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Electricity on farms in the clay hills area of Mississippi

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Electricity on Farms

In the Clay Hills Area of Mississippi

MISSISSIPPI STATE COLLEGE
AGRICULTURAL EXPERIMENT STATION

CLAY LYLE, Director

STATE COLLEGE

MISSISSIPPI

In cooperation with the Bureau of Agricultural Economics
United States Department of Agriculture.



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PREFACE

This study, made in the Clay Hills area of Mississippi, is concerned with some economic aspects of farm electrification. It is primarily descriptive, presenting experiences of farmers in the use of electric energy from central-station sources. It is one of a series of related studies made in various type-of-farming areas of the country. These studies were made possible by the cooperative efforts of state agricultural experiment stations and the Bureau of Agricultural Economics. Similar studies were made in the states of Georgia, Tennessee, Kansas, North Dakota, Wisconsin, Iowa, and Washington. They were made under authority of the Agricultural Marketing Act of 1946 (RMA, Title II).

Many persons made valuable contributions to this study. Among these were: R. J. Saville, Head, Department of Agricultural Economics, Mississippi Agricultural Experiment Station; F. M. Hunter, Rural Electrification Specialist, Mississippi Agricultural Extension Service; M. R. Cooper, Bureau of Agricultural Economics; and J. P. Schaezner of Rural Electrification Administration. The field enumerators were A. D. Seale, Jr., Sidney Ishee, Claude T. Lowry, Jr., Albert R. Legett, and Rupert B. Johnston, all students at Mississippi State College. Mrs. Barbara Reid of the Mississippi Agricultural Experiment Station was responsible for most of the computations.

The power suppliers serving the study area freely provided data on the consumption and cost of electricity for the farms in the survey. And finally, the ready cooperation of the farmers interviewed is gratefully acknowledged.

ELECTRICITY ON FARMS IN THE CLAY HILLS AREA OF MISSISSIPPI

By

J. P. GAINES¹ and JOE F. DAVIS²

INTRODUCTION

Not many years ago, there was a distinct difference between rural and urban areas in the prevailing levels of living. Some of this disparity was due to differences in income, which still prevail to some degree, but most of it was caused by differences in availability of services. In recent years, the gap between the services and facilities conveniently available to urban and rural people has narrowed considerably, mainly because of the extension of central-station electric service to rural areas. Electric service has made possible far-reaching changes in rural living, including the use of modern household equipment to reduce the drudgery connected with household work; lighting that is much superior to that given by kerosene lamps; water that can be obtained by turning a faucet rather than tugging at a rope or working a pump handle; and farm equipment of various kinds that reduces the labor needed in farm production activities. It has stimulated diversification of farm enterprises in areas long in need of adjustment from a one-crop type of agriculture. Other benefits, also, have come from the electrification of farms. These have tended to raise the level of rural living or to reduce the cost of producing farm products.

Mississippi Has Lagged in Farm Electrification

Mississippi has lagged behind most states in percentage of farms electrified. On January 1, 1935, when 11 percent of the farms in the United States were electrified, only 1 percent of Mis-

issippi farms had central-station service. By 1945, the percentage of Mississippi farms with electric service had increased to 19, while the national percentage had risen to 46. On June 30, 1951, approximately 62 percent of Mississippi's farms were connected to a distribution system. This represented a threefold increase from 1945, but it was still much below the national average of 84 percent.

Most data concerning the proportion of farms with electric service are somewhat misleading as units operated by croppers are classified as farms by the Census of Agriculture. Mississippi has a relatively large proportion of farms operated under the cropper system. It is not unusual for the operator's house on a farm to be wired for electricity, while some, or all, of the cropper houses are not wired. In the study reported here, all of the operator dwellings on the sample farms were wired for electricity but only 55 percent of the houses of croppers and laborers were wired. Reasons given for not wiring these houses were: (1) croppers did not wish to be responsible for the electric bill, (2) the houses were in such poor condition that they were not worth wiring, (3) the houses were unoccupied much of the time, and (4) operators were doing away with cropper labor by substituting machines for hand labor, especially where they were shifting to enterprises requiring less hand labor. It is apparent, therefore, that the proportion of electrified farms reported for Mississippi would be much higher if units operated by croppers were not classified as farms.

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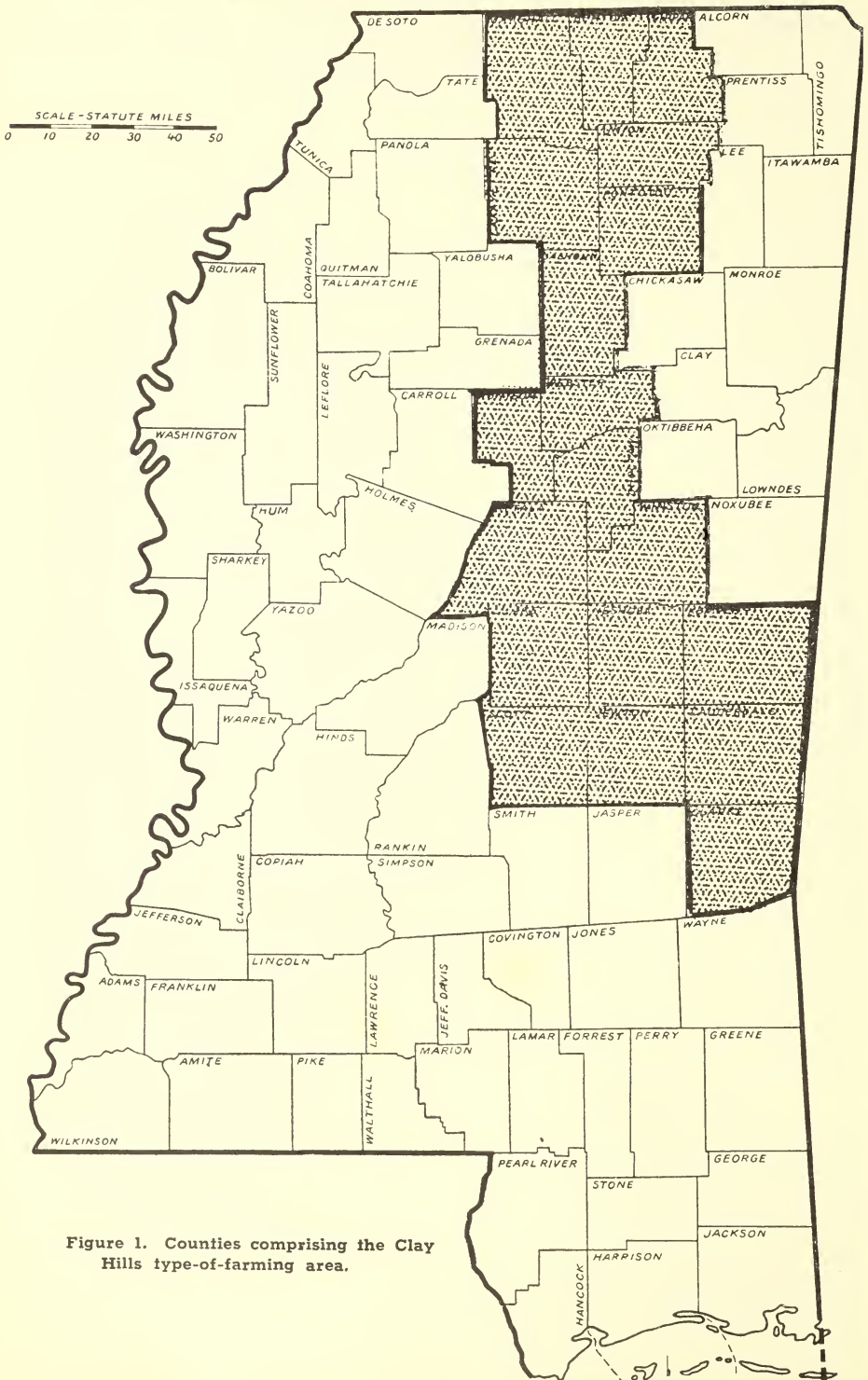


Figure 1. Counties comprising the Clay Hills type-of-farming area.

RESEARCH TECHNIQUE

Objectives of Study

This is one of a series of related studies made or proposed for the major type-of-farming areas of the country. These studies deal with certain economic aspects of farm electrification—primarily factors affecting consumption of electric energy on farms and with the place of electricity and electrical equipment in the whole scheme of farm mechanization. This study, made in the Clay Hills Area of Mississippi, is more specifically concerned with : (1) trends in the use of electric energy in the area, (2) relationship between the use of electricity (and electrical equipment) and the economic and physical characteristics of the farms, (3) costs incurred in the use of electricity, including the costs of energy, wiring, and equipment, and (4) probable changes in the use of electricity in the foreseeable future.

The Study Area

The nineteen counties that comprise most of the Clay Hills Type-of-Farming Area are indicated in Figure 1. This has long been an area of small farms, most of which depend primarily upon cotton as the source of farm income. In recent years it has adjusted rather rapidly to a more diversified agriculture, and off-farm employment has become more widespread. For example, from 1930 to 1950, acreage in cotton declined more than 50 percent (Table 1).

Cattle and calves increased 73 percent, whole milk sold, 147 percent, and hogs and pigs on farms, 97 percent.

This is an area of high density of rural population, with only 15 acres of farm land per person on farms in 1930, and only 22 acres per person in 1950. The rural population is declining relative to the urban population. In 1950 it comprised about 60 percent of the total population. Urban centers and local markets are small. Only one city (Meridian) has more than 10,000 population.

Manufacturing is increasing in volume; but, as compared to agriculture, it is still relatively minor in terms of persons employed. From 1939 to 1947, the number of manufacturing establishments increased 55 percent, and the number of persons employed in manufacturing 54 percent. However, in 1947, only 14,000 of a total population of more than 400,000 were engaged in manufacturing. The manufacturing that has developed has stimulated the expansion and development of service and trade occupations that have further served to balance the economy of the area. Following are the changes in manufacturing in the area from 1939 to 1947, as reported by the 1948 Census of Manufacturers:

	1939	1947	Increase
	Number	Number	Percent
Establishments	291	451	55
Employees	9,238	14,227	54

Table 1. Changes in population and in agriculture, Clay Hills Area of Mississippi, 1930-1950.

Item	Year		Percent change 1930-1950
	1930	1950	
Population:			
Total persons	408,076	409,941	+ 0.5
Farm population	296,852	246,000*	- 17.2
Percent farm	77	60	- 22.0
Acres per person on farm	15	22	+ 45.4
Number of census farms	64,786	57,698	- 11.0
Acres per farm	69	94	+ 35.5
Number of operating units	46,009	48,348	+ 6.8
Acres per operating unit	98	112	+ 14.9
Number of cropper units	18,777	9,350	- 51.2
Farm organization:			
Acres cotton	680,910	322,530	- 52.6
Gallons whole milk sold	5,282,112	13,044,482	+147.0
Number all cattle and calves	206,926	358,242	+ 73.1
Number hogs and pigs	88,372	173,916	+ 96.8
Number tractors	1,449	8,570	+491.4

*Preliminary estimate.

Topography and soils in the area vary considerably. Generally, the land is rolling and highly susceptible to erosion. Soils are of the coastal plain origin. Soil texture is coarse and sandy in spots, fine and sticky in others. Annual fertility is generally low and large applications of commercial fertilizer are required to increase rates of production.

Sample Selection

Within each county in the area studied, a random sample of farms and rural residences was obtained by means of area sampling. A uniform sampling rate (about 3.4 percent of the rural area) was used in all counties. Hence, the number of cases studied in each county was about in proportion to the total number of electrified operating units in it.

Operating units that had received central-station service on or before January 1, 1949, were included in the study. Usable records were taken of 500 farms and 62 rural residences. Of these 466 were served by rural electric cooperatives, 50 by municipalities, and 46 by power companies.

Enumeration: Skilled enumerators obtained the farm information, usually from operators of individual farms or rural residences. The enumeration was made in July and August, 1950. Data on the consumption of electricity and costs were provided by the suppliers who served the individual farms.

In this study, croppers were considered as farm laborers, not as farm operators; their units were not handled as individual cases but were considered as a part of the operating unit on which

they worked. Share and cash renters were considered as operators. Their farms were handled as individual cases in the analysis of the data.

Presentation of data: The general plan of presenting the data is similar to that used in the studies in other states. This is done so that certain comparisons may be made of the data from those studies. Class designations used by the Census of Agriculture are followed as nearly as practicable to permit comparisons with Census data.

All of the electricity consumed on an individual farm—whether in the operator's home, a labor's home, or in the service buildings—is considered as used by that farm. Most farms had only one dwelling that used electricity, but some (16.6 percent) had two or more. In this respect, the data as presented in this report are not entirely comparable to the data usually published by suppliers. Suppliers usually report consumption "per consumer" or "per customer" rather than "per farm."

Rural residences handled separately: As mentioned earlier, all operating units within a sample area were included in the study. This resulted in including a number of cases that were not farms by any standard, but were rural residences. They embraced very small acreages and the operators generally were employed in town or were retired. Consequently, data from farms and rural residences are handled in separate sections in this report. For this purpose a rural residence is defined as any unit of less than three acres and with agricultural production of less than \$250.

USE OF ELECTRICITY ON FARMS

It has been shown in other studies, and it is borne out in this study, that the amount of electricity used per farm in certain localities is principally a function of three factors. The factors are time, income, and size of specific farm enterprises, particularly those enterprises which use large amounts of electric energy, such as dairy businesses. Time is necessary for the farm-

er to become acquainted with the potentialities of electricity on the farm and to acquire various equipment available for his use. An adequate income is necessary if he is to buy electrical appliances. He must have a sizeable business to have need for many kinds of equipment for use in farming operations.

This study indicates, however, that

two other considerations may also have strong influences. These are the rate structures under which electricity is sold and the tenure of the farm operator. Furthermore, farms appear to vary widely in the amount of use given specific kinds of equipment. Consumption records indicate that some farmers use equipment extensively while other farmers make restricted use of theirs.

All of these characteristics are examined more fully in the following paragraphs.

Upward Trend in Consumption

From 1940 to 1949, the average amount of electricity used annually by farms in this study rose from 565 kilowatt-hours in 1940 to 1,494 in 1949 (Table 2). The increase was at an average rate of 12.5 percent annually,³ but it was somewhat more rapid in the last half of the decade than in the first. No doubt part of this difference in the rate of increase was due to better economic conditions and greater availability of electrical equipment in recent years. To a large extent, however, it indicates that farm people want

such equipment and buy it rather rapidly.

While the amount of electricity used per farm has increased substantially, the number of farms with electric service has also increased. Reports of the Bureau of the Census indicate that in 1940 there were 5,007 electrified farms in the 19 counties. The number had almost doubled by 1945, reaching 9,953. By January 1, 1949, about 26,000 farms (by the definition used in this study) had central-station electric service. Consequently, the total amount of electricity used by all farms in the area increased from about 2,800,000 kilowatt-hours in 1940 to 38,800,000 in 1949. The total amount paid for this electricity rose from about \$150,000 in 1940 to \$1,221,000 in 1949.

Data presented in Table 2 reveal two broad tendencies among farms in this study. First, farms as a rule used greater amounts of electricity as time went on, after they first received central-station electric service. For example, farms electrified in 1940 increased their average consumption from 409 kilowatt-hours in 1941 to 1,918 in

³ A fitted trend curve $Y_c = 457 (1.125)^x$; 1940 = O. Y_c is the calculated kilowatt-hours and x is the number of years after 1940. The straight line trend is $Y_c = 371 + 101x$ with the same base year.

Table 2. Average consumption of electricity per farm by year of electrification, 1940-1949.

		Consumption year									
Year	electrified	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949
		Kilowatt-hours									
Before 1939	911	757	757	941	989	973	1,171	1,409	2,568	2,217
1939	306	353	392	335	399	602	891	1,032	1,261	1,660
1940	—	409	451	547	659	763	1,089	1,332	1,588	1,918
1941	—	—	648	917	901	1,008	1,327	1,402	1,837	2,429
1942	—	—	—	619	709	694	1,089	1,298	1,904	2,358
1943	—	—	—	—	591	541	623	949	1,517	2,222
1944	—	—	—	—	—	461	571	683	947	1,118
1945	—	—	—	—	—	—	445	543	796	1,068
1946	—	—	—	—	—	—	—	660	1,032	1,465
1947	—	—	—	—	—	—	—	—	907	1,320
1948	—	—	—	—	—	—	—	—	—	1,145
All years	565	452	543	675	728	710	855	961	1,268	1,494
		Farms represented									
		Number									
Before 1939	6	7	8	9	10	17	17	17	19	26
1939	8	8	8	10	10	15	15	15	15	15
1940	—	32	34	34	34	43	45	46	47	50
1941	—	—	25	25	26	30	30	30	30	30
1942	—	—	—	13	14	18	19	20	21	22
1943	—	—	—	—	9	12	12	12	12	13
1944	—	—	—	—	—	47	46	47	47	47
1945	—	—	—	—	—	—	47	49	50	52
1946	—	—	—	—	—	—	—	42	45	45
1947	—	—	—	—	—	—	—	—	66	69
1948	—	—	—	—	—	—	—	—	—	131
All years	14	47	75	91	103	182	231	278	352	500

Table 3. Electricity used per farm, 1949, and pieces of electrical equipment in use per 100 electrified farms by period of electrification, sub-area, tenure of operator and income group, August, 1950.

Item	All farms	Period of electrification		Sub-area			Tenure of Operator			Income group ³			
		Before 1943	1943-1945	1946-1949	North	Central	South	Owner	Cash renter	Share renter	Low	Medium	High
Farms represented	500	143	112	245	144	129	227	441	20	39	150	248	102
Kilowatt-hours used per farm, 1949	1,494	2,120	1,223	1,253	1,757	1,372	1,394	1,588	897	724	869	1,287	2,918
Electric equipment per 100 farms for:													
Household operations:													
"Heavy" appliances ¹	35	50	30	28	40	34	32	39	10	3	20	28	72
"Light" appliances ²	539	651	526	479	553	535	532	556	395	415	425	500	801
Total household operations	574	701	556	507	593	569	564	595	405	418	445	528	873
Water supply:													
Pressure system	36	57	35	24	23	29	48	41	—	—	27	30	64
Farm operations:													
Farm shop	10	17	11	8	4	15	12	11	—	—	2	9	28
Dairy	6	15	—	3	6	1	9	7	—	—	—	—	27
Poultry	9	15	4	7	9	9	9	10	—	3	5	11	9
Livestock	2	2	1	3	3	2	2	3	—	—	2	2	2
General	1	2	—	1	1	3	—	1	—	—	—	1	3
Total farm operations	28	51	16	22	23	30	32	32	—	3	9	23	69
Grand total, all uses	638	809	607	553	639	628	644	668	405	421	481	581	1,006

¹ Ranges, water heaters, horrie (food) freezers and air conditioning units.² All other equipment used in household operation.³ Low income under \$2,000 total (1949) income; medium, \$2,000 to \$3,999; high, \$4,000 and over.

1949. The year-by-year increase in consumption per farm for the farms in this group was at a fairly constant rate of about 22 percent. For another example, farms electrified in 1944 used an average of 461 kilowatt-hours per farm in 1945 as compared to 1,102 kilowatt-hours in 1949. This group of farms increased their average consumption at the rate of about 25 percent annually.

The second broad tendency shown by these data is that farms electrified in recent years use less electricity than those that first received the service a number of years ago. The 143 farms electrified before 1943 used an average of 2,120 kilowatt-hours in 1949 compared to 1,242 kilowatt-hours for the 357 farms that first received the service after 1942.

No consistent association was found between year of electrification and amount of electricity used the first year. This inconsistency may be attributed largely to war-time circumstances which created a shortage of certain equipment. The trend in electricity used the first year of electrification was upward for units electrified from 1939 to 1942, downward for those electrified during the war years 1943 to 1945, and upward again for those electrified from 1946 to 1949. It is probable that those connected in the next few years will use a little more electric energy during their first year than was the case during the decade of record. Farm people have gained much from the experience of their neighbors; they will not need to go through the same long process of adaptation.

Some differences are found between the group of farms electrified before 1943 and those connected after that time. In the older group, there were more dairy farms and a larger proportion with high incomes. These differ-

ences account for some of the differences in average consumption, but they cannot account for all of them. Some of the higher consumption by farms electrified a number of years ago must certainly be due to the longer time during which farmers could become acquainted with the potentialities of electricity and electrical equipment and could install the desired equipment.

Electric equipment added gradually: Farms electrified before 1943 had about 42 percent more electric equipment per farm than did those connected after that time (Table 3). The differences were especially noticeable in ranges, water heaters, water systems and equipment used in the dairy and poultry enterprises. But they also had more of the smaller kinds such as radios, irons, clocks and toasters. The older group averaged about 6.5 pieces of "light" equipment per farm at the time of the survey as compared to 4.8 pieces per farm among farms connected more recently.

An average of 5.7 kinds of household appliances was in use per farm (Table 4). Of the three age groups, the earlier electrified farms had the greater number of kinds, averaging seven per farm. Farms electrified from 1943 to 1945 had an average of 5.6 kinds of appliances per farm, and those connected since then about 5. Forty-six percent of the older electrified farms had from six to ten different kinds of appliances, while the middle and recent time groups had mostly from three to five different kinds. Farms in the northern counties had a slightly larger number of kinds of appliances, 5.9 per farm as compared to 5.7 in each of the other groups.

The more commonly found household appliances were irons, radios, and refrigerators, in that order. Slightly over 96 percent of all farms had electric

Table 4. Household equipment per farm and percentage of farms having specified kinds, by date of electrification, July, 1950.

Item	Unit	Date of electrification			
		Before 1943	1943-1945	1946-1949	All farms
Farms represented	Number	143.0	112.0	245.0	500.0
Equipment per farm	Percent	7.0	5.6	5.0	5.7
Farms with equipment:					
Less than 3 different kinds	Percent	3.5	7.1	15.5	10.2
3 to 5 different kinds	do.	44.8	55.4	55.9	52.6
6 to 10 different kinds	do.	46.2	35.7	27.8	34.8
11 or more different kinds	do.	5.5	1.8	.8	2.4

irons, 92 percent had radios, and 87 percent had refrigerators (Appendix Table 1). Washing machines were numerous, with more than 57 percent of the farms owning one. Household fans were reported by 43 percent and hot plates by 28 percent. Electric ranges were used on 22 percent of the farms. One farm reported a television set, and two had air conditioning units. Less than 5 percent had home freezers.

Less than a third of the 500 farms in this study reported any equipment for use in farming operations. Almost half of the equipment was reported by the 143 farms electrified before 1943. Only 2 percent of the farms had an electrically operated milking machine and 9 percent had an electric brooder hover for chicks.

Twenty farms reported some kind of shop equipment using electric energy. They reported 50 pieces. The most numerous piece of equipment was the tool grinder—and fewer than 3 percent reported that. Three percent had an electrically driven saw. Less than 1 percent had such equipment as air compressors, drill presses, lathes, and welders.

Wide variations among farms: There was little tendency for farms to be "average" in the use of electricity. For example, the average consumption of the 143 farms electrified before 1943 was 2,120 kilowatt-hours in 1949, but only six farms used within 200 kilowatt-hours of the average. The median for the group was 1,027 kilowatt-hours; or, to consider the extremes, 11 farms of this older electrified group used less than 400 kilowatt-hours in 1949 while 12 others used 5,000 or more (Table 5). It is evident that the average consumption for the group was strongly influenced by a few high-consuming farms.

Farms first connected in 1943 and later years also varied widely in the use of electricity. Almost two-thirds of these farms used less than 1,000 kilowatt-hours in 1949, while 6 percent used 4,000 or more. However, relatively more of the farms electrified recently were in the low-consuming brackets than of the farms that had received service before 1943.

No seasonal trend: No seasonal pattern was apparent in the monthly consumption data for any given year (Table 6). In fact, kilowatt-hour usage was

Table 5. Distribution of farms by electricity used in 1949, by date of electrification.

Kilowatt-hours used in 1949	Date of electrification				Date of electrification			
	Before 1943	1943-1945	1946-1949	All years	Before 1943	1943-1945	1946-1949	All years
	Number				Percent			
Less than 200	1	2	7	10	0.7	1.8	2.8	2.0
200 to 399	10	14	32	56	7.0	12.5	13.1	11.2
400 to 599	14	19	36	69	9.8	17.0	14.7	13.8
600 to 799	23	20	43	86	16.1	17.8	17.6	17.2
800 to 999	20	20	42	82	14.0	17.8	17.2	16.4
1,000 to 1,999	29	20	49	98	20.2	17.8	20.0	19.6
2,000 to 2,999	9	5	17	31	6.3	4.5	6.9	6.2
3,000 to 3,999	11	4	7	22	7.7	3.6	2.8	4.4
4,000 to 4,999	14	4	5	23	9.8	3.6	2.1	4.6
5,000 or more	12	4	7	23	8.4	3.6	2.8	4.6
All farms	143	112	245	500	100.0	100.0	100.0	100.0

Table 6. Average consumption of electric energy on farms, by period of electrification, by months, 1940, 1945, and 1949.

Month	Period of electrification								
	Before 1943			1943-1945		1946-49	All farms		
	1940	1945	1949	1945	1949	1949	1940	1945	1949
	Kilowatt-hours								
January	53	71	177	43	96	92	53	62	117
February	45	73	180	39	92	91	45	62	117
March	41	62	177	38	87	91	41	54	115
April	45	73	177	39	89	96	45	62	117
May	38	64	159	38	103	90	38	55	113
June	41	71	160	37	98	96	41	59	115
July	38	72	184	38	111	109	38	60	131
August	44	67	167	37	119	109	44	56	128
September	41	78	168	40	115	108	41	64	127
October	36	74	170	35	104	104	36	59	123
November	38	72	180	43	100	112	38	60	128
December	35	87	204	45	98	121	35	71	139

fairly uniform throughout the year in 1940, 1945, and 1949. Absence of a seasonal pattern may be due to several reasons, among which are: (1) addition of equipment during the year; (2) movement of tenants and croppers during the year; and (3) uses that cause conflicting patterns to develop. For example, the use of electricity for lighting and home heating is no doubt heavier in winter, while use for milking is heavier in summer when milk production is higher. The pattern depends a great deal upon the uses and as these vary throughout the area. It is doubtful whether a decided seasonal pattern will soon develop.

In 1949, consumption of electric energy was highest in December and July, and lowest in May. An average of 122 kilowatt-hours was used per month in 1949.

More Electricity Used Where Rates Are Low

Subdivisions of study area: As the analysis progressed, it became apparent that for some purposes the study area should be divided into three geographic sub-areas or sections—Northern, Central and Southern. Three main differences led to this conclusion. (1) The cost per kwh of electricity to the farmer was lower in the northern part than in the southern. In the northern section farmers paid an average of 2.5 cents per kilowatt-hour used while those in the central section paid 3.2 cents, and those in southern counties paid 3.8 cents. The average cost to all units studied was 3.2 cents per kilowatt-hour. (2) Industry provides more off-farm employment in the southern part than in the northern. (3) Electrification of farms has spread more slowly in the central counties. In 1940, only 4 percent of the farms in the central counties were connected for electricity, as compared to 11 percent of the northern counties and 8 percent of the farms in southern counties. The following data show the progress of farm electrification in the areas since 1940. Gains since 1945 in all sections are especially noteworthy.

Section	Percent of farms electrified		
	1940	1945	1950
Northern counties	11.0	17.9	53.6
Central counties	4.4	15.7	59.9
Southern counties	8.4	17.9	58.7
Clay Hills area	8.1	17.6	57.3
State of Mississippi	9.5	18.6	55.7

The three subdivisions with the counties included in each group are: Northern group—Benton, Lafayette, Marshall, Pontotoc, Tippah and Union; Central group—Attala, Calhoun, Choctaw, Montgomery, Webster and Winston; and the Southern group—Clarke, Kemper, Lauderdale, Leake, Neshoba, Newton, and Scott.

Average consumption highest in northern counties: The average consumption of farms in the 6 northern counties was 1,757 kilowatt-hours in 1949. This was 27 percent more than the average of 1,386 kilowatt-hours used by farms in the 13 central and southern counties.

Throughout the decade of record, farms in the northern counties used more electricity per farm than did farms in the southern group of counties (Table 7). However, farms in the southern counties have rather consistently increased their average at the rate of about 20 percent per year while most of the increase in the northern counties took place in the three years 1947-49. The numbers of records avail-

Table 7. Consumption of electric energy per farm by sub-areas, 1940-49.

Year	Sub-area			Study area
	North	Central	South	
	Kilowatt-hours			
1940	988	—	248	565
1941	990	516	309	452
1942	870	836	361	543
1943	1,012	1,110	435	675
1944	1,037	1,021	512	728
1945	835	995	571	710
1946	905	1,190	712	855
1947	1,106	1,129	854	961
1948	1,701	1,294	1,075	1,268
1949	1,757	1,372	1,394	1,494
	Farms represented			
	Number			
1940	6	—	8	14
1941	8	6	33	47
1942	10	18	47	75
1943	14	21	56	91
1944	22	22	59	103
1945	41	34	107	182
1946	52	48	131	231
1947	61	61	156	278
1948	76	93	183	352
1949	144	129	227	500

able for the first half of the decade are not sufficiently adequate to be statistically conclusive, yet there are enough to indicate the trends.

Characteristics of electrified farms: Farms in the central section had an average of 121 acres per farm while northern farms had 104, and southern farms, 93 acres (Table 8). All farms averaged 103 acres. Cropland constituted about a third of all land; cotton and corn were the principal crops. There was an average for all farms of 8.2

animal units,⁴ with no significant difference between sections in livestock numbers per farm.

Total incomes⁵ averaged \$3,300 in 1949, about half of which was from farm sales, one-sixth from the home use of products produced on the farm, and more than a third from off-farm employment. Sales of cotton made up about half of total farm sales in the area. Cotton was most important in the northern section, where it constituted two-thirds of total farm sales. In

⁴The following animal unit conversion factors, as suggested by R. D. Jennings of the Bureau of Agricultural Economics, were used: Milk cow, .7; milk heifer, .3; beef cow, .5; other cattle and calves, .3; pigs raised, .13; feeder pigs bought, .10; hens and pullets, .01; chicks raised, .0035; turkeys raised, .02; and horses and mules, .9.

⁵This is gross receipts with no deductions for expenses. It is not necessarily closely related to net income or disposable income. However, it is one measure of the size of the farm business and an indication of disposable family income.

Table 8. Characteristics of electrified farms, by sub-areas, 1949.

Characteristic	Unit	Sub-area			Study area
		North	Central	South	
Farms represented	Number	144	129	227	500
Average per farm:					
Consumption of electricity	KWH	1,757	1,372	1,394	1,494
Cost of electricity used	Dollars	44.49	44.37	52.28	46.96
Acreage operated	Acres	104	121	93	103
Acreage in crops:	do.	33.7	34.7	29.2	31.9
Cotton	do.	14.1	10.7	7.9	10.4
Corn	do.	13.4	16.8	13.3	14.2
Lespedeza	do.	3.7	4.4	2.1	3.2
Income (Gross):					
Farm sales	Dollars	2,047	1,489	1,448	1,631
Cotton	do.	1,367	814	582	868
Products used in home	do.	496	466	443	464
Off-farm	do.	972	1,061	1,496	1,233
Total	do.	3,515	3,016	3,387	3,328
Animal units	Number	8.3	8.2	8.3	8.2
Wired dwellings	Dollars	1.4	1.3	1.2	1.3
Cost of electricity per \$1,000 total income	Dollars	12.66	14.71	15.44	14.09
System of farming:					
Cotton	Percent	61	37	31	41
Dairy	do.	10	7	5	7
Livestock	do.	3	7	9	7
Poultry	do.	—	—	4	2
General	do.	7	11	7	8
Part-time	do.	13	21	35	25
Subsistence	do.	6	17	9	10
Size of farm:					
Less than 30 acres	do.	18	13	23	19
30 to 69 acres	do.	33	28	27	29
70 to 139 acres	do.	26	31	31	30
140 to 259 acres	do.	17	16	13	15
260 acres or more	do.	6	12	6	7
Total income:					
Less than \$2,000	do.	29	38	26	30
\$2,000 to \$3,999	do.	52	44	51	50
\$4,000 or more	do.	19	18	23	20
Date of electrification:					
Before 1943	do.	24	19	37	29
1943 to 1945	do.	23	19	24	22
1946 and after	do.	53	62	39	49
Tenure of operator:					
Owner	do.	74	94	94	88
Cash renter	do.	6	1	5	4
Share renter	do.	20	5	1	8
Farms with:					
1 dwelling	do.	82	82	86	84
2 dwellings	do.	12	13	10	11
3 or more dwellings	do.	6	5	4	5

the southern counties, sales of cotton comprised less than one-third of total sales. Off-farm income was most important in the southern section, making up 44 percent of total income in those counties. The importance of off-farm employment in southern counties is further pointed up by the large proportion (35 percent) of part-time farmers. Of course, the larger off-farm employment, and preponderance of part-time farms, are corollary to heavier industrialization in the southern section.

Because of the high off-farm income, total income for family living probably was slightly higher in southern counties than in other sections. Income from off-farm employment largely represents a net amount available for family living. Income from farm sales does not represent disposable income or income for family living, but rather the gross amount received and available to pay production costs as well as family living expenses. Actually, the gross receipts for some individual farms in some years may not be large enough to pay the farm costs, resulting in a negative income to the family. Income from off the farm, therefore, is much more significant from the family living standpoint than is a like amount from farm sales.

Sixty-one percent of the northern farms were classified as cotton farms,⁶ while only 37 percent of central and 31 percent of southern farms, were of this system. Dairying was relatively minor, as only 7 percent of all farms in the survey were classified as dairy. Dairying was most important among farms in the northern group of counties. Livestock farms, like dairy, made up 7 percent of all farms, but were more prevalent in the southern counties. A little more than 10 percent of all farms were subsistence farms, with the preponderance in the central counties, where 17 percent of all farms were of that classification.

Southern farms, with 37 percent electrified before 1943, were electrified earlier than farms in the other sections. More than half of the farms in the

central and northern sections were electrified from 1946 to 1949, while only 39 percent of those in the southern section were electrified in that recent period.

By all the characteristics outlined, it would seem that consumption of electricity would be higher in the southern than in the other sections, yet consumption was highest in the northern counties, and by a significant amount. Income is slightly higher in the southern counties, and farms in the southern counties were electrified earlier on the average. Those two factors, as pointed out in succeeding sections, have an important relationship to kilowatt-hour consumption. However, the cost of electricity to farmers was lower in the northern group of counties. This explains at least a part of the higher average consumption in the northern counties. Northern farms paid 2.5 cents per kilowatt-hour used in 1949, while central farms paid 3.2 cents, and southern farms, 3.8 cents. Rate structures are set up so that average costs decline with amount of electricity used. Consequently, a lower average unit cost would naturally be expected where more is used. Basically, however, cost rates in the northern section are lower than in most parts of the central and southern sections. The average expense for electricity for all farms was \$47 in 1949, or about \$4 a month, with southern farmers having the highest average expense, \$52 a year.⁷

Equipment inventories differ: The higher average consumption by farms in the northern group of counties cannot be entirely accounted for by the equipment reported. Farms in the northern counties did report more household equipment, particularly ranges and water heaters. But almost half of the southern farms had pressure water systems (electric) while less than a fourth of the farms in the northern counties had such systems. Equipment for use in farming operations was not numerous in any of the sub-areas (Table 3).

The amount of use made of equipment installed is apparently another

⁶ See page 20 for a description of criteria used in classification.

⁷ See Table 24 for more data on costs.

facet of the situation Available data in this regard are not conclusive. Nevertheless the individual farm schedules indicate that farmers in the northern counties used their electrical equipment more than did farmers in the southern counties.

Large Farms Use More Electricity

Eight size-of-farm groups were established, so that the relationship between size of farm and use of electric energy could be ascertained (Table 9). These groups, based on total acres of land under operation, were: less than 9, 10 to 29, 30 to 49, 50 to 69, 70 to 139, 140 to 259, 260 to 379, and 380 or more acres. These acreage intervals were chosen because they are used by the census, and they permit visual examination of the relationships under study. Other measures of size, such as acres of cropland, acres of cotton, gross farm

income, and number of animal units, varied directly with total acres operated.

Except for farms with less than nine acres, kilowatt-hour consumption in 1949 ranged directly from 1,257 for farms with from 10 to 29 acres, to 3,991 for those with 380 or more acres of land. The failure of the group with less than nine acres to follow the pattern may be attributed to off-farm income and other factors, rather than size. The total income of this group of small farms was relatively high, with 89 percent coming from off-farm sources. The proportion of total income from off-farm sources declined with increased size of farm, while both farm sales and value of products used in the home increased with size.

A factor that may help to explain the relatively high consumption by the smallest size group is the length of time the farms had been electrified. A high-

Table 9. Characteristics of electrified farms, by size of farm, 1949.

Characteristic	Unit	Acres operated							
		9 or less	10-29	30-49	50-69	70-139	140-259	260-379	380 or more
Farms represented	Number	35	60	79	68	147	74	22	15
Average per farm:									
Consumption of electricity	Kwh	1,493	1,257	1,109	1,191	1,405	1,725	2,545	3,991
Acreage operated	Acre	5	18	39	58	99	182	291	590
Acreage in crops:	do.	1.5	8.6	15.0	22.0	33.4	52.5	63.0	169.4
Cotton	do.	0.1	2.5	4.7	8.2	10.2	19.5	20.4	47.9
Corn	do.	0.3	4.5	7.9	10.1	16.7	23.0	25.2	56.0
Lespedeza	do.	—	0.3	1.2	2.3	3.1	4.4	13.0	15.7
Income (gross):									
Farm sales	Dollar	38	435	932	1,132	1,472	3,045	3,380	8,100
Cotton	do.	2	242	414	720	723	1,590	1,555	5,304
Products used in home	do.	242	329	366	400	481	631	647	1,076
Off-farm	do.	2,188	1,414	1,273	1,116	1,093	967	904	1,761
Total	do.	2,468	2,178	2,571	2,648	3,046	4,643	4,931	10,937
Animal units	Number	1.1	3.0	5.0	5.6	9.0	12.4	19.1	31.3
Wired dwellings	do.	1.0	1.0	1.1	1.1	1.2	1.6	1.9	4.0
System of farming:									
Cotton	Percent	—	25	39	57	44	53	45	54
Dairy	do.	—	3	2	5	10	10	14	13
Livestock	do.	—	2	3	6	10	11	9	13
Poultry	do.	—	2	4	—	2	1	5	—
General	do.	—	—	5	7	11	16	14	7
Part-time	do.	86	46	32	15	16	5	9	13
Subsistence	do.	14	22	15	10	7	4	4	—
Total income:									
Less than \$2,000	do.	31	47	39	35	28	11	27	7
\$2,000 to \$3,999	do.	60	50	55	50	52	50	18	20
\$4,000 and over	do.	9	3	6	15	20	39	55	73
Date of electrification:									
Before 1943	do.	37	27	24	29	24	35	27	53
1943 to 1945	do.	26	28	23	24	21	20	23	7
1946 and after	do.	37	45	53	47	55	45	50	40
Tenure:									
Owner	do.	91	84	82	84	91	92	91	100
Cash renter	do.	9	8	5	—	2	4	9	—
Share renter	do.	—	8	13	16	7	4	—	—
Farms with:									
1 dwelling	do.	94	95	94	90	86	65	59	33
2 dwellings	do.	6	5	6	10	13	19	14	20
3 or more dwellings	do.	—	—	—	—	1	16	27	47

Table 10. Electricity used per farm, 1949, and pieces of electrical equipment in use per 100 electrified farms, by system of farming and size of farm, August, 1950.

Item	Size of farm					260 acres and over	System of farming							Sub- sistence
	Under 30 acres	30-69 acres	70-139 acres	140-259 acres	260 acres		Cotton	Dairy	Live- stock	General	Poultry	Part- time		
Farms represented	95	147	1,447	1,405	74	37	207	34	34	41	9	124	51	
Kilowatt-hours used per farm, 1949	1,344	1,147	1,405	1,725	3,131	1,416	2,773	1,968	1,545	870	1,426	864	864	
Electrical equipment for household operations:														
"Heavy" appliances ¹	30	28	25	53	73	30	56	65	39	—	—	35	22	
"Light" appliances ²	434	499	518	628	873	570	576	573	632	500	500	510	366	
Total, household operations	464	527	543	681	946	600	632	638	671	500	545	388	388	
Water supply:														
Pressure system	36	23	37	49	57	29	41	50	56	33	42	20	20	
Farm operations:														
Farm shop	1	9	18	8	16	10	12	3	10	—	14	4	4	
Dairy	—	6	11	33	85	—	85	—	—	—	—	—	—	
Poultry	6	9	10	11	8	8	12	21	15	—	8	—	—	
Livestock	1	3	2	5	2	2	6	—	2	—	2	—	—	
General	1	1	1	8	1	1	1	3	2	—	2	—	—	
Total, farm operations	9	36	31	73	21	21	118	24	29	—	26	4	4	
Grand total, all uses	509	571	616	761	1,076	650	791	712	746	533	613	412	412	

¹ Ranges, water heaters, home (food) freezers and air conditioning units.² All other equipment used for household operations.

er proportion of the small farms were electrified before 1943 than for any except the largest farm group. Many of these small places were close to urban centers and so were easily reached by distribution lines.

Slightly over 85 percent of the smallest farms were classified as part-time farms. Most of the farms with more than 30 acres were cotton farms. The largest percentage of cotton farms was in the 50 to 69 acre group. Percentages of dairy and livestock farms increased with size, and the importance of subsistence farms declined as acres operated increased.

From 80 to 90 percent of farms in all size groups were owner operated. Tenancy was most important on farms from 10 to 70 acres in size. None of the larger farms were operated by tenants, although there was a good deal of share cropping on these farms, as indicated by the number with three or more dwellings.

Large farms have more equipment: Large farms had more household equipment of nearly all kinds than did the small ones (Table 10). This was especially true of such equipment as ranges, water heaters, home freezers, and washing machines (Appendix Table 2). Practically all farms had at least one radio and one electric hand iron, but the large farms commonly had two or more of each. The 37 farms of 260 acres or more had 81 radios, 67 irons, and 54 electric refrigerators.

The number of pieces of household equipment per farm ranged from 4.6 on farms of less than 30 acres to 9.5 on farms of 260 acres or more. Variety of equipment used was also greatest on the large farms. Sixty-two percent of the farms of 260 or more acres had six or more different kinds of household equipment, while only 32 to 43 percent of the farms in the other size groups had as many. Most farms had from three to five different kinds (Table 11).

Large farms also had more equipment for use in farming operations than

did the small ones. The 95 farms of less than 30 acres reported only nine pieces of such equipment—six chick brooder hovers, one fence controller, one sander, and one wood saw. But the 37 farms of 260 acres or more had 27 pieces of farm equipment, 12 of them for use in the dairy enterprise.

Individual farm differences: Although there was a tendency for farms to use, by average, more electricity as the size of farm increased, the correlation between acres operated and kilowatt-hours used on individual farms in 1949 was negligible.⁸

Within each of the size-of-farm group the amount of electricity used by individual farms varied widely (Table 12). Thirty percent of the farms of 260 acres and more used less than 1,000 kilowatt-hours in 1949, while 16 percent used 5,000 or more. All the other size groups had wide variations among individual farms, but with greater concentration of farms in the groups using less than 1,000 kilowatt-hours during the year.

The reasons for these variations among farms similar in size are not entirely clear. Apparently two factors were influential. First, the correlation between acres operated and total income was only fair.⁹ Second, the bulk of the electricity was used for household purposes. Even in the largest size-of-farm group, about 80 percent of the electricity consumed was used in household operations. The amount of electricity used outside the home was more closely related to the size of the dairy herd than to acres operated.

Effect of System of Farming

Basis for classification: Farms in the survey were classified according to the following procedure into various systems, based upon census criteria with certain adaptations:

A. Tracts of 3 or more acres and the value of home-use products larger than product sales.

⁸ A regression equation of 1949 kilowatt-hour consumption on 1949 acres operated for 140 farms electrified in 1942 and before is $Y_c = 1780 + 1.622 X$ with a coefficient of correlation $r = +.13$. The calculated kilowatt-hours is indicated by Y_c and X represents the acres operated.

⁹ A regression equation of 1949 gross farm income on acres operated in 1949, $Y_c = 810 + 12.05 X$ with a coefficient of correlation, $r = +.63$. The calculated income is indicated by Y_c and X represents the acres operated.

Table 11. Household equipment per farm and percentage of farms having specified kinds, by size of farm, July, 1950.

Item	Unit	Acres operated				
		Less than 30	30 to 69	70 to 139	140 to 259	260 or more
Farms represented	Number	95	147	147	74	37
Equipment per farm	Pieces	4.6	5.3	5.4	6.8	9.5
Farms with kinds of equipment:						
Less than 3	Percent	22.1	8.8	6.1	6.8	8.1
3 to 5	do.	45.3	53.8	63.3	50.0	29.7
6 to 10	do.	30.5	36.7	28.6	39.2	54.1
11 or more	do.	2.1	0.7	2.0	4.0	8.1

Table 12. Distribution of farms by electricity used and by acres operated in 1949.

Acres operated	Kilowatt-hours used, 1949						
	Less than 1,000	1,000 to 1,999	2,000 to 2,999	3,000 to 3,999	4,000 to 4,999	5,000 & over	All farms
	Percent						
Less than 30 acres.....	67.4	12.6	4.2	5.3	6.3	4.2	100
30 to 69 acres	68.7	17.7	4.8	3.4	3.4	2.0	100
70 to 139 acres	61.8	21.8	8.2	3.4	1.4	3.4	100
140 to 259 acres	50.0	24.3	8.1	5.4	5.4	6.8	100
260 acres and over	29.7	24.4	5.4	8.1	16.2	16.2	100
All farms	60.6	19.6	6.2	4.4	4.6	4.6	100

1. **Subsistence farms**—Less than \$1,200 total income (agricultural production plus off-farm income.)
 2. **Part-time farms**—\$1,200 or more total income (agricultural production plus off-farm income).
- B. Tracts of 3 or more acres and product sales larger than the value of home-use products.

1. **Cotton farms**—sales from cotton (lint and seed) more than 50 percent of agricultural production.
2. **Dairy farms**—sales from milk and other dairy products more than 50 percent of agricultural production.
3. **Livestock farms**—sales from livestock more than 50 percent of agricultural production.
4. **General farms**—sales from crops and livestock so diversified that farms would not classify among the other systems.
5. **Poultry farms**—sales from poultry and poultry products more than 50 percent of agricultural production.

Cotton farms were most numerous, constituting 41 percent of all farms in the sample, followed by part-time farms, which made up 25 percent. Dairy, livestock, and general farms were about equally numerous, comprising 7, 7, and 8 percent, respectively, of the total. Ten percent were subsistence

farms, and only 2 percent were poultry farms. Cotton farms were numerous in both the northern and central counties, making up 61 and 37 percent respectively, of farms in those sections (Table 8). In the southern counties, cotton farms were second in importance ranking behind part-time farms, which made up 35 percent of all farms. All poultry farms were in the southern section.

A definite relationship was found between size of farm and system of farming. Systems with large numbers of animal units—such as livestock, dairy, and general farms—generally operated larger acreages (Table 13). Livestock farms, the largest farms, averaged 155 acres and 17 animal units. Dairy farms, with 153 acres and 16 animal units, and the general farms, with 134 acres and 11 animal units, followed closely. Cotton and poultry farms, the more labor-intensive type of enterprises, were next in size while part-time and subsistence farms were smallest. The latter systems had an average of 58 acres of land under operation, only 12 acres of cropland, and 3 animal units. Acreages of cropland were largest on cotton farms.

Total income was largest (\$7,159) on poultry farms, but so were operating expenses. Dairy farms, with \$4,404, ranked second in total income, followed in order by cotton, livestock, gen-

Table 13. Characteristics of electrified farms, by system of farming, 1949.

Characteristic	Unit	System of farming						
		Cotton	Dairy	Live- stock	Gen- eral	Poul- try	Part- time	Sub- sistence
Farms represented	Number	207	34	34	41	9	124	51
Average per farm:								
Consumption of electricity...	Kwh	1,416	2,773	1,968	1,545	870	1,426	864
Cost of electricity used	Dollars	44.68	61.67	61.96	54.39	44.57	45.86	33.56
Acreage operated	Number	119	153	155	154	102	58	58
Acreage in: Crops	Acres	49	38	24	39	10	13	12
Cotton	do.	20	6	2	10	1	1	2
Corn	do.	21	17	13	20	9	4	7
Lespedeza	do.	4	7	5	4	—	1	1
Incomes (gross):								
Farm sales	Dollars	2,382	3,228	1,717	1,837	5,620	129	247
Cotton	do.	1,836	352	140	594	132	46	120
Products used in home	do.	573	505	388	526	395	317	366
Off-farm	do.	907	671	1,494	839	1,144	2,339	398
Total	do.	3,862	4,404	3,599	3,202	7,159	2,785	1,011
Animal units	Number	9.0	16.1	17.2	11.3	14.3	3.0	3.8
Wired dwellings	Number	1.5	1.2	1.1	1.5	1.2	1.1	1.0
Cost of electricity per \$1,000 total income	Dollars	11.57	14.00	17.22	24.70	6.23	16.47	33.19
Size of farm:								
Less than 10 acres	Percent	—	—	—	—	—	24	10
10 to 29 acres	do	7	6	3	—	11	23	25
30 to 69 acres	do.	34	14	18	22	34	28	37
70 to 139 acres	do.	31	44	44	39	33	19	20
140 to 259 acres	do.	19	21	23	29	11	3	6
260 acres or more	do.	9	15	12	10	11	3	2
Total income:								
Less than \$2,000	do.	24	15	12	27	22	23	100
\$2,000 to \$3,999	do.	53	41	59	49	33	65	—
\$4,000 and over	do.	23	44	29	24	45	12	—
Date of electrification:								
Before 1943	do.	26	35	41	27	22	31	21
1943 to 1945	do.	25	12	21	15	33	24	22
1946 and after	do.	49	53	38	58	45	45	57
Tenure:								
Owner	do.	79	94	100	98	78	94	92
Cash renter	do.	4	—	—	—	22	6	4
Share renter	do.	17	6	—	2	—	—	4
Farms with:								
1 dwelling	do.	75	85	91	68	78	93	98
2 dwellings	do.	16	15	3	20	22	6	2
3 dwellings or more	do.	9	—	6	12	—	1	—

eral, part-time, and subsistence farms. Total income on subsistence farms averaged only \$1,011. Off-farm income was highest on part-time farms, comprising 84 percent of total income of farms in this group. It was least important on dairy farms. The work requirements of a dairy farm make it difficult for members of the family to work part-time at some other job.

Livestock farms were electrified earlier than farms of other systems—41 percent were connected to rural service lines before 1943. Dairy, part-time, and cotton systems were next in order of electrification, with subsistence and general farms the more recently electrified, as a rule.

Tenancy was most prevalent on cotton and poultry farms, with share renting predominant on cotton farms, and cash renting on poultry farms. All

livestock farms and more than 90 percent of general, dairy, subsistence and part-time farms, were owner-operated.

Dwellings on farms were most numerous on general, cotton, and poultry farms. Livestock, subsistence, and part-time farms usually were one family operations. More than 90 percent of these farms had only one dwelling.

Dairy farms used most electricity: Dairy farms used more electricity per farm than those of any other system, 2,773 kilowatt-hours in 1949. They were followed in order by livestock, general, part-time, cotton, poultry, and subsistence farms. This indicates the influence of the farm enterprises on the amount of electricity used, as dairy farms did not rank first in size, income or in early farm electrification. Dairy farming was high in all of these attributes, however, and this, along with an exten-

sive use of electricity for farm operations, accounts for the larger total consumption by these farms. Poultry farms used small amounts of electricity. There were only nine of these farms in the sample so the average should not be considered as conclusive. However, more operational use of electricity by these farms was for laying house lights, which required little electricity.

On the 500 farms in the survey, 29 pieces of dairy equipment were reported. These consisted of ten milking machines, ten milk coolers, eight water heaters (dairy) and one cream separator. All of this equipment was on the 34 dairy farms (Table 10).

The 41 general farms had 12 pieces of electrical equipment for use in farming operations. Six of these were chick brooders, five were shop equipment, and one was a wood saw. The 51 subsistence farms had two pieces of such equipment—one air compressor and one drill press.

Livestock farms had more of the "heavy" consuming kinds of household equipment than did those of any other system. General farms had more of the "light" consuming kinds. There is no clear indication as to why this situation existed.

The variety of household equipment in use was greatest on livestock farms. Fifty-six percent of them had six or more different kinds of equipment while only 20 percent of the subsistence farms had as many (Table 14).

Consumption Influenced by Tenure of Operator

In order to study the relationship of tenure of operator and farm electrification, farms in the study were classified into three groups—owners (including

part-owners), cash renters, and share renters. In nearly all characteristics associated with large use of electricity, owners ranked first, cash renters second, and share renters third. Owners had larger farms, with 108 acres operated, as compared to 78 acres operated by cash renters and 67 acres by share renters. Owners had larger total incomes (and with a larger proportion of it from off-farm sources) with cash renters ranking second and share renters third. A larger proportion of owner farms were electrified before 1943 than either of the other tenure groups. Owner-operated farms used considerably more electric energy—more than twice as many kilowatt-hours in 1949 as were used on share renter farms. Farms operated by cash renters used slightly more electricity than those operated by share renters—897 kilowatt-hours and 724 respectively (Table 15).

Owner-operators have most equipment: Farms that were owner operated had virtually all of the electrical equipment used in farming operations that was reported. Of the 59 tenant-operated farms, one had an electric brooder for chicks. All of the 179 water systems were on the owner-operated farms (Table 3). A substantial part of these differences may be attributed to differences in the systems of farming practiced; for of the 59 tenant-operated farms, 56 were classified as cotton, poultry, part-time, or subsistence. As indicated previously, none of these used large amounts of electricity.

Owner-operated farms also had more of the equipment used in household operations, particularly those kinds that use relatively large amounts of electricity. Two of the 59 tenant-operated farms had electric ranges and 1 had a

Table 14. Household equipment per farm and percentage of farms having specified kinds, by system of farming, July, 1950.

Item	Unit	System of farming						
		Cotton	Dairy	Live-stock	Gen-eral	Poul-try	Part-time	Sub-sistence
Farms represented	Number	207	34	34	9	41	124	51
Equipment per farm	Pieces	6.0	6.4	6.4	5.0	6.8	5.4	3.9
Farms with different kinds of equipment:								
Less than 3	Percent	7.7	2.9	2.9	11.1	7.3	12.1	27.5
3 to 5	do.	58.9	53.0	41.2	77.8	43.9	46.0	52.9
6 to 10	do.	31.9	35.3	50.0	11.1	48.8	38.7	19.6
11 or more	do.	1.5	8.8	5.9	—	—	3.2	—

Table 15. Characteristics of electrified farms, by tenure of operator, 1949.

Characteristic	Unit	Tenure of operator		
		Owner	Cash renter	Share renter
Farms represented	Number	441	20	39
Average per farm:				
Consumption of electricity	Kwh	1,588	897	724
Cost of electricity used	Dollars	49.13	38.77	26.60
Acreage operated	Acres	108	78	67
Acreage in: Crops	do.	33	25	28
Cotton	do.	10	10	12
Corn	do.	15	10	14
Lespedeza	do.	3	1	2
Income (gross):				
Farm sales	Dollars	1,642	1,470	1,588
Cotton	do.	851	660	1,172
Products used in home	do.	474	408	385
Off-farm	do.	1,306	1,054	495
Total	Dollars	3,422	2,932	2,468
Animal units	Number	8.6	4.5	5.7
Wired dwellings	do.	1.3	1.2	1.0
Cost of electricity per \$1,000 total income	Dollars	14.36	13.22	10.78
System of farming:				
Cotton	Percent	37	45	87
Dairy	do.	7	—	5
Livestock	do.	8	—	—
Poultry	do.	2	10	—
General	do.	9	—	3
Part-time	do.	27	35	—
Subsistence	do.	10	10	5
Size of farm:				
Less than 10 acres	do.	7	15	—
10 to 30 acres	do.	12	25	13
30 to 69 acres	do.	28	20	54
70 to 139 acres	do.	30	15	25
140 to 259 acres	do.	15	15	8
260 acres or more	do.	8	10	—
Total income:				
Less than \$2,000	do.	29	35	36
\$2,000 to \$3,999	do.	49	55	56
\$4,000 or more	do.	22	10	8
Date of electrification:				
Before 1943	do.	30	25	20
1943 to 1945	do.	21	35	26
1946 and after	do.	49	40	54
Farms with:				
1 dwelling	do.	82	80	100
2 dwellings	do.	12	20	—
3 or more dwellings	do.	6	—	—

food freezer. Twenty-five percent of the owner-operated farms had electric ranges and 5 percent had food freezers.

Income and the Use of Electricity Related

Income defined: In the preceding paragraphs mention has been made of the total or gross incomes of farms. In this study, farm income refers to the gross receipts of the farm both from the sale of farm products and from the value of farm products consumed in the home. No deduction is made for any farm expenses or taxes. Off-farm includes money from such sources as wages, rents and pensions. This also is a gross figure with no deductions for expenses incurred in obtaining the income.

For a study such as this, a "disposable" or "spendable" income figure would be more desirable. However, the time and expense required to obtain such a figure was considered too great to justify obtaining it. But within a restricted area and among farms of a similar type, those with relatively high gross incomes usually have relatively high net incomes. Consequently, the gross income figure may be considered an indication of relative disposable income and of the size of farm business. (See Footnote 9, page 20).

High income farms use more electricity: Farms with high incomes tended to use more electricity than did those with low incomes. For example, farms with total incomes of more than \$4,000 used an average of 2,918 kilowatt-hours in 1949 while those with less than \$2,000

total income used 869 kilowatt-hours (Table 16). This condition existed throughout the decade of record. (See Figure 2 and Appendix Table 5).

Several conditions accounted for these differences. High-income farms had more families per farm using electricity. The high-income group averaged 2.0 wired dwellings per farm, while the medium-income group averaged 1.2 and the low income group just 1.0. The high income farms had more livestock, about 4 times as many animal units per farm as the low income ones. They also included a higher proportion of dairy and livestock farms so they had more need for electrical equipment in the service buildings. All of the dairy equipment was on farms with high incomes (Table 3). In fact, the 102

farms with high incomes had more pieces of electrical equipment for use in farming operations than did all of the 398 farms with medium and low incomes.

Farms with high incomes also had more equipment for household operations, particularly of the "heavy consuming" kinds (Appendix Table 4).

The total number of household appliances per farm varied from 4 on low-income farms to 9 for high-income farms, (Table 17). Variety was also greater on high-income farms, with 60 percent reporting 6 or more different kinds of appliances, while only 34 percent of the medium-income and 27 percent of the low-income farms reported that many different kinds. Most farmers with less than \$4,000 income had

Table 16. Characteristics of electrified farms, by income groups, 1949.

Characteristic	Unit	Income group ¹		
		Low	Medium	High
Farms represented	Number	150	248	102
Average per farm:				
Consumption of electricity	Kwh	869	1,287	2,918
Cost of electricity used	Dollars	34.38	43.27	74.45
Acreage operated	Acres	77	84	188
Acreage in: Crops	do.	19	24	69
Cotton	do.	5	8	25
Corn	do.	8	11	30
Lespedeza	do.	1	2	7
Income (gross):				
Farm sales	Dollars	546	1,064	4,604
Cotton	Dollars	318	591	2,351
Products used in home	Dollars	360	435	688
Off-farm	Dollars	529	1,275	2,164
Total	do.	1,435	2,774	7,456
Animal units	Number	4.4	6.7	17.7
Wired dwellings	do.	1.0	1.2	2.0
Cost of electricity per \$1,000 total income	Dollars	23.96	15.60	10.02
System of farming:				
Cotton	Percent	33	44	47
Dairy	do.	3	6	15
Livestock	do.	3	8	10
Poultry	do.	1	1	4
General	do.	7	8	10
Part-time	do.	19	33	15
Subsistence	do.	33	*	—
Size of farm:				
Less than 30 acres	do.	26	20	5
30 to 69 acres	do.	37	31	15
70 to 139 acres	do.	27	31	29
140 to 259 acres	do.	5	15	28
260 acres or more	do.	5	3	23
Date of electrification:				
Before 1943	do.	21	26	46
1943 to 1945	do.	24	23	19
1946 and after	do.	55	51	35
Tenure:				
Owner	do.	86	87	95
Cash renter	do.	5	4	2
Share renter	do.	9	9	3
Farms with:				
1 dwelling	do.	97	86	57
2 dwellings	do.	3	11	24
3 or more dwellings	do.	1	2	19

¹ Low income under \$2,000; medium \$2,000 to \$3,999; high \$4,000 and over.

*Less than 0.5.

Table 17. Household equipment per farm and percentage of farms having specified types, by 1949 total income, July, 1950.

Item	Unit	Income		
		Less than \$2,000	\$2,000 to \$3,999	\$4,000 or more
Farms	Number	150	248	102
Appliances per farm	Pieces	4.4	5.3	8.7
Farms with different kinds of equipment:				
Less than 3	Percent	17.3	8.1	4.9
3 to 5	do.	56.0	58.1	34.3
6 to 10	do.	26.7	32.2	53.0
11 or more	do.	—	1.6	7.8

Kilowatt-hours

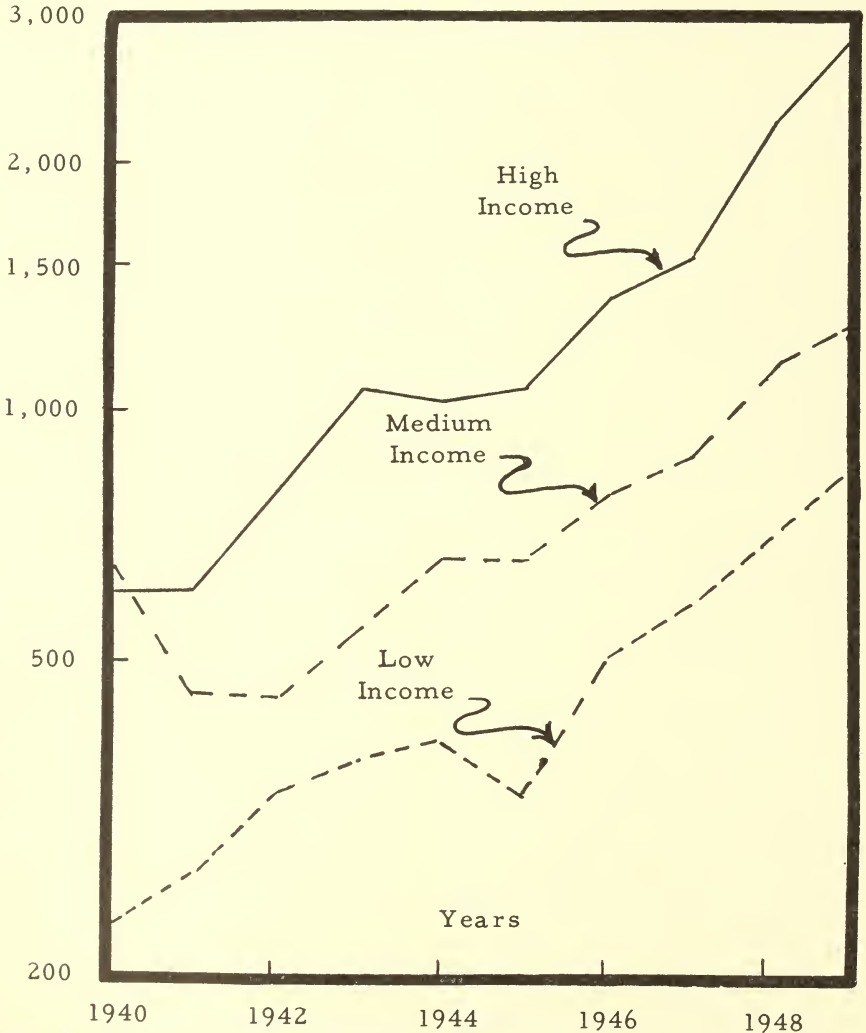


Figure 2. Consumption of electric energy per farm, by 1949 income groups, 1940-49.

from 3 to 5 different kinds of household appliances.

Wide variations among farms: Although there was a pronounced tendency for farms of high incomes to use more electricity than those with low incomes, few farms in any income group were average in this regard.¹⁰ For example, of farms electrified before 1943 and in the southern group of counties, 17 had total incomes of \$2,000 to \$2,500. The average 1949 consumption of this group of farms was 1,331 kilowatt-hours but the range was from 233 to 4,198. In this group nine farms had total incomes of \$3,000 to \$3,500. They used an average of 1,731 kilowatt-hours but ranged from 320 to 4,770.

Several factors apparently played a part in causing these differences. Two of them deserve mention here. First, there is the individual preference for electric, gas, or some other equipment for cooking and water heating. This is discussed more fully in a following section. Second, individual farms vary widely in the amount of use given the electrical equipment. For many farms it is difficult to explain the actual consumption of electricity by the uses made of it. Four farms may be used to illustrate this situation.

In Lafayette county one farm used 336 kilowatt-hours in 1949 while another one only a few miles away used 1,105. The first farm was electrified in 1945 and had a 5-room house in good condition. The operator was 64 years of age and there were three other people in the household. The operator reported a refrigerator, an iron, a radio, and a household fan. The second farm was electrified in 1948 and had a 5-room house in fair condition. The operator was 63 years old with two other people in the household. The only electrical equipment reported by this operator was a refrigerator and an iron. The equipment reported would indicate that the first farm would use more electricity than the second.

In Pontotoc county one farm used 671 kilowatt-hours in 1949 and another

used 4,245. Both were owner-operated cotton farms and were similar size and income. One had a 4-room dwelling, and the other five rooms. One operator was 60, the other 65. The electrical equipment reported by the first farmer consisted of radio, iron, refrigerator, washing machine, range, toaster, percolator, and household fan. The second farmer reported a radio, iron, refrigerator, washing machine, and range. Here again it would appear that the first farm would use more electricity than the second whereas actually it used only 16 percent as much.

With such wide variations in the uses made of equipment on the farms the lack of any central trend in total consumption is not surprising.

Lighting Farm Buildings

In addition to the operator's dwelling, most farms had a general-purpose barn and a poultry-laying house (Table 18). It was not the usual practice to connect the service buildings for electricity, however. Only 18 percent of the general barns and 10 percent of the laying houses were wired for electricity.

Only 55 percent of dwellings other than the operator's were wired for electric service. Most of the other dwellings were those of croppers or laborers.

In addition to the operator's dwelling, other buildings usually wired were dairy barns, broiler houses, and wash houses. Three percent of the farms had dairy barns, but 64 percent of these barns were wired for electric service. Nine percent reported broiler houses, with 71 percent of them connected for electric service. As wash houses usually housed electric washing machines, nearly all of them were wired.

Only occasionally were implement sheds, cribs, smokehouses, garages, and other service buildings wired. Most farmers felt that wiring of these buildings was unnecessary, as about the only use for electricity in them would be for lighting.

Thirty-seven farms had yard lights for service areas.

¹⁰ The regression equation of 1949 consumption on 1949 income among farms electrified before 1943 was $Y_c = 1334 + .135 X$ with a coefficient of correlation, $r = +.24$. The calculated kilowatt-hours is indicated by Y_c , the 1949 incomes by X . There were 139 farms in this computation; 4 extreme cases were omitted.

Table 18. Farms with various types of buildings and percent of buildings wired, by 1949 income groups and types of buildings, 1949.

Type of buildings	Income group ¹												All farms					
	Low			Medium			High			Farms with bldgs.			Buildings					
	Farms with bldgs.	Buildings		Farms with bldgs.	Buildings		Farms with bldgs.	Buildings		Farms with bldgs.	Buildings		Total	Wired		Total	Wired	
		Total	Total		Total	Total		Total	Total		Total	Total		Total	Total		Total	Percent
Number																		
Dwellings:	150	150	100	248	248	100	102	102	102	500	500	100	500	500	100	500	500	100
Operator	10	15	8	51	48	41	64	158	104	251	160	66	289	160	55	289	160	55
Other	132	134	9	227	39	17	95	109	38	454	474	86	474	86	18	474	86	18
General barn	3	3	—	4	4	3	7	7	6	86	14	14	14	14	9	14	14	9
Dairy barn	3	3	100	7	6	86	4	4	4	100	14	13	14	13	93	14	13	93
Wash house	1	1	—	4	6	—	1	1	—	0	8	—	6	8	—	6	8	—
Hog house	4	4	1	15	5	33	13	13	5	39	32	81	32	32	100	32	32	100
Shop	120	121	5	215	220	26	88	105	14	13	423	32	446	45	10	446	45	10
Laying house	10	10	80	21	18	82	16	17	9	53	47	88	49	35	71	49	35	71
Broiler house	17	17	2	44	45	4	33	37	3	81	94	116	99	9	9	99	9	9
Implement shed	23	24	—	37	37	2	23	26	—	0	83	—	87	2	2	87	2	2
Crib	34	35	4	80	80	11	49	49	6	12	163	136	164	21	13	164	21	13
Garage	11	11	—	20	20	4	9	9	5	56	40	71	40	9	22	40	9	22
Smoke house	4	4	100	13	12	92	7	7	7	100	24	24	24	23	96	24	23	96
Pump house	2	2	—	4	4	—	4	4	4	—	0	—	10	10	—	10	10	—
Feed storage	3	3	33	—	—	—	—	—	—	—	—	—	3	3	—	3	3	—
Potato house	3	3	1	—	—	—	—	—	—	—	—	—	3	3	—	3	3	—

¹ Low income, under \$2,000; medium, \$2,000 to \$3,999; high, \$4,000 or more.

Electricity Pumps Water

Running water is one of the most valued services made available by central-station electric service. Even so, in July 1950, only 36 percent of the farms in the survey had water systems (Table 19). And only 55 percent of the farms with running water had bathrooms.

About twice as many farms in the southern counties as in the northern had water systems. Reasons for this difference are not clear.

There were more owner-operated farms and more part-time farms in the southern counties but these do not account for such a wide difference. Possibly there has been more educational or promotional effort in the southern

counties to encourage the installation of water systems.

Practically all of the farms with running water had it piped into the dwelling. An occasional farm, however, had water piped into a service building or had it piped just outside the dwelling, but not into the dwelling.

The most common method of obtaining water for household use in this area was still the rope and bucket. Almost half of all the farms in this study used this method, (Table 20). Ponds, streams and springs were used by more than half of the farms to provide water for livestock.

Running water in the home is much desired by farmers in this area. It is evident that many more pressure systems will be installed as rapidly as funds and supplies of materials permit.

Table 19. Farms with running water and bathrooms, July, 1950.

Item	Farms represented Number	Farms with			
		Running water		Bathroom	
		Number	Percent	Number	Percent
All farms	500	179	36	98	20
Sub-area:					
North	144	33	23	17	12
Central	129	37	29	18	14
South	227	109	48	63	28
Period of electrification:					
Before 1943	143	82	57	46	32
1943 to 1945	112	39	35	28	25
1946 and after	245	58	24	24	10
Tenure:					
Owner	441	179	41	98	22
Cash renter	20	—	—	—	—
Share renter	39	—	—	—	—
Total income:					
Below \$2,000	150	40	27	13	9
\$2,000 to \$3,999	248	74	30	38	15
\$4,000 and above	102	65	64	47	46
System of farming:					
Cotton	207	60	29	28	13
Dairy	34	14	41	7	21
Livestock	34	17	50	15	44
General	41	23	56	9	22
Poultry	99	3	33	1	11
Part-time	124	52	42	36	29
Subsistence	51	10	20	2	4
Size of farm:					
Under 30 acres	95	34	36	19	20
30 to 69 acres	147	34	23	23	16
70 to 139 acres	147	54	37	24	16
140 to 259 acres	74	36	49	21	28
260 acres or more	37	21	57	11	30

Table 20. Miscellaneous water supply on electrified farms, by sub-areas, July, 1950.

Items	Sub-area			All farms
	North	Central	South	
Farms represented	144	129	227	500
Farms with:				
Rope and bucket	53	61	40	49
Hand pump	30	8	7	14
Spring, artesian well, etc.	5	6	5	6
Pond, stream or other source for livestock only	53	62	43	51

Alternative Sources of Energy

Household operations: For some uses in the household, lighting and ironing for example, electric energy from central-station sources had little competition from any other source. But for some other uses, cooling and water heating for example, electricity has had strong competition. From the standpoint of total consumption of electricity, these uses are important. There were 110 electric ranges and 30 electric water heaters reported on the 500 farms. These pieces of equipment probably used a fifth of all the electricity consumed by the farms in 1949. Also reported on these farms were 104 gas ranges and 20 gas water heaters. Had these 124 pieces of equipment been electrical instead, the average consumption per farm would have been 20 to 25 percent higher than it was.

Wood was the principal competitor in providing heat for the kitchen range. More than half of all kitchen ranges reported were wood burning. Less than 10 percent burned kerosene. But ranges burning liquified-petroleum gas were

being rapidly installed. Almost as many gas burning ranges as electric ranges were reported (Table 21). Of the 104 ranges, 81 were installed after the farms were electrified.

Electric ranges were a little more prevalent in the northern counties than in the southern. But gas ranges were decidedly more common in the southern counties than in the northern. Thirty-six percent of the farms in the southern counties had gas ranges, 15 percent in the central, and only 3 percent in the northern. Gas-burning water heaters were more numerous in the southern counties than in the northern.

This difference between the sub-areas in the relative use of gas and electrical appliances is no doubt due mostly to differences in rate structures. As mentioned earlier, rates charged for electricity were much lower in the northern counties. Probably, however, a greater effort to sell gas equipment in the southern counties was also a factor.

Practically all of the electric and gas ranges replaced wood-burning ranges.

Table 21. Farms with electric and gas kitchen ranges and water heaters, electrified farms, July, 1950.

Items	Farms represented	Range		Water heater ¹	
		Electric	Gas	Electric	Gas
All farms	500	22	21	7	4
Sub-area:					
North	144	26	3	9	1
Central	129	20	15	5	3
South	227	20	36	7	7
Date of connection:					
Before 1943	143	29	30	13	8
1943 to 1945	112	18	22	5	4
1946 and after	245	19	15	5	2
Income:					
Under \$2,000	150	15	14	2	3
\$2,000 to \$3,999	248	18	21	6	4
\$4,000 and over	102	39	30	18	5
Tenure:					
Owner	441	25	23	8	4
Cash renter	20	10	14	—	—
Share renter	39	—	—	—	—
System:					
Cotton	207	19	13	6	1
Dairy	34	26	18	18	—
Livestock	34	35	35	18	6
General	41	24	22	10	5
Poultry	9	—	44	—	11
Part-time	124	23	35	6	10
Subsistence	51	16	8	2	—
Size of farm:					
Under 30 acres	95	23	23	5	4
30 to 69 acres	147	19	20	6	4
70 to 139 acres	147	17	20	5	3
140 to 259 acres	74	29	19	15	4
260 acres and over	37	32	24	16	8

¹ Piped in line only.

Occasionally an oil stove was replaced. Two farmers replaced gas ranges with electric and one replaced an electric range with gas.

If a water system is to be fully effective, an automatic water heater is necessary. But of the 180 farms with water systems, only 37 had electric water heaters. Twenty more had gas heaters, 19 had kerosene-burning ones, and one had a coal heater.

Almost 60 percent of the electric ranges and water heaters, half of the gas ranges, and a third of the gas water heaters were installed between January 1948 and July 1950. This indicates a growing demand for such equipment which is not likely to abate in the near future.

For refrigeration purposes, electricity had little competition. Of 556 refrigerators reported, 484 were electric. The others were 64 ice, five gas, and three kerosene, all installed before the individual homes had electric service. These non-electric refrigerators were being rapidly replaced by electric refrigerators on farms of all income levels.

Farm operations: Except among the larger dairy farms, most milking in this area is done by hand. Only ten of the 500 farms in the study used milking machines and nine of these were with herds of 15 or more cows (Table 22). The same ten farms had electric milk

coolers and eight of them had dairy water heaters. One farm had a wood-burning water heater in the milk house. No other competing dairy equipment was used.

Most farmers in the area use hens for brooding chicks, since poultry flocks were usually relatively small. Of the 500 farms in the study, 382 raised some chicks in 1950. Forty-two of these used electric brooders, 13 used kerosene, two gas, and one burned wood for heat, (Table 23). Practically all of the electric brooders were on those farms raising less than 400 chicks.

Cost of electricity: Farmers in this study paid an average of \$47 for the electricity they used in 1949. This was 56 percent more than the average of 1940 but the kilowatt-hours used were 164 percent greater. As total consumption increased more rapidly than total expense, the cost per kilowatt-hour declined from 5.3 cents in 1940 to 3.1 cents in 1949.

Most of the difference in cost per kilowatt-hour over the years was due to the rate structures under which the electricity was sold. These provided for a declining cost per kilowatt-hour with increased use of electricity per month above an established minimum. This is the "promotional" type of rate schedule. It is intended to encourage greater use of electricity on farms.

Table 22. Farms with specialized dairy equipment, by numbers of cows milked, July, 1950.

Number of cows	Farms represented	Cream Separator		Milking machine, electric	Milk cooler, electric	Water heater, electric
		Electric	Hand			
				Number		
None	64	—	—	—	—	—
1 to 3	278	—	2	—	—	—
4 to 6	95	—	2	—	—	—
7 to 9	30	—	—	—	—	—
10 to 14	21	1	—	1	1	1
15 to 40	12	—	—	9	9	7
All farms	500	1	4	10	10	8

Table 23. Farms with electric and non-electric chick brooders, by number of chicks raised, 1950.

Chicks raised, 1950	Farms represented	Chick brooders	
		Electric	Non-electric ¹
		Number	
None	118	—	—
Under 100	255	18	3
100 to 199	104	18	8
200 to 399	14	5	1
400 to 599	1	—	1
600 to 4,200	5	1	3
Over 4,200	3	—	3
All farms	500	42	19

¹ 13 kerosene, 2 gas and 1 wood.

Table 24. Average consumption and cost of electricity per farm and per kwh, 1940-49.

Year	Farms represented	Average per farm		Cost per kwh
		Consumption	Cost	
	Number	Kwh	Dollars	Cents
1940	14	565	30.10	5.3
1941	47	452	27.69	6.1
1942	75	543	28.85	5.3
1943	91	675	31.26	4.6
1944	103	728	32.57	4.5
1945	182	710	31.78	4.5
1946	231	855	34.68	4.1
1947	278	961	37.38	3.9
1948	352	1,268	43.20	3.4
1949	500	1,494	46.96	3.1

Typical residential rate schedules for monthly billings in northern and southern counties are shown below. One or the other of these schedules, with slight modification, was used in the central counties.

NORTHERN COUNTIES

First 50 kilowatt-hour—3 cents per kilowatt-hour.

Next 150 kilowatt-hours—2 cents per kilowatt-hour.

Next 200 kilowatt-hours—1 cent per kilowatt-hour.

Next 1,000 kilowatt-hours—4 mills per kilowatt-hour.

All over 1,400 kilowatt-hours—7.5 mills per kilowatt-hour.

(The minimum monthly bill is \$1 of which 75 cents is energy charge, 25 kilowatt-hours at 3 cents per kilowatt-hour, and 25 cents is the amortization charge, 25 kilowatt-hours at one cent per kilowatt-hour. The maximum amortization charge is \$1 per month.)

SOUTHERN COUNTIES

First 20 kilowatt-hours—\$1.95 (minimum bill).

Next 20 kilowatt-hours—6 cents per kilowatt-hour.

Next 40 kilowatt-hours—4 cents per kilowatt-hour.

Next 120 kilowatt-hours—2.5 cents per kilowatt-hour.

All over 200 kilowatt-hours—1.5 cents per kilowatt-hour.

The expense for electricity, a little less than \$4 per month per farm, does not appear great. But it amounted to 1.4 percent of the average total income of the farmers.

Farms with low incomes used less electricity than those with high incomes, 869 kilowatt-hours compared with 2,918 in 1949. Their expenses for the year also were less, \$34.38 to \$74.45 (Table 16). These expenses, however, bore more heavily on the incomes of farmers in the low-income group than those in the high. To pay for the electricity used required 2.4 percent of the total incomes of the low-income farmers as compared to 1.0 percent for the high-

income farms. The low-income farmers paid four cents per kilowatt-hour for the electricity they used in 1949; the high-income farmers paid 2.55 cents.

The cash cost of wiring varied widely among the farms. A few farmers did all or most of the work themselves. They bought some supplies and their outlay of cash was as low as \$12 to \$20. Other farmers wired several buildings and hired all the work done. Some of them paid \$300 to \$400 to have the buildings wired. The cost of wiring a 4-room house was frequently about \$50.

Comments of farmers: During interviews, farmers were asked for their opinions as to the value of electric service to the farm. Definite replies were obtained from 289 farmers. Three said that the cost of electricity was too high. The other 286 indicated a high regard for electricity. Ninety-seven owner-operators said that they could not (or would not) live on a farm without electricity. Nineteen tenants said they would not live on a place without electricity and four more said they would pay more rent for a farm with electric service than for one without. Eight farmers said they could not get satisfactory tenants without providing electric service to the houses.

Some farmers attempted to assign a dollar value to electric service. For example, "It adds \$25 an acre to my place in market value." Most replies, however, were general in nature. More or less typical are the following statements. "Greatest time saver a farmer can have." "Best thing that ever came to the country." "Cheapest labor a farmer can get." "Added more to farm life than any other one thing, but the farmer cannot afford all the appliances needed."

Use of Electricity by Rural Residences

Rural residences have been defined as units of less than three acres of land with the value of agricultural production in 1949 amounting to less than \$250. (See page 10). Sixty-two of these residences were included in this study, 34 in southern counties, 25 in northern counties, and three in the central area.

Working members of rural residential families are usually employed in towns. For that reason, these units are usually located near an urban area. The numerical importance of them in different counties of the study area depended mainly upon the extent of industrialization and related business activity in the locality.

Rural residences used an average of 1,512 kilowatt-hours of electrical energy in 1949. This was slightly more than the average of 1,494 kilowatt-hours used by farm units.

Characteristics of Rural Residences

Rural residences averaged about 1½ acres of land. Ordinarily, each had a milk cow, and a garden, (Table 25). As a rule that was the extent of their agricultural activity.

Total income for these units averaged \$2,445 in 1949, which was less than that for farm units. However, 94 percent of that total was from nonfarm sources and so largely represented net disposable income. Hence, the amount available for family living was probably slightly greater for rural residences than for most farms. About half of the rural residences had total incomes of \$2,000 to \$4,000 annually, and only 13 percent earned \$4,000 or more. None had a total income of as much as \$10,000.

Distribution of units by period of electrification followed about the same pattern as for farms. Most were recently electrified, and about 50 percent reported that connection for electric service was made from January 1, 1946, to January 1, 1949.

Two-thirds of all rural residences were owned by the families living in them, and 97 percent of these units had only one dwelling. The dwellings averaged about five rooms each.

Electrical Equipment

Electrical equipment of nearly all kinds was less numerous on rural residential units than on farm units. For example, radios were reported in 87 percent of the rural residences, and on 92 percent of the farms; refrigerators, in 77 percent of the rural residences and on 87 percent of the farms; and

Table 25. Characteristics of electrified rural residences, 1949.

Characteristic	Unit	Amount
Residences reporting	Number	62
Electricity consumed	Kwh	1,512
Cost of electricity:	Dollar	44.86
Total per kilowatt-hour	Cent	3.0
Acreage operated	Acre	1.3
Livestock kept	Animal unit	0.3
Income:		
Farm sales	Dollar	23
Products used in home	do.	123
Off-farm	do.	2,299
Total income	do.	2,445
Date of electrification:		
Before 1943	Percent	29
1943 to 1945	do.	21
1946 and after	do.	50
Tenure:		
Owner	do.	66
Renter	do.	34
Age of operator:		
Less than 30 years	do.	13
30 to 39	do.	39
40 to 49	do.	21
60 and over	do.	27
Total income:		
Less than \$1,000	do.	16
\$1,000 to \$1,999	do.	21
\$2,000 to \$2,999	do.	39
\$3,000 to \$3,999	do.	11
\$4,000 and over	do.	13

Table 26. Selected household equipment in 62 rural residences, July, 1950.

Equipment	Items of equipment reported
Kitchen range:	
Electric	18
Gas	10
Other	34
Refrigerator:	
Electric	49
Ice	8
Other	0
Water heater (piped in line):	
Electric	6
Gas	2
Other	3
Water system (running water in home)	
.....	28
Bathroom	
.....	18

washing machines, in 39 percent of the residences and on 57 percent of the farms.

The only important electrical appliance that was significantly more numerous in rural residences than on farms was an electric range. Twenty-nine

percent of the residences had electric ranges, as compared to 21 percent of the farms. Electric kitchen ranges outnumbered gas ranges almost two to one in these residences. But in more than half of them wood, oil, or some other fuel was still used for cooking. (Table 26).

OUTLOOK FOR FUTURE USE

The average consumption of electricity, as has been indicated previously (Footnote 3), increased at an average rate of 101 kilowatt-hours per farm per year. If this trend continues for another 10 years or so, average consumption per farm will then approach 2,400 kilowatt-hours per year. But forecasts of future consumption of electricity in the Clay Hills area must give consideration to (1) the likelihood of connecting additional farms and homes to the distribution system, (2) characteristics of the farms and homes to be connected, (3) changes in economic conditions and shifts in farming practices, and (4) equipment that may be in use at that time.

As a basis for making estimates of changes that may occur in the next decade, it is assumed that farm income will remain at a relatively high level, that industry will continue to expand in the area and thus offer more opportunities for off-farm employment, that electric distribution systems will be extended until practically all farms in the area have service, and that electrical equipment desired by farmers will be in ample supply. These are assumptions and not predictions.

The year 1960 is taken as a focal point for the estimates. This is not an exact time, but is used merely to indicate the changes that may take place in the coming decade.

Rural service lines are being rapidly extended in the Clay Hills Area. It is assumed that by 1960 the number of farms served in this area will reach 47,500 compared with about 26,000 on January 1, 1949.¹¹ These farms, it is assumed, will have about 60,000 wired dwellings, about 126 per 100 farms.

Apparently most of the dairy and livestock farms of the area have been served. Consequently, most of the farms to be connected are small cotton farms. As a group, they are not likely to purchase as much electrical equipment as those that are now served.

The apparent desire of farm people for water systems, modern kitchen ranges, and all other kinds of equipment to relieve the drudgery of household tasks has been noted in this report. And the limited extent to which electrical equipment is used in farming operations has been pointed out. It is the opinion of the authors that there is a tremendous unsatisfied demand by farmers of the area for equipment of various kinds. The extent to which the demand is satisfied will depend on many things, including educational programs to acquaint the people with the potentialities of electricity and electrical equipment.

It is estimated that farms with water systems will increase from 36 percent in 1949 to 50 percent within a decade and that half of these will have automatic electric water heaters. If this occurs, the consumption of electricity per farm for water systems alone will increase about 450 kilowatt-hours per year and will require the installation of about 14,400 new water systems.

Almost two-thirds of all the electric kitchen ranges reported by the farmers in this study were installed in the 30 months, January 1948 to July 1950. Farms with electric ranges may increase to 27 percent, requiring 7,100 new installations. If this comes about, the average annual consumption per farm for all farms will increase about 160 kilowatt-hours.

¹¹ Farm as defined in this study rather than by the definition used by the Bureau of the Census. (See page 10).

All electric ranges, water heaters, food freezers and air conditioners are expected to use about 1,100 kilowatt-hours per farm 10 years hence, (Table 27). This is more than double the average of 1949. Other household equipment doubtless will increase in numbers and in kilowatt-hours consumed, but proportionally not as rapidly as for the above items.

Equipment for use in farm production operations is expected to use 2½ times as much electricity by 1960 as in 1949. However, in volume, this is small. In fact, the electricity used in farming operations is expected to be only about

six percent of the total by the end of the decade. However, this is a larger proportion than was used for farming operations in 1949.

On the basis of equipment expected to be in use by 1960, it is estimated that the average consumption per farm will reach about 2,300 to 2,400 kilowatt-hours annually at that time, or 58 percent more than the average for 1949.

Because of the increase in the number of farms with central-station electric service and the increased average use per farm, the total consumption by all farms in the area is expected to be about 113 million kilowatt-hours (Table 28). This would be almost three times the 38 million kilowatt-hours used in 1949. Changes in rate schedules during the period cannot be anticipated. But it seems likely that the total amount paid for that electricity by farms would be about \$3,000,000 up \$1,800,000 from 1949.

Rural residences may not keep pace with farms in increasing average consumption of electricity. However, they are expected to double in number, increasing from 1,300 in 1949 to 2,600 in 1960. Their average consumption may increase to 2,250 kilowatt-hours annually for a total consumption by then of almost 6,000,000 kilowatt-hours.

Table 27. Estimated average annual consumption of electricity per farm by major uses, 1949 and 1960.

Major use	1949	1960
	Kilowatt-hours	
Dwelling lighting	308	350
Household equipment:		
"Heavy" appliances ¹	481	1,080
"Light" appliances ²	574	710
Water pumping	65	90
Total for household operations	1,428	2,230
Service building lighting	11	15
Farm operations equipment	48	120
Water pumping	7	15
Total for farm operations	66	150
	1,494	2,380

¹ Ranges, water heaters (piped in line), food freezers and air conditioners.

² All other household equipment.

Table 28. Consumption and cost of electric energy, Clay Hills Area, 1949 and estimates for 1960.

Item	Unit	1940	1949	1960 (estimated)
Electrified farms in area	Number	5,007	26,000	47,500
Average consumption	Kwh	565	1,494	2,380
Total consumption	Kwh	2,828,955	38,844,000	113,050,000
Cost per kilowatt-hour	Cent	5.33	3.14	**
Total cost of electricity used by farms	Thousand dollar	150	1,221	**
Rural residences in area	Number	*	1,300	2,600
Average consumption	Kwh	*	1,512	2,250
Total consumption	Kwh	*	1,965,600	5,850,000
Cost per kilowatt-hour	Cent	*	2.97	**
Total cost of electricity used by rural residences	Thousand dollar	*	58	**
Total consumption—farms and rural residence	Kwh	xxxx	40,809,600	118,900,000

*Data not available.

**No estimates made.

SUMMARY

This is one of a series of similar studies that have been made in the major type-of-farming areas of the country. Basically, the studies deal with factors affecting the consumption of electric energy on farms and with the place of electricity in the whole scheme of farm mechanization.

The study area is the Clay Hills type-of-farming area comprising 19 counties. This has long been an area of small farms. Cotton has been the principal source of farm income. In recent years farmers have been shifting to a more diversified agriculture. At the same time industry has been growing in the area, providing opportunities for off-farm income. Both of these trends are expected to continue for some time.

For this study, records were obtained from 500 farms and 62 rural residences selected at random in each of the 19 counties of the area. They were intended to be representative of all farms and rural residences in the area that had central-station electric service on January 1, 1949. The records were taken in July 1950.

All of the electricity metered on one farm was considered as used by that farm. Most farms had only one dwelling but a few had two or more dwellings and some had service buildings wired.

Among the factors that determine the volume of electricity used on farms in the area are length of time the farm has had electric service, size of specific farm enterprises, particularly dairy, disposable income of the family, tenure of operator, rates charged for electricity, educational programs, and competition from liquified petroleum gas. Some important differences among farmers in the volume of electricity used cannot be accounted for by available data. Some farmers used much more electricity than others with similar electrical equipment, comparable farms, and similar family composition. Some seem to use their electrical equipment freely whereas others, possibly with an eye on the electric bill, use their electrical equipment more sparingly.

From 1940 to 1949, the average annual consumption of electricity by farms in this study increased from 565 kilowatt-hours to 1,494. The increase was as the average rate of 101 kilowatt-hours annually. The increase was more rapid in the last half of the decade than in the first half.

Although the use of electricity per farm has increased, the number of farms with electric service has increased even more conspicuously. As a consequence, the total amount of electricity used by farms in the study area rose from about 2.8 million kilowatt-hours in 1940 to 38.8 million in 1949. The amount paid for that electricity rose from about \$150,000 in 1940 to around \$1,221,000 in 1949. The expense for electricity per farm in 1949 was approximately \$47.

Farmers used this electricity in many ways. Lighting, of course, was the most universal use. All of the dwellings occupied by operators and 55 percent of the houses occupied by croppers and laborers were wired. Many of the unwired dwellings were unoccupied. Eighteen percent of the service buildings were wired for electricity. Virtually all of the farms had one or more radios and hand irons. Almost 90 percent of them had a refrigerator. Washing machines using electric power and household fans were numerous. Twenty-seven different kinds of household equipment were reported. Thirty-six percent of the farms had pressure water systems with electric motors.

Equipment for use in farm operations was less numerous. Only 31 percent of the farms had any electrical equipment for use in farming operations. Another 15 percent had lights in one or more service buildings but had no operating equipment in them. The use of electricity in farming operations amounted to about 5 percent of the total used by the 500 farms in the study—about 95 percent was used in household operations.

Farmers in the northern counties of the study area used more electricity per farm than did those in the southern

counties. The average consumption was 1,757 and 1,394 kilowatt-hours respectively. There was much less gas equipment in the northern counties than in the southern. Gas ranges were on 3 percent of the farms in the northern counties, but on 36 percent of those in the southern. One percent of the farms in the northern counties had a gas-burning water heater but 7 percent of those in the southern counties had one. Many of these differences may be accounted for by the lower rates charged for electricity in the northern counties. However, differences in intensity of educational efforts may also have played a part.

There was a general tendency for size of farm, operator's income, and kilowatt-hours of electricity used to be related. Dairy farms and livestock farms used more electricity than any other system of farming. Farms with owner-operators used about twice as much electricity per farm as did those with tenant-operators. But there was little tendency for farms to be grouped near the "average." Wide variations among farms was the rule rather than the exception.

The percentage of farms with water systems and with bathrooms, too, was about twice as high in the southern

counties as in the northern. Available data do not explain this difference. Water systems were being installed rapidly throughout the Clay Hills Area. But the rope and bucket was still the most common way of obtaining water for household use. Streams and ponds were commonly used for watering livestock.

Fifty-nine percent of the chick brooders were electric. They were more numerous on farms raising less than 400 chicks. For larger flocks other sources of heat were preferred.

Rural residences used an average of 1,512 kilowatt-hours in 1949 or about the same amount as farms. Equipment used was also similar except that the residences had no equipment for use in farming operations and had more water systems and water heaters.

Within another ten years, the average consumption per farm in this area is expected to be about 2,400 kilowatt-hours per year. Much of this increase is expected to be due to the installation of more electric ranges, water heaters, food freezers and air conditioners. About 21,500 more farms may be connected by that time so that total consumption by all farms may be about three times the total of 1949.

Appendix Table 1. Electric equipment on farms, by date of electrification, July, 1950.

Equipment	Farms reporting equipment and electrified				Pieces of equipment per 100 farms electrified			
	Before 1943	1943-1945	1946-1949	All farms	Before 1943	1943-1945	1946-1949	All farms
Farms represented	143	112	245	500	—	—	—	—
Household equipment:				Percent				
Radio	97.2	93.7	87.3	91.6	140.6	110.7	106.1	117.0
Iron	98.6	97.3	94.2	96.2	125.1	108.0	106.9	112.4
Refrigerator	92.3	88.3	83.3	87.0	105.6	97.3	91.4	96.8
Washing machine	60.8	56.2	54.7	56.8	65.7	58.0	58.4	60.4
Vacuum cleaner	9.8	4.4	3.2	5.4	9.8	4.4	3.2	5.4
Clock	21.6	16.1	5.7	12.6	25.1	18.7	5.7	14.2
Range	29.4	17.9	18.8	21.6	30.1	17.9	19.2	22.0
Sewing machine	5.5	1.8	2.4	3.2	5.5	1.8	2.4	3.2
Toaster	13.2	4.4	5.3	7.4	13.2	5.3	5.3	7.6
Percolator	6.2	4.4	3.2	4.4	6.2	4.4	3.2	4.4
Roaster	1.3	—	—	.4	1.3	—	—	.4
Hot plate	29.3	26.8	27.8	28.0	29.3	29.5	28.2	28.8
Waffle iron	4.8	1.8	2.0	2.8	4.8	1.8	2.0	2.8
Space heater	4.8	—	3.2	3.0	7.0	—	4.5	4.2
Water heater	12.6	5.4	5.3	7.4	12.6	5.4	5.3	7.4
Household fan	58.7	44.6	33.9	43.4	72.0	53.6	38.4	51.4
Air conditioner	.7	.9	—	.4	.7	.9	—	.4
Exhaust fan	1.3	3.6	.8	1.6	1.3	4.4	.8	1.8
Window fan	.7	1.8	1.2	1.2	1.7	1.8	1.2	1.2
Razor	.7	—	.4	.4	.7	—	.4	.4
Food mixer	4.1	3.6	2.0	3.0	4.1	3.6	2.0	3.0
Blanket	.7	.9	.4	.6	.7	.9	.4	.6
Heat pad	7.6	3.6	3.7	4.8	9.1	6.2	4.1	6.0
Home freezer	6.2	6.2	3.2	4.8	6.2	6.2	3.2	4.8
Meat grinder	—	—	.4	.2	—	—	.4	.2
Churn	22.3	14.3	13.7	16.4	23.0	15.2	13.7	16.8
Television set	.7	—	—	.2	.7	—	—	.2
Livestock equipment:								
Cream separator	—	—	.4	.2	—	—	.4	.2
Milking machine	5.5	—	.8	2.0	5.5	—	.8	2.0
Milk cooler	5.5	—	.8	2.0	5.5	—	.8	2.0
Dairy water heaters	4.1	—	.8	1.6	4.1	—	.8	1.6
Brooder hover	14.6	4.4	6.9	8.6	15.3	4.4	6.9	8.8
Fence controller	2.0	.9	2.8	2.2	2.0	.9	2.8	2.2
Farm shop equipment:								
Air compressor	.7	—	.4	.4	.7	—	.4	.4
Drill press	.7	.9	.4	.6	.7	.9	.4	.6
Portable drill	1.3	.9	—	.6	1.3	.9	—	.6
Tool grinder	2.8	3.6	2.0	2.6	2.8	3.6	2.0	2.6
Power saw	4.8	2.7	2.0	3.0	5.5	2.7	2.0	3.0
Welder	—	—	.4	.2	—	—	.4	.2
Lathe	.7	—	.4	.4	.7	—	.4	.4
Concrete mixer	—	.9	.4	.4	—	.9	.4	.4
Soldering iron	.7	—	.4	.4	.7	—	.4	.4
Planer	.7	—	—	.2	.7	—	—	.2
Table saw	.7	1.8	—	.6	.7	1.8	—	.6
Sanding machine	.7	—	1.6	1.0	.7	—	1.6	1.0
Equipment:								
Wood saw	2.1	—	1.2	1.2	2.1	—	1.2	1.2

Appendix Table 2. Electrical equipment on farms by size of farm, July, 1950.

Equipment	Farm reporting equipment					Equipment per 100 farms				
	Less than 30	30 to 69	70 to 139	140 to 259	260 or more	Less than 30	30 to 69	70 to 139	140 to 259	260 or more
Farms represented	95	147	147	74	Number 37	—	—	—	—	—
					Percent					
Household equipment:										
Radio	89.5	92.5	89.1	95.9	94.6	94.7	101.4	108.8	141.9	218.9
Iron	91.6	98.0	98.6	94.6	94.6	92.6	104.8	107.5	128.4	181.1
Refrigerator	73.7	84.4	92.5	94.6	94.6	74.7	88.4	99.3	112.2	145.9
Washing machine	46.3	57.1	57.8	60.8	70.3	46.3	57.1	60.5	63.5	102.7
Vacuum cleaner	7.4	2.7	6.1	2.7	13.5	7.4	2.7	6.1	2.7	13.5
Clock	14.7	9.5	12.9	12.2	18.9	16.8	10.2	15.6	12.2	21.6
Range	23.2	18.8	17.0	28.8	32.4	23.2	19.4	17.0	28.8	35.1
Sewing machine	3.2	2.0	2.7	4.0	8.1	3.2	2.0	2.7	4.0	8.1
Toaster	5.3	8.8	4.1	10.8	13.5	5.3	8.8	4.8	10.8	13.5
Percolator	4.2	3.4	4.8	6.8	2.7	4.2	3.4	4.8	6.8	2.7
Roaster	—	—	1.4	—	—	—	—	1.4	—	—
Hot plate	16.8	34.7	28.6	28.4	27.0	16.8	34.7	29.2	32.4	27.0
Waffle iron	2.1	2.0	2.0	2.7	10.8	2.1	2.0	2.0	2.7	10.8
Space heater	—	5.4	4.8	1.4	5.4	—	6.8	4.8	2.7	5.4
Water heater	5.1	5.6	4.8	15.1	16.2	5.1	5.6	4.8	15.1	16.2
Household fan	45.3	40.1	36.7	50.0	64.9	52.6	46.2	42.2	64.9	78.4
Air conditioner	—	.7	—	—	2.7	—	.7	—	—	2.7
Exhaust fan	3.2	2.0	.7	1.4	—	3.2	2.0	1.4	1.4	—
Window fan	1.0	1.4	2.0	—	—	1.0	1.4	2.0	—	—
Razor	1.0	—	.7	—	—	1.0	—	.7	—	—
Food mixer	1.0	1.4	3.4	6.8	5.4	1.0	1.4	3.4	6.8	5.4
Blanket	1.0	—	1.7	—	2.7	1.0	—	1.7	—	2.7
Heat pad	2.1	5.4	3.4	6.8	10.8	2.1	8.2	3.4	6.8	16.2
Home freezer	2.1	2.0	3.4	9.4	18.9	2.1	2.0	3.4	9.4	18.9
Meat grinder	—	—	—	—	2.7	—	—	—	—	2.7
Churn	7.4	17.0	16.3	27.0	16.2	7.4	17.7	16.3	27.0	16.2
Television set	—	—	—	1.4	—	—	—	—	1.4	—
Livestock equipment:										
Cream separator	—	—	—	—	2.7	—	—	—	—	2.7
Milking machine	—	—	2.0	4.1	10.8	—	—	2.0	4.1	10.8
Milk cooler	—	—	2.0	4.1	10.8	—	—	2.0	4.1	10.8
Dairy water heater	—	—	2.0	2.7	8.1	—	—	2.0	2.7	8.1
Brooder hover	6.3	8.2	9.5	9.4	10.8	6.3	8.8	9.5	9.4	10.8
Fence controller	1.0	2.7	2.0	1.4	5.4	1.0	2.7	2.0	1.4	5.4
Shop equipment:										
Air compressor	—	—	.7	—	2.7	—	—	.7	—	2.7
Sanding machine	1.0	.7	2.0	—	—	1.0	.7	2.0	—	—
Portable drill	—	—	1.4	1.4	—	—	—	1.4	1.4	—
Tool grinder	—	2.7	2.7	4.1	5.4	—	2.7	2.7	4.1	5.4
Power saw	—	2.7	4.1	2.8	8.1	—	2.7	4.8	2.8	8.1
Drill press	—	.7	.7	1.4	—	—	.7	.7	1.4	—
Welder	—	.7	.7	—	—	—	.7	.7	—	—
Lathe	—	.7	.7	—	—	—	.7	.7	—	—
Concrete mixer	—	—	1.4	—	—	—	—	1.4	—	—
Soldering iron	—	—	1.4	—	—	—	—	1.4	—	—
Planer	—	.7	—	—	—	—	.7	—	—	—
Table saw	—	.7	1.4	—	—	—	.7	1.4	—	—
Other equipment:										
Wood saw	1.0	—	.7	1.4	8.1	1.0	—	.7	1.4	8.1

Appendix Table 3. Electrical equipment on farms, by system of farming, July 1950.

Equipment	Farms reporting equipment										Equipment per 100-farms				
	Cotton	Dairy	Live-stock	General	Poultry	Part-time	Sub-sistence	Cotton	Dairy	Live-stock	General	Poultry	Part-time	Sub-sistence	
	Number							Percent							
Farms represented	207	34	34	41	9	124	51								
Household equipment:															
Radio	92.3	97.0	100.0	92.7	88.9	94.4	72.5	129.0	120.6	123.5	134.1	122.2	104.0	78.4	
Iron	97.1	97.0	100.0	97.6	100.0	96.0	88.2	125.1	111.7	102.9	124.4	122.2	98.4	90.2	
Refrigerator	60.8	97.0	88.2	93.1	88.9	82.2	68.6	105.3	72.9	94.5	119.5	88.9	85.5	70.6	
Washing machine	90.9	70.6	58.8	75.2	22.2	52.4	33.3	65.7	103.5	58.8	110.2	22.2	52.4	33.3	
Vacuum cleaner	3.4	8.8	14.7	12.2	22.2	9.7	—	3.4	8.8	14.7	—	—	9.7	—	
Clock	12.5	14.7	14.7	12.2	22.2	21.9	7.8	13.5	20.6	14.7	12.2	22.2	16.1	7	
Range	19.3	26.5	35.3	24.4	—	23.4	15.7	19.8	26.5	35.3	24.4	—	24.2	15.7	
Sewing machine	1.9	8.8	5.9	2.4	—	2.4	3.9	1.9	8.8	5.9	4.9	—	2.4	3.9	
Toaster	5.3	14.7	14.7	4.9	11.1	7.2	7.8	5.3	14.7	14.7	4.9	11.1	8.1	7.8	
Percolator	4.8	5.9	8.8	—	—	4.8	2.0	4.8	5.9	8.8	—	—	4.8	2.0	
Roaster	—	2.9	—	2.4	—	—	—	—	2.9	—	2.4	—	—	—	
Hot plate	26.6	32.4	26.5	36.6	22.2	27.4	27.4	27.5	32.4	26.5	39.0	22.2	28.2	27.4	
Waffle iron	2.4	2.9	—	2.4	—	5.6	—	2.4	2.9	—	2.4	—	5.6	—	
Space heater	4.3	2.9	—	4.9	—	—	3.9	6.8	2.9	—	7.3	—	—	3.9	
Water heater	36.7	17.6	17.6	9.8	—	5.6	2.0	6.3	17.6	17.6	9.8	—	5.6	2.0	
House fan	36.7	47.0	64.7	48.8	44.4	53.2	25.5	44.0	52.9	79.4	63.4	55.5	62.1	25.5	
Air conditioner	.5	—	—	—	—	.8	—	.5	—	—	—	—	.8	—	
Exhaust fan	1.4	—	—	2.4	—	4.0	—	1.4	—	—	—	—	4.8	—	
Window fan	.5	—	—	—	—	2.4	2.0	.5	—	—	2.4	—	2.4	2.0	
Razor	—	—	—	—	—	1.6	—	—	—	—	—	—	1.6	—	
Food mixer	1.9	5.9	8.8	4.9	—	3.2	—	1.9	5.9	8.8	4.9	—	3.2	—	
Blanket	1.0	—	—	—	—	.8	—	1.0	—	—	—	—	.8	—	
Heat pad	3.9	—	5.9	7.3	22.2	5.6	3.9	5.8	—	5.9	9.8	33.3	5.6	3.9	
Home freezer	3.4	11.8	11.8	4.9	—	4.0	3.9	3.4	11.8	11.8	4.9	—	4.0	3.9	
Meat grinder	.5	—	—	—	—	—	—	.5	—	—	—	—	—	—	
Churn	23.7	8.8	11.8	12.2	—	12.9	9.8	24.6	8.8	11.8	12.2	—	12.9	9.8	
Television set	—	—	2.9	—	—	—	—	—	—	2.9	—	—	—	—	
Livestock equipment:															
Cream separator	—	2.9	—	—	—	—	—	—	2.9	—	—	—	—	—	
Milking machine	—	29.4	—	—	—	—	—	—	29.4	—	—	—	—	—	
Milk cooler	—	29.4	—	—	—	—	—	—	23.5	—	—	—	—	—	
Dairy water heater	7.7	11.8	20.6	14.6	—	8.1	—	8.2	11.8	20.6	14.6	—	8.1	—	
Brooder hover	2.4	5.9	—	2.4	—	2.4	—	2.4	5.9	—	2.4	—	2.4	—	
Fence controller	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Farm shop:															
Air compressor	.5	—	—	2.4	—	.8	2.0	.5	—	—	2.4	—	.8	2.0	
Drill press	.5	—	—	—	—	.8	—	.5	—	—	—	—	.8	—	
Portable drill	1.0	—	—	—	—	.8	—	1.0	—	—	2.4	—	.8	—	
Tool grinder	2.9	2.9	—	2.4	—	3.2	—	2.9	2.9	—	4.9	—	4.8	—	
Power saw	3.4	5.9	—	4.9	—	4.0	—	3.4	8.8	—	2.4	—	4.8	—	
Welder	.5	—	—	—	—	.8	—	.5	—	—	—	—	.8	—	
Lathe	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
Concrete mixer	—	—	—	—	—	—	1.6	—	—	—	—	—	—	1.6	
Soldering iron	1.0	—	—	—	—	—	—	1.0	—	—	—	—	—	—	
Planer	—	—	—	—	—	—	.8	—	—	—	—	—	—	.8	
Table saw	—	—	2.9	—	—	1.6	—	—	—	2.9	—	—	1.6	—	
Sanding machine	.5	—	—	—	—	2.4	—	.5	—	—	—	—	2.4	—	
Other:															
Wood saw	1.0	2.9	—	2.4	—	1.6	—	1.0	2.9	—	2.4	—	1.6	—	

Appendix Table 4. Electrical equipment on farms, by 1949 total income groups, July 1950.

Items	Farms reporting equipment and with—			Pieces of equipment per 100 farms with—		
	Low income	Medium income	High income	Low income	Medium income	High income
Farms represented	150	248	102	—	—	—
Household appliances:				Number		
Radio	86.7	93.1	95.1	92.0	105.2	182.4
Iron	94.0	98.0	95.1	95.3	107.7	149.0
Refrigerator	78.7	87.1	99.0	80.0	92.3	132.4
Washing machine	42.0	59.7	71.6	42.0	60.5	87.2
Vacuum cleaner	2.0	3.6	14.7	2.0	3.6	14.7
Clock	7.3	11.3	23.5	7.3	12.1	29.4
Range	15.0	18.4	38.8	15.0	18.4	40.8
Sewing machine	2.7	2.0	6.9	2.7	2.0	6.9
Toaster	6.7	5.6	12.7	6.7	5.6	13.7
Percolator	3.3	3.2	8.8	3.3	3.2	8.8
Roaster .....	.7	—	1.0	.7	—	1.0
Hot plate	30.0	24.2	34.3	30.0	24.6	37.2
Waffle iron	2.0	2.4	5.0	2.0	2.4	5.0
Space heater	3.3	2.0	5.0	4.0	2.4	8.8
Water heater	2.0	6.0	18.4	2.0	6.0	18.4
Household fan	36.0	41.1	59.8	37.3	48.0	80.4
Air conditioner	—	.4	1.0	—	.4	1.0
Exhaust fan .....	.7	1.2	3.9	.7	1.2	4.9
Window fan .....	.7	1.6	1.0	.7	1.6	1.0
Razor .....	.7	.4	—	.7	.4	—
Food mixer .....	.7	3.6	4.9	.7	3.6	4.9
Blanket .....	.7	.4	1.0	.7	.4	1.0
Heat pad	3.3	4.8	6.9	3.3	6.0	9.8
Home freezer	2.7	3.2	11.8	2.7	3.2	11.8
Meat grinder	—	.4	—	—	.4	—
Churn	12.0	16.5	22.5	12.7	16.9	22.5
Television set	—	.4	—	—	.4	—
Livestock equipment:						
Cream separator .....	.7	—	—	.7	—	—
Milking machine	—	—	9.8	—	—	9.8
Milk cooler	—	—	9.8	—	—	9.8
Dairy water heater	—	—	7.8	—	—	7.8
Brooder hover	4.7	10.9	8.8	4.7	11.3	8.8
Fence controller	2.0	2.4	2.0	2.0	2.4	2.0
Shop equipment:						
Air compressor .....	.7	—	1.0	.7	—	1.0
Drill press	—	.8	1.0	—	.8	1.0
Portable drill	—	—	2.9	—	—	2.9
Tool grinder .....	.7	2.0	6.9	.7	2.0	6.9
Power saw .....	.7	2.0	8.9	.7	2.0	9.8
Welder	—	.4	—	—	.4	—
Lathe	—	.8	—	—	.8	—
Concrete mixer	—	—	2.0	—	—	2.0
Soldering iron	—	.4	1.0	—	.4	1.0
Planer	—	.4	—	—	.4	—
Table saw	—	.8	1.0	—	.8	1.0
Sanding machine	—	1.2	1.0	—	1.2	2.0
Other equipment:						
Wood saw	—	1.2	2.0	—	1.2	2.9

Appendix Table 5. Consumption of electric energy per farm, by 1949 income groups, 1940-1949.

Years	Income group			All farms
	Low	Medium	High	
	Kilowatt-hours			
1940	238	653	595	565
1941	273	458	601	452
1942	346	445	813	543
1943	377	534	1,069	675
1944	490	652	1,015	728
1945	444	653	1,058	710
1946	503	782	1,366	855
1947	581	873	1,540	961
1948	703	1,128	2,267	1,268
1949	869	1,287	2,918	1,494
	Farms represented			
		Number		
1940	2	5	7	14
1941	14	17	16	47
1942	19	31	25	75
1943	24	36	31	91
1944	28	41	34	103
1945	49	82	51	182
1946	63	109	59	231
1947	74	135	69	278
1948	101	170	81	352
1949	150	248	102	500