 200 work animals are kept on the ranch and enough are raised each year to supply their own needs.

Mapulehu Dairy is the personal property of George P. Cooke, the president and manager of the Molokai Ranch. This dairy carries about 100 head, formerly all Ayrshires, but Holsteins and Guernseys have been introduced in recent years. The dairy lands total 1,800 acres and the dairy headquarters are near Pukoo. Raw milk is kept sweet by good refrigeration and shipped to market at Honolulu twice per week by boat. Walter Love is superintendent of the dairy at the present time.

Three hundred fifty tons of Kiawe honey were produced on Molokai Ranch in 1928, and most of it was sold to Germany.

Sheep

The present Molokai Ranch had sheep and cattle for many years previous to 1898 but details regarding this could not be secured for this publication. The shearing counts of 1900 indicated 15,800 in that year according to G. C. Munro, and George P. Cooke reports that about 17,000 sheep were found there in 1907. The sheep were mostly of the Merino breed with some Shropshires and Southdowns, and Tunis sheep were first introduced early in 1900 with later importations made in 1904 and 1910.

Sheep raising was gradually abandoned on Molokai Ranch beginning in 1917 and only about 200 remain at the present time. This was done chiefly because cattle and sheep together resulted in over-pasturing lands that were only second rate pasture lands at best because of limited rainfall. Also in the Algaroba pastures the thorns caused much lameness among the sheep so it was decided to specialize on cattle only.

Wool used to bring only about ten cents per pound and the mutton value when marketed at one to two years of age was about six to eight dollars per carcass.

Grass and Other Forage

Molokai Ranch has a variable, but generally rather low rainfall and hence a rather limited amount of valuable perennial grasses. Australian

salt bush (*Atriplex semibaccata*) was introduced in 1901 and has proven very valuable. Bermuda grass (*Cynodon dactylon*), Natal redtop (*Tricholaena rosea*) and *Paspalum dilatatum* are found on the uplands, and Pili grass (*Andropogon contortus*) is common on the lowlands.

Annual grasses are relied on for much feed following the winter rains and include Kukaipuaa (*Panicum pruriens*), Kakonakona (*Panicum torridum*), six weeks' grass (*Panicum colonum*), Ilima (*Sida* sp.) and various weeds.

The lowlands (about 25% of total area) are covered with Kiawe trees (*Prosopis juliflora*) and these provide valuable feed during the podding season lasting from June to October.

Pigeon peas (*Cajanus indicus*) have long been grown on Molokai Ranch and are considered very valuable. About 600 acres are in pigeon peas at the present time.

History

Oramel Gulick and R. W. Meyer had cattle on Molokai as early as the fifties, probably Longhorns, but exact records of this do not seem to be available. After this Kamehameha V ran cattle on Molokai, spending considerable time over there himself,—R. W. Meyer in the meantime having established a dairy at Kalae probably with Holstein cattle. Charles R. Bishop later became heir to these Kamehameha V lands through his wife and about 1897 a group of men, including A. W. Carter, W. R. Castle and J. B. Castle, purchased these lands from the Bishop Estate and started Molokai Ranch with George Campbell as manager, as the American Sugar Company. Sugar growing was attempted but failed due to lack of water. About 1900 a group of men, including Alfred W. Carter, A. M. Brown, A. L. C. Atkinson, Ernest Wodehouse, Ernest Mott-Smith, A. S. Hartwell and A. J. Judd, Jr., purchased control of the company and continued the property as a ranch with George C. Munro as manager. James G. Munro became manager in 1906 and he was succeeded in 1907 by Charles A. Hartwell. In the meantime the association of men who purchased the company in 1900 gradually dissolved and by 1906 the Hartwell family controlled most of the stock and they sold out to Charles M. Cooke in 1908, Charles M. Cooke, Ltd., owning the bulk of the stock at the present time.

George P. Cooke, the present manager and president of the company, became manager in 1908 and has continued as manager during these years except from 1918 to 1923, when James G. Munro was manager, and again from 1923 to June of the same year, when E. E. Conant was acting manager till his death.

From 1898 till 1905 the ranch went through an important change from the former open country system to the paddock system. The wild deer and wild goats were greatly reduced during this period, water distribution was brought about and a breeding system started.

ISLAND OF MAUI

MAUI AGRICULTURAL COMPANY'S GROVE RANCH

Grove Ranch, the livestock division of Maui Agricultural Company, is located at Makawao, Maui, and comprises a total of about 12,000 acres of grazing lands ranging from sea level to about 2,500 feet elevation. The ranch acreage has been decreasing year after year as more and more of the lands are being utilized for pineapple growing for the joint account of the Maui Agricultural Company and the California Packing Corporation.

Grove Ranch at present has 1,676 grade polled Angus cattle, 72 Holstein cows, 80 light horses, eight Percherons, 189 hogs and five sheep. This has not always been a polled Angus ranch. Shorthorn bulls were introduced by Lorrin Andrews in the nineties and crossed with native cattle and later Hereford bulls were introduced and crossed with the Shorthorn grades. When D. T. Fleming became manager of the ranch early in 1900 all Hereford cattle were disposed of and the beef herd today consists essentially of polled Angus cattle.

Cattle are marketed when 2½ to 4 years of age and average 475 to 525 pounds dressed weight. About 600 are marketed annually, all slaughtered locally on Maui.

Lorrin Andrews, while manager, introduced Pilipiliula (*Chrysopogon aciculatus*), Bermuda grass (*Cynodon dactylon*), Hilo grass (*Paspalum conjugatum*), Kukaipuaa (*Syntherisma sanguinalis*), and a blueweed called Oi-pua-plu by the Hawaiians.

Mr. Fleming early in 1900 introduced several more of the *Paspalum* and Rhodes grass (*Chloris gayana*).

In recent years during the managership of W. A. Clark, pigeon peas were planted in the Haiku section, of which there now are 300 acres. The area has been decreased because each year more land is given over to the planting of pineapples.

Haiku Ranch was consolidated with Grove Ranch in 1904. Various men have been identified with the ranch in the past thirty years. Among the men who have served as managers are Lorrin Andrews, Frank Tilton, H. A. Baldwin, Will E. Beckwith, John Ritchie, Fred Baldwin, D. T. Fleming and George Steele. Others who conducted the affairs of the ranch for a time are Messrs. Kaumoana, Luna and Kalaina.

At present H. A. Baldwin is manager of Maui Agricultural Company, Ltd., and W. A. Clark has been manager of Grove Ranch since 1912.

HAWAIIAN COMMERCIAL AND SUGAR COMPANY

RANCH AND DAIRY

The ranch lands of the Hawaiian Commercial and Sugar Company consist of about 6,000 acres of fee simple lands running from the sea to an elevation of about 250 feet. The rainfall in this section is light,—24 inches and less per year,—and the area is largely covered with algaroba trees (*Prosopis juliflora*) which, while they largely prevent grasses from getting started, provide an excellent feed in themselves. The bean season lasts from the middle of June to the middle of December and cattle make good growth during this time but often little more than maintain themselves during the season when the beans are not maturing.

This plantation has long carried cattle but only as a minor division of the major enterprise, which is the production of sugar. In 1907 about 1,200 head of cattle of mixed breeding, with Holstein blood predominating, were found, sixty of these being used as dairy animals, the balance being in the beef herd, but as production of any cows in the dairy dropped to a low level they were sent out to the general ranch and other more promising milkers were brought in. In this way some 300 different cows might pass through the dairy in one year, only about sixty of them being there at any one time, a plan still in vogue to a lesser degree in some places.

Twenty grade Shorthorn cows were introduced in 1912.

The first purebred Holstein cows, five head, were purchased from Puu-waawaa Ranch in 1916, and eight Holstein bulls were imported from the

States in the same year. Six additional purebred cows were purchased in Vancouver in 1919 and fifteen more through Giltner Bros. of Kentucky in 1922, the above animals being the foundation cows of the present dairy herd. An excellent bull, "Excelsior Job," was purchased in New York State in 1923. Some fifty of a total of 130 milking cows are purebred at the present time. Practically all of the milk is consumed by the Hawaiian Commercial and Sugar Company employees.

Since 1920 the dairy has been kept distinct from the ranch, the total cattle in both divisions numbering about 900 head. The beef herd consists essentially of Holstein cattle and Holstein sires are used. According to Ben Williams, who has been manager of the ranch department since 1907, they experienced trouble from sore eyes with both Herefords and Shorthorns.

Cattle are slaughtered at $2\frac{1}{4}$ to $3\frac{1}{2}$ years of age, when they dress out at 275-525 pounds. About 150 are slaughtered annually, all being consumed locally, and besides about 200 head are purchased to supply the needs of this community.

Cattle are bred so that most of the calves will be dropped from May to August. Bulls are left on the range only sixty days, when new bulls are substituted, for they find that their stall-fed bulls from the dairy are pretty thin after two months on the range.

Inferior milk cows from the dairy are added to the beef herd from time to time, but none of the range animals are brought in the dairy now as was formerly done.

Pasture lands are added to the cane fields from time to time and as a result the number of cattle in the ranch department is decreasing.

The dairy animals are fed in the barns and paddocks and alfalfa (*Medicago sativa*), elephant (*Pennisetum purpureum*) and merker grass (*Pennisetum merkeri*) and cane tops (*Saccharum officinarum*) are largely relied on for roughage.

Hawaiian Commercial and Sugar Company has a large number of work animals, including about 60 draft and light breeding mares, 100 progeny of these, 140 draft horses, 225 saddle animals, 200 mules and 60 pack animals.

They also have about 60 Duroc-Jersey hogs, eighteen of which are breeding animals.

HALEAKALA RANCH

Haleakala Ranch, on the slopes of Haleakala on Maui, consists of a total of 34,644 acres of fee simple lands which range from cold mountain lands of about 8,000 feet elevation down to dry lands at 1,200 feet which receive practically no precipitation except from the Kona rains. These latter lands produce practically no feed during the summer months, but if the Kona rains are good they furnish very good grazing during the winter and spring months from annual grasses.

Of the total acreage, some 28,000 are grazing lands, an increasing area being given over to the growing of pineapple each year, 8,000 tons of pineapples being harvested last year.

Recently the A. F. Tavares ranch in Kula with 500 head of cattle was added to the Haleakala Ranch, now making a total of about 3,500 Herefords on the ranch, over 200 of which are purebred.

Water for the cattle comes from springs and is piped to the various paddocks.

According to early reports, much of this large tract of land was once considered suitable for sugar cane and some five hundred acres were planted, yielding about one ton of sugar per acre. Sheep were kept on part of this land in the early eighties.

This ranch formerly carried Polled Angus cattle but sometime during the managership of Louis von Tempsky, from 1895-1916, Hereford cattle were introduced, and at the end of this period Haleakala Ranch was essentially a Hereford ranch. One bull and ten females were imported from middle western states in 1919 at a cost of about \$1,200 each and these were the first of the purebred herd.

Cattle are now marketed at about 2½ to 3 years of age, when they dress out at about 450-550 pounds. A total of about 850 are marketed each year; 500 on Maui, and the balance are shipped to Honolulu.

In addition to the cattle, Haleakala Ranch carries about thirty heavy horses and one hundred and sixty light horses.

The prevailing grasses on the middle lands are Bermuda (*Cynodon dactylon*) and a grass locally called rat tail or New Zealand timothy (*Sporobolus elongatus*). Many imported grasses have been introduced, including *Paspalum dilatatum*, Rhodes grass (*Chloris gayana*), brome grass (*Bromus unioloides*), and cocksfoot (*Dactylis glomerata*). The tendency has been for the two prevailing grasses to crowd out these recent importations. Rhodes grass is considered one of the best grasses on Haleakala Ranch.

On the higher lands, Kentucky blue grass (*Poa pratensis*), white clover (*Trifolium repens*), and mesquite (*Holcus lanatus*) are quite common.

Pigeon peas (*Cajanus indicus*) and elephant grass (*Pennisetum purpureum*) are considered good fattening feeds, about 175 acres being planted to the latter.

A charter of incorporations of Haleakala Ranch was granted to Edward H. Bailey, William H. Bailey and Lorrin A. Thurston in 1888. The East Maui Stock Company, incorporated in 1883 by W. P. A. Brewer and David K. Fyfe, was deeded to the Haleakala Ranch in 1890 in return for shares in the Haleakala Ranch Company. Even previous to this Mossman and Akana-lilii were interested in these lands.

W. F. Pogue was manager of this ranch from 1890 to 1895, and he was followed by Louis von Tempsky. S. A. Baldwin, who has been manager since 1916, with H. A. Baldwin are the present owners of the Haleakala Ranch Company.

HONOLUA RANCH

Honolua Ranch, located in the Lahaina district of Maui, was started perhaps fifty or more years ago for it had grown to a small business in the eighties when Mr. Thomas Campbell was the owner. When H. P. Baldwin purchased the ranch, R. C. Searle was put in charge and at one time the ranch carried as many as 2,500 head of cattle.

With the increase of the pineapple industry and the leasing of considerable areas to the Pioneer Mill Company, available pasturage has been reduced until the herd at present numbers only about 800 head,—all grade Aberdeen-Angus or better. Aberdeen-Angus cattle were introduced at an early date to improve the cattle,—but Holsteins were also introduced, with questionable results judged from a beef value standpoint, and when D. T. Fleming took charge in 1912 all Holsteins were sold as soon as possible and new Angus blood was introduced from Montana and Washington, and only Angus blood has been introduced since that time. Cattle are marketed when about four years old and dress out at about 450 to 500 pounds. About 150 are marketed annually, all on Maui.

The lands have a total area of 16,000 acres, 2,000 acres of which are planted to other crops and of the balance perhaps 2,500 acres have fair grazing value. The lands still available for grazing are those of very low

agricultural value and little has been done toward improving the pasture, which is naturally a mixture of guava (*Psidium guayava*) and pilipiliula (*Chrysopogon aciculatus*). The guava can be eradicated only by years of cultivation, and where much expense is gone into it necessitates the planting of a crop which pays better than beef cattle, and pineapples is such a crop.

Honolua Ranch belongs to Baldwin Packers, Ltd., of which D. T. Fleming is manager and he also manages Honolua Ranch.

KAONOULA RANCH

Kaonoula Ranch is a combination of five different ranch properties which were known as the Robinson Ranch, Enos Ranch, Frank Correa Ranch, part of the Freitas Ranch and the old Cornwall Ranch. The total area is about 30,000 acres,—10,000 being held in fee simple and the balance leased lands.

The ranch lands are somewhat scattered but in general begin at Kihei and extend up the slopes of Haleakala with quite an area at Makawao. The lands range in elevation from sea level to about 8,000 feet.

The ranch carries about 4,400 Herefords, 160 light horses and 200 swine of the Poland-China and Berkshire breeds, which are generally crossed for the production of market hogs.

The Hereford herd now includes 240 registered animals, but some of these are on the range, not being considered good enough for the purebred breeding herd which numbers about 60 head.

The cattle are marketed at two years of age or under when they average about 515 pounds dressed weight. Last year 1290 were marketed in Honolulu and 130 locally for consumption on Maui. Cattle for Honolulu as well as local consumption are slaughtered on the ranch.

The present owner, H. W. Rice, acquired the property about 1916 and has always been a firm believer and very enthusiastic about the value of pigeon peas for fattening beef cattle. Fifteen hundred acres of Kaonoula

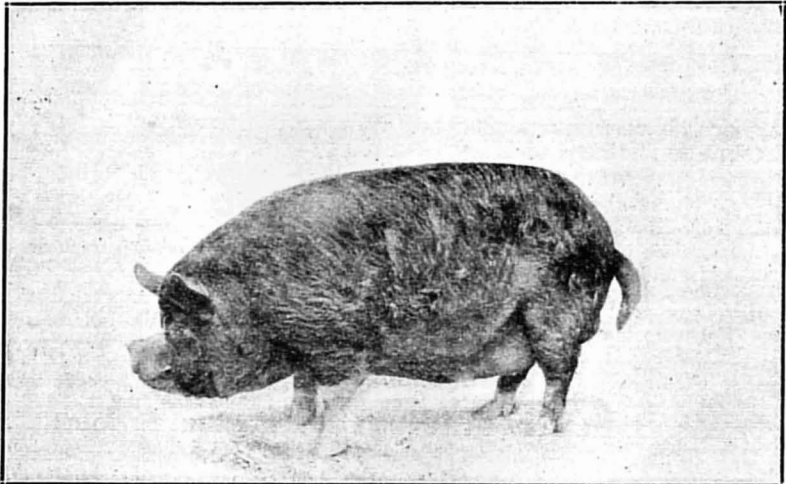


Fig. 7
Berkshire hog belonging to H. W. Rice.

Ranch in the Makawao section are planted to pigeon peas and all cattle from this ranch are pigeon pea fed for about five months before slaughtering. About 600 are carried in the 1,500 acres of pigeon peas at all times and about 120 of these are marketed each month. While on pigeon peas they average five pounds dressed weight gain per week.

The purebred cattle and horses are largely cared for on the Makawao property, the breeding stock to a large extent is kept in the section formerly known as the Correa and Cornwall Ranches.

Hogs are largely bred at Makawao and fattened at Kihei. Corn and tankage from the slaughter house is largely used as concentrated feeds for fattening the hogs.

This area was once known as Waihuli Grazing Company and in 1881 the principal owners were Henry Treadway, Will Goodness, Henry Robert and Charles Arnold with Will Goodness as manager, and at this time Shorthorn cattle were carried.

About 1882 the forests came down to the government road and consisted largely of Koa, Mamani and Pua trees. The forests have since largely died out, the lower lands are now covered with Kiawe trees.

Control of the property in 1886 was largely in the hands of Henry Roberts and Will Goodness.

William Cornwall next became owner of this ranch as well as an adjoining ranch purchased from Young Hee and upon his death, A. M. Brown purchased an interest in the ranch and became manager. Mr. Cornwall's daughter, Mrs. Blanche Walker, continued as one of the owners. In August, 1916, H. W. Rice purchased their interests, thus becoming sole owner of the ranch.

Until the time of Cornwall's death, Shorthorn cattle were the leading breed. A. M. Brown introduced some Herefords from the Parker Ranch, and H. W. Rice, the present owner and manager, has imported many more and greatly improved the cattle on the ranch.

PIONEER MILL COMPANY RANCH AND DAIRY

The Pioneer Mill Company, Limited, Ranch consists of lands near Lahaina, Maui, that are unsuitable for cane growing, ranging in elevation from sea level to 2,000 feet and extend from Honokawai Gulch to Olowalu and Lahaina boundary, having an area of about 9,000 acres. The ranch carries about 700 head of beef cattle. All beef is sold locally at an average dressed weight of 425 pounds for steers from 2½ to 4 years of age. About 125 head are slaughtered annually.

Feed consists mainly of Pili grass (*Andropogon contortus*), cactus (*Opuntia* spp.) and Koahaole (*Leucaena glauca*).

The ranch was started about 1912 by Mr. Weinzheimer, when manager of the plantation, by buying out several small ranchers that were running cattle on some of the present ranch lands. The cattle at that time were mixed breeds. In 1921 three purebred Hereford bulls were purchased through the University of California and in 1925 three more were purchased from the Parker Ranch. At present the beef herd is about 80 percent grade Hereford.

The dairy was started by Mr. Weinzheimer in the early years of his managership for the purpose of furnishing the employees with milk. The dairy cattle of that time and up to 1920 were of mixed breeds. In 1920, 15 purebred Ayrshire cows were imported from Pennsylvania, and a purebred bull of the same breed was secured from William Hyde Rice of Kauai. In 1925 a modern dairy was constructed. In the years 1926 and 1927, 15 high grade Holsteins were imported from Washington State and a pure-

bred bull purchased locally. The present dairy herd consists of 90 head, half of which are Ayrshires, quarter Holsteins and the remaining quarter consist of mixed breeds.

The green feed for the dairy consists chiefly of alfalfa (*Medicago sativa*), panicum (*Panicum barbinode*), Napier grass (*Pennisetum purpureum*) and sudan grass (*Andropogon halepensis*).

C. E. S. Burns is the present manager of the plantation and W. H. Rickard is superintendent of the ranch and dairy divisions.

ULUPALAKUA RANCH

Ulupalakua Ranch, extending along the sea for twenty-five miles and up the southwestern slope of Haleakala on Maui, has an area of approximately 63,000 acres, 28,000 of which are held in fee simple and the balance is government leased lands. While the ranch extends to the crater of Haleakala, the elevation of which is 10,000 feet, no good grazing areas are found above 6,000 feet elevation.

Ulupalakua formerly had quite a problem getting enough water and large cisterns were built. Now much of the water is secured through the Kula pipe line.

The ranch carries about 5,000 Hereford cattle at the present time, and some wild cattle are still found on different parts of the ranch. Some 1,500 head, averaging three years of age and dressing out at 500 pounds, are marketed annually; about 500 are slaughtered on Maui for local consumption and the balance are shipped to Honolulu.

The ranch headquarters are beautifully located in the midst of giant trees largely planted about 1865 by Captain John Makee, then owner of the place.

This ranch has some of the finest grazing lands in the Islands. In addition to the imported grasses, cactus (*Opuntia* spp.) and Koahaole (*Leucaena glauca*) are widely distributed over the pastures.

Talbot and Wilcox about 1848 started a sugar plantation on part of these lands and this was purchased in 1853 by Captain James Makee, who continued it as a sugar plantation for a time, but sugar growing apparently was not entirely successful in this region under conditions then prevailing, and when J. I. Dowsett acquired these lands in the early eighties, he converted the place into a cattle ranch. According to some reports Shorthorn cattle were found on the ranch at this time. Mr. Dowsett took some Angus cattle there in 1885 but Angus blood never played a big role at Ulupalakua.

Dr. Raymond, a son-in-law of Mr. Dowsett, acquired the ranch in 1900 and continued as owner till 1923, and it is probable that Hereford cattle—the present breed—were first introduced by him. J. H. MacKenzie was manager for Dr. Raymond from 1906-1907, at which time the ranch carried about 4,000 cattle, mostly Shorthorns. He was followed by Angus McPhee, who supervised operation for three years. After this A. C. Dowsett was manager for a time. Mr. McPhee returned as manager in 1921 and in 1923 the ranch was purchased by F. F. Baldwin, the present owner. Mr. McPhee continued as manager of the ranch till 1925, when Edward Baldwin took charge.

ISLAND OF NIIHAU

This island, 20 miles west of Kauai with an area of about 46,000 acres, and rising to a height of nearly 1,300 feet, is operated entirely for ranching purposes and consists of fee simple lands bought in the early sixties from

the Hawaiian monarchy and chiefs. The island was originally acquired by the Sinclair family and the ranching enterprise was started and conducted for a number of years by Francis Sinclair. Aubrey Robinson, the present owner, has been identified with the development of the property during this entire period. The present manager is Aylmer F. Robinson.

The island is principally devoted to sheep raising, aiming to maintain some 18,000 head, the present number, however, owing to recent droughts, being considerably less. The sheep are purebred Merinos, principally of the Delaine or Spanish Merino breed although some of the larger Rambouillet strain are also kept. The wool finds its market in Boston or other Eastern centers while surplus sheep are from time to time shipped to Honolulu for the island mutton market.

About 600 to 700 head of Shorthorn cattle are also pastured on the island, which stock, though not registered, has been maintained purebred practically since the time the ranch was started. This herd is the result of importations from some of the best Shorthorn stock obtainable on the mainland and in New Zealand and Australia. Animals for market are shipped chiefly to Honolulu, although some are supplied at times to the Kauai market. Owing to seasonal surf conditions at the landings, cattle can only be shipped during the summer months.

The ranch horses are mostly of Arabian strain, being descendants of animals imported from Arabia and India in 1884 by Mr. Aubrey Robinson, the present owner. This breed has proved most suitable for the ranch work. Some draft mules and Percheron horses are also raised for heavy team use on Niihau and on the Gay and Robinson plantation on Kauai, surplus stock being at times sold to other Kauai plantations.

Considerable attention has for many years been devoted to tree planting, and the island, which was formerly almost devoid of trees, has now large areas of algaroba forests (*Prosopis juliflora*) as well as ironwood (*Casuarina equisetifolia*) silver oak (*Grevillea robusta*), wind acacia, sour plum and other varieties. The algaroba forests, with their large annual crop of beans, have considerably improved grazing conditions on the island during dry seasons and have also made possible an apiary business of considerable extent, the last crop being in excess of 1,600 cases of honey, which is of excellent quality, being mostly of white or water white grades.

The increase in forest cover, however, has not brought with it any improvement in the water supply and there is always a shortage on the island, drinking water being obtained by saving in tanks and cisterns the water from rainfall on the houses. Livestock, however, thrives upon the brackish water obtained in surface wells.

The principal grasses are Bermuda Grass (*Cynodon dactylon*), and Pili (*Andropogon contortus*) and other native grasses, although *Paspalum dilatatum* and Rhodes Grass (*Chloris gayana*) also do well. Considerable care is given to the maintenance of cactus forests, which are of value for both food and water for stock. Burbank varieties of thornless cactus have been imported and grow well on the island but in general have proved less satisfactory than the thorny cactus, which is much easier to maintain under pasturage. An item of considerable expense in the operation of the ranch is involved in keeping the island free from kikania or cocklebur (*Xanthium strumarium*) which if established would prove ruinous to the wool industry. A bur grass, however, which covers large sections of the island, detracts considerably from the market value of the wool clip.

ISLAND OF OAHU**KANEOHE RANCH**

Kaneohe Ranch, on the windward side of Oahu, extends inward from the sea at Kailua toward the Pali, the highest lands having an elevation of about 500 feet. A part of this area was once given over to the growing of sugar cane and was owned by Queen Kalama, who sold same to Judge Harris. He continued sugar cane growing for a time but this was abandoned after a while as being unprofitable.

About 1890 J. P. Mendonca leased this property from Mrs. David Rice, a daughter of Judge Harris, and Mr. Mendonca secured Angus cattle from J. I. Dowsett and started Kaneohe Ranch. J. B. Castle purchased the lease in 1907 and continued operation of the ranch. In 1917 H. K. Castle, a son of J. B. Castle, purchased this property from Mrs. David Rice and has continued the operation of the ranch since that time.

Kaneohe Ranch includes a total of 12,000 acres and at one time carried 2,000 cattle, but the grazing area has been materially reduced since that time, until now there are only about 4,000 acres left for grazing purposes and these carry about 500 head of Angus cattle.

The rainfall is ample in the upper section but rather limited at times in the areas near the sea. Bermuda grass (*Cynodon dactylon*) is considered the best grass on this ranch. The cattle like it and it seems to do fairly well even with a limited rainfall. Para grass (*Panicum barbinode*) does very well where it gets a reasonable amount of rainfall and also does well in low places which are partially submerged with water during part of the year. Other grasses that have gained a foothold and are considered desirable are Rhodes grass (*Chloris gayana*), *Paspalum dilatatum* and *Pennisetum clandestinum*. Hilo grass (*Paspalum conjugatum*) is quite common but not considered very valuable.

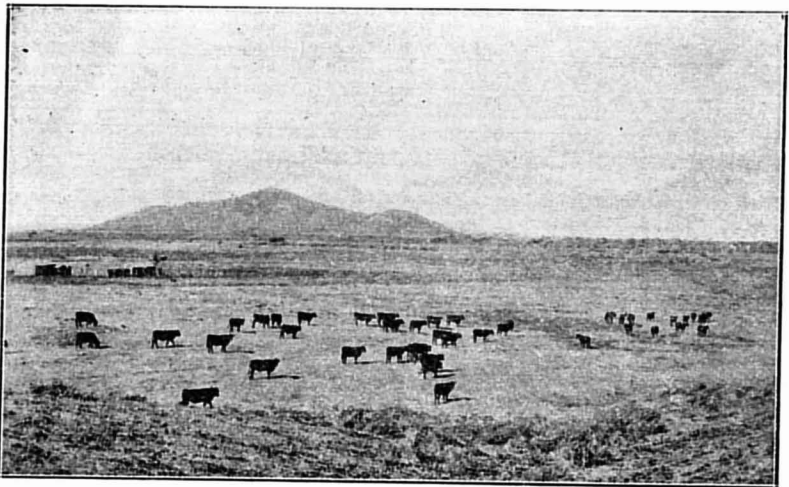


Fig. 8
Aberdeen Angus cattle on Kaneohe Ranch.
(Photo by F. G. Krauss.)

Kaneohe Ranch carries about 250 to 300 breeding cows. Cows are bred from March to July so that the calf crop begins about December, when the pastures are in best condition. About ten to fifteen breeding bulls are in service, resulting in about a 70% to 85% calf crop. All the bulls are purebred and registration papers are kept up on about 40 animals. Any animal, even though purebred and registered, if it does not meet the high standard set for the purebred herd, is put out in the general pastures and considered a grade. Cattle are marketed in Honolulu at about two years, when they dress out at 500-600 pounds.

As previously stated, the ranch was started in 1890 with purebred Angus foundation animals, but during the next twenty-five years or so a certain amount of cross breeding and use of grade bulls occurred, so it was practically necessary about ten years ago to assemble another purebred herd, which was done largely with animals from Iowa and Washington. Since 1922 Kaneohe Ranch has imported bulls about every year for the purebred herd as well as for the range, the last lot being bought directly from the International Livestock Show.

Practically all the beef slaughtered in the Territory reaches the market direct from the pastures, with the exception of a small but increasing amount of pigeon pea fed beef. Kaneohe Ranch in 1926 fed twelve two-year-old grade steers on a concentrate mixture of 120 pounds of corn and cob meal, 20 pounds of linseed oil cake meal and 24 pounds of cane molasses. Corn fodder, undeveloped on account of drought, was fed as roughage. Four and one-half pounds of additional cane molasses were poured over the corn fodder for each steer so that a steer on full concentrate feed (twenty pounds per day) received about seven and one-half pounds of molasses daily. During the feeding period of 73 days the steers averaged 3.2 pounds gain per day and the average dressed weight was 706 pounds, for which a price of 23½ cents per pound dressed weight was received. This was a premium of about five cents over the prevailing price for grass fed steers at that time. Mr. H. K. Castle, the owner and manager of Kaneohe Ranch, believes that if corn could be produced at a cost of \$25 per ton, it might pay to grain feed steers in Hawaii before marketing them.

OAHU RAILWAY AND LAND COMPANY RANCHES

The Oahu Railway and Land Company Ranches are located along the line of the railroad and consist of five more or less separated portions,—Honouliuli, Nanakuli, Mokuleia, Kawailoa and Kahuku. The total area consists of approximately 34,400 acres and with the exception of perhaps 200 acres, all the Company's pasture lands are held under leases.

The cattle number about 3,200 head, of the Shorthorn breed with the exception of 400 at Kahuku dairy, which are largely Holsteins and Jerseys.

The ranch slaughters its own cattle and the beef is largely sold to country dealers. Cattle are marketed when two to three years old and dress out at 400 to 500 pounds. About 850 are slaughtered annually as an average but the number varies considerably from year to year.

Mr. Von Holt introduced Shorthorn bulls shortly after he took charge in 1890, they being considered good hustlers and good for both dairy and beef purposes.

Seeds of various improved grasses have been scattered over various sections without much success. Pigeon peas (*Cajanus indicus*) have been planted in scattered areas and haole Koa seed has been distributed.

Some 200 light horses and a few mules are carried on the different ranches and the Honouliuli section has about 100 Duroc Jersey hogs.

The different sections of the ranch are best described separately.

Honouliuli

The Honouliuli lands, including Puuloa and Upper Waimano, have approximately 23,000 acres of pasture lands of varied quality. These lands range from sea level to perhaps 1,500 feet elevation, carry about 1,900 head and are the fattening lands for the railroad ranches. The lower lands have abundant algaroba trees (*Prosopis juliflora*) and the algaroba is making some headway on scattered rocky upper sections of the ranch. During rainy seasons native weeds afford good pasturage but during the dry season algaroba beans and Klu (*Acacia farnesiana*) are the principal feeds.

The headquarters of the ranch and the slaughter house are maintained in the Honouliuli section.

Nanakuli

The Nanakuli section consists of some 2,300 acres and carries about 225 cattle. The principal feeds are algaroba, Klu, haole Koa (*Leucaena glauca*), some native weeds and little or no improved grasses.

Mokuleia

The Mokuleia area consists of 2,900 acres, mostly rocky hillside land and only a limited amount of low land. About 400 head are pastured there.

Kawailoa

The Kawailoa section consists of only 200 acres, not over 50 feet elevation and carries about 100 head during good seasons.

Kahuku

The Kahuku lands consist of low lands lying on the sea side of the railroad, a section between cane and pineapple lands, an area between pineapple lands and the forest reserve and various gulches totalling 6,000 acres. The elevation extends from sea level to 1,300 feet.

This section carries about 600 head, some 400 of which are dairy cattle with Holstein and Jersey blood predominating.

History

The ranches date back to 1890 or before. H. M. Von Holt was in charge from 1890 to 1927, Ronald Von Holt from 1927 to 1928, and James Wight is the present manager.

WAIANA E COMPANY RANCH

The Waianae region in the southwest part of Oahu has long been a cattle country. According to John Manini of Waianae, his granduncle, Paul Marin, a Spaniard, had longhorn cattle in this region eighty to one hundred years ago, and he is also credited by Mr. Manini with having brought Bermuda grass and the cactus to Hawaii.

From the above it appears that cattle raising preceded the growing of sugar by many years in the Waianae district. The sugar plantation was started about 1878, which naturally decreased the area available for grazing but cattle were continued as part of the project.

At the present time Waianae Company carries about 500 cattle in the ranch herd and 30 in the dairy. This is quite a decrease from the number previously carried, but some former grazing lands have now been set aside as a forest area. Angus blood predominates although Shorthorn bulls have

been used at times, but since 1917 the bulls have been of the polled Angus breed, six purebred bulls being found in the herd at this time.

The grazing lands consist of about 2,000 acres, largely covered with Kiawe trees (*Prosopis juliflora*), the bean season lasting from June to January. During the balance of the year, Bermuda grass (*Cynodon dactylon*), Haole koa (*Leucaena glauca*) and Klu (*Acacia farnesiana*) are relied on to furnish pasturage.

Bulls range with the cattle throughout the year. Waianae Company ranch markets about 200 head annually at 2½ years of age, when they average 425 pounds dressed weight. About half are marketed in Waianae and the balance sent to Honolulu.

The ranch also carries about a dozen Duroc-Jersey brood sows.

J. P. Pico is foreman of the ranch division and Ernest Brecht is manager of Waianae Company.

SECTION THREE

GENERAL REVIEW OF PRESENT DAY CONDITIONS, INCLUDING STATISTICAL SUMMARIES OF LIVESTOCK AND LIVESTOCK PRODUCTIONS IN HAWAII.

Beef Production in Hawaii

The forty-one cattle ranches described herein total 107,800 cattle. Dr. L. E. Case, Territorial Veterinarian, estimates the total number of beef cattle at 157,756 for 1928, and H. C. Wong of the Extension Division states that a recent survey indicates a total of eighty cattle ranches in the Territory. The 1920 census gives 129,814 as the number of beef cattle in the Territory.

Summarized Data on Ranches Described in This Bulletin

	Number Ranches Described	Area in Acres	No. Cattle	Average Acres per Head	Number Marketed Annually	Dressed Weight of Beef Marketed Annually, Lbs.	Dressed Beef per Acre per Year, Lbs.
Hawaii	19	650,100	72,000	9.0 ¹	13,440	7,466,375	11.5 ¹
Maui	7	162,000	17,150	9.4	4,795	2,390,675	14.7
Oahu	3	40,400	4,200	9.6	1,175	546,250	13.5
Kauai	8	83,000	8,050	10.3	1,650	787,050	9.5
Molokai	1	50,000	4,500	11.1	900	450,000	9.0
Lanai and Kahoolawe	2	83,700	2,250	37.2	500	227,500	2.3
Niihau	1	46,000	650	*	150	75,000	*
Total and Average	41	1,115,200	108,800	10.2	22,610	11,942,850	10.7

Ranch Area and Ratio Between Area and Cattle

The ranches herein described have a total area of 1,115,200 acres. Assuming the same density of cattle population on the smaller ranches and using the 1920 census figures as a basis would give about 1,330,000 acres as the probable total area devoted to ranches in the Territory. This is six times as great as the area planted to sugar cane and 32 per cent of the total area of the Territory. However, thousands of these acres have very limited or perhaps no grazing value.

As an average, 10.2 acres are required for each steer or cow, but this figure disregards some 5,000 horses and 27,000 sheep pastured on these lands

¹ These Hawaii ranches also carry a total of some 4,000 horses and about 12,000 sheep which occupy much pasture land.

* Essentially a sheep ranch, so figures would be wholly erroneous.

which if reduced to a steer equivalent would probably make 9 to 9.5 acres a more nearly correct figure. Individual small ranches, largely operating in connection with sugar plantations and in part using as temporary pastures fallow cane land with heavy vegetation resulting from the residue of cane fertilization, have averages as low as two and one-half to three acres per head, and four large ranches on Hawaii and Maui average six to seven acres per head.

Beef Cattle Marketed Annually, and Average Weight

Some 22,000 cattle were marketed in 1928 from the forty-one large ranches described in this bulletin. No exact record of the total slaughtered in the Territory is available, but again using the 1920 census figures, 27,000 head producing a total of 14,213,000 pounds of dressed beef would be a fair estimate. Exact figures as to the number slaughtered in the City and County of Honolulu under inspection have been supplied by Dr. L. E. Case and Dr. James R. Mahaffy and are as follows:

	Cattle	Calves
1925.....	14,872	.....
1926.....	13,688	.....
1927.....	13,695	1,212
1928.....	14,630	1,110

The average dressed weight reported in 1928 was 528 pounds. A few ranches market their cattle under two years of age but the average seems to be two to two and one-half and in a number of cases three years.

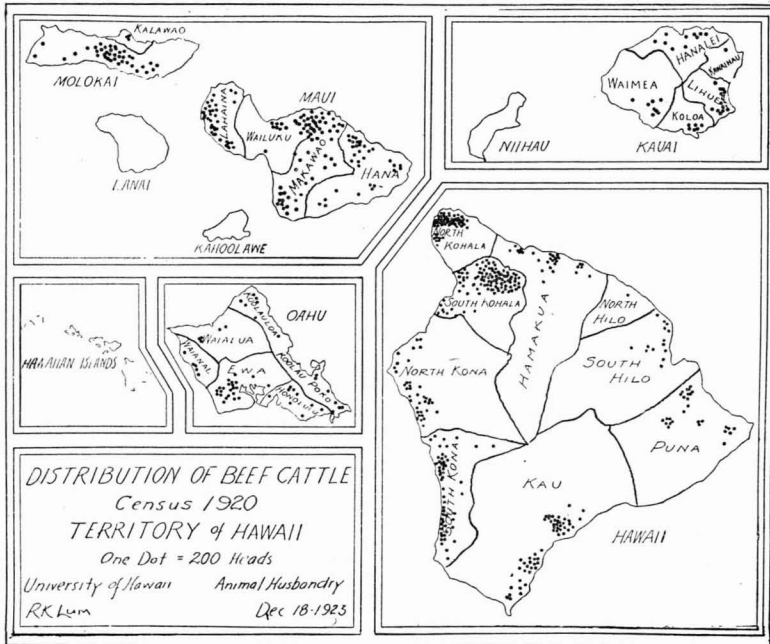


Fig. 9

Dressed Beef per Acre per Year

The pounds of dressed beef produced per acre per year is perhaps a new method of trying to determine ranching efficiency, but it seems to the writer to express better than any other one measure the summary of all the ranch pastures and operations. A ranch having thousands of acres of lava flow lands, supporting practically no vegetation in this area, obviously cannot make a good record in this regard. But given two ranches equal in all respects as to soil conditions and rainfall, the pounds of dressed beef produced per acre per year is a measure of the efficiency of management for it includes the quality of the breeding stock and their ability to produce early maturing desirable type of steers having a high dressing percentage, it is a measure of the breeding program so as to get a 100 per cent calf crop each year or as near that figure as may be possible and it is a measure of the quality of forage grasses or crops that are produced on the ranch, assuming of course, that the ranch is operating as an independent unit, neither selling or buying feeds nor buying or selling store cattle and marketing everything produced in the form of beef.

The average for the Territory,—10.7 pounds dressed beef per acre per year—is necessarily low because of the large areas of practically useless lands included in many of the ranches. Various individual ranches show figures ranging from 20 to even 50 pounds, the higher figures being limited to comparatively small ranches having the minimum of waste land. An area of 1,500 acres on one ranch planted to pigeon peas and pastured at the rate of one animal to 2½ acres is producing about 100 pounds of dressed beef per acre per year. An area of 380 acres on Hawaii planted to excellent grasses produced 138 pounds dressed beef per acre per year and a larger area of 1,900 acres on the same ranch averaged 84 pounds. Allowing twenty-five per cent for a rest period necessary for proper pasture management would still leave 63 pounds per acre per year on this 1,900 acre tract.

DAIRYING IN HAWAII

Detailed descriptions of dairies are not included in this bulletin, except as mention was made of them in connection with the operation of a larger beef ranch of which they were a part. There are approximately 160 dairies selling milk in the Territory, the largest of which has 400 cows.

Many of the dairies have excellent equipment and produce very clean milk. Two of the dairies operating near Honolulu,—the Hind-Clarke Dairy and Waialae Ranch—produce certified milk.

Milk prices range from 18 to 30 cents per quart in Honolulu, the latter being the price for certified Guernsey or Jersey milk. On the other islands prices are generally lower than in Honolulu because of cheaper pasture lands and some of the plantation dairies as a welfare measure sell milk to their employees at less than the cost of production.

Production costs are high for several reasons, chiefly the high cost or rental of land. Near Honolulu few cows have real pastures but only exercising paddocks and are largely fed on soiling crops and imported grains which cost at least six to seven dollars more than on the Pacific Coast because of transportation charges.

Holstein cows still lead but the number of Guernsey cows have greatly increased in recent years, and representatives of other breeds are found in smaller numbers.

A number of dairies formerly located on the edge of Honolulu have moved across the Pali during the past few years and are occupying lands which in part were formerly planted to pineapples, but which have tempo-

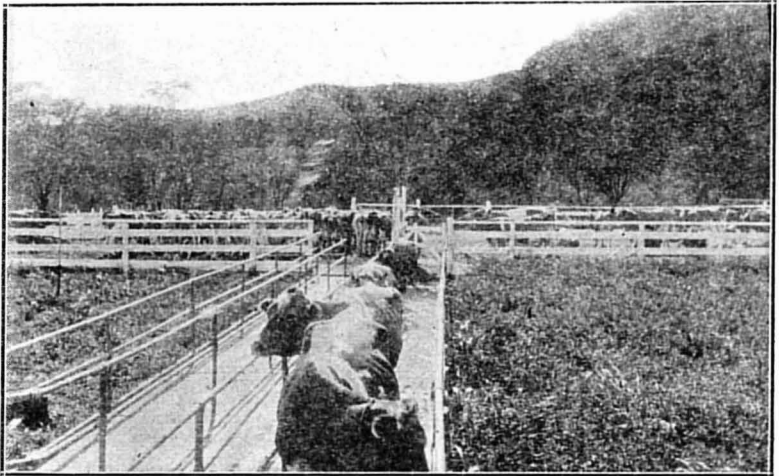


Fig. 10

Cattle going to milking barn at Hind-Clarke dairy.

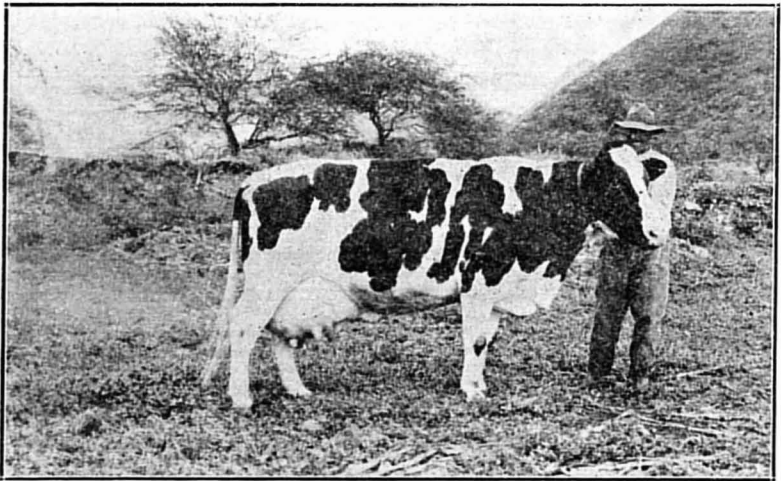


Fig. 11

Joletta, one of the Holstein foundation cows at University of Hawaii.

rarily at least been abandoned as pineapple lands. Good pastures are found on some of these dairies which should somewhat reduce the cost of milk production. Some milk from Molokai is sold in Honolulu, and it is possible that more milk may be brought to Honolulu from the other islands in the future.

Some Dairy Production Data

The following figures calculated from data furnished by M. B. Bairos, Food Commissioner of Hawaii, show the number of dairies selling milk in the different Islands and the number of cows they are milking and their production. Small dairies of one or few cows, producing milk for their own consumption only, are not included. The figures are for 1928.

Island	No. of Dairymen	Total No. of cows	No. of cows milked	Quarts milk per day	Pounds milk per year	Average pounds milk per cow per year
Oahu	84	3,984	2,726	28,086	22,040,550	5,533
Hawaii	51	.....	628	5,163	4,051,664	.....
Maui	10	.....	263	2,800	2,197,300	.....
Kauai	16	.....	319	1,801	1,413,315	.....
Molokai	1	90	68	800	627,800	6,998
Territory of Hawaii			162	4,004	38,650	30,330,629

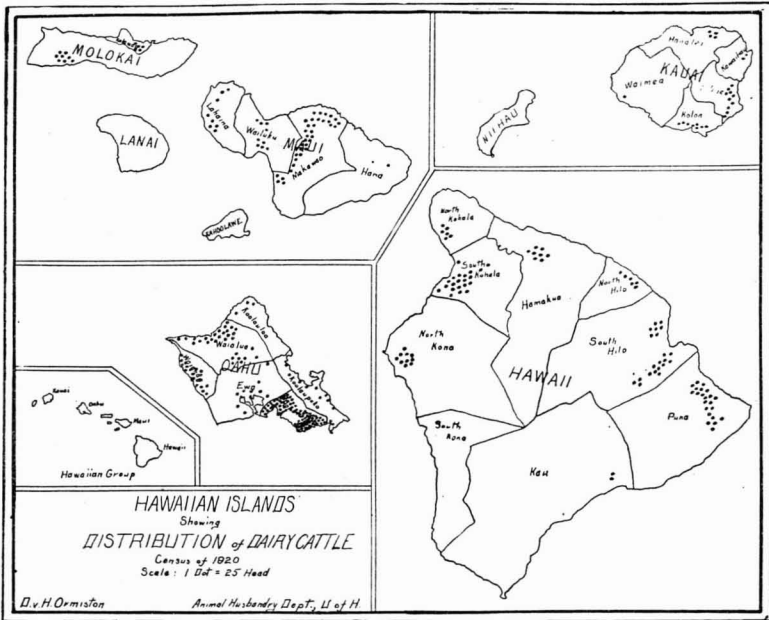


Fig. 12

The yearly production figures given above are of course only approximate, for they are based on the assumption that the quarts milk produced per day represent an average day in the year. Actually this varies from day to day, but as it is as likely to vary up as down, this figure may well serve as an average.

Average Production Per Cow

The average milk production of Oahu cows in 1928 was 5,533 pounds and of the one dairy on Molokai selling milk, 6,998 pounds. The complete numbers of mature cows on the other Islands are not available, but they are given in a sufficient number of cases to indicate that only 50 percent of the total cows used for milk are in production at any one time. For Oahu and the one dairy on Molokai 70 percent of the total mature cows are in production. Assuming 50 percent of the total cows used for dairy purposes on Hawaii, Maui and Kauai as the number in production at one time, would give 6,486 as the number of milking cows in the Territory in 1928, averaging 4,676 pounds of milk per year.

By way of comparison the 1920 census reports milk production per cow at 3,234 pounds for the Territory and 4,472 pounds for Oahu. Making comparisons based on statistics secured by different methods is at best a questionable procedure, but if such comparisons may be made between the milk yields reported on the basis of the returns made by the census enumerators in 1919 and the Territorial milk inspectors in 1928, they show an average increase of 44 percent in the milk yield of the dairy cows in the entire Territory and an increase of 24 percent for the cows on Oahu.

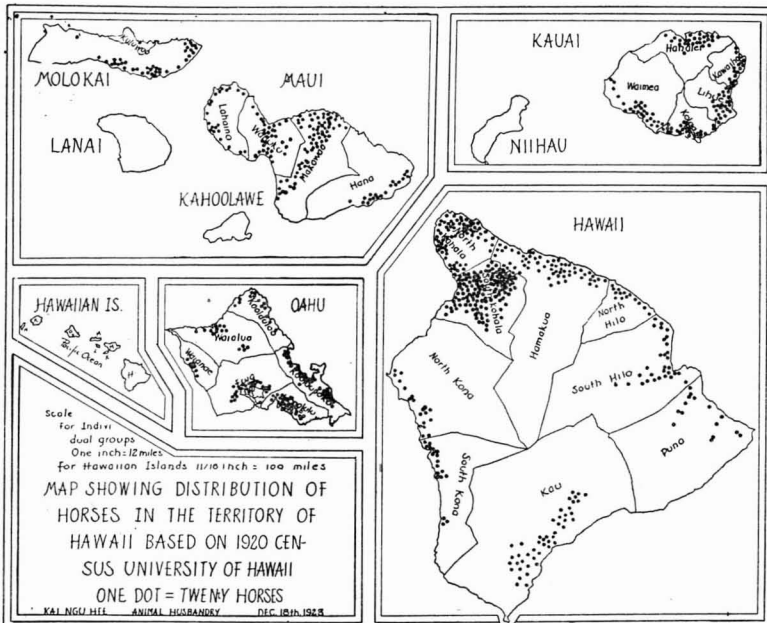


Fig. 13

Dairying has made great strides in Hawaii in the last decade along the line of better cows, better feeding methods and better sanitation. This growth is best shown by comparative figures. The data for 1909 and 1919 are taken from the U. S. census :

Territory of Hawaii

	Reported milk production lbs.	Pounds milk per cow per year
1909	8,841,625	
1919	11,506,155	3,294
1928	30,330,629	4,676

Per Capita Milk Consumption

Fresh milk consumption per capita in 1920 was estimated at 0.12 pint per person per day in the Territory and about 0.24 pint in the city and county of Honolulu. In 1928 it was 0.23 pint for the Territory and 0.32 pint for the city and county of Honolulu. This large increase has been brought about through various agencies including the educational work as to the value of milk carried on in the public schools, and by nutrition workers, but also by an improvement in the sanitary conditions under which milk is produced. Honolulu is now supplied with excellent milk, and the same is true of most districts in the outlying Islands, where plantations have erected model dairies in many places as part of their welfare work, and milk is supplied to their employees at cost or less.

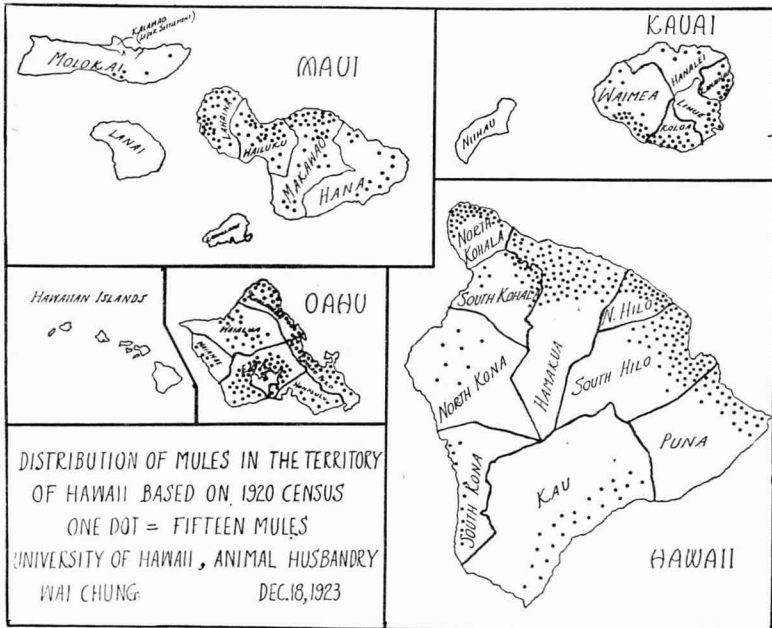


Fig. 14

Butter and Cheese

Milk produced in Hawaii is largely sold and consumed as milk. Some dairies on the outlying Islands make some butter and cheese if located in a section where there is not a sufficient population to consume all the milk produced, and similarly some milk is occasionally used for these purposes, including ice cream manufacture, during seasons of temporary over-production in sections where milk is normally sold as milk. But the total amount so used is small. Much ice cream is manufactured out of imported skim-milk powder and unsalted butter. Large quantities of butter, cheese and condensed milk are imported annually, as is shown in later tables.

According to the 1920 census, the dairymen in the Territory of Hawaii in 1919 sold 70 pounds of butter fat, made 33,411 pounds of butter and 300 pounds of cheese. No exact figures as to 1928 production are available, but while such production has undoubtedly increased greatly, the total quantity is still insignificant compared to the quantities of these same products that are imported.

Disease Among Dairy Cattle

A Territorial law requires that all cattle in herds from which milk is sold be tuberculin tested annually or oftener by the Territorial Veterinarian or his deputies and tubercular animals removed and slaughtered. In 1917, 7.09 percent of the animals tested reacted, but this number has decreased in recent years, as shown by the following table taken from the reports of the Veterinary Division of the Board of Agriculture and Forestry.

	Number tested	Percent reactors
1921	6,918	3.25
1922	6,563	2.57
1923	7,187	2.65
1924	7,452	2.94
1925	9,891	2.3
1926	14,035	2.0
1927	14,268	1.93
1928	14,760	2.19

An outbreak of anthrax occurred on Kauai, Oahu and Maui in 1917 and 1918, but the spread of the disease was promptly checked with a loss of less than 500 animals.

Liver fluke is often found among herds grazing on low wet lands or fed on soiling crops like honohono (*Commelina nudiflora*) or other forage crops mostly grown in low wet places where fluke is found.

The dairy herds of Hawaii are not entirely free from contagious abortion. Practically no agglutination test work has been done, so definite data are not available, but casual observation would suggest that trouble from this cause is not as serious as in some sections.

HORSES AND MULES IN HAWAII AT THE PRESENT TIME

The 1920 census reports 24,307 horses in the Territory, which is a decrease of 12 percent from 1910. Dr. L. E. Case, Territorial Veterinarian, estimates, on a basis of a survey made by his deputies, that there were 12,073 horses in the Territory in 1928, which would represent a big decrease since 1920. Reports by various ranch managers indicate that they are decreasing

the number of their horses, so it may be safe to predict that the number of horses may decline still more. In former years when the Army had a cavalry division in Hawaii many horses were sold to them.

Heavy horses are mostly of the Percheron breed—these being largely mares bred to jacks for mule production.

Mules numbered 10,542 in 1920, an increase of 12.0 percent over 1910. The estimate for 1928 is 8,072, which would represent a decrease of 23 percent, indicating an increased use of motor power on the plantations.

PRESENT DAY SWINE SITUATION IN HAWAII

There are few large hog farms in the Territory. Kemoo Farms at Schofield Barracks used to purchase the slops from that large Army post and carried three or four thousand hogs for many years, mostly of the Duroc-Jersey breed. The Parker Ranch has about one thousand Berkshires, Molokai Ranch has four hundred Durocs, Keauhou Ranch has several hundred, largely of the Chester White breed; Kamehameha Schools has about three hundred, largely Durocs, Berkshires and Hampshires; Grove Ranch on Maui has several hundred head, and there are undoubtedly others with a similar number, but for the most part hog raising in Hawaii is in the hands of a large number of men most of whom have only a comparatively small number.

In 1920, according to the last census, Hawaii had 38,940 hogs. Most of these hogs are kept in or on the edges of the cities and villages—perhaps nearly half of them coming in this classification—and are largely fed on garbage.

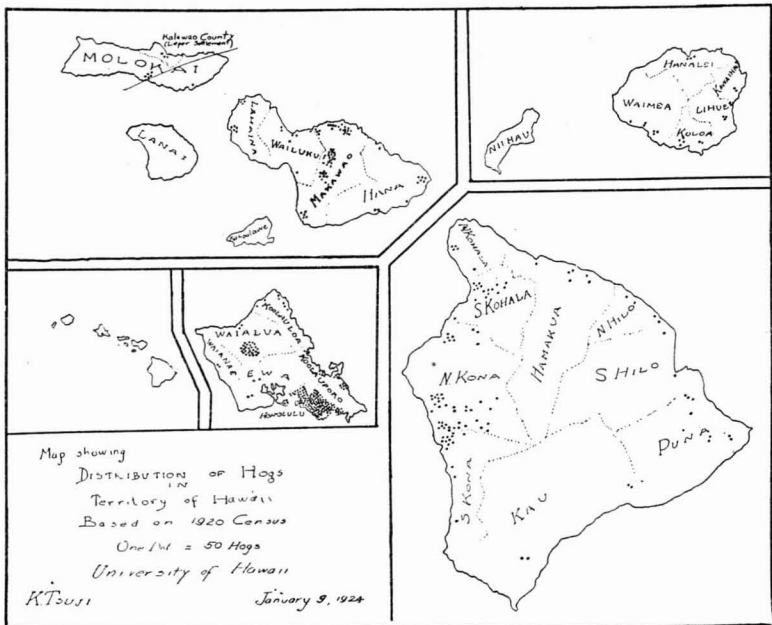


Fig. 15

Hogs for the Hawaii market should weigh about 150 pounds. Hogs weighing over 175 pounds are considered too large and a lower price is paid per pound. This is because all hogs slaughtered in Hawaii are consumed as fresh pork, and excess fat is not wanted. Hams, shoulders and lard are shipped to Hawaii largely from the mainland.

Live hogs for slaughter in Hawaii are shipped from the Pacific Coast in varying numbers. Some five thousand were shipped in 1928.

Outbreaks of hog cholera occur from time to time and many of the larger hog raisers regularly use the serum-virus treatment as protection.

The breeds mentioned in the first paragraph, together with the Tamworths and a few Poland-Chinas, constitute the leading breeds in the Territory. Of these the Berkshires and Duroc-Jerseys are most numerous.

Swine were reported by 1,567 farms in 1920 and 1,396 farms in 1910, according to the U. S. census figures. The term "farm" implies a larger area in most states than is true in Hawaii, where 75 percent of the total farms reported in 1920—4,320—were under twenty acres in area.

The hog population naturally varies greatly from month to month because of their rapid rate of increase and comparative early age at which they are marketed. A survey of H. C. Wong of the University Agricultural Extension Service indicates 22,000 hogs in the Territory in 1928.

The following data supplied by Dr. L. E. Case and Dr. James R. Mahaffy show the numbers of hogs slaughtered under inspection in Honolulu in recent years:

Year	Number slaughtered	Swine shipped to Honolulu from Pacific Coast
1925	20,254	4
1926	24,142	49
1927	26,012	210
1928	28,131	5,241

The large number shipped to Honolulu from the Pacific Coast in 1928 were largely slaughtered, and this number must be deducted from the total to get the approximate number of hogs produced locally. Furthermore, the figures are not complete, for numerous hogs are slaughtered on various farms without inspection, and no data as to the number slaughtered on the outside Islands are available. Some hogs from the outside Islands are shipped to Honolulu for slaughter and would be included in the data given above. The total number produced and slaughtered in the Territory each year must be in excess of 40,000, although this figure is at best only an estimate. Assuming an average weight of 150 pounds would total 6,000,000 pounds, and at 18 cents per pound this represents a value of \$1,080,000 as an estimated value for the hogs marketed annually in the Territory.

SHEEP IN HAWAII AT PRESENT TIME

Sheep raising in the Territory is concentrated at two places—the Humulu sheep station of the Parker Ranch and the Island of Niihau. The sheep are kept primarily for wool production—practically all of them being of the Merino breed.

Some sheep are found at other ranches, but not in large numbers. Molo-kai Ranch formerly had large numbers of sheep, but at present has only about 200 left.

The sheep industry of the Territory reached its high point about 1884, as is shown by the following figures, and since then there has been a continuous decline.

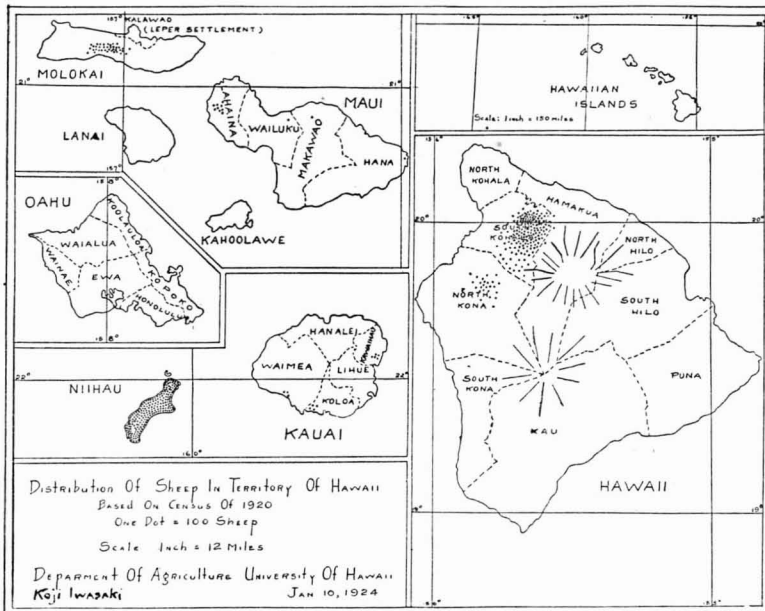


Fig. 16

Year	No. of sheep
1879	101,726 ¹
1884	121,683 ¹
1895	93,312 ¹
1910	60,306 ²
1920	44,042 ²
1928	27,000 est.

Gov. Lawrence M. Judd, former manager of the Hawaii Meat Company, reports that there is practically no lamb raised and sold in Hawaii, although the market requires large quantities of imported lamb. The demand for mutton is not great and it is hard to dispose of the mutton produced in Hawaii, and then only at an unprofitable price.

Approximately 3,500 sheep, averaging 42 pounds dressed weight at about 13 cents per pound, were marketed in Hawaii in 1928.

Wool production in the Territory since annexation is shown in the following figures:

Year	Weight raw wool	Value
1899	424,228 pounds	\$ 53,686 ³
1909	349,711 "	54,723 ³
1919	252,607 "	105,989 ³
1927	149,571 "	45,735 ⁴
1928	64,966 ⁵ "	16,112 ⁴

¹ Taxation returns reported in Pacific Commercial Advertiser, July 2, 1906.

² U. S. Census.

³ U. S. Census figures.

⁴ Wool shipped from Hawaii—Customs House data.

⁵ Ranch figures indicate this is only about half of the wool produced.

LIVESTOCK IN HAWAII
(U. S. Census Figures)

	1910	1920
Horses	27,564	24,307
Asses and Burros	2,847	2,144
Mules	9,375	10,542
Beef Cattle	140,589	129,814
Dairy Cattle	8,482	12,244
Sheep	76,722	44,042
Goats	5,110	4,904
Carabaos	399	193
Swine	30,844	38,940

Estimated Value of Livestock in Territory in 1928

Kind	Estimated number	Estimated value per head	Estimated total value
Horses	15,000	\$100.00	\$ 1,500,000
Mules	8,000	200.00	1,600,000
Asses and Burros	2,000	15.00	30,000
Beef Cattle	130,000	50.00	6,500,000
Dairy Cattle	10,000	150.00	1,500,000
Sheep	27,000	5.00	135,000
Carabaos	150	40.00	6,000
Swine	25,000	15.00	375,000
			<hr/> \$11,646,000

The above figures represent an attempt to make an estimate of the total value of the livestock in the Territory. An estimate by the Livestock Division of the Board of Agriculture and Forestry reported in the Hawaiian Forester and Agriculturist¹ places a value of \$12,342,920 on all cattle in the Territory, making a grand total of \$15,447,155 for all livestock in the Islands.

Estimate of Quantity and Value of Livestock or Livestock Products
Marketed in 1928

Dressed Beef from beef cattle—14,213,000 lbs. @ 16 2-3c.....	\$2,368,833
Dressed Beef from old or unprofitable dairy cattle ² —600,000 lbs. @ 10c	60,000
Calves marketed as veal—2,000 @ \$7.00 each.....	14,000
Swine—40,000 averaging 150 lbs., 6,000,000 lbs. @ 18c.....	1,080,000
Milk—14,100,000 quarts @ 10c per quart.....	1,410,000
Mutton—3,500 sheep averaging 42 lbs. dressed weight, 147,000 lbs. @ 13c.....	19,000
* Wool, raw—64,966 ³ lbs. @ 25c.....	16,112
* Hides and Skins—1,457,966 lbs. @ about 16c.....	237,507
* Bones, Hoofs and Horns—56,910 lbs. @ about 2c.....	1,328
* Tallow—591,737 lbs. @ about 7c.....	42,720
	<hr/> \$5,249,500

¹ Vol. XXV, No. 3, page 101 (1928).

² Based on assumption that 20 percent of total dairy cows are marketed annually because of old age or for other reasons averaging 500 lbs. dressed beef.

³ Shipped from Hawaii. U. S. Customs Office data.

³ Ranch figures indicate this is only about half of the wool produced.

*Quantity and Value of Livestock and Livestock Products
Shipped to Hawaii in 1928*¹

	Quantity	Value
Live animals	6,000 (Approx.)	\$ 194,540
Fresh beef and veal.....	4,104,883 lbs.	363,935
Cured beef	36,680 "	7,908
Fresh mutton and lamb.....	563,486 "	81,598
Fresh and pickled pork.....	1,723,863 "	366,965
Hams and shoulders.....	1,533,236 "	487,995
Bacon	477,954 "	156,720
Sausages	1,185,653 "	289,854
All other meats	2,443,744 "	411,453
Lard	279,824 "	36,884
Lard compounds	886,465 "	127,947
Butter	2,683,898 "	1,118,347
Cheese	441,493 "	136,655
Milk, condensed, evaporated or powdered.....	6,300,977 "	713,520
		\$4,494,321

¹ Data from U. S. Customs Office.

ANIMAL PRODUCTS SHIPPED FROM HAWAII TO
CONTINENTAL UNITED STATES¹

Hides and Skins

	Pounds	Value
1919	1,533,419	\$359,879
1920	1,306,057	279,671
1921	1,425,043	122,171
1922	1,611,745	174,085
1923	1,423,535	156,800
1924	2,055,420	175,863
1925	1,462,550	162,990
1926	1,421,562	138,748
1927	1,459,030	170,034
1928	1,457,966	237,507

Wool—Raw

	Pounds	Value
1919	262,930	\$108,269
1920	244,236	136,396
1921	143,459	43,165
1922	326,982	98,868
1923	176,023	73,125
1924	166,574	72,545
1925	168,365	63,210
1926	173,301	70,486
1927	149,571	45,735
1928	64,966	16,112

¹ Data from Customs Office Reports.

		<i>Tallow</i>	
		Pounds	Value
1919	.....	337,059	\$35,965
1920	.....	234,325	22,436
1921	.....	261,158	11,390
1922	.....	496,931	28,752
1923	.....	539,017	32,514
1924	.....	440,692	28,250
1925	.....	444,237	36,795
1926	.....	361,322	29,695
1927	.....	514,977	34,626
1928	.....	591,737	42,720

		<i>Bones, Hoofs and Horns</i>	
		Pounds	Value
1919	.....	.....	\$ 848
1920	.....	.....	3,143
1921	.....	.....	1,022
1922	.....	.....	944
1923	.....	92,459	3,018
1924	.....	61,397	1,412
1925	.....	58,385	1,347
1926	.....	29,129	647
1927	.....	63,866	1,047
1928	.....	56,910	1,328

ANIMALS AND ANIMAL PRODUCTS SHIPPED TO HAWAII DURING PAST TEN YEARS ¹

<i>Livestock</i>						
	Horses	Mules	Cattle	Swine	Sheep	Goats
1919	..... 218	..... 343	..... 132	..... 11	..... 50	..... 0
1920	..... 121	..... 670	..... 314	..... 480	..... 0	..... 140
1921	..... 117	..... 262	..... 708	..... 297	..... 6	..... ..
1922	..... 59	..... 374	..... 146	..... 941	..... 106	..... ..
1923	..... 63	..... 460	..... 235	..... 7,512	..... 0	..... ..
1924	..... 21	..... 294	..... 52	..... 2,174	..... 0	..... ..
1925	..... 106	..... 357	..... 358	..... 4	..... ..	..... ..
1926	..... 26	..... 263	..... 688	..... 49	..... ..	..... ..
1927	..... 145	..... 288	..... 505	..... 210	..... 0	..... 6
1928	..... 187	..... 256	..... 479	..... 5,241	..... 21	..... 5

		<i>Fresh Beef and Veal</i>	
		Pounds	Value
1919	.....	1,707,514	\$208,316
1920	.....	2,719,045	242,230
1921	.....	4,218,948	477,124
1922	.....	3,275,826	234,598
1923	.....	3,908,899	248,604
1924	.....	4,383,090	267,972
1925	.....	4,467,170	342,498
1926	.....	4,658,774	392,631
1927	.....	4,561,682	412,864
1928	.....	4,104,883	363,935

Percent from Foreign Sources

¹ Livestock data from Reports of the Board of Commissioners of Agriculture and Forestry. Other Import Data from Customs Office Reports.

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Cured Beef

	Pounds	Value	Percent from Foreign Sources
1919	53,743	\$ 17,967	0
1920	81,991	18,029	0
1921	285,608	57,057	0
1922	51,337	9,588	0
1923	56,664	12,632	0
1924	46,075	10,636	0
1925	46,922	10,157	0
1926	20,242	4,634	0
1927	64,537	11,555	0
1928	36,680	7,908	0

Fresh Mutton and Lamb

	Pounds	Value	Percent from Foreign Sources
1919	66,893	\$ 7,460	100.0
1920	290,772	26,607	100.0
1921	987,717	119,648	100.0
1922	445,925	51,560	100.0
1923	462,270	65,660	96.5
1924	491,279	67,132	94.3
1925	564,371	96,798	97.7
1926	401,719	58,513	92.3
1927	529,053	71,827	91.3
1928	563,486	81,598	90.8

Fresh and Pickled Pork

	Pounds	Value	Percent from Foreign Sources
1919	99,850	\$ 22,167	0
1920	146,270	34,299	0
1921	240,338	53,269	0.7
1922	147,627	27,802	0.4
1923	540,519	94,879	0.04
1924	1,144,805	199,029	0
1925	932,900	209,080	0.16
1926	874,178	217,318	0
1927	1,053,762	218,216	0.13
1928	1,723,863	366,965	2.4

Hams and Shoulders

	Pounds	Value	Percent from Foreign Sources
1919	613,946	\$223,932	0.4
1920	1,182,950	405,243	0.4
1921	1,323,339	439,652	0.1
1922	1,148,190	365,339	0
1923	1,247,604	347,900	0
1924	1,198,037	346,174	0
1925	1,020,124	340,796	0
1926	915,563	345,023	0
1927	1,199,900	396,590	0
1928	1,533,236	487,995	0.03

Bacon

	Pounds	Value	Percent from Foreign Sources
1919	198,914	\$ 84,516	0
1920	254,676	121,196	0
1921	366,760	159,786	0
1922	389,490	135,357	0
1923	336,453	111,974	0
1924	395,152	114,584	0
1925	314,983	128,228	0
1926	305,679	135,364	0
1927	324,893	131,122	0
1928	477,954	156,720	0

Sausages

	Pounds	Value	Percent from Foreign Sources
1919	77,959	21,683	0
1920	201,788	79,566	0
1921	213,656	56,968	0.1
1922	287,130	61,697	0
1923	551,360	125,485	0
1924	568,568	140,368	0
1925	605,385	171,667	0
1926	825,491	223,169	0
1927	1,077,886	259,385	0
1928	1,185,653	289,854	0

All other Meats

	Pounds	Value	Percent from Foreign Sources
1919 .....	.....	\$374,081	....
1920 .....	.....	448,298	....
1921 .....	.....	672,862	....
1922 .....	.....	542,662	....
1923	2,379,198	393,846	4.7
1924	1,886,884	442,004	10.9
1925	2,064,650	514,741	11.1
1926	1,880,751	341,009	18.9
1927	1,988,220	472,424	22.5
1928	2,443,744	411,453	38.6

Lard

	Pounds	Value	Percent from Foreign Sources
1919	51,033	14,001	0
1920	40,850	9,944	0
1921	108,318	14,461	0
1922	376,400	53,695	0
1923	265,532	36,984	0
1924	227,845	32,449	0
1925	109,283	20,753	0
1926	130,836	22,396	0
1927	153,667	24,239	0
1928	279,824	36,884	0

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Lard Compounds

	Pounds	Value	Percent from Foreign Sources
1919	1,562,576	\$385,625	0
1920	1,312,661	293,715	0
1921	1,774,972	252,467	0
1922	1,813,017	271,098	0.03
1923	1,625,279	245,442	0
1924	1,224,180	181,822	0
1925	1,111,095	166,874	0
1926	1,278,423	201,578	0
1927	1,396,513	195,094	0
1928	886,465	127,947	0

*Butter*¹

	Pounds	Value	Percent from Foreign Sources
1919	1,095,064	629,993	0.001
1920	1,352,989	822,241	1.9
1921	1,878,298	824,742	5.9
1922	1,834,387	712,611	37.4
1923	1,716,417	809,654	43.8
1924	2,233,486	882,709	57.1
1925	2,218,346	939,068	57.3
1926	2,177,305	912,492	48.0
1927	2,456,156	1,016,346	46.5
1928	2,683,898	1,118,347	44.7

¹ Includes some butter substitutes*Cheese*

	Pounds	Value	Percent from Foreign Sources
1919	324,449	\$ 99,125	0.2
1920	358,870	113,731	1.9
1921	481,834	125,467	0.4
1922	443,316	116,493	0.5
1923	434,961	124,028	0.4
1924	449,261	121,784	0.2
1925	483,336	130,324	0.4
1926	441,918	136,360	0.4
1927	449,550	150,044	0.4
1928	441,493	136,655	0.7

Milk, Condensed, Evaporated or Powdered

	Pounds	Value	Percent from Foreign Sources
1919	3,667,205	538,025	0.8
1920	4,398,256	653,932	0.7
1921	4,502,678	652,314	0.07
1922	4,876,303	603,169	0.01
1923	5,082,181	683,278	0.4
1924	5,467,273	684,837	0.9
1925	5,836,397	739,225	0.5
1926	5,890,760	749,786	1.5
1927	6,335,173	795,088	0.3
1928	6,300,977	713,520	0.2