

A PRELIMINARY REPORT

By
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The Cost of Growing Sugar Beets in 1922 and 1923
Weld County, Colorado.

COLORADO AGRICULTURAL EXPERIMENT STATION
Department of Economics and Sociology

and the

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INTRODUCTION.

The history of sugar beet growing for the manufacture of sugar dates back previous to 1893.

The Colorado State Agricultural College pioneered some of the experiments which led to the establishment of sugar factories in Colorado. In Bulletin No. 42 of the College relating to sugar beets in Colorado, the author asserts, "Sugar beets have been grown on the Station farm and in various parts of the State for the past nine years." Carload lot shipments of beets were sent from Grand Junction to Lehi, Utah, as early as 1893 and 1894. The first factory was built at Grand Junction in 1890.

The first sugar factory built in Northern Colorado was at Loveland in 1901. In 1902 two factories were built, one at Eaton and the other at Greeley. Factories were developed at Fort Collins and Windsor in the year 1903.

The United States census report for 1910 gives the acreage of sugar beets in Weld County for the year 1909 as 34,682 and a tonnage of 391,827, or an average tonnage of 11.3 per acre. In 1920 the acreage had increased in Weld County to 57,582 acres and the tonnage was 565,072 tons, with an average yield per acre of 9.8 tons.

The farms used as a basis for this preliminary report are located in the vicinity of Severance, Windsor, Eaton and Greeley. These are all irrigated farms. These farmers are cooperating with the Department of Economics and Sociology of the Colorado Experiment Station and the Bureau of Agricultural Economics, U. S. Department of Agriculture, in keeping detailed cost accounts on their respective farms.

Note: The cost figures in this report may require some revision simply because these tabulations have been compiled in advance of the complete analysis of the entire farm business. It appears now that such revision will affect these figures to a minor degree only. However, this report is submitted with the understanding that such changes will be made when the completed farm tabulations are published.

Summary

Tables XVII and XVIII show a summary of the more important costs together with total cost per acre, interest excluded and interest included, and cost per ton of beets interest included, for the several farms growing beets for the years 1922 and 1923.

While this report is based upon only twenty-five farms (twelve in 1922 and thirteen in 1923) yet some of the facts brought out are worthy of careful study by one who is growing sugar beets in his crop rotation.

The cost of man labor per acre for the average of each group of farms was \$12.94 in 1922 and \$9.64 in 1923. The hours of man labor required on an average to grow an acre of beets was slightly over 35 hours. The horse labor cost was \$9.46 per acre in 1922 and \$25.95 in 1923. The average number of horse hours to grow an acre of beets was 72 hours in 1922 and 81.34 hours in 1923.

Seed cost amounted to \$3.12 in 1922 and \$2.45 per acre in 1923.

Other costs were \$6.48 in 1922 and \$6.77 in 1923 per acre.

Manure costs amounted to \$5.48 and \$5.00 respectively in 1922 and 1923.

The total cost per acre without interest was \$59.70 in 1922 and \$62.42 in 1923, while costs per acre interest included were \$74.85 in 1922 and \$77.52 in 1923. Cost per pen interest included was \$6.67 and \$5.08 in 1922 and 1923 respectively.

The value received for beets per ton was \$7.88 in 1922 and \$8.19 in 1923. The average profit per ton after paying 6 per cent on the investment was \$1.21 and \$3.11 in 1922 and 1923 respectively. Four farms in 1922 and one farm in 1923 failed to return 6 per cent interest on their investment.

Note: These figures should not be interpreted by themselves, but should be considered with detailed analysis of the entire farm business.

Table I.

Yield per acre, total yield and acreage of
sugar beets.

Greeley Route Farms.

Farm No.	1922			:	1923		
	Yield per Acre	Acres in Beets	Total Yield		Farm No.	Yield per Acre	Acres in Beets
7	16.75	11.21	187.70	5	17.95	17.10	306.97
11	16.66	19.90	331.75	13	16.65	31.70	525.36
14	14.15	31.74	449.07	14	16.43	31.97	525.18
17	14.02	16.46	230.98	16	16.28	23.62	384.69
15	12.32	24.67	301.74	12	16.22	49.81	808.59
18	12.11	6.34	76.77	17	15.44	29.39	453.95
27	10.74	9.44	101.34	25	15.12	14.8	223.74
25	10.72	15.99	171.63	15	15.03	18.71	281.10
12	10.36	55.24	572.63	11	14.91	31.80	473.99
26	10.03	22.48	225.61	26	14.27	27.11	387.22
20	8.23	45.79	376.52	18	14.09	13.06	184.00
16	5.60	20.42	114.42	20	13.66	52.88	722.76
				*27	6.82	7.13	48.59
Avg.	11.23	23.3	----		15.26	26.85	---

*Farm No. 27 had 7.13 acres in beets but harvested only 4.5 acres. Yield per acre was figured on the total area planted rather than acres harvested as cost was figured on total area planted.

Table I shows the yield per acre, beginning with the farm having the highest acre yield and proceeding to the lowest. The acres in beets per farm and total yield for the years 1922 and 1923 are also given.

In 1922 farm No. 7 had the highest yield of 16.75 tons per acre while No. 16 had the lowest yield of only 5.6 tons. In 1923 farm No. 5 had the largest yield of 17.95 tons and farm No. 27 the lowest of 6.82 tons. The average yield in 1922 for the 12 farms was 11.23 tons per acre and in 1923 for the 13 farms the average was 15.26 tons.

Table II gives the actual number of hours of man labor performed per acre of beets on each farm for the years 1922 and 1923 and the rate at which this labor was charged. The labor rate on the average was lower by 2.7 cents per hour in 1923 than in 1922.

It will be observed that the average number of man hours required to grow an acre of beets for both years was practically the same, being 35.35 in 1922 and 35.95 in 1923.

Under the column entitled "actual labor costs compared to computed labor costs per acre" there has been worked out the saving or increased cost for each farm per acre of beets over the actual labor cost. The average labor rate for each year was used as a flat rate to arrive at the greater or lesser labor cost per acre compared to the actual labor cost per acre. In 1922 there were seven farms which saved from 27 cents to \$7.10 per acre by having a lower labor cost per hour than the average while five farms had a greater labor cost of 96 cents to \$4.39 per acre by having a higher labor rate per hour than the average.

In 1923 the thirteen farms were about evenly divided, seven farms having lower actual labor costs per acre due to lower labor rates per hour while six farms had a higher actual labor cost per acre due to higher labor rates per hour.

A study of table II reveals the fact that farms decreased the amount of man labor necessary to produce an acre of sugar beets in 1923 as compared with 1922. There are various reasons for this. Farm No. 11, for example, decreased the man labor in 1923 over 1922 by 7.64 man hours per acre. Upon close analysis it is found that in 1922 it required 8.68 hours to dig an acre of beets while in 1923 it required 3.8 hours or a decrease of 4.8 hours. Cultivation on this farm in 1923 was decreased by one hour per acre over 1922 while irrigating was decreased the same. The year 1922 was exceptionally dry as compared with the year 1923 and more cultivation and irrigation was necessary to hold and supply the needed moisture. Farm No. 11, also, had more acres of beets in 1923 than 1922 due to renting an additional 80 acres and the larger acreage allowed for more efficient labor distribution. Lack of space does not permit analysis of the other farms.

Table II

Direct Man Labor in producing sugar beets.

Greeley Route Farms

1922

Farm No.	Hours per acre	Rate per hour (cents)	Cost per acre	Computed cost per acre @ 36.7¢	Actual labor costs compared to computed cost per acre		Acres in beets
					Less	: greater	
25	27.07	32.7	8.85	9.94	1.09		15.99
12	29.92	33.0	9.87	10.98	1.11		55.24
20	31.51	35.7	11.25	11.56	.31		45.79
15	31.86	42.1	13.41	11.69		1.72	24.67
14	31.96	33.6	10.74	11.73	.99		31.74
16	32.61	48.8	15.91	11.96		3.85	20.42
11	35.17	49.2	17.31	12.91		4.40	19.90
17	38.70	36.0	13.93	14.20	.27		16.46
27	46.08	38.8	17.88	16.91		.97	9.44
7	46.16	41.0	18.92	16.94		1.98	11.21
26	52.26	30.6	15.99	19.18	3.19		22.48
18	67.65	26.2	17.73	24.83	7.10		6.34

Avg. 35.35 36.7 12.96

1923

Farm No.	Hours per Acre	Rate per hour (cents)	Cost per acre	Computed cost per acre @ 34¢	Actual labor costs compared to computed cost per acre		Acres in beets
					less	: greater	
12	23.23	33.8	7.85	7.90	.05		49.81
11	27.53	36.0	9.91	9.36		.55	31.8
13	34.25	41.2	14.12	11.65		2.47	31.7
20	34.81	34.2	11.90	11.84		.06	52.88
25	35.74	37.9	13.55	12.15		1.40	14.8
18	36.90	43.5	16.05	12.55		3.50	13.06
15	36.91	26.9	9.97	12.55	2.58		18.71
16	38.56	27.3	10.53	13.11	2.58		23.62
26	38.58	32.9	12.69	13.12	.43		27.11
17	41.37	32.5	13.44	14.06	.62		29.39
5	44.67	29.7	13.26	15.19	1.93		17.10
14	47.46	33.8	16.05	16.14	.09		31.97
27	60.16	34.1	20.51	20.45		.06	7.13

Avg. 35.95 34.0 12.19

Table III gives the number of hours of horse labor required per acre for each respective farm and the weighted average of all farms for the years 1922 and 1923.

Due to the increased rainfall in 1923 the average number of horse hours for all farms was increased by 9.34 hours or 11.3 per cent. Heavy roads were responsible for more four-horse teams used in hauling whereas two-horse teams did the majority of hauling in 1922. More labor was required in 1923 to break the ground crust formed after each rain resulting in increased horse labor per acre.

Farm No. 25 in 1922 had the lowest number of horse hours per acre while farm No. 27 had the highest. This is partly due to the fact that farm No. 27 has very irregular and small fields while No. 25 has fields which allow for less frequent turning in performing field work.

Farm No. 25 while having only 59.7 horse hours per acre increased the horse labor in 1923 to 91.8 hours or an increase of 32.1 hours. Analysis shows that in 1922 one man and two horses hauled 17 tons of beets per ten-hour day while one man and four horses in 1923 hauled 16 tons per day. In 1922 one man and four horses averaged in pulling beets 2.7 acres but in 1923 one man and three horses averaged 1.6 acres.

Lack of space in this preliminary report prohibits similar analysis of other farms.

Table III

Horse labor hours and cost per acre in producing
sugar beets.

Greeley Route Farms.

1922

Farm No.	Horse hrs. per acre	Total horse hours	Rate per hour (cents)	Total value horse labor	Cost per acre (dollars)	Acres in beets
25	59.7	954	14.4	\$137.37	8.59	15.99
14	61.7	1958	7.4	144.89	4.57	31.74
26	62.5	1405	16.4	230.42	10.25	22.48
7	64.3	721	29.9	215.58	19.23	11.21
11	65.0	1294	13.6	175.98	8.84	19.90
15	65.1	1606	11.7	187.90	7.62	24.67
12	65.9	3639	9.7	352.98	6.39	55.24
17	78.7	1295	10.8	139.86	8.50	16.46
16	84.7	1730	12.4	214.52	10.51	20.42
20	86.6	3963.5	14.1	558.85	12.20	45.79
18	99.2	630	14.5	91.35	14.41	6.34
27	99.8	942	20.8	195.94	20.76	9.44
Avg.	72.0		13.1		9.46	

1923

12	59.1	2943	11.4	335.50	6.74	49.81
11	62.0	1972	12.1	238.60	7.50	31.80
15	65.2	1220	11.2	136.64	7.31	18.71
17	75.3	2213	10.2	225.73	7.68	29.38
27	76.3	541	17.9	96.84	13.58	7.13
13	81.5	2583	10.1	260.88	8.23	31.70
26	32.7	2243	14.9	334.21	12.33	27.11
20	84.3	4455.5	9.8	436.64	8.26	52.83
18	85.0	1110	20.4	226.44	17.34	13.06
25	91.8	1359	14.4	195.70	13.22	14.80
5	102.6	1754	11.8	206.97	12.11	17.10
16	106.5	2516	13.6	342.18	14.49	23.62
14	109.1	3485	9.4	327.59	10.24	31.97
Avg.	81.34		11.9		9.64	

Table IV shows the price per acre and total amount paid for contract labor. The basic price for contract labor in 1922 was \$18 per acre and \$21 per acre in 1923. The reason for differences in price per acre actually paid and contract price per acre is due to differences in the measurement of the number of acres in field. The method here used included the total acres in field irrespective of headlands. Farm No. 26 in 1922 did not hire regular contract labor in thinning, blocking and hoeing. Topping was done by contract at the regular price per acre.

Table IV.

Cost of contract hand labor in producing sugar beets.

Greeley Route Farms

Farm No.	1922		:	Farm No.	1923	
	Cost per acre	Total contract labor cost			Cost per acre	Total contract labor cost
*26	\$14.33	\$322.00	:	27	\$17.17	\$122.42
20	15.57	712.88	:	26	19.64	532.46
12	16.37	904.07	:	20	20.35	1076.33
15	16.78	413.95	:	14	20.37	651.00
18	17.00	107.80	:	18	20.59	268.91
11	17.89	356.04	:	13	20.59	652.76
25	18.00	287.82	:	12	20.65	1028.83
17	18.00	296.29	:	25	21.00	310.80
27	18.10	170.84	:	16	22.09	521.80
7	18.31	205.20	:	17	21.10	620.00
16	18.54	378.50	:	11	21.45	682.00
14	20.24	642.50	:	5	21.52	368.10
			:	15	25.62	479.32
Avg.	17.16				20.95	

*Hired labor @20-25¢ per hour. Topping by regular contract. Did considerable family labor on beets.

Table V.

Total cost of all labor in producing sugar beets

Greeley Route Farms

1922				
Farm No.	Cost Direct Man labor per acre	Cost Horse labor per acre	Cost Contract labor per acre	Total cost all labor per acre
12	9.87	6.39	16.37	32.63
25	8.85	8.59	18.00	35.44
14	10.74	4.57	20.24	35.55
15	13.41	7.62	16.78	37.81
20	11.25	12.20	15.57	39.02
17	13.93	8.50	18.00	40.43
26	15.99	10.25	14.33	40.57
11	17.31	8.84	17.89	44.04
16	15.91	10.51	18.54	44.96
18	17.73	14.41	17.00	49.14
7	18.92	19.23	18.31	56.46
27	17.88	20.76	18.10	56.74
Avg.				39.58

1923				
12	7.85	6.74	20.65	35.24
11	9.91	7.50	21.45	38.86
20	11.90	8.26	20.35	40.51
13	14.12	8.23	20.59	42.94
15	9.97	7.31	25.62	42.90
26	12.69	12.33	19.64	44.66
25	13.55	13.22	21.00	47.77
14	16.05	10.24	20.37	46.66
16	10.53	14.49	22.09	47.11
17	13.44	7.68	21.10	42.22
5	13.26	12.11	21.52	46.89
27	20.51	13.58	17.17	51.26
18	16.05	17.34	20.59	53.98
Avg.				42.78

Table V represents the total labor cost, man, horse, and contract labor in producing an acre of beets. Reasons for variation of total labor cost per acre between the two years and between any two farms in a given year are due to the various rates for man and horse labor, hours required per acre for man and horse and contract price paid.

Table VI.

Seed required in producing sugar beets.

Greeley Route Farms.

1922				1923			
Farm No.	Acres in beets	Total seed lbs.	Pounds per acre	Farm No.	Acres in beets	Total seed lbs.	Pounds per acre
18	6.34	114	17.9	27	7.13	144	20.2
27	9.44	112	11.9	18	13.06	206	15.7
7	11.21	175	15.6	25	14.80	243	16.4
25	15.99	285	17.8	5	17.10	205	11.9
17	16.46	366	22.2	15	18.71	364	19.4
11	19.90	321	16.1	16	23.62	450	19.1
16	20.42	396	19.3	26	27.11	374	13.7
26	22.48	320	14.2	17	29.39	341	11.6
15	24.67	452	18.3	13	31.70	603	19.0
14	31.74	407	12.8	11	31.80	622	19.6
20	45.79	764	16.6	12	49.81	739	14.8
12	55.24	924	16.7	20	52.88	900	17.0
				14	31.97	498	15.6
Avg.			16.6				16.0

The amount of seed sown per acre is found in table VI. The rate of sowing ranged from 22.2 pounds to 11.9 pounds in 1922 and from 19.0 to 11.6 pounds in 1923. Twelve to sixteen pounds per acre seemed to be the rate most frequently used but each farmer has his own preference due to past experience in securing a perfect stand on the particular field sown to beets.

Table VII

Total water costs, water cost per acre in producing sugar beets.

Greeley Route Farms.

1922				1923			
Farm No.	Acres in beets	Total water cost	Water cost per A.	Farm No.	Acres in beets	Total water cost	Water cost per A.
14	31.74	\$22.98	\$.73	14	31.97	\$12.27	\$.45
27	9.44	7.30	.77	20	52.88	20.87	.39
20	45.79	38.80	.85	27	7.13	5.01	.70
7	11.21	10.14	.91	17	29.39	21.84	.74
25	15.99	17.63	1.10	25	14.80	17.65	1.19
12	55.24	68.24	1.24	16	23.62	30.35	1.28
26	22.48	29.72	1.32	15	18.71	27.61	1.47
15	24.67	50.04	2.03	12	49.81	75.13	1.51
11	19.90	44.59	2.24	13	31.7	67.56	2.13
17	16.46	57.44	3.49	18	13.06	31.80	2.43
16	20.42	90.03	4.41	11	31.8	77.41	2.43
18	6.34	32.22	5.08	26	27.11	86.53	3.19
				5	17.10	56.11	3.28
Avg.			1.68	Avg.			1.52

The water cost for irrigation of beets as found in table VII was arrived at as follows: The total costs of water including all extra assessments were proportioned over the total crop area for each farm according to the number of acres in each crop times the number of irrigations applied to each crop. Variations of cost of water per acre are due to the assessments of the many irrigation companies and to the different applications of water applied to each crop.

Farms No. 14 and 7 are so situated that considerable water is available for irrigation, the waste water being caught lower down by ditches and used again. Farms No. 27 and 20 have private sources of irrigation in the way of reservoirs while farm No. 17 pumps water for some land lying above the irrigation ditch. All these farms, however, purchase or own ditch or reservoir water for use during the irrigation season. These factors all influence the cost of water per acre.

Most late or reservoir water is used in the row crops such as beets and potatoes. The number of applications of water to beets is influenced by structure and type of soil and by the location of land whether steep, sloping or level, and by the amount of rainfall each season. Three to five applications of water seem to be the most common for beets.

Table VIII

Machinery costs in producing sugar beets.

Greeley Route Farms.

1922				1923			
Farm No.	Cost per acre	Total cost	Acres in beets	Farm No.	Cost per acre	Total cost	Acres in beets
20	\$1.93	\$88.19	45.79	20	\$1.24	\$65.31	52.88
15	2.08	51.40	24.67	12	1.57	78.43	49.81
12	2.17	119.88	55.24	15	1.94	36.21	18.71
25	2.88	45.99	15.99	26	2.11	57.20	27.11
14	2.98	94.72	31.74	13	2.57	81.74	31.7
16	3.37	68.76	20.42	11	2.78	88.27	31.8
26	3.92	88.12	22.48	25	3.26	48.26	14.8
7	4.36	48.90	11.21	16	4.07	96.15	23.62
17	4.93	81.13	16.46	14	4.31	137.77	31.97
18	5.28	33.48	6.34	17	4.59	135.02	29.39
27	5.52	52.12	9.44	5	4.73	80.92	17.10
11	5.64	112.21	19.90	18	6.14	80.24	13.06
				27	7.19	51.27	7.13
Avg.	3.17				2.97		

Machinery costs per acre of beets grown averaged for all farms in 1922, \$3.17 per acre, and \$2.97 in 1923. Individual costs in 1922 ranged from \$1.93 to \$5.64 and for 1923 \$1.24 to \$7.19 per acre. Machinery costs as shown in table VIII include depreciation and new repairs. Thus the number of acres of beets grown will decrease the machinery costs per acre for the depreciation and cost of new parts will not increase in proportion to the increased number of beets grown. Farms which had the lowest machinery cost per acre had the largest acreage in beets.

Table IX

Total of other costs in producing sugar beets.

Greeley Route Farms.

1922			1923		
Farm No.	Cost per acre	Total of other costs	Farm No.	Cost per acre	Total of other costs
16	\$4.66	\$ 95.11	20	\$5.59	\$295.34
26	5.48	123.03	12	5.61	279.61
11	5.57	110.92	16	5.82	137.56
25	5.86	93.70	26	6.14	166.57
27	6.36	60.08	25	6.48	95.84
20	6.47	296.29	15	6.52	122.00
17	6.63	109.13	11	7.16	227.73
12	6.93	382.68	13	7.21	228.53
14	7.39	234.53	18	9.03	118.09
15	7.49	184.72	14	9.47	302.72
7	8.11	90.92	5	10.12	172.96
18	13.48	85.48	27	11.45	81.68
			17	15.92	467.88
Avg.	6.69			7.72	

Table IX shows the total of other costs per acre of growing beets. These other costs include a proportional charge of use of auto, general building, beet shacks, fences, real estate tax, interest on contract labor, fence charge, man and horse labor charged at their respective rates per hour on the main ditches of the farm and other overhead charges.

The cost per acre of other costs ranged from \$4.66 to \$11.37 per acre in 1922 and from \$4.12 to \$10.96 in 1923. Here again the acres of beets will influence the cost per acre of growing beets.

The method used in distributing the manure costs in this report is on the basis of the fertility removed by each crop and not in proportion to the actual loads of manure applied. For comparison, the loads of manure are shown for those farms which applied manure direct to beet land.

The value of fertility removed varies with the different crops and also with the different yields for the same crop. The method used in this report reduces all yields to a ton basis with a weight or unit given to each ton of product that reflects the relative amount of fertility required for its production.

Table X gives the manurial cost of beets for 1922 and 1923. While only three farms actually applied manure to beets in 1922 and 1923 yet as explained above each crop bears a certain manurial charge each year.

Table X.
Cost of Manure in growing sugar beets.
Greeley Route Farms.

Farm No.	1922		Total manure actually applied (loads) :	Farm No. :	1923		Total manure actually applied (loads)
	Cost per acre	Total cost to beets			Cost per acre	Total cost to beets	
7	\$2.21	\$24.75	--	13	\$1.35	\$ 42.63	--
15	2.41	59.46	--	27	2.03	14.36	--
25	3.33	53.24	28	12	3.56	177.31	--
14	4.38	139.01	--	11	4.13	131.30	--
12	5.12	283.01	--	18	4.42	57.33	--
16	5.70	116.64	--	14	4.37	140.17	--
18	6.00	38.07	--	15	4.53	84.79	--
26	6.05	135.94	--	26	4.72	127.90	--
20	7.13	326.49	96	17	5.10	149.54	144
27	8.12	76.61	102	5	6.01	102.76	--
11	14.09	280.45	--	25	7.55	111.72	50
				20	7.66	405.04	230
				16	8.48	200.29	--
Avg.	5.48		:		5.00		

Table XI

Total operating cost of producing sugar beets.
(Interest excluded)

Greeley Route Farms

Farm No.	1922			:	1923			
	Cost per acre	Cost per ton	Total operating cost		Farm No.	Cost per acre	Cost per ton	Total operating cost
12	\$51.43	\$4.96	\$2841.00	:	12	\$49.72	\$3.06	\$2476.73
25	52.18	4.86	834.34	:	20	57.94	4.24	3063.98
14	53.59	3.79	1700.89	:	11	58.29	3.91	1853.79
15	55.48	4.54	1368.57	:	13	59.05	3.56	1871.98
20	57.90	7.05	2651.06	:	15	60.28	4.02	1127.86
26	59.47	5.93	1336.78	:	26	62.89	4.40	1705.13
17	59.93	4.27	966.37	:	14	67.60	4.12	2161.30
16	66.98	11.96	1367.77	:	25	68.71	4.55	1016.21
11	74.80	4.49	1488.79	:	16	69.62	4.27	1644.53
7	75.17	4.49	842.66	:	17	70.31	4.55	2066.40
27	79.88	7.44	754.07	:	5	72.83	4.06	1245.48
18	82.58	6.82	523.60	:	27	75.66	11.13	539.47
				:	18	78.37	5.56	1023.46
Avg. 59.70		5.32		:		62.44	4.09	

Table XI shows the total cost of beets per acre and per ton, interest excluded. The cost per acre ranged in 1922 from \$51.42 on farm No. 12 to \$83 per acre on farm No. 18, averaging for the group \$59.70. Farm No. 14 had the lowest cost per ton of \$3.79 while farm No. 16 had the highest cost per ton of \$11.96. It will be remembered from table I that farm No. 16 had the lowest tonnage of 5.6 tons which causes so high a cost per ton.

Farm No. 12 in 1923 again had the lowest cost per acre of \$49.70, interest excluded, decreasing the cost over 1922 by \$1.72 per acre. The reasons for this are low man hour requirements per acre together with low machinery, manure, and other costs per acre. This farm had the lowest cost of \$3.06 per ton of beets for the group in 1923 and even decreased its cost per ton over 1922 by \$1.90. This resulted from an increased yield of 5.86 tons per acre over the previous year. Farm No. 18 had the highest cost per acre of \$78.40 per acre for 1923 while farm No. 27 had the highest cost per ton of \$11.13, due to a low yield.

Table XII

Value land per acre and interest cost per acre
(Land and equipment)

Greeley Route Farms

Farm No.	1922				1923				
	Value land per acre	Int.on land per A. 6%	Int.on equip. per A. 6%	Total int. cost per A.:	Value land per acre	Int.on land per A. 6%	Int.on equip. per A. 6%	Total int. cost per A.	
17	\$108	\$6.48	\$.85	\$7.33	:17	\$111	\$6.66	\$.82	\$7.48
27	128	7.68	1.59	9.27	:27	128	7.68	1.78	9.46
20	151	9.06	.43	9.49	:20	151	9.06	.43	9.49
12	190	11.40	.37	11.77	:12	190	11.40	.60	12.00
25	222	13.32	.84	14.16	:13	219	13.14	1.34	14.48
7	253	15.18	1.53	16.71	:25	222	13.32	.83	14.15
26	272	16.32	1.01	17.33	:26	272	16.32	.81	17.13
14	274	16.44	1.17	17.61	:14	274	16.44	1.16	17.60
16	300	18.00	1.05	19.05	: 5	292	17.52	1.33	18.85
15	309	18.54	.31	18.85	:16	300	18.00	.74	18.74
18	326	19.56	1.72	21.28	:15	309	18.54	.47	19.01
11	466	27.96	1.58	29.54	:18	326	19.56	1.14	20.70
					:11	412	24.72	.66	25.38
<hr/>									
Avg.	238.50	14.31	.84	15.15	:	238	14.30	.83	15.13

The value of land per acre, and the interest cost per acre for land, equipment and total interest cost are found in table XII. The value of land ranges on the different farms from \$108, the lowest, to \$466 per acre for the highest. The value of land for each farm was based on the cropped acres. Farm No. 17 increased land value by cropping additional land of higher value.

The average interest cost per acre for both land and equipment for the years 1922 and 1923 was identical, being \$15.15 per acre. Interest on land is one of the largest single factors in the cost of producing sugar beets, being exceeded only by man labor cost.

Table XIII

Total operating cost of producing sugar beets
(Interest included)

Greeley Route Farms.

Farm No.	1922			:	Farm No.	1923		
	Cost per acre	Cost per ton	Total operating cost			Cost per acre	Cost per ton	Total operating cost
12	\$63.20	\$6.10	\$3491.27	:	12	\$61.72	\$3.06	\$3074.39
25	66.34	6.18	1060.80	:	20	67.43	4.93	3565.59
17	67.26	4.79	1107.05	:	13	73.53	4.44	2330.87
20	67.39	8.20	3085.78	:	17	77.79	5.04	2286.24
14	71.20	5.03	2259.88	:	15	79.29	5.28	1483.60
15	74.33	6.08	1833.79	:	26	80.02	5.60	2169.43
26	76.80	7.66	1726.42	:	25	83.06	5.50	1229.29
16	86.03	15.35	1756.87	:	11	83.67	5.62	2660.74
27	89.15	8.30	841.60	:	14	85.20	5.19	2723.99
7	91.88	5.48	1029.92	:	27	85.12	12.49	606.92
18	103.86	8.58	658.50	:	16	88.36	5.43	2087.19
11	104.34	6.26	2076.64	:	5	91.68	5.11	1567.77
				:	18	99.07	7.03	1293.89
Avg.	74.85	6.67		:		77.57	5.08	

The average total cost per acre of beets, interest included, for the years 1922 and 1923 was \$74.85 and \$77.52 as shown in table XIII. Farm No. 12 had the lowest total cost per acre for both years while farm No. 11 had the highest cost of \$104.40 in 1923 and farm No. 18 the highest cost in 1923 of \$99.10 per acre. The lowest cost per ton was \$4.79 in 1922 and \$3.80 in 1923 while the highest cost per ton was \$15.35 in 1922 and \$12.50 in 1923. The acreage cost per ton in 1923 was lower by \$1.59 than in 1922.

Table XIV

Relationship of yield per acre to cost per ton
Greeley Route Farms.

Farm No.	1922		:	Farm No.	1923	
	Yield per acre	Cost per ton int. incl.			Yield per acre	Cost per ton int. incl.
16	5.60	\$15.35	:	27	6.82	\$12.49
20	8.23	8.20	:	20	13.66	4.93
26	10.03	7.66	:	18	14.09	7.03
12	10.36	6.10	:	26	14.27	5.60
25	10.72	6.18	:	11	14.91	5.62
27	10.74	8.30	:	15	15.03	5.28
18	12.11	8.58	:	25	15.12	5.50
15	12.32	6.08	:	17	15.44	5.04
17	14.02	4.79	:	12	16.22	3.06
14	14.15	5.03	:	16	16.28	5.43
11	16.66	6.26	:	14	16.43	5.19
7	16.75	5.48	:	13	16.65	4.44
			:	5	17.95	5.11

The yield per acre shows a strong influence upon the cost per ton as shown in table XIV. A study of table XIV shows that low yields result in high costs per ton and high yields low costs per ton. This fact is more clearly illustrated in the following table.

Table XV.

Relation of yield to cost per ton, sugar beets.

Range of yield (tons)	1922			:	Range of yield (tons)	No. of records	1923	
	No. of records	Avg. yield (tons)	Avg. cost per ton				Avg. yield (tons)	Avg. cost per ton
5 to 6.99	1	5.60	\$15.35	:	5 to 6.99	1	6.82	\$12.50
7 to 8.99	1	8.23	8.20	:	7 to 8.99	--	--	--
9 to 10.99	4	10.36	6.64	:	9 to 10.99	--	--	--
11 to 12.99	2	12.20	6.58	:	11 " 12.99	--	--	--
13 to 14.99	2	14.10	4.96	:	13 " 14.99	4	14.16	5.48
15 to 16.99	2	16.70	5.98	:	15 " 16.99	7	16.01	4.75
				:	17 " 18.99	1	17.95	5.10

Table XVI

Relationship of yield per acre and cost per acre
in producing sugar beets.

Greeley Route Farms.

Farm No.	Yield per acre	Cost per acre int. incl.	:	Farm No.	Yield per acre	Cost per acre int. incl.
16	5.60	\$86.00	:	27	6.82	\$85.10
20	8.23	67.40	:	20	13.66	67.40
26	10.03	76.80	:	18	14.09	99.10
12	10.36	63.00	:	26	14.27	80.00
25	10.72	66.30	:	11	14.91	83.70
27	10.74	89.20	:	15	15.03	79.30
18	12.11	103.70	:	25	15.12	83.00
15	12.32	74.40	:	17	15.44	77.80
17	14.02	67.20	:	12	16.22	61.70
14	14.15	71.20	:	16	16.28	88.40
11	16.66	104.40	:	14	16.43	85.10
7	16.75	91.80	:	13	16.65	73.50
			:	5	17.95	91.60

There is no direct relationship between yields per acre and cost per acre as is borne out in table XVI. The cost of equipment charges, land charges, horse and man labor charges do not proportionally increase or decrease with low yields or high yields as is found true when comparing costs per ton and yields per acre. It costs practically as much to grow an acre of beets yielding 8 to 10 tons as 15 or 16 tons since seed, depreciation, and interest costs remain the same.

Since the introduction of sugar beets in Northern Colorado, twenty-three years ago, considerable information has been gathered as to the best cultural methods for the growing and care of the sugar beet crop. No attempt is made in this report to say what are the best methods. In the area studied it is quite common to follow potatoes with beets insofar as the soil in Weld County seems adapted to both beets and potatoes. The practice of planting beets after potatoes will explain why so few of the farmers plowed land in preparation of seed bed. The potato land, being stirred late in the fall by harvesting and the cultivation during the summer months, seems to have led to the belief that the soil is in as good a condition for beets as if the land had been plowed. However this belief seems to be gradually waning and fall plowing, even the potato land, is being practiced by many.

The common method at present is to manure potato land, springtooth harrow this land the following spring after a crop of potatoes has been raised, level and then plant the beet crop. This practice allows for early spring seeding which is highly essential if good yields are to be secured. The rush and lateness of fall work in harvesting both potatoes and beets, this work often being extended to as late as November 15th or 20th for the beet crop, leaves but a very short time for fall plowing.

Rolling before or after planting or harrowing after planting is practiced when the early growing season is especially dry or the rainfall light and frequent and a crust tends to form over the surfaces which hinders growth of the young plant.

Cultivating, ditching and irrigation is quite varied, depending on rainfall, soil types and the farmer's experience over past years.

Table XVII

Cultural practice in growing sugar beets.

Greeley Route Farms

1923

Farm No.	Plow	Disc before plow	Spring too-th.	Har-row before pl-ant	Roll before pl-ant	Lev-el	Pl-ant	Har-row after pl-ant	Roll after pl-ant	Dit-ch	Cul-ti-vate	Irri-ga-te	Sp-ray
27			2.	1		2.	1		3	1	4	1	1
20	1	1	2.	2		1.	1		1	2	5	3½	
18			2.	2		1.	1	1.		1	3	4	
26			2.			1.	1			1	5	4	
11			1.			1.	1			2	4	5	
15			1.	1			1			2	4	4	
25	1		1.	1	1	1.	1			3	5	5	
17	1	2		4		2.	1	1		2	5	2	
12			1	2			1			1	5	3½	
16		2		1			1			1	6	5	
14			2	1	1	1	1			2	3½	2	
13	1		1.	2		2.	1		1	1	4	4	
5			1½	1			1		1	1	5	4	

Table XVII shows the cultural practice of growing beets for each farm for the year 1923. No cultural practice was obtainable for the year 1922 so no comparison could be made between the two years studied. The cultural practice for the several farms could not be found to have had any great influence on the yield per acre. For example, farm No. 5 irrigated five times and cultivated four times and had a yield of 17.95 tons per acre. Farm No. 26 irrigated and cultivated the same number of times and had a yield of 14.27 tons per acre.

Table XVIII. Summary of all costs.

Greeley Route Farms
1922

Farm No.	Man labor per acre	Horse labor per acre	Contract labor per acre	Seed per acre	Water per acre	Machinery per acre	Other costs per acre
12	\$ 9.87	\$ 6.39	\$16.37	\$3.34	\$1.24	\$2.17	\$6.93
25	8.85	8.59	18.00	3.57	1.10	2.88	5.86
17	13.93	8.50	18.00	4.45	3.49	4.93	6.63
20	11.25	12.20	15.57	2.50	.85	1.93	6.47
14	10.74	4.57	20.24	2.56	.73	2.98	7.39
15	13.41	7.62	16.78	3.66	2.03	2.08	7.49
26	15.99	10.25	14.33	2.13	1.32	3.92	5.48
16	15.91	10.51	18.54	3.88	4.41	3.37	4.66
27	17.88	20.76	18.10	2.37	.77	5.52	6.36
7	18.92	19.23	18.31	3.12	.91	4.36	8.11
18	17.73	14.41	17.00	3.60	5.08	5.28	13.48
11	17.31	8.84	17.89	3.22	2.24	5.64	5.57
Avg.	12.96	9.46	17.16	3.12	1.68	3.17	6.67

Table XVIII. Summary of all costs.

Greeley Route Farms
1922

Farm No.	Manure per acre	Total cost per acre interest excluded	Total interest cost per acre	Total cost per acre interest included	Total cost per ton interest included
12	\$ 5.12	\$51.43	\$11.77	\$63.20	\$ 6.10
25	3.33	52.18	14.16	66.34	6.18
17	---	59.93	7.33	67.26	4.79
20	7.13	57.90	9.49	67.39	8.20
14	4.38	53.59	17.61	71.20	5.03
15	2.41	55.48	18.85	74.33	6.08
26	6.05	59.47	17.33	76.80	7.66
16	5.70	66.98	19.05	86.03	15.35
27	8.12	79.88	9.27	89.15	8.30
7	2.21	75.17	16.71	91.88	5.48
18	6.00	82.58	21.28	103.86	8.58
11	14.09	74.80	29.54	104.34	6.26
Avg.	5.48	59.70	15.15	74.85	6.67

Table XVIII Cont. Summary of all costs.

Greeley Route Farms.
1923

Farm No.	Man labor per acre	Horse labor per acre	Contract labor per acre	Seed per acre	Water per acre	Machin-ery per acre	Other costs per acre
12	\$ 7.85	\$6.74	\$20.65	\$2.23	\$1.51	\$1.57	\$5.61
20	11.90	8.26	20.35	2.55	.39	1.24	5.59
13	14.12	8.23	20.59	2.85	2.13	2.57	7.21
17	13.44	7.68	21.10	1.74	.74	4.59	15.92
16	9.97	7.31	25.62	2.92	1.47	1.94	6.52
26	12.69	12.33	19.64	2.07	3.19	2.11	6.14
25	13.55	13.22	21.00	2.46	1.19	3.26	6.48
11	9.91	7.50	21.45	2.93	2.43	2.78	7.16
14	16.05	10.24	20.37	2.34	.45	4.31	9.47
27	20.51	13.58	17.17	3.03	.70	7.19	11.45
16	10.53	14.49	22.09	2.86	1.28	4.07	5.82
5	13.26	12.11	21.52	1.80	3.28	4.73	10.12
18	16.05	17.34	20.59	2.37	2.43	6.14	9.03
Avg.	12.19	9.64	20.95	2.45	1.52	2.97	7.72

Table XVIII Cont. Summary of all costs.

Greeley Route Farms.
1923

Farm No.	Manure per acre	Total cost per acre interest excluded	Total interest cost per acre	Total cost per acre interest included	Total cost per ton interest included
12	\$3.56	\$49.72	\$12.00	\$61.72	\$3.06
20	7.66	57.94	9.49	67.43	4.93
13	1.35	59.05	14.48	73.53	4.44
17	5.10	70.31	7.48	77.79	5.04
15	4.53	60.28	19.01	79.29	5.28
26	4.72	62.89	17.13	80.02	5.60
25	7.55	68.71	14.35	83.06	5.50
11	4.13	58.29	25.38	83.67	5.62
14	4.37	67.60	17.60	85.20	5.19
27	2.03	75.66	9.46	85.12	12.49
16	8.48	69.62	18.74	88.36	5.43
5	6.01	72.83	18.85	91.68	5.11
18	4.42	78.37	20.70	99.07	7.03
Avg.	5.00	62.44	15.13	77.57	5.08

Table XIX

Profit or loss per ton and acre of beets.

Greeley Route Farms.

1922				
Farm No.	Cost per ton	Profit or loss per ton	Yield per acre	Profit per acre
17	\$4.79	\$3.09	14.02	\$44.32
14	5.03	2.85	14.15	40.33
7	5.43	2.40	16.75	40.20
15	6.08	1.80	12.32	22.18
12	6.10	1.73	10.36	18.44
25	6.18	1.70	10.72	18.22
11	6.26	1.62	16.66	26.99
26	7.66	.22	10.03	2.21
20	8.20	-.32	8.23	- 2.63
27	8.30	-.42	10.74	- 4.51
18	8.58	-.70	12.11	- 8.48
16	15.35	-7.47	5.60	-41.83
Avg.	6.67	1.21	11.23	13.59

1923				
12	\$3.06	\$5.13	16.22	\$83.21
23	4.44	3.75	16.65	62.44
20	4.93	3.26	13.66	44.53
17	5.04	3.15	15.44	48.64
5	5.11	3.08	17.95	55.29
14	5.19	3.00	16.43	49.29
15	5.28	2.91	15.03	43.74
16	5.43	2.76	16.28	44.93
25	5.50	2.69	15.12	40.67
26	5.60	2.59	14.27	36.96
11	5.62	2.57	14.91	38.32
18	7.03	1.16	14.09	16.20
27	12.49	-4.30	6.82	-29.33
Avg.	5.08	3.11	15.26	47.46

The profit or loss per ton and per acre of beets is found for years 1922 and 1923 in table XIX.

There were four farmers who failed to return a profit per ton and per acre on beets grown in 1922 while only one farmer failed to return a profit in 1923, when interest on land is figured at 6 per cent. If interest had not been figured every farm except No. 16 in 1922 and farm No. 27 in 1923 would have shown a return for use of land. The price recieved per ton of beets in 1922 was \$7.88 and \$8.19 in 1923.

Conclusion

Prior to the growing of sugar beets in Northern Colorado there was no row crop that could be successfully grown as a cultivated crop except potatoes in limited areas. Sugar beets have aided considerably in ridding land of wild oats and other foul weeds. It fits in the crop rotation as practiced by the farmers of Northern Colorado. Considerable feed value is derived from the tops which are either hauled and fed or pastured by sheep and cattle. The practice of feeding combined with growing beets has brought about the more extensive use of farm manure which has in some measure maintained the fertility of Northern Colorado farms. The income from the sale of beets in the fall has aided considerably in the practice of feeding sheep or cattle as this income, being certain due to a basic price per ton thru agreement of growers and the Great Western Sugar Company, is used to buy either feeder sheep or cattle or to buy supplementary concentrates for this feeder stock.

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