

Observations on Mechanical Beet Harvesting in the Great Western Sugar Company Area in 1947

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FARMERS in the territory served by the Great Western Sugar Company saved approximately three quarters of a million dollars in 1947 by harvesting 644,196 tons of beets with machines rather than by hand. This represents an average saving of almost \$650 for each of the 1,085 growers who harvested their crop mechanically.

A total of 45,748 acres were harvested with machines by the 1,085 growers, or approximately 20 percent of the total acreage. The percentage varied greatly between factory districts and states.

The Colorado district harvested an average of 15 percent of the acreage with machines; with the Brush and Fort Morgan factory districts leading with an average of 26 percent, followed closely by the Fort Lupton district with 21 percent.

In the Nebraska district, machines harvested 32 percent of the crop. Unfavorable weather and soil conditions materially reduced the actual from the expected. This is an increase of only 7 percent over 1946, which is not quite a fair comparison, however, because of the larger total acreage harvested in 1947. The comparative figures on acres harvested in 1946 and 1947 are:

| | 1947 | 1946 |
|----------------------------|--------|--------|
| Total acres | 46,418 | 38,516 |
| Harvested by machine | 14,775 | 8,758 |

Wheatland harvested 24 percent of the crop mechanically as compared to 16 percent in 1946.

The percentage of total acreage harvested by machines in the Billings and Lovell districts was 21 percent and 40 percent, respectively, Lovell having the highest percentage of all Great Western factory districts.

The highest performance was at Billings with an average of 57 acres per machine. Sterling and Lovell follow closely with 49 and 48 acres respectively. Details for each factory are shown in table 1.

As indicated in table 1, the average performance in Nebraska in 1947 did not equal that of 1946 because of unfavorable weather and soil conditions. Dry and cloddy soil conditions early in the season prevented

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fullest use of machines. We have been fighting snow, mud and frost since November 5, and obviously the fullest and most efficient use could not be made of machines under such conditions. We only completed the harvest last Saturday (January 10, 1948). Some tonnage is still left in the ground

Table 1.--Acres and tons harvested--all machines.

| | Number of machines | Acres harvested | Tons harvested | Per machine | |
|---------------------------|--------------------|-----------------|----------------|-------------|------|
| | | | | Acres | Tons |
| Billings | 101 | 5,786 | 79,044 | 57 | 782 |
| Lovell | 52 | 2,504 | 38,853 | 48 | 747 |
| | 153 | 8,290 | 117,897 | 54 | 770 |
| Eaton | 54 | 2,451 | 43,308 | 45 | 802 |
| Greeley | 28 | 977 | 16,101 | 35 | 575 |
| Windsor | 38 | 1,600 | 28,345 | 42 | 746 |
| Fort Collins | 18 | 668 | 11,063 | 37 | 615 |
| Loveland | 32 | 1,266 | 20,511 | 40 | 641 |
| Longmont | 27 | 1,010 | 16,402 | 37 | 607 |
| Brighton | 25 | 586 | 8,807 | 23 | 352 |
| Fort Lupton | 57 | 2,511 | 44,733 | 44 | 785 |
| Ovid | 53 | 2,049 | 23,032 | 39 | 435 |
| Sterling | 29 | 1,415 | 17,113 | 49 | 590 |
| Brush | 75 | 3,148 | 34,831 | 42 | 460 |
| Fort Morgan | 92 | 4,139 | 63,305 | 45 | 688 |
| | 528 | 21,820 | 327,551 | 41 | 620 |
| Scottsbluff | 75 | 3,061 | 41,572 | 41 | 554 |
| Gering | 104 | 3,726 | 51,122 | 36 | 491 |
| Bayard | 63 | 2,473 | 26,721 | 39 | 424 |
| Minatare | 43 | 1,662 | 18,824 | 39 | 438 |
| Mitchell | 50 | 1,874 | 22,702 | 38 | 454 |
| Lyman | 50 | 1,979 | 25,953 | 40 | 519 |
| | 385 | 14,775 | 186,904 | 38 | 485 |
| Wheatland | 19 | 863 | 11,844 | 45 | 623 |
| Grand totals and averages | 1,085 | 45,748 | 644,196 | 42 | 594 |

There were 1,085 machines operated in Great Western territory in 1947. This is an increase of 560 machines over 1946. The distribution between states or districts is shown in table 2.

Table 2. Distribution of harvesters between states or districts.

| | 1946 | | 1947 | |
|-----------|--------------------|-----------------|--------------------|-----------------|
| | Number of machines | Acres harvested | Number of machines | Acres harvested |
| Colorado | 240 | 6,257 | 528 | 21,820 |
| Nebraska | 205 | 8,758 | 385 | 14,775 |
| Lovell | 22 | 1,060 | 52 | 2,504 |
| Billings | 48 | 1,294 | 101 | 5,786 |
| Wheatland | 10 | 555 | 19 | 863 |
| | 525 | 17,924 | 1,085 | 45,748 |

The above shows much better performance in 1947 than in 1946. The number of machines increased 107 percent, but the acreage harvested increased 156 percent.

The International harvester, which was used extensively for the first time in 1947; performed very satisfactorily under almost every condition that a machine could reasonably be expected to operate, and as a result of this performance the International combine harvester is generally acclaimed by owners and others as a satisfactory machine. Users are critical only of the lack of equipment for conserving the beet tops.

The combined harvester and loader is a feature liked by most farmers, as well as the picking table that permits sorting of clods and rocks when conditions make such operations necessary.

These machines performed very satisfactorily under some very unfavorable conditions—snow, mud and frost. Traction for the tractor was the limiting factor in the snow and mud. The serrated disk knife did a better job of topping and held its edge longer than the solid disk.

This machine has gained the favor of farmers and the only thing that might deter growers from buying as many as can be manufactured in 1948 would be the lack of a beet-top conserving attachment. I believe the machine will ultimately need to be equipped with a more complete top-handling unit than the short cross elevator provided on a few machines in 1947.

The John Deere harvester predominated in the number of machines but the International surpassed in the acreage worked per machine. Performance varied widely, as in previous years, according to conditions. Early in the season dry, cloddy soil conditions almost stopped the use of a large number of John Deere machines, but fortunately timely rains remedied this condition. Had the rains not occurred we would have been faced with a real problem. It would have been impracticable to have continued using the harvesters, and hand labor was not available to do the work expected of the machines.

The John Deere harvester has two features to recommend it, namely, the quality of the topping and the method of conserving beet tops. Farmers generally, and others, feel this harvester has two faults:

1. Too light construction, consequently excessive breakage that makes for delays and high maintenance costs.
2. Lack of facilities for eliminating clods and rocks.

It is hoped the manufacturer can overcome these objectionable features because the John Deere harvester has many features to commend its performance.

The Scott Urschel harvester was used in a limited way in Colorado this past year. Unquestionably this machine has a greater daily capacity than any other machine successfully used in Great Western territory. Many growers reported harvesting 3 acres per day and a few, under favorable conditions, were able to harvest $4\frac{1}{2}$ to 5 acres of 18- to 20-ton beets, or 70 to 100 tons per day. High daily performances reported were 103, 96 and 80 tons per day.

This machine, also, lacks equipment for conserving the beet tops, which is a requisite in our area for any satisfactory harvester. Nevertheless this machine has been widely accepted after this year's performance and some large-acreage growers who used these harvesters in 1947 are ordering the second machine for 1948. They expect to provide a top-handling unit of their own design if the manufacturer does not provide equipment at the factory.

While many farmers object to the extra expense incurred, or the extra trucks required for loading directly into trucks and to the truck packing the ground, especially in wet weather; others object to windrowing the beets and then loading out of the windrow, with the complication of clods and rocks. They are general in their praise of the pull-type harvester because the tractor can be readily freed for other work during beet harvest.

Some growers have suggested that a trailer be provided for accumulating topped beets. This would not only eliminate the objection stated above, but would probably simplify the problem of providing a means of conserving the beet tops.

Table 3.—Recapitulation of mechanical harvester operations in the Great Western Sugar Company area in 1947.

| Make of harvester | Number of machines | Acres harvested | Tons harvested | Per machine | |
|-------------------|--------------------|-----------------|----------------|-------------|------|
| | | | | Acres | Tons |
| John Deere | 675 | 25,533 | 345,579 | 38 | 512 |
| International | 305 | 16,007 | 228,666 | 52 | 750 |
| Scott-Urschel | 49 | 2,443 | 45,640 | 50 | 932 |
| Kiest | 53 | 1,724 | 23,636 | 33 | 446 |
| Marbeet | 2 | 35 | 635 | 18 | 318 |
| Trinkle | 1 | 6 | 40 | 6 | 40 |
| Totals | 1,085 | 45,748 | 644,196 | 42 | 594 |

Some people were fearful of the performance of this machine after the tops had been badly frozen, but the performance this past year has erased such fears.

One experimental Marbeet, Midget, was used to a very limited extent on our Windsor farm. It was reported to have done a very satisfactory job of topping and lifting, but it too had the objectionable lack of beet-top conserving equipment.

This machine demonstrated well in the Billings district, but its performance was very disappointing in the demonstrations held at Wheatland and Mitchell. The crowns of the beets had been frozen and the spikes tended to break off the crowns instead of lifting the beets.

While I did not see this machine in operation, I am told it is not entirely satisfactory.

Twenty five growers purchased 1947 model Kiest harvesters and ten farmers tried to use the machines they bought in 1946, which were rebuilt and supposedly would perform satisfactorily in 1947. Not more than a third of the growers owning Kiest harvesters were able to complete their harvest with this machine. These harvesters have been a dismal failure the past 2 years and until the manufacturer can demonstrate efficient and economical performance, I think growers will be hesitant to purchase these machines.

My opening statement that growers in Great Western territory saved approximately three quarters of a million dollars by harvesting with machines instead of by hand, is predicated upon a report of the University of Nebraska, Department of Agricultural Economics, in which they show the comparative per ton costs of harvesting and loading beets by several methods.

For the past 3 years the Department of Agricultural Economics, under the direction of Professor Frank Miller, has made cost studies in cooperation with farmers in the various beet-growing areas of Nebraska. The delayed harvest has prevented some farmers sending in final figures, but based upon the reports received earlier, Professor Miller has issued a preliminary report, tables from which follow:

Table 1.—Representative costs of using a mechanical beet harvester and a mechanical beet loader in Nebraska, 1947, as determined from survey made by Rural Economics Department, University of Nebraska.

| | Harvester | Loader | Combined harvester and loader |
|---|-----------|--------|-------------------------------|
| Number of records | 22 | 16 | 7 |
| Average cost of machine | \$998 | \$732 | \$2,664 |
| Average years of life (estimated by the users)... | 5 | 9 | 6 |
| Average use in 1947 | | | |
| Acres | 64 | 65 | 71 |
| Hours | 174 | 42 | 179 |
| Tons | 787 | 800 | 873 |
| Average cost in 1947 | | | |
| Depreciation | \$232 | \$92 | \$444 |
| Repairs, repairing and lubricants | 138 | 18 | 63 |
| Shelter, interest, insurance, taxes | 39 | 26 | 98 |
| Total | \$409 | \$136 | \$605 |
| Unit costs in 1947 | | | |
| Per acre | \$9.55 | \$2.29 | \$8.73 |
| Per hour | 3.51 | 3.55 | 3.46 |
| Per ton | .78 | .19 | .71 |

Table 2.—Cost of harvesting and loading sugar beets yielding 12.3 tons per acre with mechanical equipment in 1947 as determined from a survey made by the Rural Economics Department, University of Nebraska.

| | Harvester | Loader | Combined harvester and loader |
|---|-----------|--------|-------------------------------|
| Number of records | 16 | 16 | 7 |
| Average use of machine in 1947 | | | |
| Acres | 64 | 65 | 71 |
| Hours | 174 | 42 | 179 |
| Tons | 717 | 738 | 941 |
| Acres per machine hour | .37 | 1.55 | .40 |
| Average cost per acre | | | |
| Use of machine | \$ 9.59 | \$2.29 | \$ 8.71 |
| Tractor power | 2.78 | .55 | 2.82 |
| Labor (one man to operate machine)..... | 4.61 | .71 | 3.20 |
| Gleaning fields | 1.86 | -- | 1.20 |
| Total | \$18.84 | \$3.55 | \$16.93 |
| Average cost per ton | \$ 1.67 | \$.31 | \$ 1.20 |
| Average cost per hour | | | |
| Use of machine | \$3.52 | \$3.53 | \$ 3.46 |
| Tractor power | 1.02 | .84 | 1.12 |
| Labor (one man to operate machine)..... | 1.20 | .93 | 1.06 |
| Labor to glean fields | .84 | -- | 1.00 |

Table 3. Cost of harvesting and loading sugar beets yielding an average of 12.3 tons per acre by various methods in 1947 as determined from a survey made by Rural Economic Department, University of Nebraska.

| Item | Combined harvester and loader | Harvesting with machine and loading with machine | Harvesting with machine and loading by hand | Harvesting by hand and loading with machine | Harvesting and loading by hand |
|------------------------|-------------------------------|--|---|---|--------------------------------|
| Cost per acre | | | | | |
| Use of harvester | \$8.73 | \$9.55 | \$9.55 | --- | --- |
| Tractor power | 2.82 | 2.77 | 2.77 | --- | --- |
| Wages of operator | 3.21 | 4.59 | 4.59 | --- | --- |
| Use of loader | --- | 2.29 | --- | \$2.29 | --- |
| Tractor power | --- | .55 | --- | .55 | --- |
| Wages of operator | --- | .71 | --- | .71 | --- |
| Gleaning fields | 1.20 | 1.86 | 1.86 | --- | --- |
| Use of puller (2-row) | --- | --- | --- | .45 | .45 |
| Tractor power | --- | --- | --- | 1.00 | 1.00 |
| Wages of operator | --- | --- | --- | 1.34 | 1.34 |
| Wages for hand topping | --- | --- | --- | 19.68 | 19.68 |
| Wages for hand loading | --- | --- | 9.22 | --- | 9.22 |
| Total | \$15.96 | \$22.32 | \$27.99 | \$26.02 | \$31.69 |
| Cost per ton | | | | | |
| | \$1.30 | \$1.81 | \$2.28 | \$2.12 | \$2.58 |

Wages for machine operators and gleaners were charged at the rate paid by the farmer.
 Hand topping was charged at \$1.50 per ton.
 Hand loading was charged at 75 cents a ton.

It was again demonstrated that harvesters will not work as satisfactorily under some conditions as hand labor. On the other hand, harvesters will operate satisfactorily under conditions where hand labor refuses or cannot work.

It has also been demonstrated again that successful operation is largely dependent upon the operator. There may be a slight difference in the construction of machines of the same make and we know there is wide variation in field conditions that will directly affect the performance of the machine, but generally the success or failure of the machine can be attributed to the operator.

I repeat here a statement made at Salt Lake City a year ago: "While some improvements are needed on the harvesters in general use, the greater need is for more harvesters of the improved designs."