A N N U A L R E P O R T O F
C O U N T Y A G R I C U L T U R A L A G E N T

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G R A H A M C O U N T Y, A R I Z O N A

PERIOD DECEMBER 1, 1927 to AUGUST 4, 1928

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STATUS OF COUNTY EXTENSION ORGANIZATION.

The County Farm Bureau is the legal sponsor of Extension Work in the County. This organization, which has been duly incorporated, has the responsibility for submiting the annual financial budget for carrying the expense of Extension Work within the County.

The program of Extension Work is approved by the officials of the County Farm Bureau. Local committees and the various project leaders assist in formulating plans for the various lines of work undertaken.

PROGRAM OF WORK.

The following is a summary of the program of work adopted for the present year including methods to be employed and goals established:

PROGRAM OF EXTENSION WORK FOR GRAHAM COUNTY, 1928

jects	Methods	Goals
Soils:		
1-Irrigation	Demonstration of proper lay-out of land for irrigation. Use of soil auger and cross-trenching to observe moisture movement in soil. Soil analyses.	More thorough application of water to soil by majority of farmers.
2-Reclamation of alkali soils.	Field demonstrations of method reclaiming soil.	One successful field demonstration of reclamation of alkali soil.
Farm Crops: 1-Alfalfa Hay production.	Hay grading demonstrations. Newspaper articles.	Majority of growers to become familiar with hay grading standards. Majority of growers to adopt production methods making for better quality of hay.

Farm Crops (Continued) 2.Cotton: Pink bollworm eradication.	Cooperation with Federal Horticultural Board in promoting clean-up campaign.	Thorough clean-up of all cotton fields in County to prevent pink bollworm from wintering over.
3.Wheat: Smut Control.	5 Demonstrations of smut treatment	50,000 pounds of seed wheat treated.
Wheat variety tests.		
Horticulture: 1-Pruning	Pruning demonstrations.	20 Fruit growers to prune orchards and vineyards.
2-Spraying	5 Spraying demonstrations.	20 Fruit and vegetable growers to control insect pests.
3-Lettuce Production.	Assistance given growers in adopting best production practices.	Majority of lettuce growers to adopt improved production methods.
Rodents & other pests. 1-Pocket gopher control	15 Method demonstrations. 1 Result demonstration.	2 Demonstration areas cleared of gophers. 500 farmers to adopt control measures.
2-Prairie Dog extermination.	Complete clean-up of infested range.	Complete clean-up of all prairie dog infested areas in County.
3-Rabbit Control.	5 Poisoning demonstrations.	100 Farmers to adopt control measures to protect crops.
Animal Husbandry. 1-Better Sires.	Farmers and ranchers assisted in securing pure bred males.	Majority of farmers to use pure bred sires.
Dairy Husbandry. 1-Dairy Expansion. 2-Herd Improvement.	Dairy Extension School. Dairymen assisted in securing pure bred bulls and producing cows.	All commercial dairymen to use pure bred bulls.
3-Dairy Management.	Dairy Extension School.	All commercial dairymen to adopt best methods of managing dairy herds.

'oultry Husbandry. ·Better Stock.	Poultrymen assisted in securing pedigreed males and in selecting breeding pens. Demonstration of selection of birds for show purposes.	All poultry breeders to use best stock available. Reduction in number of disqualified birds at County Fair.
·Poultry Management.	Poultry Extension School	Majority of commercial poultrymen to manage flocks on scientific and economic basis.
lgriculturl Economics. l-Farm Management.	Cost accounts secured for field beans and lettuce.	Cost accounts kept on 10 lettuce fields. Cost account kept on 10 bean fields.
2-Farm Finance.	Assistance given Directors of local Credit Corporation in promoting use of Federal Intermediate Credit Bank funds.	Majority of farmers requiring production finance for farm products to take advantage of Federal Intermediate Credit Bank funds/ 50 Farmers to use these funds to finance purchase of dairy cattle.
-Marketing Farm roducts.	Assistance given Directors of Cotton Association in increasing membership. Assistance given Hay Committee in hay marketing problems. Assistance given lettuce growers in solving marketing problems. Assistance given poultrymen in solving marketing problems.	Majority of cotton growers to market product through Cooperative Association. Hay market information made available. Lettuce marketing information made available to growers.
Boys' & Girls' Club Work.	Club Leaders' training school to develop leaders for various communities.	10 Club- 100 members to complete work.
County Fair.		Complete County Fair for all local Agricultural products.

PROJECT ACTIVITIES AND RESULTS

SOILS

Irrigation.

While irrigation has been practiced in this County for almost a half century, there are many local farms that do not have a proper lay-out for the effective and economical application of irrigation water to the soil. This situation results in a considerable waste of valuable water and in many cases crop yields are much below what they would be if a uniform and adequate penetration of moisture were secured.

As a step in the direction of improvement of irrigation practices on individual farms, two demonstrations of a proper lay-out of land for the application of irrigation water were established. In both cases the farmers were assisted in running lines for head ditches and in laying out the land for the application of water.

In March a special meeting of farmers was held at which the Extension Irrigation Specialist discussed irrigation problems with special reference to the cotton crop.

Reclamation Alkali Soils.

Approximately 4,000 acres of farm land in the County are partially unproductive because of an accumulation of alkali salts. Most of these areas have been tile drained and a considerable portion of the land has been brought back into production. In some cases an extra effort will be required to reclaim the land that is still unproductive.

For the purpose of promoting the reclamation of the above mentioned areas, a field test and result demonstration was planned for the present year. A suitable location for a demonstration was selected and arrangements made for a cooperator. Preliminary soil analyses of the plots to be reclaimed were made early in the year. It was

planned to border the plots during the spring or summer for flooding and leaching. To date it has not been possible to get the bordering work under way because of the pressure of other farm work on the part of the cooperator.

FARM CROPS.

Alfalfa Hay Production.

Normally there are approximately 12,000 acres of alfalfa in the County. From this acreage approximately 25,000 tons of hay are exported each year to points outside the County. Due to the fact that the markets are constantly demanding hay of better quality and are making a greater differential in price between grades of hay, growers are finding it profitable to familiarize themselves with the grade requirements and to make adjustments in their production methods that will insure the production of hay of the best possible quality.

As a means of familiarizing growers with the U. S. Standard grades of hay, a grading demonstration was conducted early in the year.

During recent years the quality of most of the first cutting of hay has been below normal because of the presence of wild mustard plants in the majority of the alfalfa fields. Two result demonstrations for the control of these weeds were arranged and comparative data on results and costs for the various methods were secured.

It was found that cultivation with the spring tooth or disc harrows was effective provided the work started early enough in the spring. Where the weeds were allowed to get a good start it was practically impossible to eradicate them by cultivation.

While mowing the weeds after they get a few inches high is effective in reducing the weed content of the first crop of hay, this method delays the first cutting considerably and at the same time results in a coarser hay that does not bring the usual premium as choice dairy hay.

Indications are that the least expensive and most effective method of eliminating these weeds from the first crop of alfalfa hay is by means of pulling by hand while the soil is still moist following an irrigation. In this case no attempt is made to get rid of the weeds until they are near maturity.

Pink Bollworm Eradication.

A few specimens of pink bollworm were found in the cotton fields of the County in 1926. Infestation was found in the same fields in 1927. Due to the fact that the local cotton crop usually represents a million dollar industry which would be seriously menaced if the insect became well established here the Federal Horti-dultural Board and State authorities decided to make a determined effort to eradicate the worm before the infestation became too serious.

Control measures including steam sterilization of all seed at time of ginning and the thorough burning over of all cotton fields has been put into effect.

The Extension Service's part in connection with this project has consisted of conducting a campaign to acquaint cotton growers with the necessary facts relating to the clean-up campaign and to assist in securing cooperation in promoting the work. Public meetings were held for informing cotton growers relative to the situation and plan of work.

Wheat Smut Control.

Wheat growers quite generally have not been satisfied with the formaldehyde and blue stone methods of treating seed wheat for the control of smut. This has been because of the inconvenience of these methods and the unsatisfactory seed germination frequently secured as a result of careless methods. The economy, convenience, safety and effectiveness of the dry copper carbonate treatment makes it desirable that this method be adopted by local wheat growers.

As a means of securing the general adoption of the dry copper carbonate treatment a number of method and result demonstrations were conducted. A check was made at the time of harvest and in all cases where this treatment was used the grain was entirely free from smut.

Wheat Variety Tests.

In the hope of securing a better milling wheat than the varieties grown in the County at present, a variety demonstration test was conducted during the past season. Test plantings of the new strain of hard Baart wheat in comparison with soft Baart and Marquis were arranged in such a way as to provide comparative data as to yield as well as milling and baking quality.

The planting of hard Baart and soft Baart on the Layton farm at Thatcher gave the following results:

Hard Baart, yield per acre 2,344 lbs.
Soft Baart, yield per acre 2,114 lbs.

These plantings were in the same field and received the same treatment in both cases.

The soil type is the Maricopa sandy loam.

The plantings of the hard Baart and Marquis varieties on the Stevenson farm at Lone Star gave the following results:

Hard Baart, yield per acre 2,100 lbs.
Marquis, yield per acre 2,039 lbs.

The soil type where these plantings were made is the Maricopa silt loam.

HORTICULTURE

Pruning Deciduous Fruit Trees & Grape Vines.

While the production of deciduous fruits and grapes is of only minor importance in the County, there is always some demand for instruction in pruning methods on those farms where fruit is grown. To meet this demand a series of pruning demonstrations were conducted during the early spring months.

Control of Insect Pests & Plant Diseases.

Each year there is a regular and emergency demand for assistance in connection with the control of insect pests of fruits and vegetables. During the present season spraying demonstrations have been conducted for the control of codling moth and melon aphis.

Lettuce Production.

In the fall of 1927 the first plantings of lettuce on a commercial scale were made in the County. Approximately 500 acres were planted to this crop between the dates of August 17th and September 20th. From this acreage only 40 carloads of lettuce were shipped.

Due to an unusually warm fall the early planted portion of the crop developed seed stalks and consequently was unmarketable. That portion of the crop planted between the dates of September 1st and September 10th matured a fair quality of lettuce and gave the growers a fair return. The late planted crop did not mature in time to escape the cold weather with the consequent weather damage rendering it unmarketable.

The experience with the 1927 fall crop indicates that the planting dates for the successful growing of lettuce may be limited to a period of about 10 days. Since there is normally considerable variation in weather conditions from year to year there appears to be a large element of speculation in fall lettuce growing from the standpoint of production of a crop of marketable quality.

An attempt was made to grow a spring crop of lettuce during the present year. Approximately 1300 acres were planted between the dates January 10th and February 20th. The entire crop did well until near maturity when a large amount of tip burn and considerable bacterial slime developed. These conditions made it impossible to market any of the crop.

A study of local temperature data over a period of years reveals the fact that normally there is considerable variation between high and low daily temperatures during the spring months in this locality. This situation may make it difficult during most years to mature a crop of lettuce of marketable quality.

With the above conditions prevailing it is a serious question as to whether commercial lettuce production will find a permanent place in the local agriculture. However, it is not safe to draw definite conclusions on the basis of the experience of a single year.

The above mentioned attempts to grow lettuce here were sponsored by a produce commission firm which provided their own field service. The Extension Service activities in connection with the crop have been limited to careful field observations as to satisfactory production methods, favorable planting dates, etc., so as to be in a position to render satisfactory service to growers in the event the crop proved successful and profitable.

RODENTS AND OTHER PESTS

Pocket Gopher Control.

Practically all of the farm land of the County is infested with pocket gophers. They cause a considerable loss of irrigation water as well as some damage to field crops, trees, vegetables, etc. Control methods have been worked out and demonstrated by the U. S. Biological Survey during the past few years.

During the present year' work on this project has been limited to cooperation with interested individual farmers in furnishing poison for the control of rodents. A total of 460 quarts of poison grain and 24 cans of poison for vegetable bait were issued to cooperating farmers for covering 5148 acres of farm land in connection with this work. A total of 157 farmers cooperated in this work.

Rabbit Controll

Farmers located in the outlying sections of the County frequently suffer fairly heavy losses to crops because of the depredations of rabbits. During past years various methods including rabbit drives, poisoning and shooting have been resorted to in an attempt to reduce these losses. Observations as to the effectiveness of these various methods have led to the

conclusion that when proper methods are employed, poisoning is the most effective and in addition is much more economical from the standpoint of time and money.

During the year a number of poisoning demonstrations have been conducted and 30 cooperating farmers have been issued 42 ounces of rabbit poison for the protection of 2563 acres of farm crops.

Prairie Dog Extermination.

Early in the year the Agent cooperated with a representative of the U. S. Biological Survey in making preliminary arrangements for a campaign to exterminate the prairie dogs in the Ash Flat district on the San Carlos Indian Reservation in this County. It was planned to begin this work in the late spring but due to the fact that cooperation could not be secured from the other interested parties at that time it was decided to commence active field work on September first at which time the cattlemen of the district and the Indian Agency will cooperate in the work.

ANIMAL HUSBANDRY

Better Sires.

There is a continuous demand among local farmers for better sires for all types of farm livestock. In many cases farmers do not know how to proceed to advantage in improving the quality of their stock by securing the proper kind of males. In this connection the Extension Service has been able to render a valuable service by assisting farmers in securing good males. During the present year pure bred males for a number of sheep and hog growers have been secured.

DAIRY HUSBANDRY

Dairy Expansion.

Large quantities of alfalfa hay and other dairy feeds are exported from the County each year. Physical and economic conditions are admirably suited to the production of dairy products on local farms. With these conditions prevailing it has been the policy to assist in promoting a conservative expansion of the local dairy industry.

Arrangements were made for financing the purchase of dairy cattle through the local Agricultural Credit Corporation using Federal Intermediate Credit Bank funds with provision for a 20 months amortization plan.

The shortage of hay with the consequent high prices during the present season has temporarily checked this inevitable expansion of the local dairy industry.

Dairy Herd Improvement.

Many local dairy herds are not profitable because of low producing cows and herd sires of uncertain breeding. As a means of remeding this condition the Agent has cooperated with some of the individual dairymen in donnection with keeping production and test records for their herds as a basis for the elimination of unprofitable cows. A number of these dairymen have been assisted in securing sires with production records back of them.

Dairy Management.

Feeding practices, methods of handling dairy products, and other matters having to do with the production of dairy products are in some cases not up to standard on local dairy farms.

As a means of improving this situation plans were made for a dairy extension school combined with a tour to observe equipment and practices on a number of local dairy farms. To date it has not been possible to adjust schedules to permit of securing the necessary specialist help for this school and tour.

Assistance was given the State Dairy Commissioner in securing the adoption by the town of Safford of the uniform milk products ordnance as sponsored by the U. S. Bureau of Public Health. The adoption of this ordnance has tended to improve sanitary conditions on local dairy farms and is also protecting those dairymen who have made a substantial financial investment to provide adequate facilities for the production and handling of dairy products.

A survey was made of local dairy farms in connection with a sterility problem which is being investigated by the Dairy Department of the University.

POULTRY HUSBANDRY

Poultry Management.

The poultry industry of the County is fairly well established on a commercial scale. The majority of those now engaged in the business have already had a considerable amount of experience in the management of poultry. However, there has been throughout the year a constant demand for information relating to such problems as feeding, housing, diseases and insect control, brooding, incubating, and other miscellaneous problems of poultry management.

A two day poultry extension school was held in April. The Head of the Poultry Department of the University and the Poultry Extension Specialist assisted in conducting this school. Various problems of poultry management were discussed and visits were made to a number of local poultry farms.

One cooperator was secured for the Farm Demonstration Flock project for the present year.

One caponizing demonstration was conducted in May.

AGRICULTURAL ECONOMICS

A considerable portion of the Agent's time during June and July was devoted to the compiling of economic data relative to the agricultural industry of the County. The plan is to compile and systematize these data in the form of a report to be used for future reference in connection with Extension Work in the County.

Farm Management.

In 1922 the first work in connection with a farm management project was started in the County. For the following four years accounts were kept on from 20 to 25 typical farms each year. These accounts were for the farm enterprise as a unit and the data secured provided a valuable basis for determining the most profitable local systems of farm management as well as the amount and distribution of necessary capital.

Beginning in 1925 detailed enterprise cost accounts for each of the principal farm products of the County were secured from a sufficient number of cooperators to provide fairly accurate data as to production costs as well as material and labor requirements for each of these commodities.

During the present year similar cost data were secured for the bean and hegari crops. The cost of production reports on these crops are appended to this report. Accounts were started for lettuce but due to the fact that this crop proved to be a failure these were not completed.

The 1928 outlook report of the U. S. Department of Agriculture was used as a basis for a local outlook report which was prepared and published in the local press.

Farm Finance.

The fact that production costs can be materially reduced by securing more favorable rates of interest on funds necessary to finance the production of farm commodities has resulted in the organization of a local agricultural credit corporation to make possible the securing of Federal Intermediate Credit Bank funds. This corporation was organized last year and functioned in a very satisfactory manner in providing production finance for the 1927 cotton crop.

During the present year the officers of this Credit Corporation have been assisted in securing amendments to their articles of incorporation so as to permit the financing of other farm products in addition to cotton. Recently funds have been made available for the purchase of dairy cattle.

Marketing Farm Products.

The marketing of all local farm products still presents a number of problems that remain to be solved. Cotton and eggs are the only local farm products that have been marketed on a cooperative basis to date. A considerable portion of the production of each of these commodities is still being sold through private dealers. The hay crop while marketed through private dealers is closely supervised by a producers' committee.

Assistance has been given in solving some of the problems of the local cooperations and in promoting the use of the facilities afforded producers through cooperative

associations. Market information concerning hay and other commodities has been assembled and made available to organizations and individuals.

BOYS' AND GIRLS' CLUB WORK

During past years some very successful club work has been accomplished in the County. The work in 1927 was perhaps the most successful that has been conducted in the County to date. A special achievement was the winning of the Moses' leadership trophy by Miss Caroline Eyring, a club leader and a club member from this County.

During the present year an attempt has been made to emphasize quality rather than quantity in Club work. A special effort has been made to provide for the more thorough training of local leaders and for a more thorough supervision of the work in the various communities.

The Central pig club which was organized in 1927,but due to a late start failed to finish with the other clubs, finished their work in January. Six members of this club finished the work.

Fourteen boys were enrolled in lettuce clubs early in the year. These clubs were sponsored by a local produce firm. Due to the fact that the spring lettuce crop in the County was practically a failure only six boys completed their work in connection with these clubs.

Summer club work has been organized in the Safford, Thatcher, Central, Pima and Kimball communities. A total of 18 clubs with an enrollment of approximately 140 boys and girls were organized.

A series of leaders training meetings is being conducted by the Assistant Director and the State Home Demonstration Agent each month throughout the season. It is planned that the work will be completed about September first.

A total of twenty-four club leaders and club members attended the Boys' and Girls' Club Week at the University.

One girl from the County attended the National Club Camp at Washington, D. C.

COMMUNITY ACTIVITIES.

Active participation in the activities of the Chamber of Commerce and other civic organizations has tended to strengthen Extension Work in the County in that close contact has been kept with all business and other interests.

OUTLOOK AND RECOMMENDATIONS.

The outlook for Extension Work in the County is very favorable. It is believed that the work is now well stabilized locally and is looked upon as an established institution.

The economic data that has been assembled should provide a basis for a program of work that will result in a profitable system of farm management for the district. The fact that these data have already been assembled and analysed will enable the Agent to devote a larger proportion of his time and energies to field work and other activities than has been possible during past years.

While there are many problems that could to advantage receive attention, the following are considered as some of the outstanding pieces of work that will improve the permanent agriculture of the County:

1-A better system of application of water to the land. This is largely an engineering problem of proper layout on the individual farm so as to permit of more uniform and thorough penetration of moisture in soil and eliminate waste of water.

2-A better distribution of water for the various canals so as to permit of a more efficient and economical use of water on the individual farm as in (1) above. Under the present system the heads delivered to the farms are too large and the time too short for proper application of water to the soil. Smaller heads for a longer time would result in increased crop yields and a reduction in the amount of water wasted.

3-Reclamation of the areas now unproductive because of alkali conditions.

4-The adoption of a better milling variety of wheat.

5-The production of a local supply of cotton seed for planting purposes. It is possible that this work can be accomplished to best advantage through the local cooperative marketing association.

6-The improvement of the quality of alfalfa hay in line with progress being made in competing areas.

7-The extermination of pocket gophers from farm lands as per the plan worked out by the U. S. Biological Survey.

8-The extermination of prairie dogs on the San Carlos Indian Reservation.

9-The promotion of a conservative expansion of the dairy industry.

10-The promotion of the adoption of the crop rotation which has been found to provide the highest profit combination of farm enterprises as per economic report appended hereto.

SUMMARY

1-Method and result demonstrations have been used as a means of improving irrigation practices on individual farms.

2-The quality of alfalfa hay has been improved as a result of grading and other demonstrations.

3-A plan has been put into operation for exterminating or at least holding in check the infestation of pink boll worm discovered in local cotton fields.

4-Method and result demonstrations have secured the adoption by a large number of wheat growers of the dry copper carbonate treatment for the control of wheat smut.

5-Variety demonstrations during the year indicate that the new strain of hard Baart wheat has promise in this locality.

6-Pruning demonstrations have been conducted as a means by improving local horticultural practices.

7-Methods of controlling insect pests and plant diseases of spraying have been demonstrated.

8-Observations made in connection with both spring and fall lettuce production indicate that the crop may not be successful here.

9-157 farmers cooperated in using 460 quarts of poison grain and 24 cans of poison vegetable bait in covering 5148 acres of farm land for the control of pocket gophers.

10-30 farmers cooperated in using 42 ounces of rabbit poison for protecting 2573 acres of farm land against rabbits.

11-Plans have been worked out for the extermination of prairie dogs on the San Carlos Indian Reservation in this County.

12-Farmers have been assisted in securing pure bred sires for farm livestock.

13-An expansion of the local dairy industry is taking place along conservative lines.

14-The uniform dairy products ordnance as sponsored by the U. S. Public Health Bureau has been adopted by the town of Safford and is tending to improve production methods on local dairy farms.

15-A poultry extension school was conducted as a means of solving some local problems of poultry management.

16-A complete report on the economic status of the agriculture of the County has been prepared.

17-Cost accounts on typical farms producing hegari grain and field beans have been secured.

18-A local agricultural outlook report was prepared on the basis of the U. S. Department of Agriculture report.

19-Farm production finance facilities have been improved and interest rates reduced by securing Federal Intermediate Credit Bank funds through a local agricultural credit corporation.

20-Marketing data has been assembled for the use of producers committees in connection with local marketing problems.

21-Eighteen Boys' and Girls' Clubs with a combined membership of approximately 140 members have been organized and are making satisfactory progress with this work.

APPENDIX

COST OF PRODUCTION OF HEGARI GRAIN

Changes in Harvesting Methods.

Cost of production data for hegari grain were secured in this County for the 1925 crop. At that time the crop was harvested by cutting the heads by hand while the stalks were standing in the field. After a period of drying the heads were threshed with a regular power grain thresher. This method was expensive from the standpoint of man labor and had an additional disadvantage in that the problem of drying the grain in the head was a difficult one.

For the first time in this County a considerable portion of the 1927 crop of hegari was harvested with the combined harvester and thresher. While the harvesting of this crop presents some difficulties for the operator of the combine, the substantial saving made in harvesting costs justifies the extra per acre charge made for harvesting this grain. The concensus of opinion among operators of combines in that a custom rate of $9.00 per acre is necessary for harvesting hegari while a rate of $7.50 per acre is satisfactory for harvesting wheat or barley. This extra rate for hegari is necessary because proportionately fewer acres can be cut in a day than is the case with wheat or barley.

Because of the substantial reduction made in production costs by those who harvested with the combine, indications are that this method of harvesting will be quite generally adopted by farmers producing this crop in future years. This being the case the cost of production data secured in 1925 when the old method of harvesting was in vogue will no longer be applicable. Consequently a revised set of cost data are essential at the present time. To provide these data additional cost figures were secured for the 1927 crop on those farms where the new production methods were in operation.

Production Costs.

All items entering into present production costs for hegari grain in this locality are listed in detail in Table No. 1.

The 1927 costs, when harvested with the combine, was $34.23 per acre or 86.4 cents per cwt. of threshed grain based on an average yield of 3,960 pounds of grain per acre. These costs compared with 1925 costs under the old system of harvesting show a saving in production costs of 29 cents per cwt. of threshed grain. This reduction in cost of production is due entirely to the economies effected by the new method of harvesting.

The comparative harvesting costs under the two methods are shown in detail in Table No. 2. As is indicated by these figures, the harvesting costs when segregated from other cost items show a reduction of more than 50 per cent where the combine is used.

TABLE NO. 2

COMPARATIVE HARVESTING COSTS FOR HEGARI GRAIN

(Per acre costs based on 3960 yield)

t Items:	Combined Harvester and Thresher			Cutting by hand and threshing with power		
	Quantity	Rate	Cost per acre	Quantity	Rate	Cost per acre
esting with combine n hire)			$9.00			
esting by hand:						
n labor				32 hrs.	$0.30	$9.60
rse labor				32 "	.10	3.20
reshing:						
an labor				3.6"	.30	1.08
reshing tolls				515#	.015	7.72
ving twine	.5	$.50	.25	.5	.50	.25
ing from combine:						
n labor	1.5hrs.	.30	.45			
rse labor	3.0 "	.10	.30			
hinery	3.0 "	.10	.30			
tal Costs	39.6 cwt.	$0.26	$10.30	39.6 cwt.	$0.55	$21.85

TABLE NO. 1

COST OF PRODUCING HEGARI GRAIN, GRAHAM COUNTY, ARIZONA 1927.

(Per acre averages)

Cost Items:	Quantity	Rate	Cost Per Acre
Fixed Costs:			
Farm Labor:			
Plowing:			
Man labor	3.6 hrs.	$0.30	$1.08
Horse labor	14.4 "	.10	1.44
Discing:			
Man labor	1.0 "	.30	.30
Horse labor	4.0 "	.10	.40
Dragging:			
Man labor	.8 "	.30	.24
Horse labor	3.2 "	.10	.32
Planting:			
Man labor	.8 "	.30	.24
Horse labor	1.6 "	.10	.16
Irrigating:			
Man labor	2.0 "	.30	.60
Cultivating:			
Man labor	2.0 "	.30	.60
Horse labor	4.0 "	.10	.40
Cash & Miscellaneous:			
Seed	5 lbs.	.05	.25
Water assessments (½)			.75
Taxes (½)	$125.00	3%	1.88
Interest on Investment (½)	$200.00	6%	6.00
Harvesting with combine		$9.00	9.00
Machinery	27.2 hrs.	.10	2.72
Total Fixed Costs			$26.38
Costs varying with Yields:			
Farm Labor:			
Hauling from combine:			
Man labor	1.5 hrs.	.30	.45
Horse labor	3.0 "	.10	.30
Hauling to market:			
Man labor	2.5 "	.30	.75
Horse labor	5.0 "	.10	.50
Cash & Miscellaneous:			
Sacks	32	.15	4.20
Sewing twine			.25
Machinery	8 hrs.	.10	.80
Total Variable costs			$7.85
Yield & Total Costs	39.6 cwt.	$0.864	$34.23
Returns	39.6 cwt.	$1.50	$59.40
Margin over cost		$0.636	$25.17
Return per hr. man labor	14.2	$2.09	
Interest Return on Investment (½ yr.)	$200.00	31%	

There are, however, some problems involved in storing the threshed grain when harvesting is done with the combine. It is a difficult matter to get the grain sufficiently dried out while standing in the field so that the threshed grain will not heat in storage. Special precautions are necessary in storing the grain after threshing otherwise heating and spoilage will take place. The shattering of the grain in the field and losses due to depredations of birds are other disadvantages that must be considered when the combine is used in harvesting, since the grain must stand in the field over a considerably longer period than was the case under the old method of harvesting. However, when due allowance is made for these losses and disadvantages, the reduction made in harvesting costs are so great as to much more than off-set the above mentioned disadvantages. As a matter of fact, hegari grain under present production methods is perhaps the cheapest feed that can be produced, in this section and in all probability is destined to revolutionize local feeding practices.

Relationship Between Yield and Cost.

The effect of increased yield on cost of production of hegari grain is apparent from the figures contained in Table No. 3.

TABLE NO. 3
RELATIONSHIP BETWEEN YIELD PER ACRE AND COST OF PRODUCTION. PER CWT. HEGARI GRAIN.

Yield per Acre (lbs.)	Net Cost per Acre	Net Cost per cwt. grain.
2000	$30.34	$1.52
2500	31.33	1.25
3000	32.32	1.08
3500	33.31	.95
4000	34.30	.86
4500	35.29	.78
5000	36.28	.73
5500	37.27	.68

The fixed production costs account to $26.38 per acre regardless of yield. The other items of cost including harvesting, sacks, hauling to market, etc., naturally increase the total net cost as yield per acre increases. However, as will be noted in the above figures, the effect of increased yield per acre is to reduce the net cost of production per hundred pounds of grain because the fixed charges are spread over a greater number of pounds. The cost of $1.52 for a 2000 pound yield is reduced to $1.08 when a 3000 pound yield is secured and to $0.73 for a 5000 pound yield.

Comparative Yields, Prices and Profit Margins.

The comparative profitableness of hegari and other crop under varying conditions of soil productivity and fluctuations in the market price of the grain is apparent from the data contained in Table No. 4.

Profit margins for yields varying from 2000 pounds to 5500 pounds per acre at prices varying from $1.25 to $2.50 per cwt. have been calculated.

How Costs were Determined.

1-All hired help was figured at exact cost, while $0.30 per hour for man labor and $0.10 per hour for horse labor were used for the farmer's own time and teams.

2-A flat rate of 6 per cent interest was charged on land valuations. However, since this crop is grown on land that has previously grown a crop of wheat or barley the same year, interest was charged for one-half year only.

3-Seed and other cash expenses were charged at actual cost or market value.

4-Machinery was charged at 10 cents per horse hour. This rate covers interest on investment in machinery, repairs, operating costs and depreciation.

TABLE NO. 4

COMPARATIVE YIELDS, PRICES, AND PROFIT MARGINS FOR HEGARI GRAIN GRAHAM COUNTY, ARIZONA 1927.

Yield per Acre (lbs.)	Net Profit per acre	Return per Hr. man labor.	Interest Return on Investment.	Net Profit per acre	Return per Hr. Man labor	Interest Return on Investment.
	Market Price $1.25 per cwt.			Market Price $1.50 per cwt		
2000	$5.34 loss			$0.34 loss	$0.27	5.6%
2500	.08 "	$0.29	5.9%	6.17	.79	12.2%
3000	5.18	.69	11.1%	12.68	1.26	18.7%
3500	10.44	1.06	16.4%	19.19	1.70	25.2%
4000	15.70	1.40	21.7%	26.70	2.11	31.7%
4500	20.96	1.73	27.0%	32.21	2.49	38.2%
5000	26.22	2.02	32.2%	41.22	3.01	47.2%
5500	31.48	2.94	37.5%	45.23	3.19	51.2%
	Market Price $1.75 per cwt.			Market Price $2.00 per cwt.		
2000	$4.66	$0.68	10.6%	$9.66	$1.09	15.7%
2500	12.42	1.27	18.4%	18.67	1.77	24.7%
3000	20.18	1.82	26.2%	27.68	2.40	33.7%
3500	27.94	2.34	33.9%	36.69	2.97	42.7%
4000	35.70	2.81	41.7%	45.70	3.51	51.7%
4500	43.46	3.25	49.5%	54.71	4.02	60.7%
5000	51.22	3.66	57.2%	63.72	4.48	69.7%
5500	58.98	4.06	65.0%	72.73	4.93	78.7%
	Market Price $2.25 per cwt.			Market Price $2.50 per cwt.		
2000	$14.66	$1.50	20.7%	$19.66	$1.91	25.7%
2500	24.92	2.26	30.9%	31.17	2.75	37.2%
3000	35.18	2.96	41.3%	42.68	3.53	48.7%
3500	45.44	3.62	51.4%	54.19	4.25	60.2%
4000	55.70	4.22	61.7%	65.70	4.92	71.7%
4500	65.96	4.79	72.0%	77.21	5.55	83.2%
5000	76.22	5.31	82.2%	88172	6.13	94.7%
5500	86.48	5.98	92.5%	100.23	6.68	106.2%

THE COST OF PRODUCTION OF FIELD BEANS GRAHAM COUNTY, ARIZONA 1927.

In response to a demand for data relative to the comparative profitableness of field beans or grain sorghums as second crops on land following wheat or barley, the following cost data was secured from local farms producing field beans during the 1927 crop year. It is believed that the yields and operation costs for the farms from which the data were secured are fairly representative for this Valley.

Analysis of Costs.

Table No. 1 contains a detailed list of all items entering into the cost of production of field beans. These cost figures have been reduced to per acre averages to facilitate comparison between different farms. All labor and material requirements are included in terms of quantities, as well as money costs, to give the data permanent value, for as prices of the various cost items change the data can be brought up to date by computing costs in terms of current prices.

The average cost for the County in 1927 was 4.3 cents per pound of beans based upon an average yield of 805 pounds of threshed beans. The average total cost per acre was $34.78. The fixed costs per acre were $29.70 regardless of yield. Each increase in yield of 100 pounds of threshed beans increased the total cost per acre approximately 63.7 cents.

The available equipment for threshing beans is not very satisfactory and for that reason harvesting costs are perhaps somewhat higher than would otherwise be the case.

Table No. 1

COST OF PRODUCING FIELD BEANS, GRAHAM COUNTY, ARIZONA 1927.

(Per Acre Average.)

Cost Items:	Quantity	Rate	Cost per Acre
Fixed Costs:			
Farm Labor :			
Man Labor	6.0 hrs.	$0.30	$1.80
Horse Labor	12.0 "	.10	1.20
Discing:			
Man Labor	1.8 "	.30	.54
Horse Labor	7.2 "	.10	.72
Dragging:			
Man Labor	1.8 "	.30	.54
Horse Labor	7.2 "	.10	.72
Planting:			
Man Labor	2.0 "	.30	.60
Horse Labor	3.0 "	.10	.30
Cultivating:			
Man Labor	9.0 "	.30	2.70
Horse Labor	18.0 "	.10	1.80
Hoeing:			
Man Labor	6.0 "	.30	1.80
Irrigating:			
Man Labor	3.6 "	.30	1.08
Cash & Miscellaneous:			
Seed	20 lbs.	.08	1.60
Water assessments	(½ total acre charge)	1.50	.75
Taxes (½)	$150.00	3.75%	2.81
Interest on Investment in Land (½)	$200.00	6%	6.00
Machinery	47.4 hrs.	$0.10	4.74
Costs Varying with Yields:			
Farm Labor:			
Harvesting:			
Man Labor	11.0 hrs.	.30	3.63
Horse Labor	2.0 "	.10	.20
Cash & Miscellaneous:			
Sacks	7	.15	1.05
Sewing twine			.05
Machinery	2.0 hrs.	.10	.20
Cost per Acre	805 lbs.	$0.043	$34.78
Yield & Return	805 lbs.	$0.08	$64.40
Margin over Cost		$0.037	$29.62
Return per Hr. man Labor	41.2 hrs.	$1.02	
Interest Return on Investment	(½) $200.00	35.5%	

Returns.

Returns were calculated on the following bases:

1-Margin of profit per acre.
2-Margin of profit per pound.
3-Return per hour of man labor.
4-Interest return on investment in land.

The average price for the present crop of beans is 8 cents per pound. At this price the average margin over cost per acre was $29.62 and the margin of profit per pound of beans was 3.7 cents.

By eliminating the charge for man labor as an item of cost and calculating the return for the entire margin over cost in terms of return per hour of man labor, $1.02 per hour was secured. Likewise, the charge for interest on investment in land was deducted as a cost item and the entire margin over cost was used in calculating the percentage interest return on capital invested in land. Since beans are grown as a second crop following wheat or barley, land rental or interest returns on investment in land was charged against this crop for one-hald year only. As calculated in this manner the interest return on investment in land was 35.5 per cent.

At a market price of 8 cents per pound field beans are a very profitable crop in this locality. A yield of 800 pounds of threshed beans at this price will, from the standpoint of financial returns, be the approximate equivalent of a 3500 pound yield of hegari grain at $2.00 per cwt. Since the market price of hegari grain this year is approximately $1.50 per cwt., beans have proved a much more profitable crop. From the standpoint of soil fertility as affecting the subsequent crops, the bean crop has a distinct advantage.

Relationship Between Yield and Cost.

The effect of yield on cost of production per pound of beans is apparent from the data contained in Table No. 2. It will be noted that as yield per acre increases, cost of production per pound of beans decreases. This is for the reason that there are certain fixed production costs amounting to $29.70 per acre regardless of yield. The other items of cost including harvesting and sacks increase as yield per acre increases. Thus while an increase in yield per acre increases the total cost per acre, the cost of production per pound of beans is reduced because the fixed charges are spread over a greater number of pounds. A cost of production of 6.6 cents per pound for a 500 pound yield is reduced to 4.3 cents for an 800 pound yield and to 3.6 cents when a 1000 pound yield is secured.

Table No. 2

RELATIONSHIP OF YIELD PER ACRE TO COST OF PRODUCTION PER POUND OF FIELD BEANS.

Yield per Acre (pounds)	Net Cost per acre.	Net Cost per pound of beans.
500	$32.88	$0.066
600	33.52	.056
700	34.16	.049
800	34.80	.043
900	35.43	.039
1000	36.07	.036
1100	36.71	.033
1200	37.34	.031

Comparative Yields, Prices, & Profit Margins.

Since there is considerable variation in the productivity of the soil on individual farms throughout the County and since the market price of beans fluctuates considerably from year to year, data on comparative profit margins under these varying conditions of yield and price are valuable as a basis for comparing the relative profitableness of this crop with other substitute crops. Table No. 3 contains these comparative figures in detail for field beans. Profit margins for yields varying from 500 pounds to 1200 pounds per acre at prices varying from 5 cents to 10 cents per pound have been calculated.

Three separate methods of expressing profit margins have been used. These are:

Net profit or loss per acre.
Return per hour of man labor.
Percentage interest return on investment in land.

Returns on each of these bases are included for the reason that they provide a means of measuring the relative profitableness of farm crops for any individual farmer whether the limiting factor on his particular farm happens to be land acreage, labor or operating capital.

It will be noted that with average yields per acre, bean production is not profitable when the market price is less than 6 cents per pound.

How Costs Were Determined.

1-All hired help was figured at exact cost, while $0.30 per hour for man labor and $0.10 per hour for horse labor were used for the farmer's own time and teams.

2-A flat rate of six per cent interest was charged on land valuations. However, since this crop is grown on land that has previously grown a grain crop the same year, interest was charged for one-half year only.

3-Seed and other cash expenses were charged at actual cost or market value.

4-Machinery was charged at the rate of 10 cents per horse hour. This rate covers interest on investment in machinery, repairs, operating costs and depreciation.

Table No. 3

COMPARATIVE YIELDS, PRICES, AND PROFIT MARGINS FOR FIELD BEANS, GRAHAM COUNTY, ARIZONA 1927.

Yield per Acre (lbs.)	Net Profit Per Acre.	Return per hr. man labor.	Interest Return on Invest-ment in land.	Net Profit Per Acre.	Return per hr. man labor	Interest Return on Investment in land.
	Market Price 5 cents per lb.			Market Price 6 cents per lb.		
500	$7.88 loss	$0.10	[illegible]	$2.88 loss	$0.23	3.1%
600	3.52 "	.21	2.5%	2.48	.36	8.5%
700	.84	.32	6.8%	7.84	.49	13.8%
800	5.20	.42	11.2%	13.20	.62	19.2%
900	9.57	.52	15.5%	18.57	.75	24.6%
1000	13.93	.63	19.9%	23.93	.88	29.9%
1100	18.29	.74	24.3%	29.29	1.01	35.3%
1200	22.66	.87	28.7%	34.66	1.13	40.6%
	Market Price 7 cents per lb.			Market Price 8 cents per lb.		
500	$ 2.12	$0.35	8.1%	$7.12	$0.47	13.0%
600	8.48	.50	14.5%	14.48	.65	20.5%
700	14.84	.66	20.8%	21.84	.83	27.8%
800	21.20	.81	27.2%	29.20	1.08	35.2%
900	27.57	.96	33.6%	36.57	1.18	42.6%
1000	33.93	1.12	39.9%	43.93	1.36	49.9%
1100	40.29	1.27	46.3%	51.29	1.54	57.3%
1200	46.66	1.45	52.7%	58.66	1.72	64.7%
	Market Price 9 cents per lb.			Market Price 10 cents per lb.		
500	$12.12	$0.59	18.1%	$17.12	$0.81	23.1%
600	20.48	.79	26.5%	26.48	.94	32.5%
700	28.84	1.00	34.8%	35.84	1.17	41.8%
800	37.20	1.20	43.2%	45.20	1.39	51.2%
900	45.57	1.40	51.6%	54.57	1.62	60.6%
1000	53.93	1.61	59.9%	63.93	1.85	69.9%
1100	62.29	1.81	68.3%	73.29	2.07	79.3%
1200	70.66	2.01	76.7%	82.66	2.30	88.7%