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INTERSTATE CUSTOM COMBINING IN THE GREAT PLAINS IN 1971

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INTERSTATE CUSTOM COMBINING IN THE GREAT PLAINS IN 1971. By William F. Lagrone and Earle E. Gavett. Economic Research Service, U.S. Department of Agriculture. ERS-563.

ABSTRACT

Some 3,431 U.S. interstate custom combine crews harvested 14.1 million acres of crops on the Great Plains in 1971. Of the 35 percent of the wheat acreage custom harvested, U.S. interstate crews harvested 89 percent and Canadian crews harvested less than 4 percent. Chief competitors to the U.S. interstate cutters are U.S. intrastate custom operators harvesting neighbors' grain. Interstate combine crew sizes ranged from 1 to 12 combines but crews having 2 machines were most common. Twenty-foot headers were the most common size. Combines harvested an average 1,871 acres per machine. Supporting the combines were 12,209 trucks—usually 1 grain hauling truck per combine and 1 pickup truck per crew. Labor on the 3,431 crews totaled 16,414 workers.

Keywords: Custom combining, interstate custom combining, combines, grain hauling.

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The list of custom combine operators traveling interstate was compiled from temporary use permits obtained from: Roger Giedd, Senior Pro-Ration Officer, Truck Registry, North Dakota Highway Department, Bismarck, N. Dak.; Martha Winckler, South Dakota Department of Motor Vehicles, Pierre, S. Dak.; Marian Sexton, Combine Permits Section, Nebraska Department of Roads, Lincoln, Nebr.; and A. L. Tyree, Interstate Registration Division, Highway Commission of Kansas, Topeka, Kans.

We appreciate the input of the individual interstate custom combine operators who so kindly completed our questionnaires inquiring into various aspects of their business.

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SUMMARY

Custom operators harvested about 35 percent of the 1971 wheat acreage in the Great Plains. Of this share, U.S. interstate crews accounted for about 89 percent, U.S. intrastate crews over 7 percent, and Canadian crews less than 4 percent. The major competition to U.S. interstate custom operators was thus from U.S. intrastate operators cutting their neighbors' grain, not from Canadian crews.

The 3,431 U.S. crews who crossed State lines to custom combine small grain in the Great Plains harvested 14.1 million acres of crops in 1971. Over 75 percent of this (10.9 million acres) was wheat. Other custom combining included 1.3 million acres of grain sorghum, 173,000 acres of soybeans, and 732,000 acres of other crops.

Interstate custom crews came from as far away as California and Florida to harvest in the Great Plains. But, in terms of number of crews, number of combines, and acres harvested, operators residing in Kansas and Oklahoma accounted for about 60 percent of the total. Crews from these two States and Texas and North Dakota harvested more than a million acres each.

Operators harvested more acreage in their own State than in any other State, except for operators residing in Oklahoma, Wyoming, and "other States." Oklahoma operators harvested more grain in Kansas than in Oklahoma. Since Kansas had the greatest wheat acreage, it attracted custom operators from all Plains States. About 88 percent of all interstate combines harvested crops in Kansas.

About 91 percent of the operators reported they were also farmer-ranchers. About half earned 50 percent or more of their gross income from custom combining.

Custom combining is a longstanding profession—65 percent of the operators had 10 or more years of experience. Only 6 percent reported combining for less than 2 years.

Interstate combining is a way of lengthening the season to get maximum use of the highly specialized and expensive equipment. The harvesting season lasts 10 to 20 days in any one location, but custom combiners were able to extend it to an average of 114 days by moving across State lines. Some crews harvested crops nearly year-round, but the majority started about June 1 and terminated combining before November 1.

The U.S. interstate crews employed 16,414 workers operating 7,557 combines in 1971. There were two workers per combine—one operator and one truck driver to haul grain. The number of combines per crew ranged from 1 to 12. Two-combine crews were the most common, accounting for 43 percent of all crews and 38 percent of all acreage cut by interstate combiners.

Interstate operators kept combines an average of 4 years. Those harvesting less than 1,000 acres were kept an average of 4.8 years, while machines cutting over 2,000 acres were traded at 3.6 years. Over 84 percent of the operators reported full ownership of their combines, 8 percent reported a partnership, and 7 percent reported arrangements involving two or more operators.

Fifty-seven percent of the combines had 20-foot headers. The 18-footers were second in popularity.

Texas and North Dakota operators cut more than 2,000 acres per combine in 1971. Oklahoma crews cut the least—only 1,755 acres per combine. The average for all crews was 1,871 acres.

Trucks involved in the grain harvest in the Great Plains in 1971 numbered over 12,000. Some 84 percent of the grain haulers were 2-ton rigs and 10 percent were 2-1/2 ton trucks. Generally there was one grain truck per combine and one pickup truck per crew. Other equipment—such as rolling workshops, service trailers, housetrailer, and campers—accompanied the crews.

About two-thirds of the interstate crews were a mixture of hired and family labor. Family labor generally decreased as the size of the operation increased. The labor arrangement had a significant effect on the acreage harvested per combine. Family-only outfits harvested only 1,558 acres per combine, compared with 1,882 acres for mixed crews and 1,999 acres for all hired crews.

INTERSTATE CUSTOM COMBINING IN THE GREAT PLAINS IN 1971

By

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INTRODUCTION

The invention of the binder, header, and thresher opened up wheat growing in the Great Plains. Wheat was bound, shocked, and left until the threshing machine worked its way into the community. From 1860 to about 1940, most threshing machines were "custom machines" because few farmers could afford to own a thresher strictly for their own grain. Some machines were cooperatively owned and many others were owned by farmers who did custom threshing. Some threshing machines operated across State lines but the difficulty of moving the machines, even by railroad, made any major migration negligible. The seasonality of wheat harvest resulted in a force of migrant laborers who followed the harvest northward.

The first combines reduced labor requirements but they lacked mobility. Rubber tires, higher speed tractors, and lighter combines solved the mobility problem in the late 1930's but were not put to much use until World War II.

The "self-propelled" combines probably were the real key to successful combining. Additionally, the development of dual-tired, long wheelbase trucks readily provided transportation for combine headers and other heavy equipment. Another concomitant development was the house trailer, which added to the ease and comfort of migrating custom combining crews. The first major test of custom combining occurred during the labor and equipment shortages of World War II when the "Harvest Brigades" saved bumper crops in the United States and Canada.

The forecasts of custom combining's future after World War II varied from "custom harvesting must go" to "it's just the beginning." Perhaps it has reached a middle ground, considerably better than the pessimistic forecasts but not as rosy as the most optimistic ones. Little research has been done on custom combining and much of its history is unknown.¹

*William F. Lagrone is with the Commodity Economics Division (CED). Since the study was written, Earle E. Gavett has transferred from CED to the National Economic Analysis Division.

¹ Much of the above discussion is based on John L. Fischer, "Custom Wheat Harvesting in the Economy of Western Oklahoma." Unpublished M.S. Thesis, Oklahoma State University, Stillwater, 1947.

Because of the shortages of labor and harvesting equipment during World War II, the United States and Canada entered into a reciprocal arrangement permitting the movement of U.S. custom combine operators and their equipment into Canada and of Canadian operators and their equipment into the United States. This resulted from recommendations adopted on February 17, 1942, by the Joint Economic Committee of Canada and the United States and approved by President Roosevelt on April 10, 1942. The recommendations provided for action:

1. To permit used agricultural machines and their operators or normal crews to move across the border without payment of duty, with a minimum of restrictions, and with such regulations as either country may consider necessary to ensure that the machines or members of the crews return within a specified time; and
2. To facilitate the seasonal movement of farm labor across the common boundary under such rules and regulations as will further the efficient distribution of labor for peak requirements.

These recommendations were implemented through an annual exchange of letters between the United States and Canada until 1965, when the Canadian Government advised that an exchange of letters was not necessary for the exchange of workers on a reciprocal basis.²

Over the years this arrangement has been deemed beneficial to both countries. There have been recurring shortages of machines in the major grain-producing areas on both sides of the border, and the arrangement has made it possible to minimize grain losses and to achieve a more rational distribution of services over areas where grains mature at different times in the harvest season.

Since 1969, interstate custom combiners in the Great Plains States have expressed concern with the amount and nature of competition that they have been experiencing from Canadian crews. They say that costs of combines, fuel, repairs, labor, and lodging have been

²From an unclassified document by David Thompson, European/Canadian Desk, Department of State, Washington, D.C., September 24, 1970.

continually rising, while custom rates have remained constant because of the severe competition and price-cutting by Canadian custom crews. These concerns were brought to Congress and the Departments of Agriculture, Labor, and State.

The Economic Research Service (ERS) proposed a complete mail census of all U.S. and Canadian custom combine operators who operated across State lines in 1971. The objectives of the study were to: (1) determine the number of custom combine operators traveling interstate in the Great Plains, (2) determine the residence of these operators, (3) determine the number of units operated and the acreage harvested by size and residence of outfit, and (4) obtain some information on the operators, labor, and equipment involved.

A list of U.S. and Canadian interstate custom combining crews was developed from the records of temporary permits issued by the State Highway Departments in North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Montana, Wyoming, and Colorado. Since information on the 116 Canadian crews who harvested grain in the United States in 1971 proved unobtainable, only U.S. crews were contacted. This report presents data obtained in the ERS mail survey on the 3,431 U.S. crews who crossed State lines to custom combine small grains in the Great Plains in 1971.

INTERSTATE CUSTOM COMBINERS FACE LITTLE CANADIAN COMPETITION

Table 1 presents an overview of the 1971 Great Plains wheat harvest. Some 35 percent of the wheat acreage was cut by custom operators, largely U.S. operators. The 3,431 U.S. crews harvested over 14.1 million acres of grain, including 10.9 million acres of wheat. Intrastate custom combine operators—farmers who cut their neighbors' crops—harvested 922,000 acres of wheat, over twice as much as did Canadian crews. In addition, 32 U.S. custom combine crews using 86 combines harvested 40,600 acres of grains in Canada. The major competition facing U.S. interstate custom combine operators is thus from U.S. intrastate combine operators, not from Canadians.

OPERATORS IN TWO STATES HARVEST OVER HALF OF GREAT PLAINS CUSTOM CROPS

The 1971 interstate custom combine movement totaled 7,557 combines and distribution ranged from 1 to 12 combines per crew. Outfits with 2 combines

accounted for 43 percent of the crews and harvested 38 percent of the acreage cut by interstate combiners (table 2).³ Crews with 1 to 4 combines harvested approximately 90 percent of all acreage. The totals were about the same for individual crops. Wheat accounted for slightly more than three-fourths of all crops harvested by custom combiners and there were no significant differences by number of combines.

In number of crews, number of combines, and acreage of grains harvested, operators with residence in Kansas and Oklahoma accounted for nearly 60 percent of the Great Plains total custom combined grains in 1971 (table 3). Kansas operators combined more wheat, barley, grain sorghum, and "all other grains" (primarily corn) than did Oklahoma operators, while Oklahoma operators harvested more soybeans than did Kansas operators. Crews from Texas and North Dakota also harvested more than a million acres each of all crops. Nebraska, Colorado, and South Dakota operators each harvested between 500,000 and 999,000 acres of all crops. Of the Plains States, Wyoming had the smallest interstate custom combine force—eight crews harvested only 55,000 acres.

The large custom combine crews—those with six or more combines each—came from North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas (table 4). Although crews with two combines harvested more acreage than any other size group, the percentage by State varied from 28 percent in "other States" to 61 percent for Montana operators.

Interstate custom operators harvested more acres of crops in their own State than in any other State, except for operators residing in Oklahoma, Wyoming, and "other States" (table 5). Oklahoma operators depended the most on harvesting acreage outside their own State. They harvested more acres of crops in Kansas than in Oklahoma. They combined only 838,000 acres in Oklahoma compared with 3.1 million acres in other States. Wyoming operators harvested slightly more acres in Texas than in Wyoming. And operators residing in non-Great Plains States harvested more acres of crops in Kansas than in "other States."

In contrast, the States depending most on out-of-State custom combines were Colorado, North Dakota, and Nebraska. North Dakota operators harvested only slightly less acreage in total than was harvested in North Dakota by all interstate combiners.

The large wheat acreage in Kansas drew custom combine operators from all States having interstate combine crews. Operators from North Dakota, South

³ See appendix tables 1-5 for distribution of acres harvested by crop and by State of residence of operator.

Table 1—Number of areas and combines and estimated acres of wheat harvested by type of combine operator, 1971¹

Type of combine operator	Crews	Combines	Acres harvested	
			Number	Percent of total
	----- Number -----		1,000	Percent
Total all operators	N.A.	N.A.	34,945	100.0
Producer operators	N.A.	N.A.	33,720	65.0
Custom operators				
U.S. interstate	3,431	7,557	10,867	31.1
Canadian interstate ²	116	175	435	1.3
U.S. intrastate ³	N.A.	N.A.	922	2.6
Total custom	N.A.	N.A.	12,225	35.0

N.A. = Not available.

¹ For the States of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Montana, Wyoming, and Colorado.

² Based on acreage cut per combine in the United States by U.S. interstate combine operators who also harvested in Canada.

³ Estimated from secondary data in ERS.

Dakota, Montana, Nebraska, and Colorado harvested almost as many acres in Kansas as they did in their own States. Kansas played host to 6,638 combines in 1971, 88 percent of all interstate custom combines (table 6). More than 90 percent of the combines from North Dakota, South Dakota, Nebraska, and non-Great Plains States found their way to Kansas. More than 75 percent of combines from Oklahoma and Colorado went to Kansas.

Of the major grain-producing States, North Dakota and Texas—the north and south extremes—had the smallest proportion of custom combines working in their States, about 32 percent. Some combine operators residing in either Kansas, Oklahoma, or Texas harvested crops in each of the Great Plains States and in other States. Fifty percent of the North Dakota combines traveled as far south as Oklahoma, but only 23 percent of the Oklahoma combines made it to North Dakota. Yet, 53 percent of the Oklahoma combines were used to harvest crops in Nebraska.

MACHINERY VARIES WITH CREW SIZE

Sizes of combines and numbers of combines per crew varied widely. Grain trucks and pickups were necessary for custom operations, and many operators had specialized service vehicles. There was a considerable number of service and header trailers. Other important harvesting equipment included a few tractors and grain carts. Housetrainers, campers, and buses were important in housing crews during the combining campaign.

The 20-foot header bar is by far the most popular combine size, accounting for 57 percent of all combines,

and the 18-foot is the second most important. These two sizes accounted for 80 percent of all combines in 1971. Only 4 percent of the combines were larger than 20 feet while 16 percent were smaller than 18 feet. The few larger machines tended to be concentrated in crews with six or more combines per crew, but the smaller machines were more randomly distributed (table 7).

In the four States whose operators harvested a total of more than a million acres annually, Texas and Oklahoma operators used a larger proportion of combines with header bars 20 feet or more in width, while crews from Kansas and North Dakota had a greater proportion of combines of 18 feet or less (table 8). Colorado operators had relatively large combines comparable to those in Texas and Oklahoma, while South Dakota, Nebraska, and other States had smaller machines.

Operators residing in Wyoming, Montana, and New Mexico harvested the most acres per combine. Yet these crews cut relatively little acreage. Of States with operators harvesting major acreages, Texas and North Dakota operators cut more than 2,000 acres per combine. Oklahoma operators harvested the smallest acreage per combine, 1,755 acres.

There were 12,209 trucks supporting the activity of the 7,557 combines harvesting interstate. Of these, 65 percent were grain trucks (table 9). Eighty-four percent of the trucks used to haul grain were 2 tons and 10 percent were 2-1/2 tons. Although the one-combine crews had an average of 1.29 grain trucks per crew, there was generally one grain truck for each combine in the crew. Crews with three or fewer combines had about one pickup per crew. Crews with more than three combines averaged about 1.5 pickups per crew. Other service

Table 2—Interstate custom combining: Number of U.S. crews and combines and acres of different grains harvested by size of crew, Great Plains, 1971

Combines per crew	Acres harvested					Grain sorghum	All other	
	Crews	Combines	Total	Wheat	Barley, oats, and rye			Soybeans
----- Number ----- Acres -----								
1	961	961	1,616,052	1,183,809	119,432	10,940	171,461	130,410
2	1,466	2,932	5,410,629	4,197,091	387,605	64,464	504,094	257,375
3	610	1,830	3,489,957	2,685,242	269,298	43,727	315,338	176,352
4	264	1,056	2,178,470	1,666,217	175,842	30,255	206,956	99,200
5	64	320	647,282	503,250	41,070	8,800	79,202	14,960
6	38	228	416,962	318,988	20,100	7,600	47,052	23,222
7	10	70	141,000	121,100	5,300	0	8,100	6,500
8	12	96	150,880	112,200	12,400	1,400	5,300	19,580
9	0	0	0	0	0	0	0	0
10+	6	64	94,306	79,560	746	6,000	4,000	4,000
Total	3,431	7,557	14,145,538	10,867,457	1,031,793	173,186	1,341,503	731,599
Percent of total								
1	28.0	12.7	100.0	73.2	7.4	0.7	10.6	8.1
2	42.7	38.8	100.0	77.5	7.2	1.2	9.3	4.8
3	17.8	24.2	100.0	76.9	7.7	1.3	9.0	5.1
4	7.7	14.0	100.0	76.5	8.1	1.4	9.5	4.5
5	1.9	4.2	100.0	77.8	6.3	1.4	12.2	2.3
6	1.1	3.0	100.0	76.5	4.8	1.8	11.3	5.6
7	0.3	0.9	100.0	85.9	3.8	0.0	5.7	4.6
8	0.3	1.3	100.0	74.4	8.2	0.9	3.5	13.0
9	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0
10+	0.2	0.9	100.0	84.4	0.8	6.4	4.2	4.2

Table 3—Interstate custom combining: Number of U.S. crews and combines and acres of different grains harvested by State of residence of combine operator, Great Plains, 1971

State of residence	Acres harvested					All other		
	Crews	Combines	Total	Wheat	Barley, oats, and rye		Soybeans	Grain sorghum
-----Number-----								
North Dakota	232	550	1,156,511	899,297	142,313	3,835	35,899	75,167
South Dakota	137	316	563,831	394,431	78,532	5,157	24,853	60,858
Nebraska	191	429	759,397	538,856	54,087	1,557	69,982	94,915
Kansas	1,051	2,265	4,204,134	3,205,038	296,696	39,419	406,879	256,102
Oklahoma	1,062	2,235	3,923,308	3,175,999	244,710	54,312	355,738	92,549
Texas	350	785	1,641,405	1,179,602	90,711	12,906	322,288	35,898
Montana	52	111	273,240	236,272	21,193	795	8,583	6,397
Wyoming	8	22	54,930	40,387	2,185	457	4,768	7,133
Colorado	176	377	682,226	549,405	28,474	6,428	54,164	43,755
New Mexico	24	74	175,416	114,150	12,513	218	45,356	3,179
Other States	148	393	711,140	534,020	60,379	48,102	12,993	55,646
Total	3,431	7,557	14,145,538	10,867,457	1,031,793	173,186	1,341,503	731,599
Percent of total								
North Dakota	6.8	7.3	100.0	77.8	12.3	0.3	3.1	6.5
South Dakota	4.0	4.2	100.0	70.0	13.9	0.9	4.4	10.8
Nebraska	5.6	5.6	100.0	71.0	7.1	0.2	9.2	12.5
Kansas	30.6	30.0	100.0	76.2	7.1	0.9	9.7	6.1
Oklahoma	31.0	29.6	100.0	80.9	6.2	1.4	9.1	2.4
Texas	10.2	10.4	100.0	71.9	5.5	0.8	19.6	2.2
Montana	1.5	1.5	100.0	86.5	7.8	0.3	3.1	2.3
Wyoming	0.2	0.3	100.0	73.5	4.0	0.8	8.7	13.0
Colorado	5.1	5.0	100.0	80.5	4.2	1.0	7.9	6.4
New Mexico	0.7	0.9	100.0	65.1	7.1	0.1	25.9	1.8
Other States	4.3	5.2	100.0	75.1	8.5	6.8	1.8	7.8
				76.8	7.3	1.2	95	5.2

Table 4—Interstate custom combining: Number of total acres harvested by size of crew and State of residence of combine operator, Great Plains, 1971

State of residence	Total	Combines per crew									
		1	2	3	4	5	6	7	8	9	10+
Acres											
North Dakota	1,156,511	127,870	347,033	335,965	211,637	32,284	46,490	0	55,232	0	0
South Dakota	563,831	61,001	269,386	130,044	72,211	0	0	17,284	13,905	0	0
Nebraska	759,397	66,342	313,492	207,466	39,195	15,893	61,087	55,922	0	0	0
Kansas	4,204,134	506,008	1,638,186	1,112,089	741,101	82,801	81,053	0	35,639	0	7,257
Oklahoma	3,923,308	501,726	1,545,647	795,243	669,265	160,120	156,943	31,786	0	0	62,578
Texas	1,641,405	190,847	598,254	386,416	256,121	166,201	43,566	0	0	0	0
Montana	273,240	22,578	167,524	23,243	54,531	5,364	0	0	0	0	0
Wyoming	54,930	0	17,490	37,440	0	0	0	0	0	0	0
Colorado	682,226	91,581	255,687	202,128	32,805	100,025	0	0	0	0	0
New Mexico	175,416	0	62,677	14,502	48,075	50,162	0	0	0	0	0
Other States	711,140	48,099	195,253	245,421	53,529	34,432	27,823	36,008	46,104	0	24,471
Total	14,145,538	1,616,052	5,410,629	3,489,957	2,178,470	647,282	416,962	141,000	150,880	0	94,306
Percent of total											
North Dakota	100.0	11.1	30.0	29.0	18.3	2.8	4.0	0.0	4.8	0.0	0.0
South Dakota	100.0	10.8	47.8	23.0	12.8	0.0	0.0	3.1	2.5	0.0	0.0
Nebraska	100.0	8.7	41.3	27.3	5.2	2.1	8.0	7.4	0.0	0.0	0.0
Kansas	100.0	12.0	39.0	26.5	17.6	2.0	1.9	0.0	0.8	0.0	0.2
Oklahoma	100.0	12.8	39.4	20.3	17.0	4.1	4.0	0.8	0.0	0.0	1.6
Texas	100.0	11.6	36.5	23.5	15.6	10.1	2.7	0.0	0.0	0.0	0.0
Montana	100.0	8.3	61.3	8.5	20.0	1.9	0.0	0.0	0.0	0.0	0.0
Wyoming	100.0	0.0	31.8	68.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Colorado	100.0	13.4	37.5	29.6	4.8	14.7	0.0	0.0	0.0	0.0	0.0
New Mexico	100.0	0.0	35.7	8.3	27.4	28.6	0.0	0.0	0.0	0.0	0.0
Other States	100.0	6.8	27.5	34.5	7.5	4.8	3.9	5.1	6.5	0.0	3.4
Total	100.0	11.4	38.2	24.7	15.4	4.6	2.9	1.0	1.1	0.0	0.7

Table 5—Interstate custom combining: Number of total acres harvested by State of residence
of combine operator and State of harvest, Great Plains, 1971

State of residence	State of harvest											
	Total	North Dakota	South Dakota	Nebraska	Kansas	Oklahoma	Texas	Montana	Wyoming	Colorado	New Mexico	Other States
	Acres											
North Dakota	1,156,511	357,401	204,216	117,213	341,145	86,258	11,849	0	3,576	21,504	0	13,349
South Dakota	563,831	61,244	225,714	35,419	136,719	54,082	19,885	12,277	1,291	15,594	0	1,606
Nebraska	759,397	59,996	86,919	244,385	194,820	73,685	32,589	31,009	2,463	29,408	0	4,123
Kansas	4,204,134	339,085	453,579	424,375	1,696,465	489,839	145,757	297,617	13,935	301,592	6,326	35,564
Oklahoma	3,923,308	227,460	247,700	392,109	959,936	837,627	405,704	223,077	87,932	456,293	6,952	78,518
Texas	1,641,405	28,694	97,266	92,296	216,882	56,408	719,023	55,278	16,388	319,975	10,826	28,369
Montana	273,240	12,415	13,011	13,979	73,450	19,964	19,727	105,796	0	14,898	0	0
Wyoming	54,930	0	0	1,172	10,266	2,383	17,907	0	17,481	5,721	0	0
Colorado	682,226	24,137	15,611	36,970	144,927	82,844	50,401	13,198	14,203	297,114	0	2,821
New Mexico	175,416	1,986	12,912	3,774	8,939	7,648	38,193	10,806	7,866	36,073	47,219	0
Other States	711,140	103,005	50,546	74,324	183,322	82,014	32,256	33,790	6,158	27,795	0	117,930
Total	4,145,538	1,215,423	1,407,474	1,436,016	3,966,871	1,792,752	1,493,291	782,848	171,293	1,525,967	71,323	282,280
	Percent of total											
North Dakota	100	30.9	17.7	10.1	29.5	7.5	1.0	0.0	0.3	1.8	0.0	1.2
South Dakota	100	10.9	40.0	6.3	24.2	9.6	3.5	2.2	0.2	2.8	0.0	0.3
Nebraska	100	7.9	11.5	32.2	25.6	9.7	4.3	4.1	0.3	3.9	0.0	0.5
Kansas	100	8.1	10.8	10.1	40.3	11.6	3.5	7.1	0.3	7.2	0.2	0.8
Oklahoma	100	5.8	6.3	10.0	24.5	21.4	10.3	5.7	2.2	11.6	0.2	2.0
Texas	100	1.8	5.9	5.6	13.2	3.4	43.8	3.4	1.0	19.5	0.7	1.7
Montana	100	4.5	4.8	5.1	26.9	7.3	7.2	38.7	0.0	5.5	0.0	0.0
Wyoming	100	0.0	0.0	2.1	18.7	4.4	32.6	0.0	31.8	10.4	0.0	0.0
Colorado	100	3.5	2.3	5.4	21.3	12.1	7.4	1.9	2.1	43.6	0.0	0.4
New Mexico	100	1.1	7.4	2.1	5.1	4.4	21.8	6.2	4.5	20.5	26.9	0.0
Other States	100	14.5	7.1	10.4	25.8	11.5	4.5	4.8	0.9	3.9	0.0	16.6
Total	100	8.6	9.9	10.2	28.0	12.7	10.6	5.5	1.2	10.8	0.5	2.0

Table 6--Interstate custom combining: Number of U.S. combines by State of harvest and State of residence of combine operator, Great Plains, 1971

State of residence	State of harvest											Total
	N. Dak.	S. Dak.	Nebr.	Kans.	Okla.	Tex.	Mont.	Wyo.	Colo.	N. Mex.	Other States	
	Number											
N. Dak.	495	423	349	525	275	42	0	11	74	0	40	550
S. Dak.	149	307	134	289	202	36	13	4	36	0	18	316
Nebr.	138	189	402	402	253	71	33	15	75	0	8	429
Kans.	758	978	1,283	2,219	1,648	442	369	57	769	17	72	2,265
Okla.	511	488	1,182	1,915	1,993	802	301	248	1,054	23	130	2,235
Tex.	69	168	266	465	174	756	71	56	509	33	44	785
Mont.	27	33	51	111	58	33	103	0	31	0	0	111
Wyo.	0	0	12	18	12	10	0	22	16	0	0	22
Colo.	58	31	101	292	267	95	27	29	356	0	6	377
N. Mex.	4	22	20	30	18	66	22	26	62	66	0	74
Other States	182	115	245	372	295	88	50	15	82	0	196	393
Total	2,391	2,754	4,045	6,638	5,195	2,441	989	483	3,064	139	514	7,557

Table 7—Interstate custom combining: Number of U.S. combines by size of combine and size of crew. Great Plains, 1971

Combines per crew	Total combines	Size of combine						Acres harvested per combine	
		<14 feet	14 feet	16 feet	18 feet	20 feet	22 feet		24 feet
.....Number.....									
1	961	6	89	65	282	479	28	12	1,681
2	2,932	16	246	230	685	1,650	81	24	1,845
3	1,830	0	120	172	464	1,004	44	26	1,907
4	1,056	2	68	45	214	689	24	14	2,062
5	320	2	12	22	32	242	0	10	2,022
6	228	0	30	10	16	138	22	12	1,828
7	70	0	8	0	0	62	0	0	2,014
8	96	0	0	40	20	36	0	0	1,571
9	0	0	0	0	0	0	0	0	0
10+	64	0	0	0	8	32	0	24	1,473
Total	7,557	26	573	584	1,721	4,332	199	122	1,871

Percent of total								
1	100	0.6	9.3	6.8	29.3	49.8	2.9	1.3
2	100	0.5	8.4	7.8	23.4	56.3	2.8	0.8
3	100	0.0	6.6	9.4	25.3	54.9	2.4	1.4
4	100	0.2	6.4	4.3	20.3	65.2	2.3	1.3
5	100	0.6	3.8	6.9	10.0	75.6	0.0	3.1
6	100	0.0	13.2	4.4	7.0	60.5	9.6	5.3
7	100	0.0	11.4	0.0	0.0	88.6	0.0	0.0
8	100	0.0	0.0	41.7	20.8	37.5	0.0	0.0
9	100	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10+	100	0.0	0.0	0.0	12.5	50.0	0.0	37.5
Total	100	0.4	7.6	7.7	22.8	57.3	2.6	1.6

Table 8—Interstate custom combining: Number of U.S. combines by size and acres harvested per combine, by State of residence of combine operator, Great Plains, 1971

State of residence	Total combines	Size of combine						Acres harvested per combine		
		<14 feet	14 feet	16 feet	18 feet	20 feet	22 feet	24 feet	Acres	
		Number								
North Dakota	550	2	61	36	159	266	22	4	2,040	
South Dakota	316	4	40	52	75	129	16	0	1,784	
Nebraska	429	4	89	22	85	207	18	4	1,770	
Kansas	2,265	10	171	185	654	1,116	75	54	1,856	
Oklahoma	2,235	2	79	109	511	1,484	20	30	1,755	
Texas	785	2	62	81	48	540	28	24	2,091	
Montana	111	0	16	2	10	75	8	0	2,461	
Wyoming	22	0	2	0	8	10	2	0	2,496	
Colorado	377	0	30	24	79	242	2	0	1,809	
New Mexico	74	0	0	12	4	56	0	2	2,370	
Other States	393	2	23	61	88	207	8	4	1,809	
Total	7,557	26	573	584	1,721	4,332	199	122	1,871	
Percent of total										
North Dakota	100	0.4	11.1	6.5	28.9	48.4	4.0	0.7		
South Dakota	100	1.3	12.7	16.5	23.7	40.8	5.0	0.0		
Nebraska	100	0.9	20.8	5.1	19.8	48.3	4.2	0.9		
Kansas	100	0.4	7.5	8.2	28.9	49.3	3.3	2.4		
Oklahoma	100	0.1	3.5	4.9	22.9	66.4	0.9	1.3		
Texas	100	0.2	7.9	10.3	6.1	68.8	3.6	3.1		
Montana	100	0.0	14.4	1.8	9.0	67.6	7.2	0.0		
Wyoming	100	0.0	9.1	0.0	36.4	45.4	9.1	0.0		
Colorado	100	0.0	8.0	6.4	20.9	64.2	0.5	0.0		
New Mexico	100	0.0	0.0	16.2	5.4	75.7	0.0	2.7		
Other States	100	0.5	5.9	15.5	22.4	52.7	2.0	1.0		
Total	100	0.4	7.6	7.7	22.8	57.3	2.6	1.6		

Table 9—Interstate custom combining: Number and size of trucks by type and size of crew, Great Plains, 1971

Combines per crew	Crews	Total grain trucks	Size of grain trucks				Service trucks	Pickup trucks
			< 2 tons	2 Tons	2.5 Tons	3+ Tons		
Number								
1	961	1,242	61	1,052	84	45	54	801
2	1,466	3,095	101	2,607	303	84	276	1,400
3	610	1,824	66	1,543	129	86	219	677
4	264	1,053	8	855	157	33	118	401
5	64	320	14	270	22	14	46	103
6	38	234	0	172	46	16	34	60
7	10	68	0	56	0	12	10	22
8	12	71	5	54	0	12	2	30
9	0	0	0	0	0	0	0	0
10+	6	39	15	2	22	0	2	8
Total	3,431	7,946	270	6,611	763	302	761	3,502
Average number per crew								
1		1.29	0.06	1.09	0.09	0.05	0.06	0.83
2		2.11	.07	1.78	.21	.06	.26	.96
3		2.99	.11	2.53	.21	.14	.36	1.11
4		3.99	.03	3.24	.60	.13	.45	1.52
5		5.00	.22	4.22	.34	.22	.72	1.61
6		6.16	--	4.53	1.21	.42	.90	1.58
7		6.80	--	5.60	--	1.20	1.00	2.20
8		5.92	.42	4.50	--	1.00	.17	2.50
9		--	--	--	--	--	--	--
10+		6.50	2.50	.33	3.67	--	.33	1.33
Total		2.32	.08	1.93	.22	.09	.22	1.02

vehicles such as rolling workshops increased in importance as the number of combines per crew increased, with an average of 0.22 vehicle for all crews.

The custom combiners used 2,092 service trailers (table 10). Of the service trailers identified by length, 57 percent were 19 or more feet long and 22 percent were less than 14 feet in length. There was 0.6 trailer per crew but only 0.3 trailer per combine. A good many operators hauled headers by angling them on grain trucks.

Counting the number of campers, buses, and house-trailers, there was 0.9 housing vehicle per crew (table 11). However, the number of housing vehicles per crew varied significantly by size of crew, from about 0.4 for the one-combine crews to 2.8 for the eight-combine crews. Both the two-combine and three-combine crews had about one housing vehicle per crew. A majority of the housing vehicles slept five or more people and the next most important group had room for three or four people. Only about 10 percent of the housing vehicles were for one or two people. Housing vehicles were used more often by operators from States traveling longer-than-average distances in the custom combine campaign (table 12).

MOST OPERATORS HAVE AT LEAST 10 YEARS OF EXPERIENCE

Interstate custom combining is a long-established profession—65 percent of the operators had 10 or more years of experience combining across State lines (table 13). Twenty-five percent of custom combine operators reported 10-14 years of experience and 24 percent reported 20-29 years of experience. An additional 29 percent had between 3 and 10 years of experience. The relative stability of custom combining operations was indicated by the fact that only 6 percent of the operators were combining across State lines for the first or second time. As expected, the one-combine group of operators reported the least experience. Years of experience increased as the number of combines per crew increased.

Texas custom combine operators had the most experience in operating across State lines, followed by Nebraska and Oklahoma operators. Of the major States, North Dakota operators had the fewest years of experience in interstate combining.

In the farm-related business of custom combining, about 91 percent of the operators reported that they were also farmer-ranchers (table 14). For all operators, there was almost an even split between operators reporting 50 percent or more of gross income from custom combining and those reporting less than 50

percent of gross income from custom combining operations. Apart from farming-ranching, specific occupations were of little importance with the largest number in the "all other" category. About 2 percent of the operators had school teaching as their principal occupation. Occupations other than farming-ranching were concentrated in the one-to-three combine groups.

Fewer than a third of the one-combine operations provided the operator with 50 percent or more of his income. As size of outfit increased, the proportion of income from custom combining increased. More than 80 percent of the operators with five combines per crew derived most of their income from custom combining.

INTERSTATE COMBINING LENGTHENS THE HARVEST SEASON

Interstate custom combining is a way of lengthening the season for highly specialized and expensive equipment. Instead of 3-4 weeks of work on the same farm, the interstate operator pieces together a long season of work by moving with the harvest. About one-third of the custom combine operators began operations between May 1 and May 31 and about two-thirds began on June 1 or later (table 15). Although there was considerable variation in ending dates, 45 percent of the operators continued operations after November 1, an indication that grain sorghum or corn was harvested. Only 16 percent ended harvest before August 1, while 23 percent ended harvest between August 1 and August 31. The beginning date was earlier and the ending date of harvest was later as number of combines per crew increased.

As expected, Texas custom combine operators had average earlier starting dates than did operators from other States, with 54 percent beginning before June (table 16). In Kansas and Nebraska, 37 and 30 percent, respectively, of the operators began harvesting before June 1. Only 21 percent of the South Dakota, Colorado, and North Dakota operators began harvesting before June 1.

Sixty-four percent of the Texas and 53 percent of the Colorado operators harvested after November 1. A majority of operators in New Mexico, Wyoming, and Montana also ended harvesting after November 1. In contrast, only 34 percent of the North Dakota and 38 percent of the Oklahoma operators harvested after November 1. Most North Dakota operators terminate combining before November 1 because late fall crops are not readily available there. It is not known why most Oklahoma operators terminate combining prior to November 1, since large acreages of grain sorghums are produced in Oklahoma and adjacent States and offer work throughout the winter.

Table 10—Interstate custom combining: Number and size of service trailers and number of tractors, motorcycles, and grain carts by size of crew, Great Plains, 1971

Combines per crew	Crews	Total service trailers	Size of service trailers					Tractors	Motor- cycles	Grain carts	
			<14 feet	15-16 feet	17-18 feet	19-20 feet	21+ feet				Unspecified
Number											
1	961	307	45	28	36	75	50	73	50	28	0
2	1,466	852	110	45	69	135	179	314	101	59	2
3	610	479	89	24	22	101	62	181	85	34	2
4	264	274	30	14	26	66	59	79	28	20	4
5	64	98	4	14	0	20	24	36	18	0	4
6	38	40	2	2	0	14	4	18	6	2	0
7	10	14	0	0	14	0	0	0	0	0	0
8	12	12	8	0	0	0	0	4	4	0	0
9	0	0	0	0	0	0	0	0	0	0	0
10+	6	16	16	0	0	0	0	0	0	6	0
Total	3,431	2,092	304	127	167	411	378	705	292	149	12
Average number per crew											
1		0.32	0.05	0.03	0.04	0.08	0.05	0.08	0.05	0.03	—
2		.58	.08	.03	.05	.09	.12	.21	.07	.04	1
3		.79	.15	.04	.04	.17	.10	.30	.14	.06	1
4		1.04	.11	.05	.10	.25	.22	.30	.11	.08	.02
5		1.53	.06	.22	—	.31	.38	.56	.28	—	.06
6		1.05	.05	.05	—	.37	.11	.47	.16	.05	—
7		1.40	—	—	1.40	—	—	—	—	—	—
8		1.00	.67	—	—	—	—	.33	.33	—	—
9		—	—	—	—	—	—	—	—	—	—
10+		2.67	2.67	—	—	—	—	—	—	1.00	—
Total		.61	.09	.04	.05	.12	.11	.21	.09	.04	1

1 Less than one-half percent.

Table 11--Interstate custom combining: Number of campers and buses and housetrailers
by size of crew, Great Plains, 1971

Combines per crew	Crews	Total campers & buses	Size of campers and buses			Total house- trailers	Size of housetrailers			Total housing vehicles
			<3 people	3-4 people	5+ people		<3 people	3-4 people	5+ people	
Number										
1	961	99	29	47	23	312	60	155	97	411
2	1,466	330	37	210	83	965	107	431	427	1,295
3	610	191	14	49	128	515	38	121	356	706
4	264	107	4	12	91	315	6	74	235	422
5	64	26	2	4	20	81	4	8	69	107
6	38	26	0	0	26	64	2	10	52	90
7	10	4	0	0	4	12	2	2	8	16
8	12	10	2	0	8	24	2	0	22	34
9	0	0	0	0	0	0	0	0	0	0
10+	6	0	0	0	0	8	0	0	8	8
Total	3,431	793	88	322	383	2,296	221	801	1,274	3,089
Average number per crew										
2		0.10	0.03	0.05	0.02	0.33	0.06	0.16	0.10	0.43
3		.23	.03	.14	.06	.66	.07	.29	.29	.88
4		.31	.02	.08	.21	.84	.06	.20	.58	1.16
5		.41	.02	.05	.35	1.19	.02	.28	.89	1.60
6		.41	.31	.06	.31	1.27	.06	.13	1.08	1.67
7		.68	--	--	.68	1.68	.05	.26	1.37	2.37
8		.40	--	--	.40	1.20	.20	.20	.80	1.60
9		.83	.17	--	.67	2.00	.17	--	1.83	2.83
10+		--	--	--	--	--	--	--	--	0
Total		.23	.03	.09	.11	.67	.06	.23	.37	.90

Table 12--Interstate custom combining: Number of campers and buses and housetrailers
by State of residence of combine operator, Great Plains, 1971

State of residence	Crews	Total campers & buses	Size of campers and buses			Total house- trailers	Size of housetrailers			Total housing vehicles	Average per crew
			<3 people	3-4 people	5+ people		<3 people	3-4 people	5+ people		
Number											
North Dakota	232	69	9	20	40	165	24	50	91	234	1.00
South Dakota	137	20	0	4	16	83	2	45	36	103	.75
Nebraska	191	38	4	20	14	85	10	28	47	123	.64
Kansas	1,051	231	16	112	103	665	71	205	389	896	.85
Oklahoma	1,062	254	37	82	135	769	60	298	411	1,023	.96
Texas	350	62	6	34	22	254	27	72	155	316	.90
Montana	52	14	0	10	4	32	2	14	16	46	.88
Wyoming	8	6	0	2	4	4	0	4	0	10	1.25
Colorado	176	40	8	14	18	105	10	39	56	145	.82
New Mexico	24	12	0	6	6	24	4	2	18	36	1.50
Other States	148	47	8	18	21	110	11	44	55	157	1.06
Total	3,431	793	88	322	383	2,296	221	801	1,274	3,089	.90

Table 13—Interstate custom combining: Number of custom combine operators reporting number of years of operations across State lines by size of crew and State of residence of combine operator, Great Plains, 1971

Item	Years operating across State lines						Total
	1-2	3-5	6-7	10-14	15-19	20-29	30+
<i>Number</i>							
Combines per crew							
1	108	251	97	243	100	135	27
2	65	231	209	360	216	340	45
3	19	72	78	159	86	179	17
4	4	9	24	64	34	100	29
5	4	2	4	15	11	26	2
6	0	0	2	8	8	18	2
7	0	0	2	2	0	4	2
8	0	2	0	4	0	4	2
9	0	0	0	0	0	0	0
10+	0	0	2	0	0	4	0
Total	200	567	418	855	455	810	126
State of residence							
North Dakota	26	66	42	54	16	28	0
South Dakota	2	28	28	36	14	27	2
Nebraska	12	23	21	45	26	58	6
Kansas	73	172	141	222	140	229	74
Oklahoma	47	164	104	299	162	257	29
Texas	14	37	27	83	58	121	10
Montana	4	6	8	17	13	2	2
Wyoming	0	2	0	6	0	0	0
Colorado	10	29	19	55	12	49	2
New Mexico	0	2	4	6	2	10	0
Other States	12	38	24	32	12	29	1
Total	200	567	418	855	455	810	126
							3,431

Table 14—Interstate custom combining: Number of custom combine operators reporting occupations relative to percent of income from custom combining by size of crew, Great Plains, 1971

Combines per operator	Operators	Operators with 50 percent or more of gross income from custom combining	Occupations with less than 50 percent of gross income from custom combining									
			Total	Farming- ranching	Equipment dealer	Trucking	Garage, service station	Teaching	Other			
			Number	Percent	Number	Percent	Number					
1	961	276	28.7	685	71.3	553		10	9	7	40	66
2	1,466	780	53.2	686	46.8	561		0	17	5	22	81
3	610	398	65.2	212	34.8	159		14	4	0	13	22
4	264	188	71.2	76	28.8	62		5	6	3	0	0
5	64	52	81.2	12	18.8	6		4	2	0	0	0
6	38	26	68.4	12	31.6	12		0	0	0	0	0
7	10	0	0.0	10	100.0	10		0	0	0	0	0
8	12	8	66.7	4	33.3	4		0	0	0	0	0
9	0	0	--	0	--	0		0	0	0	0	0
10+	6	0	0.0	6	100.0	4		0	0	0	0	2
Total	3,431	1,728	50.3	1,703	49.6	1,371		33	38	15	75	171

Table 15—Interstate custom combining: Number of crews starting and ending harvest on various dates by size of crew.
Great Plains, 1971

Combines per crew	Crews	Starting date		Ending date				
		May 1 - May 31 ¹	June 1 or later	May 1 - July 31	Aug. 1 - Aug. 31	Sept. 1 - Sept. 30	Oct. 1 - Oct. 31	Nov. 1 - Feb. 28
		<i>Number</i>						
1	961	208	753	251	270	89	70	281
2	1,466	479	987	211	327	164	98	666
3	610	258	352	68	130	50	45	317
4	264	126	138	10	43	17	21	173
5	64	40	24	4	14	4	4	38
6	38	26	12	0	2	2	0	34
7	10	10	0	2	0	0	2	6
8	12	4	8	0	0	0	2	10
9	0	0	0	0	0	0	0	0
10+	6	6	0	0	4	0	0	2
Total	3,431	1,157	2,274	546	790	326	242	1,527

¹ One operator in North Dakota reported a starting date before May 1, included in May total.

Table 16 - Interstate custom combining: Number of crews starting and ending harvest on various dates by State of residence of combine operator, Great Plains, 1971

State of residence	Crews	Starting date		Ending date				
		May 1 - May 31	June 1 - Feb. 28	May 1 - July 31	Aug. 1 - Aug. 31	Sept. 1 - Sept. 30	Oct. 1 - Oct. 31	Nov. 1 - Feb. 28
Number								
N. Dak.	232	51 ¹	181	15	51	35	53	78
S. Dak.	137	28	109	10	12	33	18	64
Nebr.	191	57	134	27	47	13	14	90
Kans.	1,051	391	660	158	265	109	64	455
Okla.	1,062	312	750	241	301	75	42	403
Tex.	350	190	160	43	53	12	16	226
Mont.	52	14	38	0	6	6	14	26
Wyo.	8	0	8	0	0	2	0	6
Colo.	176	36	140	39	28	14	2	93
N. Mex.	24	14	10	0	2	2	0	20
Other States	148	64	84	13	25	25	19	66
Total	3,431	1,157	2,274	546	790	326	242	1,527

¹ One operator in North Dakota reported starting date before May 1, included in May total.

The average length of the custom combining season is 114 days, ranging from 89 days for one-combine crews to 178 days for the six-combine group (table 17). Crews harvesting less than 1,000 acres per combine averaged 38 days compared with 132 days in length for crews harvesting 2,000 acres or more per combine.

The harvest season averaged 144 days for crews from Texas, compared with 114 days for North Dakota crews (table 18). Oklahoma operators averaged only 32 days for crews harvesting less than 1,000 acres per combine compared with 167 days for New Mexico operators harvesting more than 2,000 acres per combine.

YEARS OF MACHINE USE AND OWNERSHIP ARRANGEMENTS VARY

Interstate combine operators use their machines on many more acres than does the average farmer. The length of time they operate the same combine is largely a function of acres harvested. Operators harvesting 2,000 acres or more in 1971 kept their combines an average of 3.6 years compared with 4.8 years for those harvesting less than 1,000 acres per year (table 19). Most interstate operators reported that they operated the same combine about 4 years. In general, the length of time decreased as the number of combines per crew increased, from 4.0 years for 1-combine crews to 1.3 years for 10-combine crews. Colorado and Oklahoma operators operated their combines for the longest average time—this is mainly a function of the small acreage harvested per machine. Of the major Great Plains grain States, operators from North Dakota kept their combines the shortest length of time, 3.1 years.

While several farmers may band together into a custom combine crew, such an arrangement is not typical (table 20). Over 84 percent of the custom combine operators reported full ownership of their equipment, about 8 percent reported partnerships, and about 7 percent reported arrangements involving two or more operators. Only a very few leased or managed equipment for others. Partnerships and arrangements between two or more operators are more important in the larger size groups, beginning with the three-combine size group.

CREWS INCLUDE FAMILY AND HIRED LABOR

Interstate custom combining is a full-service operation, providing the farmer with combines, grain hauling trucks, and operating crew all at one time for a fee. The labor that travels interstate is a major element in the custom combining service. In total, some 16,414 workers were employed in the operation of 3,431 interstate combine outfits in 1971. They harvested over 14 million acres, an average of 862 acres per worker. Regardless of size of operation, there were about two workers per combine—one for operating the combine, the other for operating the truck to haul grain.

While family groups are frequently depicted as the major interstate custom combine crews, most operations were a mixture of both family and hired workers. Slightly more than two-thirds of all crews included family and hired labor. Crews consisting of hired labor only and family labor only each accounted for about 16 percent of all crews (table 21). In general, family labor decreased as size of operation increased. Seemingly, there was no distinct pattern for hired labor only.

The labor arrangement had a significant effect on the acreage harvested per combine. Family-only outfits harvested only 1,558 acres per combine, compared with 1,892 acres for mixed crews and 1,999 acres for all hired crews (table 22). North Dakota was the only State in which crews with family-only operators harvested more acres per combine than the other two labor groups. Of the other major States, Kansas and Texas operators combined the largest acreage per combine with hired labor only. Oklahoma, Nebraska, Colorado, and South Dakota operators harvested the largest acreage with both family and hired labor.

It appears that four- or five-combine outfits are the optimum size as measured by acres harvested per combine (table 22). The logistics involved in locating jobs and moving crews appear to hamper large outfits. For instance, those having eight or more combines averaged fewer acres per machine than any other crew size.

The number of workers by major occupation—combine operator, grain hauler, and other labor—is presented by type of crew in tables 23-25.

Table 17—Interstate custom combining: Average length of custom combine campaign by acreage harvested per combine and size of crew, Great Plains, 1971

Combines per crew	Acres harvested per combine				Total
	<1,000	1,000-1,499	1,500-1,999	2,000+	
	Days				
1	40	70	101	131	89
2	34	60	80	129	119
3	7	67	93	128	125
4	NR	NR	54	147	145
5	NR	NR	NR	146	146
6	NR	NR	NR	178	178
7	NR	NR	NR	153	153
8	NR	NR	NR	169	169
9	0	0	0	0	0
10+	NR	NR	NR	126	126
Total	38	67	94	132	114

NR = no report. averages computed from number reporting in each group.

Table 18—Interstate custom combining: Average length of custom combine campaign by acreage harvested per combine and State of residence of combine operator, Great Plains, 1971

State of residence	Acres harvested per combine				Total
	<1,000	1,000-1,499	1,500-1,999	2,000+	
	Days				
North Dakota	55	51	80	124	114
South Dakota	55	80	87	129	122
Nebraska	43	105	144	131	123
Kansas	40	73	95	135	116
Oklahoma	32	53	83	123	100
Texas	67	115	95	155	144
Montana	NR	NR	78	151	145
Wyoming	NR	NR	NR	148	148
Colorado	35	64	139	130	116
New Mexico	NR	NR	NR	167	167
Other States	30	43	112	133	117
Total	38	67	94	132	114

NR = no report. averages computed from number reporting in each group.

Table 19—Interstate custom combining: Average number of years operating same combine by average acreage harvested per combine, size of crew, and State of residence of combine operator, Great Plains, 1971

Item	Acres per combine				Total
	<1,000	1,000-1,499	1,500-1,999	2000+	
Combines per crew	<i>Years</i>				
1	4.6	4.3	3.7	3.6	4.0
2	5.4	4.5	4.8	3.6	3.8
3	4.5	6.0	4.1	3.7	3.8
4	3.0	0	2.0	3.5	3.5
5	0	0	0	3.1	3.1
6	0	0	0	2.5	2.5
7	0	0	0	3.6	3.6
8	0	0	0	2.4	2.4
9	0	0	0	0	0
10	0	0	0	1.3	1.3
Total	4.8	4.4	4.0	3.6	3.8
State of residence					
North Dakota	7.0	2.2	3.4	3.0	3.1
South Dakota	3.8	7.0	2.0	3.8	3.8
Nebraska	3.6	4.0	4.2	3.6	3.7
Kansas	4.6	4.7	4.3	3.7	3.9
Oklahoma	5.0	4.6	4.3	3.7	4.0
Texas	4.6	4.6	3.4	3.7	3.8
Montana	0	0	4.0	3.0	3.1
Wyoming	0	0	0	2.5	2.5
Colorado	6.0	3.8	4.6	4.0	4.2
New Mexico	0	0	0	3.1	3.1
Other States	4.0	2.7	1.6	2.7	2.8
Total	4.8	4.4	4.0	3.6	3.8

Table 20—Interstate custom combining: Percentage of operators reporting various equipment management arrangements by size of crew, Great Plains, 1971

Combines per crew	Owned	Partnership	Leased	Managed for others	2 or more operator arrangement
	<i>Percent</i>				
1	92	5	1	0	2
2	86	6	2	1	6
3	77	11	0	1	11
4	71	14	0	1	15
5	72	22	0	0	6
6	58	32	0	0	10
7	80	20	0	0	0
8	50	17	17	0	16
9	0	0	0	0	0
10	0	67	0	0	33
Total	84	8	1	1	7

¹ Less than 0.5 percent.

Table 21 --Interstate custom combining: Number of combining crews and workers by type of labor and size of crew, Great Plains, 1971

Combines per crew	Total crews	Total workers	Family labor only		Hired labor only		Family & hired labor	
			Crews	Workers	Crews	Workers	Crews	Workers
	Number							
1	961	2,424	312	692	73	155	576	1,577
2	1,466	6,398	168	594	286	1,043	1,012	4,761
3	610	3,901	46	244	129	669	435	2,988
4	264	2,234	18	121	58	446	188	1,667
5	64	639	6	46	14	137	44	456
6	38	438	2	16	8	85	28	337
7	10	144	2	22	0	0	8	122
8	12	152	0	0	8	102	4	50
9	0	0	0	0	0	0	0	0
10+	6	84	0	0	0	0	6	84
Total.	3,431	16,414	554	1,735	576	2,637	2,301	12,042
	Average no. ----- Percent of crews ----- per crew							
1		2.5	32.5		7.6		59.9	
2		4.4	11.5		19.5		69.0	
3		6.4	7.5		21.2		71.3	
4		8.5	6.8		22.0		71.2	
5		10.0	9.4		21.9		68.7	
6		11.5	5.3		21.0		73.7	
7		14.4	20.0		0.0		80.0	
8		12.7	0.0		66.7		33.3	
9		0.0	0.0		0.0		0.0	
10+		14.0	0.0		0.0		100.0	
Total		4.8	16.1		16.8		67.0	

Table 22- Interstate custom combining: Acres harvested per combine by type of labor, size of crew, and State of residence of combine operator, Great Plains, 1971

Item	Family labor only	Hired labor only	Family & hired labor	All crews
Combines per crew	<i>Acres</i>			
1	1,475	1,844	1,773	1,681
2	1,470	1,976	1,871	1,845
3	1,747	2,142	1,854	1,907
4	1,992	2,142	2,045	2,062
5	2,293	1,897	2,026	2,022
6	NR	1,277	2,117	1,828
7	1,243	-	2,207	2,014
8	-	1,648	1,419	1,571
9	-	-	-	-
10+	-	-	1,474	1,473
Total	1,558	1,999	1,892	1,871
State of residence				
North Dakota	2,568	2,070	2,067	2,040
South Dakota	1,466	1,743	1,849	1,784
Nebraska	1,172	1,650	1,875	1,770
Kansas	1,355	2,220	1,855	1,856
Oklahoma	1,670	1,709	1,778	1,755
Texas	1,624	2,282	2,153	2,091
Montana	1,413	2,641	2,824	2,461
Wyoming	-	-	2,513	2,496
Colorado	1,678	1,532	1,903	1,809
New Mexico	-	2,850	2,330	2,370
Other States	1,097	1,986	1,729	1,809
Total	1,558	1,999	1,892	1,871

NR = no report.

Table 23—Interstate custom combining: Number of workers by major occupation and size of crew, family labor only, Great Plains, 1971

Combines per crew	Crews	Combine operators	Grain haulers	Other labor	All labor
<i>Number</i>					
1	312	335	323	34	692
2	168	318	254	22	594
3	46	129	103	12	244
4	18	71	44	6	121
5	6	26	20	0	46
6	2	12	4	0	16
7	2	14	8	0	22
8	0	0	0	0	0
9	0	0	0	0	0
10+	0	0	0	0	0
Total	554	905	756	74	1,735
<i>Percent of total</i>					
1		37.0	42.7	46.0	39.9
2		35.1	33.6	29.7	34.2
3		14.2	13.6	16.2	14.1
4		7.9	5.8	8.1	7.0
5		2.9	2.7	—	2.6
6		1.3	0.5	—	0.9
7		1.6	1.1	—	1.3
8		—	—	—	—
9		—	—	—	—
10+		—	—	—	—
Total		100.0	100.0	100.0	100.0

Table 24—Interstate custom combining: Number of workers by major occupation and size of crew, hired labor only, Great Plains, 1971

Combines per crew	Crews	Combine operators	Grain haulers	Other labor	All labor
	<i>Number</i>				
1	73	76	77	2	155
2	286	552	469	22	1,043
3	129	361	290	18	669
4	58	228	193	25	446
5	14	74	53	10	137
6	8	47	34	4	85
7	0	0	0	0	0
8	8	60	38	4	102
9	0	0	0	0	0
10+	0	0	0	0	0
Total	576	1,398	1,154	85	2,637
	<i>Percent of total</i>				
1		5.4	6.7	2.3	5.9
2		39.5	40.6	25.9	39.5
3		25.8	25.1	21.2	25.4
4		16.3	16.7	29.4	16.9
5		5.3	4.6	11.8	5.2
6		3.4	3.0	4.7	3.2
7		—	—	—	—
8		4.3	3.3	4.7	3.9
9		—	—	—	—
10+		—	—	—	—
Total		100.0	100.0	100.0	100.0

Table 25—Interstate custom combining: Number and type of workers by major occupations and size of crew.
family and hired labor, Great Plains, 1971

Combines per crew	Crews	Combine operators			Grain haulers			Other labor			All labor		
		Family labor	Hired labor	Family & hired labor	Family labor	Hired labor	Family & hired labor	Family labor	Hired labor	Family & hired labor	Family labor	Hired labor	Family & hired labor
							<i>Number</i>						
1	576	467	353	820	366	331	697	42	18	60	875	702	1,577
2	1,012	1,131	1,418	2,549	931	979	1,910	242	60	302	2,304	2,457	4,761
3	435	655	971	1,626	480	689	1,169	177	16	193	1,312	1,676	2,988
4	188	280	625	905	206	407	613	131	18	149	617	1,050	1,667
5	44	38	188	226	38	129	167	49	14	63	125	331	456
6	28	36	127	163	12	103	115	40	19	59	88	249	337
7	8	6	50	56	2	50	52	14	0	14	22	100	122
8	4	12	20	32	8	10	18	0	0	0	20	30	50
9	0	0	0	0	0	0	0	0	0	0	0	0	0
10+	6	12	42	54	6	24	30	0	0	0	18	66	84
Total	2,301	2,637	3,794	6,431	2,049	2,722	4,771	695	145	840	5,381	6,661	12,042
							<i>Percent of total</i>						
1		17.7	9.3	12.8	17.9	12.2	14.6	6.0	12.4	7.1	16.3	10.5	13.1
2		42.9	37.4	39.6	45.4	35.9	40.0	34.8	41.4	36.0	42.8	36.9	39.6
3		24.8	25.6	25.3	23.4	25.3	24.5	25.5	11.0	23.0	24.4	25.2	24.8
4		10.6	16.5	14.1	10.1	15.0	12.9	18.8	12.4	17.7	11.5	15.8	13.8
5		1.4	5.0	3.5	1.8	4.7	3.5	7.1	9.7	7.5	2.3	5.0	3.8
6		1.4	3.3	2.5	0.6	3.8	2.4	5.8	13.1	7.0	1.6	3.7	2.8
7		0.2	1.3	0.9	0.1	1.8	1.1	2.0	—	1.7	0.4	1.5	1.0
8		0.5	0.5	0.5	0.4	0.4	0.4	—	—	—	0.4	0.4	0.4
9		—	—	—	—	—	—	—	—	—	—	—	—
10+		0.5	1.1	0.8	0.3	0.9	0.6	—	—	—	0.3	1.0	0.7
Total		100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Appendix table 1—Interstate custom combining: Acres of wheat harvested by State of residence of combine operator and size of crew, Great Plains, 1971

State of residence	Combines per crew										Total
	1	2	3	4	5	6	7	8	9	10+	
						<i>Acres</i>					
North Dakota	101,583	272,211	267,934	146,305	20,086	41,695	0	49,483	0	0	899,297
South Dakota	36,885	177,175	91,763	63,638	0	0	17,527	7,443	0	0	394,431
Nebraska	35,525	222,513	150,419	33,334	13,089	43,395	40,581	0	0	0	538,856
Kansas	335,627	1,291,570	861,550	571,585	74,640	63,082	0	0	0	6,984	3,205,038
Oklahoma	416,650	1,248,336	638,935	507,145	140,701	119,543	27,734	28,366	0	48,589	3,175,999
Texas	126,638	432,200	268,462	198,234	123,772	30,296	0	0	0	0	1,179,602
Montana	20,412	144,736	16,341	50,700	4,083	0	0	0	0	0	236,272
Wyoming	0	12,070	28,317	0	0	0	0	0	0	0	40,387
Colorado	72,980	204,490	168,210	28,165	75,560	0	0	0	0	0	549,405
New Mexico	0	42,061	10,764	30,056	31,269	0	0	0	0	0	114,150
Other States	37,509	149,729	182,547	37,055	20,050	20,977	35,258	26,908	0	23,987	534,020
Total	1,183,809	4,197,091	2,685,242	1,666,217	503,250	318,988	121,100	112,200	0	79,560	10,867,457

Appendix table 2—Interstate custom combining: Acres of barley, oats, and rye harvested by State of residence of combine operator and size of crew, Great Plains, 1971

State of residence	Combines per crew										Total
	1	2	3	4	5	6	7	8	9	10+	
						<i>Acres</i>					
North Dakota	19,029	51,458	37,643	25,444	6,753	0	0	1,986	0	0	142,313
South Dakota	12,434	39,126	18,035	3,972	0	0	0	4,965	0	0	78,532
Nebraska	7,369	16,766	15,393	457	0	8,839	5,263	0	0	0	54,087
Kansas	38,046	107,399	85,700	61,234	596	3,377	0	0	0	344	296,696
Oklahoma	23,616	96,735	54,101	53,931	9,534	6,793	0	0	0	0	244,710
Texas	9,063	26,108	21,447	18,967	14,172	954	0	0	0	0	90,711
Montana	1,192	14,242	3,177	993	1,589	0	0	0	0	0	21,193
Wyoming	0	795	1,390	0	0	0	0	0	0	0	2,185
Colorado	2,628	12,519	6,276	2,781	4,270	0	0	0	0	0	28,474
New Mexico	0	3,873	795	3,972	3,873	0	0	0	0	0	12,513
Other States	6,055	18,584	25,341	4,091	283	137	37	5,449	0	402	60,379
Total	119,432	387,605	269,298	175,842	41,070	20,100	5,300	12,400	0	746	1,031,793

Appendix table 3—Interstate custom combining: Acres of soybeans harvested by State of residence of combine operator and size of crew, Great Plains, 1971

State of residence	Combines per crew										Total
	1	2	3	4	5	6	7	8	9	10+	
						<i>Acres</i>					
North Dakota	199	1,391	1,649	596	0	0	0	0	0	0	3,835
South Dakota	0	4,163	199	0	0	0	0	795	0	0	5,157
Nebraska	248	1,150	159	0	0	0	0	0	0	0	1,557
Kansas	2,633	22,783	5,240	7,770	0	993	0	0	0	0	39,419
Oklahoma	3,299	17,571	13,454	12,439	0	1,589	0	0	0	5,960	54,312
Texas	1,986	6,528	3,299	1,093	0	0	0	0	0	0	12,906
Montana	0	795	0	0	0	0	0	0	0	0	795
Wyoming	0	0	457	0	0	0	0	0	0	0	457
Colorado	1,192	2,454	0	0	2,782	0	0	0	0	0	6,428
New Mexico	0	218	0	0	0	0	0	0	0	0	218
Other States	1,383	7,411	19,270	8,357	6,018	5,018	0	605	0	40	48,102
Total	10,940	64,464	43,727	30,255	8,800	7,600	0	1,400	0	6,000	173,186

Appendix table 4—Interstate custom combining: Acres of grain sorghum harvested by State of residence of combine operator and size of crew, Great Plains, 1971

State of residence	Combines per crew										Total
	1	2	3	4	5	6	7	8	9	10+	
						<i>Acres</i>					
North Dakota	1,211	7,490	11,306	4,568	3,378	4,967	0	2,979	0	0	35,899
South Dakota	596	17,344	4,927	1,986	0	0	0	0	0	0	24,853
Nebraska	7,938	26,819	18,836	5,164	0	7,152	4,073	0	0	0	69,982
Kansas	56,993	167,941	98,480	70,988	5,523	6,954	0	0	0	0	406,879
Oklahoma	48,880	127,040	72,434	72,949	7,361	19,126	3,974	0	0	3,974	355,738
Texas	49,652	112,087	91,923	34,022	26,060	8,544	0	0	0	0	322,288
Montana	397	4,411	1,392	2,383	0	0	0	0	0	0	8,583
Wyoming	0	4,768	0	0	0	0	0	0	0	0	4,768
Colorado	5,794	18,610	10,688	1,589	17,483	0	0	0	0	0	54,164
New Mexico	0	14,166	3,975	13,307	13,908	0	0	0	0	0	45,356
Other States	0	3,418	1,377	0	5,489	309	53	2,321	0	26	12,993
Total	171,461	504,094	315,338	206,956	79,202	47,052	8,100	5,300	0	4,000	1,341,503

Appendix table 5—Interstate custom combining: Acres of all other grains harvested by State of residence of combine operator and size of crew, Great Plains, 1971

State of residence	Combines per crew										Total
	1	2	3	4	5	6	7	8	9	10+	
						<i>Acres</i>					
North Dakota	5,324	14,506	17,892	34,068	2,384	0	0	993	0	0	75,167
South Dakota	11,275	32,300	14,402	2,086	0	0	0	795	0	0	60,858
Nebraska	15,316	44,154	24,023	0	2,980	1,986	6,456	0	0	0	94,915
Kansas	75,417	60,253	68,403	34,269	2,980	7,549	0	7,231	0	0	256,102
Oklahoma	5,743	41,938	10,540	18,355	2,443	9,557	0	0	0	3,973	92,549
Texas	3,536	19,509	1,828	4,172	2,880	3,973	0	0	0	0	35,898
Montana	338	3,576	1,986	497	0	0	0	0	0	0	6,397
Wyoming	0	0	7,133	0	0	0	0	0	0	0	7,133
Colorado	8,657	18,105	16,993	0	0	0	0	0	0	0	43,755
New Mexico	0	1,987	0	0	1,192	0	0	0	0	0	3,179
Other States	4,804	21,047	13,152	5,753	101	157	44	10,561	0	27	55,646
Total	130,410	257,375	176,352	99,200	14,960	23,222	6,500	19,580	0	4,000	731,599

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