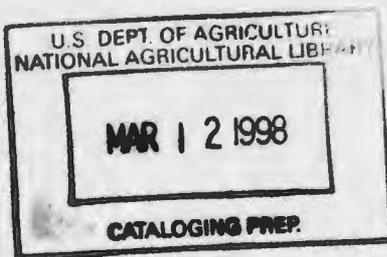


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HAY HARVESTING PRACTICES AND LABOR USED, 1967 48 STATES



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ABSTRACT

Hay harvested in 1967 from 64.7 million acres was valued at \$2.9 billion or \$45 per acre. Labor input for harvesting was 2.9 man-hours per acre, valued at \$3.86--8.6 percent of per acre value of hay. Use of laborsavings equipment, particularly in commercial hay areas, is evident. Hay was conditioned and windrowed with a windrower-conditioner using only 0.41 man-hour of labor. This compares with 1.6 man-hours when using a mower and three separate operations. Likewise, mechanical field loading of baled hay greatly reduced labor requirements. Field loading with a bale thrower required only 1.16 man-hours of labor including storing the hay. Loading and storing by hand took 1.97 man-hours. Baling hay continued to increase, accounting for 90 percent of the hay acreage in 1967 compared with 83 percent in 1961. Most of the increase came from twine-tied bales since the proportion of the acreage tied with wire changed little since 1961. Custom and exchange work for baling declined from 62 percent in 1951 to 18 percent of baled acreage in 1967. For field loading and storing baled hay, custom work accounted for 16 percent of baled acreage. To prepare hay for field curing, custom and exchange operations accounted for 12 percent of the hay acreage. This was principally where windrowers or swathers were used. Data are based on information supplied by crop reporters of the Statistical Reporting Service.

Keywords: Hay, cutting, conditioning, windrowing, baling, field loading, loose hay, custom and exchange, man-hours, labor rates, and labor cost.

CONTENTS

	<u>Page</u>
SUMMARY	iii
INTRODUCTION	1
ACREAGE OF HAY AND LABOR USED	2
HAY CUTTING, CONDITIONING, AND WINDROWING	
EQUIPMENT	2
Equipment Size and Performance	6
Labor Comparisons	6
METHODS OF HANDLING HAY.....	9
Baling	9
Bale Weights	9
Loose Hay	14
LABOR USE AND COST BY FIELD LOADING SYSTEM ...	14
LABOR USE AND COST BY OPERATION	18
EXTENT OF CUSTOM AND EXCHANGE OPERATIONS....	21

SUMMARY

Relatively new practices some farmers are using in the hay harvest permit substantial savings in labor over older methods. In the 1967 harvest, 188 million man-hours of labor were used--an average of 2.9 man-hours per acre, valued at \$3.86. Laborsavings with the relatively new, high-capacity, multiple-operation equipment may be illustrated with data on the preparation of the crop for field curing. When a windrower-conditioner was used (which cuts, conditions, and windrows in one operation), hay was put in the windrow with 0.41 man-hour of labor per acre. When a mower, conditioner, and rake were used in three operations, the average labor use was 1.6 man-hours per acre. Size of operation and climate largely determine the feasibility of using some of the haying equipment which saves labor.

The practice of field baling hay has been increasing. It accounted for 90 percent of the hay crop in 1967, compared with 83 percent in 1961, and only 15 percent in 1939. Twine-tied bales accounted for most of the increase in baling. Plastic tying material was used for about 2 percent of the acreage.

Field loading and storing of baled hay took over half of the total man-hours per acre. Field loading was done by hand on 31 percent of the acreage baled, indicating that labor can be saved here through more extensive use of mechanical loading equipment.

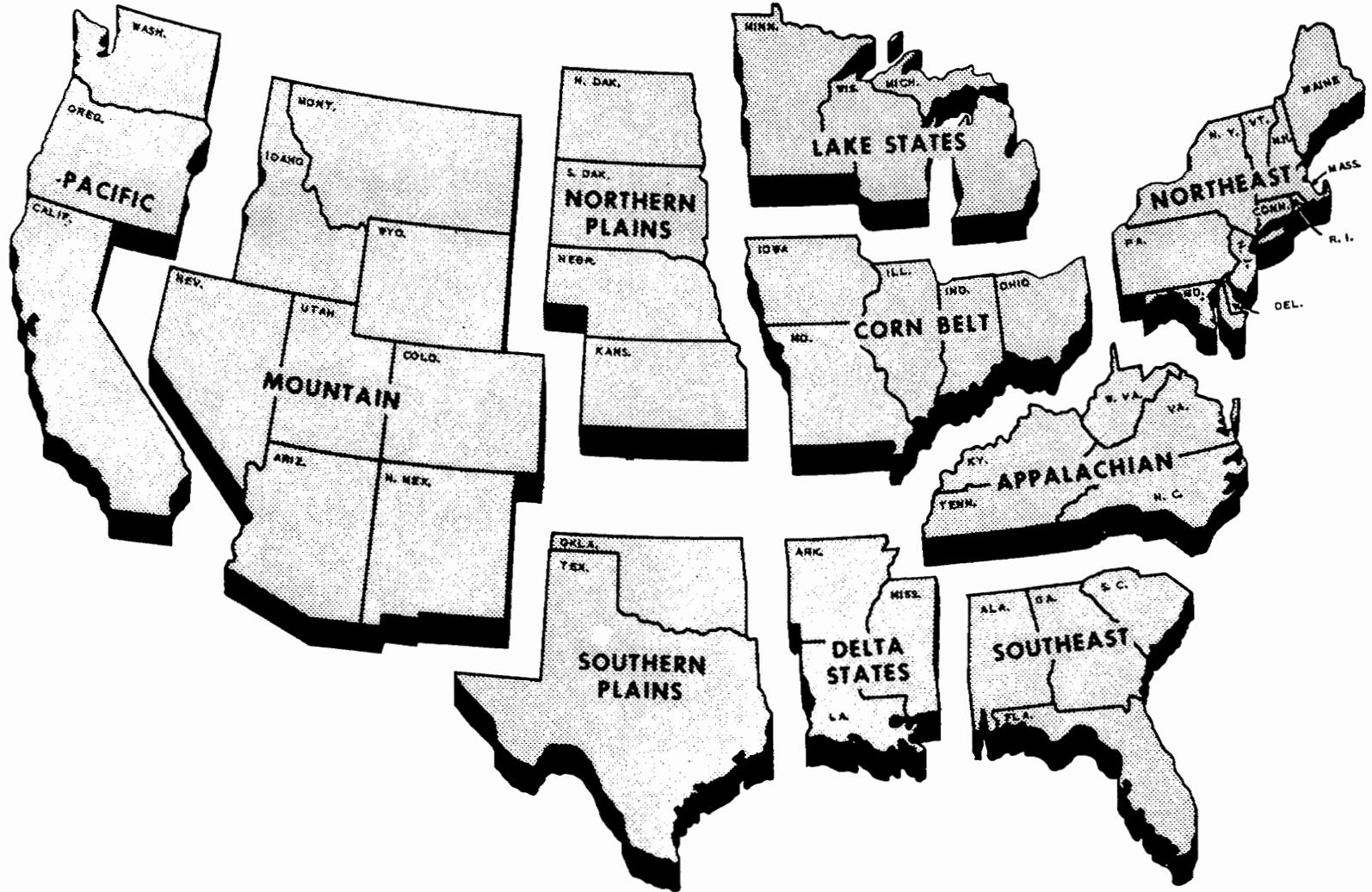
Handling hay in loose form had dwindled to 10 percent of the acreage by 1967, and was concentrated in seven States in the Northern Plains and Mountain regions. Field cubing accounted for less than 1 percent of the acreage and was concentrated in the irrigated areas of the West.

Custom and exchange work in harvesting hay was most important in areas where relatively new methods of handling hay were common. The Plains, Mountain, and Pacific regions, in which heavy use was made of windrowers or swathers and mechanical bale loading equipment, are examples.

In 1967, only 18 percent of the hay acreage baled was with custom or exchange equipment. This compares with over 60 percent in 1951 when the number of balers on farms was 300,000. For the 1967 crop, about 780,000 balers were on farms. For field loading and storing baled hay, custom and exchange work, with 16 percent of the acreage, was nearly as extensive as custom baling.

Custom and exchange operations accounted for 12 percent of the acreage cut, conditioned, and windrowed. This work was principally in areas where windrowers or swathers were used extensively.

FARM PRODUCTION REGIONS



AT

HAY HARVESTING PRACTICES AND LABOR USED, 1967
48 States

by

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INTRODUCTION

Haying is big business. In 1967, the hay crop at \$2.9 billion was second only to corn in farm value among all crops produced in the 48 States. In terms of volume, 126.3 million tons were produced on 64.7 million acres--a yield of nearly 2 tons per acre. Harvesting this large crop requires much labor and equipment.

Labor for harvesting the hay crop, as for many other farm operations, is becoming increasingly more costly and less available. New technology, which reduces the amount of labor associated with farmwork, is continually being tried and adopted. The high cost of hired farm labor in many industrialized areas, combined with strong competition for labor by the nonfarm labor market, pressures farmers into adopting laborsaving equipment--even on relatively small farms.

Four phases of hay harvesting are examined in this report. These are (1) cutting, conditioning, and windrowing; (2) baling; (3) field loading and storing baled hay; and (4) field handling and storing loose hay.

Objectives in this study are to (1) determine labor input per acre for harvesting hay in 1967, (2) estimate labor costs for harvesting done with different types and sizes of equipment, (3) determine extent of use by types and sizes of hay cutting machinery, balers, and field loading systems, and (4) determine how much custom or exchange equipment was used.

Data for this report are based on information obtained from 11,300 crop reporters of the Statistical Reporting Service in February 1968. Farmers throughout the 48 States reported on hay harvesting methods in 1967, equipment used, and labor involved.

Labor costs are computed from the hours used for an operation as determined in the survey, and the 1967 State average wage rate per hour without board and room.^{1/}

ACREAGE OF HAY AND LABOR USED

Nationwide, 188 million hours of labor were used in harvesting 65 million acres of hay in 1967, or 2.9 hours per acre (table 1). The amount of labor used per acre ranged from 1.5 hours in North Dakota to 4.6 hours in Arizona. Kind of hay, number of cuttings, method of harvest, type and size of equipment, weight of bales, size and location of haying operations, and yield per acre all influenced labor inputs.

For example, in North Dakota, large acreages of wild hay are usually cut only once a year. Much of this hay is stacked with large mechanical stackers or otherwise bulk handled with little labor required. In Arizona, 84 percent of the acreage was in alfalfa and many cuttings were involved.

In California, labor inputs were particularly low considering that 61 percent of the hay crop was alfalfa, which provides multiple cuttings. Here 73 percent of the hay was sold and exceptionally heavy bales were made. Mechanical handling of fewer bales per acre contributed to low labor inputs. Also, some of the market hay was baled and delivered to a roadside pickup point without additional labor for storing.

The Southeast had the highest regional average of 3.8 man-hours per acre, 31 percent above the national average. This was due to generally lower capacity equipment used in working small irregular fields. However, when labor cost is considered, the Southeast, because of low wage rates, was near the national average of \$3.86 per acre.

Yield per acre was not obtained in the hay harvesting survey, but is reported annually. In 1967, an average of 1.95 tons of hay was harvested per acre (table 2). This varied from 3.13 tons in the Pacific to 1.36 tons per acre in the Northern Plains. Labor inputs per ton averaged 1.5 hours and were lowest in the mechanized Pacific and highest in the Southeast.

HAY CUTTING, CONDITIONING, AND WINDROWING EQUIPMENT

In 1967, some 93.7 million acres of hay were cut. This is 1.45 times the 64.7 million acres in hay, as some acreage was harvested several times. The cutter-bar mower was used to cut 60 percent of the 1967 hay acreage (table 3). Use of this machine accounted for 82 percent of the acreage on the smallest farms (less than 100 acres) and 45 percent on the largest farms (1,000 acres and over).

^{1/} Farm Labor. La 1(1-69), U.S. Dept. Agr., Statis. Rptg. Serv., Jan. 1969.

Table 1.—Hay: Acreage and percentage in alfalfa, percentage sold, man-hours, and labor cost per acre for harvesting, 48 States, 1967

State and region	Acreage of all hay	Percentage of--		Man-hours per acre	Wage rate per hour ^{1/}	Labor cost per acre ^{2/}
		Acreage in alfalfa	Production sold			
	1,000 acres	Percent	Percent	Man-hours	Dollars	Dollars
New England.....	1,348	19	11	3.0	1.54	4.62
New York.....	2,772	44	6	3.5	1.43	5.00
New Jersey.....	160	46	23	3.9	1.49	5.81
Pennsylvania.....	2,049	37	13	3.8	1.31	4.98
Delaware.....	36	17	15	2.4	1.28	3.07
Maryland.....	327	21	11	3.4	1.27	4.32
Northeast.....	6,692	36	10	3.5	1.43	5.00
Michigan.....	1,645	78	16	3.2	1.41	4.51
Wisconsin.....	4,090	73	08	3.9	1.41	5.50
Minnesota.....	3,407	68	13	3.1	1.35	4.19
Lake States.....	9,142	72	11	3.5	1.39	4.87
Ohio.....	1,654	36	18	2.9	1.30	3.77
Indiana.....	972	52	12	3.0	1.36	4.08
Illinois.....	1,409	62	10	4.1	1.42	5.82
Iowa.....	2,808	70	08	3.8	1.45	5.51
Missouri.....	2,914	29	10	2.9	1.24	3.60
Corn Belt.....	9,757	49	11	3.3	1.35	4.46
North Dakota.....	3,904	35	08	1.5	1.32	1.98
South Dakota.....	4,488	49	06	1.6	1.27	2.03
Nebraska.....	4,491	40	13	1.9	1.36	2.58
Kansas.....	2,465	51	18	3.0	1.37	4.11
Northern Plains.....	15,348	43	12	1.9	1.34	2.55
Virginia.....	1,016	8	08	3.2	1.12	3.58
West Virginia.....	604	12	06	3.3	.99	3.27
North Carolina.....	476	2	10	3.1	1.03	3.19
Kentucky.....	1,620	15	07	3.4	1.20	4.08
Tennessee.....	1,236	6	08	3.5	1.01	3.54
Appalachian.....	4,952	10	08	3.3	1.08	3.56
South Carolina.....	227	^{3/}	10	4.2	.89	3.74
Georgia.....	433	1	19	3.6	1.01	3.64
Florida.....	156	^{3/}	22	3.6	1.12	4.03
Alabama.....	497	1	16	3.9	.93	3.63
Southeast.....	1,313	1	17	3.8	1.03	3.91
Mississippi.....	639	2	12	3.6	.94	3.38
Arkansas.....	739	9	13	3.8	1.09	4.14
Louisiana.....	333	6	18	3.4	1.02	3.47
Delta States.....	1,711	6	14	3.6	1.03	3.71
Oklahoma.....	1,649	34	28	2.9	1.24	3.60
Texas.....	2,297	8	24	2.6	1.12	2.91
Southern Plains.....	3,946	19	26	2.7	1.14	3.08
Montana.....	2,370	47	11	2.1	1.40	2.94
Idaho.....	1,323	79	27	3.6	1.48	5.33
Wyoming.....	1,226	38	10	2.0	1.33	2.66
Colorado.....	1,482	50	31	2.3	1.39	3.20
New Mexico.....	270	71	60	3.5	1.09	3.82
Arizona.....	233	84	70	4.6	1.26	5.80
Utah.....	582	77	26	3.7	1.44	5.33
Nevada.....	410	38	23	1.7	1.47	2.50
Mountain.....	7,896	55	27	2.6	1.34	3.48
Washington.....	876	59	42	3.5	1.59	5.57
Oregon.....	1,137	35	24	3.2	1.47	4.70
California.....	1,897	61	73	2.8	1.62	4.54
Pacific.....	3,910	53	58	3.1	1.60	4.96
48 States.....	64,667	44	18	2.9	1.33	3.86

^{1/} Average 1967 farm wage rate per hour without room and board. Farm Labor. U.S. Dept. Agr., Statis. Rptg. Serv., Jan. 1969.

^{2/} Totals may not agree with details because of rounding.

^{3/} Less than 0.5 percent.

Table 2.--All hay: Yield per acre and labor productivity,
by farm production region, 48 States, 1967

Region	Yield per acre <u>1/</u>	Labor used per--	
		Acre	Ton
	<u>Tons</u>	<u>Man-hours</u>	<u>Man-hours</u>
Northeast.....	2.00	3.5	1.8
Lake States.....	2.31	3.5	1.5
Corn Belt.....	2.21	3.3	1.5
Northern Plains.....	1.36	1.9	1.4
Appalachian.....	1.61	3.3	2.0
Southeast.....	1.74	3.8	2.2
Delta States.....	1.81	3.6	2.0
Southern Plains.....	1.73	2.7	1.6
Mountain.....	2.14	2.6	1.2
Pacific.....	3.13	3.1	1.0
48 States.....	1.95	2.9	1.5

1/ Crop Production, 1969 Annual Summary. U.S. Dept. Agr., Statis. Rptg. Serv.

Table 3.--Hay: Acreage cut, average times over, percentage cut and conditioned, by type of machine, farm production region, and size of farm, 1967, and percentage of production conditioned, 1961

Item	Total acreage cut	Average times over <u>1</u> / ₁	Percentage cut with--					Percentage conditioned separately	Total conditioned		
			Mower (cutter-bar)	Mower-conditioner	Wind-rower or swather	Windrower or swather-conditioner	Other machines <u>2</u> / ₂		1967	1961 <u>3</u> / ₃	
	<u>1,000 acres</u>	<u>Number</u>	-----							<u>Percent</u>	
<u>Region</u>											
Northeast.....	8,599	1.28	59	23	3	10	5	29	62	47	
Lake States.....	13,114	1.43	63	22	4	10	1	23	55	40	
Corn Belt.....	14,117	1.45	79	12	3	5	1	14	31	20	
Northern Plains.....	19,611	1.28	70	2	16	11	1	1	14	4	
Appalachian.....	5,672	1.15	86	8	3	1	2	15	24	12	
Southeast.....	1,712	1.30	73	10	8	2	7	4	16	6	
Delta States.....	2,190	1.28	69	12	3	12	4	10	34	6	
Southern Plains.....	6,733	1.71	47	10	7	34	2	4	48	11	
Mountain.....	13,294	1.68	40	2	18	39	1	1	42	10	
Pacific.....	8,619	2.20	27	4	18	50	1	1	55	23	
All regions.....	93,661	1.45	60	10	10	18	2	10	38	22	
<u>Size of farm</u>											
Less than 100 acres.....	5,492	1.34	82	7	4	6	1	9	22	<u>4</u> / ₄	
100-179 acres.....	12,100	1.41	76	10	4	9	1	20	39	<u>4</u> / ₄	
180-259 acres.....	11,398	1.41	69	15	5	9	2	18	42	<u>4</u> / ₄	
260-499 acres.....	21,490	1.42	61	14	6	16	3	12	42	<u>4</u> / ₄	
500-999 acres.....	16,685	1.43	57	9	11	21	2	8	38	<u>4</u> / ₄	
1,000 acres and over.....	26,496	1.55	45	6	19	29	1	2	37	<u>4</u> / ₄	
48 States.....	93,661	1.45	60	10	10	18	2	10	38	22	

1/ Acreage cut once over divided by the actual hay acreage shown in table 1.

2/ Mainly rotary mowers and forage harvesters.

3/ Since 1961 data are based on production and 1967 on acreage, data for the 2 years are not strictly comparable.

4/ Not available.

Of the multiple-operations equipment, windrower- or swather-conditioners were used extensively in the Southern Plains, Mountain, and Pacific regions. The relatively long periods of dry weather and large acreages of hay make use of this high-capacity machine feasible in these areas.

In humid areas such as the Northeast and Lake States, mower-conditioners were used more extensively than elsewhere. In addition, conditioners alone were used extensively in these regions. An extra trip over the field is required for this operation, but it hastens drying. However, it also contributes to the higher-than-average labor use in these regions.

Equipment Size and Performance

Large acreages of hay are required to justify an investment in high-capacity equipment such as windrower-conditioners, unless work is done on a custom basis to extend the use of the machine.

Sizes of equipment and performance, by region and size of farm, are presented in table 4. The size of windrowers or swathers in width of cut ranged from 7.7 feet in the Appalachian region to 13.7 feet in the Northern Plains. By size of farm, the range was from 8.5 to 13.5 feet on small and large farms respectively. In contrast, the average operating width of mowers in the 48 States as a whole was less than 7 feet.

Average acreage cut per hour is essentially a function of the operating width. Windrowers or swathers, alone or with conditioners, averaged about 4 acres per hour countrywide, but wide variations existed among regions. Windrower- or swather-conditioners in the Appalachian region cut only 2.6 acres per hour compared with 4.3 acres per hour in the Northern Plains, and on the large-size farms.

Conditioning equipment was used on about 22 percent of the hay crop in 1961 and 38 percent in 1967 (table 3). The highest percentage in both periods was in the Northeast--47 percent in 1961 and 62 percent in 1967. However, increased use of conditioning equipment in other parts of the country was more pronounced, especially in the drier areas, where conditioning was just getting started in 1961.

Labor Comparisons

Five combinations or systems of equipment for cutting, conditioning, and windrowing were combined from the survey data to determine labor use, costs, and possible savings (table 5). The conditioner was assumed desirable in all areas and was used in each system.

Where it was feasible to use a windrower-conditioner, only 0.41 man-hour per acre was needed to get hay into the windrow, at a labor cost of \$0.55. The system used to the greatest extent--mower; conditioner; rake--required 1.58 man-hours per acre or \$2.10 in labor costs. Weather, small fields, less investment, and to some extent tradition, are factors in the use of equipment with high labor cost. Recent sales data show a strong trend toward mower-conditioners, and windrowers or swathers, which have a higher capacity for cutting hay than the cutter-bar mower.

Table 4.--Hay cutting machines: Average operating width and acreage per hour, by farm production region and size of farm, 48 States, 1967

Item	Mower (cutter-bar)		Mower- conditioner		Windrower or swather		Windrower- or swather- conditioner	
	Average operating width	Acres per hour	Average operating width	Acres per hour	Average operating width	Acres per hour	Average operating width	Acres per hour
<u>Region</u>	<u>Feet</u>	<u>Acres</u>	<u>Feet</u>	<u>Acres</u>	<u>Feet</u>	<u>Acres</u>	<u>Feet</u>	<u>Acres</u>
Northeast.....	6.9	1.9	7.4	2.3	8.8	3.1	9.4	3.4
Lake States.....	6.9	2.6	7.2	2.8	11.0	3.9	10.3	3.5
Corn Belt.....	6.9	2.6	7.4	2.9	8.5	3.2	9.6	3.4
Northern Plains.....	7.4	3.2	8.6	3.4	13.7	4.8	12.7	4.3
Appalachian.....	6.5	2.1	6.9	2.4	7.7	2.7	8.0	2.6
Southeast.....	6.5	1.9	7.3	2.0	8.4	2.8	9.5	2.9
Delta States.....	6.6	2.0	7.4	2.6	8.5	2.9	9.6	3.0
Southern Plains.....	7.0	2.9	8.0	2.9	10.4	4.0	11.9	3.4
Mountain.....	7.0	2.5	8.2	2.5	12.5	4.2	12.7	4.0
Pacific.....	6.6	2.4	7.9	3.3	12.6	4.0	12.6	4.2
All regions.....	6.9	2.5	7.4	2.6	11.5	4.1	11.4	4.0
<u>Size of farm</u>								
Less than 100 acres.....	6.6	2.1	7.2	2.1	8.5	2.8	10.7	3.3
100-179 acres.....	6.8	2.3	7.3	2.4	9.5	3.2	11.0	3.6
180-259 acres.....	6.9	2.3	7.3	2.6	9.5	3.5	11.2	3.8
260-499 acres.....	7.0	2.6	7.5	2.7	11.3	3.7	11.3	3.8
500-999 acres.....	7.2	2.7	7.6	2.8	12.9	4.1	11.8	3.9
1,000 acres and over.....	7.3	2.9	8.2	2.9	13.5	4.6	12.2	4.3
48 States.....	6.9	2.5	7.4	2.6	11.5	4.1	11.4	4.0

Table 5.--Cutting, conditioning, and windrowing hay: Man-hours and labor cost per acre using designated systems, by farm production region and size of farm, 48 States, 1967

Item	System 1/									
	I	II	III	IV	V	I	II	III	IV	V
	-----Man-hours-----					-----Dollars-----				
Region										
Northeast.....	1.72	1.38	1.05	0.91	0.41	2.46	1.97	1.50	1.30	0.59
Lake States.....	1.56	1.36	.99	.87	.40	2.17	1.89	1.38	1.21	.56
Corn Belt.....	1.52	1.38	.96	.88	.42	2.05	1.86	1.30	1.19	.57
Northern Plains.....	1.11	.99	.69	.61	.29	1.49	1.33	.92	.82	.39
Appalachian.....	1.43	1.30	.87	.84	.45	1.54	1.40	.94	.91	.49
Southeast.....	1.69	1.42	1.12	.91	.44	1.74	1.46	1.15	.94	.45
Delta States.....	1.68	1.42	1.13	.93	.42	1.73	1.46	1.16	.96	.43
Southern Plains.....	1.59	1.45	1.03	.94	.50	1.81	1.65	1.17	1.07	.57
Mountain.....	1.70	1.43	1.11	.97	.45	2.28	1.92	1.49	1.30	.60
∞ Pacific.....	2.27	1.91	1.21	1.06	.59	3.63	3.06	1.94	1.70	.94
All regions.....	1.58	1.36	1.00	.86	.41	2.10	1.81	1.33	1.14	.55
Size of farm										
Less than 100 acres.....	1.81	1.52	1.20	1.03	.51	2.41	2.02	1.60	1.37	.68
100-179 acres.....	1.73	1.49	1.10	.99	.51	2.30	1.98	1.46	1.32	.68
180-259 acres.....	1.67	1.44	1.03	.94	.46	2.22	1.92	1.37	1.25	.61
260-499 acres.....	1.55	1.38	.99	.87	.42	2.06	1.84	1.32	1.16	.56
500-999 acres.....	1.49	1.31	.94	.83	.41	1.98	1.74	1.25	1.10	.55
1,000 acres and over.....	1.35	1.19	.87	.74	.36	1.80	1.58	1.16	.98	.48
48 States.....	1.58	1.36	1.00	.86	.41	2.10	1.81	1.33	1.14	.55

- 1/ System I - Mower; conditioner; rake.
 II - Windrower or swather; conditioner; rake.
 III - Mower-conditioner; rake.
 IV - Windrower- or swather-conditioner; rake.
 V - Windrower-conditioner.

METHODS OF HANDLING HAY

Handling hay from the windrow to the barn or stack can be accomplished in a number of ways. Traditionally, hay was harvested loose--either pitched on a wagon by hand, loaded with a mechanical hay loader, or gathered with a buck rake. More recently, some of it has been chopped and blown into a wagon box. Now, except in a few States, loose hay is seldom found.

Field cubing--chopping and pressure forming hay into bite-size cubes--offers a low-volume way for economical transport of hay. Moisture conditions are critical for field cubing, however, and the practice has been restricted to semiarid areas of the West. Little information is available on the extent of field cubing, but recent estimates show about 840,000 tons cubed in four States.^{2/}

Hay to be used on the farm where grown is mostly baled with automatic twine-tie balers. Hay to be sold and transported long distances is frequently baled with wire-tie balers.

Baling

After field curing to some extent, 90 percent of the 1967 hay tonnage was baled, compared with 83 percent in 1961 and less than 15 percent in 1939 (table 6).

The percentage of hay production baled with twine increased from 67 percent in 1961 to 73 percent in 1967 (table 7). This continues a long upward trend in twine baling. The proportion of the hay crop baled with wire has changed little in recent years. An increase of 8 percent in production of hay from 1961 to 1967 means some increase in the quantity baled with wire.

The tonnage tied with plastic or synthetic tying material was included in the proportion tied with twine. Since the quantity was small, and survey results are subject to variation, only major areas of use are indicated as general guidelines. In the 48 States as a whole the quantity was less than 2 percent of the hay crop. But in the Northern Plains, Montana, and Colorado, indications were that around 5 percent of the crop was tied with plastic material.

Bale Weights

Average bale weight varies widely by region, kind of tying material used, and whether bales are for home use or for sale. Hay in twine-tied bales, largely for use on the farm where baled, are packaged loosely for ease in handling and sometimes for air circulation when additional curing is needed. Wire ties are frequently used to bind dense bales for transport, often to distant markets.

^{2/} Soteropoulos, G. and deBhur, H.E. Cubing--Past, Present and Future. Paper No. 68-635, Amer. Soc. Agr. Engin., Dec. 1968.

Table 6.--Hay: Production and percentage distribution by method of harvest, 48 States, specified years

Year	Production	Baled		Loose	
		Twine	Wire	Chopped	Long
	Million tons	Percent			
1918 <u>1/</u>	82.3	<u>2/</u>	24.4	<u>2/</u>	75.6
1939.....	86.5	<u>2/</u>	14.5	<u>2/</u>	85.5
1944.....	102.9	<u>2/</u>	26.8	1.7	71.5
1948.....	96.2	20.8	26.7	5.6	46.9
1951.....	109.5	37.9	23.8	7.5	30.8
1954.....	107.8	50.9	21.6	7.2	20.3
1961.....	117.0	66.6	16.3	6.8	10.3
1967 <u>3/</u>	126.3	72.9	16.8	2.6	7.0

1/ Yearbook of Agriculture, 1918. Production revised.

2/ No information obtained.

3/ Field cubed hay tonnage representing 0.7 percent of production not included.

Table 7.--Hay: Production and percentage distribution by method of harvest, by State and farm production region, 48 States, 1961 and 1967

State and region	1961					1967				
	Production	Baled		Loose		Production	Baled		Loose	
		Twine tied	Wire tied	Dry chopped	Long loose		Twine tied	Wire tied	Dry chopped	Long loose
	1,000 tons	Percent				1,000 tons	Percent			
New England.....	2,792	89	2	4	5	2,306	98	1	1	1/
New York.....	6,051	86	3	7	4	5,845	94	3	3	1/
New Jersey.....	439	91	3	4	2	383	92	5	2	1
Pennsylvania.....	4,140	88	3	5	4	4,035	95	2	2	1
Delaware.....	79	93	2	2	3	75	98	2	1/	1/
Maryland.....	773	92	2	1	5	710	95	4	1/	1
Northeast.....	14,274	87.7	2.7	5.4	4.2	13,354	95.0	2.4	2.2	.4
Michigan.....	3,214	80	5	12	3	3,300	91	3	5	1
Wisconsin.....	8,648	76	2	18	4	10,268	91	1	7	1
Minnesota.....	7,635	84	3	5	8	7,583	94	2	2	2
Lake States.....	19,497	79.8	2.9	11.9	5.4	21,151	92.0	1.7	4.9	1.4
Ohio.....	3,924	80	8	8	4	2,936	91	5	3	1
Indiana.....	2,519	80	9	8	3	1,925	88	7	4	1
Illinois.....	4,267	72	17	9	2	3,808	84	12	3	1
Iowa.....	7,497	83	5	9	3	7,285	94	2	2	2
Missouri.....	4,888	84	9	2	5	5,642	93	6	1/	1
Corn Belt.....	23,095	80.4	9.0	7.2	3.4	21,596	91.0	5.7	2.0	1.3
North Dakota.....	3,522	59	4	2	35	4,145	59	2	1	38
South Dakota.....	3,997	43	5	4	48	4,913	50	3	4	43
Nebraska.....	6,047	36	12	7	45	6,497	50	11	5	34
Kansas.....	4,297	65	21	5	9	5,282	69	25	2	4
Northern Plains.....	17,863	49.1	11.0	4.9	35.0	20,837	56.6	10.9	3.2	29.3

See footnote at end of table.

--Continued

Table 7.--Hay: Production and percentage distribution by method of harvest, by State and farm production region, 48 States, 1961 and 1967--Continued

State and region	1961					1967				
	Production	Baled		Loose		Production	Baled		Loose	
		Twine tied	Wire tied	Dry chopped	Long loose		Twine tied	Wire tied	Dry chopped	Long loose
	1,000 tons	Percent				1,000 tons	Percent			
Virginia.....	1,957	89	3	1	7	1,532	97	<u>1</u> / <u>1</u>	2	1
West Virginia.....	955	75	3	2	20	912	94	<u>1</u> / <u>1</u>	<u>1</u> / <u>1</u>	5
North Carolina.....	893	80	6	2	12	623	96	2	<u>1</u> / <u>1</u>	2
Kentucky.....	2,664	90	5	1	4	2,947	95	2	<u>1</u> / <u>1</u>	3
Tennessee.....	1,831	84	7	1	8	1,951	93	3	<u>1</u> / <u>1</u>	4
Appalachian.....	8,300	85.6	4.9	1.2	8.3	7,965	95.0	2.0	<u>1</u> / <u>1</u>	3.0
South Carolina.....	392	76	9	3	12	390	91	3	1	5
Georgia.....	660	81	10	1	8	845	89	8	<u>1</u> / <u>1</u>	3
Florida.....	204	85	12	<u>1</u> / <u>1</u>	3	274	93	5	<u>1</u> / <u>1</u>	2
Alabama.....	652	79	11	<u>1</u> / <u>1</u>	9	775	92	4	<u>1</u> / <u>1</u>	4
Southeast.....	1,908	79.7	10.3	1.4	8.6	2,284	91.0	5.4	<u>1</u> / <u>1</u>	3.6
Mississippi.....	870	88	8	1	3	1,096	94	4	1	1
Arkansas.....	989	83	9	1	7	1,357	93	4	1	2
Louisiana.....	596	88	5	3	4	644	95	2	2	1
Delta States.....	2,455	86.0	7.7	1.5	4.8	3,097	93.8	3.6	1.2	1.4
Oklahoma.....	2,194	38	56	3	3	3,062	34	65	<u>1</u> / <u>1</u>	<u>1</u> / <u>1</u>
Texas.....	2,510	42	51	4	3	3,774	42	56	<u>1</u> / <u>1</u>	<u>1</u> / <u>1</u>
Southern Plains.....	4,704	40.1	53.4	3.5	3.0	6,836	38.4	60.0	<u>1</u> / <u>1</u>	1.6

See footnote at end of table.

--Continued

Table 7.--Hay: Production and percentage distribution by method of harvest, by State and farm production region, 48 States, 1961 and 1967--Continued

State and region	1961					1967				
	Production	Baled		Loose		Production	Baled		Loose	
		Twine tied	Wire tied	Dry chopped	Long loose		Twine tied	Wire tied	Dry chopped	Long loose
	1,000 tons	Percent				1,000 tons	Percent			
Montana.....	2,528	58	10	2	30	3,864	71	6	1	22
Idaho.....	3,103	68	18	9	5	3,714	78	16	4	2
Wyoming.....	1,427	53	19	3	25	1,946	60	25	1/	15
Colorado.....	2,916	52	27	7	14	2,848	55	31	3	11
New Mexico <u>2/</u>	720	23	72	3	2	963	26	54	1/	2
Arizona <u>2/</u>	1,209	11	82	4	3	1,122	7	78	1/	1/
Utah.....	1,308	62	25	8	5	1,665	60	28	7	5
Nevada.....	589	16	60	10	14	809	10	75	5	10
Mountain.....	13,800	51.1	29.4	5.9	13.6	16,931	57.8	27.5	2.5	9.6
Washington <u>2/</u>	1,800	45	45	5	5	2,345	47	47	1	1
Oregon.....	1,962	48	33	8	11	2,325	62	35	1	2
California <u>2/</u>	7,299	14	72	12	2	7,579	12	78	5	1/
Pacific.....	11,061	25.1	60.7	10.2	4.0	12,249	28.3	63.9	3.5	.6
48 States.....	116,957	66.6	16.3	6.8	10.3	126,300	72.9	16.8	2.6	7.0

1/ Less than 0.5 percent.

2/ Percentages for 1967 do not include the following estimated percentages of hay tonnage cubed: New Mexico, 18; Arizona, 15; Washington, 4; California, 5. These estimates were reported by Soteropulos and deBuhr (see footnote 2 on page 9).

For twine-tied bales, the average weight generally declined over the country from 1951 to 1967 (table 8). While mechanized bale handling has increased since 1951, a large number of bales are still moved by hand--in the field and in feeding operations. Light bales mean handling more bales but with less strain.

For wire-tied bales, there was a strong trend toward heavier bales in areas where a high percentage of the tonnage was sold. In California, with 73 percent of the production sold (table 1), weights of wire bales averaged 93 pounds in 1951 and 118 pounds in 1967. Bales with higher density help offset higher transportation costs by permitting more tonnage to be hauled per truck or other conveyance.

The average weight of bales tied with plastic material was generally greater than that of bales tied with natural fibers. This was especially true in the Mountain and Pacific regions, where bales are normally heavier than average. Some farmers reported about half of the baled hay tied with sisal and the remainder with plastic material. This indicates experimentation with a new product.

Loose Hay

Most of the hay handled as long loose hay is concentrated in a few States, mainly in the Northern Plains and Mountain regions. Much of the hay handled loose is wild hay, low in yield and value. To minimize harvesting costs, high-capacity cutting equipment is used along with stackers and stack movers.

The practice of chopping cured hay declined from more than 7 percent of the crop in the early 1950's to less than 3 percent in 1967 (table 6). Harvesting more of the hay crop as grass silage and green chop has been a factor in less of the crop being chopped for cured hay. For example, data from assessors' records in Wisconsin show an increase in acreage of the hay crop harvested for grass silage from 140,000 acres in 1953 to 387,000 acres in 1967.

LABOR USE AND COST BY FIELD LOADING SYSTEM

The four methods of field loading baled hay on which labor inputs were obtained for 1967 are presented in table 9. More of the hay acreage was handled with trailed wagons and chutes than any other method--35 percent. Loading hay from the ground by hand accounted for 31 percent of the acreage. Mechanical bale handling equipment accounted for the remainder. "Other methods" (bale wagons, bale loaders, and bale bunchers) covered 22 percent of the acreage and bale throwers 12 percent. The "other methods" accounted for 65 percent of the acreage in the Pacific States, 60 percent in the Mountain, and 35 and 32 percent in the Northern Plains and Southern Plains, respectively. Bale throwers were used extensively in the Northeast States with 41 percent of the acreage covered by this method.

Small farms generally had a higher percentage of the acreage loaded from the ground by hand. Conversely, use of mechanical bale loading equipment,

Table 8.--Bale weights: Average by type of tying material, by State and farm production region, 48 States, 1951 and 1967

State and region	Twine-tied				Wire-tied	
	Bale shape		Sisal and hemp	Plastic <u>1/</u>	1951	1967
	Round	Rectangular				
	1951		1967			
	-----Pounds-----					
New England.....	50	53	41	---	65	60
New York.....	56	55	44	---	68	64
New Jersey.....	48	54	47	---	60	62
Pennsylvania.....	50	52	42	---	66	62
Delaware.....	<u>1/</u>	56	50	---	65	---
Maryland.....	53	53	46	---	63	69
Northeast.....	51	53	43	46	66	65
Michigan.....	58	60	50	---	67	63
Wisconsin.....	58	61	51	---	70	77
Minnesota.....	59	66	54	---	72	77
Lake States.....	58	62	52	54	70	75
Ohio.....	54	56	47	---	67	61
Indiana.....	58	60	53	---	69	66
Illinois.....	60	61	53	---	69	67
Iowa.....	58	62	54	---	69	71
Missouri.....	59	60	57	---	67	63
Corn Belt.....	58	60	53	58	68	65
North Dakota.....	65	65	54	---	84	69
South Dakota.....	60	66	54	---	75	71
Nebraska.....	61	66	57	---	70	68
Kansas.....	61	63	59	---	68	69
Northern Plains....	62	65	56	57	71	69
Virginia.....	57	58	49	---	68	58
West Virginia.....	54	55	47	---	68	52
North Carolina.....	61	59	53	---	67	70
Kentucky.....	62	62	54	---	72	61
Tennessee.....	60	61	54	---	71	63
Appalachian.....	59	60	52	55	70	62
South Carolina.....	54	57	48	---	69	72
Georgia.....	55	56	50	---	67	69
Florida.....	54	55	53	---	67	---
Alabama.....	51	58	52	---	65	74
Southeast.....	54	57	51	54	67	70

See footnote at end of table

--Continued

Table 8.--Bale weights: Average by type of tying material, by State and farm production region, 48 States, 1951 and 1967--Continued

State and region	Twine-tied				Wire-tied	
	Bale shape		Sisal and hemp	Plastic ^{1/}	1951	1967
	Round	Rectangular				
	1951		1967			
	-----Pounds-----					
Mississippi.....	66	58	54	---	65	70
Arkansas.....	56	61	60	---	66	70
Louisiana.....	55	56	58	---	63	70
Delta States.....	57	59	57	---	65	70
Oklahoma.....	67	66	63	---	71	68
Texas.....	58	60	60	---	65	65
Southern Plains....	64	63	61	62	69	67
Montana.....	57	62	60	---	76	70
Idaho.....	68	61	61	---	76	75
Wyoming.....	62	65	60	---	74	90
Colorado.....	59	61	61	---	73	75
New Mexico.....	50	63	66	---	72	76
Arizona.....	65	73	65	---	74	101
Utah.....	65	64	62	---	76	81
Nevada.....	65	65	65	---	80	105
Mountain.....	64	62	61	65	75	83
Washington.....	55	62	55	---	79	87
Oregon.....	61	63	57	---	76	72
California.....	60	63	76	---	93	118
Pacific.....	57	62	57	76	82	107
48 States.....	57	60	52	56	71	83

^{1/} Data not available by States.

Table 9.--Field loading and storing baled hay: Percentage of acreage and man-hours per acre, by method of loading, farm production region, and size of farm, 48 States, 1967 ^{1/}

Item	Acreage of hay baled ^{2/}	Percentage of acreage by--				Man-hours per acre by--				
		Trailed wagon and chute	Bale thrower	From ground by hand	Other methods ^{3/}	Trailed wagon and chute	Bale thrower	From ground by hand	Other methods ^{3/}	All methods
	1,000 acres	-----Percent-----				-----Man-hours-----				
<u>Region</u>										
Northeast.....	6,518	32	41	24	3	1.83	1.33	1.99	1.70	1.66
Lake States.....	8,566	74	15	9	2	1.94	1.39	2.33	2.09	1.89
Corn Belt.....	9,435	56	11	29	4	1.79	1.26	2.03	1.46	1.79
Northern Plains....	10,367	31	7	27	35	1.09	.96	1.31	1.12	1.15
Appalachian.....	4,803	28	5	64	3	1.65	1.43	2.01	2.02	1.88
Southeast.....	1,265	24	7	62	7	1.83	1.59	2.20	1.80	2.04
Delta States.....	1,666	14	3	75	8	1.82	1.47	2.14	1.86	2.05
Southern Plains....	3,873	8	7	53	32	1.28	1.16	1.70	1.30	1.50
Mountain.....	6,735	9	3	28	60	1.57	1.37	1.94	1.07	1.37
Pacific.....	3,605	6	2	27	65	1.80	1.30	2.57	1.28	1.66
All regions.....	56,833	35	12	31	22	1.54	1.16	1.97	1.36	1.59
<u>Size of farm</u>										
Less than 100 acres:	3,865	43	6	45	6	1.70	1.38	2.16	1.72	1.88
100-179 acres.....	7,957	49	12	31	8	1.60	1.20	2.09	1.61	1.70
180-259 acres.....	7,502	50	14	28	8	1.57	1.15	2.04	1.47	1.64
260-499 acres.....	13,867	41	15	28	16	1.54	1.12	2.00	1.29	1.56
500-999 acres.....	10,230	29	17	29	25	1.50	1.12	1.91	1.28	1.50
1,000 acres and over:	13,412	16	7	32	45	1.40	1.11	1.90	1.20	1.44
48 States.....	56,833	35	12	31	22	1.54	1.16	1.97	1.36	1.59

^{1/} Totals may not agree with details because of rounding.

^{2/} Calculated from tonnage using average regional yield.

^{3/} Mainly bale wagons, bale accumulators, and bale loaders.

other than bale throwers, was much more extensive on large farms than on small ones. This indicates that a large haying operation is needed to justify use of expensive, specialized high-capacity equipment which saves labor.

Using bale throwers, an average of only 1.16 man-hours per acre were needed to load and store baled hay throughout the 48 States. This compares with 1.59 man-hours per acre for all field loading and storing of baled hay, and 1.97 man-hours per acre when loading from ground by hand. A trip over the field to pick up bales was eliminated when bale throwers were used, and this accounted for much of the reduction in labor. However, where bulk bale handling equipment was used extensively (Mountain and Pacific regions), only 1.07 and 1.28 man-hours of labor were used to load and store hay or position it for buyer pickup.

While the larger hay operations, as measured by size of farm, showed some advantages in reducing labor, the range was much less than among regions.

For most of the regions, slightly smaller crews were used with bale throwers than with any of the other field loading systems (table 10). But nationwide, the average was lowest for "other methods"--2.5 workers, compared with 2.9 for bale throwers. The number of workers used with the "other methods" was especially small in the Mountain and Pacific regions.

The labor cost per acre for field loading and storing baled hay was \$2.11 in 1967 (table 10). Regional variations in wage rates coupled with the extent of labor use resulted in a wide range in labor cost. For instance, in the Pacific region, the cost of loading hay by hand was \$4.11 compared with \$1.76 in the Northern Plains. For "other methods," with which 65 percent of the hay was field loaded in the Pacific region, the labor cost was \$2.05 per acre. More of the total cost was shifted to high-capacity mechanical bale handling equipment with this method. The average crew was 2.2 workers compared with 3.0 when loading by hand.

LABOR USE AND COST BY OPERATION

Considering labor use per acre by principal haying operations, baling took the least time and field loading and storing baled hay the most time--0.53 man-hour compared with 1.59 man-hours (table 11). There was relatively little difference in labor input for baling among sizes of farms. Smaller farms generally had older balers with less capacity than those on larger farms, but more custom baling was done on smaller farms. Balers used by custom operators usually have above-average capacity.

Use of large equipment to cut, condition, and rake hay is more evident in some regions and also on larger farms. In the Northern Plains, with an average of 0.59 man-hour per acre for these operations, large windrowers or swathers cover hay acreage rapidly. Conversely, in the Northeastern States, where there was a wide use of mowers and some conditioning of hay was done in a separate operation, 1.15 man-hours per acre were used.

Table 10.--Field loading and storing baled hay: Average number of workers per day and labor cost per acre, by method of loading, farm production region, and size of farm, 48 States, 1967 ^{1/}

Item	Method of loading and number of workers				Labor cost per acre by--				
	Trailed wagon and chute	Bale thrower	From ground by hand	Other methods ^{2/}	Trailed wagon and chute	Bale thrower	From ground by hand	Other methods ^{2/}	All methods
	-----Number-----				-----Dollars-----				
<u>Region</u>									
Northeast.....	2.9	2.7	2.8	2.8	2.62	1.90	2.85	2.43	2.37
Lake States.....	3.0	2.6	2.3	2.9	2.70	1.93	3.24	2.91	2.63
Corn Belt.....	3.0	2.6	2.3	2.9	2.42	1.70	2.74	1.97	2.42
Northern Plains.....	3.7	3.1	3.3	3.0	1.46	1.29	1.76	1.50	1.54
Appalachian.....	3.2	3.0	3.4	3.6	1.78	1.54	2.17	2.18	2.03
Southeast.....	3.9	3.6	3.6	3.7	1.88	1.64	2.27	1.85	2.10
Delta States.....	3.9	3.0	3.8	3.0	1.87	1.51	2.20	1.92	2.11
Southern Plains.....	3.0	3.0	3.2	3.0	1.46	1.32	1.94	1.48	1.71
Mountain.....	3.0	2.8	2.7	2.3	2.10	1.84	2.60	1.43	1.84
Pacific.....	3.2	2.5	3.0	2.2	2.88	2.08	4.11	2.05	2.66
All regions	3.2	2.9	3.1	2.5	2.05	1.54	2.62	1.81	2.11
<u>Size of farm</u>									
Less than 100 acres..	3.0	2.5	3.0	2.5	2.26	1.81	2.87	2.29	2.50
100-179 acres.....	3.1	2.7	3.1	2.5	2.13	1.60	2.78	2.14	2.26
180-259 acres.....	3.2	2.8	3.2	2.4	2.09	1.53	2.71	1.96	2.18
260-499 acres.....	3.4	2.9	3.1	2.5	2.05	1.49	2.66	1.72	2.08
500-999 acres.....	3.5	2.9	3.2	2.4	2.00	1.49	2.54	1.70	2.00
1,000 acres and over..	3.7	3.0	3.1	2.5	1.86	1.48	2.53	1.60	1.92
48 States.....	3.2	2.9	3.1	2.5	2.05	1.54	2.62	1.81	2.11

^{1/} Totals may not agree with details because of rounding.

^{2/} Mainly bale wagons, bale accumulators, and bale loaders.

Table 11.--Hay harvested and labor used: Total acreage of hay and man-hours per acre by designated operations, farm production region, and size of farm, 48 States, 1967

Item	Acreage of all hay	Operation				Total
		Cutting, conditioning, and raking	Baling	Loading and storing baled hay	Harvesting loose hay <u>1/</u>	
	<u>1,000 acres</u>	<u>Man-hours</u>				
<u>Region</u>						
Northeast.....	6,692	1.15	0.70	1.66	1.25	3.5
Lake States.....	9,142	1.08	.62	1.89	1.35	3.5
Corn Belt.....	9,757	1.01	.54	1.79	1.49	3.3
Northern Plains.....	15,348	.59	.38	1.15	.86	1.9
Appalachian.....	4,952	.97	.57	1.88	1.81	3.3
Southeast.....	1,313	1.00	.64	2.04	2.04	3.8
Delta States.....	1,711	1.05	.51	2.05	1.64	3.6
Southern Plains.....	3,946	.79	.47	1.50	1.12	2.7
Mountain.....	7,896	.74	.60	1.37	1.38	2.6
Pacific.....	3,910	.99	.57	1.66	1.40	3.1
All regions.....	64,667	.89	.53	1.59	1.05	2.9
<u>Size of farm</u>						
Less than 100 acres.....	4,092	1.18	.57	1.88	1.45	3.8
100-179 acres.....	8,599	1.13	.57	1.70	1.25	3.5
180-259 acres.....	8,093	1.07	.57	1.64	1.14	3.3
260-499 acres.....	15,134	.91	.53	1.56	1.09	2.9
500-999 acres.....	11,630	.81	.53	1.50	1.01	2.7
1,000 acres and over.....	17,119	.67	.51	1.44	1.00	2.3
48 States.....	64,667	.89	.53	1.59	1.05	2.9

1/ Cutting and conditioning excluded.

A wide range in use of labor to harvest loose hay existed among regions. In the Northern Plains, the 0.86 man-hour per acre reflected use of specialized bulk handling equipment. In the Southeast over 2 man-hours per acre were used. However, only a small proportion of the total loose hay was harvested in this region.

Labor costs per acre by principal hay harvesting operations are presented in table 12. Labor costs are estimated on the basis of average 1967 farm wage rates per hour without room and board. This is a rough approximation of the alternative use value of farm labor. It is recognized that this may differ considerably from the true value and the results must, therefore, be used with caution. While strides have been made in labor savings, further savings are possible, especially in preparation of the crop for curing, and in the loading and storing operation. Progress is being made by farmers through the use of larger cutting equipment, along with cutting and conditioning equipment which does both jobs with one pass over the field. Use of a windrower-conditioner holds down labor cost where use is feasible but is limited because of weather and in many cases by size of haying operation. Mechanical loading of baled hay will increase as labor becomes higher in cost and less available.

EXTENT OF CUSTOM AND EXCHANGE OPERATIONS

In 1967, farmers used custom and exchange services for harvesting hay to a moderate extent over most of the country (table 13). Baling was the most extensive custom operation--18 percent of the acreage. However, this represented a significant decline from earlier years in custom services for baling. While figures are not strictly comparable for earlier years, in 1951 over 60 percent of the hay baling was done by custom operators (table 14). At that time, fewer than 300,000 balers were on farms, as compared with about 780,000 available for the 1967 hay crop.

Custom and exchange operations in field loading and storing baled hay followed those for baling closely with 16 percent of the 1967 hay acreage covered (table 13). It is likely that many of the custom baler operators also provided services for field loading and storing hay.

Combination cutting-conditioning equipment has relatively high initial cost compared with conventional single operation machines. The use of custom services for these machines was generally important in the areas where windrower or swather-conditioners were used extensively. From 34 to 50 percent of the hay acreage was cut with these machines in the Southern Plains, Mountain, and Pacific regions (table 3). These areas all had a higher-than-average percentage of the acreage cut and conditioned with custom equipment.

Considering size of farm, generally the smaller farms used custom services to a greater extent than larger farms. But on farms with 1,000 acres or more a higher percentage of the acreage was handled with custom or exchange equipment than on some of the smaller farms. This was especially true for field loading and storing baled hay, indicating that some of the large-tonnage hay buyers supplied not only hauling equipment but also field loading equipment.

Table 12.--Hay harvested and labor cost: Total acreage of hay and labor cost per acre, by designated operations, farm production region, and size of farm, 48 States, 1967

Item	Acreage of all hay	Labor cost per acre ^{1/}				Total
		Cutting, conditioning, and raking	Baling	Loading and storing baled hay	Harvesting loose hay ^{2/}	
	<u>1,000 acres</u>	-----Dollars-----				
<u>Region</u>						
Northeast.....	6,692	1.64	1.00	2.37	1.79	5.00
Lake States.....	9,142	1.50	.86	2.63	1.88	4.87
Corn Belt.....	9,757	1.37	.73	2.40	2.01	4.46
Northern Plains.....	15,348	.79	.51	1.54	1.15	2.55
Appalachian.....	4,952	1.05	.62	2.03	1.95	3.56
Southeast.....	1,313	1.03	.66	2.20	2.10	3.91
Delta States.....	1,711	1.08	.53	2.14	1.69	3.71
Southern Plains.....	3,946	.90	.54	1.71	1.28	3.08
Mountain.....	7,896	.99	.80	1.84	1.85	3.48
Pacific.....	3,910	1.58	.91	2.65	2.25	4.96
All regions.....	64,667	1.18	.70	2.11	1.40	3.86
<u>Size of farm</u>						
Less than 100 acres.....	4,092	1.57	.76	2.50	1.92	5.05
100-179 acres.....	8,599	1.50	.76	2.26	1.66	4.66
180-259 acres.....	8,093	1.42	.76	2.18	1.52	4.39
260-499 acres.....	15,134	1.21	.70	2.08	1.45	3.86
500-999 acres.....	11,630	1.08	.70	2.00	1.36	3.59
1,000 acres and over.....	17,119	.89	.68	1.92	1.33	3.10
48 States.....	64,667	1.18	.70	2.11	1.40	3.86

^{1/} Calculated from man-hours per acre times the 1967 average wage rates shown in table 1.

^{2/} Cutting and conditioning excluded.

Table 13.--Hay harvesting with custom or exchange equipment: Percentage of acreage by principal operations, farm production region, and size of farm, 48 States, 1967

Item	Acreage	Percentage by operation		
		Cutting and conditioning <u>1/</u>	Baling	Field loading and storing of baled hay
	<u>1,000 acres</u>	<u>Percent</u>		
<u>Region</u>				
Northeast.....	6,692	4	5	3
Lake States.....	9,142	6	11	10
Corn Belt.....	9,757	9	23	20
Northern Plains.....	15,348	10	21	13
Appalachian.....	4,952	16	24	17
Southeast.....	1,313	14	18	16
Delta States.....	1,711	20	26	20
Southern Plains.....	3,946	29	32	40
Mountain.....	7,896	16	16	15
Pacific.....	3,910	18	24	33
All regions.....	64,667	12	18	16
<u>Size of farm</u>				
Less than 100 acres.....	4,092	21	33	22
100-179 acres.....	8,599	15	21	17
180-259 acres.....	8,093	11	17	15
260-499 acres.....	15,134	10	17	14
500-999 acres.....	11,630	9	15	13
1,000 acres and over.....	17,119	11	16	18
48 States.....	64,667	12	18	16

1/ Conditioning as a separate operation not included.

Table 14.--Hay baled: Total and percentage with custom or exchange equipment, by farm production region, 48 States, specified years

Region	Hay baled				Percentage with custom or exchange equipment			
	1951	1961	1964	1967	1951 ^{1/}	1961	1964	1967
	---Million tons---	---Million acres---	---Percent of tons---	---Percent of acres---				
Northeast.....	9.2	12.8	6.7	6.5	55	14	13	5
Lake States.....	9.7	16.5	8.1	8.6	73	24	20	11
Corn Belt.....	17.1	20.6	10.6	9.4	70	40	36	23
Northern Plains.....	8.2	10.6	9.4	10.4	59	38	27	21
Appalachian.....	4.9	7.5	5.0	4.8	69	50	39	24
Southeast.....	1.2	1.7	1.4	1.2	60	42	31	18
Delta States.....	1.7	2.3	1.8	1.7	64	52	38	26
Southern Plains.....	2.9	4.3	3.6	3.9	71	50	44	32
Mountain.....	5.3	11.0	6.3	6.7	45	24	18	16
Pacific.....	6.6	9.5	3.5	3.6	51	46	31	24
48 States.....	66.8	96.8	56.4	56.8	62	34	28	18

^{1/} Custom only.