GRAIN DRYER USE BY NORTH DAKOTA FARMERS

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Grain drying has increased in importance as a production cost in North Dakota due to expanding sunflower production and rapidly rising fuel costs. Farmers were surveyed during the winter of 1979 by the Department of Agricultural Economics to determine the extent and use of on-farm grain drying facilities in North Dakota.

Study objectives were to estimate the amount of the 1978 grain harvest that was dried and the capacity of available on-farm grain drying facilities. Three thousand farmers were surveyed, using a random block sampling design based on crop reporting district and farm size. Collected data were expanded to create estimates for state totals.

Excellent harvest conditions prevailed in 1978. Barley and oats harvests were complete by mid-September, both ahead of normal. Rainy weather in the latter part of September delayed completion of part of the small grain harvest until early October, but it was still completed ahead of normal. Corn and sunflower harvest ended in early November with an early winter storm on November 9.

Grain Dried

Shelled corn, sunflower, and mustard producers reported that much of their crop was mechanically dried. Mechanically drying grain involves the use of an artificial heat source. Grains only aerated or sun dried in the field were not considered dried.

Shelled corn producers dried 76 per cent of the 1978 crop. Sunflower and mustard growers dried 41 per cent. Part of the triticale, wheat, soybean, flax, barley, oats, and rapeseed crops was also mechanically dried (Table 1). On-farm drying facilities were used by producers in almost all cases in which grain was dried for storage. Crops also were identified as being raised with or without irrigation. Although almost all of the 1978 crop in North Dakota was raised without irrigation; producers of irrigated sunflower, shelled corn, and wheat reported a higher percentage of the irrigated grain was dried. For example, while only 8 per cent of the non-irrigated wheat crop was dried, 60 per cent of the wheat reported raised with irrigation was dried (Table 1). However, none of the irrigated flax, barley, or oats reported was mechanically dried.

Producers estimated average moisture content before and after grain drying. Estimates of moisture removed from grain ranged from an average of 2 per cent removed from irrigated wheat to 7 per cent removed from irrigated sunflower (Table 2).

Available Grain Drying Capacity

Two measurements were used in determining the capacity of on-farm grain drying facilities available for use. Dryer capacity was estimated as the amount of grain the drying unit could process per hour. If all North Dakota on-farm grain dryers were put into use simultaneously, 1.6 million bushels of grain could have been processed per hour (Table 3). However, most grain dryer capacity is in the northern and eastern areas of the state where sunflower and corn production is concentrated (Figure 1).

Estimates of grain dryer capacity, fuel type used, age of the dryer, and farm size of the dryer owner were also compared.

Almost all North Dakota grain dryers used LP gas for fuel. LP gas dryers accounted for 98 per cent of available dryer capacity. Of the dryer capacity available in 1978, the largest portion, 32 per cent, was acquired in 1973-74. Only 23 per cent was acquired in 1975-76, while 15 per cent was acquired in 1977-78, the most recent time period included (Table 3).

FIGURE 1

North Dakota Dryer Capacity Available in 1978

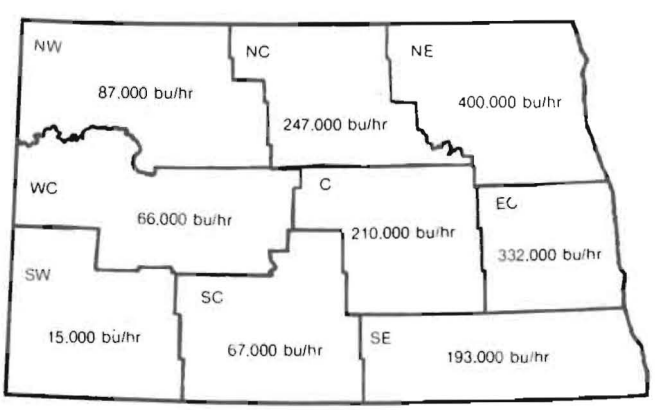

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TABLE 1. DRYING PRACTICES OF NORTH DAKOTA FARMERS IN 1978

Crop	Volume Received	Mechanically Dried and Stored				Mechanically Dried and Sold at Harvest		Percentage of Crop Dried
		On-Farm		Off-Farm				
	(000 bu.)	(000 bu.)	%	(000 bu.)	%	(000 bu.)	%	%
Shelled Corn								
Dryland	17,443	10,674	61.2	968	5.5	1,564	9.0	75.71
Irrigated	1,590	1,290	81.2	0	0.0	14	0.9	82.04
Sunflower (cwt.)								
Dryland	3,315,969	670,277	20.2	153,424	4.6	542,822	16.4	41.21
Irrigated	9,356	4,113	44.0	0	0.0	3,317	35.5	79.41
Mustard	39,571	6,676	16.9	2,640	6.7	7,219	18.2	41.79
Triticale	505	79	22.5	0	0.0	0	0.0	15.67
Wheat								
Dryland	320,912	17,479	5.4	571	0.2	6,499	2.0	7.66
Irrigated	4,384	19	0.4	0	0.0	2,593	59.2	59.59
Soybeans	2,912	117	4.0	0	0.0	0	0.0	4.02
Flax	4,611	33	0.7	37	0.8	106	2.3	3.83
Barley	134,686	3,514	2.6	0	0.0	170	0.1	2.73
Oats	70,357	423	0.6	0	0.0	0	0.0	0.60
Rapeseed	15,079	59	0.4	0	0.0	0	0.0	0.39

Farmers in the smallest farm size group (1-639 cropland acres) owned the largest portion of dryer capacity. They accounted for one-third of available on-farm dryer capacity (Table 3). This was due to the large number of farms in that size group. There were 23,295 farms statewide in the 1-639 acre size group compared to only 16,307 farms in the other three size groups combined.

Analysis of available dryer capacity by farm size groups from a per farm or per acre viewpoint is revealing. Smaller farms averaged less dryer capacity than larger farms. Farms in the 1-639 acre and 640-959 acre farm size groups averaged a dryer capacity of 23 bushels per hour per farm (Table 4). This was much less than the available capacity of farms in the 960-1,499 acre size group, which averaged 71 bushels per hour per farm and the farms of 1,500 or more acres, which averaged 159 bushels per hour per farm.

TABLE 2. AVERAGE MOISTURE CONTENT OF GRAINS DRIED, NORTH DAKOTA, 1978

Crop and Farming System	Per Cent Moisture		
	Beginning	Ending	Removed
Shelled Corn			
Dryland	20	13	7
Irrigated	19	12	7
Sunflower			
Dryland	14	9	5
Irrigated	16	9	7
Mustard			
Dryland	13	8	5
Wheat			
Dryland	16	12	4
Irrigated	15	13	2
Soybeans			
Dryland	16	10	5
Flax			
Dryland	14	8	6
Barley			
Dryland	16	13	3

TABLE 3. CAPACITY OF NORTH DAKOTA GRAIN DRYERS, 1978

Category of Dryer	Dryer Capacity in Bushels Per Hour	Percentage of Capacity in Category
Size of Farm (Acres)		
1-639	533,000	33.0
640-959	173,000	10.7
960-1,499	401,000	24.8
1,500 and More	510,000	31.5
Type of Fuel		
LP Gas	1,568,000	97.6
Natural Gas	29,000	1.8
Diesel	9,000	0.6
Age of Dryer		
1977-1978	237,000	14.6
1975-1976	365,000	22.6
1973-1974	516,000	31.9
1971-1972	219,000	13.5
1969-1970	87,000	5.4
1968 or Older	194,000	12.0
TOTAL CAPACITY	1,617,000	100.0

TABLE 4. GRAIN DRYER CAPACITY BY FARM SIZE GROUPS, NORTH DAKOTA, 1978

Farm Size Group	Dryer Capacity in Bushels Per Hour Per Farm	Dryer Capacity in Bushels Per Hour Per 1,000 Acres
1-639 Acres	22.9	69.0
640-959 Acres	23.2	29.4
960-1,499 Acres	71.3	60.5
1,500 Acres and More	159.4	72.0

Analysis of available dryer capacity from a per acre perspective indicated that the 1-639 acre farm size group averaged 69 bushels per hour per thousand acres. This is comparable to the average available dryer capacity of 61 bushels per hour per thousand acres for the 960-1,499 acre size group and 72 bushels per hour per thousand acres for the 1,500 and more acre size group. However, the 640-959 acre size group averaged only 29 bushels per hour per thousand acres of available dryer capacity (Table 4). The large amount of dryer capacity per acre in the 1-639 acre size group is due to the smaller amount of cropland owned by each dryer owner in this group and the minimum capacity of grain drying units.

Summary

Many North Dakota farmers are installing and using grain drying facilities. Even in the excellent harvest year of 1978, nearly 1.3 billion hundredweight of sunflower was dried—more than 41 per cent of the sunflower crop. Farmers also dried 76 per cent of their shelled corn and 42 per cent of their mustard crops. Although less than 10 per cent of the wheat and barley crops was dried, farmers dried millions of bushels of crops in 1978.

North Dakota's on-farm drying facilities handled almost all of this load. Ninety-two per cent of North Dakota's on-farm dryer capacity had been acquired since 1971, almost all fueled by LP gas. Most of this dryer capacity was in the eastern and north central portions of the state where sunflower and corn production is concentrated.

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A.2. Values Used in Calculations

Items	Units	Area			
		West	NWC	SWC	EC
Average Annual Precipitation (1950-1977)	Inches	15.65	16.50	16.74	18.08
Wheat Planted on Nonfallow Land (In Hundreds), 1979 County Average	Acres	253	883	885	967
Average Percent of Acres Harvested (1950-1977)					
Fallow	Percent	95.34	97.81	96.47	96.91
Nonfallow		91.62	95.00	94.87	96.03
1980 Normalized Wheat Yields					
Fallow	Bu./Planted	26.14	29.62	25.62	31.81
Nonfallow	Acre	17.91	21.41	18.46	25.63
Cost of Production Except Land[a]					
Fallow	$/Acre	70.91	74.04	70.42	83.88
Nonfallow		55.63	59.51	55.79	69.34
Cost of Production Except Land and Nitrogen[a]					
Fallow	$/Acre	69.57	72.68	69.47	81.81
Nonfallow		52.67	54.47	52.85	63.72
Nitrogen Used					
Fallow	Lbs./Acre	5.83	5.92	4.12	9.01
Nonfallow		12.89	25.31	13.63	27.60
Cost Associated With Change In Yield[b]					
Fallow	$/Bushel	1.55	1.56	1.56	1.58
Nonfallow		1.54	1.43	1.50	1.47
Cost Associated With Unplanned Change in Yield[c]					
Fallow	$/Bushel	.50	.51	.51	.53
Nonfallow		.49	.50	.51	.53

[a]No charge was made for management, risk, or general farm overhead.
[b]Fertilizer and handling cost only.
[c]Handling cost only.