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Economic Crop Alternatives for Dry Farm Areas of Northern Utah

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ECONOMIC CROP ALTERNATIVES FOR DRY FARM AREAS OF NORTHERN UTAH

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SUMMARY OF FINDINGS

Dry land farming is an essential part of the economy of northern Utah. With wheat in surplus production and subsequent crop controls a serious problem has developed in the area. The State Agricultural Statistician and the Agricultural Stabilization and Conservation Committee report that between thirty thousand and forty thousand acres have been taken from wheat production and are available for crops other than wheat.

Crops which can be raised successfully in northern Utah dryland areas are few. Barley has been the main crop substituted for wheat. Safflower, a plant whose seeds are used in production of a valuable oil, was introduced in the area in 1957.

In the fall and winter of 1957 and 1958, a survey was made of 25 safflower growers who had signed for a crop of 50 acres or more, 30 wheat producers, and 25 barley producers. Costs and returns on their enterprises were calculated and comparisons made.

In the area studied, average wheat yields were 19.6 bushels per acre. Average costs per acre was $25.24, and net returns amounted to $12.67 per acre of crop.

The average yield of barley was 32.6 bushels per acre, with average costs of $20.64. The net return per acre amounted to $5.76.

The average yield of safflower was 517 pounds per acre. Average cost per acre to produce the safflower was $18.03 with a net return of 10 cents since the receipts amounted to $18.13. However, there was evidence that in some cases the safflower was planted on land well below average in productivity. Net returns and losses were found on farms in all areas.

In comparing the three crops studied, wheat, barley, and safflower, net return from wheat was superior to that from either of the other crops. However, since the farmer cannot plant all his available acres to wheat, he needs to know which crop offers the best alternative.

Under 1957 conditions of production and price, barley was more profitable than safflower on most farms studied. But the first year of raising safflower proved quite definitely that it does have a place in dry land farming. It was not a wonder crop which will grow on land hitherto incapable of producing a crop, but it will compete with other crops when grown on good land with good production practices.

The study showed that it was more profitable to raise crops of barley or safflower on acres diverted from wheat production than to allow the land to lie idle.

To maximize net return a dry farm farmer in northern Utah should plant wheat in his entire allotment and grow barley or safflower on the remaining available acres of his farm. Whether he grows safflower or barley should be determined by the type of soil, the amount of precipitation, and his personal preference.

INTRODUCTION

Receipts from dryland crops have totaled about five million dollars annually in recent years in Box Elder-Cache County area. This has been around 20 percent of the total value of all farm products sold in the two county area. Winter wheat has been the most important crop raised in the dry land areas. It has accounted for two-thirds of the total cash crop income in these areas. Because of surpluses of wheat in the United States, the number of acres grown has been restricted beginning in 1954. The basic problem of farmers has been to maintain their income at satisfactory levels when they reduce their production of wheat. This problem has been especially acute in northern Utah and similar areas because of the limited number of alternative crops which could be grown.

We report here our study of alternative crop possibilities with two primary objectives in mind. First, to determine the economics of production for wheat, barley, and safflower. Second, to determine under what conditions of production and price, safflower and barley could become economic substitutes for one another and for wheat on northern Utah dryland areas.

The crop possibilities studied were limited to wheat, barley, and safflower, as these crops are usually adapted to this area. We have purposely omitted alfalfa and alfalfa seed production as these seem not to be real possibilities in parts of northern Utah. We have purposely omitted considerations of the government programs of soil-bank or acreage reserve. We do not know the future of these programs and have no way of predicting what changes may occur. A farmer knowing the real crop production alternatives would then be able to compare the results that might be obtained from enlisting his acres in any government program that might be developed in the future.

Our first problem was to get production information on the crops that could be grown in this area. Wheat was the most important crop. Barley has been most commonly raised in dry land areas diverted from wheat and it has been about the only alternative crop. During the winter of 1956 and 57 however, a drive was undertaken to interest farmers in raising safflower. Before that time safflower had been raised only on a limited experimental basis in the area. A vegetable oil company contracted for clean safflower seed at $70 per ton to be grown during the summer of 1957. Seed was provided for growers at $8 per 100 pounds. This seemed like a possible new crop since the same machinery was used for its production as for wheat.

We concentrated our effort in studying dry farm crop production in the eastern half of Box Elder County and the western part of Cache County. The study includes those crops which depend entirely on precipitation for moisture. Average precipitation over the area varied from 12 to 18 inches per year.

The basic information obtained for this study came from survey records of 30 wheat producers, 25 barley producers, and 25 safflower producers. For wheat and barley records we looked for producers whom we thought would be typical. In the case of safflower we went to all producers we could locate who had 25 or more acres during the crop year.

Our survey records were designed to obtain the amount and cost of all inputs in production and the output and its value. With this information we could calculate the profitableness of production for each producer and for the group.

Similar practices for wheat production were followed throughout the dry-land areas we studied. Most farmers planted about half of their cultivated land each year and left the rest in fallow. In this way their work was about the same each year.

Farmers contacted harvested an average of 184 acres of wheat per farm in 1957, or 26 percent of their land area. The balance was either in barley, safflower, alfalfa, or idle.

The most common type of plow used was the digger which loosened the soil without plowing under the stubble. The land was plowed in the fall or the next spring after harvest. The fallow land was cultivated with weeders. Wheat was usually planted in September and harvested the next year in late July or early August.

At harvest time the wheat was either hauled to an elevator by trucks or stored on the farm. We ended our concern with production when the crop had been harvested and delivered to some point for sale or storage.

Costs of Production

We have included all costs chargeable to the 1957 wheat crop as obtained from our survey. In order to simplify presentation, costs have been classified as material costs, depreciation and repairs, labor, interest on capital invested, and property taxes.

In material costs we have included seed, fuel, oil and grease, and miscellaneous. Costs included as miscellaneous were fertilizer, crop insurance, cost of custom work over the cost of labor, and incidental expenses.

Seed was planted at an average rate of 72 pounds per acre at a cost of $2.75. When the farmer purchased seed, the actual price was recorded. If he used his own grain, the market price plus cleaning and treating fees were used as the cost. We found the average cost of seed for the area was $2.30 per bushel or an average of $.14 per bushel of wheat produced.

Fuel, which included gasoline and diesel fuel, cost $1.24 per acre of wheat produced. Gasoline was used in trucks, combines, and some tractors. Diesel fuel was used in most tractors and two or three trucks. Four gallons of diesel fuel and 1.9 gallons of gasoline were used per acre of wheat produced at a price of $.17 1/2 and $.28 per gallon, respectively.

The value of oil and grease used amounted to $.34 per acre, or about $.02 per bushel of wheat produced.

Only six growers reported using fertilizer. One farmer used barnyard manure and the other five used commercial fertilizers containing only nitrogen. No phosphorus nor potassium was applied. Fertilizers accounted for 44 percent of miscellaneous costs. Costs for custom work other than labor totaled 50 percent of miscellaneous costs, and the remainder included crop insurance and incidental expenses. The total miscellaneous costs were $.82 per acre, or $.04 per bushel of wheat produced.

Material cost totaled $5.16 per acre, or $.26 per bushel of wheat produced. This amount was 20.3 percent of the total cost of production.

We depreciated machinery by using the "straight line depreciation method." We used 6 percent of the purchase price per year for machines with moving parts and 4 percent of the purchase price annually for machines with stationary parts. Only the percent a machine was used for

wheat was charged to wheat, and that amount was depreciated rather than the full purchase price. The average beginning inventory value of machinery per farm was $10,496. Of this amount, 53 percent, or $5,592, was charged to wheat.

wheat required an average of 2 man-hours of labor. This measure includes the wheat and an acre of fallow. Under the summer fallow system it took two acres of ground to produce one acre of crop each year. At an hourly rate of $1, the total cost of labor to produce one acre of wheat was $2.00, or $.11 per bushel.

Table 1. Value of machinery used for dryland wheat production in northern Utah

	Avg. per farm	Percent charged to wheat	CHARGED TO WHEAT		
			Avg. per acre wheat	Avg. rep.s per acre	Avg. depr. per acre
	dollar	dollar	dollar	dollar	dollar
Plows	843	63	2.88	.22	.18
Harrows	95	59	.30	.02	.02
Discs	223	55	.67	.02	.06
Weeders	284	59	.91	.11	.09
Drills	526	61	1.73	.10	.16
Combines	3,295	53	9.55	.50	.90
Tractors	3,832	56	11.68	.43	1.05
Trucks	1,398	35	2.66	.23	.28
Total	10,496	53	30.39	1.63	2.75
Machine shed	571	54	1.68		.10

Building depreciation was a small item of cost and amounted to less than 1 percent of the total. The only buildings we considered for this enterprise were machine sheds. We found the average value of machine sheds per farm was only $571, with $326 per farm charged to wheat. We depreciated machine sheds at 3 percent of the building cost per year. It amounted to $.10 per acre, or less than $.01 per bushel of wheat produced.

Machine repairs charged to wheat were $1.62 per acre of wheat produced. Repairs included cost of parts replaced, materials used to repair machinery, and mechanics' wages. Machinery repairs cost $.08 per bushel of wheat produced. Machine repairs and depreciation together amounted to $4.38 per acre, or $.23 per bushel of wheat.

Our study showed that an acre of

Hired labor accounted for 23 percent, or .5 man-hours, per acre of wheat produced. The other 1.6 man-hours per acre, or 77 percent, were performed by the operator and his family (table 2). Since most work on dryland farms was done with machinery, a child was able to do almost as much work as a man. However, where a child did only part of what a man could do, we adjusted the figures to a man equivalent. The 1.6 man-hours per acre for operator and family labor represent 1.6 full man-hours of work.

The largest single cost was interest on the capital invested, which accounted for 45.7 percent of the total. This was calculated by charging 6 percent interest on capital invested in land and machinery. Since the land was summer fallowed, we considered capital for two acres of land for each acre of wheat produced. Value per acre of land equaled $81.25. When

Table 2. Man-hours of operator and family labor and hired labor spent per acre of wheat in dryland areas of northern Utah, 1957

	Hired per acre	Operator & family per acre	Total man-hours per acre	Percent hired	Percent each operation is of total
	man-hours	man-hours	man-hours	percent	percent
Plowing and digging	.16	.44	.60	27	30
Disc and harrowing	.02	.19	.21	10	10
Weeding	.12	.24	.36	33	18
Drilling	.02	.20	.22	9	11
Harvesting	.09	.27	.36	25	18
Hauling	.08	.17	.25	32	13
Total	.49	1.51	2.00	25	100

this was doubled and $30.39 worth of machinery was added, a total of $192.89 was obtained. Six percent of this total gave us the $11.57 charged for interest on investment.

Interest on money that was invested in the crop was $.45 per acre of wheat. We arrived at this by charging 7 percent interest on value of all inputs from the time of use until the value could be recovered when the crop was harvested. This cost amounted to $.02 per bushel of wheat produced.

Taxes on land and equipment accounted for 6.2 percent of the total cost of production, or $1.57 per acre of wheat harvested. We obtained tax figures from the farmer as he attempted to apportion the total tax charges against the land used for wheat production. We checked these against assessed valuation and mill levies for the area. Property taxes amounted to $.08 per bushel of wheat produced (table 3).

Return From Wheat Production

The average yield of wheat on the northern Utah dry-land farms we studied was 19.6 bushels per acre. The average price was $1.93 per bushel. We obtained this figure from actual prices received by farmers for wheat sold or the market price at the time of harvest in case of storage. Receipts per acre totaled $37.91. Total costs per acre were $25.34; the net return was $12.57 per acre. This represented the amount left to the farmer after all costs including his non-cash contributions to the 1957 crop of wheat were paid. These included material costs, insurance, custom labor, operator and hired labor, machine and building depreciation and repairs, interest on capital, and money invested in the crop and taxes.

DRY-LAND BARLEY PRODUCTION

We found that barley had not been raised extensively on dry-land farms in northern Utah until acreage allotments were put on wheat in 1954. Since then, it has been produced on most farms.

Most barley planted was spring barley, planted in the spring and harvested the following summer. The practices used in producing barley were similar to those of wheat. After harvest

Table 3. Cost, receipts, and net return from wheat production in dryland areas of northern Utah in 1957

Item	Per acre		Amount per bushel	Percent of total
	Quantity	Amount		
		dollars	dollars	dollars
Material				
Seed	1.2 bushels	2.75	.14	10.9
Fuel	1.9 gal. gas; 4 gal. fuel	1.24	.06	4.9
Oil and grease		.34	.02	1.4
Miscellaneous		.82	.04	3.2
Total material		5.16	.26	20.3
Machine depreciation 6% purchase price		2.76	.14	10.9
Machine repairs		1.62	.08	6.4
Building depreciation 3% purchase price (machine shed)		.11	.01	.4
Total depreciation and repairs		4.49	.23	17.7
Hired labor	.5 hr.	.49	.03	1.9
Operator and family labor	1.5 hr.	1.51	.08	6.4
Total labor		2.00	.11	8.3
Interest on capital invested	6% of $192.89	11.57	.59	45.7
Interest on money in crop	7% of money invested	.45	.02	1.8
Total interest		12.02	.61	47.5
Taxes	$.785	1.57	.08	6.2
Total costs		25.24	1.29	100.0
Receipts	19.6 bu.	37.91	1.93	--
Net return		12.67	.64	--

the land was loosened with a digger plow in the fall or the next spring, depending upon moisture conditions and how much time the farmer had.

The summer after harvest the land was cultivated two or three times with weeders to kill the weeds and to keep the ground surface loose. The following spring the land was cultivated or disked and then drilled. Deep furrow drills were most widely used, although press-wheel and double disk drills were used by some farmers.

Most farmers harvested their barley in August with self-propelled combines. These machines cut a swath 12 to 14 feet wide and cut from 20 to 50 acres a day, depending upon the conditions of the crop, weather, and machine used.

Most of the crop was sold to dealers, and the grower kept some for livestock and dairy enterprises.

Costs of Production

We have made the same cost classifications for barley as we used for wheat.

Seed was planted at an average rate of 54 pounds per acre at a cost of $1.34. The cost for seed averaged $1.20 per bushel, or $.04 per bushel of barley harvested.

In 1957, fuel cost the farmer $.99 for each acre of barley produced. This was the cost for one acre of barley plus one acre of fallowed ground. The $.99 for fuel was spent for 1.5 gallons of gasoline and 3.3 gallons of diesel fuel per acre. The average prices paid were $.175 per gallon of diesel fuel and $.28 per gallon of gasoline. Fuel cost $.03 per bushel of barley produced.

We found the oil, grease, and filters cost was $.26 per acre of barley produced, or about $.01 per bushel harvested.

The total of miscellaneous costs was $.36 per acre of barley grown, or $.01 per bushel produced.

Material costs totaled $2.95 per acre, or $.09 per bushel of barley produced, and amounted to 14.4 percent of the total cost of producing barley.

We found machinery depreciation amounted to 10.3 percent of total costs, and machinery repairs accounted for an additional 5 percent.

Our study revealed the average value of machinery per farm after depreciating the purchase prices to 1957 was $11,774. Twenty-eight percent of this value was charged to wheat and other enterprises. Value of machinery charged to each acre of barley produced was $23.05 (table 4).

Building depreciation was a small item because we considered only machine sheds. Their average value per farm charged to barley was $224. Depreciation was calculated at 3 percent of the building cost per year and amounted to $.08 per acre of barley raised.

An average of 1.9 man-hours was spent to produce an acre of barley. This was the time taken to care for the acre of barley and the additional fallowed acre. At an hourly rate of $1.00, it cost $1.92 for all labor to produce an acre of

Table 4. Value of machinery used for dryland barley production in northern Utah, 1957

	Avg. per farm	Percent charged to barley	CHARGED TO BARLEY		
			Avg. per acre	Repairs per acre	Depr. per acre
	Dollar	Percent	Dollar	Dollar	Dollar
Plows	917	29	1.86	.11	.12
Harrows	87	30	.18	--	.01
Discs	204	43	.60	.03	.05
Weeders	295	33	.67	.07	.06
Drills	578	29	1.15	.05	.11
Combines	3,785	32	8.39	.38	.73
Tractors	4,477	26	7.88	.18	.75
Trucks	1,431	23	2.32	.20	.27
Total	11,774	28	23.05	1.02	2.10
Machine shed	840	27	1.54	--	.08

barley. This amounted to $.05 per bushel of barley harvested.

Twenty-four percent of the labor used was hired. The other 76 percent was provided by farm operators and their families. Where children worked on the enterprise, we adjusted their work according to how much they accomplished in relation to a man-hour. Hired labor contributed .44 man-hours per acre, and operator and family labor accounted for the other 1.48 man-hours to produce an acre of barley (table 5).

Table 5. Man-hours spent per acre of barley grown in dryland areas of northern Utah, 1957

	Hired per acre	Operator & family per acre	Percent hired	Total man-hours per acre	Percent each is of total
	hours	man-hours	percent	man-hours	percent
Plowing and digging	.16	.45	26	.61	29.7
Discing and harrowing	.02	.16	12	.18	10.6
Weeding	.14	.24	37	.38	16.2
Drilling	.02	.18	11	.20	11.3
Harvesting	.03	.31	7	.34	19.3
Hauling	.07	.15	50	.22	12.8
Total	.44	1.49	23	1.93	100.0

Interest on capital invested was the largest single cost and accounted for 54.2 percent of the total cost of producing barley. We charged six percent interest on capital invested in land and machinery. Because of fallowing, we charged interest on two acres of land for each acre of crop. This was added to machinery investment, and 6 percent interest was charged on the total. The land planted to barley was valued at $80 per acre. The two acres of land together with the machinery, totaled $185. Interest on investment per acre was $11.08 per acre, or $.34 per bushel of barley produced.

Interest on money in the crop amounted to only $.21 per acre or less than $.01 per bushel of barley produced. This value we obtained by charging 7 percent interest on charges accrued and money paid out for production costs from the time the debt was incurred until the crop was harvested.

Taxes on land and equipment accounted for 6.3 percent of the total production cost or $1.28 per acre of barley. This amounted to about $.04 per bushel of barley harvested.

Total cost per acre of barley planted was $20.64 or $.63 per bushel harvested (table 6).

Return from Barley

The average yield of barley on farms in our study was 32.6 bushels per acre. The 1957 yield was above average because of favorable precipitation during the growing season. However, the high yield was offset by a price well below the past ten-year average, $1.15 per bushel. This was also below the state average of $.87 for 1957.

Receipts per acre of barley planted were $26.40; costs totaled $20.44, leaving a net return of $5.96 per acre. The cost per bushel was $.63 and receipts were $.81, allowing a net return of $.18 per bushel produced.

Net return represented the amount left to the farmer after all costs of the 1957 crop were allowed.

Table 6. Costs, receipts, and net returns from barley in dryland areas of northern Utah in 1957

Item	Per acre		Amount per bushel	Percent of total cost
	Quantity	Amount		
		dollars	dollars	percent
Material				
Seed	54 pounds	1.34	.04	6.5
Fuel	3.3 gal. diesel fuel			
	1.5 gal. gasoline	.99	.03	4.8
Oil and grease		.26	.01	1.3
Miscellaneous		.36	.01	1.8
Total material		2.95	.09	14.4
Machine depr.	6% & 4% of purchase price	2.10	.07	10.3
Machine repairs		1.02	.03	5.0
Building depr.	3% of building price	.08	--	.4
Total Depr. and repairs		3.20	.10	15.7
Hired labor	.44 hours	.44	.01	1.1
Operator and family	1.48 hours	1.48	.04	7.3
Total labor	1.72 hours	1.72	.05	8.4
Interest on capital investment	6% land and machinery	11.08	.34	54.2
Interest on money in crop	7% investment	.21	.01	1.0
Total interest		11.29	.35	55.2
Taxes	$.64 per acre	1.28	.04	6.3
Total costs		20.64	.63	100.0
Receipts	32.6 bu.	26.40	.81	--
Net return		5.76	.18	--

DRYLAND SAFFLOWER PRODUCTION

Safflower producers employed methods and practices similar to those for barley and used the same machinery.

Most of the land planted to safflower in 1957 was fallowed in 1956. Before being planted, most of the land was plowed with diggers or disks and harrowed. Safflower was planted in the spring between the last of March and the first part of May and was harvested in the fall of the same year.

After the safflower was drilled, little more was done until harvest except by 2 of the 25 growers, who harrowed for weeds before the safflower plants came up. Safflower had a longer growing season than barley or wheat, giving the producer a chance to harvest the grain before starting safflower harvest. After the harvest of the safflower in September and October, the seeds were stored on the farm or in commercial warehouses. Producers were paid for

part of the estimated amount they had stored and they received the remainder of the receipts after the seed had been cleaned and weighed. Growers received $70 per ton of cleaned seed.

Cost of Production

Our study of safflower allowed all appropriate costs chargeable to the 1957 safflower crop by 25 dryland farmers in northern Utah. Acreages ranged from 25 to 245 per farm. We have used the same cost classification for safflower as we used in reporting wheat production.

Seed was planted at an average rate of 21 pounds per acre with a cost of $1.76. Farmers obtained the seed from the Pacific Vegetable Oil Corporation at $8.00 per hundred pounds.

Fuel, which included gasoline and diesel, cost $.77 per acre of safflower raised. The 1.15 gallons of gasoline per acre were used for trucks, combines, and tractors. Most tractors used diesel fuel, averaging 2.5 gallons per acre.

Grease and oil costs to the farmers were used to figure costs. The per acre cost of safflower produced was $.28, or $.05 per hundred pounds of safflower harvested.

Miscellaneous costs included seed cleaning fees, fertilizer, and a state charge, which was a fee of $1.00 per safflower grower. Cleaning amounted to $.51 per acre, or $.10 per hundred pounds of seed produced.

We found material and cleaning costs totaled $3.53 per acre of safflower harvested. This amounted to $.68 per hundred pounds of seed harvested, or 19.7 percent of the total cost.

Each farm raising safflower had an average of $19,999 worth of machinery in 1957. This figure was found by taking the purchase price of machinery and depreciating it to 1957. Of this amount 8 percent, or $1575, was charged to safflower. Value of machinery charged to each acre of safflower was $19.06 (table 7). Depreciation per acre on all machinery used for safflower production was $1.63, or $.32 per hundred pounds of seed produced. Machinery repairs added another $.87 per acre, or $.17 per hundred pounds of seed produced.

Depreciation on the machine shed amounted to only $.04 per acre of safflower produced.

Our study showed an average of 1.3 man-hours was used to produce one acre of safflower and to care for one acre of fallow. At an hourly rate of $1.00, the labor cost to produce an acre of safflower was $1.30, or $.25 per one hundred pounds of seed produced.

We found practically no hired labor used in raising safflower. Operator and family labor was used (table 8).

Labor requirement figures for safflower were lower than for wheat and barley. The main difference came in less time spent in preparing the land and hauling the crop produced.

In safflower production as with barley and wheat we found that interest on capital invested was the largest single item of cost. It accounted for $9.45 per acre, or 52.4 percent of the total cost. This equaled $1.82 per one hundred pounds of seed harvested. Estimates given by farm operators valued the land at $69 per acre.

Interest on money invested on production of the crop amounted to $.16 per acre harvested. Here we charged 7 percent interest on all money paid out for crop production from the time the investment was made until the crop was harvested.

Taxes on land and equipment totaled $1.05 per acre of safflower raised. This was 5.8 percent of the total cost, or $.20 per one hundred pounds of seed produced.

Table 7. Value of machinery used for dryland safflower production in northern Utah, 1957

	Avg. per farm	Percent charged to safflower	Charged to safflower		
			Avg. per acre	Rep.s per acre	Avg. depr. per acre
	dollars	percent	dollars	dollars	dollars
Plows	1,157	8.3	1.17	.04	.06
Harrows	113	11.5	.15	--	.01
Discs	368	10.5	.47	.01	.04
Weeders	546	8.4	.55	.04	.05
Drills	1,171	9.4	1.33	.03	.11
Combines	5,861	9.4	6.65	.38	.57
Tractors	8,353	7.5	7.55	.31	.67
Trucks	2,430	4.1	1.19	.06	.12
Total	19,999	7.9	19.06	.87	1.63
Machine shed	1,845	5	1.18	--	.04

Table 8. Man-hours spent per acre of safflower grown in dryland areas of northern Utah, 1957

	Total man-hours per acre	Percent each is of total
Plowing and digging	.28	21
Discing and harrowing	.15	12
Weeding	.29	22
Drilling	.18	14
Harvesting	.30	23
Hauling	.10	8
Total	1.30	100

Total costs per acre of safflower raised equaled $18.03, or $3.48 per one hundred pounds of seed harvested (table 9).

Return from Safflower

Farmers in our survey had an average of 83 acres of safflower yielding 517 pounds of cleaned seed per acre. The contract price was $70 per ton, or $3.50 per hundred pounds. Receipts per acre were $18.13. With a cost of $18.03 per acre of safflower, only $.10 net return was obtained, or about $.02 per hundred pounds harvested.

Some Advantages and Disadvantages of Raising Safflower

There would be some advantages in producing safflower if it could become an economic substitute for barley. It would give dryland farmers another alternative crop and the same equipment could be used as in wheat and barley production. Because safflower matures later than wheat or barley, it would give a better distribution of labor requirements and would ordinarily require no labor during the time that wheat and barley are harvested.

Table 9. Costs, receipts, and net returns from safflower in dryland areas of northern Utah in 1957

Item	Per acre		Per 100 lbs. seed	Percent of total cost
	Quantity	Amount		
		dollars	dollars	percent
Material				
Seed	21 pounds	1.76	.34	9.9
Fuel	1.15 gallons gasoline 2.5 gallons diesel fuel	.77	.15	4.3
Oil and grease		.28	.05	1.5
Miscellaneous		.72	.14	4.0
Total material		3.53	.68	19.7
Machine depreciation	6% and 4%	1.63	.32	9.0
Machine repairs		.87	.17	4.8
Building depreciation	3%	.04	.01	.2
Total depreciation and repairs		2.54	.50	14.0
Total labor	1.3 man-hours	1.30	.25	7.2
Interest on capital invested	6% of $157	9.45	1.82	52.4
Interest on money in crop	7% production costs	.16	.03	.9
Total interest		9.61	1.85	53.3
Taxes		1.05	.20	5.8
Total all costs		18.03	3.48	100.0
Receipts	517 pounds	18.13	3.50	--
Net return		.10	.02	--

Safflower could be a reasonably profitable crop when planted on land with an adequate level of fertility and moisture. More than with a single headed plant the safflower plant will branch-out and produce a greater number of seed heads when growing conditions are favorable.

A high-protein meal, quite similar to linseed and cotton seed meal, is a by-product of safflower processing. Livestock feeders of Utah would benefit from the safflower industry if it became large enough to require the establishment of a processing plant in or near northern Utah where by-products could be available.

We noted some disadvantages in safflower production. Since safflower required a longer growing season than barley and was not planted until late spring or early summer, there was danger of frost damage before the seed matured. Also since the growing season is longer the moisture problem may be more limiting when dry periods occur in late summer.

Safflower left little cover on the soil to offer protection against erosion, whereas barley and wheat left a better cover. This was an important item, particularly on the steeper slopes.

Many farmers complained of safflower being difficult and disagreeable to harvest. It had an abundance of fuzz in its heads which clogged combine radiators. While not a costly drawback, this was a source of irritation to machine operators.

CONDITIONS OF PRODUCTION AND PRICE UNDER WHICH SAFFLOWER BECOMES AN ECONOMIC SUBSTITUTE FOR BARLEY IN NORTHERN UTAH DRYLAND AREAS

No published data were available on barley and safflower yields in dryland areas of northern Utah. Barley statistics were compiled as a total of dryland and irrigated barley, and safflower was not raised before 1957 except in minor quantities mostly for experimentation. The best material available with which to compare the two crops was the survey conducted for this study.

Looking at the averages of production and price for safflower and barley, barley was more profitable. The average net return for safflower was only $.10, while the net return for barley was $5.96 per acre. For comparison, the farmers raising barley and those raising safflower were divided into three groups according to net return per acre. The highest one-third of barley raisers had a net return of $11.63 per acre while the upper one-third of safflower raisers received a net return of $9.40 per acre.

The medium one-third of the barley growers surveyed had a net return of $2.91 per acre. The comparable group of safflower growers had a net loss of $.92 per acre. The difference here was almost as great as the first group.

The lowest one-third of the barley producers lost $6.79 per acre while the lowest one-third of the safflower producers lost $6.20.

With average yields and conditions the same as those of 1957, the price of safflower would need to be $.40 per pound to equal barley. If the price of barley were $.63 per bushel and costs of production were the same as 1957, net returns of barley and safflower would be equal providing all other costs and prices remained unchanged.

Assuming that the price of barley and safflower remained at 1957 levels and costs of production were the same, it would take 680 pounds of safflower per acre to equal 32 bushels of barley. It would likewise take about 26 bushels of barley to equal 517 pounds of safflower per acre.

CONDITIONS UNDER WHICH SAFFLOWER AND BARLEY BECOME ECONOMIC SUBSTITUTES FOR WHEAT

From the foregoing budgeting problem, it can readily be seen that at average yields and average farm earnings, wheat was more profitable than either barley or safflower. This was true even when the one-third of barley and safflower farms with the highest net return were compared with average wheat return per acre.

Under 1957 conditions of price and production, there was no feasible situation where safflower and barley yielded higher net return per acre than did wheat. However, wheat prices were held high by price supports. If the price supports were removed on wheat, and if costs and prices remained steady for barley, wheat prices would

need to fall to $1.60 per bushel to equal barley at 1957 yields. To equal average safflower returns, wheat could drop to $1.30 per bushel.

On the other hand, if the wheat yield and price were held constant, the barley price would need to increase to $1.02 per bushel to give a net return comparable to that of wheat. At the 1957 levels of production, the safflower price would need to be $5.90 per hundred pounds to compete with net return for wheat per acre.

Table 10. Selected figures for wheat, barley, and safflower on dryland areas of northern Utah, 1957

Crop	Yield	Yield needed to meet all costs	Difference	1957 price (per lb. or per bu.)	Net return
				Dollars	Dollars
Wheat	19.6 bu.	13.1 bu.	6.5 bu.	1.93	12.54
Barley	32.6 bu.	25.2 bu.	7.4 bu.	.81	5.99
Safflower	517 lbs.	514 lbs.	2.8 lbs.	.035	.10

POSSIBLE COMBINATIONS OF WHEAT, BARLEY, AND SAFFLOWER TO MAXIMIZE NET RETURN

With the basic input-output data for wheat, barley, and safflower, we are in a position to examine the possible results of combining varying acreages of each crop. To do this we are assuming we have a 700 acre farm relatively uniform throughout and of good productivity. This is about the average farm we found in our wheat enterprise survey. Although some other crops have been grown in the area we have limited our study to wheat, barley, and safflower.

We further assumed that one-half of the farm would be fallowed each year, and the other 350 acres planted to crops. It was assumed that the allotment which could be used was 235 acres for the farm. Under the law, the wheat acreage allotment was based on the history of acreages for preceding years. The base could not be over one-half of the farm in dryland areas. The base was cut by a percentage calculated for the counties by dividing the county allotment by the total base acres. This figure was near 70 percent in Cache and Box Elder Counties.

The percentage that base acres have been restricted in Cache and Box Elder Counties for the past four years ranged from 64.6 to 81.6 (table 10).

For 1957 the historical base was assumed to be 336 for the 700-acre assumed farm. Of this amount, 70 percent gives a wheat allotment of 235 acres. Accordingly, 235 acres is the maximum amount of wheat which could have been grown under government programs. Since 350 acres of land could be cropped, there would be 115 acres available for some crop other than wheat.

We used a budgeting process to determine the situations under different levels of production that would give the highest farm earnings. To begin with, we computed the average cost and return for each of the crops--wheat, barley, and safflower--

Table 11. Percent wheat acreage allotments were of base acres in Cache and Box Elder Counties, Utah, 1954-1957

	Cache County	Box Elder County
	percent	percent
1954	81.6	75.6
1955	69.3	64.6
1956	72.0	67.9
1957	71.8	68.2

from the survey data. Each crop survey was divided into three equal parts according to net return per acre of crop (table 12).

For the budgeting problems that follow, we adjusted the survey data to fit more nearly a normal situation. First, we adjusted the prices from the 1957 price

Table 12. Selected measures of production for wheat, barley, and safflower in northern Utah dryland areas classified by net return per acre, 1957

Net return level	Farm size	Acres crop	Per acre				
			Bushels	Man-hours	Cost	Receipts	Net return
	acres	acres			dollars	dollars	dollars
		Wheat					
1/3 High	728	150	30.3	2.1	29.01	57.71	28.70
1/3 Middle	632	220	16.9	2.0	24.45	32.87	8.42
1/3 Low	694	180	14.0	2.3	24.85	27.61	2.76
		Barley					
1/3 High	1430	264	39.7	1.4	20.21	31.84	11.63
1/3 Middle	830	80	29.9	2.0	21.99	24.90	2.91
1/3 Low	951	109	17.2	2.3	21.03	14.24	-6.79
		Safflower					
1/3 High	1571	77	858*	1.4	19.80	29.20	9.40
1/3 Middle	2188	90	482*	1.3	17.11	16.19	- .92
1/3 Low	1982	79	348*	1.3	17.74	11.54	-6.20

*Pounds per acre

The figures presented in table 12 are average yields, costs, and return per acre for farms in each group. Within this study we found no close association between net return per acre and man-hours spent. There was a direct relation between yield and net return per acre. The differences in net return per acre appeared to be due to differences in soil, precipitation, and management.

to a ten-year average. The 1957 wheat price was near average because of the stabilizing price supports. Barley prices were considerably below the ten-year average. There were no prices quoted for safflower before 1957, so the 1957 price was used. We used ten-year averages for the years 1948 to 1957 obtained from Utah Agricultural Crop Reports reported by the State Agricultural Statistician.

Second, we adjusted yields to more nearly reflect normal yields. Barley yields for 1957 were about 25 percent above normal. Wheat yields were only slightly above normal and safflower yields were questionable, as there had been no appreciable amount raised until 1957. However, we assumed that safflower yields would increase as farmers learned more about its culture. We found evidence that some of the 1957 crop of safflower was planted on land of low productivity. Of 25 farmers included in our survey, 7 reported that safflower was grown on land of less than average productivity on their farms. Therefore, the 1957 safflower yields were adjusted upward for the analysis.

increased slightly. We found that there would be little difference between the amount of labor per acre spent on a 700-acre farm on the three different crops.

The budget summaries which follow all apply to a 700-acre farm. Of the total labor, 76 percent was performed by operator and family labor, and the other 24 percent was hired. The adjusted figures were used in budget situations that follow.

What we have called budget situations are different combinations of wheat, barley, and safflower with wheat yields held constant with three levels of

Table 13. Adjusted data for wheat and three levels of barley and safflower production for dryland areas of northern Utah

	Yield per acre	Price per bu. or lb.	Cost per acre dollars	Man-hours per acre man-hours
Wheat				
Medium	19.5 bu.	1.91	24.00	2.0
Barley				
High	29 bu.	1.15	23.90	2.0
Medium	23 bu.	1.15	20.50	2.0
Low	17 bu.	1.15	19.00	2.0
Safflower				
High	1000 lb.	.035	24.00	1.9
Medium	750 lb.	.035	21.00	1.9
Low	500 lb.	.035	19.00	1.9

Third, we made some adjustments in the cost of production per acre so they could apply to a 700-acre farm on which all land was of uniform productivity. We assumed that the land throughout the farm was of equal value.

We made slight adjustments in man-hours of labor per acre. Our survey average figure was used for wheat, but figures for barley and safflower were

production for barley and safflower on a 700-acre dryland farm.

We used farm earnings as the measure in the situations to determine which situation was most favorable. Farm earnings are net return plus the value of operator and family labor.

In situation 1A, we provide for 700 acres of land with only 235 acres of wheat.

Situation 1A. Wheat allotment and no other crop

Crop	Acres	Yield per acre	Price	Receipts	Man-hours operator & family	Total cost	Farm earnings	Farm earnings per acre
	acres	bushels	dollars	dollars	man-hours	dollars	dollars	dollars
Wheat	235	19.5	1.91	8,752	375	5,265	3,487	14.84
Fallow	230	--	--	--	61	1,549	-1,549	--
Fallow	235	--	--	--	--	--	--	--
Total	700	xx	xx	8,752	436	6,418	1,938	2.77

Farm earnings were $2.77 per acre, or $1,938 for the farm. This was the amount that accrued to the operator for his labor and management. One-half of the farm could still have been in fallow if 115 acres more had been cropped. Since taxes and interest had to be paid on these, the farmer could have received more returns from cropping the other 115 acres and would have furnished employment for himself and his family. With machinery available to raise 235 acres of wheat, it is probable that he could have farmed 115 more acres at little added expense.

High barley yields would be possible under good management and favorable climatic conditions. This combination increased costs and labor, but the increase in farm receipts more than compensated for the difference. Farm earnings amounted to $4,749 for the farm, or $6.78 per acre. These returns on barley could not be expected during a dry year. Total investment for machinery was higher in this situation than in 1A, but investment per acre of crop was less.

Situation 1B. Wheat allotment with 115 acres of barley producing at high level

Crop	Acres	Yield per acre	Price	Receipts	Man-hours operator & family	Total cost	Farm earnings	Farm earnings per acre
	acres	bushels	dollars	dollars	man-hours	dollars	dollars	dollars
Wheat	235	19.5	1.91	8,752	375	5,265	3,487	14.84
Barley	115	29	1.15	3,835	175	2,573	1,262	10.97
Fallow	350	--	--	--	*	*	*	*
Total	700	xx	xx	12,587	550	7,838	4,749	6.78

In situation 1B we provided for the full 235-acre wheat allotment and 115 acres of barley. We assumed that the

In situation 1C we provided for the total allotment of 235 acres of wheat and 115 acres of barley. This situation was

Situation 1C. Wheat allotment with 115 acres of barley producing at the medium level

Crop	Acres	Yield per acre	Price	Receipts	Man-hours of operator and family	Total cost	Farm earnings	Farm earnings per acre
	acres	bushels	dollars	dollars	man-hours	dollars	dollars	dollars
Wheat	235	19.5	1.91	8,752	375	5,265	3,487	14.84
Barley	115	23	1.15	3,042	175	2,183	859	7.47
Fallow	350	--	--	--	*	*	*	*
Total	700	--	--	11,794	550	7,448	4,346	6.21

*Cost of fallow included in crop

exactly like 1B except that we assumed only medium yields of barley. This was a situation that should be attainable to an average farmer on an average 700-acre farm. Total farm earnings in this situation was $4,346, or $6.21 per acre. Machinery and labor requirements were essentially the same as in 1B.

earnings amounted to $3,725, or $5.32 per acre of crop.

In situation 1E we provided that one-half of the 700 acres was planted to barley and the other one-half fallowed. No wheat was grown in this situation. Medium yields were harvested. Machinery and

Situation 1D. Wheat allotment with 115 acres of barley producing at the low level

Crop	Acres	Yield per acre	Price	Receipts	Man-hours of operator and family	Total cost	Farm earnings	Farm earnings per acre
	acres	bushels	dollars	dollars	man-hours	dollars	dollars	dollars
Wheat	235	19.5	1.91	8,752	375	5,265	3,487	14.87
Barley	115	17	1.15	2,248	175	2,010	238	2.07
Fallow	350	--	--	--	*	*	*	*
Total	700	xx	xx	11,000	550	7,275	3,725	5.32

In situation 1D we provided for the same crop acreage distribution as in the preceding example. We assumed yields for wheat were medium and barley yields were low. Low barley yields could result from poor farming practices, dry growing season, or a combination of both. Machinery and labor requirements would be about the same as for the two preceding situations. Investment per acre would likely be a little less as no fertilizer would be applied here. Farm

labor requirements were almost as much as in the situations above where barley and wheat were both raised. Farm earnings were less because of the differences in the price of wheat and barley. Wheat prices have been pegged at a high level while barley prices have fluctuated with the market. Farm earnings where only barley was raised at 23 bushels per acre were $2,615, or $3.74 per acre of land. Farm earnings were better than in situation 1A where only the wheat allotment was

Situation 1E. Barley at medium production level planted in one-half of farm

Crop	Acres	Yield per acre	Price	Receipts	Man-hours operator & family	Total cost	Farm earnings	Farm earnings per acre
	acres	bushels	dollars	dollars	man-hours	dollars	dollars	dollars
Barley	350	23	1.15	9,258	532	6,643	2,615	7.47
Fallow	350	--	--	--	*	*	*	*
Total	700	xx	xx	9,258	532	6,643	2,615	3.74

*Cost of fallow included in crop

planted. In other words, 350 acres of barley was a better program than 215 acres of wheat with the balance of the land idle.

In the next four situations we are concerned with wheat and different levels of safflower production on our 700-acre dryland farm. In every case we assumed 350 acres of the farm were fallowed and the other 350 acres were planted to crops. We assumed average wheat yields. We also assumed that if wheat were profitable with average yields, it would be even more profitable with high levels and hence we did not make budgets for the high yield situations.

as for combinations of wheat and barley previously discussed. Good management and farming practices would be required to produce high safflower yields under normal conditions. This would include application of fertilizer in most situations. At this level of production farm earnings were $4,918, or $7.03 per acre.

In situation 2B we provided for 235 acres of wheat and in addition 115 acres of safflower, at medium yields per acre. This level of production should be attainable without any special effort on the part of the operator if sound farming practices are used. Labor requirements

Situation 2A. Wheat allotment and 115 acres of safflower at the high production level

Crop	Acres	Yield per acre	Price	Receipts	Man-hours operator & family	Total cost	Farm earnings	Farm earnings per acre
	acres	bu or lb	dollars	dollars	man-hours	dollars	dollars	dollars
Wheat	235	19.5 bu.	1.91	8,752	375	5,265	3,487	14.84
Safflower	115	1000 lb.	.035	4,025	166	2,594	1,431	12.44
Fallow	350	--	--	--	*	*	*	*
Total	700	xx	xx	12,777	541	7,859	4,918	7.03

*Cost of fallow included in crop

In situation 2A we provided for the entire allotment of wheat and in addition 115 acres of safflower at the high level of production, 1000 pounds per acre. Labor requirements were essentially the same

were about the same as in the previous situation with the cost of production slightly less. Farm earnings totaled $4,257, or $6.08 per acre.

Situation 2B. Wheat allotment and 115 acres of safflower at the medium production level

Crop	Acres	Yield per acre	Price	Receipts	Man-hours operator & family	Total cost	Farm earnings	Farm earnings per acre
	acres	bu or lb	dollars	dollars	man-hours	dollars	dollars	dollars
Wheat	235	19.5 bu.	1.91	8,752	375	5,265	3,487	14.84
Safflower	115	750 lb.	.035	3,019	166	2,249	770	6.70
Fallow	350	--	--	--	*	*	*	*
Total	700	xx	xx	11,771	541	7,514	4,257	6.08

*Cost of fallow included in crop

Situation 2C. Wheat allotment and 115 acres of safflower at the low production level

Crop	Acres	Yield per acre	Price	Receipts	Man-hours of operator and family	Total cost	Farm earnings	Farm earnings per acre
	acres	Bu/Lb	dollars	dollars	man-hours	dollars	dollars	dollars
Wheat	235	19.5 bu.	1.91	8,752	375	5,265	3,487	14.84
Safflower	115	500 lb.	.035	2,012	166	2,019	-7	-.06
Fallow	350	--	--	--	*	*	*	*
Total	700	xx	xx	10,764	541	7,284	3,480	4.97

In situation 2C we provided for 235 acres of wheat with 115 acres of safflower at a low level of production. Labor requirements were the same as in previous examples, but inputs were slightly less. No fertilizer was used, and some poorer practices were assumed. Farm earnings totaled $3,480, or $4.97 per acre. At this level of production, safflower receipts and costs were nearly equal.

In situation 2D we made no provision for wheat. Only safflower was raised on all 350 acres cropped. We assumed that medium yields were obtained, giving 750 pounds of safflower seed per acre of crop. Labor requirements were slightly less than when wheat was also raised. Machine requirements would be almost as much as for wheat and safflower combined. Farm earnings were $2,343 total, or $3.35 per acre.

This study suggested that where it was possible to obtain high levels of production with a little added input, the extra effort or expense paid off. Wheat was more profitable than safflower in all situations described. While safflower alone was profitable at the medium level of production, it would have been more profitable to raise wheat on acres allotted.

We next assumed a group of situations exactly the same as those in part 2 with the exception that the price of safflower

Situation 2D. Safflower at the medium production level planted in one-half of the farm

Crop	Acres	Yield per acre	Price	Receipts	Man-hours operator & family	Total cost	Farm earnings	Farm earnings per acre
	acres	bu/lb	dollars	dollars	man-hours	dollars	dollars	dollars
Safflower	350	750 lb.	.035	9,188	505	6,845	2,343	6.69
Fallow	350	--	--	--	*	*	*	*
Total	700	xx	xx	9,188	505	6,845	2,343	3.35

*Cost of fallow included in crop

was $.04 per pound instead of $.035. Such an increase could be possible if demand for safflower increased or if a processing plant were built in or near northern Utah or if the oil content of the seed were increased through plant breeding. We have not shown the details of these budgets but under the high price assumption for safflower it could replace wheat at yields of 19.5 bushels per acre when safflower produced 1000 pounds of seed. With lower safflower yields than this, wheat was still the crop of higher net return.

We have presented a summary of all assumed situations budgeted in table 14.

CONCLUSIONS

Our survey gave us a picture of conditions as they were in 1957 on northern Utah dryland areas. Winter wheat was the most profitable crop raised in the area studied, but wheat prices were at levels caused by government supports and acreages were limited by allotments. While such conditions prevail, wheat is likely to remain a profitable crop. At present we see no indications that price supports and acreage allotments on wheat will be discontinued in the near future.

If controls were terminated, the price of wheat would likely fall. If the price of wheat fell to $1.25 per bushel with costs remaining equal to those of 1957, it would still be as profitable as the normal crop of barley. Our investigations suggest that wheat yields have been more uniform than barley yields because wheat is planted in the fall and uses winter moisture. Barley yields have fluctuated from over thirty bushels per acre to almost nothing, depending upon spring and summer precipitation.

If the new fall barley now being tested proves successful, it may make barley a more reliable crop to raise in dryland areas.

Barley was more profitable than safflower throughout the area generally in 1957. From individual cases, however, safflower shows good potential to become an accepted crop in dryland areas of northern Utah. Because of the heavy precipitation during the 1957 growing season, barley yielded exceptionally well. It was difficult to compare safflower to the 1957 barley crop for this reason and also because no previous safflower crop had been grown in northern Utah. The 1957 crop did prove that safflower can be grown successfully when it is planted on good land. Five safflower producers of the twenty-five interviewed in our study received over 800 pounds of seed per acre, bringing a net return per acre of almost $11.00. The largest yield of seed produced by any one grower was 1200 pounds per acre. While this yield was

Table 14. Summary of budget situations with results measured in farm earnings per farm and per acre

Situation	Crop raised	Farm earnings	Farm earnings per acre
		dollars	dollars
1A	Wheat only (235A.)	1938	2.77
1B	Wheat and barley, high level	4749	6.78
1C	Wheat and barley, medium level	4346	6.21
1D	Wheat and barley, low level	3725	5.32
1E	Barley only (350 A.)	2615	3.74
2A	Wheat and safflower, high level	4918	7.03
2B	Wheat and safflower, medium level	4257	6.08
2C	Wheat and safflower, low level	3480	4.97
2D	Safflower only (350 A.)	2343	3.35
3A	Wheat and safflower high level, high price	5493	7.85
3B	Wheat and safflower med. level, high price	4688	6.70
3C	Wheat and safflower low level, high price	3768	5.38
3D	Safflower only (350 A.) high price	3655	5.22

achieved by only one producer, it is an indication of what can be done under favorable conditions. All high yields of safflower were produced on average or better than average land. On the better land, higher net return was realized from safflower than from barley.

Because 1957 was the first year of safflower production in northern Utah, it seems probable that higher yields will be realized as producers gain experience. The 1957 crop demonstrated that safflower should not be raised where barley or wheat would not produce a profitable crop. Safflower and barley should be planted as early as possible in the spring to make use of spring rains.

Dryland farming has become highly mechanized. About two man-hours per acre was spent on 1957 dryland crops. Large farms use labor more efficiently than small ones. Farms having less than 700 acres spent 2 3/10 man-hours per acre of crop, while farms of over 1400 acres produced an acre of crop with about 1 5/10 man-hours per acre. Larger and better machines together with better management, account for the greater labor efficiency on large farms.