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Costs and Returns For Selected Crops In A Closed Basin, San Luis Valley, Colorado 1974

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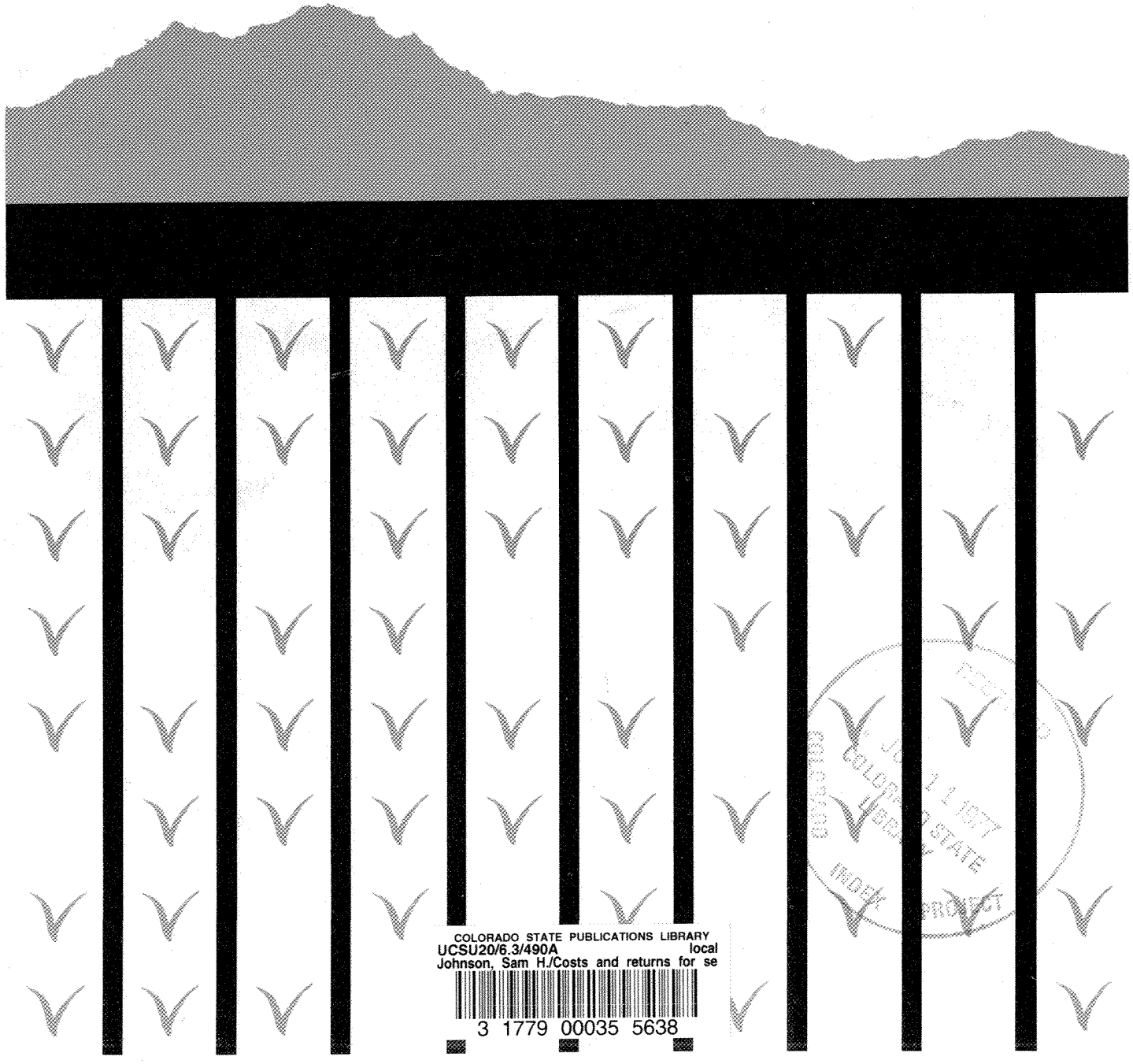

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COSTS AND RETURNS FOR SELECTED CROPS IN CLOSED BASIN, SAN LUIS VALLEY, COLORADO 1974

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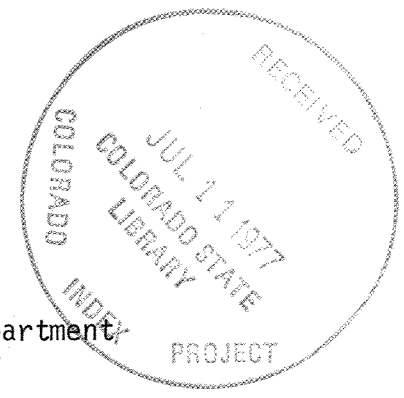

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I. PURPOSE AND SCOPE

The main purpose of this publication is to provide information to farmers and others in the agribusiness communities to help in making management and policy decisions. This information includes:

1. Crop operation calendars for selected crops in different subareas.
2. Costs and returns to selected crops under various irrigation practices.
3. Net returns to management and risk for selected crops in different subareas under various irrigation practices.

The data is of necessity an average of conditions on many farms and ranches and does not necessarily represent any single farm. Therefore, the individual farmer must take into account his particular situation before he uses this data.

The scope of this publication is limited to farms and ranches in the Closed Basin portion of the San Luis Valley. It examines alternative returns under flood, row and center pivot irrigation. Due to the lack of information and the dry year (1974), this publication does not examine returns to "water buggy" irrigation or subirrigation. There is no prejudgement of these latter techniques, it is simply a problem of scarcity of information.

This study was primarily concerned with returns to alternative crops and did not attempt to explore the livestock industry. For this reason, the forage crops are treated as if they are marketed as cash crops. In reality, a high proportion of the hay crops do not enter the market directly, but are fed on the farm, to be marketed later in the form of livestock.

The study does not attempt to value the hay fed to livestock but instead takes the existing market price as the farmer's opportunity cost. Livestock feeders may want to make the appropriate adjustments in the value of their hay crops so that the returns more directly reflect the livestock market situation.

II. STUDY AREA

The San Luis Valley is a large relatively flat plain located in the highlands of south central Colorado. The total valley is approximately 90 miles from north to south and 50 miles east to west, covering an area nearly twice the size of the state of Delaware. The altitude of the valley floor ranges from 7,440 feet on the south, where the Rio Grande passes between the San Luis Hills, to about 8,000 feet around its rim. It is bounded on the west and north by the Continental Divide, and on the east by an offshoot of the Rocky Mountains, the Sangre de Cristo Range. The valley lies in the drainage of the headwaters of the Rio Grande, an area of about 8,000 square miles. The Rio Grande enters the valley from the West and flows south out of the valley into New Mexico [1].

The climate is that of a high mountain desert with an average annual precipitation of about seven inches. The desert climate, combined with the short growing season of from 90 to 120 days, makes irrigation essential for agricultural production.

The northern portion of the valley lies within a basin which is separated from the Rio Grande drainage by a low alluvial divide. (See Figure 1) This divide, almost imperceptible to the eye, extends southeasterly from the vicinity of Del Norte to a point a few miles north of Alamosa and then easterly to the eastern rim of the valley. To the north

of this divide is an area of 2,940 square miles which is not tributary to the Rio Grande. This is termed the "Closed Basin." The trough or sump of the Closed Basin is defined in general by a contour of 7,525 feet. The valley falls from west to east with an average fall of 9.5 feet per mile. However, the slope actually varies from four to ten feet per mile depending on the area [2].

The first large diversion canals off the Rio Grande were constructed to provide water in the Closed Basin area. The Rio Grande Canal was the largest canal in the United States at its time of construction and has diverted over 300,000 acre feet of water north of the river in a single year, although the historical average is much less than this figure. By 1890 the present network of canals had been largely completed and the Closed Basin was rapidly blooming into a major agricultural producing area [3].

A. Historical Crop Trends

The original settlers in the Closed Basin, planted large acreages of spring wheat and oats. The first yields were good--sometimes between 40 and 60 bushels an acre-- and flour mills were built at Del Norte, Monte Vista, Hooper, Mosca and Alamosa. However, the method of irrigation known as subirrigation soon resulted in lower lands in the eastern and central portions of the basin going to seep, thus forcing abandonment of many farms. Irrigation water was then applied to lands further west which had poorer soils. Drainage projects have allowed part of this land to be brought back into production. However, the seepage and repeated cropping had impoverished the soils to such an extent that the once great wheat fields along the eastern and central portions of the Closed Basin were gone forever[4].

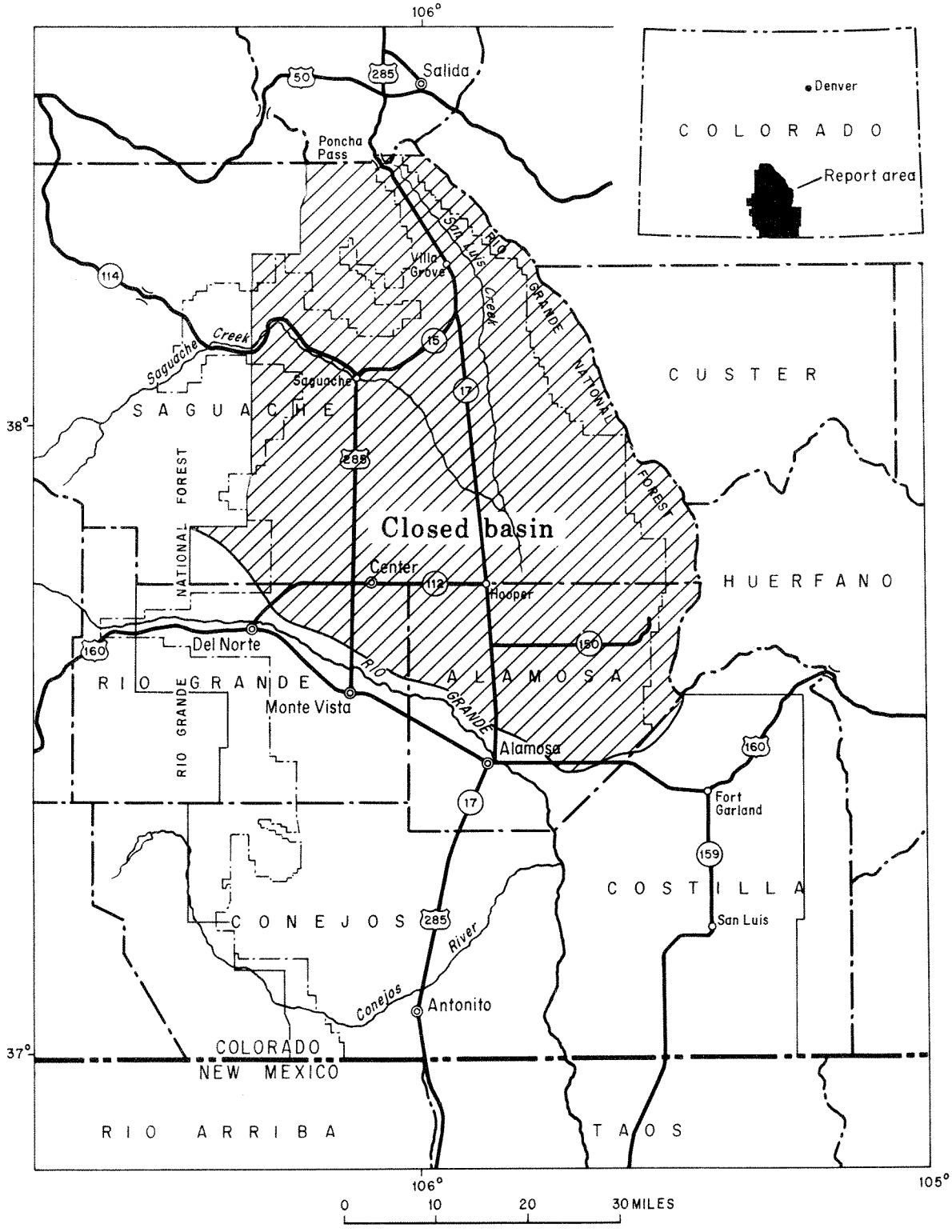


Figure 1. --Index map showing location of closed basin as discussed in this report.

Source: Colorado Water Conservation Board [10].

In the early 1900's, the farmers turned to field peas as their cash crop. The peas were not harvested as usual but instead sheep and then hogs were turned out into the fields of ripened peas in the fall. The animals grazed the peas until December and were then shipped to market. By the late 1920's sweet clover began to replace field peas due to problems with root-rot in the peas. This brought about a decline in the hog industry and altered the system of lamb feeding [5].

By the late 1920's the main crop of the valley today, potatoes, had begun to assert their importance. Within two decades the valley had surpassed the Greeley district in productivity. The standard rotation became potatoes, peas, and grain. Later, sweet clover replaced peas [6].

Today, potatoes are recognized as the most important crop in the valley. The standard rotation in the major production area of the valley is potatoes and grain, with the grain usually a high-quality malting barley. Table 1 gives the 1974 estimated crop acreages, yield and total value for the main crops in the valley. The total value of potatoes and barley is greater than 65 per cent of the valley's aggricultural production. Potatoes alone make up almost 40 per cent of the total value.

Table 1

ESTIMATED CROP ACREAGES, YIELDS AND VALUES FOR SAN LUIS VALLEY, COLORADO, 1974*

Crops	Acres	Yields per Acre	Total Value (million dollars)
Potatoes	35,000	250 Cwt.	21.0
Barley	82,000	50 Bu.	14.7
Malt	75,000	50 Bu.	13.7
Feed	7,000	50 Bu.	1.0
Alfalfa Hay	109,000	1.7 Ton	9.25
Grass Hay	90,000	1.3 Ton	4.68
Oats	11,000	40 Bu.	1.1
Wheat	4,000	45 Bu.	0.810

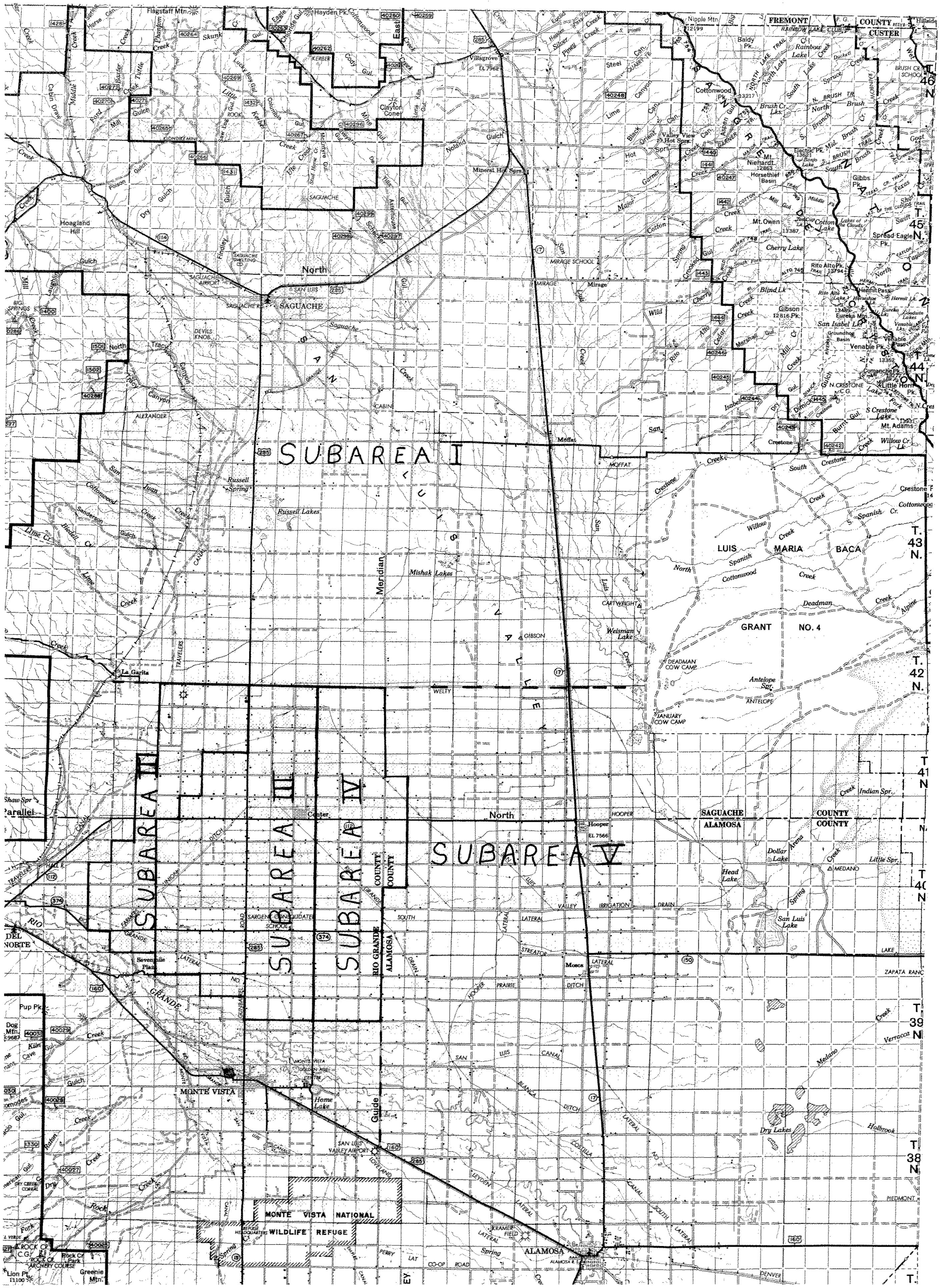
* Source: San Luis Valley Extension Service (Handout), 1974.

Historical changes in cropping patterns in the San Luis Valley reveal a number of interesting contrasts. For example, statistics for 1932 indicate that the total irrigated acreage exceeded 750,000 acres, while data for 1972 indicates that less than 350,000 acres were cropped. The 1974 acreage of potatoes is estimated at 35,000 acres. This is almost 50 per cent less than the 1932 acreage of 67,515 acres of potatoes. The acreage of cereal crops in 1972, about 105,000 acres, is almost 10,000 acres greater than the 1935 cereal acreage, but is 104,000 acres less than the 1910 cereal acreage of 209,736 acres [7, 13]. The vast acreages of field peas as well as smaller areas of market garden peas and sugar beets have disappeared from the valley.

B. Type of Farming, Soil Types, Markets

Farming in the Closed Basin is marked by a number of extremes, both in terms of farm size as well as in production practices. In the northern end of the valley, it is possible to find ranches larger than 10,000 acres while in the area just north of the river there are viable farms of less than 160 acres. The ranches near Saguache produce only hay for feed while the farms in the Center area have no livestock and strictly follow a potato-grain rotation.

For this study's purpose, the Closed Basin was divided into five subareas (See Figure 2). Subarea I is all the land north of the La Garita; this land is almost exclusively used for ranching with grass, hay and some alfalfa hay as the principal crops. The soils in Subarea I vary from a heavy loam-clay loam of the Nortonville-Alamosa-Lasauses Association that in places is up to six feet deep to a fine textured sandy loam of the Hooper-Corlett Association. This latter soil is underlaid by sand at depths of 20 to 40 inches. Large areas are alkaline and covered


SUBAREA I
SUBAREA II
SUBAREA III
SUBAREA IV
SUBAREA V
SAGUACHE
SAN LUIS VALLEY
LUIS MARIA BACA GRANT NO. 4
SAGUACHE COUNTY
ALAMOSA COUNTY
RIO GRANDE COUNTY
Moffat
Crestone
Mineral Hot Sprs.
Villa Grove
Hooper
Mosca
Center
La Garita
DEL NORTE
MONTE VISTA
ALAMOSA
MONTE VISTA NATIONAL WILDLIFE REFUGE
San Luis Lake
Head Lake
Dollar Lake
Russell Lakes
Mishak Lakes
Meridian
T. 46 N.
T. 45 N.
T. 44 N.
T. 43 N.
T. 42 N.
T. 41 N.
T. 40 N.
T. 39 N.
T. 38 N.

with a combination of rabbitbrush, greasewood, and saltgrass-- known locally as "chico." Table 2 details the principle characteristics of the ranches in this subarea.

Subareas II and V are both composed of farms following a grain-hay rotation. Subarea II is located on coarse textured gravelly sandy loam soils of the Dunul-Graypoint-Dervich Association. This soil is underlaid by gravel and sand at a depth of six to fifteen inches. Subarea V is located on the sandy alluvial soils of the Gunbarrel-Mosca-San Luis Association. These soils are underlaid by sand and fine gravel and are saline and alkali unless artificially drained. The principle characteristics of the Subarea II and V farms are shown in Table 2.

Subareas III and IV are the most important areas in the valley in terms of dollar value of production. The farms follow a straight potato-grain rotation and keep almost no livestock. Subarea III is on a coarse gravelly soil, similar to Subarea II, but also contains some finer soil of the Gunbarrel-Mosca-San Luis Association. Subarea IV is on Gunbarrel loamy sand but does not suffer from the salinity problems associated with this soil in Subarea V. The difference in the soils between Subarea III and Subarea IV is evidenced by the fact that an air-separation potato harvester is required in Subarea III while a mechanical-separation potato harvester is used in Subarea IV. Table 2 provides the principle characteristics of the farms in these two subareas [14].

The principle grain in the valley--malt barley--is grown on contract for two brewing companies. The crop is usually custom harvested and delivered to storage facilities in either Center, or Monte Vista, Colorado. Hay is usually harvested and stored on the farm or sold to local ranchers

Table 2

REPRESENTATIVE SIZE AND ACREAGE DATA FOR FARMS IN CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Subarea	Average Farm Size (acres)	Average Irrigated Acreage	Average Grain Acreage	Average Potato Acreage	Average Alfalfa Hay Acreage	Average Grass Hay Acreage
Subarea I	3500	785	--	--	185	600
Subarea II	480	260	180	--	80	--
Subarea III	640	559	319	240	--	--
Subarea IV	800	720	370	350	--	--
Subarea V	865	510	200	--	310	--

or truckers traveling through the valley. Potatoes are harvested and stored in large potato cellars. These may be on-farm, but more often are privately or co-operatively owned and located on or near the railroad. The potatoes are marketed throughout the year with each farmer agreeing to provide a fixed percentage of his crop for sale each month. However, there are also numerous other marketing outlets and arrangements making potato marketing by far the most complicated market structure in the valley.

C. Water Supply-Source and Amounts

The San Luis Valley is classified as a high desert valley due principally to the average annual precipitation of less than seven inches. This precipitation does vary from year to year but in the average year only a small amount is actually effective in terms of crop production. Table 3 lists the total precipitation for selected years at four weather stations in the valley.

The agricultural water supply is provided by two principle sources. Large amounts of Rio Grande River water is diverted into the Closed

Basin, and the farmers pump water from their abundant ground water source. Figure 3 is a schematic diagram depicting the relationship of water use in the valley in terms of relative importance of surface diversions, withdrawals from the deep confined aquifer, and withdrawals from the shallow unconfined aquifer.

The number of wells in the different subareas vary depending on the availability of surface water and the degree of development in the area. The average farm in Subarea I has four wells of 1,200 gallons per minute (GPM) capacity each, plus two large artesian wells of greater than 1,000 GPM capacity each. The average farm in Subarea II has three wells of 1,200 GPM capacity each, while the average farm in Subarea III has six wells of 1,200 GPM capacity each. An average farm in Subarea IV has ten wells of 1,200 GPM capacity each. The typical farm in Subarea V has 3.3 wells of 1,200 GPM capacity each, however, due to the tightness of the sandy soil in this subarea, these wells often do not have a strong continuous yield.

The average surface water supply to the Closed Basin for the period 1936 through 1959 was as follows:

Source	Acre-Feet
Natural Streams	258,600
Springs	11,000
Man-made diversions from the Rio Grande	287,600
	556,900

It is difficult to establish exactly how much water is pumped from the unconfined aquifer but recent studies seem to indicate during a dry year more than 400,000 acre-feet will be pumped from the shallow unconfined aquifer in the Closed Basin alone. This is supplemented by more than 55,000 acre-feet from deep artesian wells. When these figures for the

Table 3

TOTAL ANNUAL PRECIPITATION FOR SELECTED STATIONS
SAN LUIS VALLEY, COLORADO, 1951-73
(inches)

Year	Station Location			
	Alamosa	Saguache	Center	San Luis
1951	4.09	6.49	-	-
1952	7.76	7.79	-	7.65
1953	6.49	-	-	17.89
1954	5.56	6.71	-	8.73
1955	4.16	6.44	-	10.02
1956	3.40	5.59	-	-
1957	8.66	14.98	-	17.55
1958	5.01	5.86	-	8.18
1959	9.55	8.71	-	9.80
1960	5.85	6.80	-	7.91
1961	10.19	9.13	10.01	12.17
1962	4.74	4.65	5.36	7.89
1963	6.55	4.77	6.68	8.91
1964	7.07	8.48	6.96	8.28
1965	9.84	11.87	11.03	12.65
1966	4.96	5.84	4.78	7.82
1967	10.86	10.94	7.90	-
1968	8.10	6.88	6.91	7.79
1969	11.55	13.95	11.06	-
1970	8.08	5.85	5.36	9.79
1971	8.35*	8.35*	8.35*	8.35*
1972	7.70	6.73	6.76	7.93
1973	8.39	8.62	4.62	8.93

- Indicates data not available.

* Average for San Luis Valley

Source: U.S. Department of Commerce [11].

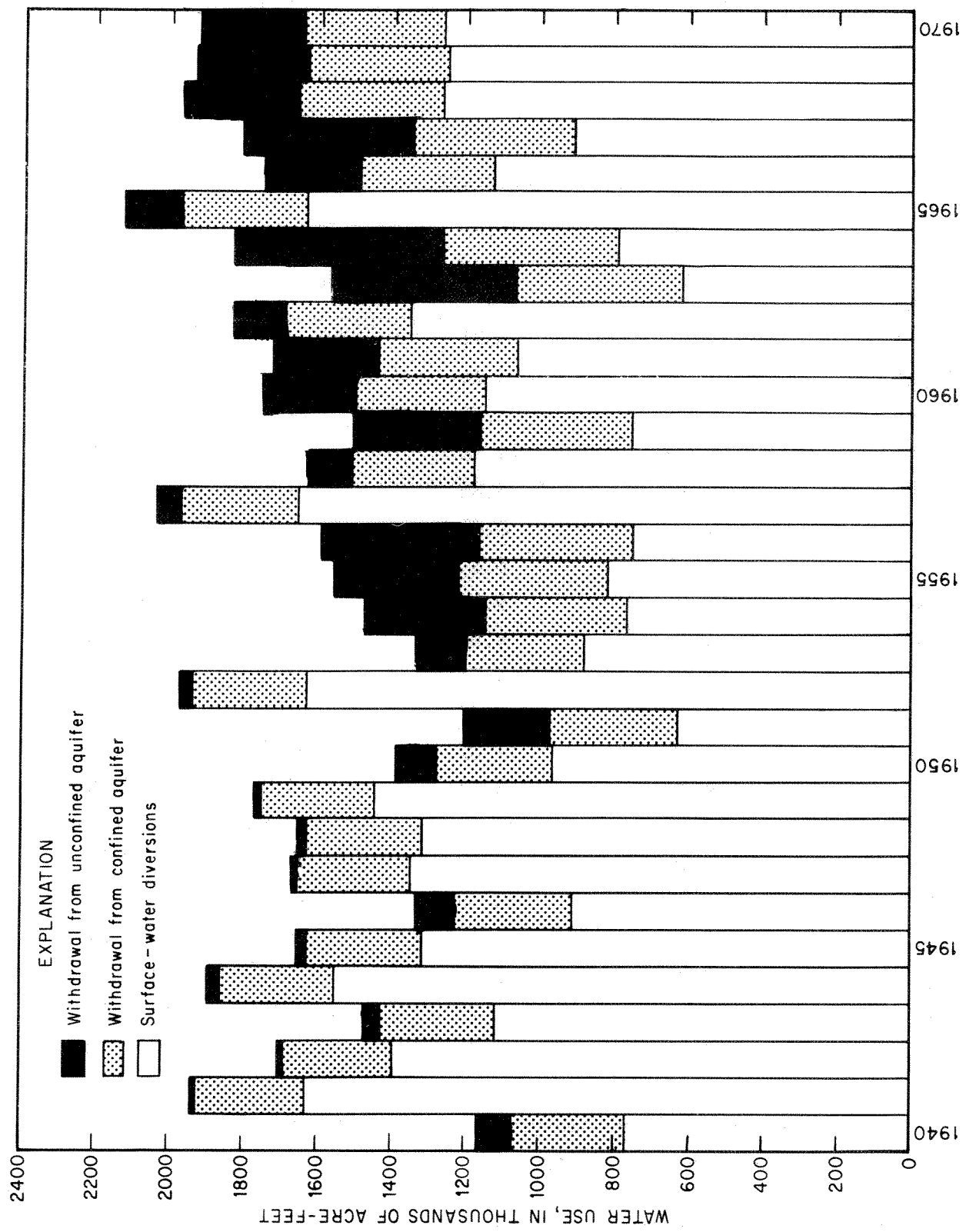


FIGURE 3. Water Use in the San Luis Valley, Colorado, 1940-1970

Source: Colorado Water Conservation Board [12].

ground-water are combined with the figures for the surface water, the total indicates that there is probably an average of more than 1,000,000 acre-feet available for crop production. However, these figures reflect over-diversions from the Rio Grande that will not occur in the future due to changing enforcement of the Rio Grande Compact.

III. SOURCES OF DATA

The data used in construction of crop budgets reported here were gathered in the fall of 1974 in a random survey of Closed Basin farmers. This survey was designed to interview approximately 20 per cent of the irrigated acreage in the Closed Basin. Table 4 provides the number of farmers and irrigated acreage interviewed in each subarea.

Table 4

NUMBER OF FARMS AND TOTAL IRRIGATED ACREAGE SURVEYED IN EACH SUBAREA, 1974

	Subarea I	Subarea II	Subarea III	Subarea IV	Subarea V	Total
No. of Farms Surveyed	17	7	15	17	16	72
Total Irrigated Acreage in Survey (acres)	17,581	2,256	11,674	13,606	10,206	55,323

The total acreage operated by those interviewed includes probably greater than one third of the actual harvested irrigated acreage in the Closed Basin, so the random survey exceeded the 20 per cent goal by a large margin.

The data used in developing the price trend relationships was obtained from the Colorado Agricultural Statistics [8]. However, since the Colorado Agricultural Statistics do not separate feed barley from malt barley, it

was necessary to contact the Adolph Coors marketing branch to obtain price trend data for malting barley. Potato trend prices are, of course, an aggregate of returns to number ones as well as chips, feed, etc., and, consequently, suffer the problems associated with aggregate prices. For the purposes of this study, it is believed that these prices are sufficiently accurate.

A. Prices

Budgeting can be used to help make planning decisions if it provides a realistic estimate of the net returns a farmer can expect from his crops over the planning period. However, a major problem in budgeting the returns to crops is predicting the long run effects of the two price problems: the continuous inflation of input prices and the cyclical fluctuation of output prices. That is, he must predict what will be the average price of each input and commodity over the planning period.

Since prices fluctuate and future prices are uncertain, it is common to use price behavior in the recent past as a basis for future expectations. The recent unprecedented inflation and high crop prices may reduce the value of this technique, but until a better technique is developed, this methodology will continue to be followed.

Recent trends in farm costs

Table 5 shows the United States Department of Agriculture (USDA) price index for the commodities farmers use in production. These figures indicate that farm costs increased by about four per cent per year from 1965 to 1972, but shot up about 20 per cent in each of the last two years.

The input prices used in the budgets are the prices actually paid by the farmers in the 1974 growing season. In view of the input price

Table 5

INDEX OF PRICES PAID BY FARMERS, 1965-1974

Year	Price Index for all Commodities Used in Production (1965=100)
1965	96
1966	99
1967	100
1968	102
1969	106
1970	110
1971	115
1972	122
1973	146
1974	172

Source: USDA, Agricultural Statistics 1974 and Agricultural Prices (monthly bulletin)

inflation indicated in Table 5, costs in future years will be higher than 1974 costs, but in light of the present economic situation, it is difficult to predict accurately how much higher. Therefore, all budgets are presented in terms of 1974 input costs.

Recent Trends in Commodity Prices

In the last two years, most farm commodity prices have been quite high; enough so that it would be unrealistic to expect these prices to hold over the future. Indeed, the first three months of 1975 showed a decline in many farm commodity prices. In order to smooth out recent price fluctuations, the average price over the last five years, using prices reported in Colorado Agricultural Statistics [7], is probably a better indication of expected future price than is the present price. Table 6

shows the calculations for four crops. The simple average, however, does not fully reflect the inflated value of the current dollar. To adjust for

Table 6

CALCULATION OF THE AVERAGE PRICE FOR FOUR CROPS (1970-1974)

Year	Potatoes $/cwt.	Barley $/cwt.	Alfalfa Hay $/ton	Grass Hay $/ton
1970	1.42	3.82	28.00	23.00
1971	1.57	3.82	33.00	28.00
1972	2.89	3.82	42.50	37.50
1973	5.06	6.25	47.50	42.50
1974	2.25*	7.50	55.00	48.00
Five-year Average Price	2.64	5.04	41.20	35.80

*Preliminary Estimate

cost inflation, all crop prices were expressed in 1974 dollars on the basis of the input cost index shown in Table 5. For example, in 1970, the cost index is 110 while the 1974 index is 172. The price adjustment factor is then 172/110 = 1.56. This means that, relative to the cost of farm inputs, one dollar of costs in 1970 was equivalent to $1.56 in 1974. A five year average of commodity prices in 1974 dollars is presented in Table 7.

Table 7

CALCULATION OF THE AVERAGE-INFLATION-ADJUSTED PRICE FOR FOUR CROPS (1970-1974).

Year	Potatoes $/cwt.	Barley $/cwt.	Alfalfa Hay $/ton	Grass Hay $/ton
1970	2.25	5.96	43.68	35.88
1971	2.36	5.73	49.50	42.00
1972	4.07	5.39	59.93	44.25
1973	5.97	7.38	56.05	50.15
1974	2.25*	7.50	55.00	48.00
Five Year Average Price	3.38	6.39	52.83	44.06

* Preliminary Estimate

In recognition of future price uncertainty, the returns for a range of commodity prices are shown. The range of prices selected for each crop is shown in Table 8. The crop budgets were calculated on the basis of the middle value which in most cases is the average price in 1974 dollars.

Table 8

CROP PRICES USED IN BUDGETING COSTS AND RETURNS

Crop	Unit	Prices
Potatoes	Cwt.	$2.00, $2.50, $3.00, $3.50
Barley	Cwt.	$5.50, $6.50, $7.50
Alfalfa Hay	Ton	$50,00, $55,00, $60.00
Grass Hay	Ton	$44.00, $48.00, $52.00

B. Crop Yields

Barley and potatoes appear to be particularly well suited crops for the Valley. Both crops yield quite well, especially when the overall quality of the soils is taken into account. The yearly variation in yields seems to reflect, for the most part, the availability of water. Barley yields are especially responsive to water supply. For example, in Subarea III a farmer can grow a crop of barley with 21 irrigations of .84 acre inches per acre per irrigation using a center pivot sprinkler and expect yields of better than 45 hundredweight (cwt.) per acre. Under flood irrigation a farmer in Subarea III can grow a crop of barley with 12 irrigations of 5.0 acre inches per acre per irrigation and expect a yield of better than 25 cwt. per acre. Even though the latter farmer applies three times as much water, crop yields are lower because the water is not available precisely when the crop needs it and much of the fertilizer is leached away.

For potatoes, the differences between row irrigation and sprinkler irrigation are not as well defined. This survey revealed that on the average the yields to row irrigation and sprinkler irrigation were almost identical.

Some farmers reported a larger percentage of number ones under sprinklers while others reported a smaller percentage of number ones and a larger percentage of small potatoes, but on the average, the production yields seem to be remarkably similar. Table 9 details the yields in Subareas III and IV under different irrigation schemes.

Alfalfa and grass hay are not as well suited to the Closed Basin climate. With the short growing season, it is rare that a farmer will get more than two cuttings and not unusual to obtain only a single cutting. With the recent increase in fertilizer prices, many of the ranchers, especially in Subarea I, did not fertilize at all in 1974. This, of course, did nothing

Table 9

YIELDS PER ACRE OF POTATOES AND BARLEY IN SUBAREAS III AND IV UNDER ROW, FLOOD AND SPRINKLER IRRIGATION, 1974

	Subarea III				Subarea IV			
	Potatoes		Barley		Potatoes		Barley	
	Row	Sprin.	Flood	Sprin.	Row	Sprin.	Flood	Sprin.
Average Yields (Cwt.)	260	260	30	45	250	250	35	45
Highest Yield (Cwt.)	315	312	35	51	350	375	55	45
Lowest Yield (Cwt.)	170	220	17.50	43	200	225	22.5	40

to help their yield and the quality of the hay. While a few ranchers in Subarea I attempt to raise hay under sprinklers, it is not widespread enough to be considered typical. However, in section IV, costs and returns are calculated to see what type of yields and price would be needed to justify a sprinkler for hay. A number of farmers in Subarea V do raise alfalfa hay under sprinkler as part of their rotation. With their returns to barley

as well as their high hay yields, they can usually break even on their hay. Table 10 gives typical hay yields in Subareas I, II, and V.

Table 10

GRASS HAY AND ALFALFA HAY YIELDS PER ACRE IN SUBAREAS I, II AND V CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

	Subarea I		Subarea II	Subarea V
	Alfalfa Hay	Grass Hay	Alfalfa Hay	Alfalfa Hay
Average Yield (tons)	2.0	1.5	2.0	2.25
Highest Yield (tons)	4.0	2.0	2.5	4.0
Lowest Yield (tons)	1.5	.75	1.5	1.0

C. Typical Production Practices for Different Irrigation Systems

The production practices for grain and hay are quite similar for all subareas. The only difference in production practices is found in the irrigation system. Both grain and hay are produced either by flood irrigation or by sprinkler irrigation, with flood predominately in Subarea I and sprinklers equally important in Subareas II and V. The approximate number of sprinklers found in each subarea is given in Table 11.

Table 11

APPROXIMATE NUMBER OF CENTER PIVOT SPRINKLERS BY SUBAREA CLOSED BASIN, SAN LUIS VALLEY, COLORADO, SUMMER 1974

	Subarea I	Subarea II	Subarea III	Subarea IV	Subarea V	Total
No. of Sprinklers	25	45	81	16	134	301

Potato production practices vary by irrigation system, and vary even more by soil type. Potatoes in Subarea III require an air-separation harvester to separate the potatoes from the rocks. This type of system slows the harvest down so that 8 to 10 acres a day harvested is a good day. In Subarea IV where mechanical separation units can be used, 20 acres a day harvested is a usual day. These time differences are reflected in the production costs as well as in the repair and maintenance costs. These costs were offset slightly by the increased yields in Subarea III over Subarea IV, but this may have been a random quirk and not a significant difference at all. However, the difference in land costs between Subarea III and Subarea IV offsets the differences in costs and yields.

In order to develop individual crop budgets, it is first necessary to provide a daily schedule of the different production practices for the various crops. These crop calendars are not taken from any individual farm but are typical of how representative farmers operate in the different subareas. These calendars are designed to show actual operation schedules and do not attempt to show how a farmer "should" operate, only how many farmers typically do operate. Tables 12 - 22 contain the operating schedules for the principle crops.

Table 12

MALT BARLEY OPERATION CALENDAR, SUBAREAS II AND III
CLOSED BASIN, SAN LUIS VALLEY, COLORADO 1974

Irrigation Practice C.P. Sprinkler

Operation	Date	Practice
Fertilize	20 March	Broadcast Fertilizer - 150 lbs.
Ditcher	1 April	Eversman Type Ditcher
Cultivate	3 April	Tool Bar and Shanks
Plant	5 April	Drill - 100 lbs. per acre
Irrigate	8 April	May Preirrigate if necessary Sprinkle - 1.0 inch
Irrigate	20 April	Sprinkle - 1.0 inch
Irrigate	5 May	Sprinkle - 1.0 inch
Fertilize	10 May	Top Dress - 100 lbs.
Irrigate	22 May	Sprinkle - 1.0 inch
Irrigate	1 June	Sprinkle - 1.0 inch
Irrigate	9 June	Sprinkle - 1.0 inch
Spray	10 June	2-4-D Aerial Application
Irrigate (17 times) -	14 June - 1 August	Sprinkle 1.0 inch approximately every 3 days between
Windrow	10 August	S.P. Windrower - 12'
Combine	15 August	Custom Combine - .60 Cwt.
Plow	15 Sept.-6 Oct.	4 Bottom Plow
Land Plane	10 October	12' - Land Plane
Dike	12 October	Disk Type Diker
Drag	16 October	
Disk	20 October	Offset Disk followed by Harrow

Table 13

MALT BARLEY OPERATION CALENDAR, SUBAREAS IV AND V
CLOSED BASIN, SAN LUIS VALLEY, COLORADO 1974

Irrigation Practice C.P. Sprinkler

Operation	Date	Practice
Fertilize	22 March	Broadcast 150 lbs.
Cultivate	26 March - 7 April	Tool Bar and Shanks
Ditcher	9 April	Eversman Type Ditcher
Drill	10 April	90 lbs. per acre
Irrigate	12 April	Perhaps earlier if necessary .85 inch per circle
Irrigate	24 April	Sprinkle .85 inch
Irrigate	10 May	Top Dress 100 lbs.
Irrigate	24 May	Sprinkle .85 inch
Spray	1 June	2-4-D Aerial Application
Irrigate (17 times) -	3 June - 5 August	sprinkle .85 inch approximately every 4 days
Windrow	13 August	Self Propelled Windrower - 12'
Combine	20 August	Custom combine - .60 cwt.
Fall Plow	15 Sept. - 10 Oct.	4 Bottom Plow
Land Plane	12 October	12' Land Plane
Diker	15 October	Disk Type Diker
Border Drag	18 October	
Disk and Harrow	26 October	10' Disk followed by Harrow

Table 14

MALT BARLEY OPERATION CALENDAR, SUBAREAS II AND III
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice Flood Irrigation

Operation	Date	Practice
Fertilize	22 March	Broadcast 150 lbs.
Cultivate 2	26 March - 7 April	Tool Bar and Shanks
Ditcher	8-9 April	Eversman Type Ditcher
Drill	10 April	90 lbs. per acre
Irrigate	12 April	Perhaps pre-irrigate if necessary Flood 4.00 inches
Irrigate	25 April	Flood 4.00 inches
Irrigate	10 May	Flood 4.00 inches
Fertilize	15 May	Top Dress - 100 lbs.
Irrigate	25 May	Flood 5.00 inches
Spray	1 June	2-4-D Aerial Application
Irrigate (8 times) - Flood 5.0 inches approximately every 9 days	5 June - 3 August	
Windrow	12 August	Self propelled Windrower - 12'
Combine	16 August	Custom Combine - .60 Cwt.
Fall Plow	15 Sept. - 10 Oct.	4 Bottom Plow
Land Plane	12 October	12' Land Plane
Diker	14 October	Disk Type Diker
Border Drag	18 October	
Disk and Harrow	25 October	10' Disk followed by Harrow

Table 15

MALT BARLEY OPERATION CALENDAR, SUBAREAS IV AND V
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice Flood Irrigation

Operation	Date	Practice
Fertilize	20 March	Broadcast Fertilizer - 160 lbs.
Cultivate	4 April	Tool Bar or Rotovator
Ditcher	5 April	Eversman Type
Drill	6 April	Drill - 100 lbs. per acre
Irrigate	10 April	May preirrigate if necessary Flood - 4.00 inches
Irrigate	24 April	Flood - 4.75 inches
Irrigate	7 May	Flood - 5.75 inches
Fertilize	10 May	Top Cress - 100 lbs.
Irrigate	22 May	Flood - 5.75 inches
Irrigate	3 June	Flood - 5.75 inches
Spray	10 June	2-4-D Aerial Application
Irrigate (6 times) - Flood 5.75 inches approximately every 9 days	16 June - 1 August	
Windrow	10 August	S.P. Windrower - 12'
Combine	15 August	Custom Combine - .60 Cwt.
Plow	15 Sept.-7 Oct.	4 Bottom Plow
Land Plane	10 October	12' - Land Plane
Dike	12 October	Disk Type Diker
Drag	16 October	
Disk	20 October	Offset Disk followed by Harrow

Table 16

POTATO OPERATION CALENDAR, SUBAREA III
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice C.P. Sprinkler

Operation	Approximate Date	Practice
Plow	20 March -5 April	4 Bottom Plow
Ditcher	7 April	Eversman Type Ditcher
Harrow	10 April	Spring Tooth Harrow
Drag	14 April	
Row Out & Fertilize	23 April	Preplant Fertilizer
Plant	10 May	22 Sacks per acre
Irrigate	13 May	May irrigate once in April if necessary Sprinkle - 1.0 inch
Irrigate	25 May	Sprinkle - 1.0 inch
Cultivate	1 June	Tool Bar or Rotovator
Hill Up	8 June	Tool Bar and Hiller Shovels
Irrigate	10 June	Sprinkle - 1.0 inch
Cultivate	21 June	Tool Bar or Rotovator
Irrigate (4 times) - Sprinkle 1.0 inch approximately every 4 days between 24 June - 9 July		
Spray	11 July	Aerial Application Chemical-$4.75/acre
Irrigate (7 times) - Sprinkle 1.0 inch approximately every 3 days between 12 July - 1 August		
Dust	3 August	Aerial Application Chemical-$5.25/acre
Irrigate (9 times) - Sprinkle 1.0 inch approximately every 3 days between 5 August - 1 Sept.		
Remove Vines	15 September	Vine Beater - 2R
Harvest	16 Sept.-10 Oct.	S.P. Potato Harvester - Air Separation
Chisel	15 October-4Nov.	10" Chisel
Drag	8 November	

Table 17

POTATO OPERATION CALENDAR, SUBAREA IV
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice C.P. Sprinkler

Operation	Approximate Date	Practice
Ditcher	20 March	Eversman Type Ditcher
Drag	25 March-5 April	
Row Out & Fertilize	15 April	Preplant Fertilizer
Irrigate	25 April	Preirrigate - Sprinkle 1.0 inch
Plant	2 May	Plant - 20 sacks per acre
Irrigate	4 May	Sprinkle - 1.0 inch
Irrigate	20 May	Sprinkle - 1.0 inch
Irrigate	1 June	Sprinkle - 1.0 inch
Cultivate	5 June	Tool Bar or Rotovator
Hill up	10 June	Tool Bar and Hiller Shovels
Irrigate	12 June	Sprinkle - 1.0 inch
Cultivate	17 June	Tool Bar or Rotovator
Irrigate	25 June	Sprinkle - 1.0 inch
Irrigate	2 July	Sprinkle - 1.0 inch
Irrigate	6 July	Sprinkle - 1.0 inch
Hill up	8 July	Tool Bar and Hiller Shovels
Irrigate	11 July	Sprinkle - 1.0 inch
Spray	12 July	Aerial Application Chemical-$4.75/acre
Irrigate (7 times) - Sprinkle 1.0 inch approximately every 3 days between 14 July and 31 July.		

(cont'd)

Table 17 (continued)

Operation	Approximate Date	Practice
Dust	1 August	Aerial Application Chemical -$5.25/Acre
Irrigate (12 times) - Sprinkle 1.0 inch approximately every 3 days between 2 August and 3 Sept.		
Remove vines	12 September	Vine Beater - 4R
Harvest	16 Sept.-10 Oct.	S.P. Potato Harvester-Mechanical Separation
Plow	20 October	4 Bottom Plow
Land Plane	25 October-3 Nov.	12' - Land Plane
Drag	7 November	
Harrow	10 November	Spring Tooth Harrow

Table 18

POTATO OPERATION CALENDAR, SUBAREA III
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice Row Irrigation

Operation	Approximate Date	Practice
Plow	22 March-9 April	4 Bottom Plow
Ditcher	10 April	Eversman Type Ditcher
Harrow	15 April	
Drag	20 April	
Row Out & Fertilize	25 April	Preplant Fertilizer
Plant	8 May-15 May	22 Sacks per acre - 4R Planter
Irrigate	15 May	May irrigate once in April if necessary Furrow - 1.6 inches
Irrigate	27 May	Furrow - 1.6 inches
Cultivate	1 June	Tool Bar or Rotovator
Hill Up	10 June	Tool Bar and Hillers
Irrigate	11 June	Furrow - 1.6 inches
Cultivate	24 June	Tool Bar or Rotovator
Irrigate (5 times) Row irrigate 1.6 inches approximately every three days between 26 June - 10 July		
Spray	11 July	Aerial Application Chemical-$4.75/acre
Irrigate (7 times) Row irrigate 1.6 inches approximately every three days between 13 July - 31 July		
Dust	1 August	Aerial Application Chemical-$5.25/acre
Irrigate (11 times) Row irrigate 1.6 inches approximately every three days between 3 August - 3 Sept.		
Remove vines	13 September	Vine Beater - 2R
Harvest	15 Sept.-10 Oct.	S.P. Potato Harvester - Air Separation
Chisel	15 Oct.-4 Nov.	10" Chisel
Drag	8 November	

Table 19

POTATO OPERATION CALENDAR, SUBAREA IV
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice Row Irrigation

Operation	Approximate Date	Practice
Ditcher	20 March	Eversman Type Ditcher
Drag	25 March-5 April	
Row Out and Fertilize	15 April	Preplant Fertilizer
Irrigate	25 April	Preirrigate - Furrow 1.75 inches
Plant	8 May	Plant - 20 sacks per acre
Irrigate	12 May	Furrow - 1.75 inches
Irrigate	22 May	Furrow - 1.75 inches
Irrigate	5 June	Furrow - 1.75 inches
Cultivate	9 June	Tool Bar or Rotovator
Hill up	12 June	Tool Bar and Hiller Shovels
Irrigate	20 June	Furrow - 1.75 inches
Cultivate	22 June	Tool Bar or Rotovator
Irrigate	1 July	Furrow - 1.75 inches
Irrigate	5 July	Furrow - 1.75 inches
Hill Up	8 July	Tool Bar and Hiller Shovels
Irrigate	9 July	Furrow - 1.75 inches
Spray	11 July	Aerial Application Chemical-$4.75/acre
Irrigate (5 times) Row	irrigate 1.75 inches approximately every 4 days between 13 July & 29 July	
Dust	1 August	Aerial Application Chemical-$5.25/acre
Irrigate (9 times) Row	irrigate 1.75 inches approximately every 4 days between 2 August & 3 Sept.	
Remove Vines	12 September	Vine Beater - 4R
Harvest	15 Sept.-10 Oct.	S.P. Potato Harvester-Mechanical Separation
Plow	20 October	4 Bottom Plow
Landplane	25 Oct.-3 Nov.	12' - Plane
Drag	8 November	
Harrow	10 November	Spring Tooth Harrow

Table 20

ALFALFA HAY OPERATION CALENDAR, SUBAREAS I, II AND V
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice Flood Irrigation

Operation	Approximate Date	Practice
Ditcher	20 March	Eversman Type Ditcher
Fertilize	5 April	Broadcast
Plow	15 April	3 Bottom Plow
Disk	20 April	Offset Disk - 8'
Land Plane	25 April	Land Plane - 12'
Border Drag	1 May	
Irrigate	10 May	Flood - 7.0 inches
Drill	15 May	10' Drill - 10 lbs/acre
Irrigate	1 June	Flood - 7.0 inches
Windrow	1 July	S.P. Windrower - 12'
Bale	4 July	PTO - Baler
Stack	8 July	Pull Type Stacker
Irrigate	15 July & 15 August	Flood - 7.0 inches
Windrow	1 September	S.P. Windrower - 12'
Bale	4 September	PTO - Baler
Stack	12 September	Pull Type Stacker
Irrigate	16 September	Flood - 7.0 inches

Table 21

ALFALFA HAY OPERATION CALENDAR, SUBAREAS I, II, AND V
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice C.P. Sprinkler

Operation	Approximate Date	Practice
Ditcher	20 March	Eversman type ditcher
Fertilize	5 April	Broadcast
Plow	15 April	3 Bottom Plow
Disk	20 April	Offset Disk - 8'
Land Plane	22 April	Land Plane - 12'
Irrigate	25 April	Sprinkle 2.0 inches
Irrigate	10 May	Sprinkle 2.0 inches
Drill	15 May	10'Drill - 10 lbs/acre
Irrigate (4 times)	Sprinkle 2.0 inches approximately every 10 days between 25 May - 26 June	
Windrow	1 July	S.P. Windrower - 12'
Bale	4 July	PTO-Baler
Stack	8 July	Pull Type Stacker
Irrigate (5 times)	Sprinkle 2.0 inches approximately every 9 days between 12 July - 20 August	
Windrow	1 September	S.P. Windrower - 12'
Bale	4 September	PTO-Baler
Stack	10 September	Pull Type Stacker
Irrigate	15 September	Sprinkle 2.0 inches

Table 22

GRASS HAY OPERATION CALENDAR, SUBAREA I
CLOSED BASIN, SAN LUIS VALLEY, COLORADO, 1974

Irrigation Practice Flood Irrigation

Operation	Approximate Date	Practice
Fertilize	28 March	Broadcast - 100 lbs.
Ditcher	30 March	Eversman Type Ditcher
Irrigate	15 May	Flood - 7.20 inches
Irrigate	15 June	Flood - 7.20 inches
Windrow	1 July	S.P. Windrower - 12'
Bale	5 July	PTO-Baler
Stack	10 July	Pull Type Stacker
Irrigate	15 July	Flood - 7.20 inches
Irrigate	15 August	Flood - 7.20 inches
Windrow	1 September	S.P. Windrower - 12'
Bale	4 September	PTO-Baler
Stack	10 September	Pull Type Stacker

IV. ESTIMATES OF COSTS AND RETURNS

The results taken from the sample survey were used to develop the representative crop operation calendars. These operating practices were then entered as data in the U.S.D.A., Economic Research Service, Crop and Livestock Budget Generator [9]. This computer routine generates variable and fixed costs associated with any set of operating practices and any given machinery complement. Once these variable and fixed costs are available, it is a simple matter to determine how the net returns vary as the yields and crop prices change.

Crop yield data was obtained from the survey for the different subareas (Tables 9 and 10). Price data was taken from Section III, with a variable range for each crop price level. This range attempts to cover a high, medium and low price for each crop.

Using these different prices, it was a simple matter to develop the expected returns as the market price varied from high to low. Tables 23 - 37 are constructed to illustrate costs and revenues under surface irrigation and sprinkler irrigation in the five subareas for the medium price level. Table 38 is designed to illustrate how the net returns under surface irrigation vary as the price level varies. Table 39 presents the different net returns under sprinkler irrigation as the price level changes.

NOTES:

(A) Interest on operating Capital is charged for six months for grains and hay and eight months for potatoes.

(B) Overhead Charge includes maintenance and repair costs on fixed structures, land taxes, water assessment, and accounting-tax preparation charges.

(C) Land Charge is the opportunity cost at eight per cent for owning this land.

(D) Interest on Machinery, Equipment and Overhead is the opportunity cost at eight per cent for owning this machinery and equipment.

Table 23

Ranch — SUBAREA I Mid-Price Range — Rio Grande Canal San Luis Valley - Closed Basin - N. End of Valley

Surface Irrigation

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
GRASS HAY	Ton	48.00	1.50	72.00
Total Receipts				72.00
2. Variable Costs				
Fertilizer	Lbs.	.09	100.00	9.00
Fertilizer Spreader	Acre	.50	1.0	.50
Miscellaneous expense	Acre	5.00	1.0	5.00
Tractor Fuel Cost	Acre			4.50
Tractor Lube Cost	Acre			.68
Tractor Repair Cost	Acre			1.79
Equipment Fuel Cost	Acre			.59
Equipment Lube Cost	Acre			.09
Equipment Repair Cost	Acre			4.00
Irrigation Fuel Cost	Acre			6.05
Irrigation Lube Cost	Acre			.58
Irrigation Repair Cost	Acre			.29
Labor				
Machine Labor	Hr.	2.50	3.380	8.45
Other Labor				
Irrigation Labor	Hr.	2.25	.806	1.81
Interest on Operating Capital		.08	33.83 x 6/12	1.35
Total Variable Costs				35.18
3. Income Above Variable Costs				36.82
4. Overhead Charge				3.90
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				6.16
Equipment				6.25
Irrigation System				1.81
6. Total Machinery, Equipment and Overhead Fixed Costs				18.12
7. Returns to Land, Risk, Management, and Capital				18.70
8. Land Charge	Acre	.08	250	20.00
9. Interest on Machinery, Equipment and Overhead		.08	100.66	8.05
10. Returns to Risk and Management				-9.35

Footnotes: This budget assumes unimproved native hay four irrigations - 28.80 inches total.

The operating capital interest is based on a six month time period - March through August.

Table 24

Ranch — SUBAREAS I, II, & V Mid-Price Range — Rio Grande Canal San Luis Valley Closed Basin

C.P. Sprinkler Irrigation — 1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
ALFALFA HAY	Ton	55.00	3.00	165.00
Total Receipts				165.00
2. Variable Costs				
Alfalfa Seed	Lbs.	1.85	2.00	3.70
Fertilizer	Lbs.	.09	100.00	9.00
Fertilizer Spreader	Acre	.50	.20	.10
Miscellaneous Expense	Acre	5.00	1.00	5.00
Tractor Fuel Cost	Acre			5.00
Tractor Lube Cost	Acre			.75
Tractor Repair Cost	Acre			1.98
Equipment Fuel Cost	Acre			.53
Equipment Lube Cost	Acre			.08
Equipment Repair Cost	Acre			5.00
Irrigation Fuel Cost	Acre			14.65
Irrigation Lube Cost	Acre			.14
Irrigation Repair Cost	Acre			1.68
Labor				
Machine Labor	Hr.	2.50	3.624	9.06
Other Labor				
Irrigation Labor	Hr.	2.25	.528	1.19
Interest on Operating Capital		.08	57.37 x 6/12	2.29
Total Variable Costs				60.15
3. Income Above Variable Costs				104.85
4. Overhead Charge				3.90
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				6.77
Equipment				6.78
Irrigation System				22.80
6. Total Machinery, Equipment & Overhead Fixed Costs				40.25
7. Returns to Land, Risk, Management, and Capital				64.60
8. Land Charge	Acre	.08	300.00	24.00
9. Interest on Machinery, Equipment and Overhead		.08	206.61	16.53
10. Returns to Risk and Management				24.07

Footnotes:

Table 25

Ranch — Subareas I, II, & V Mid-Price Range — Rio Grande Canal San Luis Valley - Closed Basin - N.End of Valley

Surface Irrigation — 1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
ALFALFA HAY	Ton	55.00	2.00	110.00
Total Receipts				110.00
2. Variable Costs				
Alfalfa Seed	Lbs.	1.85	2.00	3.70
Fertilizer	Lbs.	.09	100.00	9.00
Fertilizer Spreader	Acre	.50	.20	.10
Miscellaneous Expense	Acre	5.00	1.00	5.00
Tractor Fuel Cost	Acre			5.00
Tractor Lube Cost	Acre			.75
Tractor Repair Cost	Acre			1.98
Equipment Fuel Cost	Acre			.53
Equipment Lube Cost	Acre			.08
Equipment Repair Cost	Acre			5.00
Irrigation Fuel Cost	Acre			6.72
Irrigation Lube Cost	Acre			.64
Irrigation Repair Cost	Acre			.32
Labor				
Machine Labor	Hr.	2.50	3.624	9.06
Other Labor				
Irrigation Labor	Hr.	2.25	.896	2.02
Interest on Operating Capital		.08	49.90 x 6/12	1.99
Total Variable Costs				51.89
3. Income Above Variable Costs				58.11
4. Overhead Charge				3.90
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				6.77
Equipment				6.78
Irrigation System				2.02
6. Total Machinery, Equipment & Overhead Fixed Costs				19.47
7. Returns to Land, Risk, Management, and Capital				38.64
8. Land Charge	Acre	.08	300.00	24.00
9. Interest on Machinery, Equipment and Overhead		.08	111.41	8.90
10. Returns to Risk and Management				5.74

Footnotes: This assumes the rancher replaces one fifth of his stand each year. Four irrigations - 32.00 inches total.

The operating capital interest is based on a six month time period - March through August.

Table 26
SUBAREA II
Mid-Price Range

Hay-Grain Farm

C.P. Sprinkler

Rio Grande Canal
San Luis Valley - Closed Basin - W. of Gun Barrel

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	Cwt.	6.50	42.50	276.25
Total Receipts				276.25
2. Variable Costs				
Fertilizer	Lbs.	.12	150.0	18.00
Fertilizer Spreader	Acre	.50	1.0	.50
Barley Seed	Cwt.	7.50	.9	6.75
2-4D	Acre	.83	1.0	.83
Custom Air Application	Acre	2.10	1.0	2.10
Custom Combine	Cwt.	.60	51.0	30.60
Fertilizer Available N	Lbs.	.12	100.0	12.00
Fertilizer Spreader	Acre	.50	1.0	.50
Miscellaneous Expense	Acre	12.50	1.0	12.50
Tractor Fuel Cost	Acre			6.26
Tractor Lube Cost	Acre			.94
Tractor Repair Cost	Acre			2.98
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			14.29
Irrigation Lube Cost	Acre			.14
Irrigation Repair Cost	Acre			1.68
Labor				
Machine Labor	Hr.	2.50	3.948	9.87
Other Labor				
Irrigation Labor	Hr.	2.25	.388	.87
Interest on Operating Capital		.08	124.52 x 6/12	5.81
Total Variable Costs				130.33
3. Income Above Variable Costs				145.92
4. Overhead Charge				15.36
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.24
Equipment				5.17
Irrigation System				22.89
6. Total Machinery, Equipment & Overhead Fixed Costs				50.86
7. Returns to Land, Risk, Management, and Capital				95.06
8. Land Charge	Acre	.08	300	24.00
9. Interest on Machinery, Equipment and Overhead		.08	220.32	17.63
10. Returns to Risk and Management				53.43

Footnotes: This Budget assumes 21 circles - .84 inches per circle. The operating capital interest is based on a six month time period.

Table 27

Hay-Grain Farm

Surface Irrigation

SUBAREA 11
Mid-Price Range

Rio Grande Canal
San Luis Valley - Closed
Basin - W. of Gun Barrel

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	Cwt.	6.50	25.50	165.75
Total Receipts				165.75
2. Variable Costs				
Fertilizer	LBS.	.12	150.00	18.00
Fertilizer Spreader	Acre	.50	1.00	.50
Barley Seed	Cwt.	7.50	.90	6.75
2-4D	Acre	.82	1.00	.82
Custom Air Application	Acre	2.10	1.00	2.10
Custom Combine	Cwt.	.60	31.00	18.60
Fertilizer-Available N	Lbs.	.12	100.00	12.00
Fertilizer Spreader	Acre	.50	1.00	.50
Miscellaneous Expense	Acre	10.00	1.00	10.00
Tractor Fuel Cost	Acre			6.26
Tractor Lube Cost	Acre			.94
Tractor Repair Cost	Acre			2.98
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			12.70
Irrigation Lube Cost	Acre			.60
Irrigation Repair Cost	Acre			1.21
Labor				
Machine Labor	Hr.	2.50	3.948	9.87
Other Labor				
Irrigation Labor	Hr.	2.25	3.689	8.30
Interest on Operating Capital		.08	121.34 x 6/12	5.66
Total Variable Costs				121.50
3. Income Above Variable Costs				44.25
4. Overhead Charge				16.45
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.24
Equipment				5.17
Irrigation System				3.81
6. Total Machinery, Equipment & Overhead Fixed Costs				32.67
7. Returns to Land, Risk, Management, and Capital				11.58
8. Land Charge	Acre	.08	300.00	24.00
9. Interest on Machinery, Equipment and Overhead		.08	114.30	11.54
10 Returns to Risk and Management				- 23.96

Footnotes: This budget assumes 12 irrigations - 5.0 inches per irrigation. The operating capital is based on a six month time period - March through August.

Table 28

Potato-Grain Farm

Center Pivot Sprinkler

SUBAREA III
Mid-Price Range

Rio Grande Canal
San Luis Valley - Closed
Basin - W. of Gunbarrel
1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	CWT.	6.50	45.00	292.50
Total Receipts				292.50
2. Variable Costs				
Fertilizer	Lbs.	.12	150.0	18.00
Fertilizer Spreader	Acre	.50	1.0	.50
Barley Seed	Cwt.	7.50	.9	6.75
2-4 D	Acre	.83	1.0	.83
Custom Air Application	Acre	2.10	1.0	2.10
Crop Insurance	Acre	10.00	1.0	10.00
Custom Combine	Cwt.	.60	54.00	32.40
Fertilizer - Available N	Lbs.	.12	100.00	12.00
Fertilizer Spreader	Acre	.50	1.0	.50
Miscellaneous expense	Acre	12.50	1.0	12.50
Tractor Fuel Cost	Acre			6.26
Tractor Lube Cost	Acre			.94
Tractor Repair Cost	Acre			2.98
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			14.29
Irrigation Lube Cost	Acre			.14
Irrigation Repair Cost	Acre			1.68
Labor				
Machine Labor	Hr.	2.50	3.948	9.87
Other Labor				
Irrigation Labor	Hr.	2.25	.388	.87
Interest on Operating Capital		.08	136.32 x 6/12	5.45
Total Variable Costs				141.77
3. Income Above Variable Costs				150.73
4. Overhead Charge				15.36
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.24
Equipment				5.17
Irrigation System				22.89
6. Total Machinery, Equipment & Overhead Fixed Costs				50.86
7. Returns to Land, Risk, Management, and Capital				99.87
8. Land Charge	Acre	.08	500	40.00
9. Interest on Machinery, Equipment and Overhead		.08	220.32	17.63
10. Returns to Risk and Management				42.24

Footnotes: This budget assumes 21 circles - .84 inch per circle. The operating capital interest is based on a six month time period - March through August.

Table 29

Potato - Grain Farm
Surface Irrigation

SUBAREA III
Mid-Price Range

Rio Grande Canal
San Luis Valley - Closed Basin - W. of Gun Barrel

1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	Cwt.	6.50	30.00	195.00
Total Receipts				195.00
2. Variable Costs				
Fertilizer	Lbs.	.12	150.00	18.00
Fertilizer Spreader	Acre	.50	1.00	.50
Barley Seed	Cwt.	7.50	.90	6.75
2-4 D	Acre	.82	1.00	.82
Custom Air Application	Acre	2.10	1.00	2.10
Crop Insurance	Acre	10.00	1.00	10.00
Custom Combine	Cwt.	.60	36.00	21.60
Fertilizer - Available N	Lbs.	.12	100.00	12.00
Fertilizer Spreader	Acre	.50	1.00	.50
Miscellaneous Expense	Acre	12.50	1.00	12.50
Tractor Fuel Cost	Acre			6.26
Tractor Lube Cost	Acre			.94
Tractor Repair Cost	Acre			2.98
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			12.70
Irrigation Lube Cost	Acre			.60
Irrigation Repair Cost	Acre			1.21
Labor				
Machine Labor	Hr.	2.50	3.948	9.87
Other Labor				
Irrigation Labor	Hr.	2.25	3.689	8.30
Interest on Operating Capital		.08	130.20 x 6/12	5.21
Total Variable Costs				135.41
3. Income Above Variable Costs				59.59
4. Overhead Charge				16.45
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.24
Equipment				5.17
Irrigation System				3.81
6. Total Machinery, Equipment & Overhead Fixed Costs				32.67
7. Returns to Land, Risk, Management, and Capital				26.92
8. Land Charge	Acre	.08	500	40.00
9. Interest on Machinery, Equipment and Overhead		.08	114.30	11.54
10. Returns to Risk and Management				-24.62

Footnotes: This budget assumes 12 irrigations- 5.0 in. per irrigation - 60 in. total the operating capital interest is based on a six month time period - March through August.

Table 30

Potato-Grain Farm
SUBAREA III
Center Pivot Sprinkler Mid-Price Range

Rio Grande Canal
San Luis Valley - Closed Basin - W. of Gun Barrel
1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
POTATOES	Cwt.	3.00	255.00	765.00
Total Receipts				765.00
2. Variable Costs				
Potato Seed	Cwt.	5.00	22.00	110.00
Spray	Acre	4.75	1.0	4.75
Custom Air Application	Acre	2.10	1.0	2.10
Dust	Acre	5.25	1.0	5.25
Custom Air Application	Acre	2.10	1.0	2.10
Fertilizer - Available N	Lbs.	.25	120.00	30.00
Fertilizer - Available P	Lbs.	.25	150.00	37.50
Miscellaneous Expense	Acre	10.00	2.00	20.00
Storage	Cwt.	.15	250.00	37.50
Tractor Fuel Cost	Acre			9.55
Tractor Lube Cost	Acre			1.43
Tractor Repair Cost	Acre			4.61
Equipment Fuel Cost	Acre			7.72
Equipment Lube Cost	Acre			11.16
Equipment Repair Cost	Acre			17.10
Irrigation Fuel Cost	Acre			14.16
Irrigation Lube Cost	Acre			.14
Irrigation Repair Cost	Acre			1.68
Labor				
Machine Labor	Hr.	2.50	10.120	25.30
Other Labor	Hr.	2.25	7.70	17.32
Irrigation Labor	Hr.	2.25	5.28	1.19
Interest on Operating Capital		.08	350.56 x 8/12	18.70
Total Variable Costs				369.26
3. Income Above Variable Costs				395.74
4. Overhead Charge				15.36
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				10.62
Equipment				15.76
Irrigation System				22.80
6. Total Machinery, Equipment & Overhead Fixed Costs				64.54
7. Returns to Land, Risk, Management, and Capital				331.20
8. Land Charge	Acre	.08	500	40.00
9. Interest on Machinery, Equipment and Overhead		.08	303.51	24.28
10. Returns to Risk and Management				266.92

Footnotes: This budget assumes a leakage of 10 hundredweight
24 circles - one inch per circle
The operating capital interest is based on an eight month time period March through October.

Table 31

Potato-Grain Farm
Row Irrigation
SUBAREA III
Mid-Price Range
Rio Grande Canal
San Luis Valley - Closed Basin - W.of Gun Barrel
1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
POTATOES	Cwt.	3.00	255.00	765.00
Total Receipts				765.00
2. Variable Costs				
Potato Seed	Cwt	5.00	22.00	110.00
Spray	Acre	4.75	1.0	4.75
Custom Air Application	Acre	2.10	1.0	2.10
Dust	Acre	5.25	1.0	5.25
Custom Air Application	Acre	2.10	1.0	2.10
Fertilizer - Available N	Lbs.	.25	120.00	30.00
Fertilizer - Available P	Lbs.	.25	150.00	37.50
Miscellaneous Expense	Acre	10.00	2.00	20.00
Storage	Cwt.	.15	250.00	37.50
Tractor Fuel Cost	Acre			9.55
Tractor Lube Cost	Acre			1.43
Tractor Repair Cost	Acre			4.61
Equipment Fuel Cost	Acre			7.72
Equipment Lube Cost	Acre			1.16
Equipment Repair Cost	Acre			17.10
Irrigation Fuel Cost	Acre			9.07
Irrigation Lube Cost	Acre			.86
Irrigation Repair Cost	Acre			.43
Labor				
Machine Labor	Hr.	2.50	10.12	25.30
Other Labor	Hr.	2.25	7.70	17.32
Irrigation Labor	Hr.	2.25	7.34	16.52
Interest on Operating Capital		.08	360.27 x 8/12	19.21
Total Variable Costs				379.48
3. Income Above Variable Costs				385.52
4. Overhead Charge				16.45
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				10.62
Equipment				15.76
Irrigation System				2.72
6. Total Machinery, Equipment & Overhead Fixed Costs				45.55
7. Returns to Land, Risk, Management, and Capital				339.97
8. Land Charge	Acre	.08	500	40.00
9. Interest on Machinery, Equipment and Overhead		.08	220.20	17.62
10. Returns to Risk and Management				282.35

Footnotes: This Budget assumes a leakage of 10 hundredweight
27 irrigations - 43.2 inches total
The operating capital interest is based on an eight month time period - March thru October.

Table 32

Potato-Grain Farm

Center Pivot Sprinkler

SUBAREA IV
MID-PRICE RANGE

Rio Grande Canal
San Luis Valley - Closed Basin - Sargents District
1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	Cwt.	6.50	45.00	292.50
Total Receipts				292.50
2. Variable Costs				
Fertilizer	Lbs.	.12	150.00	18.00
Fertilizer Spreader	Acre	.50	1.0	.50
Barley Seed	Cwt.	7.50	1.0	7.50
2-4D	Acre	.82	1.0	.82
Custom Air Application	Acre	2.10	1.0	2.10
Crop Insurance	Acre	6.00	1.0	6.00
Custom Combine	Cwt.	.60	54.0	32.40
Fertilizer - Available N	Lbs.	.12	100.0	12.00
Fertilizer Spreader	Acre	.50	1.0	.50
Miscellaneous Expense	Acre	12.50	1.0	12.50
Tractor Fuel Cost	Acre			6.48
Tractor Lube Cost	Acre			.97
Tractor Repair Cost	Acre			2.94
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			14.28
Irrigation Lube Cost	Acre			.15
Irrigation Repair Cost	Acre			1.68
Labor				
Machine Labor	Hr.	2.50	3.906	9.77
Other Labor				
Irrigation Labor	Hr.	2.25	.462	1.04
Interest on Operating Capital		.08	133.3 x 6/12	5.34
Total Variable Costs				138.69
3. Income Above Variable Costs				153.81
4. Overhead Charge				14.79
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.60
Equipment				5.18
Irrigation System				22.89
6. Total Machinery, Equipment & Overhead Fixed Costs				50.46
7. Returns to Land, Risk, Management, and Capital				103.35
8. Land Charge	Acre	.08	750	60.00
9. Interest on Machinery, Equipment and Overhead		.08	220.26	17.62
10. Returns to Risk and Management				25.73

Footnotes:

This budget assumes 21 circles - one inch per circle. The operating capital interest is based on a six month time period - March through August.

Table 33

Potato-Grain Farm — SUBAREA IV, Mid-Price Range — Rio Grande Canal, San Luis Valley - Closed Basin-Sargents District 70 Co. Line

Surface Irrigation — 1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	Cwt.	6.50	35.00	227.50
Total Receipts				227.50
2. Variable Costs				
Fertilizer	Lbs.	.11	160.0	17.60
Fertilizer Spreader	Acre	.50	1.0	.50
Barley Seed	Cwt.	7.50	1.0	7.50
2-4D	Acre	.82	1.0	.82
Custom Air Application	Acre	2.10	1.0	2.10
Crop Insurance	Acre	6.00	1.0	6.00
Custom Combine	Cwt.	.60	42.0	25.20
Fertilizer Available N	Lbs.	.12	100.0	12.00
Fertilizer Spreader	Acre	.50	1.0	.50
Miscellaneous Expense	Acre	12.50	1.0	12.50
Tractor Fuel Cost	Acre			6.48
Tractor Lube Cost	Acre			.97
Tractor Repair Cost	Acre			2.94
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			13.31
Irrigation Lube Cost	Acre			.63
Irrigation Repair Cost	Acre			1.27
Labor				
Machine Labor	Hr.	2.50	3.906	9.77
Other Labor				
Irrigation Labor	Hr.	2.25	3.865	8.70
Interest on Operating Capital		.08	132.50 x 6/12	5.30
Total Variable Costs				137.80
3. Income Above Variable Costs				89.70
4. Overhead Charge				15.88
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.60
Equipment				5.18
Irrigation System				3.99
6. Total Machinery, Equipment & Overhead Fixed Costs				32.65
7. Returns to Land, Risk, Management, and Capital				57.05
8. Land Charge	Acre	.08	750	60.00
9. Interest on Machinery, Equipment and Overhead		.08	147.58	11.81
10. Returns to Risk and Management				- 14.76

Footnotes: This budget assumes 11 irrigations - 5.76 inches per irrigation - 63.4 inches total. The operating capital interest is based on a six month time period - March through August.

Table 34

Potato-Grain Farm
Center Pivot Sprinkler

SUBAREA IV
Mid-Price Range

Rio Grande Canal
San Luis Valley - Closed Basin - Sargents District to Co. Line
1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
POTATOES	Cwt.	3.00	250	750.00
Total Receipts				750.00
2. Variable Costs				
Potato Seed	Cwt.	5.00	20.0	100.00
Spray	Acre	4.75	1.0	4.75
Custom Air Application	Acre	2.10	1.0	2.10
Dust	Acre	5.25	1.0	5.25
Custom Air Application	Acre	2.10	1.0	2.10
Fertilizer - Available N	Lbs.	.25	120.0	30.00
Fertilizer - Available P	Lbs.	.25	150.0	37.50
Miscellaneous Expense	Acre	10.00	2.0	20.00
Storage	Cwt.	.15	250.0	37.50
Tractor Fuel Cost	Acre			12.15
Tractor Lube Cost	Acre			1.83
Tractor Repair Cost	Acre			5.82
Equipment Fuel Cost	Acre			.84
Equipment Repair Cost	Acre			12.20
Irrigation Fuel Cost	Acre			14.28
Irrigation Lube Cost	Acre			.14
Irrigation Repair Cost	Acre			1.68
Labor				
Machine Labor	Hr.	2.50	9.88	24.70
Other Labor	Hr.	2.25	7.70	17.32
Irrigation Labor	Hr.	2.25	.616	1.39
Interest on Operating Capital		.08	337.15 x 8/12	17.98
Total Variable Costs				355.13
3. Income Above Variable Costs				394.87
4. Overhead Charge				14.79
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				13.09
Equipment				10.84
Irrigation System				22.96
6. Total Machinery, Equipment & Overhead Fixed Costs				61.68
7. Returns to Land, Risk, Management, and Capital				333.19
8. Land Charge	Acre	.08	750	60.00
9. Interest on Machinery, Equipment and Overhead		.08	298.22	23.86
10. Returns to Risk and Management				249.33

Footnotes: This budget assumes a leakage of 10 hundredweight. 28 circles - one inch per circle

The operating capital interest is based on an eight month time period - March through October.

Table 35

Potato-Grain Farm

Row Irrigation

SUBAREA IV
Mid-Price Range

Rio Grande Canal
San Luis Valley - Closed Basin - Sargents District
1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
POTATOES	Cwt.	3.00	250.00	750.00
Total Receipts				750.00
2. Variable Costs				
Potato Seed	Cwt.	5.00	20.0	100.00
Spray	Acre	4.75	1.0	4.75
Custom Air Application	Acre	2.10	1.0	2.10
Dust	Acre	5.25	1.0	5.25
Custom Air Application	Acre	2.10	1.0	2.10
Fertilizer - Available N	Lbs.	.25	120.0	30.00
Fertilizer - Available P	Lbs.	.25	150.0	37.50
Miscellaneous Expense	Acre	10.00	2.0	20.00
Storage	Cwt.	.15	250.0	37.50
Tractor Fuel Cost	Acre			12.15
Tractor Lube Cost	Acre			1.83
Tractor Repair Cost	Acre			5.82
Equipment Fuel Cost	Acre			5.57
Equipment Lube Cost	Acres			.84
Equipment Repair Cost	Acre			12.20
Irrigation Fuel Cost	Acre			8.08
Irrigation Lube Cost	Acre			.77
Irrigation Repair Cost	Acre			.38
Labor				
Machine Labor	Hr.	2.50	9.88	24.70
Other Labor	Hr.	2.25	7.70	17.32
Irrigation Labor	Hr.	2.25	6.55	14.73
Interest on Operating Capital		.08	343.62 x 8/12	18.33
Total Variable Costs				361.95
3. Income Above Variable Costs				388.05
4. Overhead Charge				15.88
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				13.09
Equipment				11.57
Irrigation System				2.43
6. Total Machinery, Equipment & Overhead Fixed Costs				42.97
7. Returns to Land, Risk, Management, and Capital				345.08
8. Land Charge	Acre	.08	750	60.00
9. Interest on Machinery, Equipment and Overhead		.08	216.05	17.28
10. Returns to Risk and Management				267.80

Footnotes: This budget assumes a leakage of 10 hundredweight. Irrigations 40 inches total.

The operating capital interest is based on an eight month time period - March through October.

Table 36

Hay-Grain Farm

C.P. Sprinkler

SUBAREA V
Mid-Price Range

Farmers Union Canal
San Luis Valley - Closed
Basin - W. of Gun Barrel

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	Cwt.	6.50	42.50	276.25
Total Receipts				276.25
2. Variable Costs				
Fertilizer	Lbs.	.12	150.00	18.00
Fertilizer Spreader	Acre	.50	1.0	.50
Barley Seed	Cwt.	7.50	1.0	7.50
2-4D	Acre	.82	1.0	.82
Custom Air Application	Acre	2.10	1.0	2.10
Custom Combine	Cwt.	.60	51.0	30.60
Fertilizer Available N	Lbs.	.12	100.0	12.00
Fertilizer Spreader	Acre	.50	1.0	.50
Miscellaneous Expense	Acre	12.50	1.0	12.50
Tractor Fuel Cost	Acre			6.48
Tractor Lube Cost	Acre			.97
Tractor Repair Cost	Acre			2.94
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			14.28
Irrigation Lube Cost	Acre			.15
Irrigation Repair Cost	Acre			1.68
Labor				
Machine Labor	Hr.	2.50	3.906	9.77
Other Labor				
Irrigation Labor	Hr.	2.25	.462	1.04
Interest on Operating Capital		.08	125.54 x 6/12	5.02
Total Variable Costs				130.56
3. Income Above Variable Costs				145.69
4. Overhead Charge				14.79
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.60
Equipment				5.18
Irrigation System				22.89
6. Total Machinery, Equipment & Overhead Fixed Costs				50.46
7. Returns to Land, Risk, Management, and Capital				95.23
8. Land Charge	Acre	.08	300	24.00
9. Interest on Machinery, Equipment and Overhead		.08	222.26	17.62
10. Returns to Risk and Management				53.61

Footnotes: This Budget assumes 21 circles - one inch per circle. The operating capital interest is based on a six minth time period.

Table 37

Hay-Grain Farm

Surface Irrigation

SUBAREA V
Mid-Price Range

Farmers Union Canal
San Luis Valley - Closed Basin
East of County Line
1974

INDIVIDUAL CROP BUDGETS - PER ACRE COSTS

	Unit	Price or Cost/Unit	Quantity per acre	Value or Cost/acre
1. Gross Return from Production				
MALT BARLEY	Cwt.	6.50	30.00	195.00
Total Receipts				195.00
2. Variable Costs				
Fertilizer	Lbs.	.11	160.00	17.60
Fertilizer Spreader	Acre	.50	1.0	.50
Barley Seed	Cwt.	7.50	1.0	7.50
2-4D	Acre	.82	1.0	.82
Custom Air Application	Acre	2.10	1.0	2.10
Custom Combine	Cwt.	.60	36.0	21.60
Fertilizer Available N	Lbs.	.12	100.0	12.00
Fertilizer Spreader	Acre	.50	1.0	.50
Miscellaneous Expense	Acre	12.50	1.0	12.50
Tractor Fuel Cost	Acre			6.48
Tractor Lube Cost	Acre			.97
Tractor Repair Cost	Acre			2.94
Equipment Fuel Cost	Acre			1.22
Equipment Lube Cost	Acre			.18
Equipment Repair Cost	Acre			2.31
Irrigation Fuel Cost	Acre			13.31
Irrigation Lube Cost	Acre			.63
Irrigation Repair Cost	Acre			1.27
Labor				
Machine Labor	Hr.	2.50	3.906	9.77
Other Labor				
Irrigation Labor	Hr.	2.25	3.865	8.70
Interest on Operating Capital		.08	122.90 x 6/12	4.92
Total Variable Costs				127.82
3. Income Above Variable Costs				67.18
4. Overhead Charge				17.70
5. Machinery and Equipment Ownership Fixed Costs (Deprec., Taxes, and Insurance)				
Tractor				7.60
Equipment				5.18
Irrigation System				3.99
6. Total Machinery, Equipment & Overhead Fixed Costs				34.47
7. Returns to Land, Risk, Management, and Capital				32.71
8. Land Charge	Acre	.08	300	24.00
9. Interest on Machinery, Equipment and Overhead		.08	147.58	11.81
10. Returns to Risk and Management				- 3.10

Footnotes: This Budget assumes 11 Irrigations - 5.70 inches per irrigation. The operating capital interest is based on a six month time period.

Table 38

EFFECT OF ALTERNATIVE CROP PRICES ON NET RETURNS TO SURFACE IRRIGATED CROPS IN THE CLOSED BASIN (1974)

CROP	SUBAREA	YIELD/ACRE	PRICE/UNIT ($)	TOTAL COSTS PER ACRE ($)	NET RETURN PER ACRE*
Malt Barley	II	25.50 Cwt.	5.50 Cwt.	189.71	- 49.46
		25.50 Cwt.	6.50 Cwt.	189.71	- 23.96
		25.50 Cwt.	7.50 Cwt.	189.71	1.54
Malt Barley	III	30.00 Cwt.	5.50 Cwt.	219.62	- 54.62
		30.00 Cwt.	6.50 Cwt.	219.62	- 24.62
		30.00 Cwt.	7.50 Cwt.	219.62	5.38
Malt Barley	IV	35.00 Cwt.	5.50 Cwt.	242.26	- 49.76
		35.00 Cwt.	6.50 Cwt.	242.26	- 14.76
		35.00 Cwt.	7.50 Cwt.	242.26	20.24
Malt Barley	V	30.00 Cwt.	5.50 Cwt.	198.10	- 33.10
		30.00 Cwt.	6.50 Cwt.	198.10	- 3.10
		30.00 Cwt.	7.50 Cwt.	198.10	26.90
Potatoes	III	255 Cwt.	2.00 Cwt.	482.65	27.35
		255 Cwt.	2.50 Cwt.	482.65	154.85
		255 Cwt.	3.00 Cwt.	482.65	282 35
		255 Cwt.	3.50 Cwt.	284.65	409.85
Potatoes	IV	250 Cwt.	2.00 Cwt.	482.20	17.80
		250 Cwt.	2.50 Cwt.	482.20	142.80
		250 Cwt.	3.00 Cwt.	482.20	267.80
		250 Cwt.	3.50 Cwt.	482.20	392.80
Alfalfa Hay	I, II	2.0 Ton	50.00 Ton	104.26	- 4.26
		2.0 Ton	55.00 Ton	104.26	5.74
		2.0 Ton	60.00 Ton	104.26	15.74
Alfalfa Hay	V	2.25 Ton	50.00 Ton	104.26	8.24
		2.25 Ton	55.00 Ton	104.26	19.49
		2.25 Ton	60.00 Ton	104.26	30.74
Grass Hay	I	1.5 Ton	44.00 Ton	81.35	-15.35
		1.5 Ton	48.00 Ton	81.35	- 9.35
		1.5 ton	52.00 Ton	81.35	- 3.35

*Net return is defined as returns to risk and management.

Table 39

EFFECT OF ALTERNATIVE CROP PRICES ON NET RETURNS TO SPRINKLER IRRIGATED CROPS IN THE CLOSED BASIN (1974)

CROP	SUBAREA	YIELD/ACRE	PRICE/UNIT ($)	TOTAL COSTS PER ACRE ($)	NET RETURN PER ACRE* ($)
Malt Barley	II	42.50 Cwt.	5.50 Cwt.	222.82	10.93
		42.50 Cwt.	6.50 Cwt.	222.82	53.43
		42.50 Cwt.	7.50 Cwt.	222.82	95.93
Malt Barley	III	45 Cwt.	5.50 Cwt.	250.26	- 2.76
		45 Cwt.	6.50 Cwt.	250.26	42.24
		45 Cwt.	7.50 Cwt.	250.26	87.24
Malt Barley	IV	45 Cwt.	5.50 Cwt.	266.77	-19.27
		45 Cwt.	6.50 Cwt.	266.77	25.73
		45 Cwt.	7.50 Cwt.	266.77	70.73
Malt Barley	V	42.50 Cwt.	5.50 Cwt.	230.64	11.11
		42.50 Cwt.	6.50 Cwt.	230.64	53.61
		42.50 Cwt.	7.50 Cwt.	230.64	98.11
Potatoes	III	255 Cwt.	2.00 Cwt.	498.08	11.92
		255 Cwt.	2.50 Cwt.	498.08	139.42
		255 Cwt.	3.00 Cwt.	498.08	266.92
		255 Cwt.	3.50 Cwt.	498.08	394.42
Potatoes	IV	250 Cwt.	2.00 Cwt.	500.67	- .67
		250 Cwt.	2.50 Cwt.	500.67	124.33
		250 Cwt.	3.00 Cwt.	500.67	249.33
		250 Cwt.	3.50 Cwt.	500.67	374.33
Alfalfa Hay	I, II, V	3 Ton	50 Ton	140.93	9.07
		3 Ton	55 Ton	140.93	24.07
		3 Ton	60 Ton	140.93	39.07

*Net return is defined as returns to risk and management.

D. Comparison of total farm net returns under surface and sprinkler irrigation.

The farm operator who is considering changing to a sprinkler irrigation system must take into account the fact that the present generation of center pivot sprinklers is only able to irrigate about 135 acres out of a quarter section. This can be compared to an average surface irrigated quarter that usually irrigates about 150 acres. Therefore, when a farmer chooses to go to a center pivot sprinkler he loses about 15 acres per quarter unless he decides to surface irrigate his corners. The farmer will probably find that cropping four small areas (less than four acres each) is relatively costly and usually discovers that farming these corners is at best a marginally profitable activity.

From the data presented in this document, it is possible to compare returns to farms that exclusively use surface irrigation techniques and those that use both surface and sprinkler irrigation. As an example, a representative 640 acre farm from Subarea III is chosen. This farm follows a standard potato-grain rotation with 559 acres in surface irrigation. It is possible to compare the total farm budget from this farm to an irrigated farm in the same area that has two quarters under sprinklers assuming the farmer does not irrigate his corners. This comparison is found in Table 40.

From Table 40 it is apparent that even without operating the corners on the sprinkler quarters, the farmer can increase his total net return to crops by installing sprinkler irrigation.

Table 40

NET RETURNS TO RISK AND MANAGEMENT ON TWO SUBAREA III FARMS: FARM A - ALL SURFACE IRRIGATED, FARM B - PARTLY UNDER SPRINKLER AND PARTLY SURFACE IRRIGATED

Type Farm	Crop	Irr. Method	Net Returns Per Acre* ($)	Acres on Farm	Net Returns From Crop ($)
Farm A	Malt Barley	Flood	5.38	319	1,716.22
	Potatoes	Row	154.85	240	37,164.00
	Non-productive			81	--
		TOTAL NET RETURNS		640	38,880.22
Farm B	Malt Barley	Flood	5.38	167	898.46
	Malt Barley	Sprin.	87.24	135	11,777.40
	Potatoes	Row	154.85	92	14,246.20
	Potatoes	Sprin.	139.42	135	18,821.70
	Non-productive			111	--
		TOTAL NET RETURNS		640	$45,743.76

*Malt Barley is priced at $7.50/cwt. and potatoes are priced at $2.50/cwt.

V. CONCLUSIONS

The main purpose of this document is to provide costs and returns estimates for the important crops in the Closed Basin, San Luis Valley, Colorado. This publication is not intended as a means of "selling" any production techniques. However, a short discussion on the figures presented in the budgets may help to clarify the data.

The potato budgets illustrate that under present operating practices there appears to be no economic advantage to growing potatoes under sprinklers. This conclusion is based on the fact that yields do not vary between row irrigated potatoes and sprinkler irrigated potatoes and that the savings on water is presently insignificant. If the farmers learn how to increase their yields as they gain more experience with sprinklers and/or if water were to become more costly then the current economic relationship may change.

The barley budgets illustrate that there is very definitely an economic advantage to raising grain under sprinklers. The average yields under sprinklers of 45 cwt. to the acre with 21 acre-inches of water are significantly greater than flood irrigated yields of 30 cwt. to the acre with 60 acre-inches of water. As water becomes more scarce and its value increases, then the sprinklers will become even more important.

Grass hay, if sold as a cash crop, is not profitable at any of the three price ranges. However, as stated in the text, most of this hay is marketed in the form of livestock and therefore the cash crop figures may not present the entire picture.

The alfalfa hay budgets are quite interesting, especially in the relationships between yields and irrigation techniques. With yields of two tons

per acre, flood irrigated alfalfa is only marginally profitable, even at $55 a ton. The operator could lose as much as $30 an acre if he only obtains two tons to the acre and uses sprinkler irrigation. On the other hand, if the farmer can improve his yield by a single ton to three tons of alfalfa hay to the acre than at $55 per ton, he can make a profit of more than $24 per acre. Since very little alfalfa hay is presently grown under sprinklers, it is difficult to state conclusively what the average yield under sprinklers should be, but three tons to the acre might reasonably be anticipated. Further research and experience with sprinklers will hopefully lead to the answer to this question.

The final point to be addressed is the question of groundwater drawdown. With the expansion of sprinklers in the valley, some of the operators are not using all of their surface water right. Since there is practically zero deep percolation under sprinkler irrigated fields unless the farmer uses some of his surface water right, the net recharge to the aquifer is less than under surface irrigation practices. The long run implications of drawing down the aquifer must not be ignored, but should be one of the major concerns of all water user organizations and all water regulatory agencies.

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