BULLETIN 187 JANUARY, 1943

SHARING FARM MACHINERY

Agricultural Experiment Station
University of Arizona, Tucson

ORGANIZATION

BOARD OF REGENTS

Sidney P. Osborn (ex officio) ..... Governor of Arizona
E. D. Ring, B.A. (ex officio) ..... State Superintendent of Public Instruction
Cleon T. Knapp, LL.B., Treasurer ..... Tucson
Joseph H. Morgan, LL.B. ..... Prescott
Jack B. Martin, Secretary ..... Tucson
M. O. Best ..... Phoenix
Clarence E. Houston, LL.B., B.A. ..... Tucson
Mrs. Joseph Madison Greer, B.A. ..... Phoenix
Roland Ellsworth ..... Mesa
Sam H. Morris, A.B., J.D. ..... Globe

Alfred Atkinson, D.Sc. ..... President of the University

EXPERIMENT STATION STAFF

Paul S. Burgess, Ph.D. ..... Director
Ralph S. Hawkins, Ph.D. ..... Vice-Director

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY DEPARTMENT

George W. Barr, Ed.D. ..... Agricultural Economist
Elzer D. Tetreau, Ph.D. ..... Rural Sociologist
Ned O. Thompson, M.S. ..... Assistant Agricultural Economist
Mrs. Alberta Hart ..... Statistical Clerk

SHARING FARM MACHINERY

By Ned O. Thompson

The hope of securing increased agricultural production during the war period with little new machinery available hinges on making greater use of existing farm machinery. This may be accomplished through increased custom contracting, machine renting, or other methods of machine sharing. To explore the possibilities and means of making more efficient use of what machinery is available on farms; to determine present supplies of machinery on farms; and the age and condition of this machinery, was the purpose of this study. Information was secured on an area sample basis covering about 10 per cent of the irrigated land in Maricopa, Pinal, and Yuma counties. In all, 348 farmers were interviewed regarding the machinery problem.

Present supplies

Arizona farmers in general were fortunate in that they entered the war period with fairly adequate supplies of farm machinery. Machinery sales were higher than normal in the years 1941, early 1942, and in 1937. Many of the larger vegetable and cotton producers anticipated the present machinery shortage and bought heavy equipment for land-preparation work in place of relying on custom contractors. This advantageous position of the state in respect to farm machinery deteriorated somewhat during 1942 with the sale of part of the custom-operated tractors and other large equipment. Also, the use of farmer and contractor-owned large machinery on war construction work was expanded during the year.

The age of machinery on farms, together with a knowledge of the extent to which it has been used, offers the best measure of its condition. Tractors on farms in the sample areas of the three counties studied are distributed by age in Figure 1. Similar information was secured for other machinery. These charts illustrate the relative newness of a large portion of the tractors in use, especially in Yuma County. Larger purchases in Yuma County during recent years are a reflection of relatively recent improvement in farm income with an expansion of the vegetable industry. Age of tractors on farms in the three counties, taken together, were: 2 years or less, 28 per cent; 3 to 4 years, 18 per cent; 5 to 7 years, 34 per cent; 8 years or more, 20 per cent. With little replacement machinery available, the average age of machinery on farms will increase rapidly. The rate of wearing out of farm machinery will tend to increase in the future through expanded use of the remaining serviceable machinery. These charts were

Picture on cover page furnished by O. S. Stapley Company, Phoenix, Arizona.

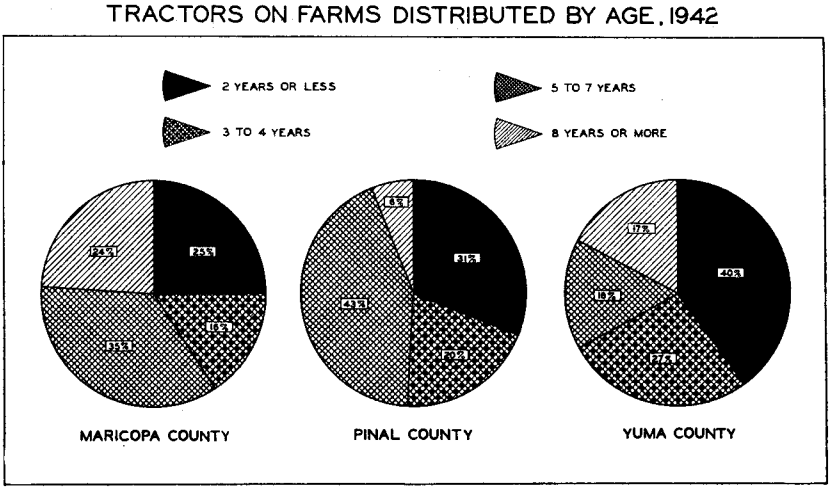

Figure 1.—Although a large proportion of the tractors on farms were purchased within the past 2 years, the average life of these tractors will be shorter than normal because of expanded use of those remaining in service.

based on the age distribution of 640 tractors in the three counties.

Successful administration of war programs in respect to farm machinery requires a knowledge of the size, type, and quantity of machinery in use in the various states and counties. It was calculated that approximately 3,300 wheel tractors and 800 track-laying tractors were in use on farms in Maricopa, Pinal, and Yuma counties. Estimates of numbers of tractors and other major items of machinery in use in the three counties are given in Table 1. Practically all the machinery listed was being operated with tractor power. In addition, there was a considerable quantity of old horse-drawn and other more or less obsolete machinery on farms that was not being utilized. War conditions may force the use of some of this old equipment; however, most of it will be sold for scrap or used to furnish repair parts.

Present utilization of farm machinery

Size of farm and extent of seasonal diversification of crops are the principal factors affecting the annual use that is made of farm machinery. The effect of size of farm on the acreage covered for various machines, together with the normal use made of machines on farms producing primarily cotton and alfalfa, is illustrated in Table 2. Similar information is available from the study for machines on other types of farms.

On these farms producing primarily cotton and alfalfa a four-row, general-purpose tractor normally took care of 225 acres. The range in average use for four-row tractor outfits was from 135

TABLE 1.—CALCULATED NUMBER OF USABLE MACHINES ON FARMS IN MARICOPA, PINAL, AND YUMA COUNTIES, 1942.

Kind of machine	Maricopa County	Pinal County	Yuma County
Wheel tractors:			
2-row general purpose	1,000	175	85
4-row general purpose	1,215	430	210
Standard type	230	*	*
All wheel tractors	2,445	605	295
Track-laying tractors:			
40-60 D.B.H.P.†	145	45	65
25-39 D.B.H.P.†	125	55	30
Less than 25 D.B.H.P.†	300		45
All track-laying tractors	570	100	140
Hay balers	225	*	50
Combines	195	*	70
Disk plows:			
2 to 4 disks	955	170	100
5 disks or more	255	95	45
Disk harrows:			
9 ft. or less	1,585	310	250
Over 9 feet	265	75	65
Cotton planters:			
2-row	485	105	160
4-row	270	210	*
Tractor mowers	945	135	150
Sulky rakes	1,355	160	225
Side-delivery rakes	605	125	80
Renovators	735	45	50
Border disks	670	180	205
Stalk cutters	580	225	*
Spike-tooth harrows (3 sections)	1,105	390	205

*The sample area was not considered sufficiently representative of the use of this machine to serve as a basis for estimating the number of machines in the county.

†The drawbar horsepower as used in this bulletin refers to the rated horsepower determined in the Nebraska Test, calculated at 75 per cent of the maximum horsepower corrected to standard conditions.

acres on the smaller farms to 370 acres on the largest farms. Only part of this variation in acreage farmed per row-crop tractor was due to greater use of track-laying tractors in land-preparation work on the larger farms. Experience has shown that a four-row tractor outfit is capable of caring for about 320 acres of cotton or cotton and alfalfa where the land-preparation work is contracted. Under similar conditions, a two-row tractor outfit can handle from 160 to 200 acres.

Greater acreage covered by disk plows and disk harrows on the larger farms was partly due to the difference in the size of machines used. Because of the long season for preparing the land for crops in 1942, the average use made of farmer-owned disk plows was higher than occurs in some years. As a whole, these

farms tended to be overstocked with disk harrows. Acreage disked more than once was counted only once in computing the use figures given in Table 1.

These farmers generally made more efficient use of cotton planters than of most machines. The normal use for four-row planters in the area was 310 acres per machine. On the other hand, tractor mowers and sulky and side-delivery rakes were not used efficiently on many of these farms. The normal use in the area was 65 acres of alfalfa for tractor mowers and 45 acres for rakes.

The use made of farm machines is one of the criteria considered in rationing the limited supplies of new machinery. The prospective buyer must show that the equipment will perform more than the average service for similar machinery in the community. In order for a small farm operator to qualify under this condition it is necessary for him to do custom contracting, machine renting, or buy his equipment jointly with one or more other operators.

Climatic conditions in southern Arizona's irrigated valleys make it possible to grow crops on a year-round basis. As a result, it is possible to make extensive year-round use of farm machinery. In actual practice, however, a large portion of the farmer-owned machinery is not utilized much more on a yearly basis than is machinery in colder climates because of the high degree of specialization of farming in the area. On cotton or cotton-alfalfa farms where the land-preparation work is hired, the farmer-owned machinery is used extensively during about 6 months of the year, from March through August. On farms of this type, where the operator uses his row-crop tractors for preparing the land for crop, the period of use is extended to about 8 months. Operators of large cotton or cotton-alfalfa farms often have heavy land-preparation equipment in addition to the row-crop machinery. On such farms, unless custom work is done, the land-preparation machinery is used extensively only in the winter and early spring months and the row-crop machinery during the spring and summer months. On vegetable farms, the periods of use are reversed, the row-crop machines being used mainly during the fall and winter months and the heavier land-preparation equipment during the summer and fall seasons. Thus, good possibilities exist for expanding the use of existing machinery as the need arises through an exchange between different types of farms. In considering the feasibility of such an exchange, it must be realized that different types of planting and cultivating equipment are used on vegetable and cotton farms.

METHODS OF MACHINE SHARING

Throughout the country, farmers have in the past tried various methods of machine sharing with the idea of reducing their operating costs. Now the emphasis is on making the machines available when and where needed, with the cost to the individual farmer of secondary importance. Methods of machine sharing may be grouped under the following heads: custom work, ex-

TABLE 2.—THE INFLUENCE OF SIZE OF FARM ON ACREAGE COVERED PER MACHINE, COTTON-ALFALFA FARMING AREA OF MARICOPA AND PINAL COUNTIES, 1942.*

Range in size of farms	Average size of farm	Acreage farmed per row-crop tractor	Per cent of operators having track-tractors	Acres plowed per disk plow	Acres disked per disk harrow	Cotton acreage covered		Alfalfa acreage covered	
						Per culti-vator	Per planter	Per tractor mower	Per sulky or side-delivery rake
99 acres or less.....	60	60†	0	25	20	30†	90†	20	15
100 to 179 acres.....	145	135	12	180	60	105	135†	45	30
180 to 259 acres.....	210	160	0	205	105	125	185	50	25
260 to 499 acres.....	340	195	17	115	140	140	250	80	50
500 to 999 acres.....	705	285	45	260	250	200	365	120	70
1,000 acres or more.....	1,945	370	78	385	230	310	560	135	95
Normal use in cotton-alfalfa area....	.....	225	....	175	140	185	310	65	45

*Based on the experience on 110 farms distributed by groups as follows, starting with the smallest size of farm group: 26 farms, 16 farms, 9 farms, 23 farms, 22 farms, 14 farms. Where an operation was performed more than once on the same field, the acreage was counted only once in computing the acreage covered per machine.

†These figures represent acreage covered per two-row machine, while other figures in the same columns represent acreage covered per four-row machine.

change work, machine renting, borrowing, joint ownerships, and machinery co-operatives.[1]

Custom work

Wide use of custom contracting of heavy tillage and harvesting machinery operations in the larger irrigated valleys of the state has been the predominant method of making efficient use of these larger machines. Since custom contracting has proved so successful both from the standpoint of cost of operation and efficiency in the use of machines, it would seem logical to encourage its expansion during the war period as the supply of new machinery diminishes.

During the last year there has occurred a noticeable trend away from custom machinery work. This was only partly due to the long season which occurred for preparing the land for spring crops. Many operators with good incomes in 1941 bought machinery to do their own work. They anticipated a period of shortage—a period in which they were not sure that the custom operators could be depended upon to do the machinery work. As a result, other farmers who continued to contract their land-preparation operations experienced little difficulty in getting the work done in spite of the fact that many tractors formerly used for custom work on farms were engaged in nonfarm construction work. More difficulty was experienced in contracting harvesting operations, especially hay baling and trucking. In the case of hay baling, the difficulty was not due to a shortage of balers but resulted from delays due to a shortage of labor to operate the machinery.

The possibilities for expanding custom contracting depend largely upon making greater use of farmer-owned machinery. Machines in the hands of custom operators are already being used to near capacity in most instances. Under present conditions, however, the majority of farmers who have ample machinery

[1]Where custom work is done, the owner of the machine furnishes the machine, the labor, and pays all costs of operation. The work is charged for on a contract basis. Exchange work is similar to custom work, except that payment is made in the form of return labor, machinery work, or both. Under machine renting agreements, the user furnishes the labor and ordinarily pays other operating costs, such as fuel, oil, and grease, while the owner of the machine receives a rental that should cover repairs, depreciation, and interest on the investment. Borrowing of machinery implies no charge for its use. The difference between joint ownership and machinery co-operatives is largely a matter of legal arrangement and bookkeeping. In each case, two or more individuals share in the ownership of the machines. Under joint ownership agreements, each owner usually pays all costs of operating for the period that he uses the machine. Machinery co-operatives are legally organized as such and the machinery is owned in the name of the association. Usually, each member of the association furnishes the labor and often the fuel for operating the machine during the period he uses it. A rental charge is made to cover the other costs and risks of ownership. Any excess funds accumulated by the association through rentals are usually returned to the members in the form of dividends in proportion to use made of the machinery.

are reluctant to do custom work. They lack managerial time, have difficulty in getting labor, are delayed in getting repairs, and wish to save the machines for use on their own farms. In other words, if it becomes necessary materially to expand custom contracting in order to offset the shortage of machinery, it could not readily be accomplished on a voluntary basis.

About 45 per cent of the plowing, 35 per cent of the floating, and from 25 to 35 per cent of the disking was contracted in 1942 in Maricopa and Pinal counties. In Yuma County, only about 20 per cent of the plowing and 15 per cent of the disking and floating were done on a custom basis. The approximate per cent of machinery work contracted in the three counties in 1942 and the prevailing rates charged at the time the study was made for the Salt River Valley are given in Table 3.

Custom rates for machinery work increased for most operations during the past year. As might be expected, some rates increased more than others. Influencing factors on rate changes have been the proportion of labor going into the operation and the relative profitableness of the operation under the old rate. For example, the large increase in the rate for baling was due to the wage-rate increase. Considerable labor is used in hay baling. On the other hand, rates charged for plowing increased more than rates for disking or floating, primarily because at 1941 rates plowing was not as profitable an operation as was disking or floating. It is anticipated that rates charged for custom work will continue to advance because of the shortage of labor and machinery.

Exchange work

Exchange work as a method of machine sharing has not been used extensively in Arizona. On small, one-tractor farms, however, it has proved to be a convenient method, especially at cotton planting time where an additional tractor may be needed to disk or float ahead of the planter. With a shortage of labor and machinery, farmers who are equipped to do a small amount of custom work may be more interested in receiving payment in the form of labor or machinery work of a kind for which they are not equipped than in receiving cash.

Machine renting

In the past, no great amount of renting of machinery has been done. Operators hesitate to rent their machinery because they do not like to charge a neighbor for its use, find it hard to determine a fair rental rate, and may not have the machine returned in time or in good condition. Many operators have said they preferred lending the machinery rather than having the borrower feel that he was overcharged for its use. Yet borrowing has ordinarily proved to be an unsatisfactory arrangement—one of the parties concerned usually does more lending than borrowing.

TABLE 3.—THE IMPORTANCE OF CUSTOM MACHINERY WORK IN MARICOPA, PINAL, AND YUMA COUNTIES IN 1942, AND RATES CHARGED PER ACRE FOR VARIOUS OPERATIONS IN THE SALT RIVER VALLEY.

Operation	Per cent contracted			Custom rates per acre in the Salt River Valley in 1942		
	Maricopa County	Pinal County	Yuma County	Range	Most common	Approximate per cent increase over 1941
Plowing	45	45	20	$1.50 to $2.50	$1.75	17
Floating	35	35	15	.60 to 1.00	.75	0
Disking	35	25	15	.60 to 1.00	.75	0
Combining small grains	55	90	70	3.00 to 4.00	3.50	17
Mowing and raking hay	15	30	20	1.15 to 1.50	1.50	20
Hay baling (per ton)	75	80	90	2.25 to 3.00	3.00	33
Cotton planting	20	5	....	.50 to .75	.75	20

Conditions during the next few years may alter this attitude toward renting machinery. If the need for machines becomes sufficiently great, it will be considered obligatory that an operator make his machinery available to others when it is not in use on his own farm. The shortage of labor will restrict operators who have machines which are not in use from engaging in custom work. For relatively inexpensive machines that are not easily ruined through neglect, some rental arrangement may prove to be the most satisfactory method for both parties.

The accompanying table gives suggested rental rates for machines most likely to be rented. These figures include charges for interest, depreciation, and normal repairs and are based on the average use of the machines in the area. No charge was included for shelter, insurance, or taxes, which items are small or nonexistent on an acreage or per-hour basis under Arizona conditions. In renting equipment on the basis of these rates it is assumed that the owner will pay all normal repairs but that the renter will be responsible for all unusual repairs due to neglect on his part. To these charges the owner might justifiably add from 10 to 25 per cent to cover the inconveniences and risks of renting.

TABLE 4.—SUGGESTED RENTAL RATES FOR CERTAIN FARM MACHINES IN ARIZONA FOR 1943.

Kind of machine	New cost	Average acres per hour	Suggested rental charges*		
			Per hour	Per day	Per acre
Tractors:	$1,000	.....	$0.30	$3.00	.....
	1,500	.....	.45	4.50	.....
	2,000	.....	.60	6.00	.....
Cultivators: 2-row	175	2.0	.14	1.40	$0.07
4-row	350	3.0	.28	2.80	.09
Plows: 2-disk	275	0.5	.36	3.60	.73
3-disk	350	0.7	.46	4.60	.66
4-disk	425	0.85	.56	5.60	.66
Disk harrows: 7 ft.	200	2.2	.20	2.00	.09
10 ft.	275	3.0	.28	2.80	.09
Renovator: 8 ft.	250	1.6	.62	6.20	.38
Stalk cutter: 2-row	60	2.5	.12	1.20	.05
Cotton planters: 2-row	175	2.0	.28	2.80	.14
4-row	350	3.0	.56	5.60	.18
Grain drill: 12 ft.	325	3.3	.63	6.30	.19
Tractor mower: 7 ft.	190	2.6	.38	3.80	.15
Sulky rake: 12 ft.	90	3.0	0.14	1.40	0.05

*These charges do not include fuel or lubricants for tractors, or labor in operating the machines, or the 10 to 25 per cent risk and inconvenience charge mentioned elsewhere.

Most owners are particularly opposed to renting their large tractors, combines, hay balers, and other machinery of a type where the investment is large and considerable skill and experience are needed in its operation. In case it becomes necessary

to expand the use of such farmer-owned machinery it seems that one of the more feasible methods of expansion would come through renting the equipment to trustworthy, specialized custom operators during periods when the owner is not using the machines. Such a method would relieve the farmer of many of the management difficulties of doing custom work and would give him some assurance that supervision was being given by an individual skilled and equipped to take proper care of the machine.

Joint ownership

On small farms, joint ownership of machinery by two or more operators offers one means of economizing on its use. This sharing of the ownership of machines has proved most successful among operators with family relationships whose farms are located close together. Joint ownership has not been too popular a practice because the machinery is seldom used equally by both operators; also, difficulties arise on the division of repair costs and time of use. Operators of rented farms have the additional objection of instability of tenure in one locality—they may move from the neighborhood and thus disrupt the machinery partnership.

If the operators of small to medium-sized farms are to receive a share of the limited supply of new machinery, they will need to make the machines available to other producers. Already it is apparent that custom contracting of operations such as hay baling and combining may be curtailed because of labor shortages. Joint ownership of such machinery by groups of small farm operators who among them could furnish the necessary labor may prove to be a more satisfactory method.

Machinery co-operatives

Experiments in the use of machinery co-operatives in Arizona have been made under the guidance of the Farm Security Administration. To date the experience with this type of machine sharing has been insufficient to determine its adaptability to Arizona farming conditions. Present indications are that the use of organized machinery co-operatives would be limited to groups of small farm operators in isolated areas, who have difficulty financing their machinery purchases individually or jointly.

MACHINERY REQUIREMENTS

Since sufficient machines are not being manufactured to replace those worn out, the average age of machines on farms will tend to increase and the total number of effective machines decrease. Farmer estimates of the maximum years of additional expected life of machinery on farms were secured in the survey. This information for tractors is given in Figure 2. Undoubtedly the period of use for some of the tractors could be extended beyond that

indicated but at a repair cost that would be uneconomical. More rapid depletion of machines in Pinal County reflects greater use, due to larger operating units.

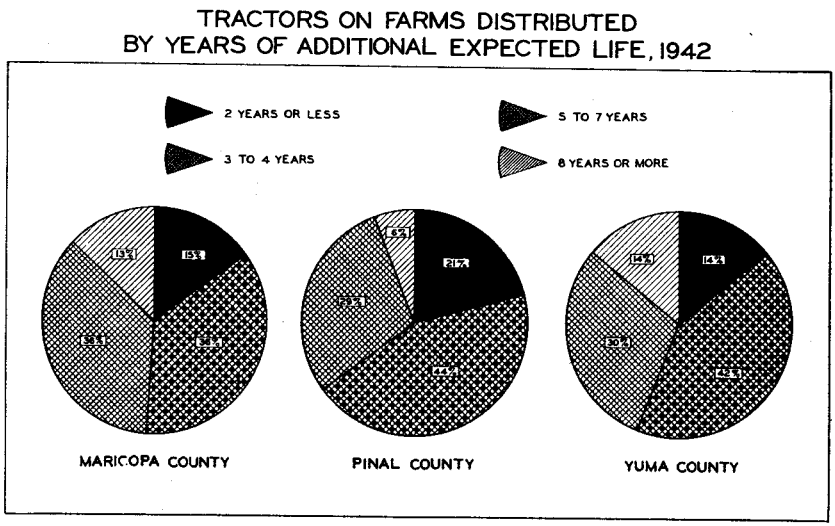

Figure 2.—Farmers anticipate that about one-sixth of the tractors on farms in these three counties will be worn out before the end of the 1944 season. More rapid depletion of machinery in Pinal County reflects greater annual use.

Shifts in agricultural production in Arizona's irrigated valleys to meet changing war needs can be readily made because of the adaptability of climate and soils. In making any major shifts in crop production, however, consideration must be given to the present supply of machinery on farms and the effect of such shifts on the requirements for additional machinery. For example, a shift to American-Egyptian cotton from upland cotton could be made without materially affecting the machinery needs of the state, except for ginning equipment. Such a shift, made at the expense of almost any other crop, would increase the machinery requirements, especially for cotton planters, cultivators, stalk cutters, and cotton trailers.

In view of the large quantity of relatively new machinery on farms in these major irrigated valleys, it seems likely that farmers will be able to get by during 1943 with relatively little new machinery. Their main concern is that they be given ample supplies of repair parts. Present indications are that the need will be greatest for new haying and livestock machinery, especially tractor mowers, sulky and side-delivery rakes, and feed grinders.

ORGANIZING FOR EFFECTIVE USE OF MACHINERY

Rationing

Rationing of new machinery has already been undertaken by the government to help alleviate the farm machinery shortage. This program has, for the most part, had a favorable reception from the farmers of the state because they realize the necessity of such control when limited supplies are available. The main objection during 1942 to the rationing program has been to the basis used for allocating available supplies to the states. Except for ease in administration, the use of any one year as a basis for distributing machinery by areas has little merit. Sales records by areas, covering a period of years and with corrections for agricultural expansion, should prove to be a fairer basis of allocation to the state.

Repair program

Farmers have responded well to publicity urging them to overhaul machinery and make the necessary repairs in advance of the rush season of machinery use. Especially for machines used only at certain seasons of the year, it is possible for farmers to overhaul in advance and to order parts sufficiently early to get delivery when needed. Many repair needs, however, are due to breakage and cannot be anticipated. The success of the machinery repair program is, therefore, dependent not only upon farmers using sufficient foresight and ordering parts in advance, but also upon machinery dealers being able to maintain adequate supplies of parts and maintaining retail houses for the sale of parts and repair service. Many of the retail houses in smaller trading areas will probably be forced out of business, due to decreased income from new machinery sales. Some examples of this have already occurred in the Salt River Valley. Closing of local dealers' houses results in longer-distance driving for farmers and delay in getting repairs made. A number of agencies selling different makes of equipment might jointly operate parts and repair service establishments in the smaller towns in order to cut overhead costs. Company identity could be maintained only in larger towns, where new machinery as well as parts would be handled.

Price ceilings have been placed on the servicing and repairing of farm machinery which, in effect, tends to limit wages received by farm machinery mechanics. Unless wages in war industries are effectively controlled, the better mechanics will be attracted away from the farm machinery repair service because of the industry's inability to meet wage competition.

Use of existing machines

No attempt has been made to control the use of machinery already in the hands of farmers. To date, crop or livestock losses due to machinery shortages have not been sufficiently great to warrant much restriction on the use made of such machinery. It

seems extremely likely, however, that some action, preferably on a voluntary basis, will be needed in the near future. Farmers will need to organize locally to facilitate the bringing together of those who need machinery help and those who can provide it. In many communities a local machinery dealer or repair service operator may be willing to act as a clearinghouse to maintain lists of those who have certain machines available for custom work, for rent, or for sale, together with information on rental and custom rates.

Additional governmental control and regulation needed in respect to farm machinery during the war period will depend upon how successfully farmers voluntarily prevent production losses due to machinery shortages by making more effective use of existing machinery.

SUMMARY

The relative newness of a large proportion of the machinery on farms in the larger irrigated valleys of the state is illustrated by the 1942 age distribution of tractors in these areas. Twenty-eight per cent had been in use for 2 years or less, 18 per cent for 3 to 4 years, 34 per cent for 5 to 7 years and 20 per cent for 8 years or more. With little new machinery available, however, the life of these tractors will be shorter than normal because of expanded use of those remaining in service. Farmers estimated that about one-sixth of the tractors on farms in Maricopa, Pinal, and Yuma counties will be worn out before the end of the 1944 season.

Wide variations occur between farms in the use made of farm machinery. For example, the range in average acres farmed with four-row tractor outfits on cotton-alfalfa farms was from 135 acres on the smaller farms to 370 acres on the largest farms. In addition, on most farms irrespective of size, the machinery tends to be used extensively only at certain seasons of the year. These seasons of extensive use vary, however, between farms, depending on the kind of crops grown. For these reasons good possibilities exist for expanding the use of existing machinery as the need arises through some method of machine sharing.

For heavy tillage and harvesting operations custom contracting has in the past proved the most satisfactory method of machinery sharing. In the Salt River Valley, for example, about 45 per cent of the plowing, 35 per cent of the disking and floating, 55 per cent of the combining, and 75 per cent of the hay baling was contracted in 1942. During the year, the rates charged for these operations increased in some cases by as much as 33 per cent over the previous year.

Suggested rental rates were made for machines most likely to be rented (Table 4). These figures include charges for interest, depreciation, and normal repairs and are based on the average use of the machines in the area. The rates vary from $1.20 a day for two-row stalk cutters to $6.00 a day for the larger wheel tractors.

RECOMMENDATIONS

The emphasis during 1943 should be on furnishing farmers with adequate repair parts and repair service rather than on using much critical material for manufacture of new machinery. A consolidation of machinery agencies in small towns to cut overhead cost may be necessary to insure their continued operation on a repair-parts and service basis.

Farmers will need to organize locally to facilitate programs of machine sharing. Local dealers or repair-shop operators could aid in preventing crop losses by maintaining lists of used machinery available for sale, rental, or custom work, together with information on rental and custom rates.

Although custom contracting of machinery has in the past proved the most successful means of making efficient use of farm machinery in Arizona, it seems likely that any material expansion of this method of machine sharing will be difficult in view of the shortage of farm labor. Machine renting shifts the burden of securing the labor to the individual who needs the work done, and this may prove to be a more successful method for operations involving less expensive items of machinery. Farmers may also be more interested in doing exchange work than in receiving pay in the form of cash. Joint ownership of such machinery as hay balers and combines, by groups of small farm operators who between them can furnish the labor for operation, may replace custom contracting under war conditions.

The entire program of increased agricultural production with limited supplies of new machinery calls for increased planning and closer co-operation on the part of farmers, the machinery industry, and government educational and action agencies.