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## University of Arizona, College of Agriculture

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### A SUCCESSFUL GRAIN AND CATTLE FARM IN SOUTHERN ARIZONA

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The farm herein described consists of 480 acres and is located in one of the irrigated valleys of southern Arizona. It has an abundant water supply and the soil of 400 acres belongs to the best type to be found in the region, loess containing enough sand to approach closely to sandy loam. The remainder of the farm, 80 acres, has a soil type approaching closely the adobe or clay loam type of soil found occasionally in the valleys of southern Arizona. Soils of this type are strong in fertility but not so easily worked and do not respond to irrigation quite so well as the sandier soils.

The ownership of the farm is vested in the operator and members of his family, the farm being managed, however, as if owned entirely by one person. The operator is a graduate of a state university and is technically trained in both agriculture and engineering. He has had thirty-five years' experience on this farm. His farm practice consists in adaptation of methods that are in quite general use in his region.\*

The principal farm enterprises are the raising of grain for the market and the fattening and sale of beef cattle. The farm has been under observation by the writer during a period of four years, 1913 to 1916 inclusive. During this period figures obtained on 48 grain farms showed grain farming to be one of the less profitable enterprises on farms in southern Arizona, while similar statistics for 30 beef-cattle farms showed the fattening of beef cattle for market to be among the more profitable enterprises during the same period.

Since the average net income on this farm for the four years was considerably greater than the average returns on 32 large farms

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\*The name of the owner of the farm is withheld, as is the exact location of the farm, in order to avoid flooding a busy farmer with correspondence, and also because the information obtained from him is considered confidential.

studied in this region, it is believed that a detailed account of all farming operations, expenses, and financial returns on this farm during the four-year period will prove instructive to farmers in this region, and perhaps also in other localities of the Southwest where soil and climatic conditions may be similar.

## DETAILS OF MANAGEMENT

### LABOR

The owner of this farm lives in town and visits the farm several times a week, thus keeping in touch with the details of management, tho he does no manual labor. He operates the farm thru a workman-foreman who lives on the farm and devotes his entire time to details of the farm work. The owner determines the financial policy, the cropping system, and the methods of culture and irrigation, makes all sales and purchases, and fixes wages.

The foreman is a white man. He is married, and has a permanent interest in the community thru the ownership of a small farm which he rents to another farmer. He is paid a salary of \$1200 per year with house rent furnished free. In addition, the farm furnishes him free feed for 150 chickens, five milch cows and their offspring, and he may also have a garden if he so desires. In 1915 he had 15 head of cattle on the farm and his only charge for feed was \$40 pasture rent on two steers which he sold at the end of the year for \$238. His sales of milk amounted to an average of \$25 per month and his sales of eggs were about \$150 for the year. No inventory was taken to determine his gains from sales and growth of live stock, but it is safe to say that his salary and perquisites were the equivalent of \$150 per month.

The wisdom of this liberal policy towards the farm foreman is evidenced by the financial results herein presented, and its effect on his spirit and morale may be epitomized in his own words: "Yes, I get a good salary considering my privileges, but I reckon the boss figures that when I have 15 cattle of my own out among his steers I am not going to let a single animal bloat if I can help it, and he figures right."

The other help on the farm consists largely of Mexicans, also married men, who have been paid during the four-year period \$60 per month and house rent free. The houses built for these laborers cost about \$250 each, and while they are small, containing but one or two rooms, they are welcomed by their occupants and are a potent factor in securing permanent and reliable labor for this ranch. The foreman's house contains four rooms and is about ~~the~~

good as the average farm dwelling found on a 40-acre ranch in Arizona.

This system of handling labor might be applied successfully in Arizona on any farm large enough to employ the full time of one or more laborers, but on smaller farms, where the labor must of necessity be more transient, it is not probable that married men could be obtained or profitably provided for in this manner.

### CULTURAL METHODS

The grain crops are chiefly wheat and barley, tho occasionally a grain sorghum crop is grown on the same land during the latter half of the season, after a barley crop has been harvested. This farmer never follows wheat with a grain sorghum, tho other successful farmers in the region often do so.

Wheat and barley are seeded as follows. The land is heavily irrigated twice before plowing, water being applied by flooding to approximately 16 inches in depth over the whole field in the two irrigations. The irrigations are given at intervals of about two weeks, the first one sprouting weed seeds and starting foul grasses which are then destroyed by the plow which follows the second irrigation in from four to six days. The fields are permanently prepared for irrigation by bordering into lands 60 feet wide, and two lands are irrigated with one head of water. The water runs one-fourth of a mile long and the fall is eight feet to the mile.

Plowing and seeding are both done on the same day. One man with five horses and a gang plow turns over five acres of soil a day. Another man with five horses drags the land, harrows it and seeds it with a grain drill, all in the same day. If necessary to prepare a good seed bed, the land is double disked before drilling. This method of plowing and seeding after irrigation instead of before is highly recommended by this farmer, but other successful men say that on the heavier soils, or where there is heavy sod, the land must be irrigated after plowing, in order to settle the soil sufficiently to make a good seed bed.

Barley seeding is commenced about October 15, and wheat seeding about November 15. The seed is sown at the rate of sixty pounds per acre in the case of either wheat or barley, except when alfalfa is sown with the barley, in which case the barley is sown at the rate of only forty pounds per acre.

The grain is not irrigated after seeding until it is "in the boot" when one copious irrigation is usually sufficient to mature the crop. Barley and wheat are both subject to injury by smut, and wheat is

often damaged by rust. The seed is given the copper sulphate treatment for smut, and when grain is damaged by rust the manager changes to land less rich in humus.

The practice of following wheat and barley with a summer crop of grain sorghum is not general on this farm, as it is on some grain farms, the operator stating that the yield of the following crop of wheat or barley is reduced by the practice. However, occasionally such a crop of milo is grown after three successive crops of grain have been grown on the same land. After the milo is harvested, the land is seeded back to alfalfa with a barley crop, the alfalfa seed being sown at the rate of twenty pounds per acre.

When milo is seeded, the grain stubble is burned, the land irrigated and double disked, and the milo planted with a corn planter. The crop receives two irrigations and cultivations before maturity. When the heads have been harvested the stalks are pastured off after which the land is prepared in the manner described above and seeded to barley with alfalfa. Burning the stubble and thoroughly disking in lieu of plowing results in good yields of milo on this farm, but many successful growers claim that better crops are obtained by plowing the land.

The barley crop, which follows the milo, is headed in May of the following year and the land quickly irrigated. This starts the young alfalfa into a sturdy growth, the plants quickly springing up thru the standing straw. The alfalfa and straw are cut together for hay after which the field may be regarded as firmly established in alfalfa.

The average yield of grain per acre during the four years this farm has been under observation has been, wheat, 2,019 pounds (33.6 bu.); barley, 2,714 pounds (56.5 bu.) These are large averages. During one of these years the wheat yield was cut down to 1,100 pounds per acre by rust, and the barley to 1,000 pounds per acre by pasturing too late in the spring. In ordinary years, then, the grain yields are much larger than yields usually obtained in this region.

It is the plan of the operator to keep about half of his land in alfalfa and the other half in grain, tho these proportions may vary somewhat from year to year. The manner of seeding alfalfa has been described under the discussion of grain crops. It is cultivated by double disking at least twice per year, once in the spring and once in the fall, and when labor is available it may be disked as often as once after each irrigation. The general practice is to plow up the field and reseed about once every three to five years, tho one

field of 40 acres has not been reseeded in 35 years. In other fields alfalfa is rotated with the grain crops.

Only one irrigation for each hay or pasture crop is given, but the water is applied by flooding to a depth of at least eight inches at each irrigation. The fields are thus irrigated about five times a year. This is a good practice on this particular soil type.

### FEEDING PRACTICE

About 200 steers are fattened for the market every year on this farm but they are never grain-fed, in the sense understood by farmers in the corn belt. The feeding period covers nearly the entire year. In the summer the steers are pastured on alfalfa, 200 head being turned into a 40-acre field when the alfalfa is about mature enough to be cut for hay. The steers tramp down a great deal of the feed but eat it later. Bloating is avoided by keeping the cattle from pasturing on young alfalfa, and by having a man watch the cattle constantly during the bloating season, which is early spring and late fall. Indeed, the cattle are watched at all seasons of the year when at any time it becomes necessary to pasture immature alfalfa. Forty acres of alfalfa on this farm pastured in this manner will feed 200 steers six weeks in May and June and about two weeks in late September and early October. When the feed is exhausted the steers are turned into another 40-acre field, and the

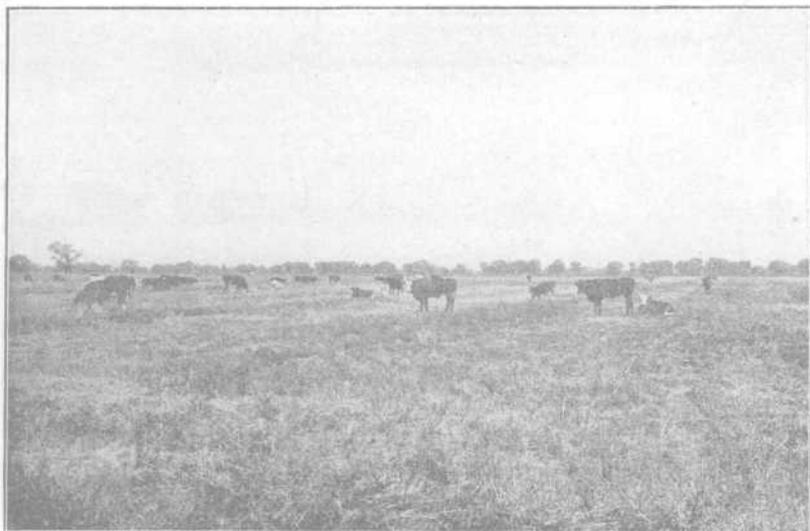


Fig. 1. Steers cleaning up alfalfa field recently cut for hay.

field from which they are removed is irrigated and not pastured again until another crop of alfalfa is mature.

The alfalfa is never irrigated while being pastured, and in rainy weather the steers are put into a corral and fed hay. When a field of alfalfa is cut for hay, steers are turned into it for a few days to clean up waste hay. (See Fig. 1.) Such hay as they may get in this manner, or may be fed during rainy weather, is all they receive during the summer months.

During the winter months the steers receive a combination of hay and green pasture. Winter pasture is obtained by seeding all alfalfa fields to barley in late September. The fields are double-disked dry and the barley seeded with a grain drill at the rate of 90 pounds per acre. This disking serves as one of the cultivations given the alfalfa. After seeding, the land is irrigated twice at intervals of about ten days. Irrigation is postponed in this case until after seeding in order to avoid starting the growth of alfalfa ahead of the barley, there being danger of choking out the young barley if the alfalfa gets started too much ahead of it.

The barley does not injure the alfalfa in any way and in a favorable winter may be pastured off at least three times during the season, the growth being from 8 to 15 inches high at each pasturing. The first and last crops so pastured always contain a good growth

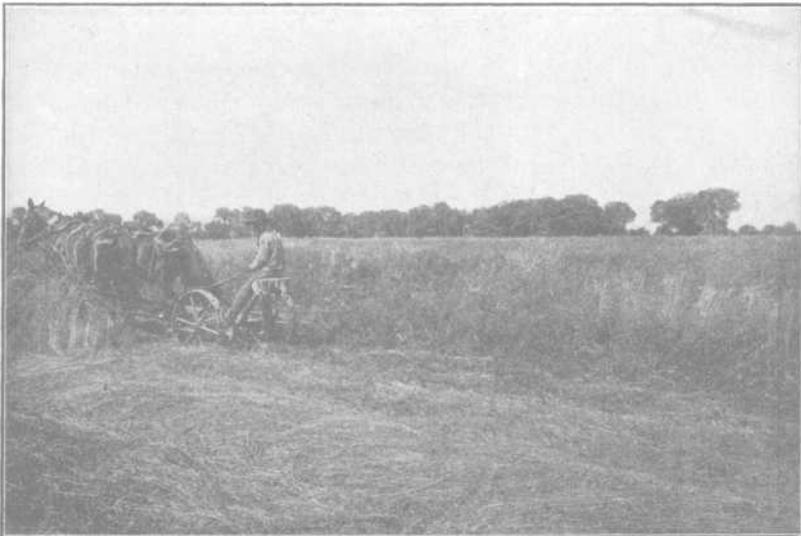


Fig. 2. Cutting the first crop of hay from an alfalfa field on which barley was sown for winter pasture.

of alfalfa mixed with the barley. The barley is an almost certain preventive of bloat in such pasture.

After March 1, the steers are removed from such fields as are wanted for a first crop of hay, usually about 120 acres, and the barley grows up with the alfalfa, heading out and becoming partially filled with grain by the time the alfalfa is ready to cut for hay.

The hay thus produced is used with green pasture for finishing off the fat steers. The barley greatly increases the yield (see figs. 2 and 3) as much as  $2\frac{1}{2}$  tons per acre being obtained, while the first crop of alfalfa upon which barley has not been seeded rarely reaches  $1\frac{1}{2}$  tons per acre. There is enough grain in such hay to increase the rate of fattening and make firm the flesh of the steers.

The two succeeding crops on these fields (120 acres) are cut for hay and all crops following are pastured off.

Additional winter pasture is also obtained by pasturing the wheat and barley grain fields, the value of the feed so obtained being sufficient to pay for putting in the crops. Additional summer pasture is obtained by irrigating the wheat and barley stubble fields, producing more or less volunteer grain and wild grasses, and pasturing these fields until time to plow for the next crop. (The operator states that this practice is not successful on adobe soil.) The wheat and barley grain fields make no contribution to the feed of cattle other than the winter and summer pasture thus obtained,



Fig. 3. First crop of hay from 60 acres alfalfa on which barley was seeded for winter pasture. Estimated yield 150 tons.

but barley grain is fed to all work horses, and the milo crops are either pastured off with steers or the heads harvested and fed to steers along with hay and green pasture, after which the stalks are pastured off

From 400 to 600 tons of alfalfa hay are made on the farm every year and an occasional seed crop is harvested from parts of the alfalfa fields. No hay is sold until it is known that there will be a surplus of winter feed, only 370 tons having been so disposed of during the four years. The hay is fed to the steers in racks around the stacks and the manure is hauled out and spread with a manure spreader on any spots in the fields of grain or alfalfa where the crops are lightest. All alfalfa seed is sold except that required for seeding on the farm.

Any grain and alfalfa fields in Salt River and Yuma Valleys could be managed as they are on this farm where soil types are similar. It is quite possible that better results could be obtained in pasturing alfalfa if the fields were made small enough for a crop to be fed off in a shorter time, as other studies seem to indicate that the best results are obtained when the crop is fed off in not over 15 to 20 days.

#### PURCHASING AND MARKETING

Steers classified as "yearlings" are purchased from the Arizona ranges and are fed on the ranch from ten to twelve months. They weigh from 500 to 700 pounds when brought to the ranch and are expected to gain about 500 pounds before they are marketed for beef. While the operator may be considered a shrewd buyer, the fact that he has purchased his steers for twelve consecutive years from the same man shows that he has always paid fair prices. The steers are sold by weight to buyers who come to his ranch from California, the buyer taking all shipping responsibility and paying all shipping expenses.

Grain is usually marketed when threshed, there being no granaries on the farm; but when the price offered by local millers is considered too low the grain is hauled to town and stored until better prices prevail.

#### FINANCIAL STATEMENTS

During the four years this farm has been under observation 892 steers have been purchased at a total cost of \$33,530, or an average price of \$37.59 per head; 750 steers have been fattened and sold for a total of \$57,838, or an average selling price of \$77.12 per head. This is a feed margin of \$39.53 per steer. Twenty steers died during

the four years. At the beginning of the period there were 180 steers on the farm, worth \$7,200, and at the end 302 steers worth \$10,100. The net gains on steers during the four years were \$27,208. No feed for steers was purchased at any time during the period.

The average area in wheat per year during the four years was 177 acres, from which total sales amounting to \$26,469 were made at an average price of \$1.92 per cwt (\$1.15 per bu.) The average area in barley per year was 70 acres, contributing sales to the total amount of \$9,060 at an average price of \$1.66 per cwt. (79.7 cents per bu.) The milo crop averaged 20 acres per year and all of it was fed on the farm.

The average area per year in alfalfa was 210 acres. The total sales during the four years were: hay, \$4,075, at an average price of \$11.14 per ton; alfalfa seed, \$2,600, at \$.118 per pound; pasture, \$140.

There were miscellaneous receipts of \$600, and twenty work horses contributed \$825 in sales of colts, bringing the total receipts in four years up to \$70,977, of which wheat and barley contributed \$35,529, alfalfa \$6,815, livestock \$28,033, and miscellaneous sources \$600.

The total expense during the four-year period was \$30,816, leaving a net income of \$40,161 for the period, not counting as expense any interest on borrowed money, nor charging against the farm anything for the labor of the operator.

The expenses for the four years were distributed as follows: Labor, including foreman, \$13,330; repairs and depreciation, \$2,862; threshing and grain bags, \$6,584; baling and hauling, \$718; taxes, \$4,330; water, \$2,662; insurance and incidentals, \$330.

The total investment was \$80,565, consisting of: Real estate, \$60,000; livestock, \$11,565; machinery and tools, \$1,500; feed and supplies, \$4,500; cash, \$3,000.

## CONCLUSION

It will be seen from the financial statements that this farm has been a financial success. In type of ownership it does not differ from other large farms under United States reclamation projects, since the organic act creating the United States Reclamation Service prohibits the sale of a water right for more than 160 acres to any one person. All farms of more than 160 acres under these projects are therefore combinations of holdings of different persons.

Any farm of 160 acres or more in southern Arizona might be operated successfully with an organization similar to this one pro-

vided the operator had sufficient ability. Other studies indicate, however, that equal success might be obtained with the single enterprise of steer feeding, by devoting most of the farm to alfalfa and growing only enough grain to provide necessary rotation for run-down alfalfa fields.

Recent high prices for hay and cotton have made both hay and cotton farms produce greater returns than could be expected from an organization similar to the one of this farm, but we have no records of such high returns from these enterprises running over as long a period of years. The owner of this farm has had practically the same organization for the last twelve years and he states that it has been profitable during all of this time, though he has had an occasional bad year, one of which is included in these studies.

The outstanding features of success on this farm may be briefly stated as follows:

- 1 The liberal policy pursued towards the farm foreman and other labor on the farm, by which permanent helpers are secured who take a personal interest in the success of the farm.

- 2 The thorough cultural methods pursued in the preparation of the soil and seeding of grain.

- 3 Copious but not too frequent irrigations, insuring deep penetration of roots and thereby a large feeding field for the plants.

- 4 The intensive cultivation of alfalfa fields and their rotation with other crops.

- 5 The system followed in summer pasturing alfalfa, the seeding of barley on alfalfa for winter pasture, and the reinforcement of yield and quality (for steer feeding) of the alfalfa hay by allowing barley to mature with the first crop of hay.

- 6 The combination of cattle feeding with grain raising, which provides a means of rotating the grain fields with alfalfa, one of the best soil renovating legumes for this region and provides a good and profitable market for the legume crop. The fertility of the soil has thus not only been kept up, but shows indications of having been steadily increased.

- 7 The personal sagacity, experience and education of the operator, who is not only technically trained, but is a remarkably good judge of livestock and a successful manager of men.