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University of Arizona

College of Agriculture

Agricultural Extension Service

AN ECONOMIC SURVEY OF
SALT RIVER VALLEY PROJECT
IN MARICOPA COUNTY,
ARIZONA

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College of Agriculture, Agricultural Extension Service

P. H. Ross, Director

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FOREWORD

This survey, the first of the kind made in this State, was carried on coöperatively by the Bureau of Agricultural Economics of the United States Department of Agriculture, the Arizona Agricultural Experiment Station, the Arizona Agricultural Extension Service, the United States Department of Agriculture Extension Service, with the assistance of the Maricopa County Farm Bureau, the Salt River Valley Water Users' Association, the Phoenix Chamber of Commerce, the Roosevelt Haygrowers' Association, the Arizona Pima Cotton Growers' Association, the Mesa Lettuce Growers' Association, Arizona Citrus Growers' Association, and a large group of interested individual farmers. Many private commercial concerns contributed much to the information secured. The Water Users' Association not only gave invaluable assistance in making available much of the data used in this publication, but appropriated \$2,500 to help defray the expenses of the office and field force engaged in accumulation and analysis of additional data. Mr. Byron Hunter of the Bureau of Agricultural Economics spent several months in field work in Maricopa County, and the securing of field records and interpretation of the data secured was largely his work. Dr. M. J. B. Ezekiel and Dr. Emil Rauchenstein of the Bureau of Agricultural Economics assisted in the interpretation of the data.

Special appreciation of the services of Mr. Eugene Merritt of the Office of Coöperative Extension Work in outlining the studies, and to Mr. A. C. Cooley of the Office of Demonstration on Reclamation Projects, U. S. D. A., is hereby acknowledged.

At least 75 people have made direct contribution to the work outlined in this publication, making it impossible to credit authorship to any one person or group of persons less than the total number contributing.

The fine spirit of all coöperating parties is gratefully acknowledged.

P. H. Ross, *Director,*
Agricultural Extension Service.

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AN ECONOMIC SURVEY OF
SALT RIVER VALLEY PROJECT
IN MARICORA COUNTY,
ARIZONA

INTRODUCTION

The purpose of this survey was to assemble facts pertinent to the economic status of agriculture in the Salt River Valley Project, from which to determine an agricultural policy or program to guide its future development. All available economic data bearing on this subject obtainable from state, national, and local sources were the foundation. In addition, more than 160 farm records, secured directly from farmers, covering a year's operation of their individual farms were secured in detail and carefully summarized and analyzed.

An organization of commodity committees, composed in each case of a group of producers of their respective commodity, with a representative of the College of Agriculture acting as secretary was effected.* The duty of the secretary was to assemble all pertinent economic information available on his respective subject, and then, in conference with his committee, to summarize and analyze the material in hand, to the end that recommendations as to the place of each respective commodity in the agriculture of the area surveyed should be made. This plan of procedure made it possible to secure presumably the most interested and best informed group of people possible to systematically study all phases of the economic agricultural situation and to recommend the most effective means of adequately meeting them. The result is a carefully considered and conservative presentation of the facts.

The value of the information in the publication will be greatest, of course, to the farmer at present on the land. To the homeseeker from other regions is made available in a single volume a fund of information very rarely to be obtained regarding any area because similar information only in rare instances has ever been assembled. The possibilities in many lines of agricultural endeavor are given in detail, including economic information of especial value.

* There was one exception to this arrangement. A representative of the Phoenix Chamber of Commerce acted as secretary of the Finance and Credit Committee.

The following committees were organized on the basis outlined above:

| | |
|----------------|--------------------|
| Land and Water | Beef Cattle |
| Cotton | Sheep* |
| Alfalfa | Small Grains* |
| Truck Crops | Hogs |
| Citrus | Grapes and Dates |
| Dairy | Deciduous Fruits |
| Poultry | Credit and Finance |

Their respective reports with recommendations follow in order.

* These reports were incomplete and will be published separately later.

REPORT OF LAND AND WATER COMMITTEE

By

G. E. P. SMITH, Committee Secretary

The total water supply needed for the project of the Salt River Valley Water Users' Association is determined by three main factors: first, the total cropped area; second, the average quantity of water required per acre, measured at the farmer's headgate, called the net duty of water; and third, the quantity lost in the canal system by seepage and evaporation, principally by seepage.

The area included in the project has been increased from time to time by the consolidation of contiguous areas with water rights and by the inclusion of some new lands. The total area now on the books of the Association as having water rights is 242,626 acres. For the most part this is inclusive of the area in highways. A portion of the total is occupied by roads, ditches, farmsteads, and waste land. The farm acreage cropped in 1926-27 was 216,942 acres, and additional water was required for townsites and subdivisions.

DUTY OF WATER

The term "duty of water" has been used for a long time by irrigationists to express the quantity of water required per year to irrigate an acre of land. If the quantity is expressed in acre-feet, then numerically, it equals the aggregate depth, in feet, of the water applied during a year, assuming that the water is spread uniformly on the land. Thus, 3 acre-feet of water per acre is equivalent to an aggregate depth of 3 feet of water evenly spread.

If the term "duty of water" refers to the quantity of water received by the farmer, it is called the net duty. If it refers to the quantity diverted from a river for an acre of land, then it is the gross duty and includes the amount lost in the canal system. We shall use the net duty in this report.

Duty of water is a most useful and necessary concept. It is employed in designing new projects, in which either the area of land or the available water supply may be fixed, and determines the sizes of canals and of structures; it is used, also, in the operation of projects, particularly where soil differences exist and where water economy must be practiced. It is of great con-

cern to the agriculturist who must maintain and control the soil moisture according to the needs and welfare of his crops. It is required in judicial proceedings, for the determination and settlement of water rights, and, unfortunately, water adjudications usually have been based on an inadequate knowledge of the proper duty of water. In many of its applications, too, it is important to know the monthly duty, as well as the annual duty of water.

Another distinction that is made is between duty of water based on beneficial use and duty based on economic use. Thus, if 3 acre-feet per acre gives a good yield of a certain crop, an additional acre-foot per acre may give a slightly higher yield, and yet that last acre-foot might result in much more production with greater net profit if used on land which otherwise would not be irrigated. The general public is interested in economic use, but the individual farmer is interested in securing the greatest profit from the definite area which he owns, and under present economic conditions, he is justified in such irrigation practice as will yield that result.

FACTORS INFLUENCING DUTY OF WATER

The duty of water must necessarily be approximate and variable. It depends on several factors, which will be discussed separately in the following paragraphs.

First, the soil. Light sandy or gravelly soil, and shallow soil underlain by sandy or gravelly subsoil requires more water per acre than loams of ample depth. Loams require variable amounts according to texture and depth. Heavy soils in many instances will not take much water, though much may be needed. Fertility, especially humus, has a marked effect upon duty of water and the duty on the same soil therefore may be changed from year to year.

A soil survey of the Salt River Valley was made about 25 years ago. However, it is now considered as having been largely a reconnaissance survey. A more detailed soil survey has been made during the past 3 years, but the maps and descriptions have not been published. Even when they are available, it will still be necessary to investigate the effect of differing quantities of water on each soil type, before the desired knowledge of duty of water for this valley can be had.

In several states where water commissioners attempt to administer the water supplies on the basis of beneficial use, the distribution is made according to soil types and oftentimes a

special board of qualified men are appointed to determine the allocation of water for each type of soil. Court adjudications in Arizona have not differentiated in this respect, and all types of land have been treated alike.

Another factor which influences duty of water is the cropping program. Alfalfa is recognized as the water gourmand, due to the high transpiration ratio, the great length of growing season, and partly to the large tonnage per acre. Grains have a lower transpiration ratio, and lower water requirements, which means a higher duty of water. A change in cropping, as from alfalfa to cotton, may decrease the water demand of the project 20 or 30 percent. This might pass unnoticed, but it might be difficult to change back again if in the meantime the released water has been put to beneficial use on other lands.

A third factor is the weather which varies from year to year. A good rain, say 2 inches, with a week of cloudy weather, may save an irrigation. The relative humidity, which depends in part on the temperature, is important.

The summers of 1918, 1924, and 1928 were recognized as so unfavorable that more irrigation water than usual was needed per acre.

Fourth, the irrigation practice is a factor. This includes the method of laying out the land, the length of run in its relation to width of land, slope, soil permeability, and head of water; also, the degree of leveling, the depth of water per application, the uniformity of distribution of the water, and whether a man irrigates only when the soil auger shows that water should be applied or according to calendar regardless of how wet or dry the soil may be and also on such practices as letting alfalfa lie dormant during the middle of summer.

INVESTIGATIONS

Investigations of duty of water have been made, either by selecting representative farms, and then measuring the quantities of water applied and weighing the crops harvested; or by laying out small experimental plots and applying different quantities of water and measuring the effects on yield. Neither way is satisfactory unless investigation is made as to the losses by deep percolation and by weeds, and as to the physiological responses of the crop.

Duty of water measurements in the Salt River Valley were made during 5 years from 1912 to 1917, by the Irrigation In-

vestigations Office of the United States Department of Agriculture. This was due to an agreement with the Arizona Agricultural Experiment Station, by which the former stayed out of the field of ground-water investigations and the latter out of the field of duty of water, the purpose being to avoid duplication of effort.

The results of the studies in 1912-1917 are published as Bulletin 120 of the Arizona Experiment Station. The crops studied included alfalfa, cotton, sugar cane, wheat, grain sorghums, and cantaloupes. Most of the fields on which the duty of water was determined were in the eastern part of the Valley on soil described as Maricopa sandy loam. The author states in the bulletin that the soils tested are representative of 90 percent of the Valley.

DUTY OF WATER FOR VARIOUS CROPS

ALFALFA

Much attention was given to alfalfa, the leading crop of the Valley at that time. Studies were made on 42 fields, varying in area from 6 to 154 acres, and also on 21 experimental plots, each one one-hundredth of an acre. The yields reported from various depths of application of water are as follows:

| Depth of application Feet | Yield per acre on fields Tons | Yield per acre on plots Tons |
|------------------------------|-------------------------------------|------------------------------------|
| 2 | 3.6 | 2.2 |
| 3 | 5.1 | 4.4 |
| 4 | 6.3 | 6.1 |
| 5 | 7.2 | 7.25 |
| 6 | 8.0 | 8.2 |

It appears, therefore, that on good soil, such as Maricopa sandy loam, there may be a profit in applying even the sixth foot of water. However, it is recognized that repeated heavy irrigations result in losses of water to the saturated ground water zone, with tendency to rise of the water table and increased cost of pumping for drainage. Consequently, the committee believes that not over 5 acre-feet per acre should be used on the more pervious soils of the Valley, and then only in light applications, and that an average net duty for alfalfa should not exceed 4.5 acre-feet per acre.

COTTON

The most important crop at the present time, in point of valuation, is cotton. The investigations of 1912-17 included 14 field tests of the duty on Pima cotton, and the authors state in their summary that $2\frac{1}{4}$ to $2\frac{1}{2}$ acre-feet of water per acre are justified. However, they were dealing with land that had been in alfalfa for many years and was, therefore, in a high state of fertility. Since that time a large percentage of the area of the project has been in cotton, and much of the cotton area has been continuously in cotton, without rotation and has deteriorated greatly, not only in yield but also in water retentivity. At the present time many growers are using over 4 acre-feet, and the committee is of the opinion that the average duty required for Upland cotton is 3.0 acre-feet and for long staple cotton it is 3.5 acre-feet.

WHEAT AND BARLEY

The conclusion in the bulletin as to small grains is that from 1.4 to 1.8 acre-feet per acre are required. The winter rainfall during the years of duty tests was considerably above normal, and the committee, therefore, has adopted 2.0 acre-feet per acre as an average for the Valley, basing this partly on personal experience and observations.

SORGHUMS AND CORN

The results of the tests given in Bulletin 120 indicate that 1.2 acre-feet is adequate for grain sorghums. The committee believes that that figure is too low and is agreed on the need of 2.0 acre-feet per acre. The writer, however, is of the opinion that the duty should be somewhat higher.

CANTALOUPE

Bulletin 120 recommends for cantaloupes the use of 3 acre-feet per acre, but the committee is unanimous in the opinion that, on account of the short period of the crop, about 90 days, so much water cannot be used profitably, and that much of it is wasted in the effort to "sub" the water laterally more than the best practice requires. We have adopted, therefore, 2.5 acre-feet per acre.

LETTUCE

The duty of water for lettuce is under investigation now by Professors Schwalen and Wharton, with special reference, not to economy of water, but as to the quantity and irrigation practice which gives the greatest value of marketable heads. The committee is aware that the fall crop and spring crop differ in requirements but has averaged them at 2.0 acre-feet per acre.

CITRUS ORCHARDS

An estimate of the duty for citrus orchards was arrived at by examinations of some water delivery records, and much weight was attached to that of C. D. Stahlberg, because of the excellent condition of the trees of his orchard.

OTHER CROPS

No experimental data of value are available regarding the duty on other crops and the members of the committee were obliged to rely on their own experiences in assuming average values.

As stated at the outset, the estimates of water demand based on assumed duties of water must be approximate and variable from year to year.

TABLE I.—WATER DEMAND BASED ON THE 1926-27 CROP AREAS.

| Crop | Area Acres | Duty Acre-feet per Acre | Demand Acre-feet |
|---|-------------------------|-------------------------------|---------------------|
| Alfalfa | 64,112 | 4.5 | 288,500 |
| Cotton | | | |
| Long staple | 32,400 | 3.5 | 113,400 |
| Short staple | 28,818 | 3.0 | 86,450 |
| Wheat and barley | 34,358 | 2.0 | 68,720 |
| Sorghum and corn | 13,995 | 2.0 | 27,990 |
| Oats, hay | 2,516 | 3.0 | 7,550 |
| Bermuds | 2,448 | 4.0 | 9,790 |
| Cantaloupes | 7,127 | 2.5 | 17,820 |
| Lettuce | 8,550 | 2.0 | 17,100 |
| Citrus orchard | 4,040 | 3.0 | 12,120 |
| Deciduous orchard | 1,753 | 3.0 | 5,260 |
| Garden | 2,852 | 5.0 | 14,260 |
| Vineyard | 795 | 3.0 | 2,380 |
| Miscellaneous (vegetables, etc.) | 1,851 | 2.0 | 099,69 |
| Pasture | 27,865 | 2.3 | 3,700 |
| | 233,480 | | 744,700 |
| Area cropped twice | 16,538 | | |
| Net area cropped | 216,942 | | |
| Excluded townsites | 3,548 | | |
| (Delivered by contract) and subdivisions | 744 Irrigated | | 10,000 |
| Canal losses | | | 380,410 |
| Water Developed by Roose- velt Water Conservation District (1928) | | | 45,000 |
| North side Indians | (700 Miner's inches) | | 12,000 |
| South side Indians | (11,100 acres) | | 3,800 |
| | | | 1,195,000 |

WATER DEMAND OF THE SALT RIVER PROJECT

Having fixed upon definite values for the average duty of water of each crop, it is now possible to make studies of the total water demand of the entire project, which of course is a unit in regard to water supply. Such a study has been prepared, based on the crop areas of 1926-27, the areas for the year just closed not being yet available. The accompanying tabulation gives the area for each important crop and for an item called "miscellaneous" which includes small areas in onions, potatoes, and other horticultural crops. The third column gives the accepted duty for each crop and the fourth column the demand for water delivered at the farmers' headgates. The total demand for the farmed area amounts to 744,700 acre-feet. Adding the items of townsites, canal losses, water developed by Roosevelt Water Conservation District and water delivered to Indian Reservations, the total required at diversion points is 1,195,000 acre-feet.

It should be added that the demand is not constant but will change with the agriculture of the Valley and could be reduced, if necessity arises, by temporary or permanent controlled programming of agriculture. Also, the demand can be reduced somewhat by improvements in irrigation practices.

WATER SUPPLY

ADEQUACY, SUITABILITY, AND COST

There are three important factors affecting the economic phase of the water supply of the Salt River Project. These are (1) the adequacy of the supply, (2) its suitability, that is, its freedom from substances injurious to plants or to the soil—in short, its purity, and (3) its cost.

ADEQUACY OF SUPPLY

The committee does not consider a special engineering determination of the adequacy of the supply necessary for the purposes of this survey, since the question has already been so thoroughly studied by many engineers of national prominence. The Association through its board of governors and the United States Government through the bureau of Reclamation has taken the greatest precautions to safeguard the water supply of the project and nothing has been done which in any way affects that supply without the most careful study by and complete agreement between the engineers of both the Association and

the United States. The study of the voluminous records of stream discharge, rainfall, evaporation, ground water, storage, drainage, etc., and the translation of such data into terms of water supply, is an intricate and time consuming problem. The committee, therefore, feels that the purpose of this survey will best be served by taking the situation as it is accepted by the Association and the Government, on which the entire \$25,000,000 investment in irrigation, power, and other works is based. The figures given in the following brief statement were obtained from the engineering department of the Water Users' Association:

The water supply is considered adequate. The area for which water supply has been allowed has been limited to the acreage which can adequately be served. This area has been determined by considering all the water available from the Salt and Verde rivers with the storage available on the Salt, the return flow at Joint Head and the water available from underground by pumping. The reasonable duty of water has been taken as the amount actually used averaged over the period of time for which records have been kept and is usually placed at 3.6 acre-feet per acre per year, delivered at the farm. In fixing the limit on the irrigable acreage, the available water has been distributed in such manner that there is not an unreasonably large amount held over or wasted in wet periods for the sake of making available a 100-percent supply in the most extremely dry periods. It is estimated that the most economical condition is fulfilled when the supply will be 100 percent in all except such extreme cases as for instance the years 1902, 1903, and 1904. Records show such a condition to have occurred but once in the last 60 years.

In such periods the Association would have its choice between two courses. It might decide to get along with a slightly curtailed supply or it might install additional pumping plants to make available a larger amount of water from the underground reservoir which underlies the Project. Few people realize the enormous quantity of water which is stored in this reservoir. The contents are estimated roughly at 3,000,000 acre-feet within feasible pumping distance. The volume in which this is made available depends entirely on the number of pumping plants installed, which in turn, depends on the sum of money which the Association considers it advisable to spend for that purpose. In other words, the amount of water which is obtainable from underground to supplement the river water depends entirely on what the farmers wish to spend to get it. At the present time

work is just beginning on a \$335,000 program of installing new pumping equipment sufficient to produce several times the quantity of water as that available to project lands from drainage pumps sold in 1927 to the Roosevelt Irrigation District. The new installations will be located where the water will be available over a large area of the Project. This will by no means be the limit of possible pump development. More water may be developed by spending more money. The underground supply is ample to permit this. Notwithstanding the great amount of pumping during the last 4 years, in addition to the pumping in preceding years, the average water level on the project has not been affected seriously and considerably more pumping will have to be done before the output will equal the inflow.

In the event that no further pumping installations are considered advisable and there should be a recurrence of such an extremely dry period as that of 1902, 1903, and 1904, the only effect would be a reasonable curtailment in production, such as fewer crops of alfalfa in such a year and foregoing the practice of raising more than one crop on the same land in one season. It would not mean the loss of any crops or injury to orchards or trees.

QUALITY OF WATER SUPPLY

Complete information is lacking as to the effects of different kinds of alkali and their limits of concentration in irrigation water upon the various types of soil found in the Valley and on the crops that are commonly grown. However, from the purely economic standpoint as to the suitability of the project water supply for the growth of any crops which have yet been raised here, it may be stated that the quality of water has not been found injurious to the crops irrigated by it. No single instance is known on the Project where damage has been sustained by crops on account of the quality of the water, where the underground drainage conditions were good. It is a fact, however, that in 1918, some 80,000 acres of project land had a water table within 10 feet or less of the surface and that a considerable area of such land was entirely waterlogged and seriously damaged. The drainage problem has been completely solved by pumps and, with the exception of a very small area, the damaged land has been reclaimed and made productive again by leaching. A recurrence of this condition cannot come about as the Water Users' Association now keeps systematic records of the underground water table, based on measurements made two or more times a year and the pumping plants now installed are capable of controlling the water level practically as desired.

As long as a downward movement of water is maintained in the soil no damage will result from irrigation water of the character used on the Salt River Project. This is important, however, because if such a downward movement is not maintained, an accumulation of alkali in the soil will result with consequent damage to crops. Some experimental data are available as to the limit of concentration which certain plants will stand, but more research would be of value.

COST OF WATER

During the last seven irrigation seasons the total amount collected from shareholders of the Salt River Valley Water Users' Association in the form of assessments and for water in excess of the first 2 acre-feet available on payment of the assessment, is as follows:

| Year | Total collected | Average per acre |
|---------|-----------------|------------------|
| 1921-22 | \$ 488,928.00 | \$2.40 |
| 22-23 | 877,000.00 | 4.31 |
| 23-24 | 792,120.00 | 3.89 |
| 24-25 | 582,801.00 | 2.47 |
| 25-26 | 1,392,467.00 | 5.98 |
| 26-27 | 1,169,719.00 | 4.92 |
| 27-28 | 1,115,506.00 | 4.59 |

It has been anticipated in making the great power developments which have been completed recently and to which additions are now being made, that the power revenues will eventually take care of all project expenses, including amortization of indebtedness. Certainly with an assured power income in excess of \$2,000,000 a year, it is not conceivable that water costs could under any circumstances be increased over those for the last 7 years.

RECOMMENDATIONS

The committee recognizes the need of more definite knowledge as to the needs of various crops for water. It has been brought out that the need for irrigation water varies with the crop, soil, weather, and agricultural practice. Present knowledge on this subject is far from complete.

Therefore, the committee recommends:

That further research be continued to determine the beneficial duty of water for different crops on different soils and the best agricultural practices designed to obtain the maximum benefits. The same crop will differ on different soils in its water requirements, as to quantity required and the time, volume, and

frequency of applications. Also, methods of irrigation adapted to different crops, soils and the slopes of land vary. For instance, in some cases the length of runs, that is, the distance between head ditches, must be much shorter than in others in order to secure proper penetration without wasting too much water into the underground levels below the root zone. For some crops and soils, small heads are advisable for comparatively long periods of time. For others, the best practice seems to be in the use of the largest heads which can be properly handled. The time when water should be applied in the course of the production of crops differs. More information is needed as to what constitutes the most favorable time to supply water as determined by the need of the plant. Opinions on this particular subject have quite recently undergone very radical changes from the opinions held a few years ago. Investigators are devoting a great deal of effort to a determination of the facts and such investigations should be continued. Another feature of irrigation practice is the use of water so as to avoid accumulation of alkali in the soil or injury to crops. Much is yet to be learned as to the degree of tolerance of different crops for alkali under different conditions. An occasional thorough flooding in rotation with furrow irrigation is one method advocated in order to distribute any alkali accumulated at the tops of ridges through the soil and wash it down below the root zone. More knowledge is needed on the subject of reclaiming alkali and fine-textured impervious soils by leaching or otherwise.

Knowledge of the character of the soil and its proper classification is, of course, a necessity in a study of the best irrigation and cultural practice and the duty of water for the different crops as these are affected by varying soil conditions. The soil survey of the Valley which has recently been completed should be available in bulletin form within the next year. The results of this survey should serve as an appropriate foundation for studies of water duty.

T. A. Hayden
S. Carl Miller
O. M. Lassen
G. E. P. Smith, Secretary.

REPORT OF THE COTTON COMMITTEE

By

HARRY A. STEWART, Committee Secretary

INTRODUCTION

IMPORTANCE OF COTTON IN MARICOPA COUNTY

Cotton is the major cash crop grown in Maricopa County. It was first introduced on a commercial scale in 1912 when 400 acres were grown and it has developed in importance until in 1927, 83,000 acres were harvested. The two major varieties grown are American Egyptian (Pima) and Upland (Acala).

HISTORY OF INTRODUCTION OF AMERICAN EGYPTIAN COTTON AND DEVELOPMENT OF PIMA COTTON*

About three-quarters of a century ago, there was developed in Egypt a new commercial type of cotton which ranged from $1\frac{1}{8}$ inches to $1\frac{1}{2}$ inches in length of staple, which had a strength and fineness of fiber that made it especially adapted to the manufacture of sewing thread, fine dress goods, and tire fabrics which caused it to bring the highest price of any cotton on the market except Sea Island. American spinners and goods manufacturers liked this cotton so well that they have imported an average of more than 100,000 bales per year into the United States for the past 6 years.

It was more than 25 years ago that the United States Department of Agriculture began the investigation of the possibilities of producing Egyptian cotton in the United States. It was found that Egyptian cotton was adapted only to a climate characterized by long, hot, dry summers, hence the experimental work on this cotton was soon confined to the irrigated valleys of Arizona and southern California.

By selection from the plants grown from imported Egyptian seed, a variety "Yuma" was started in 1908. This variety was grown until 1917 when it was replaced by another variety which had been developed from a very distinct individual plant, discovered in a field of "Yuma" at the United States Field Station, at Sacaton, Arizona. The variety Yuma, had an average staple length of $1\text{-}7/16$ inches, while the new selected strain

* T. H. Kearney, History of Introduction of American Egyptian Cotton and Development of Pima Cotton. U. S. Department of Agriculture Year-book, 1926 (Pages 251-254).

"Pima" had a length of 1-9/16 inches. Therefore, at this time, 1917, the change from Yuma to Pima was made.

At the present time, Pima is used for the manufacture of highly finished cloth, such a broadcloth, mercerized goods, sewing threads, fine dress goods, higher grades of automobile tires and other similar articles which require long fibers of great strength.

INTRODUCTION OF UPLAND VARIETIES—ACALA CHARACTERISTICS

In 1914, Upland cotton began to be grown on a commercial scale in Maricopa County. Mebane was the chief variety grown up to 1917. From that time until 1921, Upland was completely left out of the planting system. However, in 1922 and 1923 the price of Pima did not advance enough above Upland to pay for the difference in harvesting and ginning costs and consequently Upland cotton was again introduced into this county.

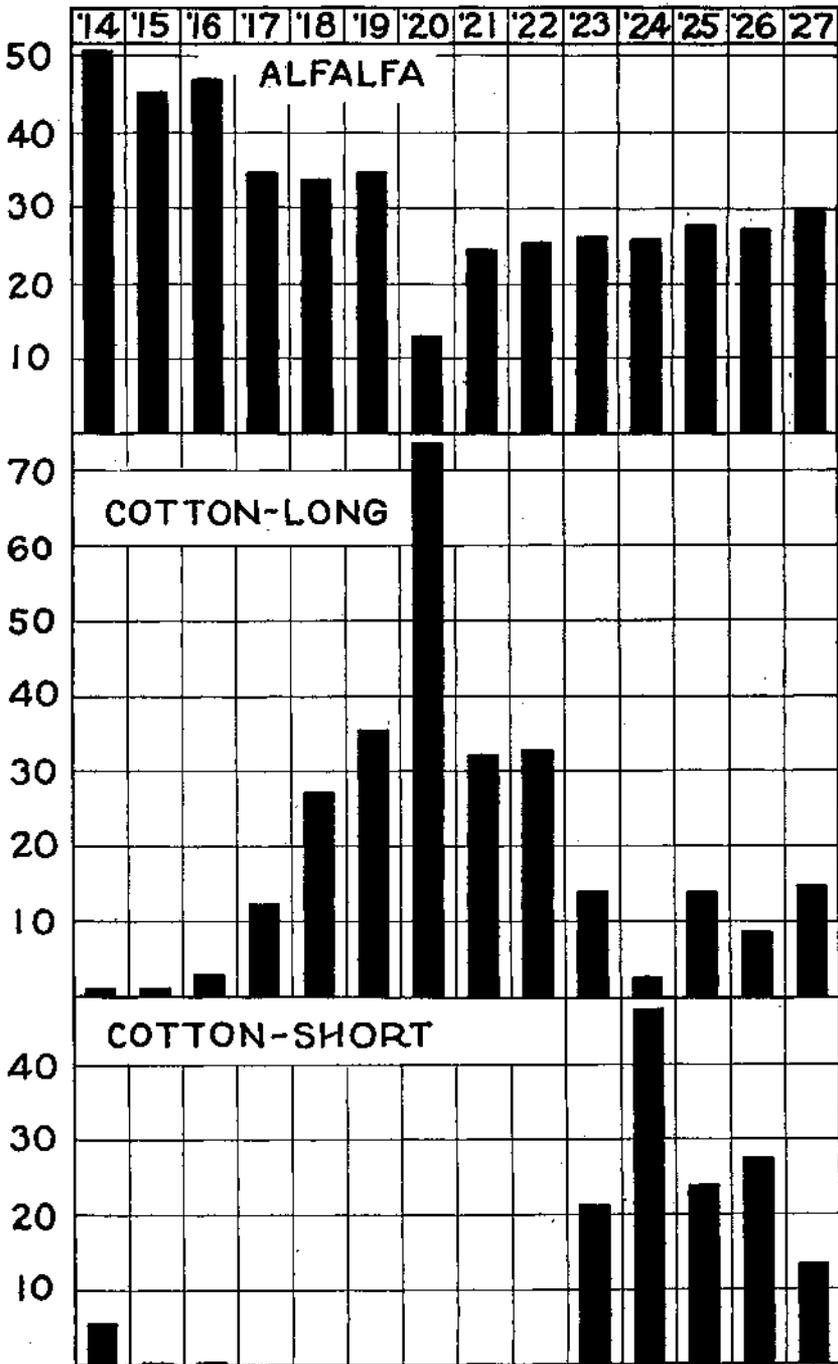
At this time, the Acala variety of Upland cotton came into greater prominence and began to occupy the greater portion of the acreage planted to Upland cotton. Variety tests carried on by the United States Department of Agriculture and the University of Arizona Experiment Stations, comparing Acala with Mebane, Lone Star, Hartsville and several other varieties, over a period of years, has shown that Acala cotton gives higher average yields. It has an average staple length of 1-1/16 to 1 1/8 inches and usually commands a premium over middling spot cotton. Acala, at the present time, represents about 90 percent of the acreage in Upland cotton in the County. Acala cotton is used to a large extent in the making of cloth, thread, and automobile tire fabrics and for mixing with wool textiles.

RELATION OF PIMA AND UPLAND

Figure 1 shows that American Egyptian was practically the only cotton grown until 1922. There was a keen demand for Pima cotton for the manufacture of automobile tires throughout the war period and the December 1 price at Phoenix ranged from 43 cents in 1916, to 80 cents in 1919. These attractive prices gave the production of Pima a tremendous impetus, and the acreage increased from 7,000 acres in 1916, to 180,000 acres in 1920.

About this time however, new methods of making tires were developed in which shorter staple cottons were used. This, together with the heavy importations from Egypt, of Sakellari-dis cotton increased domestic production, and the decline in the general price level after the war caused a slump

PERCENT OF TOTAL CROPPED ACREAGE - SALT RIVER PROJECT.



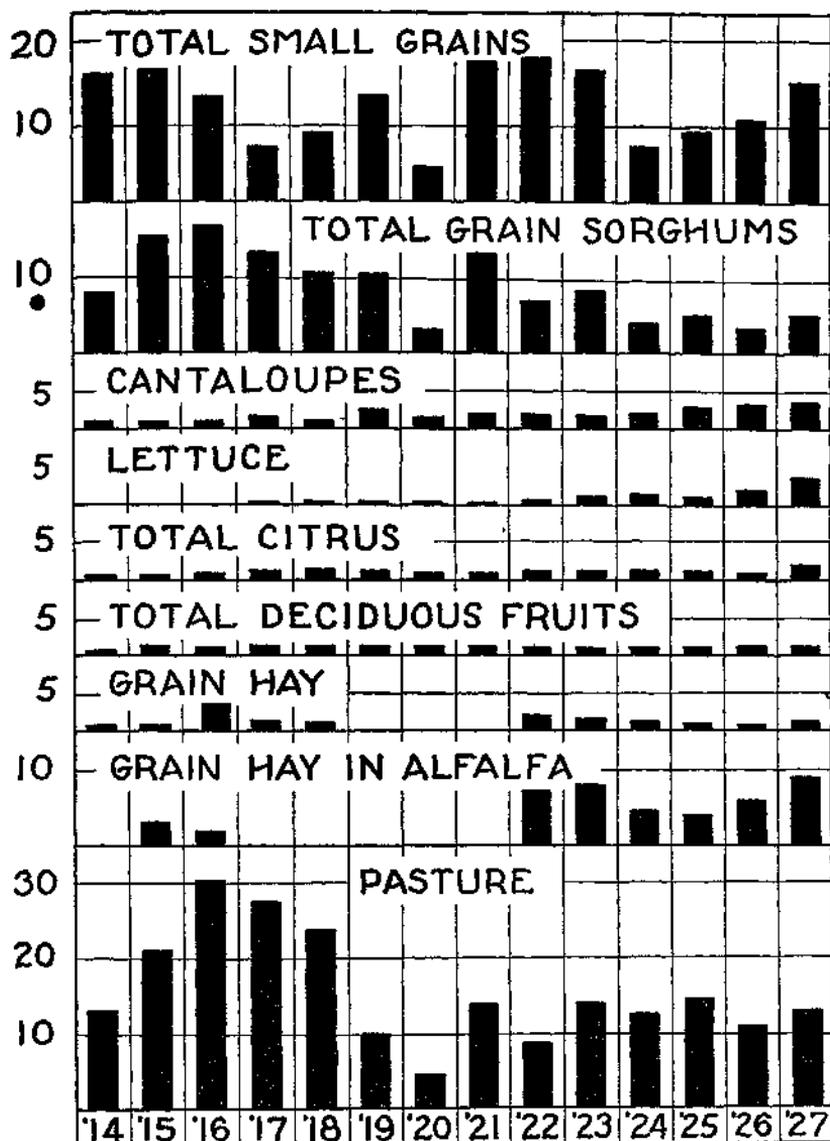


Fig. 1.—Showing the percentages of the total crop acreage growing alfalfa, long-staple cotton, short-staple cotton and other crops on the Salt River Valley Project—1914 to 1927 inclusive.

in the demand for Pima cotton. In 1920 the December 1 price at Phoenix went down to 28 cents per pound. This drop in price had its effect on production and the Pima acreage decreased from 180,000 acres in 1920 to 73,600 acres in 1921. Because of the fact that in 1921 the December 1 price was 30 cents per pound for Pima and only 18 cents for Upland, few of the growers planted the shorter cotton in 1922, while 77,000 acres were planted to Pima. On December 1, 1922, the Upland price had risen to 25 cents per pound, while Pima was bringing 32 cents. This narrowing of the price margin caused many growers to feel that they could make more money by growing the shorter staple and in 1923, 45,000 acres of Upland cotton were planted and the Pima acreage was reduced to 40,000 acres. At this time, the Upland growers found that they had made much money with a price on December 1, 1923, of 35 cents for Upland and only 40 cents for Pima, and 122,000 acres were planted to Upland in 1924, while only 8,000 acres were devoted to Pima.

The next 3 years, 1924, 1925, and 1926 were years of heavy world production for Upland cotton and the December 1 price at Phoenix, Arizona, dropped from 35 cents in 1923 to 14 cents in 1926. This caused the Upland acreage to drop from 122,000 in 1924 to 39,185 acres in 1927. On the other hand, the price of Pima has remained close to 40 cents per pound and the acreage has increased from 8,000 acres in 1924 to 44,000 acres in 1927.

These facts show that there has been a marked fluctuation in acreage and a tendency for growers to jump from one variety to the other with price shifts. In most instances, however, the change to the other variety has been made too late and the price has dropped after planting time, making the change in variety an unprofitable one.

PIMA VERSUS UPLAND

Since we have the two varieties of cotton, Pima and Upland, in the county, one is particularly interested in knowing which cotton has been found to be more profitable. Figure 2 shows that Upland gave a greater return per acre for 1922 and 1923, while Pima was more profitable to grow for the period since that time, that is 1924 to 1927 inclusive.

This comparison can be made by any grower where the yield per acre of each variety is known for his farm, thereby determining which cotton is more remunerative to him.

GROSS RETURN PER ACRE OF PIMA AND UPLAND COTTON IN MARICOPA COUNTY, ARIZONA, LESS PICKING AND GINNING EXPENSES - 1922-'27

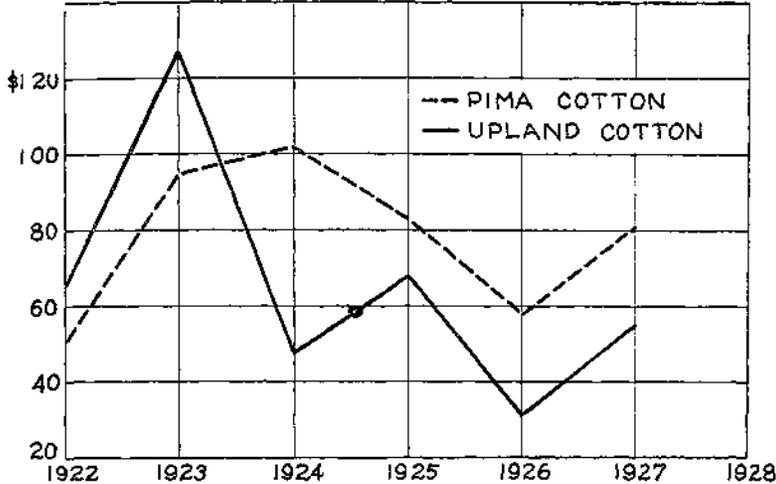


Fig 2.—Showing the gross return per acre of Pima and Upland cotton in Maricopa County, Arizona, less picking and ginning expenses—1922 to 1927 inclusive.

COMPETITION OF PIMA WITH IMPORTED EGYPTIAN COTTON

USES AND INTERCHANGEABLENESS OF PIMA AND SAKELLARIDIS COTTON

Sakellaridis cotton has an average staple length of $1\frac{1}{2}$ inches and Pima $1\frac{9}{16}$ inches, which has made it possible for the fine goods mills of the world to substitute one for the other in the making of high finish goods.

Since 1925, Pima, due to its longer staple and its uniformity, has been placed in a class at the top of the cotton industry. It will be noted in figure 3 that up until 1925 the Pima cotton received a lower price per pound at Boston, than did Sakellaridis. This was, to a large extent, due to the lack of a stabilized industry and to the process of establishing the new cotton on the market. However, since 1925, the Pima cotton industry has been more stable, that is, a steady supply has been produced and the length and strength of the fiber have been maintained along with its uniformity, while the Sakellaridis cotton has deteriorated slightly in quality because of the mixture of other varieties in the Sakellaridis producing areas.

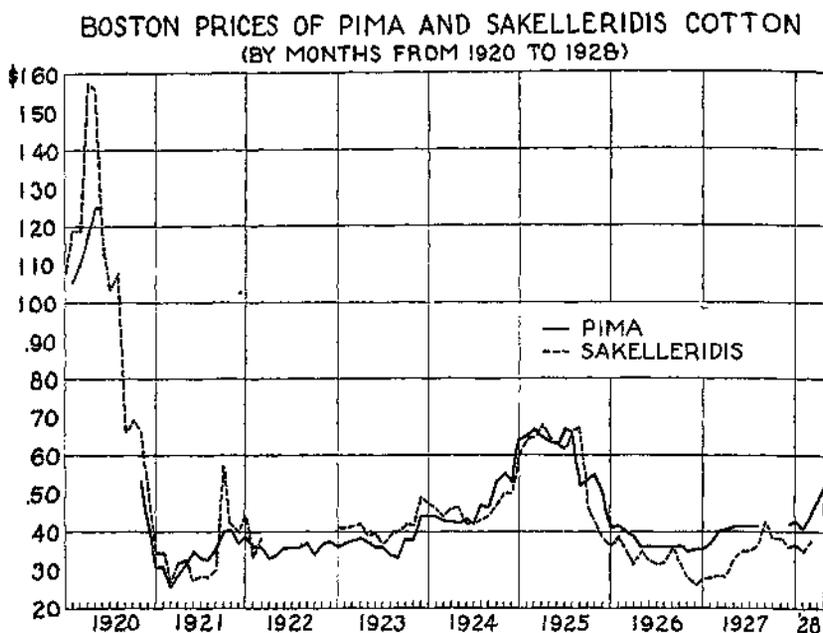


Fig. 3.—Showing the Boston prices of Pima and Sakellaridis cotton by months—1920 to 1928.

There has been an annual importation of over 100,000 bales of Sakellaridis cotton into the United States for the past 5 years and there is a production of about 1,500,000 bales of Egyptian cotton annually in Egypt. It is understood that about 50 percent of this is Sakellaridis. This shows that the United States imports only about 14 percent of the total Sakellaridis cotton produced in Egypt and that about 86 percent or approximately 600,000 bales of the Sakellaridis cotton is consumed in the other cotton manufacturing centers of the world. It indicates that there is a very large demand for this high quality cotton for which Pima can be substituted.

PROBLEMS OF PRODUCTION OF HIGH YIELDS AND GOOD QUALITY

SOIL IN RELATION TO THE PRODUCTION OF COTTON

Pima cotton should be planted as early in the season as weather conditions will permit, while Acala cotton may be planted at a much later date with the expectations of a fair yield.

Most of our warm areas are located on the outer boundaries

of the project because of the greater amount of slope which provides air drainage plus the warmth received from the adjacent mountains. These areas are specially adapted to the growing of Pima, though high yields of Upland varieties are also expected. These soils are gravelly or sandy loam in character. They are naturally easily irrigated and well aerated, which factors are very important in the production of good yields of cotton. However, a considerable amount of cotton is grown on the heavier types of soil and where good farming practices have been followed and favorable weather conditions prevail, yields comparable to those of light soils are obtained.

NECESSITY OF MAINTAINING SOIL FERTILITY

Most of the cotton growers who have stayed with the production of cotton in Maricopa County for a number of years, have found that by rotating cotton with alfalfa, a larger yield may be obtained. Most of those growing cotton on the gravelly or sandy soils are pretty well agreed that 4 or 5 years is the average that Pima can be grown profitably without again building up the soil by planting alfalfa for a period of 3 or more years. On our heavier types of soil, clay loam and silt and some of the Glendale Loess soils, satisfactory yields are not unusual for 5 or 6 years following alfalfa. In some instances, the fertility of the soil has been kept up by the use of sour clover. This is broadcasted in the cotton early in August and receives two or more irrigations to assure its growth.

Up to the present time, commercial fertilizers have not been of any appreciable value in the County, though they are continually being tested by growers and the specialists of the Experiment Station of the United States Department of Agriculture and the State University.

PURE SEED

Many other problems are essential for the cotton grower to consider, other than the assurance of an abundance of fertility, if he expects to grow a cotton of high quality and large yield. The first prerequisite for the production of a cotton of uniform strength and length of staple is planting pure seed. Maricopa County, through the efforts of the Maricopa County Farm Bureau Pure Seed Association, which is an organization of growers, buyers, and ginners, assisted by the Agricultural Extension Service of the University of Arizona and representatives from the United States Department of Agriculture, has been able to provide a sufficient amount of pure Pima planting

seed to take care of the acreage in the County. It is estimated that 90 percent of the acreage planted to Pima is planted to pure seed.

This cannot be said about the Upland varieties planted in the County, though the Acala variety probably approaches 75 percent planting of pure seed. Acala pure seed has been available from the Coachella Valley, California, at all times, to take care of the planting demand. In 1928, 1,000 acres of Acala cotton were grown under the supervision of the Maricopa County Farm Bureau Pure Seed Association which will contribute materially to the more widespread planting of this variety. However, many growers who have not wanted to give up some Upland variety that they thought might be exceedingly promising here since it had produced large yields in the South, have not been able to get pure seed because of state quarantine laws against cotton insects of the southern areas. This has forced them to plant the best seed available which is usually very badly mixed and the resulting lint lacks uniformity.

IRRIGATION

Cotton should never be allowed to want for water, especially after the squares have begun to appear. Any stress condition after this will cause heavy shedding and a lowered quality of lint. It is highly important to have a considerable storage of water in the soil previous to planting or soon after, so that it will not be necessary to irrigate again until the squares have started to appear. From this time to some time in the late fall after picking has begun, the plant should never want for moisture although too luxuriant vegetative growth should be avoided. It requires more water to produce cotton on poor soils that are low in fertility and on weedy land than on clean, fertile soils.

CULTIVATION

Sufficient cultivation should be done previous to laying the cotton by, to keep down growth of weeds and thus eliminate competition for moisture and plant food, allow for soil aeration, and provide loose soil so that furrowing out for irrigation can be easily accomplished.

PICKING AND DRYING

Many growers have been able to raise the quality of their cotton one or two grades by insisting that cotton be picked clean and when dry. However, sometimes during late fall and winter months when heavy dews occur, there is some moisture on the cotton all day. Under these conditions, large drying frames are used. These are so constructed as to stand about 4 feet above the

ground so that free circulation of air can take place. The floor of the frame is made of $\frac{3}{4}$ -inch or 1-inch mesh wire netting. In turning the cotton occasionally to be sure of proper drying, small fragments of leaves and other trash are removed from the cotton, thus improving the grade.

GINNING

After the grower has gone to the trouble and expense of growing a high grade of cotton, it is quite important that the cotton be ginned properly, otherwise that which he has labored 6 to 9 months in producing may be totally or partially lost.

A first-class job of ginning of a given variety should not be sacrificed for a high lint percentage. Gin men know how to increase the percentage of lint but that does not produce quality cotton and when cotton is ginned too closely the cotton is classed as wasty. Running the saws too fast also should be avoided as this cannot be done without injuring the lint.

MARKETING THE COTTON CROP

The marketing of the cotton crop in this district varies somewhat from methods in other producing areas. Part of the crop is sold at the gins, usually at the time of ginning, on samples drawn from each bale, either to the ginners or to the buyers representing various shippers. Prices of the Upland varieties are subject to the same influences as elsewhere.

Pima cotton is sold on slightly different terms. Twenty-two pounds per bale is deducted for tare, and the sale is made on the net weight of the cotton. Different grade descriptions are also used for Pima; No. 2 being the basis grade as "middling" is in the Upland varieties.

A large volume of cotton is sold coöperatively through the Arizona Pima Cotton Growers, a coöperative marketing Association. This organization has expanded until it is statewide in its activities, and has been one of the notably successful coöperatives. It is strictly a coöperative, non-profit organization and occupies a very prominent position in marketing the Upland and Pima varieties not only of this Valley, but throughout the State.

Quite a large percentage of the crop in this County is sold in the spring and early summer for delivery in the fall. Usually when production loans are made, or the market reaches a high level, enough is sold early in the season to cover production loans. Owing to the Arizona conditions of freedom from insect pests, slight danger of loss from storms, and certainty of production, this can be done with more safety both to the seller and the buyer than in the humid cotton belt in southern states.

TABLE II.—TOTAL ACREAGE, PRODUCTION, YIELD PER ACRE, DECEMBER 1 PRICE F. O. B. PHOENIX, PER ACRE VALUE OF PIMA AND UPLAND COTTON FROM 1912-27 IN MARICOPA COUNTY.

| Year | AMERICAN EGYPTIAN | | | | | | | | | | UPLAND | | |
|------|-------------------|-------------|---------------------|-------------------------------|-----------------------|------|---------|-------------|---------------------|-------------------------------|----------------------|--|--|
| | Acreage | Pro-duction | Yield per acre lint | F. O. B. Phoenix Dec. 1 price | Gross value per acre* | Year | Acreage | Pro-duction | Yield per acre lint | F. O. B. Phoenix Dec. 1 price | Gross value per acre | | |
| | | Bales | Lbs. | Cents | \$ | | | Bales | Lbs. | Cents | | | |
| 1912 | 400 | 240 | 300 | 20 | 60.00 | 1912 | | | | 14 | | | |
| 1913 | 3,700 | 2,035 | 275 | 20 | 55.00 | 1913 | | | | 14 | | | |
| 1914 | 10,700 | 5,529 | 258 | 15 | 38.70 | 1914 | 2,000 | 1,100 | 275 | 8 | 20.00 | | |
| 1915 | 2,300 | 1,017 | 222 | 22 | 48.84 | 1915 | 300 | 175 | 292 | 13 | 37.96 | | |
| 1916 | 7,000 | 3,164 | 226 | 43 | 97.18 | 1916 | 1,000 | 600 | 300 | 20 | 60.00 | | |
| 1917 | 29,000 | 13,558 | 230 | 72 | 165.60 | 1917 | 260 | 160 | 320 | 31 | 99.20 | | |
| 1918 | 69,000 | 32,801 | 238 | 55 | 130.90 | 1918 | | | | 28 | | | |
| 1919 | 83,000 | 37,956 | 229 | 80 | 183.20 | 1919 | | | | 40 | | | |
| 1920 | 180,000 | 75,837 | 205 | 28 | 57.40 | 1920 | | | | 17 | | | |
| 1921 | 73,600 | 34,378 | 234 | 30 | 70.20 | 1921 | | | | 18 | | | |
| 1922 | 77,000 | 33,907 | 220 | 32 | 70.10 | 1922 | 4,500 | 2,700 | 300 | 25 | 75.00 | | |
| 1923 | 40,000 | 22,960 | 287 | 40 | 114.80 | 1923 | 45,000 | 35,000 | 389 | 35 | 136.15 | | |
| 1924 | 8,000 | 4,374 | 274 | 47 | 124.78 | 1924 | 122,000 | 61,000 | 250 | 23 | 57.50 | | |
| 1925 | 40,000 | 20,586 | 257 | 41 | 105.37 | 1925 | 65,000 | 47,341 | 361 | 22 | 80.05 | | |
| 1926 | 28,000 | 16,382 | 277 | 31 | 85.87 | 1926 | 75,000 | 47,314 | 315 | 14 | 44.10 | | |
| 1927 | 44,000 | 24,350 | 275 | 38 | 104.50 | 1927 | 39,185 | 25,000 | 319 | 20 | 63.80 | | |

Source: Acreage production, yield lint per acre for Pima and Upland obtained from Division of Crops and Livestock Estimates, Bureau of Agricultural Economics, U. S. Department of Agriculture and from S. H. Hastings, of the S. W. Cotton Co., for F. O. B. December 1 price.

* In comparing gross value per acre of two varieties, it must be remembered that picking and ginning charges per lb. for Pima are higher than for Upland cotton.

TABLE III.—UNITED STATES ACREAGE, PRODUCTION AND DECEMBER 1 PRICE OF UPLAND COTTON PER POUND AND WORLD PRODUCTION 1916-27.

| Year | U. S. acreage | U. S. production | World production | December 1 price of Upland cotton |
|------|---------------|------------------|------------------|-----------------------------------|
| | 1000 Acres | 1000 Bales | 1000 Bales | Cents per pound |
| 1916 | 34,985 | 11,450 | 19,845 | 19.6 |
| 1917 | 33,841 | 11,302 | 19,675 | 27.7 |
| 1918 | 36,008 | 12,041 | 20,613 | 27.6 |
| 1919 | 33,566 | 11,421 | 21,331 | 35.6 |
| 1920 | 35,878 | 13,440 | 20,984 | 13.9 |
| 1921 | 20,509 | 7,954 | 15,439 | 16.2 |
| 1922 | 33,036 | 9,755 | 19,300 | 23.8 |
| 1923 | 37,123 | 10,140 | 19,700 | 31.0 |
| 1924 | 41,360 | 13,628 | 24,900 | 22.6 |
| 1925 | 46,053 | 16,104 | 27,900 | 18.2 |
| 1926 | 47,987 | 17,977 | 28,000 | 10.9 |
| 1927 | 40,168 | 12,789 | ..... | 19.6 |

Source: U. S. Department Yearbooks 1924, 1925, 1926: Crops and Markets Vol. 4, No. 12; Foreign Crops and Markets Vol. 16, No. 11.

TABLE IV.—APPROXIMATE DIFFERENCE IN NET RETURN PER ACRE FROM PIMA AND UPLAND COTTON, MARICOPA COUNTY, ARIZONA, 1922-27.*

| Item | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 |
|--|----------|----------|----------|----------|----------|----------|
| Pima Cotton: | | | | | | |
| Lint-average yield per acre lbs. | 220 | 287 | 274 | 257 | 277 | 275 |
| Seed-average yield per acre lbs. | 595 | 776 | 740 | 695 | 750 | 745 |
| Price of lint per pound, cents | .32 | .40 | .47 | .41 | .31 | .38 |
| Price of seed per pound, cents | 1.26 | 2.04 | 1.06 | 1.33 | .90 | 1.50 |
| Gross return per acre: | | | | | | |
| Lint cotton | \$ 70.40 | \$114.80 | \$128.78 | \$105.37 | \$ 85.87 | \$104.50 |
| Cotton seed | 7.50 | 15.83 | 7.84 | 9.24 | 6.75 | 11.18 |
| | \$ 77.90 | \$130.63 | \$136.62 | \$114.61 | \$ 92.62 | \$115.68 |
| Expense items which differ: | | | | | | |
| Picking cotton† | 19.91 | 25.98 | 24.77 | 23.23 | 25.07 | 24.88 |
| Ginning cotton† | 7.56 | 9.86 | 9.40 | 8.82 | 9.52 | 9.45 |
| Total | \$ 27.47 | \$ 35.84 | \$34.17 | \$ 32.05 | \$ 34.59 | \$ 34.33 |
| Gross return less expenses which differ: | | | | | | |
| Lint Cotton: | | | | | | |
| Lint-average yield per acre, lbs. | 300 | 389 | 250 | 364 | 215 | 319 |
| Seed-average yield per acre, lbs. | 637 | 827 | 531 | 774 | 457 | 678 |
| Price of lint per pound, cents | .25 | .35 | .23 | .22 | .14 | .20 |
| Price of seed per pound, cents | 1.26 | 2.04 | 1.06 | 1.33 | .90 | 1.50 |
| Gross return per acre: | | | | | | |
| Lint cotton | \$ 75.00 | \$136.15 | \$ 57.50 | \$ 80.08 | \$ 30.10 | \$ 63.80 |
| Cotton seed | 8.03 | 16.87 | 5.63 | 10.29 | 4.11 | 10.17 |
| Total | \$ 83.02 | \$153.02 | \$ 63.13 | \$ 80.37 | \$ 34.21 | \$ 73.97 |
| Expense items which differ: | | | | | | |
| Picking cotton† | \$ 13.62 | \$ 17.68 | \$ 11.35 | \$ 16.54 | \$ 9.77 | \$ 14.49 |
| Ginning and bagging† | 5.16 | 6.69 | 4.30 | 6.26 | 3.70 | 5.49 |
| Total | \$ 18.78 | \$ 24.37 | \$ 15.65 | \$ 22.80 | \$ 13.47 | \$ 19.98 |

TABLE IV.—Continued.

| Item | 1922 | 1923 | 1924 | 1925 | 1926 |
|--|----------|----------|----------|----------|----------|
| Gross return less expenses which differ: | \$ 64.25 | \$123.65 | \$ 47.48 | \$ 67.57 | \$ 20.74 |
| The amount by which the net return per acre of Pima is above (+) or below (-) the net return of Upland | \$-13.82 | \$-33.86 | \$+54.97 | \$+14.99 | \$+37.29 |
| The price for Pima which would have given the same net return per acre as was obtained from Upland | \$.38 | \$.52 | \$.27 | \$.35 | \$.18 |

*Source: Yields of lint and prices of seed from Bureau of Agricultural Economics. Prices of lint cotton are Phoenix F. O. B. December 1. Prices furnished by S. H. Hastings, S. W. Cotton Company. Yields of seed are based on 32% and 27% ginning percentages respectively for Upland and Pima cotton.

†The picking of Pima cotton is figured at 2.37 cents per pound of seed cotton and Upland cotton at 1.41 cents. ‡The ginning and baling of Pima cotton is figured at \$.90 per 100 lbs. of seed cotton. The ginning of Upland cotton is figured at \$.45 per 100 lbs. of seed cotton and the bags and ties at \$1.50 per bale.

NOTE: In considering the comparisons made in the foregoing table, it should be remembered (as is frequently claimed) that the Pima cotton may have been given some advantage over the Upland by being planted on the better grades of soil.

TABLE V.—PRICES OF SAKELLARIDIS AND PIMA COTTON BY MONTHS LANDED BOSTON, 1920-28 JANUARY-JUNE INCLUSIVE.*

| Item | January | February | March | April | May | June |
|--------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Cents per lb. | Cents per lb. | Cents per lb. | Cents per lb. | Cents per lb. | Cents per lb. |
| 1920 | | | | | | |
| Sakellaridis | 108.13 | 119.50 | 157.62 | 156.00 | 156.00 | 115.00 |
| Pima | — | 105.00 | 110.00 | 125.00 | 125.00 | 125.00 |
| 1921 | | | | | | |
| Sakellaridis | 34.14 | 34.37 | 26.62 | 31.75 | 32.50 | 27.50 |
| Pima | 31.88 | 32.13 | 26.88 | 29.13 | 32.00 | 32.35 |
| 1922 | | | | | | |
| Sakellaridis | 44.25 | 33.75 | 37.63 | — | — | — |
| Pima | 39.00 | 35.50 | 36.00 | 32.50 | 34.00 | 36.00 |
| 1923 | | | | | | |
| Sakellaridis | 41.00 | 41.00 | 41.13 | 42.00 | 38.63 | 39.85 |
| Pima | 36.50 | 37.00 | 37.50 | 38.50 | 37.50 | 36.00 |
| 1924 | | | | | | |
| Sakellaridis | 47.38 | 46.75 | 43.75 | 45.50 | 46.00 | 42.00 |
| Pima | 44.50 | 44.50 | 43.00 | 43.00 | 43.00 | 43.50 |
| 1925 | | | | | | |
| Sakellaridis | 64.50 | 65.00 | 67.00 | 65.00 | 63.00 | 63.00 |
| Pima | 60.00 | 65.00 | 65.00 | 68.00 | 65.00 | 62.00 |
| 1926 | | | | | | |
| Sakellaridis | 36.00 | 39.00 | 34.50 | 32.00 | 34.50 | 32.50 |
| Pima | 41.00 | 41.50 | 40.00 | 39.00 | 36.50 | 36.50 |
| 1927 | | | | | | |
| Sakellaridis | 27.38 | 27.75 | 28.38 | 27.63 | 32.88 | 34.38 |
| Pima | 35.50 | 36.25 | 40.00 | 40.25 | 41.00 | 41.00 |
| 1928 | | | | | | |
| Sakellaridis | 36.63 | 34.25 | 37.13 | 41.63 | 43.25 | — |
| Pima | 43.00 | 41.00 | 43.75 | 48.00 | 52.50 | — |

Source: U. S. Bureau of Agricultural Economics.

* Each monthly price is based upon a single quotation. From 1923 to 1927 inclusive, the monthly quotations for the two varieties are for the same day of the month, while prior to 1923 the day upon which the quotations for the two varieties was made, varies considerably.

TABLE V.—CONTINUED. PRICES OF SAKELLARIDIS AND PIMA COTTON BY MONTHS LANDED BOSTON, 1920-28. JULY-DECEMBER INCLUSIVE.*

| Item | July | August | Sept. | October | Nov. | December |
|--------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | Cents per lb. | Cents per lb. | Cents per lb. | Cents per lb. | Cents per lb. | Cents per lb. |
| 1920 | | | | | | |
| Sakellaridis | 103.00 | 107.13 | 67.62 | 69.13 | 65.50 | 44.62 |
| Pima | — | — | — | — | 53.50 | 41.00 |
| 1921 | | | | | | |
| Sakellaridis | 28.25 | 28.15 | 30.50 | 55.50 | 42.00 | 40.00 |
| Pima | 33.00 | 33.00 | 35.50 | 40.00 | 41.00 | 37.00 |
| 1922 | | | | | | |
| Sakellaridis | — | — | — | — | — | — |
| Pima | 36.00 | 36.00 | 37.00 | 34.00 | 36.50 | 37.00 |
| 1923 | | | | | | |
| Sakellaridis | 37.00 | 39.50 | 40.00 | 42.25 | 41.50 | 49.25 |
| Pima | 36.00 | 34.00 | 33.00 | 38.00 | 38.00 | 44.50 |
| 1924 | | | | | | |
| Sakellaridis | 42.00 | 46.88 | 46.63 | 52.88 | 55.00 | 53.00 |
| Pima | 42.00 | 43.00 | 44.00 | 47.50 | 50.00 | 50.00 |
| 1925 | | | | | | |
| Sakellaridis | 62.00 | 67.00 | 67.50 | 47.50 | 41.50 | 39.00 |
| Pima | 67.50 | 67.00 | 52.50 | 54.00 | 55.50 | 49.00 |
| 1926 | | | | | | |
| Sakellaridis | 31.50 | 32.00 | 35.50 | 31.80 | 28.00 | 25.75 |
| Pima | 36.50 | 36.50 | 36.50 | 36.50 | 35.00 | 35.50 |
| 1927 | | | | | | |
| Sakellaridis | 24.75 | 36.00 | 42.00 | 37.75 | 37.75 | 36.00 |
| Pima | 41.00 | 41.00 | 44.00 | 40.50 | — | 41.75 |
| 1928 | | | | | | |
| Sakellaridis | — | — | — | — | — | — |
| Pima | — | — | — | — | — | — |

TABLE VI.—ACREAGE, PRODUCTION OF ALL EGYPTIAN COTTON AND IMPORTS OF SAKELLARIDIS AND UPPERS INTO THE UNITED STATES FROM 1919 TO 1923.

| Season | Acreage of Egyptian cotton | Egyptian production 500 lb. bales | Sakellaridis 500 lb. bales imports | Uppers 500 lb. bales imports |
|----------|----------------------------------|---|--|------------------------------------|
| 1919-20* | | | | |
| 1922-23† | 1,869,000 | 1,391,000 | 104,000 | 130,000 |
| 1923-24 | 1,780,000 | 1,353,000 | 117,000 | 212,000 |
| 1924-25 | 1,856,000 | 1,569,000 | 130,000 | 34,000 |
| 1925-26 | 1,997,000 | 1,629,000 | 101,000 | 89,000 |
| 1926-27 | 1,854,000 | 1,497,000 | 108,000 | 131,000 |

* Previous to 1922-23 Sakellaridis and uppers were not segregated.

† 1919-20 Total U. S. consumption of Sakellaridis and Egyptian uppers was 323,000 bales.

Source: U. S. Bureau of Agricultural Economics.

RECOMMENDATIONS

We, the Cotton Committee of the Agricultural Economic Survey of Maricopa County, present the following recommendations:

1. That in view of the fact that cotton has proved to be a profitable cash crop in the Salt River Valley, we believe that this crop should continue to occupy an important position in the agriculture of the County.

2. That the acreage of Pima cotton should be increased gradually where soil and other conditions are favorable and this increased acreage should be maintained so that the mills can be assured of a sufficient volume to meet their needs.

3. That the acreage of Upland cotton should be increased or decreased primarily upon the basis of the outlook for the current year rather than upon the price received for the previous year.

4. That where proper growing conditions and sufficient water supply and soil fertility exist, a grower can reasonably expect a considerably higher yield of both Pima and Upland than the average yields obtained in the Valley.

5. That the Maricopa County Pure Seed Association, in cooperation with the United States Department of Agriculture and the University of Arizona Agricultural Extension Service, continue to maintain sufficient pure seed of the Pima variety for planting and that all seed planted in the County be obtained from this source. Any growers in the County who are able to meet the requirements of the production of pure seed, should be encouraged to assist in maintaining this supply of pure Pima seed for planting.

6. That the Maricopa County Farm Bureau Pure Seed Committee continue to promote pure seed acreage for our supply of Acala planting seed, and that growers be encouraged to use seed from this source.

7. That the planting of home grown and gin-run seed should be discouraged as it will not produce a uniform character or length of staple.

8. That this Committee believes the work of the United States Department of Agriculture and the University of Arizona in breeding up the cotton varieties in the County, and the work of improving the strains should be continued.

9. That where sour clover has been continuously planted in the cotton on light soils, one should expect to hold up his yields

to profitable production for a longer period than if cotton without the sour clover had been grown.

10. That the growing of sour clover in heavy soils be thoroughly tested out. The difficulty of securing a good growth is recognized, but the advantages of the resultant soil improvement make a careful trial advisable.

11. That where light soils are planted to alfalfa for 3 to 5 years and then planted to cotton, satisfactory yields may usually be expected for 3 or 4 years. Where heavy soils are planted to alfalfa for 3 to 5 years and then planted to cotton, yields of cotton should be maintained for 5 or 6 years.

12. That uniform and deep penetration of the soil moisture should be obtained either previous to planting or soon after, so that usually it may not be necessary to irrigate again before the setting of squares. From this time on, the plants should not be allowed to suffer from lack of moisture but excessive vegetative plant growth should be avoided.

13. That the soil should not be allowed to become too dry in late fall as deficiency of moisture at this time may cause a deterioration in the quality of lint.

14. That cotton should be thinned when from 4 to 8 inches high.

15. That sufficient cultivation of soil should be done between irrigations to keep down weeds, break the crust in order to allow for better water penetration, and to eliminate cracks in the soil.

16. That cotton should be picked as clean as possible and thoroughly dried previous to ginning.

17. That home-made sun cotton driers should be used in order to insure dry cotton.

18. That in ginning, quality cotton should be the goal, rather than a high percentage of lint.

19. That cotton be graded by government standard and sold on that basis.

J. K. Williams
S. H. Hastings
C. J. King
R. S. Hawkins
K. D. Hellwarth
Chas. Martin
Harry Thompson
Fay Collier
H. A. Stewart, Secretary

REPORT OF ALFALFA COMMITTEE

By

I. A. BRIGGS, Secretary

For many years prior to 1919, alfalfa was the most important crop in the Salt River Valley. The growing of alfalfa and the dairy industry formed the backbone of the agriculture of the section. Prices for hay compared fairly well with the returns from other crops. The increased production of cotton which reached the high point in 1920 and the disposal of large numbers of dairy cows, together with the very high freight rates, resulted in a considerable decrease in the alfalfa acreage. From 1914 to 1919 the land devoted to alfalfa in the Salt River Valley ranged from 50 to 35 percent of the total cropped acreage. The year 1920 saw the low point in the production of alfalfa when only a little over one-eighth of the land under cultivation was in this crop. The following year, the acreage increased to about 25 percent and there has been a more or less gradual increase up to the present time when a little more than 30 percent of the cropped land is in alfalfa. The percentage of the total cropped acreage of the Salt River Valley which is in alfalfa is indicated in figure 1. (See pp. 20, 21.)

The acreage of alfalfa in the Salt River Valley will apparently be maintained at present levels and possibly increased slightly. There is an increasing appreciation of the necessity for growing alfalfa in order to maintain the fertility of the soil. It is fairly well understood that for the most profitable cotton production the cotton land should be in alfalfa approximately one-third of the time. When lettuce or lettuce and cantaloupes are grown, the heavy demands of these crops for nitrogenous fertilizers require that the land be in alfalfa about one-half the time. The beneficial effects of alfalfa are not so apparent unless the land has been in alfalfa from 3 to 5 years.

The steady increase in the number of dairy cows during the past few years is resulting in a greater demand for alfalfa hay and also for alfalfa pasture. The practice of winter pasturing sheep and cattle on the alfalfa fields has meant that on a large percentage of the farms the last crop in the fall is being pastured off rather than cut for hay. Not only is the winter pasturing an important factor but the increasing numbers of both sheep and beef cattle which are kept on the farms during the summer months are resulting in the marketing of one, two,

or sometimes three summer cuttings in the form of pasture. So important has this method of handling the crop become that it is very difficult to find alfalfa fields which are not pastured at least a part of the year. The trend of production and acreage of alfalfa is shown in figure 4.

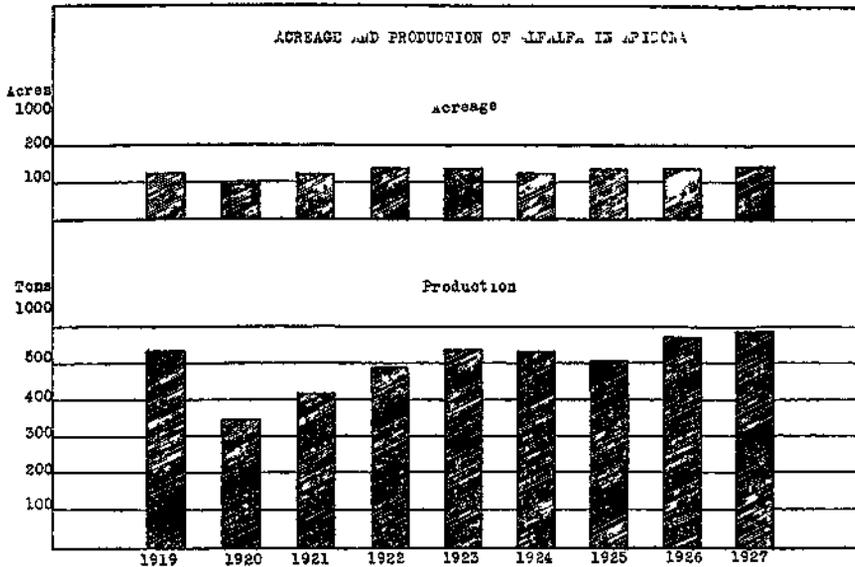


Fig. 4.—Showing acreage and production of alfalfa in Arizona—1919 to 1927 inclusive.

The prospect for satisfactory prices for alfalfa seems quite good although such prices are so largely dependent upon supply and demand in outside areas that the condition of the crop in Arizona is often an unimportant factor. The relation of outside markets to the alfalfa situation in Arizona will be considered in more detail later.

The average gross return per acre from alfalfa is greater than that from any other general field crop grown to any extent in the Salt River Valley, with the exception of cotton. Table VII compares the gross returns from the principal general field crops grown in the Salt River Valley.

The data in Table VII were compiled from yield and cost data prepared by the Salt River Valley Water Users' Association. Such crops as wheat, hegari, milo, and barley do not occupy the land during the entire year and the returns from these crops must be considered with this point in mind. The gross returns do not represent the relative profit from crops in all cases because

the various costs of production vary so widely. Alfalfa growing, however, provides for a wide distribution of labor and in this way lessens the seasonal demand for labor now found on many of the highly specialized farms.

TABLE VII.—GROSS RETURNS PER ACRE FOR THE PRINCIPAL FIELD CROPS GROWN IN THE SALT RIVER VALLEY.

| Crop | 1923 | 1924 | 1925 | 1926 | 1927 | Average |
|---------------------|----------|----------|----------|----------|----------|----------|
| Alfalfa | \$ 80.00 | \$ 85.00 | \$ 90.00 | \$ 44.00 | \$ 55.00 | \$ 70.00 |
| Upland cotton | 157.00 | 96.00 | 96.00 | 55.00 | 78.00 | 95.00 |
| Pima cotton | 110.00 | 156.00 | 132.00 | 185.75 | 93.00 | 125.55 |
| Wheat | 36.00 | 36.55 | 50.40 | 31.50 | 33.75 | 37.64 |
| Hegari | 30.00 | 37.50 | 52.50 | 25.00 | 27.00 | 34.40 |
| Milo | 40.00 | 43.75 | 61.25 | 28.00 | 28.00 | 40.25 |
| Barley | 28.00 | 31.35 | 33.15 | 26.20 | 27.60 | 29.26 |
| Oat hay | 36.00 | 32.00 | 29.75 | 14.25 | 16.50 | 25.60 |

The cost of producing alfalfa is an important factor in the profit of the crop just as it is with other crops. Production costs vary widely as they are influenced by many different factors. The cost of production studies made in connection with the Agricultural Economic Survey and other studies conducted in the Salt River Valley indicate that the cost of producing 5 tons of alfalfa hay to the acre, in five cuttings, amounts to approximately \$60.00, or \$12.00 per ton. The costs involved are divided almost equally between fixed costs and production, harvesting, and marketing costs. The records of the Water Users' Association show an average selling price for alfalfa for the 5-year period, 1923 to 1927 inclusive, of \$14.50 per ton. Table VIII shows that the members of the Roosevelt Hay Growers' Association received an average gross return of \$14.69 with an average net return of \$12.32 at the shipping point.

TABLE VIII.—ALFALFA HAY PRICES IN THE SALT RIVER VALLEY 1922-1927 INCLUSIVE.

| Grade | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | Average |
|----------------------------------|---------|---------|---------|---------|---------|---------|---------|
| No. 1 Alfalfa | \$19.88 | \$17.82 | \$19.38 | \$16.96 | \$12.91 | \$18.87 | \$17.64 |
| Standard Alfalfa .. | 17.44 | 16.08 | 18.12 | 14.29 | 11.85 | 16.02 | 15.55 |
| No. 2 Alfalfa | 15.92 | 13.50 | 15.62 | 11.39 | 9.38 | 13.84 | 13.28 |
| No. 3 Alfalfa | 10.90 | ..... | ..... | 9.70 | 8.32 | 11.25 | 10.04 |
| *Average | 16.04 | 15.80 | 17.71 | 13.09 | 10.49 | 14.98 | 14.69 |
| Association expense | 3.06 | 2.62 | 2.33 | 1.96 | 2.21 | 2.00 | 2.365 |
| Net to grower at marketing point | 12.98 | 13.17 | 15.38 | 11.13 | 8.28 | 12.98 | 12.32 |

* Unweighted.

NOTE: Prices received for all straight alfalfa hay including the grades No. 1 Alfalfa, Standard Alfalfa, No. 2 Alfalfa and No. 3 Alfalfa. No record of prices received for No. 3 Alfalfa is given for 1923 or 1924 and the averages are for the first three grades only. These data were furnished by the Roosevelt Hay Growers' Association.

When alfalfa is planted at the proper time in the fall and receives good care, the yields the first season should be very nearly as high as those later. Possibly the lower yields the first season should be charged to the crop or practice which prevents the alfalfa being planted at the proper time.

Alfalfa requires more water than any of the other field crops generally grown in the Salt River Valley and consequently suffers more than any of the others when there is a water shortage. Maximum yields of alfalfa cannot be obtained unless large amounts of water are applied.

Marr and Smith,* from data secured on 42 farms in the Salt River Valley during the period from 1913 to 1915, report a water requirement varying from 4.65 acre-inches to 11.3 acre-inches of water per ton of hay produced with an average of 8 inches per ton in addition to the rainfall. The average amount of water used on alfalfa land on the 42 farms, all but three of which were on Maricopa Sandy Loam soil, was 3.47 acre-feet and the average yield was 5.19 tons. For the group of farms which used less than 3.47 acre-feet, the average amount of water applied was 2.44 acre-feet and the average yield was 4.07 tons. On those farms where 4 acre-feet were used, the average yield was 6.3 tons and where 5 acre-feet were used the average yield was 7.2 tons. While the proportion is somewhat high for the 4-foot application, the relation between increased applications of water and increased yields is very apparent.

A factor of considerable importance in this connection is that until the past few years there was an over-delivery of irrigation water amounting to approximately 20 percent of the amount charged according to estimates based on hydrographers' test measurements. When this over-delivery is taken into consideration, the actual amount of water used on the alfalfa fields studied amounted to 4.12 acre-feet instead of 3.47 acre-feet. This amounts to approximately 9.5 inches of irrigation water per ton of alfalfa produced or 4 acre-feet of irrigation water for a 5-ton yield. This over-delivery factor should be kept in mind when considering the figures in the preceding paragraph.

Nearly all the farmers seen during the recent Agricultural Economic Survey reported that they could have increased their yields of alfalfa had they used more water. In many cases, the yields reported could have been increased one ton or more by this means. The added expense of producing the additional yield would be the cost of the water amounting to approximately

* Marr, James C., and Smith, G. E. P. The use and duty of water in the Salt River Valley.

\$1.00 per acre depending upon the amount used and the cost of harvesting and marketing amounting to \$4.58 on the average or a total of \$5.58. With an average return of \$12.00 per ton, this would leave over \$6.00 profit on the increased yield since the fixed charges had been met by the average production. This would hold true provided an extra cutting were obtained. However, the extra yield might be secured without increasing the number of cuttings in which case the cost of producing the extra tonnage would be materially reduced.

While the cash return is not entirely dependent on the yield produced, the two are very closely related. Moreover, the highest quality hay is obtained from rapidly growing plants and such hay is produced with a lower water requirement per ton than that which grows slowly or is allowed to remain dormant for a considerable period.

From statements made by farmers who make a practice of pasturing their alfalfa extensively, it appears that larger amounts of water are required when alfalfa is pastured than when cut for hay if the best results are to be obtained. With the rapid development of the pasturing business, the importance of ample supplies of irrigation water cannot be over emphasized.

When the returns from other kinds of crops are considered and in view of the risks involved and the high initial expense, the farmer who grows alfalfa for market should be able to do so with a reasonable expectancy of a margin of profit in addition to the added value of the alfalfa to the soil. Since the matter of securing increased yields by the application of larger amounts of irrigation water has been so clearly demonstrated and since yields and profits are so closely related in alfalfa growing, the irrigation factor should receive careful consideration. If additional amounts of water are not available, it may be advisable to restrict the acreage in alfalfa in order that such restricted acreage, through the added water available, may show profitable yields. Alfalfa fields receiving 4 acre-feet of irrigation water or more each season will ordinarily return a profit while those receiving 3 acre-feet or less stand very little chance of paying the expenses involved.

Because of the water shortage which often exists, it is considered good practice to hold the water off the alfalfa fields during August. This results in the loss of a short crop but it also controls water grasses and saves water for use later when the water requirement of the alfalfa plants is not so great in comparison with the amount of hay produced.

For many years, the principal market for alfalfa from the Salt River Valley has been in the dairy section of Southern California centering in and around Los Angeles. This market has usually taken about 70 percent of the hay shipped from the Salt River Valley. During the past few years, there has been an increase in the amount of alfalfa shipped to southern states where the market demand has been somewhat stronger than in California. Figure 5 illustrates very clearly some of the reasons for the decrease in demand for Arizona alfalfa in southern California.

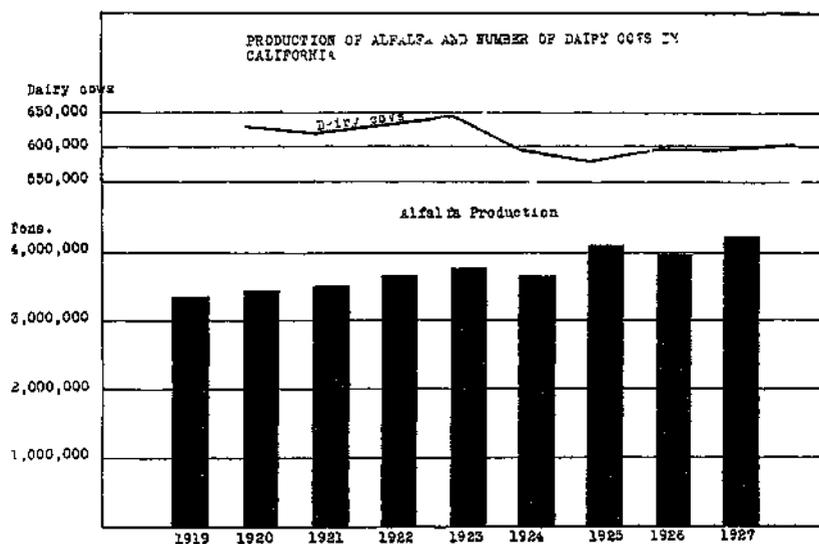


Fig. 5.—Showing the production of alfalfa and the number of dairy cows in California—1919 to 1927 inclusive.

The largest developments in the production of alfalfa in California have been in the southern sections of the State. It will be noted that there has been an increase from 3,318,000 tons in 1919 to 4,204,000 tons in 1927 or an increase of 26.6 percent. From January 1, 1920 to January 1, 1928, the number of dairy cows decreased from 629,000 to 602,000, or about 4.5 percent. While large quantities of alfalfa are fed to other classes of livestock, the alfalfa dairy-cow ratio gives a fairly good idea of the increasing extent to which California is meeting her needs for alfalfa. While the production amounted to 5.28 tons per dairy cow in 1920, it amounted to 7.05 tons per dairy cow in 1927.

The trend in the production of alfalfa in the south central states where a great deal of Arizona alfalfa is marketed is shown in figure 6.

The demand for Arizona alfalfa in the southern states depends upon the condition of the feed supplies in these states, upon the amount of alfalfa produced in surplus producing states, and upon the demand of other and more distant markets for the surplus from such states. The production of alfalfa in the states which furnish alfalfa in competition with Arizona in southern markets is shown in the accompanying table. Nebraska, Kansas, and Colorado are states with surplus production located fairly close to the south central states and the same is true of New Mexico although that state produces a comparatively small amount of alfalfa for outside markets. Alfalfa is shipped to the southern markets from Idaho, Utah, and Wyoming for the reason that many of the eastern and western states will not permit shipments of alfalfa from these states to enter on account of the prevalence of the alfalfa weevil.

TABLE IX.—ALFALFA PRODUCTION IN STATES WHICH COMPETE WITH ARIZONA FOR SOUTHERN MARKETS.*

| | | Neb. | Kans. | Colo. | Idaho | Utah | Wyo. | N. M. | Total |
|------|--------------------|-------|-------|-------|-------|-------|-------|-------|--------|
| 1919 | Acreage | 1,215 | 1,316 | 782 | 651 | 365 | 330 | 117 | 4,776 |
| | Production | 2,416 | 2,595 | 2,019 | 1,741 | 749 | 514 | 279 | 10,313 |
| 1920 | Acreage | 1,233 | 1,231 | 845 | 665 | 380 | 437 | 127 | 4,918 |
| | Production | 3,329 | 2,708 | 2,366 | 2,194 | 1,064 | 1,005 | 343 | 13,009 |
| 1921 | Acreage | 1,196 | 1,065 | 818 | 652 | 412 | 469 | 132 | 4,734 |
| | Production | 2,823 | 1,917 | 2,045 | 2,217 | 1,112 | 918 | 343 | 11,375 |
| 1922 | Acreage | 1,163 | 919 | 818 | 648 | 431 | 475 | 107 | 4,561 |
| | Production | 2,407 | 2,252 | 1,759 | 2,009 | 1,259 | 1,021 | 257 | 10,964 |
| 1923 | Acreage | 1,163 | 885 | 783 | 657 | 458 | 500 | 104 | 4,550 |
| | Production | 3,024 | 2,221 | 1,762 | 1,971 | 1,287 | 1,050 | 270 | 11,585 |
| 1924 | Acreage | 1,358 | 981 | 873 | 731 | 467 | 400 | 116 | 4,926 |
| | Production | 3,269 | 2,374 | 2,003 | 1,328 | 999 | 800 | 313 | 11,681 |
| 1925 | Acreage | 1,300 | 902 | 870 | 709 | 495 | 400 | 116 | 4,792 |
| | Production | 3,016 | 2,057 | 2,001 | 2,694 | 1,722 | 830 | 313 | 12,693 |
| 1926 | Acreage | 1,258 | 893 | 879 | 674 | 495 | 408 | 121 | 4,728 |
| | Production | 2,566 | 1,786 | 2,285 | 2,157 | 1,609 | 893 | 333 | 11,634 |
| 1927 | Acreage | 1,233 | 929 | 853 | 664 | 500 | 388 | 117 | 4,724 |
| | Production | 3,297 | 2,324 | 2,047 | 2,420 | 1,350 | 834 | 322 | 13,094 |
| | Average acreage | 1,241 | 1,013 | 836 | 671 | 445 | 422 | 117 | |
| | Average production | 2,904 | 2,304 | 2,032 | 2,137 | 1,240 | 880 | 308 | |

1921 Yearbook, United States Department of Agriculture.

1924 Yearbook, United States Department of Agriculture.

1927 Yearbook, United States Department of Agriculture.

* Thousands of tons and thousands of acres.

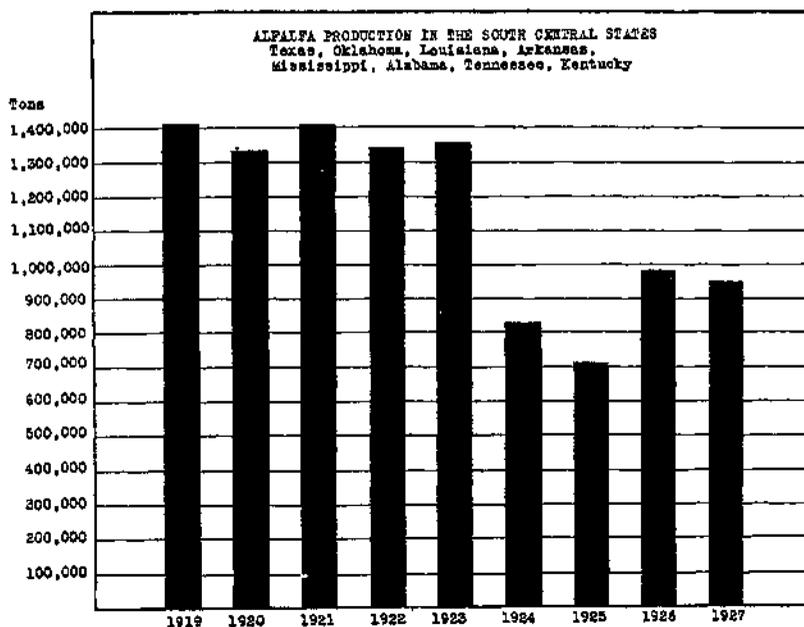


Fig. 6.—Showing the alfalfa production in the South Central States—1919 to 1927 inclusive.

A study of the table shows that when the various states included are considered together, there has been no general tendency toward increasing or decreasing the total production of alfalfa. Variations in yearly production have been the result of seasonal conditions rather than of major changes in acreage. Some decrease in acreage has occurred in Kansas since 1921 while there has been a tendency toward increased acreage in Utah. The combined acreage of the states included was less in 1926 and 1927 than at any time during the 9-year period with the exception of 1922 and 1923 when there was a marked reduction in acreage.

The condition of the feed crops throughout the southern states is usually of more importance as a factor in regulating the prices of alfalfa in these states than is the amount of alfalfa produced in surplus producing states. The condition of the cotton crop and the market for cotton is also an important factor. An example of the importance of these factors occurred in the fall and winter following the large surplus produced in 1927 when prices for alfalfa were maintained at high levels in spite of the large supplies.

The quality of the hay produced is an important factor in determining the profitableness of the alfalfa crop. There is

always a demand for high quality hay on all markets and when there is a surplus, the only hay which will sell at all well is the choice product.

The prices by grades for the alfalfa handled by the Roosevelt Hay Growers' Association are given in Table X. The No. 1 Alfalfa brought an average of \$2.09 more than the Standard Alfalfa during the 6-year period while the No. 2 Alfalfa brought \$2.27 less than the Standard and \$3.24 more than the No. 3 Alfalfa. When the average charge of \$3.35 for baling and hauling is deducted from the net market price, the actual sale price of the loose hay in the field is obtained. Such a deduction gives average values for the 6 years of \$11.92 for No. 1 Alfalfa, \$9.83 for Standard Alfalfa, \$7.56 for No. 2 Alfalfa, and \$4.17 for No. 3 Alfalfa. It is clear that No. 1 Alfalfa has been worth nearly three times as much to the farmer who produces it as has No. 3 Alfalfa. Improvement of the product offered the buyer will pay anyone who raises alfalfa or hay.

The necessity for producing the highest quality hay possible is very evident. Conditions often arise which make this impossible such as storms, weed and grass growth, competition of other farm work, lack of proper machinery, and other factors. However, added attention to securing and maintaining good stands, time of cutting, and method and time of curing and baling will do much to improve the quality of the product. Any practice which tends to increase the percentage of leaves in the alfalfa offered for sale will increase its value.

TABLE X.—A COMPARISON OF RETURNS RECEIVED FOR DIFFERENT GRADES OF ALFALFA IN THE SALT RIVER VALLEY FROM 1922 TO 1927, INCLUSIVE.

| | No. 1 | Standard | No. 2 | No. 3 |
|--|---------|----------|---------|---------|
| Average price received by Association | \$17.64 | \$15.55 | \$13.28 | \$10.04 |
| Average price less Association expense | 15.27 | 13.18 | 10.91 | 7.67 |
| Value of loose hay in the field† | 11.92 | 9.83 | 7.56 | 4.17 |

* Data furnished by the Roosevelt Hay Growers Association.

† Figures obtained during the Agricultural Economic Survey showed an average baling cost of \$2.48 and an average hauling cost of \$0.87 making a total of \$3.35. The value of the loose hay in the field is obtained by deducting this sum from the average price less the Association expense.

The Alfalfa Committee organized in connection with the Agricultural Economic Survey, after careful consideration of the

topics presented in this paper together with other factors bearing upon the production, management, and marketing of alfalfa and of the relationships which exist between the alfalfa industry and other agricultural industries of the Salt River Valley submitted the following recommendations:

RECOMMENDATIONS

1. That at least one-third of the irrigated acreage of Maricopa County be kept in alfalfa at all times, properly rotated with other crops, for the purpose of maintaining the fertility of the soil and the proper economic balance between the various agricultural enterprises.

2. That so far as possible, the alfalfa produced be fed in the County rather than shipped out to distant markets which entails high freight rates. That the fattening of cattle, the development of the dairy industry and the feeding of sheep will result in products of high value which can be shipped at less expense; that such methods will meet the necessary demands of citrus and other cash crops for fertilizer.

3. That every effort be made to produce alfalfa hay of the highest quality since quality is always of prime importance whether the hay is fed locally or sold in outside markets.

In order to produce the highest quality of alfalfa hay it is essential:

- (1) To have the land well levelled in order to secure uniform irrigation.
- (2) To have a seedbed well irrigated and properly prepared so as to secure maximum germination.
- (3) To plant at least 20 pounds of good seed per acre in order to secure the thickest possible stand of alfalfa and to control the grass and weeds.
- (4) To irrigate in such a way as to promote continuous plant growth.
- (5) To cut when the plants are in the 1/10 to the 1/5 bloom stage.
- (6) To rake, bunch, cure, and bale soon enough after cutting to prevent the shattering of leaves.
- (7) To use individual or community hay presses in order that all hay may be baled at the proper time.

4. That all plantings be confined to the Common or Chilean and Hairy Peruvian varieties.

5. That the state authorities be heartily supported in their work of keeping out the alfalfa weevil.

6. That the Federal Hay Standards are best suited to the conditions of the alfalfa industry of the country and that the adoption of these standards be recommended by this Conference.

The committee believes that the amount of water used is too low for maximum yields of alfalfa and that profitable production is distinctly limited by this curtailment of yields.

G. C. Spilsbury, Chairman

I. A. Briggs, Secretary.

L. P. Draper

Wm. A. Glassford

REPORT OF COMMERCIAL TRUCK CROPS COMMITTEE

By

M. F. WHARTON, Committee Secretary

LETTUCE

Head lettuce production and consumption in the United States has increased rapidly during the past 10 years. United States shipments during the year 1917 amounted to only 6,000 carlots, the greater part of which was made up of the variety Big Boston. With the development of the "Iceberg" type varieties, the production was tremendously stimulated and during the year 1927 there was a total of over 45,000 carlots of lettuce consumed. This tremendous increase in volume of production and consumption has not been attended with a decrease in price. In fact, the price is still sufficiently high during the greater part of the year to insure a fair return to the grower of quality lettuce. For acreage growth in the United States see figure 7.

The greatest increase in lettuce production has been in the western part of the United States where the "Iceberg" type of lettuce is produced. Over 90 percent of this type of lettuce is produced in six western states—California, Arizona, Idaho, Washington, Colorado, and New Mexico. The first two named are by far the largest producers as their crop comes on the market during the winter months. Considerable head lettuce of the Big Boston variety is grown as a summer crop in eastern and southern United States. This variety is of an inferior quality and does not seriously affect the market of Iceberg lettuce.

The production of head lettuce in Arizona is limited by climatic conditions to the fall and spring seasons. The better yields and quality are produced during December and January and again in March and April. Competition during the latter part of January and through the month of February from the Imperial Valley, coupled with unfavorable weather conditions in the Salt River Valley at this time, limits the seasons in Arizona to late fall and early spring. This winter crop, produced in late January and February does not warrant expansion due to these facts.

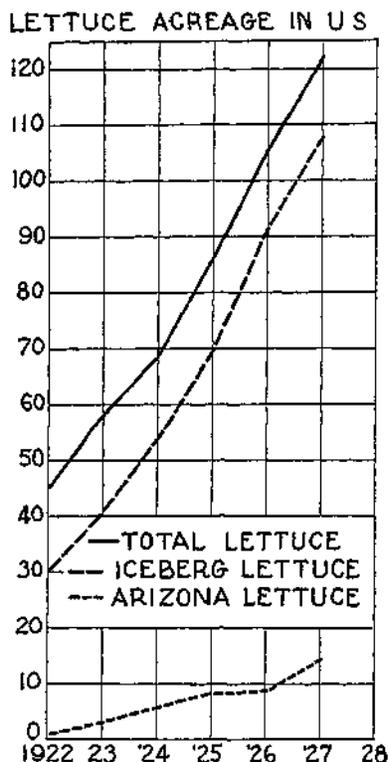


Fig. 7.—Showing the growth of lettuce acreage in the United States—1922 to 1927 inclusive.

From figure 8 it appears that the fall crop is the most favorable. Salt River Valley lettuce comes on the market in high quality and grade just as Idaho and northern California are completing their fall season. No other state is producing lettuce in any great quantity during the latter half of December and the first part of January. By the middle of January the Imperial Valley of California is beginning to ship in considerable quantity and the quality of Arizona lettuce is decreasing rapidly. Arizona must get out of the market by the middle of January or take a loss in price due to competition of better quality lettuce.

The spring season starts in the Salt River Valley late in March as the season is closing in the Imperial Valley. Better quality lettuce from Arizona has little trouble with competition from the Imperial Valley during this season. Central and northern California start their spring season near the middle of

April and should the weather conditions be favorable, as they were during the spring of 1928, the harvest from these sections will commence early enough to be in direct competition with Arizona. Still the fact that the consuming public is eating more lettuce at this time of year makes room for large quantities of high quality produce. Another item for consideration with the spring crop is that of "slime" damage that is caused by unfavorable weather conditions. Whenever there is an early spring there is always a considerable loss in the field and in transit from this cause.

Considering the lack of competition in the fall and the danger of competition in the spring and the added menace of disease, it seems to the writer that the logical time for any expansion in the industry for the Salt River Valley would be during the fall season.

A word as to the production of quality lettuce would not be amiss at this time inasmuch as there is considerable competition during the greater part of the year. Experience has shown that quality lettuce cannot be produced in quantity except on the richest soil. The fertility must be amplified with an abundance of organic matter in the soil and to that end there is a continual

MONTHLY CARLOT SHIPMENTS OF LETTUCE

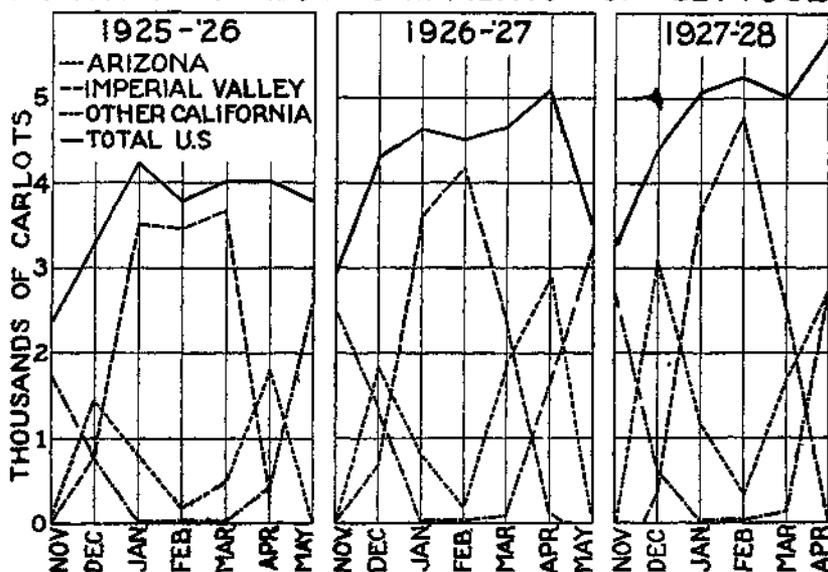


Fig. 8.—Showing the carlot shipments of lettuce in the United States during the fall and winter months (November to May) 1926 to 1927 inclusive, and November, 1927 to April, 1928.

search for alfalfa land to use for lettuce. It is conservatively estimated that a grower must produce 150 crates of quality lettuce with sizes limited to 4 and 5 dozens in order to feel financially safe. This means that the best land must be available and that the crop must be produced in the most economical manner.

A conservative estimate by one of the leading growers of lettuce in the Salt River Valley is that the farmer does not receive any profit on his lettuce unless it sells for at least \$2.50 per crate on the eastern market. This price is needed to properly pack, ice, ship, and market a crate of lettuce. It is also well known that lettuce is not the cheapest crop to produce in that it requires a considerable amount of hand labor and a large amount of horse labor in preparing the land properly and in producing the crop. This being the case, it is suggested that a yield of 200 crates per acre be set as the one that will make a profitable return to the grower providing the eastern market is not over-supplied at the time.

Since alfalfa land is at such a premium for use as lettuce ground, it is also suggested that the annual crop acreage of lettuce be limited to not more than 25 percent of the total land in alfalfa. In this way there will always be a sufficient amount of alfalfa sod ready to use for lettuce and the production per acre as well as the quality of the crop produced will be increased.

CANTALOUPE

The cantaloupe industry in the Salt River Valley has had a history of ups and downs and many seasons have been quite disastrous for the growers of these melons. During the early period of this industry there was an attempt made to grow early season melons by forcing under paper covers. This did not prove financially successful, inasmuch as the Imperial Valley of California could reach the market and satiate the appetites of the eastern consumers for extra early season melons before Salt River Valley melons were ripe. The price obtainable for the Salt River Valley melons grown in this way was not high enough to warrant the extra cost of covers and labor. The growers next turned to the possibility of producing for the market after the Imperial Valley had finished shipping most of its crop and the quality had decreased to some extent. Here another obstacle was encountered in the Georgia peach. However, it was found that there was a short period of time from the latter part of June to the middle of July that melons could be marketed profitably.

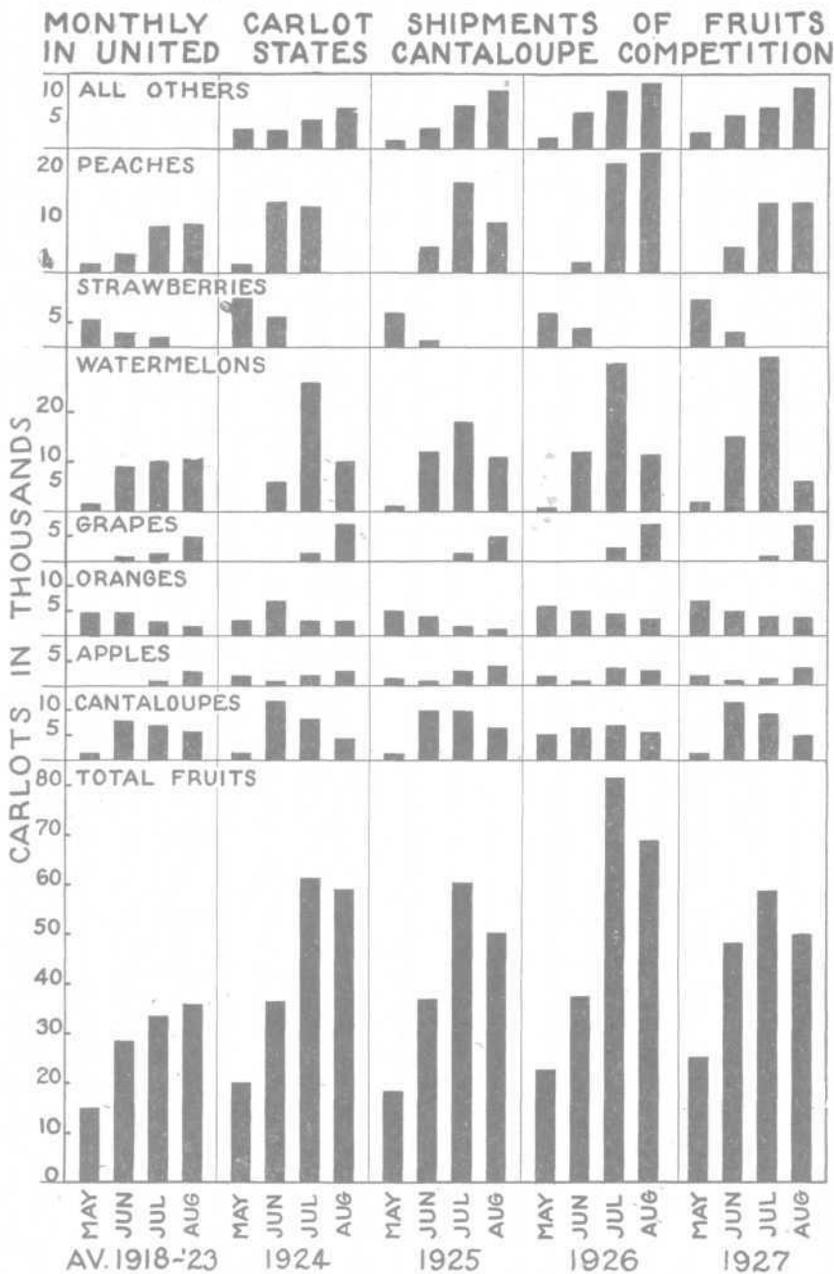


Fig. 9.—Showing the monthly carlot shipments of fruits in the United States which compete with cantaloupes on the market—1924 to 1927, with the averages for the period 1918-1923.

Figure 9 shows that during the month of July there is a greater total amount of fresh fruit available to the tables of the consuming public than at any other time in the year. The greater part of this fruit is marketed during the latter half of the month although there is still some competition from strawberries during the earlier part. By far the most serious competition to the cantaloupe is the fresh peach that reaches the market in large quantities during the latter part of July. From this it would seem that the wisest course would be to produce melons for the market during the latter half of June and up into July until the peaches come on the market. By diligent observation of the market there is a possibility of continued profit after this time, but it means a stricter grading of the fruit and a thorough knowledge of the market.

As to the advisability of the expansion of this industry in the Salt River Valley, there is some doubt. Figures 10 and 11 show that since 1922 there has been little national expansion in the acreage of melons. The carlot shipments, or, in other words, the demand, has also shown an up-and-down curve rather than a steady, increased demand. From this it would seem wisest to limit the expansion of the industry to a very slow growth until the eastern demand reflected in prices logically invites more

CANTALOUPE ACREAGE BY AREAS FOR 1914-'28

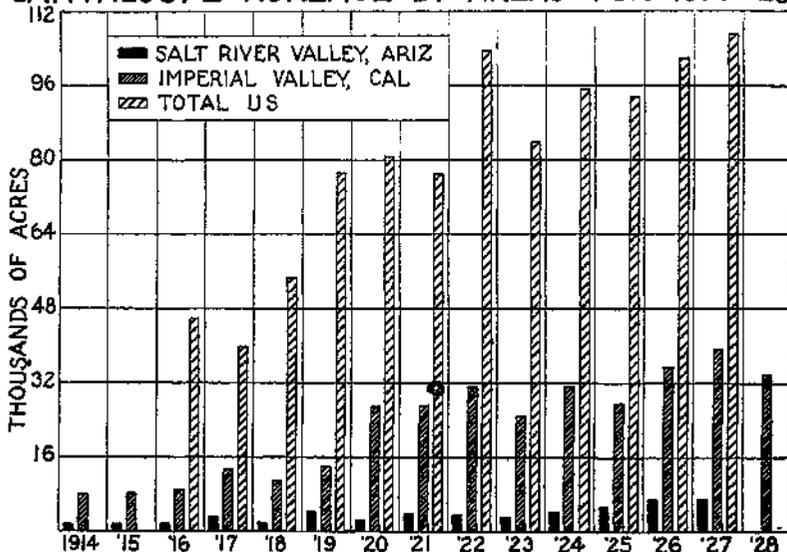


Fig. 10.—Showing cantaloupe acreage of the United States by areas for the years 1914 to 1928.

rapid growth of the industry. This is also desirable in view of the limited season bounded on one side by heavy competition from earlier producing areas and on the other by seasonable fruits more desirable.

To a considerable extent the same argument for fertile alfalfa soil of the proper texture for cantaloupes is true, as for lettuce. A high yield per acre with a correspondingly high quality of produce will reflect in the gross returns a fair profit for the growers. The high cost of producing an intensively cultivated crop such as melons makes it necessary that the best ground available be utilized and that the best and most economical methods of culture be practiced. A limiting of acreage to more fertile and better adapted soil types will no doubt be reflected in the demand and the price received by Arizona growers.

ORIGIN OF CANTALOUPE SHIPMENTS - 1920-'27

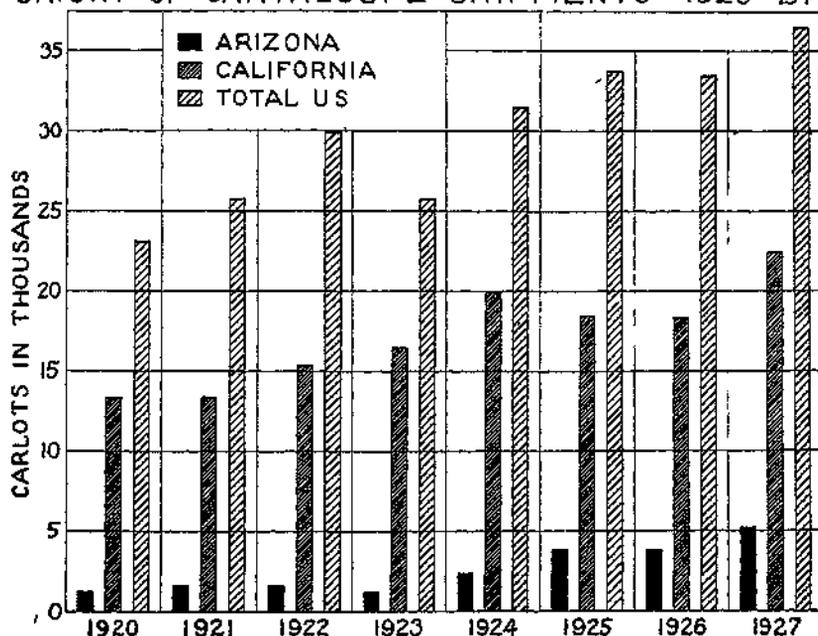


Fig. 11.—Showing origin of cantaloupe shipments in the United States—1920 to 1927 inclusive.

RECOMMENDATIONS

LETTUCE

1. Present lettuce acreage should not be increased until more alfalfa land is available to insure proper rotation as a permanent program.

2. Competition of Idaho and Imperial Valley in the fall crop and Imperial Valley and central California in the spring crop warrants careful consideration of market demand before expansion is advisable.

3. Some acreage may be shifted from spring to fall inasmuch as the competition is less severe during December.

4. Production and quality of lettuce in the Salt River Valley may be desirably increased by careful selection of soil and proper attention to culture. This will insure profit at lower price by increased acre yields and will tend to stabilize the industry.

5. Comparison of fall and spring lettuce as a permanent crop in the cropping program reveals the following:

- (a) Fall lettuce utilizes land to better advantage and allows double cropping.
- (b) Marketing conditions favor expansion of fall lettuce acreage.
- (c) Use and distribution of water is more economical with the spring crop.
- (d) Day labor is more plentiful in spring.
- (e) There are fewer climatic and pest hazards with spring lettuce.
- (f) The quality and yield of both crops are nearly equal.

6. Where possible, lettuce should be sold f. o. b. on Federal grades, as this prevents speculation and loss.

7. Pool selling limited to short time pools is advocated to equalize returns and yet allow more benefit from favorable market conditions.

8. Education of the growers and attention to marketing conditions favor better selling and less speculation. Under present conditions the farmer must receive more than \$2.60 per crate, delivered, before any profit can be realized.

9. A minimum yield of 200 crates per acre of first-quality lettuce of sizes equally divided between 4 and 5 dozens per crate is necessary in order to be profitable. This estimate is high, due to the unstability of crop and market conditions.

10. In order to stabilize the lettuce industry along permanent crop program lines, it is advocated that permanent growers limit their annual lettuce acreage to not more than 25 percent of their land any season. This will permit suitable land being selected each year and the quality and yield will be reflected in this judicious practice.

11. Lettuce production should be limited to soils that have been in alfalfa, Bermuda, or other soil-building sod, for a period of at least 3 years immediately prior to planting to lettuce.

12. In order to maintain desirable quality, sizes, and yield, lettuce should not be grown for more than two crops in succession on the same soil.

CANTALOUPE

1. Present acreage is sufficient in the Salt River Valley project due to limited season and very little national increase in demand.

2. Sales should be limited by early season cantaloupe competition and later season competition of other fruits. When the price drops in July, the season should end since competition of other fruits prevents a stable price recovery.

3. In the normal crop program, cantaloupes use maximum amounts of water, labor, and land at a period of high crop demand.

4. The centralized packing-house system of packing melons is heartily advocated because:

- (a) Fewer handlings are necessary.
- (b) Reduced overhead in packing.
- (c) Closer supervision of operations.
- (d) More uniform grade and pack.
- (e) Better handling, packing, and storing facilities that result in better condition of melons.

These advantages should be reflected in higher price due to improved quality and condition and a lower unit handling and packing cost.

Louis Groehler, Chairman
M. F. Wharton, Secretary
Charles Hobart

REPORT OF THE CITRUS COMMITTEE

By

C. H. COULSON, Committee Secretary

The commercial production of citrus fruits in the United States is confined to the sub-tropical climate of the Gulf States in the South and to California and Arizona in the West. At the present time, two states, California and Florida, produce all but 1 percent of the oranges grown in the United States, while Florida alone ships 90 percent of the grapefruit produced. Plantings on a larger scale however, have recently been made in Texas and orange and grapefruit developments in Arizona will make these two states of increasing importance in citrus production.

The citrus fruits, indigenous to China and Malay Archipelago, were introduced into the West Indies and Florida by the Spaniards, prior to 1600, and into California by the Jesuit missionaries in 1769. The citrus industry was slow to start and did not assume large proportions until the adoption of improved varieties and establishment of the California and Florida Citrus Exchanges.

TABLE XI.—ACREAGE AND PRODUCTION OF CITRUS PRODUCING COUNTRIES.*

| Country | Acres | Production Boxes |
|------------------------|-----------|------------------|
| 1. United States | 619,000 | 59,400,000 |
| 2. Spain | 178,000 | 40,000,000 |
| 3. Italy | 170,000 | 26,000,000 |
| 4. Japan | 150,000 | 9,500,000 |
| 5. Australia | 53,000 | 2,200,000 |
| 6. South Africa | 42,000 | 2,100,000 |
| 7. Palestine | 11,000 | 2,100,000 |
| 8. Algeria | 18,000 | 2,100,000 |
| | 1,241,000 | 143,400,000 |

* All citrus fruits included and figures approximate.

Source: Estimates given at University of California, Summer Session at Riverside, 1928.

Citrus fruit is also grown to a considerable extent in India, China, Brazil, Paraguay, Argentina, Cuba, and Porto Rico.

The local citrus industry began with the planting of the Ingleside Grove at the foot of Camelback Mountain in 1893. This planting was of Washington Navels and Sweet Seedlings. The grove of the late E. D. Duncan was planted the same year or one year later, as was the Butler grove on North Central Avenue.

Since that date, further plantings have been made annually on a moderate scale. The freeze of 1913 which caused severe damage seriously checked development for a time and it has been only during the past 3 or 4 years that development has been on a large scale.

Citrus development is not confined to Arizona and to the other citrus districts of the United States, however. Approximate figures are given in Table XI, showing the acreage and production of citrus fruits of the various countries of the world. New developments tend to favor grapefruit but large acreages in Florida have recently been set to oranges. Overproduction of oranges and grapefruit has not yet been experienced but production is increasing much more rapidly than our population.

The per capita consumption of oranges in the United States 20 years ago was 35. Last year it was 55. The per capita consumption of grapefruit has practically doubled during the past 10 years. Competition of other fresh fruits and the danger of overproduction of grapefruit and oranges merit consideration and a careful analysis of the situation. Especially in view of the fact that the development of a citrus grove involves a large investment per acre, both in time and money.

OUTLOOK

ACREAGE AND PRODUCTION

The acreage of oranges and grapefruit in Arizona is shown in figure 12. Development has been slow until the past 3 or 4 years. Proposed plantings and developments under way will increase the present acreage about seven times. The increase is expected to be largely grapefruit.

Grapefruit production in the Salt River Valley has increased steadily during recent years and apparently will continue to increase at an even greater rate. The production of oranges has varied from year to year with the exception of groves planted to selected trees. The production of oranges and grapefruit in the Salt River Valley is shown as follows:

TABLE XII.—PRODUCTION IN CARLOADS OF ORANGES AND GRAPEFRUIT IN THE SALT RIVER VALLEY 1923-24 TO 1927-28.

| | 1923-24 | 1924-25 | 1925-26 | 1926-27 | 1927-28 | 1928-29* |
|-----------------|---------|---------|---------|---------|---------|----------|
| Oranges | 122 | 82 | 142 | 127 | 96 | 150 |
| Grapefruit | 247 | 219 | 320 | 353 | 363 | 450 |

* Estimated.

Source: Data obtained through courtesy of Arizona Citrus Growers' Association. Ten percent added for growers not in Association. Data given are in carloads figured from field boxes on the basis of three field boxes to two packed boxes and 400 boxes to a car.

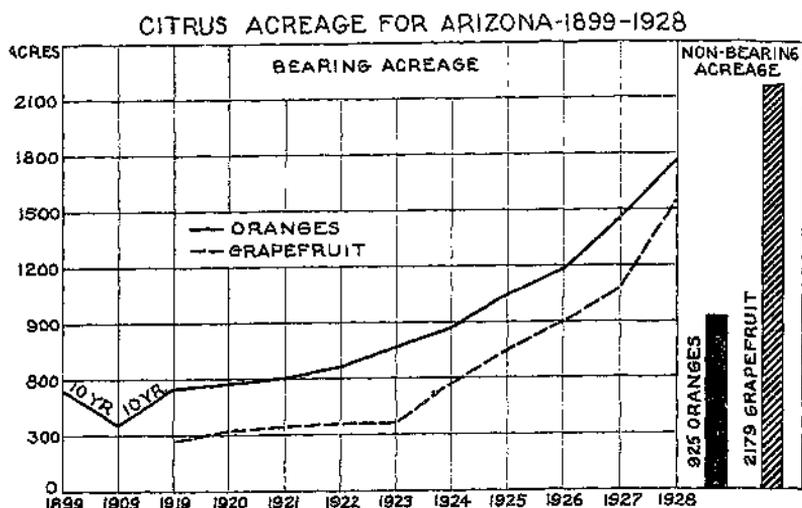


Fig. 12.—Showing the growth of acreages in citrus fruits in Arizona—1899 to 1928.

The carlot shipments of citrus fruits from the Salt River Valley are not as great as indicated in the above table, due to the amount of fruit that is handled locally. The present bearing acreage of citrus fruits in the Salt River Project is 2,738 acres, of which 1,567 are oranges and 1,171 grapefruit.

The bearing acreage of oranges in the United States has increased steadily during the past 10 years. The 1928 bearing acreage is 339,000, an increase of 138,000 acres or 68 percent since 1919. The bearing acreage of grapefruit has more than trebled during the same period. In 1919, the bearing acreage was 36,000 and in 1928 it totaled 118,000 acres, an increase of 228 percent. The present non-bearing acreage of oranges in the United States is 131,000 and that of grapefruit, 91,000 acres. Table XIII shows the bearing acreage of oranges and grapefruit from 1919 to 1928. The bearing and non-bearing acreage by states is shown in figure 12.

TABLE XIII.—BEARING ACREAGE FOR THE UNITED STATES OF ORANGES AND GRAPEFRUIT, 1919-1928.

| | 1919 | 1920 | 1921 | 1922 | 1923 |
|------------------|---------|---------|---------|---------|---------|
| Oranges | 201,670 | 226,250 | 243,778 | 262,615 | 280,870 |
| Grapefruit | 36,518 | 44,419 | 51,002 | 55,205 | 57,437 |
| | 1924 | 1925 | 1926 | 1927 | 1928 |
| Oranges | 289,600 | 300,510 | 314,460 | 324,000 | 339,000 |
| Grapefruit | 66,445 | 63,879 | 70,572 | 99,923 | 118,068 |

Sources: U. S. D. A. Yearbook 1927. Annual Report of Florida Citrus Exchange, and California Bulletin by Wellman and Braun.

The acreage by states of bearing and non-bearing oranges and grapefruit including percent non-bearing is shown in Tables XIV and XV.

TABLE XIV.—ACREAGE BY STATES, 1928, OF BEARING AND NON-BEARING ORANGES.

| Oranges | Bearing | Non-bearing | Percent non-bearing |
|--------------------|----------------|----------------|---------------------|
| Arizona | 1,767 | 925 | 31 |
| California | 187,231 | 22,519 | 10 |
| Florida | 142,172 | 78,000† | 35 |
| Texas | 2,300 | 22,500 | 90 |
| Alabama | 4,030* | 7,120* | 64 |
| Louisiana | 1,800 | Not available | — |
| TOTAL | 339,300 | 131,064 | 28 |

* Satsuma.

† Estimated.

Source: Data received by letter from Bureau of Statistics and subject to revision.

TABLE XV.—ACREAGE BY STATES, 1928, OF BEARING AND NON-BEARING GRAPEFRUIT.

| Grapefruit | Bearing | Non-bearing | Percent non-bearing |
|--------------------|----------------|---------------|---------------------|
| Arizona | 1,571 | 2,179 | 58 |
| California | 7,828 | 4,596 | 37 |
| Florida | 103,800 | 22,000* | 17 |
| Texas | 6,200 | 52,500 | 89 |
| TOTAL | 119,399 | 81,275 | 41 |

* Estimated.

Source: United States Bureau of Statistics.

PRODUCTION

Favorable and unfavorable seasons cause the yield to vary widely. Oranges show the greatest variation, but grapefruit production in the United States was less last year than in 1924-25. About 99 percent of the entire crop of oranges is produced in two states, California and Florida, only 1 percent of the crop being shipped from the other orange producing states. A more rapid increase of acreage in Florida is causing orange production to climb more rapidly in that state than in California, Florida now producing about half as many oranges as California as compared to one-third as many in 1924. Florida now has a large acreage of non-bearing oranges, while non-bearing acreages in other states are relatively small. A much greater increase in production of oranges is to be anticipated from Florida with a moderate increase from other states.

Production trends of grapefruit have had and presumably

will continue to have a much more decided upward trend than oranges. Florida now produces about 89 percent of the commercial crop in the United States, Texas 5 percent, California 4 percent, and Arizona 2 percent. A large part of the acreage now in bearing is not yet in full bearing and 41 percent of the entire acreage is non-bearing.

The production trend of oranges and grapefruit is shown in Table XVI.

The heaviest shipments of both oranges and grapefruit are made during the winter and spring months.

PRICES

Despite the fact that the production of oranges and grapefruit has increased, the price level has been maintained. Consumers are eating more oranges and grapefruit and paying more for them. The weighted average auction price at New York of oranges and grapefruit, is shown in Table XVII. Note the lower average price during years of heaviest production.

TABLE XVI.—CARLOT SHIPMENTS OF ORANGES AND GRAPEFRUIT IN THE UNITED STATES. CROP YEAR ENDING IN THE YEAR GIVEN.

| | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 |
|------------------|--------|--------|--------|--------|--------|--------|--------|
| Oranges | 86,340 | 44,320 | 40,102 | 48,485 | 40,822 | 30,270 | 60,540 |
| Grapefruit | | | | | | | |
| | 1915 | 1916 | 1917 | 1918 | 1919 | 1920 | 1921 |
| Oranges | 57,930 | 54,100 | 67,420 | 28,005 | 58,637 | 58,987 | 74,782 |
| Grapefruit | | | | | | | 11,626 |
| | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 |
| Oranges | 50,242 | 74,630 | 85,577 | 69,957 | 77,602 | 89,137 | |
| Grapefruit | 13,488 | 17,672 | 20,307 | 21,202 | 15,334 | 13,832 | 15,686 |

Source of data: Oranges, production from California Bulletin 457 "Oranges" by Wellman & Braun, dividing production in boxes by 400. Grapefruit from U. S. D. A. Yearbook for 1927.

TABLE XVII.—WEIGHTED AVERAGE AUCTION PRICES OF ORANGES AND GRAPEFRUIT ON THE NEW YORK MARKET, 1919-1927.

| | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Florida (Grapefruit) | | | | | | | | | |
| October to July | \$3.70 | \$4.55 | \$4.03 | \$3.70 | \$2.98 | \$3.38 | \$4.50 | \$3.94 | \$4.88* |
| California (Navels) | | | | | | | | | |
| December to June | 5.70 | 4.63 | 6.07 | 4.45 | 3.67 | 5.94 | 5.23 | 5.15 | 6.16† |
| California (Valencias) | | | | | | | | | |
| May to December | 5.69 | 7.56 | 6.09 | 8.13 | 5.86 | 5.70 | 8.12 | 5.80 | 6.39 |
| Florida (Oranges) | | | | | | | | | |
| October to July | 5.91 | 4.17 | 4.44 | 4.65 | 3.27 | 4.89 | 5.07 | 4.47 | 5.74‡ |

* October, November and December only.

† December only.

‡ October, November and December only.

Source: U. S. D. A. Yearbook for 1927.

TABLE XVIII—AVERAGE AUCTION PRICES OF ORANGES AND GRAPEFRUIT BY MONTHS ON THE NEW YORK MARKET, 1919-27.

| | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Aug. |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Florida grapefruit | | \$4.23 | \$3.84 | \$3.65 | \$3.62 | \$3.66 | \$3.84 | \$4.16 | \$4.41 | \$4.23 | \$4.38 | |
| California Navels | | | | 5.39 | 4.89 | 4.49 | 4.81 | 5.49 | 5.34 | 5.25 | | |
| California Valencias | \$7.00 | 7.42 | 6.87 | | | | | | 5.50 | 6.11 | 6.15 | \$6.49 |
| Florida oranges | | 4.14 | 4.49 | 3.89 | 3.96 | 4.43 | 5.07 | 6.00 | 6.30 | 7.13 | | |

Source of Data: U. S. D. A. Yearbook for 1927, compiled from Tables 134, 136, 137 and 138.

Table XVII shows that there has been no decline in prices of either oranges or grapefruit when the yearly average price is considered. Consistently higher prices are received during certain months of the year and the average prices at New York are shown by months in Table XVIII.

There is a direct relation of price to monthly shipments which favors certain districts. California Valencias are shipped during the summer and fall months when there is little or no competition from other citrus districts. Eighty percent of the grapefruit of the United States is shipped from November to April. The early grapefruit of Arizona and summer grapefruit of California is in a favorable situation. Likewise, the early Navels from Arizona which attain high quality during November, find a very favorable market.

TABLE XIX.—MONTHLY CARLOT SHIPMENTS OF GRAPEFRUIT BY STATES OF ORIGIN, AVERAGE 1922-23 TO 1926-27.

| | Carlot shipments | | | | | Percentage shipped each month | | | | |
|-----------------|------------------|--------|-------|-------|--------|-------------------------------|--------------|--------------|--------------|--------------|
| | Cal. | Fla. | Texas | Ariz. | Total | Cal. | Fla. | Tex. | Ariz. | Total |
| | Cars | Cars | Cars | Cars | Cars | Per- cent | Per- cent | Per- cent | Per- cent | Per- cent |
| October | 29 | 1,285 | 18 | 36 | 1,368 | 5.6 | 7.3 | 5.2 | 20.9 | 7.3 |
| November | 49 | 2,339 | 77 | 21 | 2,486 | 9.5 | 13.3 | 22.5 | 12.2 | 13.3 |
| December | 50 | 1,673 | 69 | 17 | 1,809 | 9.7 | 9.5 | 20.1 | 9.9 | 9.7 |
| January | 44 | 2,532 | 73 | 23 | 2,672 | 8.6 | 14.3 | 21.3 | 13.4 | 14.3 |
| February | 43 | 2,495 | 56 | 25 | 2,619 | 8.4 | 14.1 | 16.3 | 14.5 | 14.0 |
| March | 53 | 2,681 | 31 | 27 | 2,792 | 10.3 | 15.2 | 9.0 | 15.7 | 15.0 |
| April | 36 | 2,395 | 17 | 12 | 2,460 | 7.0 | 13.6 | 5.0 | 7.0 | 13.2 |
| May | 42 | 1,637 | 1 | 7 | 1,687 | 3.2 | 9.3 | 0.3 | 4.1 | 9.0 |
| June | 41 | 364 | 1 | ..... | 406 | 8.0 | 2.1 | 0.3 | ..... | 2.2 |
| July | 54 | 71 | ..... | ..... | 125 | 10.5 | 0.4 | ..... | ..... | 0.7 |
| August | 49 | 20 | ..... | ..... | 69 | 9.5 | 0.1 | ..... | ..... | 0.4 |
| September | 24 | 146 | ..... | 4 | 174 | 4.7 | 0.8 | ..... | 2.3 | 0.9 |
| Total | 514 | 17,638 | 343 | 172 | 18,667 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source of data: California Bulletin No. 463, "Grapefruit." Table V, Page 14.

TABLE XX.—PER CAPITA CONSUMPTION OF ORANGES AND GRAPEFRUIT FROM 1908 TO 1927 INCLUSIVE.

| Year | 1908 | 1909 | 1910 | 1911 | 1912 | 1913 | 1914 | 1915 | 1916 | 1917 |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Oranges | 32 | 38 | 33 | 40 | 34 | 24 | 46 | 44 | 41 | 50 |
| Grapefruit ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... |
| Year | 1918 | 1919 | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 |
| Oranges | 21 | 42 | 42 | 52 | 25 | 51 | 56 | 46 | 49 | 55 |
| Grapefruit ..... | ..... | 2.4 | 3.7 | 3.6 | 3.9 | 4.6 | 5 | 5 | 4.2 | 4.5 |

Source of Data: Oranges from California Bulletin 457 "Oranges" by Wellman & Braun. Grapefruit, from California Bulletin on Grapefruit by Wellman & Braun.

CONSUMPTION

There has been a steady increase in the consumption of oranges in the United States, which has varied with production. Last year the per capita consumption in the United States was 55 oranges and 4½ grapefruit. This gives one orange per week to the people of the United States, while the average for grapefruit allow us only one in 81 days. The per capita consumption has been dependent on production.

COSTS

The expense involved in bringing a citrus grove into bearing is high and a careful analysis of cost should be made before undertaking such development. At 4 years of age a grapefruit grove will pay its way if properly cared for while 5 years is required for oranges to reach a self-sustaining basis. No actual records over a period of years are available but according to figures of H. C. Heard, Manager of the Arcadia Orchards Company, Inc., the total cost at the end of the fifth year varies from \$1,500.00 to \$1,800.00 per acre. Table XXI shows the actual costs involved, estimated as accurately as possible.

TABLE XXI.—COST PER ACRE OF BRINGING A CITRUS GROVE INTO PRODUCTION.

| | |
|--------------------------------|------------------|
| a. Cost of land | \$ 500.00 |
| b. Cost of trees | 164.00 |
| c. Planting | 22.00 |
| d. Machinery | * |
| e. Cost during each year | |
| TOTAL | \$ 686.00 |

| Item | 1st year | 2nd year | 3rd year | 4th year |
|-------------------------------------|-----------------|-----------------|-----------------|-----------------|
| Labor | \$ 50.00 | \$ 50.00 | \$ 50.00 | \$ 50.00 |
| Fertilizer | 10.00 | 20.00 | 30.00 | 40.00 |
| Water | 5.00 | 5.00 | 5.00 | 5.00 |
| Tractor and equipment | 35.00 | 35.00 | 35.00 | 35.00 |
| Winter protection material | 5.50 | 5.50 | | |
| Taxes | 9.00 | 9.00 | 9.00 | 9.00 |
| Interest on investment 7% | 58.03 | 68.67 | 82.51 | 98.01 |
| TOTAL | \$170.53 | \$193.17 | \$211.51 | \$237.01 |

TOTAL \$ 812.22

Combined Total \$1,498.22

* Original cost of tractor and machinery is not included as this factor will vary so widely per acre depending on the make of tractor purchased and size of planting. The annual labor charges and tractor and equipment expense will vary with the size of planting and efficiency of the grower. The cost of water per acre will be less than \$5.00 in the Salt River Project and as high as \$20.00 per acre in pump districts, depending upon the lift.

The items of expense will probably remain about the same with the exception of the cost of land and trees and of fertilizer. The price of land promises to increase and the price of trees will doubtless be reduced from its present range of \$1.50 to \$2.00. Organic fertilizer which is relatively cheap at the present, may materially increase in price.

The cost of producing citrus fruits in the Salt River Valley is low compared to that in other irrigated citrus districts. Factors responsible for low production costs are moderately priced land, cheap water and fertilizer, and freedom from insects and diseases. Orchard heating has not been found necessary which further reduces production costs. Costs per acre of oranges and grapefruit are approximately the same. Grapefruit require more water but the low cost of water makes this difference insignificant.

The production costs and the returns received as shown by records taken in connection with this survey are given in Tables XXII and XXIII.

TABLE XXII.—PRODUCTION COSTS PER ACRE OF SIX CITRUS GROVES IN THE SALT RIVER VALLEY FOR 1926-1927.

| Grove | 1 | 2 | 3 | 4 | 5 | 6 | Average |
|--------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Cover crop | \$ 2.67 | — | \$ 3.25 | \$ 3.35 | — | \$ 2.87 | \$ 3.08 |
| Fertilizer | 55.60 | 14.75 | 29.20 | 36.67 | \$ 31.00 | 22.18 | 31.23 |
| Labor | 80.00 | 107.37 | 115.00 | 33.00 | 32.50 | 61.62 | 88.08 |
| P. & H. | 44.37 | 1.87 | 31.78 | 37.33 | 45.16 | 48.37 | 35.30 |
| Taxes | 17.00 | 22.00 | 30.19 | 31.25 | 17.58 | 21.87 | 23.30 |
| Water | 8.50 | 5.50 | 4.23 | 5.55 | 5.10 | 5.50 | 5.73 |
| Tractor | 29.47 | 22.85 | 12.43 | 15.00 | 12.70 | 19.50 | 18.66 |
| Machinery | 10.26 | 12.10 | 4.65 | 5.88 | 3.08 | 6.44 | 7.07 |
| Building | 3.42 | 13.16 | 5.90 | 20.00 | 4.60 | 9.37 | 9.32 |
| TOTAL | \$248.29 | \$199.60 | \$236.08 | \$257.93 | \$151.64 | \$197.72 | \$221.52 |

TABLE XXIII.—INCOME FROM GROVE PER ACRE.

| Grove | Yield in field boxes | | Gross return | | Cost of production | Net return | |
|----------------|----------------------|------------|--------------|------------|--------------------|-----------------|-----------------|
| | Oranges | Grapefruit | Oranges | Grapefruit | | Oranges | Grapefruit |
| 1. | 62.5 | 463 | \$125.00 | \$ 691.17 | \$248.29 | \$-124.00 | \$441.88 |
| 2. | 20 | 89 | 84.14 | 178.00 | 199.60 | -115.60 | -21.60 |
| 3. | 252 | 274 | 727.10 | 446.60 | 236.08 | 491.02 | 210.52 |
| 4. | 275 | 500 | 600.00 | 600.00 | 257.93 | 342.07 | 342.07 |
| 5. | 212 | 176 | 598.37 | 363.25 | 151.64 | 446.73 | 111.61 |
| 6. | 127 | 706 | 318.00 | 1,171.00 | 197.72 | 120.28 | 973.28 |
| Average | | | | | | \$176.75 | \$342.96 |

A most significant fact revealed in this study was that growers spending the most money were receiving the highest

net returns. The difference in cost of production is largely due to the amount of manure applied and the high yielding groves had either applied during 1926-27 or the year preceding large amounts of organic fertilizer. The size of the grove has a marked influence on cost per acre, the larger groves having a decided advantage. The equipment needed in the operation of a citrus grove is the same for 10 as for 40 acres. One tractor is enough with which to take care of a 40-acre grove. The yields per acre will doubtless be increased in the Valley as a whole, due to careful selection of nursery stock, a factor which was sadly neglected in the earlier plantings.

The interest on investment was not included and could be figured from two angles. The first based on the cost of bringing the grove into bearing which would figure interest on \$1,500.00 per acre. The values given by the growers however, average \$3,500.00 per acre which would increase this item from \$120.00 per acre to \$280.00.

HAZARDS

The Salt River Valley is very favorably situated for citrus fruit production, with its high quality fruit, early season, freedom from insects and diseases, and low production costs. But the grower is faced with the fact that serious freezes do occur even if at very long intervals. The freeze in January, 1913, was the most serious, other cold winters doing little material damage. However, cold winters have not been frequent enough to cause the general adoption of orchard heating.

Dynamite is used successfully in breaking up caliche layers and the most gravelly soils of the foothill slopes can be made to produce satisfactorily by application of manure.

A decided general slope of the land is necessary to afford air drainage but limits are reached at which satisfactory irrigation can be obtained. Rather steep land may be used by irrigating across the general slope.

A water supply of 2 to 5 acre-feet is necessary depending on the age and variety of the grove. A mature grapefruit grove requires more water than any other and Washington Navels the least. Citrus are not tolerant to alkali and development of groves under pump irrigation should be made only after a careful study of the water supply. The river and reservoir waters are very low in salt.

NURSERY STOCK

The character of tree planted is of fundamental importance in the successful development of citrus grove. Sour orange stock

has proved entirely satisfactory for oranges and grapefruit. Sweet orange stock, while harder to raise under local conditions, is probably just as good and is superior as a stock for lemons and tangerines. Sour orange should continue to be our stock for general use, however. Only vigorous seedlings should be used as a dwarf root system will never produce a satisfactory tree.

The buds used should be from trees of known production and quality, which will insure against low production and poor quality. Production records have been kept by the County Agent's office on a number of groves in the Salt River Valley and excellent buds of Marsh grapefruit, Washington Navels, Valencias and Sweet Seedling oranges are available.

The selection of trees resolves itself into selection of vigorous seedlings, budded to the best buds available and the further selection of vigorous budded trees. The bud union should be at least 4 inches above the soil surface. Three to five scaffold branches are the desired number.

Nursery trees should be balled rather than planted open root to the orchard. Spring planting has given more satisfactory results than fall planting, the loss of growth being more than offset by the danger of freezing of young trees.

The price of good trees has averaged about \$1.75 during the past 2 years with some sales as high as \$2.50 per tree. A reduction in cost of trees is to be expected considering the number of seedlings grown this year.

PLANTING

The square system of planting is used exclusively, the distance varying with the variety used. Twenty-four feet is generally recommended for grapefruit, 22 feet for Valencias and Sweet Seedlings and 20 feet for Navels. When a mixed planting is made, 22 feet should be used. Losses of trees often occur by planting so deep as to cover the bud union and by placing fertilizer in the holes prior to planting, the one instance in citrus culture that manure should not be used. The use of dynamite in hard soils and in soils of a caliche nature is advisable.

Wind injury in the Salt River Valley is not sufficient to justify the general use of windbreaks. Growers with established windbreaks of eucalyptus, however, would not consider having them removed. The windbreak, if used, should be planted so as not to interfere with air drainage.

CARE OF THE GROVE

Irrigation.—Frequent runs of water are necessary during the first year. If the trees are planted carefully and water applied immediately, little, if any loss of trees is to be expected. During the first summer, water is applied at periods of 10 to 15 days. Irrigation water is not applied late in the fall as a succulent condition of the trees makes them more susceptible to frost injury. The last run of water is usually made in early October.

Irrigation practice during succeeding years follows the general rule of applying water only as the trees indicate the need of water. A fluctuating water content of the soil is desired. It is the general practice to withhold water in the fall to harden the trees before winter. A heavy irrigation in late January or February is generally made. The furrow system is used by most growers and the water held in the furrows until penetration is obtained.

Cultivation.—Cultivation to the extent of keeping down weeds and providing loose soil for furrows is essential. Frequent cultivations are not necessary and the continued packing of the soil by the tractor is harmful in some soils.

Soil Fertility.—Citrus trees require a very fertile soil. Our most fertile soils are not rich enough. It is safe to say that a citrus grove in the Salt River Valley has never been overfertilized except where commercial fertilizers were used. Two to 4 tons of manure per acre on a 1-year old grove is sufficient when applied near the trees. The amount should be increased, as the grove develops, to 10 or 15 tons per acre as the grove comes into bearing. In all cases where manure is used, best results are obtained by fall or early winter application.

Leguminous cover crops can be used to supplement the fertilizer program. Sweet clover sown in March, cowpeas in May or sour clover in the fall, give good results and materially increase the soil fertility. Summer cover crops compete with the trees, however, and winter cover crops tend to increase the frost hazard, hence locations and water supply should influence the grower in the selection of a cover crop.

Pruning.—It would not be necessary to beat many spears into pruning hooks to take care of the pruning of a citrus grove. The best groves of the Valley have never been pruned, with the exception of the removal of cross branches, suckers, undesirably

located branches and the removal of dead wood. An attempt to shape a tree by pruning, after it has been headed and planted in the orchard, usually does more harm than good. A vigorous branch on one side of the tree one season will be balanced by other vigorous branches the next.

Winter Protection.—Young trees may be seriously damaged or killed entirely during a very cold winter such as was experienced in 1913 and such damage has led to the practice of protecting the trees during the first two or three winters. This is done by tying hegari stalks or similar material around the trees in the late fall and removing the material after danger of frost injury. Orchard heating is not being used.

CARE OF THE BEARING GROVE

The same principles of irrigation, cultivation, and fertilization apply to the bearing grove as for a young grove. Naturally, more water and heavier applications of fertilizer are required. Good results can be obtained by an application of a quickly available nitrate in February, to increase the set of fruit. This applies particularly to Navels, which are subject to a heavy drop with the coming of hot weather.

INSECTS

No serious insect pests are found in the Salt River Valley. Ants are responsible for the loss of a few young trees and are eradicated only by continued applications of calcium cyanide. Cyanide will kill the tree if applied too close. Thrips scar some fruit and cause some dropping of fruit during the setting period, but are not considered serious. Citrus aphid are present but are not serious.

The scale insects, such as the Black, Red, and Yellow have never been found. Cottony cushion scale, found in one grove was quickly eradicated by the Vedalia or Australian ladybug beetle, imported by the State Entomologist's office.

DISEASES

Little damage is experienced from citrus diseases. Gummosis and Scaly Bark are present but are not difficult to control under local conditions.

MARKETING

About 85 percent of the citrus fruit produced in the Salt River Valley is marketed through the Arizona Citrus Growers' Association, a coöperative marketing association which is largely responsible for the stability of the citrus industry of the

Valley. The grower can pick his own fruit and deliver it to the packing house or get this service through the Association. The cost of picking is 5 cents per field box for grapefruit and 8 cents for oranges.

Arizona grapefruit is marketed largely in California, where it consistently tops the market. Some shipments have been made to England with excellent results.

Oranges are shipped to eastern markets. Last year, Arizona Navels sold at a premium of 50 cents to \$1.00 per box on the Chicago market. This plus satisfactory returns from other markets is encouraging to Arizona orange growers.

New markets must soon be developed for grapefruit, as California can absorb only limited amounts. The canned grapefruit industry may develop into an important means of handling certain grades of grapefruit.

RECOMMENDATIONS

We, the Citrus Committee of the Agricultural Economic Survey of Maricopa County, present the following recommendations for your approval:

1. Due to the fact that citrus fruits have proved to be a very profitable crop in the Salt River Valley and that the Project has decided advantages over other irrigated districts in regard to climate, soil, pests, and cost of production, citrus fruit should continue to be one of our principal crops.

2. There is no apparent likelihood of a sufficient increase in acreage of oranges to seriously affect the general market situation for several years to come. The earliness of maturity and excellent quality of our oranges are decided advantages, but we may experience a leveling down in price, due to increasing competition of citrus and other fresh fruits. The orange acreage should be increased in our favored districts.

3. In regard to grapefruit, there has been a great increase in consumption during recent years but the acreage has made an even greater comparative increase and we face the necessity of more efficient distribution and development of new markets. The low cost of production and distinctive qualities of our fruit, warrant a conservative increase of acreage in the Salt River Valley.

4. The excellent returns obtained to date by Arizona citrus growers, have been the result of their being united in one central marketing organization and it is recommended that to get wider distribution and cut the cost of production and marketing, that

with the increased citrus acreage the marketing arrangements should remain closely united. Efforts should be made to increase the utilization of off-grade fruits in the form of citrus by-products.

5. The outlay involved in bringing a citrus grove into bearing is high and all risks should be carefully considered before entering the field of citrus production. Citrus production faces weather variations and fluctuations in price and the grower should consider and make allowance for these risks.

6. The most economical production is obtained from tracts of 40 acres or more, but the more intensive care given small tracts results in higher production. Ten acres is the minimum that will satisfactorily act as the sole source of income for an average family.

7. The relative dormancy of citrus trees in winter in the Salt River Valley enables them to resist successfully low temperatures, which would be extremely destructive in more humid districts.

8. Since the yield per acre has such an important bearing on production cost per box, it is absolutely essential that plantings be restricted to trees of high vigor, budded from trees of known quality and production. Production records have been kept by the County Agent's office on several groves of the different varieties in the Project. The high producing trees of excellent quality are the source of best buds.

9. The square system of planting is the most practical. The planting distances giving the best results are roughly 20 feet for Navels, 22 feet for Valencias and sweet seedlings, and 24 feet for grapefruit.

10. The trees should not be planted so deep as to cover the bud union. Dynamite should be used prior to planting if the subsoil is of a caliche nature. Manure should not be applied in the holes prior to planting. The planting of sour seedlings in orchard form to bud later is decidedly inadvisable.

11. In regard to irrigation, short runs of 300 to 500 feet give best results, under average conditions. So far as practical, the direction of run should avoid rapid fall.

12. Irrigations should be frequent the first year with a gradual lengthening of the period between irrigations as the grove comes into bearing, but in groves of all ages, water should be withheld as much as possible during the fall months, in order to minimize possible injury by frost.

13. Cultivation is necessary to keep down weeds, provide loose soil for making furrows, and to aid in water penetration.

14. The fertility of the soil will determine the amount of fertilizer applied, but fertilizer should be applied after the first year to stimulate growth and early bearing. As the trees come into bearing, these applications should be increased to 15 or 20 tons annually, the applications being made in the late fall or winter.

15. Cover crops are decidedly beneficial in building up the soil but it must be borne in mind that winter cover crops are conducive to lower temperatures, that cover crops which compete with the trees during the blossoming and fruit setting period should be avoided and that cover crops in a mature grapefruit grove should be used only when an ample supply of water is available.

16. Pruning operations should be limited to the removal of cross branches and poorly located suckers.

17. Picking should be done carefully to avoid injury to the tree and fruit.

18. The increasing competition of citrus fruit from other districts, of other fresh fruits and of the holdover of citrus fruit from the preceding season, will necessitate an increasingly high shipping standard of Arizona citrus fruits of all varieties.

19. Arizona grapefruit is now marketed largely in California. Shipments to England have increased and local markets are consuming larger amounts, but the increasing acreage will necessitate the development of new markets.

20. Arizona oranges are shipped to eastern markets with excellent results and have a more encouraging market than our grapefruit.

F. W. Avery, Chairman
I. de R. Miller
H. C. Heard
Mack Wetmore
C. H. Coulson, Secretary

REPORT OF THE DAIRY COMMITTEE

By

CLYDE F. ROWE, Committee Secretary

Dairying has held a key position in the agricultural scheme of the Salt River Valley due, first, to the favorable climatic conditions both for dairying and for the production of dairy feeds; second, because dairying has been a profitable pursuit; third, because of favorable market conditions for dairy stock and dairy products, and fourth, because of the need of maintaining soil fertility.

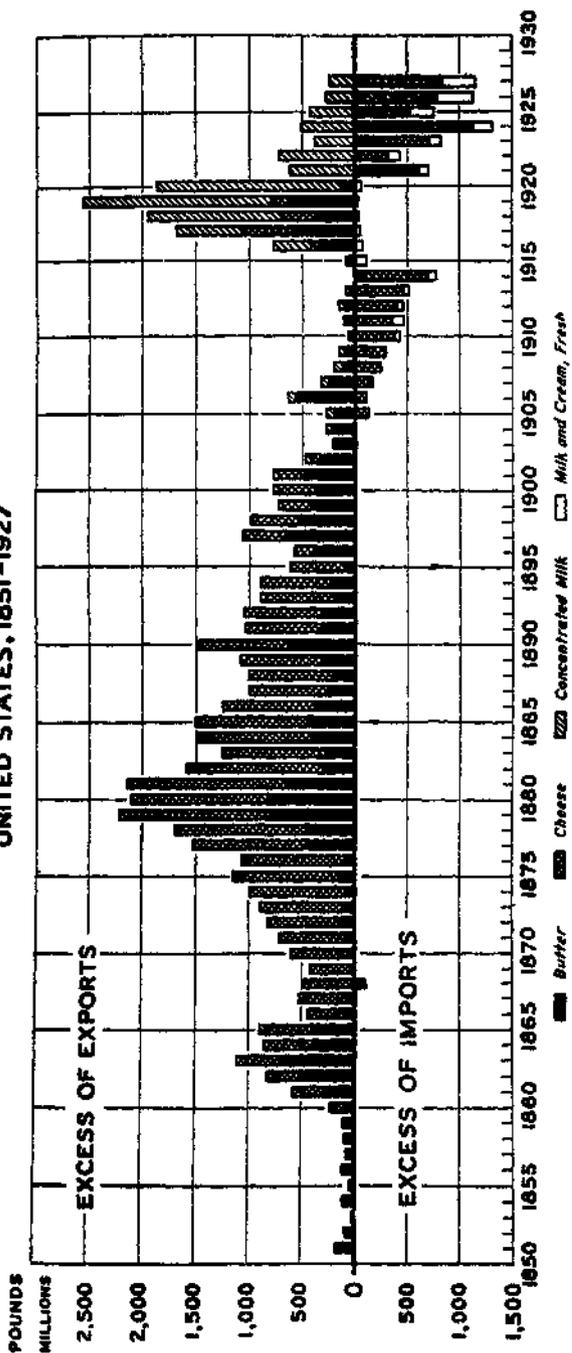
One of the important questions the committee was endeavoring to solve was the future possibilities, or the outlook for dairying on the Project, as well as on a national basis. In taking up this question the committee found that the number of dairy cows being kept for milk in the United States has increased only slightly from 1920 to 1926, whereas the population during the same period of time has increased about 10 percent. (See Table XXIV.) This would indicate that dairy production was not keeping pace with consumption. However, the average annual production per cow has increased about 1,000 pounds, which has had considerable influence on the total production.

It was found by the committee that the large percentage of increase in dairy cows has been principally in the southern or cotton belt and the eleven western states. (Reference: See Tables XXV and XXVI.) It was also noted that the per capita consumption in the United States has increased as follows: milk 22.2 percent, butterfat 15.8 percent, cheese 15.2 percent, ice cream 10.9 percent, dried, evaporated, and condensed milk products 16.5 percent. (Table XXVII.) During the 3-year period ended 1925 the excess of imports of dairy products amounted to about the equivalent of 400,000,000 pounds of milk annually. (See figure 13.)

Since the year ended January 1, 1928, definite figures are not available relative to imports and exports, yet it is evident that imports greatly surpass exports. This indicates that the dairy industry on a national basis will stand considerable expansion.

Relative to the development of the dairy industry in the Salt River Valley, it was found that during the 5-year period ended January 1, 1928, the increase in the number of cows and heifers being kept for milk has been less than 5 percent, that during

EXCESS OF EXPORTS OR IMPORTS OF DAIRY PRODUCTS
UNITED STATES, 1851-1927



In terms of shipping milk equivalent, assuming 1 lb. of butter = 2 1/2 lbs. of milk, 1 lb. of cheese = 10 lbs. of milk, 1 lb. of concentrated milk = 2 1/2 lbs. of milk, 1 lb. of cream = 7 lbs. of milk.

Fig 13.—Showing the excess of exports or imports of dairy products in the United States, 1850 to 1927. (Courtesy of Bureau of Agricultural Economics, U. S. D. A.)

this period the average annual milk production has increased about 1,200 pounds per cow, that the exports of butter and cheese have increased very slightly, exact figures not being available, and that the population of the State as a whole has increased about 25 percent. (See Table XXIV.) In addition, the increase in per capita consumption has been normal, amounting to about 18 percent, figured on a whole milk basis. It was also noted by the committee that the acreage in irrigated land has increased about 100,000 acres during the past 10 years. These conditions seem to warrant a normal expansion of the dairy industry on the Project provided such expansion could be made profitable for the dairyman.

The profits to be realized in dairying are dependent upon cost of production and the selling price of milk or butterfat. During the year just closed the average price per pound of butterfat and milk being sold to the condensary was about 53 cents, for Grade B milk sold to milk plants was about 67½ cents per pound butterfat, and for sour cream being sold for butter making was about 50 cents per pound. Cost of production is dependent upon, first, actual feed cost; second, equipment and labor cost; and third, the ability of the individual cow to produce large quantities of milk and butterfat.

From a study of 22 dairy farm records secured in this survey it was found by the committee that 1.4 acres of land are required to produce hay and pasture to maintain one cow per year. The average value of this land amounted to \$271.00 per acre. The building cost including such items as milk sheds, hay barns, milk houses, shade sheds, amounted to \$27.20 per cow. The average cost per cow for water system was \$11.80. The average value of dairy equipment per cow including such items as milking machines, milk cans, buckets, coolers, etc., amounted to \$5.60. The average miscellaneous cost per cow amounted to \$4.70, making a total equipment cost per cow of \$49.30, not including land. The annual labor per cow amounted to 145.1 hours. (See Table XVIII.) This included the actual handling of the dairy cow, as well as the growing of necessary young stock to maintain the herd. The average annual milk production per cow for the Cow Testing Association amounted to 7,770 pounds of milk and 280.6 pounds of butterfat. The average feed cost per pound of butterfat for the Cow Testing Association amounted to \$111.37. (See Table XXVIII.)

The average annual return per cow above feed cost amounted to \$11.37. (See Table XXVIII.)

TABLE XXIV.—ESTIMATED POPULATION BY DIVISIONS AND SPECIFIED STATES, JANUARY 1, 1920-1926.*

| Division and state | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | Percentage 1926 is of 1920 |
|--------------------|----------|----------|----------|----------|----------|----------|----------|----------------------------|
|  | Thousand | Thousand | Thousand | Thousand | Thousand | Thousand | Thousand | Percent |
| United States | 105,711 | 107,433 | 109,169 | 110,793 | 112,710 | 114,553 | 116,257 | 110 |
| North Atlantic | 29,662 | 30,125 | 30,591 | 31,037 | 31,534 | 32,009 | 32,457 | 109 |
| North Central | 34,020 | 34,513 | 35,010 | 35,471 | 36,028 | 36,568 | 37,083 | 109 |
| South Atlantic | 13,990 | 14,247 | 14,506 | 14,750 | 15,034 | 15,300 | 15,547 | 111 |
| South Central | 19,136 | 19,332 | 19,630 | 19,859 | 20,139 | 20,410 | 20,658 | 108 |
| Mountain | 3,336 | 3,425 | 3,516 | 3,598 | 3,699 | 3,799 | 3,890 | 117 |
| Pacific | 5,567 | 5,741 | 5,916 | 6,078 | 6,276 | 6,467 | 6,642 | 119 |
| Mountain States: | | | | | | | | |
| Montana | 549 | 571 | 593 | 613 | 638 | 662 | 684 | 125 |
| Idaho | 432 | 445 | 459 | 471 | 487 | 502 | 515 | 119 |
| Wyoming | 195 | 201 | 207 | 212 | 219 | 226 | 233 | 119 |
| Colorado | 940 | 957 | 976 | 992 | 1,012 | 1,032 | 1,050 | 112 |
| New Mexico | 360 | 365 | 369 | 373 | 377 | 382 | 386 | 107 |
| Arizona | 384 | 385 | 367 | 382 | 401 | 419 | 436 | 131 |
| Utah | 449 | 459 | 469 | 478 | 488 | 499 | 509 | 113 |
| Nevada | 77 | 77 | 77 | 77 | 77 | 77 | 77 | 100 |
| Pacific States: | | | | | | | | |
| Washington | 1,357 | 1,384 | 1,411 | 1,436 | 1,467 | 1,497 | 1,524 | 112 |
| Oregon | 783 | 797 | 812 | 825 | 841 | 856 | 870 | 111 |
| California | 3,427 | 3,560 | 3,693 | 3,817 | 3,968 | 4,114 | 4,248 | 124 |

* Census 1920. Other years based on census estimates.

TABLE XXV.—COWS AND HEIFERS KEPT FOR MILK TWO YEARS OLD AND OVER; 1920-1928.
(000 omitted)

| States or divisions | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 |
|---------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| North Atlantic | 3,375 | 3,356 | 3,348 | 3,358 | 3,283 | 3,211 | 3,143 | 3,058 | 3,074 |
| North Central | 10,686 | 10,734 | 10,996 | 11,206 | 11,468 | 11,742 | 11,721 | 11,415 | 11,380 |
| South Atlantic | 1,745 | 1,752 | 1,770 | 1,768 | 1,749 | 1,748 | 1,690 | 1,659 | 1,709 |
| South Central | 3,959 | 3,877 | 3,930 | 3,913 | 3,869 | 3,864 | 3,597 | 3,734 | 3,326 |
| Mountain | 702 | 707 | 737 | 763 | 803 | 844 | 852 | 867 | 871 |
| Pacific | 960 | 982 | 1,007 | 1,055 | 1,088 | 1,097 | 1,085 | 1,085 | 1,088 |
| Arizona | 35 | 30 | 35 | 36 | 36 | 37 | 32 | 35 | 35 |
| Salt River Valley | | | | 16.6 | 19.1 | 18.0 | 15.9 | 17.7 | |
| United States | 21,427 | 21,408 | 21,788 | 22,063 | 22,255 | 24,496 | 22,188 | 21,818 | 21,948 |

TABLE XXVI.—HEIFERS ONE AND TWO YEARS OLD BEING KEPT FOR MILK, 1920-1928.
(000 omitted)

| States or divisions | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 |
|---------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| North Atlantic | 612 | 535 | 484 | 506 | 468 | 463 | 420 | 443 | 487 |
| North Central | 2,240 | 2,170 | 2,143 | 2,156 | 2,110 | 2,246 | 2,109 | 2,142 | 2,176 |
| South Atlantic | 353 | 335 | 318 | 331 | 336 | 302 | 272 | 286 | 302 |
| South Central | 855 | 777 | 732 | 773 | 809 | 755 | 703 | 755 | 780 |
| Mountain | 151 | 147 | 161 | 159 | 168 | 184 | 183 | 188 | 194 |
| Pacific | 207 | 191 | 185 | 217 | 246 | 245 | 236 | 234 | 236 |
| Arizona | 9 | 6 | 7 | 9 | 11 | 9 | 8 | 10 | 9 |
| United States | 4,418 | 4,155 | 4,023 | 4,147 | 4,137 | 4,195 | 3,923 | 4,048 | 4,175 |

TABLE XXVII.—PER CAPITA ANNUAL CONSUMPTION OF DAIRY PRODUCTS IN THE UNITED STATES.*

| Year | Milk | Butter | Cheese | Con- densed and evaporated milk | Ice cream |
|---------------------------|---------|--------|--------|---|--------------|
| | Gallons | Pounds | Pounds | Pounds | Gallons |
| 1917 | 42.4 | 14.6 | 2.89 | 10.49 | 2.07 |
| 1918 | 43.0 | 14.0 | 3.00 | 12.50 | 2.14 |
| 1919 | 43.0 | 14.8 | 3.50 | 12.30 | 2.49 |
| 1920 | 43.0 | 14.7 | 3.50 | 10.17 | 2.46 |
| 1921 | 49.0 | 16.1 | 3.50 | 11.40 | 2.28 |
| 1922 | 50.0 | 16.5 | 3.70 | 12.69 | 2.43 |
| 1923 | 53.0 | 17.0 | 3.90 | 13.25 | 2.63 |
| 1924 | 54.75 | 17.25 | 4.20 | 14.00 | 2.50 |
| 1925 | 54.75 | 17.04 | 4.26 | 14.87 | 2.80 |
| Average, period 1921-1925 | 52.3 | 16.8 | 3.71 | 13.3 | 2.54 |
| Average, period 1917-1920 | 42.8 | 14.5 | 3.22 | 11.4 | 2.29 |
| Increase | 9.1 | 2.3 | .49 | 1.9 | .25 |
| Percentage increase | 22.2 | 15.8 | 15.2 | 16.5 | 10.9 |

* Completed from data reported by division of dairy and poultry products, Bureau of Agricultural Economics (August, 1926).

Increases in consumption per capita between 1917 and 1925 were as follows:

| | |
|-------------------------------------|--------------|
| Milk | 12.4 gallons |
| Butter | 2.4 pounds |
| Cheese | 1.37 pounds |
| Condensed and evaporated milk | 4.4 pounds |
| Ice cream | 0.7 gallons |

The estimated average table use of dairy products expressed as whole milk was nearly 1,000 pounds, or about 110 gallons per person in 1925, which is nearly one-fourth greater than in 1920.

TABLE XXVIII.—HERD IMPROVEMENT ASSOCIATION REPORTS.

| Year | Average No. cows | Average milk per cow (lbs.) | Average fat per cow (lbs.) | Average feed cost per cow | Average feed cost per lb. fat | Average return over feed cost |
|------|---------------------|--------------------------------------|-------------------------------------|---------------------------------|-------------------------------------|--|
| 1925 | 630 | 7,519.0 | 258.8 | \$62.50 | 25.2c | \$92.45 |
| 1926 | 568 | 8,078.0 | 298.4 | 70.88 | 24.5c | 117.30 |
| 1927 | 875 | 7,451.6 | 260.8 | 59.55 | 21.9c | 102.06 |
| 1928 | 1,109 | 7,770.0 | 280.6 | 62.05 | 22.2c | 111.87 |

It is evident that if the profits of the dairymen are to be increased, it must come through greater production as influenced by breeding, feeding, and culling. The number of purebred sires of high production ancestry being used has been increased quite rapidly during the past few years. It was the opinion of the committee that a great deal could be accomplished through the organization of bull associations and bull clubs.

It is especially important that dairymen feed more liberally of a well-balanced ration as a means of increasing production, the opinion of the committee being that concentrates composed chiefly of home grown feeds be used as liberally as production will allow, also that alfalfa hay and silage be used liberally in connection with pasture throughout the year. In many instances dairymen are practicing soiling as a means of increasing the carrying capacity of their land. While this practice is approved, yet it must be remembered that it is very destructive to the fertility of the soil, and every effort should be put forth to conserve the soil fertility.

During the past year 145 cows out of 2,200 in the Cow Testing Association were sold for beef purposes. This shows that the number of non-profitable cows is quite large. It was also found by the committee that the season of freshening had a great deal to do with the annual production. Fall freshening is highly recommended as a means of increasing annual production. A large percentage of the dairymen are not giving enough attention to the rest period nor to conditioning of cows between lactation periods. This undoubtedly has considerable influence on the annual production, and was given special consideration by the committee.

Young stock that is not properly grown is impaired often to the extent of 25 percent of their production ability. It is highly important that the growing and developing of young stock be given special consideration.

Disease and tuberculosis eradication has been given special attention during the past years by the United States Bureau of Animal Industry and the State Veterinarian. The number of federal-accredited herds has increased quite rapidly, and the percentage of re-actors has steadily decreased. Arizona at the present time has a very high rating in the control of tuberculosis.

Milk ordinances and regulations have had considerable influence on the production of a clean, wholesome product, and have been outstanding factors in increasing the per capita consumption of dairy products.

The Herd Improvement Association has been one of the most important factors in putting dairying in the Salt River Valley on a profitable basis. Figures during the past 8 years show decided improvement in all phases of the dairy industry.

AVERAGE EXPENSE OF A TEN-COW HERD IN THE SALT RIVER VALLEY

| | |
|---|------------|
| Cows | \$1,360.00 |
| Bull | 225.00 |
| Land (14 acres) | 3,794.00 |
| Buildings, Value | 272.00 |
| Upkeep | 13.00 |
| Water System, Value | 118.00 |
| Upkeep | 7.00 |
| Dairy Equipment, Value | 56.00 |
| Upkeep | 5.00 |
| Miscellaneous | 47.00 |
| Taxes (Cattle) | 29.00 |
| Labor: | |
| Operator | |
| Family, 1,451 hours (total) | |
| Hired | |
| Horse, 20 hours | |
| Total money investment for ten-cow herd | \$5,926.00 |

RECOMMENDATIONS

1. Since dairying has played an important part in the agricultural development of Maricopa County and has been one of the profitable agricultural pursuits, and since the dairy outlook for the future is promising, we therefore recommend conservative increase in the dairy industry, in order to meet the increased demand for dairy products locally and in the State, as well as dairy stock in the State and in adjoining states.

2. That purebred sires of high production ancestry be used and that special study be made to determine the value of bulls now in use and that bull associations and bull clubs be promoted, where their economic use is indicated.

3. That a liberal amount of pasture be supplied throughout the year to be used in connection with alfalfa hay, silage, and concentrates.

4. That where soiling is practiced, every effort be put forth to conserve soil fertility through the use of available manure.

5. That silage be used on dairy farms as a means of keeping a uniform flow of milk, to decrease the amount of acreage, to care for a cow, and to guard against possible feed shortage.

6. That concentrates be used liberally on cows that respond, and that home-grown feeds be used as far as possible.

7. That breeding for fall freshening be practiced, and that cows be given 6 to 8 weeks rest between lactation periods and be in good flesh at time of freshening.

8. That special attention be given to the growth of young animals being kept for dairy purposes.

9. That bulls be kept in good roomy bull pens rather than be allowed to run with the herd.

10. We highly commend the work of the Federal and State officials for their work in tuberculosis eradication and recommend that this work be continued. That dairymen make a careful study of abortion and other contagious diseases and use every means available to eliminate them from the herds of the County.

11. That dairymen put forth every effort to produce clean, wholesome milk as a means of increasing confidence and per capita consumption.

12. We recommend the Herd Improvement Association as a basis of intelligent breeding, feeding, and culling.

Signed:

Frank Reed Sanders, Chairman
W. A. Van Sant
E. F. Van Kirk
D. W. Fountain
Clyde Hussey
Clyde F. Rowe, Secretary

REPORT OF THE POULTRY COMMITTEE

By

H. EMBLETON, Committee Secretary

That there is a shortage in egg production within the State of Arizona is apparent after a glance at figure 14. California is our main source of supply for out-of-state eggs. Arizona is in sixth place to receive eggs shipped out of California on a volume basis.

Figure 15 indicates that every state in the Union, except Arizona, contributed to the New York market in 1925, again indicating that every other state has a seasonal surplus of eggs.

The apparent yearly production of eggs in Arizona is 50 carloads less than the amount of eggs consumed annually within the State.

There is the reverse condition regarding the supply of poultry from the meat standpoint, though there is a brisk demand for hens and young males of the heavier breeds of poultry.

There have been vast numbers of chicks shipped into Arizona to replenish flocks within the State. These have been the means of many Arizona dollars going into neighboring states to aid in the upbuilding of the poultry industry in those states. This condition is due first, to the fact that the chicks shipped in have been graded in accordance with a definite systematic plan known as accrediting, and secondly, to out-of-state buying having become a habit. Now that an accrediting system is established in Arizona, the hatcheries in this State will benefit by absorbing this trade, which will put Arizona on a more profitable basis.

It was found that there was a brisk demand for 8-weeks-old pullets but apparently this was not a profitable venture at present prices for this commodity.

Turkeys are a 1-year crop with conditions varying from year to year and profits depending upon supply and demand. Indications point to a heavy crop for the current year, 1928. This crop will be sold apparently at a profit, due to a shortage in other turkey-raising centers.

Arizona's poultry industry plays very little part in the national situation as can be seen from the figures in the following table taken from results compiled by the United States Bureau of Agricultural Economics. The Pacific and Mountain states combined had only 8.2 percent of all the chickens in the United States in 1925. Of this 8.2 percent, California, Washington, Oregon, and Colorado account for 75 percent. In other words,

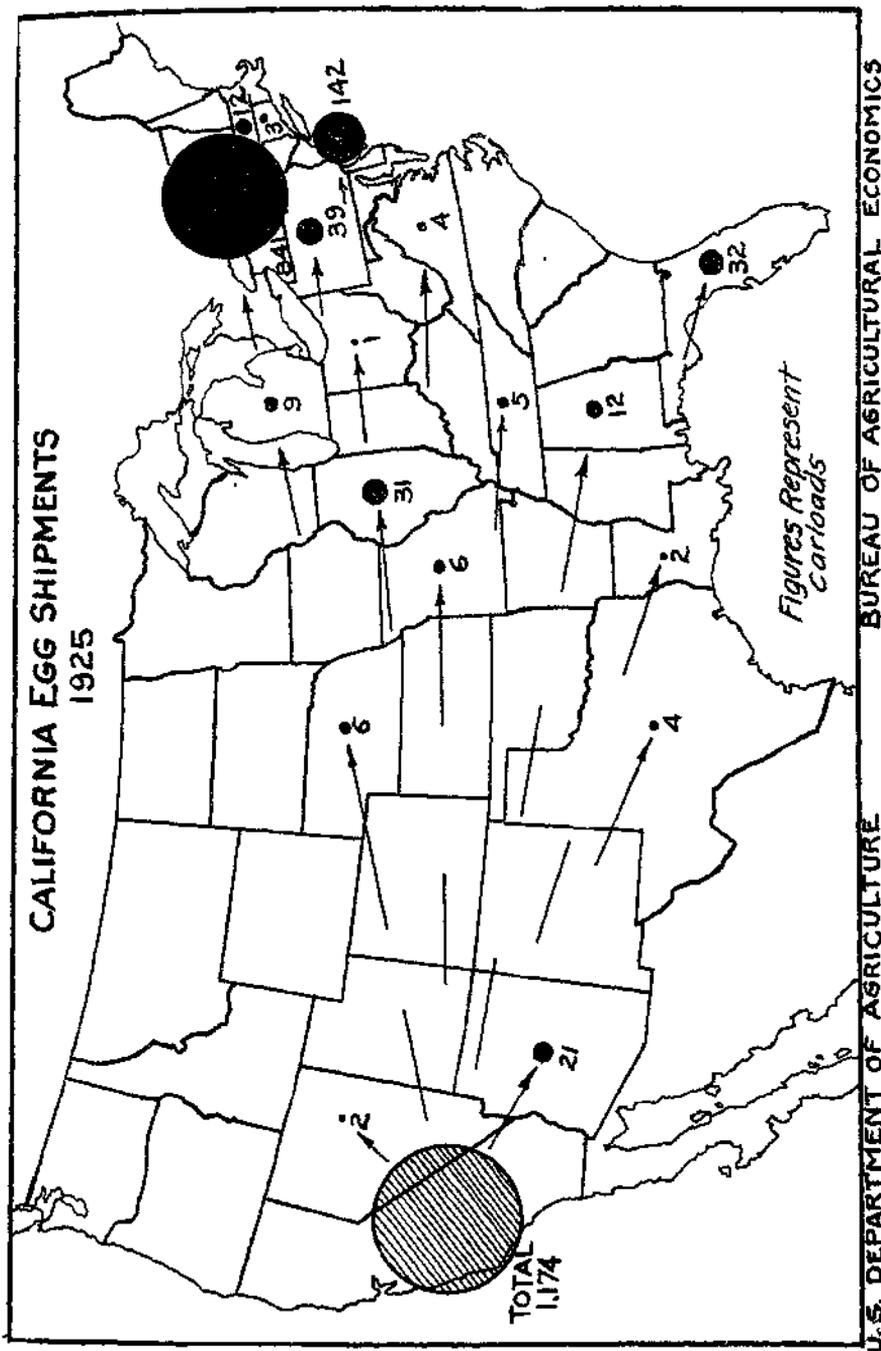


Fig. 14.—Showing Arizona's egg imports from California.

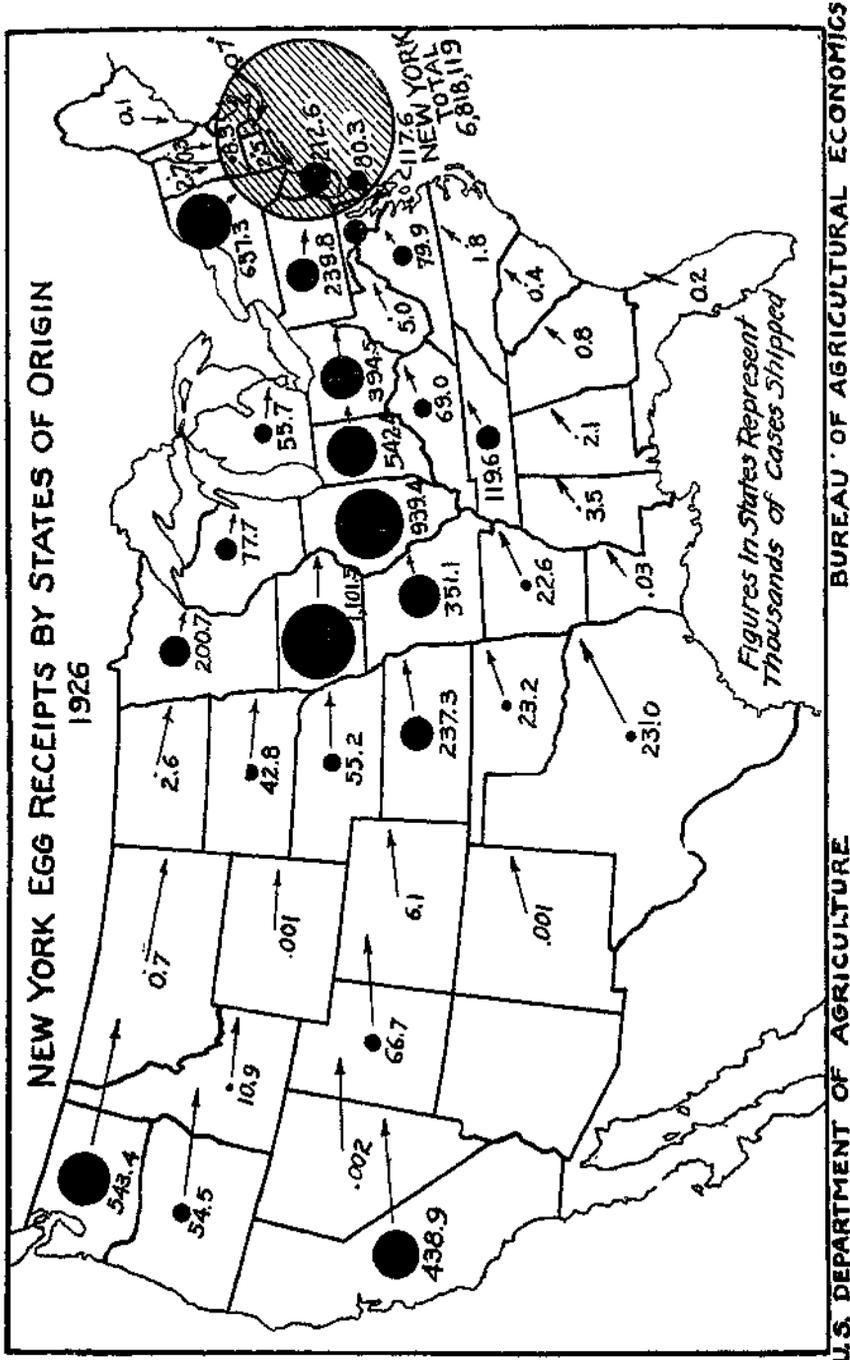


Fig. 15.—Showing New York egg receipts by states of origin—1926. Note that Arizona contributes none.

Arizona has one-tenth of one percent of all the poultry in the United States. The middle western states produce 63 percent of all poultry in the United States.

TABLE XXIX.—DISTRIBUTION OF CHICKENS ON FARMS AND EGGS PRODUCED BY GEOGRAPHIC DIVISIONS AND BY STATES IN THE MOUNTAIN AND PACIFIC DIVISIONS, 1910, 1920 AND 1925.*

| Division and state | Chickens on hand | | | Eggs produced | | |
|--------------------------|------------------|------|------|---------------|------|------|
| | 1910 | 1920 | 1925 | 1909 | 1919 | 1924 |
| | % | % | % | % | % | % |
| United States | 100 | 100 | 100 | 100 | 100 | 100 |
| West Central North | 30.4 | 29.3 | 30.1 | 28.1 | 28.7 | 28.4 |
| East North Central | 24.8 | 23.5 | 21.9 | 24.7 | 24.2 | 23.1 |
| West South Central | 10.4 | 11.1 | 10.8 | 10.4 | 9.5 | 8.4 |
| South Atlantic | 9.1 | 10.1 | 10.0 | 8.5 | 8.7 | 8.0 |
| East South Central | 8.7 | 9.5 | 8.5 | 8.1 | 8.4 | 5.9 |
| Middle Atlantic | 8.7 | 7.6 | 8.5 | 10.1 | 9.2 | 11.3 |
| Pacific | 3.4 | 4.6 | 5.2 | 4.4 | 6.0 | 8.4 |
| New England | 2.5 | 1.6 | 2.0 | 3.5 | 2.3 | 3.0 |
| Mountain | 2.0 | 2.7 | 3.0 | 2.2 | 3.0 | 3.5 |
| Western States | 100 | 100 | 100 | 100 | 100 | 100 |
| California | 37.5 | 40.1 | 38.0 | 39.1 | 42.7 | 43.2 |
| Washington | 14.6 | 13.6 | 15.9 | 15.7 | 14.2 | 18.5 |
| Oregon | 11.6 | 9.6 | 9.8 | 11.4 | 9.8 | 9.1 |
| Colorado | 10.9 | 11.1 | 11.1 | 10.1 | 9.5 | 8.2 |
| Idaho | 6.7 | 6.4 | 6.0 | 6.2 | 5.7 | 5.2 |
| Montana | 6.1 | 7.9 | 7.5 | 5.7 | 7.9 | 5.9 |
| Utah | 4.5 | 3.7 | 4.1 | 4.5 | 3.8 | 4.0 |
| New Mexico | 3.4 | 2.7 | 2.8 | 2.8 | 2.0 | 1.8 |
| Wyoming | 2.2 | 2.4 | 2.4 | 2.0 | 2.1 | 1.9 |
| Arizona | 1.7 | 1.9 | 1.9 | 1.7 | 1.7 | 1.6 |
| Nevada | .8 | .6 | .7 | .8 | .6 | .8 |

* U. S. Bureau of Agricultural Economics.

Nationally, the situation is such, that although poultry will still be profitable, there will not be the margin of profit it has had in the past.

The size of the poultry flock is an important factor in flock management. A survey carried on in California indicates that the larger the flock, up to 2,500 birds, the greater the net farm return.

The average egg production per bird in the Salt River Valley flocks varies considerably. (Table XXX.) About one-third of the flocks included in the survey produced a profit from the year's operations. Another third were on the border line. The production of the remaining one-third was such that the farm could not hope to operate at a profit.

The feed cost represents approximately 50 percent of the total expenses. (Table XXX.)

TABLE XXX.—LABOR AND FEED COSTS AND CAPITAL INVESTED IN 12 POULTRY FARMS INCLUDED IN THE SALT RIVER VALLEY ECONOMIC SURVEY.

| Farms | I | M | J | H | D | F | K | G | L | B | C | E |
|---|------|------|------|------|-------|------|------|------|------|------|------|------|
| Size of flock | 280 | 532 | 336 | 568 | 342 | 563 | 630 | 1200 | 1250 | 1400 | 1400 | 1225 |
| Average eggs per bird | 158 | 155 | 92 | 193 | 179 | 190 | 114 | 129 | 92 | 120 | 129 | 82 |
| Feed cost per bird (young stock pro-rated) | 2.14 | 2.71 | 2.78 | 1.86 | 4.34 | 4.12 | 2.00 | 1.54 | 1.46 | 1.43 | 2.40 | 1.00 |
| Capital invested per bird | 3.40 | 2.20 | 3.54 | 4.44 | 14.40 | 4.90 | 8.04 | 1.00 | 2.50 | 3.32 | 3.36 | 3.60 |
| Other land | 3.33 | 3.70 | 1.33 | 4.00 | 6.00 | 2.20 | 1.58 | 2.50 | .40 | 1.50 | 1.78 | .61 |
| Cost labor per bird @ 30c | 3.00 | 1.87 | .73 | 1.70 | 4.20 | 1.76 | 2.35 | .46 | .39 | .83 | 1.67 | .52 |
| Cost housing per bird | .33 | .44 | .50 | .73 | 3.00 | 1.74 | .81 | .93 | .70 | 1.46 | 1.52 | 1.45 |
| Acres land to poultry | 2 | 4 | 3 | 5 | 10 | 10 | 2 | 6½ | 2 | 3½ | 6 | 5 |
| Market eggs | 55.5 | 68 | 16 | 68.4 | 18.6 | 61.8 | 44 | 97 | 76 | 36 | 43 | 84 |
| Hatchery | — | — | 53.5 | 10.0 | 33.2 | 4.1 | 2 | — | 4 | 58 | 11 | — |
| Chicks and stock | 30.7 | 28 | 30.5 | 16.8 | 48.2 | 34.1 | 43 | 1 | 13 | 6 | 38 | 2 |
| Broilers and fryers | 6.2 | 4 | — | 4.0 | — | — | 11 | — | — | — | 8 | 14 |
| Miscellaneous | 8.6 | — | — | .8 | — | — | — | 2 | 7 | — | — | — |
| Feed | 49.8 | 52.6 | 63.6 | 35.5 | 38.5 | 59.8 | 30 | 66 | 59 | 49 | 51 | 53 |
| Labor | 38.1 | 35.1 | 19.9 | 35.5 | 31.3 | 19.1 | 43 | 19 | 16 | 27 | 36 | 21 |
| Water | — | .6 | 1.9 | 2.2 | .9 | .7 | — | — | — | — | — | — |
| Auto | — | — | — | 9.7 | 3.6 | 3.4 | 10 | 8 | 7 | 3 | 2 | 4 |
| Depreciation | .9 | 2.1 | 8.1 | 2.6 | 9.0 | 5.2 | — | 2 | 2 | 3 | 3 | 4 |
| Interest | 3.3 | 3.3 | 7.7 | 7.1 | 11.3 | 7.3 | 11 | 6 | 8 | 9 | 3 | 1 |
| Miscellaneous | 7.9 | 6.3 | 3.8 | 7.4 | 5.4 | 4.5 | 6 | — | 8 | 9 | 5 | 7 |

The labor cost represents approximately 35 percent of the total expense. (Table XXX.)

The capital invested in land varies from 40 cents to \$6.00 a bird. (Table XXX.)

The capital invested in the remaining part of the enterprise varies from \$1.00 to \$14.40 a bird. (Table XXX.)

The cost of housing a bird varies from 33 cents \$3.00.

RECOMMENDATIONS

We, your committee on poultry make the following recommendations regarding the poultry situation in the Salt River Valley.

Since there is an apparent shortage of 50 carloads of eggs yearly in Arizona, there is room for expansion of the poultry industry at least to the point where this shortage can be supplied from within the State.

Improvements along the following lines would tend to make poultry a more profitable enterprise.

1. The production of quality products in order to increase the consumption per capita.
2. The development of collective marketing in order to establish grades and quality.
3. Increasing the average egg yield on a flock basis through the use of better foundation stock.
4. Unnecessary expensive equipment should be avoided.
5. Strict sanitary conditions on the poultry farm to avoid the originating and spread of diseases are fundamental.
6. A flock of from 2,000 to 2,500 fowls is apparently an economical unit.
7. The feed situation can be improved by using more uniform feed. Collective buying may be the means of securing this uniformity.
8. Ample cold storage space should be provided to take care of seasonal needs.
9. The newly organized Accredited Hatchery Association should be encouraged in order to standardize grades of chicks and better meet out-of-state competition in the sale of baby chicks.

10. The Arizona State Poultry Federation is a needed centralizing organization. It should be encouraged and supported.

11. That legislation on Rules and Standards of Quality and Weight be supported.

Wm. M. Spretsma, Chairman
Roy T. Abbeloos
M. E. Bemis
Chaire E. House
John Rosenhoffer
Gus Forester
H. B. Hinds
George House
J. Albert Liggett
O. M. Henson
H. Embleton, Secretary

REPORT OF THE BEEF CATTLE COMMITTEE

By

C. U. PICKRELL, Committee Secretary

Beef-cattle production in Maricopa County has been considered only insofar as there is any connection with irrigated lands here. The annual number of beef cattle fattened each year in Maricopa County is dependent upon a number of factors, principal of which are:

1. The acreage used for alfalfa production.
2. Acreage used for cotton production.
3. Demand for feed for dairy cattle.
4. The demand for feed for the production of early lambs.
5. Range conditions in other sections of the State and in adjoining states.

The year 1917 saw a marked reduction in the area used for the growing of alfalfa; up until this time at least 50 percent of the irrigated land of this County was planted to alfalfa. In 1917 the area in alfalfa dropped to 35 percent. This reduction in the area used for alfalfa continued until the close of 1919, and the first part of 1920 saw less than 15 percent of the area of farm land in the County given to alfalfa growing.

Market conditions in the cotton industry in 1920 brought about a movement toward more alfalfa growing and in 1921 the alfalfa acreage increased to 25 percent of the total area. Since this time or during the period of the past 7 years, the land given to alfalfa growing has ranged from 25 to 30 percent. During this same period, the cotton industry has used from 20 to 40 percent of the land. With the present demands for feed from the dairy and sheep industries, approximately 50,000 head of cattle can be conveniently fattened annually in Maricopa County.

The report of the Livestock Sanitary Board shows the annual slaughter of cattle in Maricopa County now to be approximately 50,000 head, which is almost equal to the annual production. While the annual production of beef is approximately equal to the annual slaughter, further analysis is necessary to give a better appreciation of the situation. During some months, fat cattle are shipped out of the County, and during other periods, all or a portion of the County's beef supply comes from other sections of the State, and at times, for short periods, small supplies of killer animals have been secured in New

Mexico, California, Texas, and Old Mexico. In this connection, it might be stated that shipments of beef from without the State are generally small in number, and such a condition has been quite an irregular occurrence. But the existence of such a condition goes to show what may become an established practice, should we see a further increase in population of Maricopa County, with no further enlargement in beef production.

This movement of fat cattle in and out of the County may be accounted for to a large extent as follows:

An enormous increase of the population of the County, coupled with a marked decrease in the use of pasture for fattening, has greatly reduced the number of cattle that might have been offered on the summer and fall markets. Normally cattle marketed at this time are taken care of on pastures.

The months of October and November are the period of the State's greatest supply of range beef. This, of course, has an outstanding effect on the price of other cattle coming on the market at that time. Also during the summer months, Pacific Coast markets have a large supply of pasture beef to draw upon, from California and other areas more closely situated to these markets than is Maricopa County. The majority of these cattle is absorbed during the summer and fall. Pacific Coast markets can best absorb Arizona beef cattle during the period of January to May. Consequently, a higher price can be expected during that period. Another reason is that the feed supply used in pen fattening comes on the market in the fall which brings the close of the fattening period during the later winter or early spring. Then, too, climatic conditions during the period of October to May are less favorable to gains in weight. As a result of the combination of all of the above-mentioned factors, approximately 75 percent of the beef supply of Maricopa County is placed on the market during the months of December, January, February, March, April, and during the first half of May.

Normally, supplies of range beef are available outside of the County during the period April to December. The amount depends largely upon range conditions. If range conditions are good, beef supplies from this source are large, and range beef can always be sold cheaper than the product that has been finished on farm lands. While the range-produced beef seldom equals farm-produced beef in grade, large supplies of such meat always have a depressing effect upon the other beef that is on the market at that time. When such conditions exist, finished cattle must compete in price, be held over until range supplies are exhausted, or be shipped to Pacific Coast markets at a low figure.

As a result of the situation, it has not been an uncommon occurrence during the past 6 or 7 years, to find the local supplies of finished beef during the summer months so short that it has to be shipped in from other sections.

It is not uncommon to see the supply of range beef coming into Maricopa County as early as April, while the out-going movement of farm produced beef is still in progress. This movement of range beef continues throughout the summer and fall, and into December, after the shipment of finished beef to outside markets has commenced.

Briefly, the marketing situation in Maricopa County might be stated as follows :

A supply of range beef during late spring, summer, and fall is normally expected which has caused summer supplies from the farm lands to be reduced accordingly. During the remainder of the year, Maricopa County produces more beef than the market can consume and as a result, fat cattle are shipped to outside markets.

COSTS AND COMPARATIVE VALUES

For the purpose of having a basis for comparison the average price for the 5-year period 1923-27 inclusive, has been taken for the feeds most generally used in rations here.

Ground hegari, \$35.00 per ton; cottonseed meal, \$35.00 per ton; alfalfa hay (farm price in stack), \$15.00 per ton; corn or hegari silage, \$6.00 per ton, and cottonseed hulls, \$6.00 per ton.

While there is no regularly established market reporting service for cattle in Arizona, the Arizona Cattle Growers' Association since 1922 has published a weekly report that contains prices for both feeder and fat cattle.

In compiling the data for the following table, prices have been taken as follows: The price of feeder cattle given in the column 23-24 was the average price paid during the spring, summer, and fall of 1923. The feeder price, shown under 24-25, was the average price paid during the corresponding period in 1924 and the same in the other three columns. The prices for fat cattle are the average prices paid during the period December to May, for example: The fat cattle price shown in the column 23-24 is the average price paid during the period of December, 1923, to May, 1924.

The prices given for feeder cattle are the prices that were paid f. o. b. range shipping points. To secure the average price of feeder cattle laid down at Maricopa County points, it would

be necessary to add costs as follows: Shipping expense 25 cents per cwt.; purchasing expense 10 cents per cwt.; 8 percent shrinkage which would average about 40 cents per cwt., or a total expense additional of approximately 75 cents per cwt. This would bring the average price for feeder cattle laid down in Maricopa County for the period 1923-1928 up to \$6.45 per cwt.

Successful cattle feeders, through long experience, have formed the conclusion that cattle feeding in Maricopa County, to be at all profitable, must be conducted on a margin of not less than \$2.00 per cwt., between the buying and selling price. Some cattle feeders are of the opinion that increasing prices of land demand a margin of \$2.25 to \$2.50 per cwt.

The margin between the average buying and average selling price for each year indicated that cattle feeding has been profitable during the past 5 years, provided a \$2.00 margin is sufficient.

TABLE XXXI.—CATTLE PRICES IN MARICOPA COUNTY 1923 TO 1928 INCLUSIVE.

| Season | 23-24 | 24-25 | 25-26 | 26-27 | 27-28 | Average 5 years 23-28 |
|--|--------|--------|--------|--------|---------|-----------------------------|
| Range price feeder cattle .. | \$5.00 | \$5.25 | \$5.50 | \$6.00 | \$6.50 | \$5.65 |
| Prices feed cattle laid down Maricopa County .. | \$5.75 | \$6.00 | \$6.25 | \$6.75 | \$7.25 | \$6.40 |
| Fat cattle price | \$8.00 | \$8.00 | \$8.25 | \$9.00 | \$11.00 | \$8.85 |
| Margin | \$2.25 | \$2.00 | \$2.00 | \$2.25 | \$3.75 | \$2.45 |

FEED REQUIREMENTS

As has been previously mentioned, the most economical ration that has thus far been worked out is composed of cottonseed meal, alfalfa hay, and silage, composed of hegari or corn. In calf feeding, the use of at least a small amount of grain has been found to be essential. While some groups of yearling heifers and steers have been successfully fattened without the use of grain, a small amount of grain in the ration is quite desirable.

Cattle 2 years old and older can be successfully fattened on a ration of cottonseed meal, alfalfa hay and silage without the use of grain.

Based on 5-year average prices of feeds and results obtained by the University of Arizona Experiment Station and other institutions, rations in the following table in approximately these proportions have been found to be the most satisfactory.

The following table has been prepared from data secured from the feeding of a good grade of cattle. For example: 400-pound calves are above the average in weight for Arizona. Also there are many groups of range yearlings in the State that will not average 500 pounds in weight. In such cases, the daily ration as well as the daily gain would be less.

TABLE XXXII.—RATIONS FOR CATTLE OF VARIOUS AGES.

| | | Grain | Meal | Hay | Silage | Daily gain | Days required to finish | Total average gain | Finish weight |
|------------|-----|-------|------|-----|--------|------------|-------------------------|--------------------|---------------|
| Calf | 400 | 3* | 3 | 7 | 20 | 2.00 | 180 | 360 | 760 |
| Yearling | 500 | — | 3 | 3 | 30 | 2.00 | 120† | 240 | 740 |
| Two-year | 650 | — | 3 | 4 | 45 | 2.25 | 120 | 270 | 920 |

* For last 90 days only.

† Many times it is more profitable to feed yearlings 150 days.

Cost 100 lbs. gain:

| | |
|----------------|--------|
| Calf | \$9.10 |
| Yearling | 8.00 |
| Two-year | 9.75 |

TABLE XXXIII.—COST OF PRODUCTION AND SELLING PRICE BASED UPON AVERAGE PRICES OF FEED FOR FEEDER AND FAT CATTLE PERIODS 1923-1927.

| | |
|--|----------------|
| 650 lb. steer @ | \$41.60 |
| Daily ration: | |
| 3 lbs. cottonseed meal | @ \$35.00 |
| 4 lbs. alfalfa hay | @ 15.00 |
| 45 lbs. silage | @ 6.00 |
| Total feed cost 120 days | 26.10 |
| Depreciation and interest on investment in equipment | .50 |
| Labor | 2.50 |
| Interest | 1.10 |
| Death loss | .85 |
| | <u>\$72.65</u> |
| 2¼ daily gain for 120 days—920 steer @ \$8.85 | \$81.42 |
| Profit | <u>8.77</u> |

COST OF 100 POUNDS OF GAIN

The final test of a ration is the cost of 100 pounds of gain. In the above table is shown the approximate cost of 100 pounds of gain, using the following prices: Cottonseed meal, \$35.00 per ton; ground hegari, \$35.00 per ton; alfalfa hay, \$15.00 per ton; silage, \$6.00 per ton. The cost of gain on calves is high because of the use of grain.

Market values are not always based upon feeding value of different feeds. Many times a cattle feeder in this section finds it necessary to make changes in the ration shown in the above table, for reason of price or of shortage in supply. For example,

much more alfalfa hay could be fed satisfactorily, but in comparison of alfalfa hay and cottonseed meal both in price and feeding value, cottonseed meal is much the cheaper.

In feed value, 1 pound of cottonseed meal containing 40 percent protein is equal to $3\frac{1}{2}$ pounds of good alfalfa hay.

Silage has about one-third the value of alfalfa hay and two-thirds the value of cottonseed hulls. Up to about 3 pounds per head per day, cottonseed meal has about two and one-half times the value of hegari or barley. While prevailing prices would warrant the use of certain feeds to the complete exclusion of certain other feeds, other points must be taken into consideration. The same result cannot be obtained when alfalfa hay is entirely eliminated from the ration. Although cottonseed hulls are one and one-half times as valuable as silage from a standpoint of gain, cattle obtain a more desirable finish and can be carried profitably much longer on silage than when cottonseed hulls are used.

METHODS OF PRODUCTION IN USE

Methods of feeding might be divided into three classes as follows: First, the use of pasture for the entire fattening period. Second, pen feeding for the entire fattening period. Third, the use of pasture for the first part of the fattening period, finishing being carried on in feed pens.

In the first method both straight alfalfa pasture and alfalfa-barley pasture are used. Sometimes, when the price of alfalfa hay permits, the pasture is supplemented with 5 to 10 pounds of hay per head per day during the winter months.

In pen feeding the following rations are in use:

- Alfalfa hay and silage
- Cottonseed meal, and silage
- Cottonseed meal, silage, and alfalfa hay
- Cottonseed meal, silage, alfalfa hay, and grain
- Cottonseed meal, and cottonseed hulls
- Cottonseed meal, cottonseed hulls, and grain

During the early farming history of the County, when alfalfa hay was very cheap, cattle were fattened on alfalfa hay alone, but this method has long ago passed into the background.

If the price of alfalfa hay and grain permitted, a very desirable ration can be secured. At one time this ration was used to some extent, but advancing prices soon eliminated it.

The chief objection to pasturing is delay in production. Cutting the hay returns the ground immediately to growing a

new crop, while pasturing requires a grazing period nearly equal to the period of growth, before a new crop can be started. Continuous pasturing also brings on a growth of weeds, which greatly shortens the life of a stand of alfalfa. If alfalfa is to be pastured at all it should not be pastured during the period of April to July as this is the period best suited to hay production.

However, the agriculture of the County has not yet reached such an intensive state that some cheap summer pasture is not available. Beef cattle are the only means of utilizing this feed.

Supplies of feeder cattle come into the County during the months of April and May, and during October and November. The cattle arriving in the spring are taken care of on pasture until fall and generally are then placed in feed pens.

Cattle arriving in the fall are placed in pens immediately as the months of October and November are the period of shortest feed supply.

From a standpoint of management, cattle feeding has been conducted by two classes of operators, those who own cattle and purchase their entire supply of feed; and those who carry on cattle feeding as a part of their general farming operations. The first-mentioned class has confined its operations largely to pasture feeding with a few recently beginning to use the feed pens of commercial companies from whom they purchase feed. The last-mentioned class, however, has proved to be the more permanent.

Cattle feeders who operate on their own land often purchase some feed or pasture in addition.

It is not considered advisable to attempt cattle feeding on farm units of less than 160 acres in size. The most successful operators believe that for best results a man should own or control at least half of the land required for his annual feeding operations.

Feeder cattle are supplied to Maricopa County from all the range sections of the State.

RELATION TO OTHER FARM INDUSTRIES

Through previous study and as a result of the survey it is quite evident that if the present production per acre of cotton and vegetable crops is to continue, the supply of soil fertility must be maintained.

The present value of land for this purpose can be largely attributed to a long period of previous use for alfalfa growing. Up to the time of the outbreak of the World War, much of the

alfalfa land of the County was used entirely or for a large part of the year for the production of pasture, either alfalfa or alfalfa and barley mixed. As a result of this method of harvesting the crop, much humus was returned to the soil, in addition to the amount of fertility supplied by the alfalfa plant.

Increased costs of production with increasing land values are eliminating much of the use of alfalfa for pasture but the value of the alfalfa plant for soil fertility is of outstanding importance. This fact is recognized to the extent that vegetable growers now use only land that just previously has been in alfalfa and they much prefer that alfalfa be grown on this land for at least 3 years previous to its use for vegetable growing.

During the fall and winter months when haymaking is not desirable, two valuable crops of pasture can be produced without interfering seriously with the program of hay production. While this pasture has a value for cattle feeding, it can be used more profitably by dairy cattle or ewes that are used in the production of early lambs.

Sheep have been using a large portion of this class of feed that is not consumed by dairy cows and during some years have overbid the dairy industry for it. As to the future proportional use of the feeds here by the various kinds of livestock, much depends upon future prices of early lambs and dairy products.

The development of the cotton-growing industry in the County has made an added place for cattle feeding, by providing a cheap concentrate in the form of meal and a roughage in the form of hulls.

A feed crop that is seldom produced as a major crop, but which has a great value in cattle feeding, and one which can be grown at a time of the year when land might otherwise be idle, is a silage crop. Land that has been released from lettuce growing in the spring can be planted to a silage crop in summer and the crop harvested in time for the fall planting of alfalfa.

Some farmers in the past have preferred a rotation of alfalfa and grain growing to the growing of cotton or vegetables. When alfalfa land is alternated with grain growing, silage can successfully be grown on the same land following the grain crop. In this way a fair return per acre can be secured at a small labor expense.

From information obtained in this survey, it appears that silage production has a place in the agriculture of the County.

In brief, it might be said that cattle feeding under present conditions has the following functions:

It affords an opportunity for maximum production by using alfalfa, pasture, and silage.

It is a means of marketing crops with a minimum amount of labor and equipment.

It utilizes lower grades of hay and by-products of the cotton industry to best advantage.

Affords an occupation for persons who like livestock, but do not have a temperament suited to the dairy industry.

The most important point of all is that it returns the maximum amount of fertility to the soil.

Even though the industry has faced many serious difficulties in fluctuation of feed supplies and prices, as well as broad fluctuations in cattle prices, cattle feeding has remained as a continuous and important part of the farming system of a number of very successful farmers of Maricopa County.

MARKET SITUATION

Mention has already been made of the situation as to annual supply and demand, showing that while the annual supply and annual consumption of the County are about equal and also that the situation by months is not the same, the fact that at times more fat cattle are produced than the local markets can consume, makes it essential that a careful study of outside markets be made.

There is little doubt but that Pacific Coast points will continue to be our best and only outside market. Evidence of this is:

That the percentage of increase in population in California during the past 5 years has been more than two and one-half times the percentage of increase in population of the United States.

The beef-cattle population of California and the 12 states most favorably located to California has not increased during the past 5 years.

Maricopa County points have a great advantage, due to the fact that beef cattle from here can be shipped to Los Angeles at one-half the expense that cattle can be placed in Los Angeles from Missouri River points.

OUTLOOK

The rapidly increasing population of Maricopa County should continue to make cattle feeding sufficiently profitable to compete more ably with other livestock industries of the County for feeds.

Outside market conditions are favorable for the future. If local markets or outside markets should desire in the future a supply of finished cattle throughout the year, it can be successfully produced here. Considering this information, with the fact that beef cattle can best use lower grades of hay as well as cottonseed feeds, beef cattle production should continue to have a permanent place in the agriculture of Maricopa County.

IMPORTANT POINTS

Some outstanding points in this survey were that a cattle feeder, in order to be successful, must be a successful farmer as well as a good judge of both feeder and fat cattle. Also, quality in cattle is a great factor in success. Beef cattle must not only be well bred to be profitable under Maricopa County conditions, but they must be produced on ranges where there has been sufficient feed for proper development. Often the difference in the return received from good cattle and common cattle is the difference between a profit and loss.

RECOMMENDATIONS

We, the Beef Cattle Committee of the Agricultural and Economic Survey of Maricopa County, present the following for your approval:

1. That the best farm practice is the use of alfalfa in rotation with the growing of cotton, vegetables, grains, and other farm crops; and that the system of rotation should be arranged so that not less than 40 percent of the land used for the growing of these crops is planted to alfalfa at all times.

2. That until such a time as the expansion of the dairy industry or the development of an outside hay market replaces beef production, we believe that it can be profitably conducted in Maricopa County. This recommendation is based on the following observations:

(a) The gradually increasing demand for slaughter cattle on the Los Angeles market.

(b) The gradual increase in annual shipments of Arizona cattle to California.

(c) That Arizona ships more than twice as many cattle into California each year as any other state.

(d) That the percentage of increase in population in California during the past 5 years was more than two and one-half times the percentage of increase in the United States.

(e) The beef-cattle population of California and of the 12 states most favorably located to California shows no increase during the past 5 years.

(f) That Maricopa County points are favorable because of a shipping charge of only about half that from Missouri River points to Los Angeles.

(g) That the annual slaughter in Maricopa County now approximately equals, and sometimes exceeds the production.

(h) That the production of beef in Maricopa County has been profitable during the past 5 years.

3. Beef-cattle production should not be attempted on units smaller than 160 acres, and when it is conducted on larger areas the parts of the land used should be located in as close proximity to each other as possible.

4. We consider the exclusive use of land for pasture as an undesirable practice.

5. We believe the best practice is one which provides for the making of some hay during the period of April 1 to July 31 for use as a supplement to pasture during the winter months, and especially during periods of rainy weather.

6. That pen fattening has a place under certain conditions, such as the use of cottonseed hulls and ensilage; where the production of the latter is carried on in connection with the growing of grain crops.

7. That silos, especially trench silos, can profitably be used in pen feeding.

8. Where it has now been proved that cattle can be finished successfully in Maricopa County during the warmer months, that a greater effort should be made to give our local market a sufficient supply of finished cattle throughout the year; paying as close attention as possible to the fact that the months of October and November are the period of the State's greatest beef supply, and also the period of shortest feed supply in the County.

9. In closing, the committee desires to call special attention to the following:

Many failures in the past have been due to the lack of experience and fundamental training of those engaged in the industry; that a successful cattle feeder must not only be a successful farmer, but he must also be a judge of both feeder and fat cattle; and that securing good quality in cattle is of utmost importance.

W. T. Tweedy, Chairman
 Cecil H. Miller
 E. E. Jack
 C. U. Pickrell, Secretary.

TABLE XXXIV.—CATTLE SHIPPED INTO CALIFORNIA, BY CARLOADS, SHOWING STATE OF ORIGIN.

| | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 | Total |
|--------------------------------|-------|-------|-------|-------|-------|-------|--------|
| Arizona | 4,527 | 2,966 | 3,532 | 5,318 | 6,619 | 8,455 | 31,515 |
| Nevada | 1,832 | 2,136 | 2,667 | 3,215 | 3,143 | 2,909 | 15,902 |
| Utah | 832 | 1,019 | 1,836 | 2,779 | 2,656 | 2,303 | 11,425 |
| Oregon | 1,170 | 1,357 | 1,305 | 1,314 | 1,427 | 840 | 7,413 |
| Idaho | 724 | 734 | 1,659 | 1,455 | 1,632 | 1,060 | 7,264 |
| New Mexico | 2,101 | 724 | 739 | 1,140 | 1,008 | 1,125 | 6,897 |
| Texas | 1,358 | 875 | 1,013 | 981 | 1,169 | 717 | 6,113 |
| Colorado | 1,029 | 191 | 527 | 462 | 266 | 341 | 2,816 |
| Montana | 275 | 181 | 653 | 335 | 580 | 221 | 2,245 |
| Wyoming | 417 | 257 | 280 | 422 | 453 | 215 | 2,044 |
| Washington | | 27 | | 34 | 52 | 17 | 130 |
| Missouri River points | 151 | | 63 | 33 | | 63 | 310 |
| Mexico | | | 68 | 23 | 165 | 223 | 479 |
| Canada | | | | | | | 43 |

TABLE XXXV.—TOTAL SHIPMENTS OF CATTLE FROM ARIZONA 1920 TO 1927 INCLUSIVE.

| | 1920 | 1921 | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 |
|--|---------|---------|---------|---------|---------|---------|---------|---------|
| Total cattle shipped from Arizona | 194,357 | 191,083 | 209,083 | 219,587 | 257,089 | 307,288 | 323,429 | 378,814 |
| Cattle shipped from Arizona to California | 84,196 | 103,751 | 148,332 | 136,466 | 143,805 | 226,294 | 234,909 | 306,472 |
| Percentage of Arizona cattle shipped to California | 43 | 54 | 71 | 62 | 56 | 74 | 71 | 81 |

SLAUGHTER UNDER FEDERAL INSPECTION AT LOS ANGELES

| | Cattle | Calves |
|------------|---------|---------|
| 1922 | 229,944 | 97,693 |
| 1923 | 277,692 | 129,083 |
| 1924 | 285,854 | 136,833 |
| 1925 | 298,630 | 157,253 |
| 1926 | 300,518 | 145,596 |

BEEF-CATTLE POPULATION

| | California | 11 Western States and Texas |
|------------|------------|-----------------------------|
| 1922 | 1,380,000 | 14,579,000 |
| 1923 | 1,435,000 | 14,027,000 |
| 1924 | 1,478,000 | 14,489,000 |
| 1925 | 1,330,000 | 14,190,000 |
| 1926 | 1,322,000 | 14,330,000 |
| 1927 | 1,360,000 | 12,769,000 |

TABLE XXXVI.—LOS ANGELES PRICE FOR GOOD BEEF STEERS,
1,100 LBS. DOWN.

| | 1922 | 1923 | 1924 | 1925 | 1926 | 1927 |
|-----------------|------|------|----------|-------|-------|-------|
| January | | 7.97 | 8.65 | 8.17 | —8.60 | 8.94 |
| February | | 7.53 | 8.88 | 7.92 | —8.59 | 8.86 |
| March | | 7.86 | 8.96 | 8.52 | 8.84 | 9.01 |
| April | | 7.64 | F&M Dis. | 9.09 | 8.69 | 9.23 |
| May | | 7.24 | 8.40 | 8.86 | 8.36 | 8.99 |
| June | | 7.21 | 8.31 | 8.41 | 8.26 | 8.93 |
| July | | 7.33 | 8.22 | 8.11 | 8.20 | 8.93 |
| August | | 7.44 | —7.47 | —7.38 | 8.20 | 9.23 |
| September | | 7.66 | 8.14 | —7.72 | 8.26 | 9.45 |
| October | 7.79 | 7.45 | 8.34 | —7.76 | 8.30 | 9.62 |
| November | 7.89 | 8.01 | 7.96 | —7.88 | 8.47 | 10.16 |
| December | 7.96 | 8.24 | 7.97 | —8.11 | 8.85 | 11.06 |

REPORT OF THE SWINE COMMITTEE

By

E. B. STANLEY, Committee Secretary

Swine raising on the Salt River Valley Project has never become established on a commercial basis as an integral part of the agricultural system. Sporadic attempts at pork production on a large scale have invariably met with failure. During the first few years following the opening of the Salt River Valley Project, the hog population of the County reached its highest peak. The marked increase in hogs at this time was attributed to the large acreage devoted to grain crops that were being raised on the new project land. Following this peak period (1915-17) in hog production, a pronounced decrease in the number of hogs occurred, the reduction continuing until 1921, when a strong upward swing in the hog market increased the hog population of the Salt River Valley temporarily for 3 years, but falling back again to the lowest number ever recorded in the history of the Project as shown in figure 16.

HOGS AND GRAIN - S.R.V. PROJECT - 1914-'28

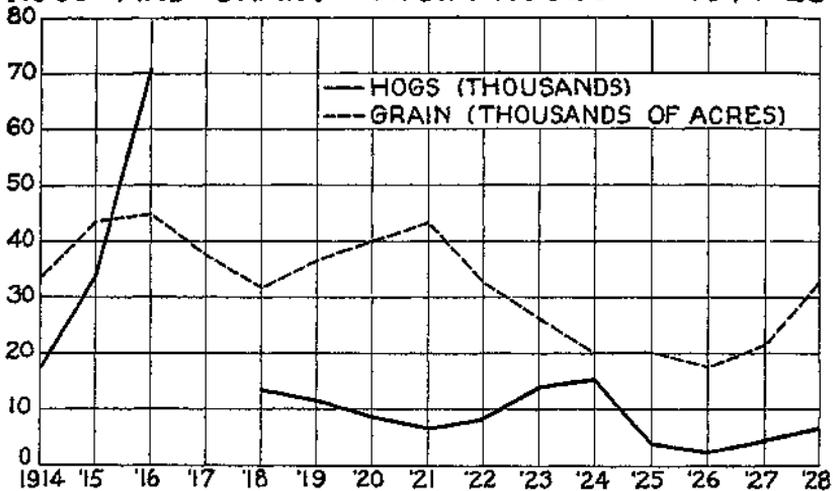


Fig. 16.—Showing the trends in swine and small grain production on the Salt River Valley, Arizona, Project—1914 to 1928,

It is significant that the production of small grains—barley, grain sorghums, and corn—has undergone a rather steady decline over the same period, marking the decrease in hog produc-

tion. The hog is dependent upon concentrates, principally grain, for the major portion of its subsistence; hence, any material change in the supply of grain feed would have a direct bearing on the hog business. A comparison of the trends in swine and small grain production is shown in figure 16.

The role of the hog in the Salt River Valley is largely that of a scavenger. Where skimmilk, as a by-product of dairy farming is available, hogs will be found, though only as an exception do hogs constitute any more than an incidental phase of the farming system.

RECOMMENDATIONS

The trend of the agricultural system in the Salt River Valley is away from the production of grain feeds (sorghums, barley, and corn), toward a more highly intensified and specialized type of farming more in keeping with our natural advantages. The curtailment of grain production has necessarily been accompanied by a concurrent reduction in swine, since the hog is dependent for the major portion of its ration, upon grain feeds. The status of the hog business, largely because of its dependence upon the availability of grain feeds, is now and will be reflected by the relative position that the production of grain feeds will occupy with respect to the agricultural system. Other livestock enterprises, dairy, poultry, and sheep and cattle feeding are to be reckoned with as an outlet for the grain and other staple feed crops. Hog raising, as a business, must constitute a profitable means of utilizing a grain crop. Unless hogs can increase the net returns to the farm above that of the alternative of marketing the grain crop direct, the hog business cannot justify its existence, at least on a commercial scale.

Aside from the freight differential, hogs produced in the corn belt are in direct competition with locally produced pork. The prevailing level of local grain prices is not conducive to competitive hog production on a commercial scale with the corn belt section.

The remunerative method of hog raising in the Salt River Valley is in conjunction with dairying or utilization of other by-products. The material saving in the amount of grain required to fatten hogs, effected by the use of dairy products, increases the net returns from hogs. The hog lends itself to production in small numbers on farms as a scavenger to consume waste products.

Carl Holmes, Chairman
Tom Owens
E. B. Stanley, Secretary

REPORT OF THE GRAPES AND DATES COMMITTEE

By

D. W. ALBERT, Committee Secretary

DATES

The date palm was one of the first plants to be put under cultivation. It has been and still is the most important food plant to the people living in the great desert regions of the Old World. Many of the desert areas in Africa and Arabia would not be habitable if it were not for this plant. The commercial date growing sections of the Old World are located in the hot semi-arid regions of northern Africa, including the Middle Nile Valley, Arabia, Mesopotamia, and southwestern Persia.

Factors limiting commercial date production might be summed up briefly as follows: A long, hot growing season; moderate winter temperatures; low atmospheric humidity during the ripening season, an abundant supply of water for irrigation.

There is only a relatively small area in the United States that will conform to the above requisites. This area is confined, for the most part, to the hot desert section in the southwestern part of Arizona and southeastern California. The date palm is grown in many other sections of the South, but only for ornamental or shade purposes, commercial date production being prohibited by high humidity in the coastal sections, and by humidity and lack of sufficient heat units in the interior sections.

More than a quarter of a century has passed since the first imported date offshoots were planted in Arizona and California. For many years before, seedling dates had been grown, but no attempt had been made to commercialize them except to a limited extent in Sonora and Lower California where there is an old Mexican adage that "the date is the tree of the future." At the present time we are beginning to see the realization of the old adage. One thing held the industry back in Arizona—confidence in the date as a safe, economic venture.

The date being entirely different from any of the horticultural plants grown in this country, many problems confronted the new industry. Problems on propagation of offshoots, ripening of fruit by artificial means, behavior of varieties, insect control, and general cultural practices had to be solved experimentally. Progress on the solution of these problems was, of

necessity, slow. While the final solution has not been found for all these problems, progress has been such that it has reached commercial application.

The consumer has accepted the American-grown fresh date at a price few other fruits can command. The limited area in which dates can be produced in this country will assure profitable returns to the producer for good quality dates for many years to come. Inferior quality dates will meet direct competition with the imported product which can be placed on the market and sold for less than the cost of production in this country.

GRAPES

The grape industry in Arizona is very closely linked with that of California. The relationship is particularly close between Arizona and Riverside, Imperial and part of Kern counties, where the crops are harvested at approximately the same time. Another close relationship lies in the fact that the bulk of Arizona grapes is sold through the California Fruit Growers' Exchange.

During the years of high prices at the close of the World War the grape industry was expanded rapidly in Arizona and California. In Arizona the unit of planting was small and usually subsidiary to other farm operations. When the new plantings came into production the price received for the fruit was not as high as had been anticipated. This resulted in partial neglect of many of the small vineyards, which in turn further reduced the net return. Quite a large number of these small vineyards have been taken out or commercially abandoned during the last 2 or 3 years.

Those vineyards of sufficient size to warrant personal supervision of cultural practices and equipment for production and handling the crops have for the most part made satisfactory returns. Probably few other crops are subject to so many hazards and require the detailed supervision as grapes. Not only is this true of the growing and handling of the crop at the vineyard, but in the shipping and marketing as well. Unfavorable weather conditions in the eastern markets when the crop is ready for shipment may so reduce the demand that the price may drop below the cost of production. Another element tending toward instability in market demand is the competition with other fresh fruits. During the month of July when the bulk of the Arizona crop is ready for shipment there are more fresh fruits sold on the market than during any other one month of the year.

RECOMMENDATIONS

We, the Grapes and Dates Committee of the Agricultural Economic Survey of Maricopa County, present the following for your approval:

GRAPES

1. In view of the fact that the percentage of failures in the past has been so large, it does not appear advisable to encourage further expanding of the grape industry at the present time. This does not imply that vineyards properly handled and of sufficient acreage to carry the overhead costs of producing good quality grapes, have not nor will not continue to show a profit.

2. More attention and study should be given to the production of better quality and increased yield of fruit. The added expense of obtaining high quality in grapes is more than offset by the price received. Factors pertinent to the production of good quality fruits are:

- (a) Better insect control.
- (b) More and better fertilization.
- (c) Improved pruning practices.
- (d) More and more careful thinning of fruit.
- (e) More careful irrigation and cultivation.
- (f) Better grading and more careful handling.

3. In view of the favorable attitude of the retail trade toward the lug cushion (stem up) pack, billed and labeled for table grapes, it is recommended that this type of pack be used especially for the better grades of fruit. The importance of grade and pack cannot possibly be over estimated.

4. A very careful study of market trends and varieties should be made by everyone contemplating planting grapes.

DATES

1. The acreage planted to dates in Arizona at this time is small, but indications are that it will be increased as rapidly as desirable offshoots are available.

2. Arizona has a larger area suited to the production of dates than any other one section in the United States.

3. We believe that date culture will prove more profitable than any other agricultural food crop, provided only that judg-

ment is shown in the selection of location, soil, and of varieties of superior quality suited to our climatic conditions.

4. There is no danger of overproduction or unprofitable prices for a great many years, for the following reasons:

(a) The acreage in the United States that can produce dates commercially is limited.

(b) The number of offshoots is limited.

(c) America imports 70,000,000 pounds of dates annually. The number of pounds of fresh dates grown in the United States is approximately 1,000,000. This makes the per capita consumption a little more than one-half pound, which, compared to European countries, is very insignificant.

5. Date growers must place on the market, a product that is greatly superior in quality to the imported dates, for the reason that imported dates can be produced and delivered to our eastern or western seaboard for less than the cost of producing dates in this country.

6. Anyone contemplating going into the date business should first make a careful study of all factors.

Col. Dale Bumstead, Chairman
E. S. Boles
Roy Franklin
D. W. Albert, Secretary

REPORT OF THE DECIDUOUS FRUITS COMMITTEE

By

A. F. KINNISON, Committee Secretary

Deciduous fruit production in the Salt River Valley is of very little importance as a commercial enterprise. During the past several years land devoted to these fruits has approximated 1,000 acres, and the bulk of the production is consumed on the farm or sold to local and nearby markets. Only rarely has a full carload of any deciduous fruit been shipped from the Valley during the past few years. Small express shipments of apricots and plums go to various points in Arizona, New Mexico, Texas, and Colorado each year, but these markets appear to be adequately cared for by the present bearing acreage.

It is unlikely that an increase in the bearing deciduous fruit acreage of the Salt River Valley resulting in carlot movement to eastern consuming centers would meet with success.

California has about 40,000 acres planted to plums, 10,000 acres to apricots, and more than 175,000 acres in bearing peaches. A large percentage of the California production of these fruits is canned or dried, and should the fresh fruit markets be able to absorb more of the fresh fruit at a profit to the producer, an increased tonnage could be diverted from canning or drying channels. In the case of apricots only 2 percent of the total California production is disposed of in the fresh fruit markets.

While it is true that the Salt River Valley has an advantage of somewhat earlier maturity over many California producing sections this advantage is more apparent than real. Restricted districts of the hot interior valleys have practically as early maturity and have many times the acreage devoted to deciduous fruits as has the Salt River Valley.

During the 1926 season, California carlot shipments of apricots were started the week of May 8-15. During the week of May 15-22, 20 cars were shipped; 93 cars moved during the week of May 22-29, and 115 cars the week of May 29-June 5. The Newcastle variety from the Salt River Valley would be out of the way before heavy California shipments start, but the Royal, which is the most important shipping variety, would compete with the heavy shipments from California during the period from May 22 to June 10.

The plum situation is quite similar to that of the apricot, with certain California districts enjoying practically as early maturity as the Salt River Valley.

Nearly 1,000 cars of fresh plums were shipped from California to eastern markets during June, 1927, which comprised 35 percent of the total movement of fresh plums and prunes from that States. In addition, California shipped 750 cars of mixed deciduous fruits during the same period.

Large quantities of other fresh fruits compete directly with California deciduous fruits during the Salt River Valley season of maturity. In 1926 nearly 27,000 cars of such fruits were shipped to the consuming centers of the country during the period from May 16 to June 12. These shipments consisted in large measure of strawberries, watermelons, cantaloupes, and peaches.

It now appears that the commercial production of peaches in the United States is greater than the markets of the country can absorb. Georgia leads all other states in carlot shipments of peaches, with a total of nearly 12,500 cars in 1925. Twelve other states, however, ship annually more than 1,000 carloads each. Georgia peaches are the first to reach the market, the shipments attaining considerable volume by the last week of May. The 1928 peach crop for Georgia was rather disastrous, since a large crop was harvested, and distribution was not sufficiently wide to avoid an over-supply, with resultant low prices in many eastern markets.

RECOMMENDATIONS

The Committee on Deciduous Fruits is of the opinion that an increase in the present acreage of deciduous fruits in the Salt River Valley is not justified in view of the fact that the present production is sufficient to supply the limited markets available. A possible exception to this is the peach, where local production is not sufficient to supply the Valley markets.

The large consuming centers of the East are abundantly supplied with a diversity of fresh fruit and melons, during the greater part of the Salt River Valley's producing season.

An annual planting of not to exceed 100 acres, is justified to maintain the present acreage.

The following cultural suggestions play an important part in tree health and longevity and in the production of satisfactory crops of high quality fruits.

1. Only clean, healthy stock should be planted.

2. Land infested with root rot, nematodes, or with a shallow water table should be avoided.

3. The Newcastle and Royal varieties of apricots and the Beauty and Santa Rosa varieties of plums are best adapted to shipping. Other varieties which will prolong the season on local markets may be used.

4. Trees should be pruned every year. The intermediate system is recommended.

5. Systematic and intelligent thinning of the fruit is necessary.

6. The annual application of barnyard manure or the incorporation of a green manure crop, is desirable.

7. The maintenance of adequate soil moisture, particularly immediately prior to blossoming, when fruit first starts to break color, immediately following harvest, during August and September for fruit bud development and in late fall, is important.

It is apparent that the life of deciduous fruit trees is materially shortened by continued, excessive irrigation.

A. G. Bailey
Ernest R. Hall
L. H. Seargeant
A. F. Kinnison, Secretary

REPORT OF CREDIT AND FINANCE COMMITTEE

By

M. E. BEMIS, Committee Secretary

The total area of Maricopa County is 5,690,240 acres. The total area of all land assessed is 931,922 acres. The area in cities and townsites would not exceed 10,000 acres. Patented mining claims and all other property which includes land could hardly make the grand total area 1,000,000 acres, therefore the land area from which county and state revenue is derived is less than one-fifth of the total area. Most of this four-fifths non-taxed land is Public Domain, Indian Reservation, or Forest Reserve, with a relatively small acreage of State lands.

It would seem that there is a considerable area of land that is within established irrigation projects or that is equipped with pumps which is not classed as irrigated land by the assessor. A compilation of the various projects made by the Chamber of Commerce in February of this year indicates 363,220 acres under irrigation. (See Table XXXVIII.)

Since that date the Roosevelt Water Conservation District has put under irrigation over 10,109 acres. The Beardsley Project has under irrigation about 12,000 acres and the Roosevelt Irrigation District approximately 15,000 acres. This would make a total of 400,329 acres which have been irrigated and farmed during the season of 1928. Probably 30 to 40 thousand acres additional will be available for irrigation in 1929 in the new irrigation projects.

INDEBTEDNESS OF THE PROJECTS*

Salt River Project:

Due United States Reclamation fund\$ 5,489,651.84

Bonded indebtedness:

Mormon Flat Development 1,800,000.00

Horse Mesa Development 4,743,000.00

Stewart Mountain 4,100,000.00

Short time bonds 1,000,000.00

\$17,132,651.84

The physical valuation of the dams, power plants and power lines with the proposed Stewart Mountain Development and Valley Lines, together with pumping plants to be installed is approximately\$29,000,000.00

* From records of Salt River Valley Water Users' Association.

| | |
|---|--------------|
| Roosevelt Water Conservation District, total bonded indebtedness | 3,750,000.00 |
| Roosevelt Irrigation District | 2,500,000.00 |
| Beardsley Irrigation District, or Maricopa County Municipal Water Conservation District No. 1 | 4,500,000.00 |

It is estimated by the writer that 90 percent of all farm lands in the Salt River Project are mortgaged at \$75.00 to \$100.00 an acre.

TABLE XXXVII—ASSESSED VALUATION OF LAND IMPROVEMENTS AND LIVESTOCK, MARICOPA COUNTY, 1928.

| Description | Number | Unit value | Valuation |
|---|------------|------------|---|
| Irrigated land, or subject thereto | 265,938.42 | \$ 115.59 | \$ 30,739,895 |
| Improvements on above | — | — | 4,822,245 |
| Dry-farming land | 53,533.67 | 25.86 | 1,384,375 |
| Improvements on above | — | — | 175,485 |
| Grazing land | 612,449.83 | 7.12 | 4,357,610 |
| Improvements on above | — | — | 305,095 |
| Poultry, dozen | 18,635 | 6.04 | 112,575 |
| Turkeys, dozen | 79 | 12.09 | 955 |
| Ostriches | 15 | 5.00 | 75 |
| Bees, stands of | 1,439 | 5.00 | 57,235 |
| Horses, stock | 157 | 15.45 | 2,425 |
| Horses, range | 456 | 16.24 | 7,405 |
| Horses, work—Class A | 65 | 101.54 | 6,600 |
| Horses, work—Class B | 3,851 | 44.49 | 171,330 |
| Horses, saddle | 733 | 41.72 | 30,580 |
| Horses, stallions | 9 | 111.11 | 1,000 |
| Mules, Class A | 240 | 100.00 | 24,000 |
| Mules, Class B | 2,781 | 44.07 | 122,550 |
| Asses | 90 | 3.89 | 350 |
| Jacks | 2 | 100.00 | 200 |
| Cattle, range | 12,942 | 17.60 | 227,805 |
| Cattle, steers, 2 years and up .. | 5,911 | 26.29 | 155,415 |
| Cattle, stock | 1,842 | 22.87 | 41,780 |
| Cattle, beef or feeders | 5,316 | 30.54 | 162,370 |
| Cattle, milch cows, A | 713 | 100.49 | 71,650 |
| Cattle, milch cows, B | 12,389 | 52.99 | 656,530 |
| Cattle, bulls, farm | 545 | 73.84 | 40,245 |
| Cattle, bulls, range | 161 | 38.29 | 6,165 |
| Sheep | 27,086 | 5.94 | 160,835 |
| Sheep, bucks | 473 | 14.27 | 6,750 |
| Goats, common | 45 | 2.00 | 90 |
| Swine | 1,984 | 9.80 | 19,445 |
| Machinery and equipment | | | 1,590,310 |
| | | | \$ 45,461,361 |
| | | | About 35 per- cent of total assessed valua- tion of the County. |
| The total assessed valuation of all property in Maricopa County for 1928 is | | | \$132,399,944 |

TABLE XXXVIII.—IRRIGATION PROJECTS IN MARICOPA COUNTY WITH SOURCE AND COST OF WATER.

| Project | Source of water | Cost of water | Acres now irrigated | Possible of irrigation |
|-------------------------------|--|----------------------|---------------------|------------------------|
| Salt River Project | Salt River Pumps | \$1.50 per acre-foot | 240,000 | |
| Acadia | | | 1,500 | |
| Goodyear | | | 8,500 | |
| Roosevelt water | Pumps and cooperative with S. R. V. Dist. | \$6.00 two acre-feet | | |
| Marinette | | \$10 to \$12 an acre | 27,300 | 14,700 |
| West Agua Fria | | | 9,000 | 5,000 |
| Litchon | | | 4,000 | 4,000 |
| Buckeye | Pumps | \$10 to \$12 an acre | 9,000 | 3,000 |
| Arlington | Gila River | Maintenance | 23,000 | |
| Gillespie | Gila River | Maintenance | 4,000 | |
| Enterprise | Gila River | Maintenance | 15,000 | 65,000 |
| Gila Land & Cattle Co. | Gila River | Maintenance | 800 | |
| Wickenburg | Gila River | Maintenance | 1,000 | 4,000 |
| St. Johns | Hasayampa | Maintenance | 300 | 500 |
| Queen Creek | Salt River Pumps | \$10 to \$12 an acre | 1,320 | |
| Indian Reservations | Salt and Gila Rivers Pumps and cooperative with S. R. V. W. A. | | 2,200 | |
| Roosevelt Irrigation District | | | 16,300 | |
| Verde River | Verde River | | | 41,000 |
| Beardsley | Agua Fria | | | 80,000 |
| Nadaburg | Hasayampa | | | 40,000 |
| TOTAL | TOTAL | | 368,220 | 80,000 |

Total of 650,420 acres irrigated and possible of irrigation.

NATIONAL FARM LOAN ASSOCIATIONS OF MARICOPA COUNTY

There are two associations: Salt River Valley National Farm Loan Association, Miss L. M. James, Secretary and Treasurer, Water Users' Building, Phoenix. This Association on April 1, 1928, had a total of 509 members with loans aggregating \$2,517,500. Maricopa County National Farm Loan Association, F. V. Anderson, Secretary and Treasurer, Mesa, Arizona. This Association on March 31, 1928, had a total of 330 members with loans aggregating \$1,533,000.

Each Association elects from its membership a Board of Directors of five, three of whom may constitute a Loan Committee.

Loans are made on lands with established water rights.

A farm must have not less than 10 acres, and loans in the Salt River Project may not be made on larger acreage than 160 acres.

The Loan Board must appraise the value of the land. It is the general experience here that the Land Bank at Berkeley cuts the appraised value about \$40.00 an acre. Loans are then made on 50 percent of the final approved value, but this must not exceed \$100.00 an acre for the land. The loan, however, may be increased to an amount equal to 20 percent of the insurable value of permanent improvements.

Money obtained for loans may be used for paying an existing debt on lands; for improvements on the land; for live stock or for equipment. The history of farm loan associations in this County shows that there have been very few delinquencies in the years which it has been operating. The rate of interest is $5\frac{1}{4}$ percent, plus 1 percent, which is applied to retire the loan in a period of 30 years.

The Association of Pacific Coast Joint Stock Land Banks through the California branch maintains offices in the Ellis Building in Phoenix and loans money on farm lands in the Salt River Project and in a few other parts of the State. Their loans total \$2,500,000.00 in Arizona. About 80 percent of this is in the Salt River Valley. Their rate is 6 percent plus an amount which will amortize a loan in twenty years. This is based on 40 semi-annual payments of \$43.26 on each \$1,000 loan.

LIVESTOCK LOANS

Through an Act of Congress which became a law in 1923, Intermediate Credit Banks were authorized to operate through

local organizations for the loaning of Federal funds on livestock.

Loans are made through Agricultural Credit Corporations and through Livestock Loan Companies.

Locally we have the Arizona Livestock Loan Association with offices in the Ellis Building, Phoenix, authorized to do business in Arizona and New Mexico, and the Pacific National Credit Corporation, also with offices in the Ellis Building. The first named organization is a state-wide institution; the last operates through several Mountain and Coast states, including Arizona.

The procedure is for the customer to make application for the loan. The directors of the Association pass and make recommendations to the Intermediate Credit Bank. Usually these loans are approved, and the inspector employed by the Intermediate Credit Bank, investigates and upon his recommendation the loan is made.

In the case of range cattle, a loan may be up to 50 to 65 percent of the appraisal value; in case of feeder cattle 80 or 90 percent of the purchase price, although in most instances loans are made for 100 percent of the purchase price.

The Loan Association takes security on the stock and the feed in the case of feeder cattle.

On range stock the security on the range equipment as well as on stock is required.

In the matter of forest permittees all matters pertaining to permits are thoroughly checked. If the borrower owns patented land, security is required on the land.

Feeder loans are made for a period of 6 to 12 months. Range loans for a period of 9 to 12 months with renewal for 3 years. The rate of interest is 7 to 7½ percent according to the re-discount rate.

Dairy loans are made for 50 percent of the appraised value and payable at the rate of 3 percent on the principal monthly. These loans run for a period of 9 months and are renewable twice.

There is no cost to the borrower for commission; his only expense is for the inspection service. The inspector receives from \$5.00 to \$8.00 a day and mileage.

HAY AND GRAIN

About 75 percent of the alfalfa hay sold in the Salt River Valley is handled by the Roosevelt Hay Growers' Association, cooperative marketing organization.

The first and second crops of hay are handled as a "spring pool." Usually this is shipped out immediately and returns are made to the growers within 30 days.

The third and fourth crops, sometimes a part of the second, are put in haysheds or warehouses, under the control of the Association, and is known as the "season pool." Advances are made to members on hay stored equal to 60 to 70 percent of the market price of hay at the time this is put into storage. This hay is held until market conditions warrant selling to best advantage. If the market price advances and the growers require additional assistance, further advances are made by the Association to the growers.

The fall crop of alfalfa is marketed usually as soon as harvested. This is known as the "fall pool," and settlement is usually made within 30 days.

The Arizona Hay & Grain Company is a subsidiary organization, which purchases hay of non-members of the Association, and sells to the Association.

Incidental to the operation of the Roosevelt Hay Growers' Association it might be mentioned that the quality of hay has been materially improved since the Association has been operating. Better market prices are being obtained, which means more profit to the grower.

ALFALFA SEED

The Roosevelt Hay Growers' Association handles about 80 percent of the seed produced in Maricopa County. This is handled in a manner similar to the "season pool" of alfalfa hay. That is to say that 60 to 70 percent of the market value of the seed at the time of harvest is advanced to the growers. The seed is held in storage and marketed as conditions will warrant.

GRAIN

The Roosevelt Hay Growers' Association handles a small amount of grain, but at the present time it does not encourage growers of grain to market through the Association.

Competition between mills and feed houses maintains prices of grain to the growers which are considered to be fair, consequently the Hay Growers' Association encourages its members to sell for cash to the mills and feed dealers.

COTTON

The largest medium of financing cotton growers is handled coöperatively through the Arizona Pima Cotton Growers' Asso-

ciation and the Mutual Cotton and Oil Company through the Southwest Cotton Credit Association, which is a subsidiary of the Intermediate Credit Association.

The officers of this company are with the Mutual Cotton and Oil Company. Cotton growers desiring financial assistance make application through the Arizona Pima Cotton Growers' Association, the Mutual Cotton and Oil Company or any of the gins operated by the last named company. A committee of the Cotton Growers' Association investigates and reports. If the committee approves, mortgage papers covering the crop for the season, together with the detailed statement regarding the applicant's financial status, are sent on to the Intermediate Credit Bank. If it is anticipated by the Southwest Cotton Association that the loan will be approved by the Intermediate Credit Bank, a part of the loan is advanced immediately. The average amount of loans is \$15.00 an acre. This is usually advanced in three or four installments.

The crop is inspected at intervals by field men of the Credit Association. The return at the present time is $6\frac{1}{2}$ percent or $1\frac{1}{2}$ percent over the Federal re-discount rate.

The applicant usually signs an agreement to sell his seed to the Mutual Cotton and Oil Company at a definite price based upon definite ratio with the price of cottonseed oil in Dallas.

This year of 1928 there are approximately 800 members in the Arizona Pima Cotton Growers' Association. This includes between 50 percent and 60 percent of the cotton growers in the Salt River Valley and a somewhat larger percentage in the Tucson District, and in the Upper Gila Valley, and a relatively small percentage of growers in the Yuma and Casa Grande districts.

The membership has increased about 125 percent this year over the membership last year, and this Association expects to handle about one-third of all the cotton in Arizona and more than one-half the cotton in the Salt River Valley.