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Aggregate Wheat and Barley Production in Idaho, 1970

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UNIVERSITY OF IDAHO

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Roger B. Long and Monica E. Thomas

Farm managers are continually shifting their use of resources in response to changes in the costs of inputs, the prices of their products, and the physical limitations in each area. This research is an effort to estimate the production response of wheat and barley in Idaho to alternative market prices, assuming that the input costs and physical limitations remain constant.

Wheat is the fourth most important income crop in the State. It is sold domestically for use as flour and feed, and it is also exported to foreign markets. Barley, on the other hand, is the principal feed grain in the State.

With changing economic conditions and Government programs which tend to limit the amounts of wheat and barley produced in Idaho, a pertinent question is how much of these crops would be produced at various product prices. Because this question is so important to Idaho agriculture, this research was undertaken with the sponsorship of the U. S. Department of Agriculture and the Department of Agricultural Economics at the University of Idaho.

Objectives and Procedures

The specific objectives of this study were:

- (1) To determine individual farm supply responses to alternative price relationships and levels, with emphasis on wheat and feed grains.
- (2) To develop aggregate regional supply responses for the State, using individual farm data.

Sample data from farms throughout Idaho were used to construct average farm budgets for representative size farms and for the major field crops in Idaho. These budgets were then used in linear programming models to estimate how resources would be optimally allocated to maximize farm

profits (3). Restrictions were incorporated in the programming models to represent rotations, livestock feed requirements, and marketing contracts on crops where they existed (see appendices). Prices for wheat and barley were then varied to estimate their impact on production. For purposes of this study, Government programs were assumed not to be in effect and farmers were assumed to react to price changes in order to maximize profits. The results for representative farms were then aggregated to estimate responses in production for the State.

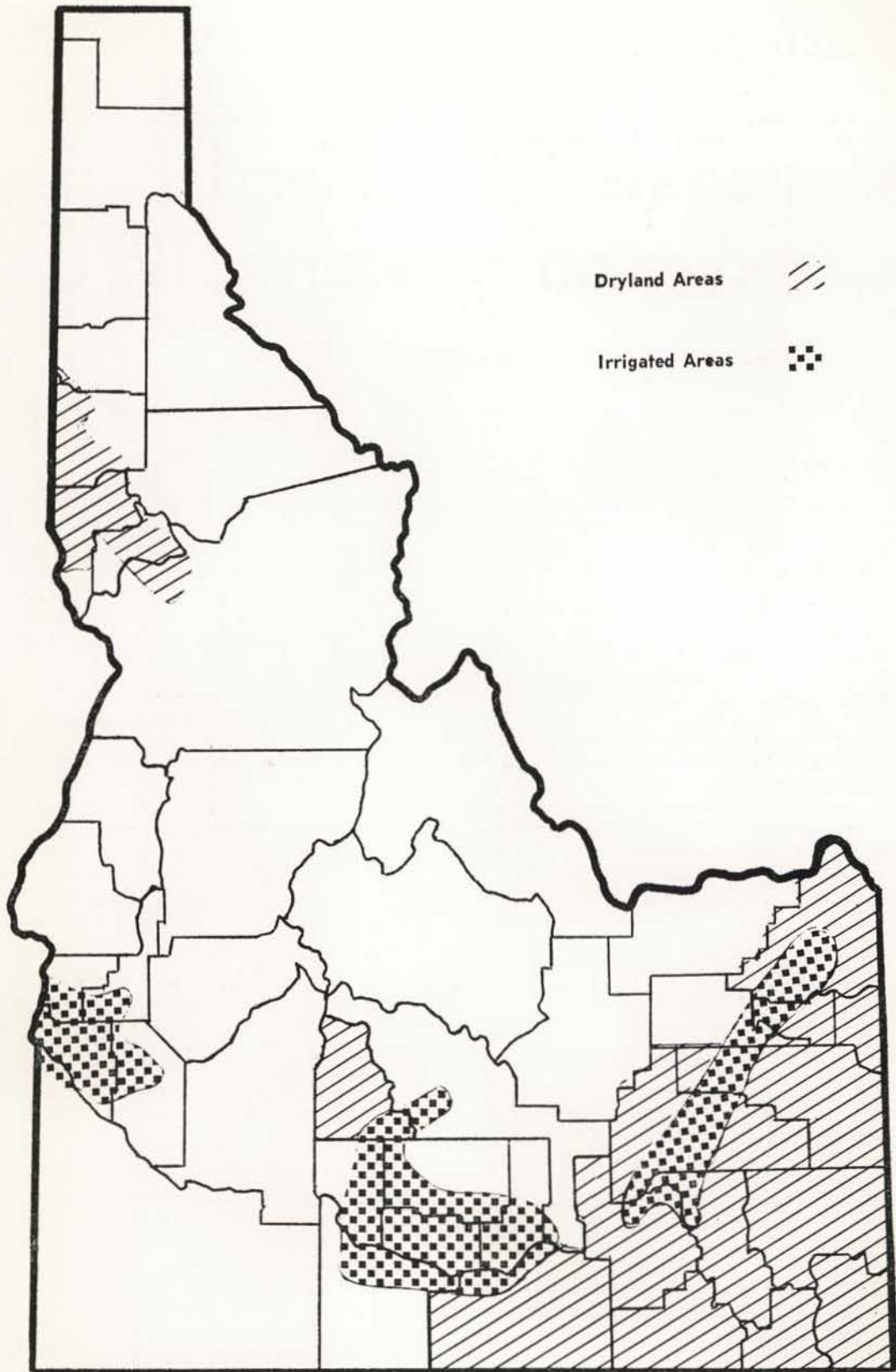
Agricultural Areas

In the study, Idaho was divided into 5 agricultural areas: 2 dryland and 3 irrigated. The dryland areas were the north panhandle, including the Palouse Prairie, and the southeast dryland area. The irrigated portions of the State were divided into the southwest, southcentral and the southeast irrigated areas. The primary portions of each irrigated area are located along the Snake River in south Idaho.

Soft wheat is grown in the Palouse Prairie of north Idaho and the three irrigated areas. This is primarily used as a feed grain or is exported to Far East markets. Hard wheat is grown in the southeast dryland area. Hard wheat with high protein content may be sold for bread flour, while the remainder is sold as a feed grain.

Competition among field crops varies considerably between areas. Fewer field crops can be grown in the dryland areas than in the irrigated areas. Wheat and barley are the major field crops in the southeast dryland area, while wheat, barley, and peas are the major field crops in the north dryland area. There are 11 major competitive field crops in the southwest irrigated area, 6 in the southcentral irrigated area, and 4 in the southeast irrigated area. Because of the basic differences in the type of agriculture, the responses of farms in each area were developed separately.

The five major wheat producing regions in Idaho.



Irrigated Areas

Table 1 lists the number of farms estimated to be producing wheat and barley in the three irrigated areas in 1970. Farms tend to be larger in size in the southcentral and southeast irrigated areas than in the southwest. The three farm sizes in each area are representative in terms of existing farms. Larger and smaller farms exist but were not included in the programs because of inadequate information. Numbers of farms in each area were estimated from 1964 Census of Agriculture data (9). Total area in farms was also obtained from the Census, and adjustments were made to include the additional irrigated acreage in each area.

Yields used in farm budgets were those anticipated by farmers, if they were to grow each crop. Production estimates for wheat and barley were based on programming results, which were in terms of acres, and yields experienced in each area and published by the Statistical Reporting Service, United States Department of Agriculture (6, 7). Initial product prices and yields used in the programming for each area are presented in table 2.

Yields are generally lower in areas of higher elevation because of the shorter growing seasons, and decrease from west to east along the Snake River. Yields do not tell the whole story, however, since the quality of some crops is higher in some areas than others. For example, southcentral and southeast Idaho produce higher quality potatoes than southwest Idaho.

The linear programming model estimated the acreage planted to each crop for individual farms. To obtain the total acreage in wheat and barley for an area, the number of farms estimated to be in the area in 1970 was multiplied by the number of acres in wheat and barley on the individual farm level. To obtain wheat and barley production, yields estimated by the Statistical Reporting

Table 1. Estimated number of farms in south Idaho irrigated areas, 1970.

Area	Number of farms
Southwest	
80 acre farm size	1,662
160 acre farm size	1,547
240 acre farm size	325
Southcentral	
160 acre farm size	641
240 acre farm size	1,985
320 acre farm size	481
Southeast	
80 acre farm size	1,852
160 acre farm size	3,357
240 acre farm size	1,003

Service (6, 7) were multiplied by the number of predetermined acres. In this way, the data were converted from the individual farm level to an aggregate level for an area.

Southwest Irrigated

This area is the most complex agricultural area in the State. More than 40 crops are grown commercially. Eleven field crops each occupied one percent or more of the irrigated land in 1964, according to the Census of Agriculture (table 3). Crops not considered in this analysis were fruits, vegetables, and minor seed crops. The area devoted to these excluded crops is quite stable from year to year and the returns are higher than for most of the included crops. It was assumed that these latter crops would remain at their 1964 levels for the near future, since orchards require long-term investments and the vegetable and seed crops are grown primarily under contract.

Table 2. Assumed product prices and per acre yields for south Idaho irrigated farms, 1970.

Enterprise	Unit	Southwest Idaho		Southcentral Idaho		Southeast Idaho	
		Product price	Yield per acre	Product price	Yield per acre	Product price	Yield per acre
Potatoes	cwt.	\$ 1.83	280	\$ 1.83	215	\$ 1.83	205
Sugar beets	ton	13.82	25	13.82	17.5	13.82	17.5
Alfalfa hay	ton	20.90	5.2	20.90	4.8	20.90	4.2
Alfalfa (seed)	cwt.	44.74	5.1				
Alfalfa (hay)	ton	20.90	3				
Field beans	cwt.	7.15	18.3	7.15	17.5		
Field corn	bu.	1.33	93.5				
Corn for seed	cwt.	10.75	18.5				
Corn for vegetables	ton	26.59	7.3				
Wheat	bu.	1.07	88*	1.07	82*	1.07	74*
Barley	bu.	.94	87*	.94	83*	.94	70*
Red clover (seed)	cwt.	27.76	4.8				
Red clover (hay)	ton	20.90	1				

* These yields were used in budget construction only. Statistical Reporting Service data were used for estimating supply responses.

Hay and feed grain production occupies a large portion of the irrigated area to support large numbers of livestock. Farms were assumed to produce sufficient hay and feed grains to support the livestock in the area. The minimum feed requirements are reflected in the model programming. Livestock do not compete directly with field crops for resources. For example, cattle are fed on farms during winter months only, and many others are fed in specialized operations.

Returns from field crops are especially high for potatoes, sugar beets, and alfalfa seed (table 4). Since these crops would dominate any model maximizing returns, maximum acreage limits were

Table 3. Major crops in southwest Idaho irrigated area, 1964.¹

Enterprise	Acres harvested	% of total acreage
Potatoes	15,664	3.2
Sugar beets	44,505	9.3
Alfalfa hay	162,847	33.9
Alfalfa seed	31,895	6.6
Field beans	6,154	1.3
Field corn	46,629	9.7
Corn for seed	5,177	1.1
Corn for vegetables	6,336	1.3
Wheat	31,507	6.6
Feed grain ²	33,640	7.0
Red clover seed	5,980	1.2
Other ³	90,450	18.8
Total	480,784	100.0

¹Source: 1964 Census of Agriculture (9).

²Oats, barley, rye, mixed, other.

³All other remaining irrigated crops.

established to reflect marketing restrictions from contracts, price uncertainty, and quality restrictions in the area.

Tables 4 to 6 summarize per acre costs, gross returns, net returns and returns above variable costs for the 11 major irrigated field crops in southwest Idaho. Costs in these tables are based on interviews with farmers in the spring of 1968 (1). Costs and returns are shown for representative farms of 80, 160, and 240 acres. Table 1 lists the number of farms estimated to be in each of these categories for all three irrigated areas.

Linear programming models for the three farm sizes are presented in Tables A-1 to A-3. Essentially, these programs summarize the resource requirements for land, labor, and capital, and allocate these resources to maximize returns over variable costs. Total land, capital, and labor resources are also summarized in these tables. Labor requirements and availability are shown for eight periods during the growing season. The first and the eighth are two-month periods while the others are each one month in length. These periods are adjusted for family labor that is available full-time in the summer and only part-time the rest of the year.

As indicated earlier, the flexibility constraints or bounds represent marketing restrictions for crops commonly grown under contract and feed requirements for livestock. This puts upper bounds on the production of some crops, and lower or minimum bounds on the production of others. Cropping enterprises were not established in the form of rotation but some managers do follow specific rotations on their farms. Farmers indicated that either alfalfa or grain should be grown every four years in a normal rotation. These rotational requirements are easily met with bounds used in the programs.

Table 4. Enterprise costs, gross returns, and net returns — 80-acre southwest Idaho irrigated farms, 1970.¹

Enterprise	Costs per acre			Gross returns per acre	Net returns per acre ²	Returns above variable costs
	Fixed	Variable	Total			
Potatoes	\$56.61	\$226.12	\$282.73	\$512.40	\$229.67	\$286.28
Sugar beets	57.41	152.08	209.49	345.50	136.01	193.42
Alfalfa hay	57.24	63.19	120.43	108.68	-11.75	45.49
Alfalfa seed	54.76	118.36	173.12	290.87	117.75	172.51
Field beans	58.40	59.42	117.82	130.84	13.02	71.42
Field corn	55.67	81.80	137.47	124.35	-13.12	42.55
Corn for seed	55.67	108.98	164.65	198.88	34.23	89.90
Corn for vegetables	55.67	78.63	134.30	194.11	59.81	115.48
Wheat	55.26	61.59	116.85	94.16	-22.69	32.57
Barley	55.26	60.00	115.26	81.78	-33.48	21.78
Red clover seed	53.21	95.74	148.95	155.54	6.59	59.80

¹Source: Butterfield (1).

²Using average prices and expected yields, net returns for alfalfa hay, field corn, wheat, and barley were negative. This relationship may not hold on highly productive land or in years of high prices. These crops are also used in rotations to improve overall productivity of the land.

Table 7 summarizes wheat and barley acreage responses to alternative market prices on irrigated farms in southwest Idaho. These results were obtained by varying the prices and subsequent returns above variable costs in the programming models. Prices are quoted for the closest terminal market and are adjusted to account for transportation charges to the market. Consequently, prices in southwest Idaho would be lower than the Portland price by the amount of the transportation costs.

There were 480,784 acres of irrigated land harvested in southwest Idaho in 1964 according to census data. At the prices programmed in table 7, the total area devoted to barley varied from zero to 45,848 acres; the area devoted to wheat, from zero to 106,577 acres.

Production responses were obtained directly from acreage estimates by multiplying acreage times estimated yield using Statistical Reporting Service yields projected to 1970. Yield expectations of farmers were somewhat higher than those actually calculated from SRS data (6, 7). Farmer yield expectations were used in budgets to compare returns from crops; however, SRS yields for 1970 were used to make the projections in table 8. Programming results at alternative prices estimated barley production to vary from zero to 3,245,580 bushels; wheat production, from zero to 8,191,508 bushels. At high wheat and barley prices, alternative crops were displaced in this area, thus the relatively elastic response in production. Other areas were not as responsive because they had fewer alternative crops.

Table 5. Enterprise costs, gross returns, and net returns — 160-acre southwest Idaho irrigated farms, 1970¹

Enterprise	Costs per acre			Gross returns per acre	Net returns per acre	Returns above variable costs
	Fixed	Variable	Total			
Potatoes	\$54.89	\$223.67	\$278.56	\$512.40	\$233.84	\$288.73
Sugar beets	56.21	150.48	206.69	345.50	138.81	195.02
Alfalfa hay	55.49	63.78	119.27	108.68	-10.59	44.90
Alfalfa seed	54.17	119.52	173.69	290.87	117.18	171.35
Field beans	56.04	57.52	113.56	130.84	17.28	73.32
Field corn	54.04	79.12	133.16	124.35	-8.81	45.23
Corn for seed	54.04	106.30	160.34	198.88	38.54	92.58
Corn for vegetables	54.04	75.95	129.99	194.11	64.12	118.16
Wheat	53.78	59.35	113.13	94.16	-18.97	34.81
Barley	53.78	57.76	111.54	81.78	-29.76	24.02
Red clover seed	52.90	96.21	149.11	155.54	6.43	59.33

¹Source: Butterfield (1).

Table 6. Enterprise costs, gross returns, and net returns — 240-acre southwest Idaho irrigated farms, 1970¹

Enterprise	Costs per acre			Gross returns per acre	Net returns per acre	Returns above variable costs
	Fixed	Variable	Total			
Potatoes	\$53.28	\$221.10	\$274.38	\$512.40	\$238.02	\$291.30
Sugar beets	55.05	148.82	203.87	345.50	141.63	196.68
Alfalfa hay	54.32	63.51	117.83	108.68	-9.15	45.17
Alfalfa seed	53.32	119.22	172.54	290.87	118.33	171.65
Field beans	54.13	54.79	108.92	130.84	21.92	76.05
Field corn	53.29	81.93	135.22	124.35	-10.87	42.42
Corn for seed	53.29	104.86	158.15	198.88	40.73	94.02
Corn for vegetables	53.29	74.51	127.80	194.11	66.31	119.60
Wheat	52.60	57.11	109.71	94.16	-15.55	37.05
Barley	52.60	55.52	108.12	81.78	-26.34	26.26
Red clover seed	52.70	95.93	148.63	155.54	6.91	59.61

¹Source: Butterfield (1).

Table 7. Southwest Idaho irrigated farms, wheat and barley acreage response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
\$.77			(acres)		
Wheat	0	0	0	0	0
Barley	0	0	45,848	45,848	45,848
1.02					
Wheat	32,514	32,514	32,514	32,514	32,514
Barley	0	0	45,848	45,848	45,848
1.28					
Wheat	32,514	32,514	32,514	32,514	32,514
Barley	0	0	45,848	45,848	45,848
1.54					
Wheat	32,514	32,514	32,514	32,514	32,514
Barley	0	0	45,848	45,848	45,848
1.79					
Wheat	32,514	32,514	32,514	32,514	32,514
Barley	0	0	45,848	45,848	45,848
2.05					
Wheat	32,514	32,514	32,514	32,514	32,514
Barley	0	0	45,848	45,848	45,848
2.30					
Wheat	35,933	35,933	35,933	35,933	35,933
Barley	0	0	45,848	45,848	45,848
2.56					
Wheat	35,933	35,933	35,933	35,933	35,933
Barley	0	0	45,848	45,848	45,848
2.82					
Wheat	0	0	45,848	45,848	45,848
Barley	35,933	35,933	35,933	35,933	35,933
3.07					
Wheat	72,191	72,191	72,191	72,191	72,191
Barley	0	0	45,848	45,848	45,848
3.33					
Wheat	106,577	106,577	106,577	106,577	106,577
Barley	0	0	45,848	45,848	45,848
3.58					
Wheat	106,577	106,577	106,577	106,577	106,577
Barley	0	0	45,848	45,848	45,848

Table 8. Southwest Idaho irrigated farms, wheat and barley production response at alternative market prices, 1970.¹

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$ 1.00	\$ 1.23
	(bushels)				
\$.77					
Wheat	0	0	0	0	0
Barley	0	0	3,245,580	3,245,580	3,245,580
1.02					
Wheat	2,499,026	2,499,026	2,499,026	2,499,026	2,499,026
Barley	0	0	3,245,580	3,245,580	3,245,580
1.28					
Wheat	2,499,026	2,499,026	2,499,026	2,499,026	2,499,026
Barley	0	0	3,245,580	3,245,580	3,245,580
1.54					
Wheat	2,499,026	2,499,026	2,499,026	2,499,026	2,499,026
Barley	0	0	3,245,580	3,245,580	3,245,580
1.79					
Wheat	2,499,026	2,499,026	2,499,026	2,499,026	2,499,026
Barley	0	0	3,245,580	3,245,580	3,245,580
2.05					
Wheat	2,499,026	2,499,026	2,499,026	2,499,026	2,499,026
Barley	0	0	3,245,580	3,245,580	3,245,580
2.30					
Wheat	2,761,810	2,761,810	2,761,810	2,761,810	2,761,810
Barley	0	0	3,245,580	3,245,580	3,245,580
2.56					
Wheat	2,761,810	2,761,810	2,761,810	2,761,810	2,761,810
Barley	0	0	3,245,580	3,245,580	3,245,580
2.82					
Wheat	2,761,810	2,761,810	2,761,810	2,761,810	2,761,810
Barley	0	0	3,245,580	3,245,580	3,245,580
3.07					
Wheat	5,548,600	5,548,600	5,548,600	5,548,600	5,548,600
Barley	0	0	3,245,580	3,245,580	3,245,580
3.33					
Wheat	8,191,508	8,191,508	8,191,508	8,191,508	8,191,508
Barley	0	0	3,245,580	3,245,580	3,245,580
3.58					
Wheat	8,191,508	8,191,508	8,191,508	8,191,508	8,191,508
Barley	0	0	3,245,580	3,245,580	3,245,580

¹Wheat yield 76.86 bu./acre. Barley yield 70.79 bu./acre.

Table 9. Major crops in southcentral Idaho irrigated area, 1964.¹

Enterprise	Acres harvested	acreage % of total
Potatoes	56,235	7.3
Sugar beets	79,213	10.3
Alfalfa hay	239,031	31.0
Field beans	106,449	13.8
Wheat	100,099	13.0
Feed grain ²	42,750	5.5
Other ³	147,097	19.1
Total	770,874	100.0

¹Source: 1964 Census of Agriculture (9).

²Oats, barley, rye, mixed, other.

³All other remaining irrigated crops.

Southcentral Irrigated

Six crops dominate the agricultural picture in the southcentral irrigated area (table 9). According to people in agriculture in this area, there has been an expansion in field corn and sugar beet production in recent years. This analysis is based on the six major crops in 1964 (potatoes, sugar beets, alfalfa, beans, wheat, and barley). Other crop production was assumed to remain constant.

Cost data were obtained from previous work by Withers and Cheline (see footnotes, table 10), and projected to 1970 using the index of prices paid by farmers. Costs and returns differ from southwest Idaho in that farms are larger and crop yields are somewhat different. Potatoes and sugar beets again have the highest net returns per acre. Their production, however, is limited by contracts and by uncertain prices. Alfalfa and grain again support a relatively large number of livestock which compete only in a minor way with crop production during the growing season.

Tables A-4 to A-6 summarize linear program models for 160, 240, and 320-acre farms. Capital and labor requirements, enterprise returns, total resources available, and production bounds reflect production characteristics of southcentral Idaho.

Table 10. Enterprise costs, gross returns, and net returns — 160, 240, 320 acre southcentral Idaho irrigated farms, 1970.¹

Enterprise	Costs per acre			Gross returns per acre	Net returns per acre	Returns above variable costs
	Fixed	Variable	Total			
160 acres						
Potatoes	\$33.14	\$201.73	\$234.87	\$393.45	\$158.58	\$191.72
Sugar beets	33.14	132.15	165.29	241.85	76.56	109.70
Alfalfa hay	33.14	54.65	87.79	100.32	12.53	45.67
Field beans	33.14	75.12	108.26	125.13	16.87	50.01
Wheat	33.14	60.89	94.03	87.74	-6.29	26.85
Barley	33.14	60.89	94.03	78.02	-16.01	17.13
240 acres						
Potatoes	33.14	191.77	224.91	393.45	168.54	201.68
Sugar beets	33.14	116.00	149.14	241.85	92.71	125.85
Alfalfa hay	33.14	52.93	86.07	100.32	14.25	47.39
Field beans	33.14	64.30	97.44	125.13	27.69	60.83
Wheat	33.14	51.56	84.70	87.74	3.04	36.18
Barley	33.14	51.56	84.70	78.02	-6.68	26.46
320 acres						
Potatoes	33.14	176.93	210.07	393.45	183.38	216.52
Sugar beets	33.14	106.32	139.46	241.85	102.39	135.53
Alfalfa hay	33.14	50.27	83.41	100.32	16.91	50.05
Field beans	33.14	59.13	92.27	125.13	32.86	66.00
Wheat	33.14	45.98	79.12	87.74	8.62	41.76
Barley	33.14	45.98	79.12	78.02	-1.10	32.04

¹Sources: Cheline, Richard J. 1968. An economic approach to the agricultural use of ground water in the Oakley Fan area of Cassia county, Idaho. Unpublished M.S. thesis, Dep. Agr. Econ., Univ. of Idaho. (projected data to 1970).

Withers, Russell V. 1965. Potato production costs. Idaho Agr. Exp. Sta. Bull. 477. (projected data to 1970).

Withers, Russell V. 1966. Sugar beet production costs in eastern and southcentral Idaho. Idaho Agr. Res. Progress Rep. 119. (projected data to 1970).

This model has fewer labor periods because crop alternatives are fewer and the competition between enterprises less. Capital availability is lower to reflect the lower input intensity indicated by Census data and previous research.

Acreage responses of barley to increased prices were quite inelastic in the southcentral irrigated area. The model provided for barley to meet animal feed requirements by establishing a minimum level of production in the program. At an 88-cent-per-bushel Portland price, 43,339 acres of barley were planted (table 11). Production remained at this level at all prices of barley and wheat programmed, reflecting only the need for feed barley.

The wheat acreage, however, was much more responsive to price changes. At 77 cents per bushel, returns did not cover variable costs so no wheat was planted. At prices above \$1.02 per bushel, the wheat area planted varied from 81,737 to 337,835 acres.

Production responses were derived directly from acreage estimates. Barley production, at prices above 77 cents per bushel, remained constant at about 3.1 million bushels. Wheat production was estimated to vary from zero bushels at 77 cents per bushel to 5.4 million bushels at \$1.02 and 22.5 million bushels at \$3.58 per bushel.

Production responses of wheat and barley es-

Table 11. Southcentral Idaho irrigated farms, wheat and barley acreage response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(acres)				
\$.77					
Wheat	0	0	0	0	0
Barley	0	0	43,339	43,339	43,339
1.02					
Wheat	81,737	81,737	81,737	81,737	81,737
Barley	0	0	43,339	43,339	43,339
1.28					
Wheat	95,198	95,198	95,198	95,198	95,198
Barley	0	0	43,339	43,339	43,339
1.54					
Wheat	184,233	184,233	184,233	184,233	184,233
Barley	0	0	43,339	43,339	43,339
1.79					
Wheat	248,126	248,126	248,126	248,126	248,126
Barley	0	0	43,339	43,339	43,339
2.05					
Wheat	248,126	248,126	248,126	248,126	248,126
Barley	0	0	43,339	43,339	43,339
2.30					
Wheat	248,126	248,126	248,126	248,126	248,126
Barley	0	0	43,339	43,339	43,339
2.56					
Wheat	288,765	288,765	288,765	288,765	288,765
Barley	0	0	43,339	43,339	43,339
2.82					
Wheat	288,765	288,765	288,765	288,765	288,765
Barley	0	0	43,339	43,339	43,339
3.07					
Wheat	288,765	288,765	288,765	288,765	288,765
Barley	0	0	43,339	43,339	43,339
3.33					
Wheat	288,765	288,765	288,765	288,765	288,765
Barley	0	0	43,339	43,339	43,339
3.58					
Wheat	337,835	337,835	337,835	337,835	337,835
Barley	0	0	43,339	43,339	43,339

Table 22. Southeast Idaho dryland farms, wheat and barley production response at alternative market prices, 1970.¹

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(bushels)				
\$.77					
Wheat	4,913,730	4,913,730	4,913,730	4,913,730	4,913,730
Barley	14,743,097	14,743,097	14,743,097	14,743,097	14,743,097
1.02					
Wheat	13,103,250	13,103,250	13,103,250	4,913,730	4,913,730
Barley	2,640,541	2,640,541	2,640,541	14,743,097	14,743,097
1.28					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	4,913,730
Barley	2,640,541	2,640,541	2,640,541	2,640,541	14,743,097
1.54					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
1.79					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
2.05					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
2.30					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
2.56					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
2.82					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
3.07					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
3.33					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
3.58					
Wheat	13,103,250	13,103,250	13,103,250	13,103,250	13,103,250
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541

¹Source: Long (5).

Southeast Irrigated

Grains, alfalfa hay, and sugar beets are the principal crops in the irrigated area along the Snake River in southeast Idaho. Higher elevations and colder weather limit crop alternatives. In recent years, increased production of sugar beets has done much to increase farm incomes. The enterprises included under "other irrigated crops" in table 13 are primarily irrigated pasture and irrigated wild hay. These crops are grown on land where the major field crops cannot be grown. For this reason, other irrigated crops were not included in the program.

Table 13. Major crops in southeast Idaho irrigated area, 1964.¹

Enterprise	Acres harvested	% of total acreage
Potatoes	153,696	15.7
Sugar beets	45,774	4.7
Alfalfa hay	338,986	34.7
Wheat	145,738	14.9
Feed grain ²	103,713	10.5
Other ³	190,299	19.5
Total	978,206	100.0

¹Source: 1964 Census of Agriculture (9).

²Oats, barley, rye, mixed, other.

³All other remaining irrigated crops.

Estimated costs and returns for three sizes of irrigated farms are shown in table 14. Potatoes, and then sugar beets, are again the crops with the highest returns over variable costs. Hay, grain, and wheat have returns considerably below either potatoes or sugar beets. To maximize profits, managers would be expected to grow as many potatoes and sugar beets as resources and market outlets would permit. Since they cannot grow as much of these crops as they may desire, grains and alfalfa also enter the picture. Barley, feed grains, and alfalfa are grown primarily to supplement livestock production. Irrigated wheat is used as a feed grain or for pastry flour both in the United States and in the Far East.

Alfalfa, wheat, and barley were estimated to have negative net returns per acre at 1970 prices. In the short run, however, when only variable costs need to be covered, these crops are grown in crop rotations to increase productivity and to supply feed in sufficient amounts for animals in the area. Greater diversification in field crops is highly desirable in this area. It is expected that additional field crops will be introduced in the future, but such additions should not change these results in the next 10 years or so.

Tables A-7 to A-9 summarize per-acre resource requirements, returns over variable costs, resource restrictions, and enterprise limits for 80, 160, and 240 acre farms. The maximum limits for potatoes and sugar beets represent the acreage necessary to meet marketing contracts. The minimum requirements represent the minimum amount of potatoes and sugar beets that would be grown

Table 14. Enterprise costs, gross returns, and net returns — 80, 160, 240 acre southeast Idaho irrigated farms, 1970.¹

Enterprise	Costs per acre			Gross returns per acre	Net returns per acre	Returns above variable costs
	Fixed	Variable	Total			
80 acres						
Potatoes	\$41.80	\$226.60	\$268.40	\$375.15	\$106.75	\$148.55
Sugar beets	54.03	138.06	192.09	241.85	49.76	103.79
Alfalfa hay	57.24	63.19	120.43	87.78	-32.65	24.59
Wheat	55.26	61.59	116.85	79.18	-37.67	17.59
Barley	55.26	60.00	115.26	65.80	-49.46	5.80
160 acres						
Potatoes	41.80	201.73	243.53	375.15	131.62	173.42
Sugar beets	50.43	131.04	181.47	241.85	60.38	110.81
Alfalfa hay	55.49	63.78	119.27	87.78	-31.49	24.00
Wheat	53.78	59.35	113.13	79.18	-33.95	19.83
Barley	53.78	57.76	111.54	65.80	-45.74	8.04
240 acres						
Potatoes	41.80	191.77	233.57	375.15	141.58	183.38
Sugar beets	48.71	115.13	163.84	241.85	78.01	126.72
Alfalfa hay	54.32	63.51	117.83	87.78	-30.05	24.27
Wheat	52.60	57.11	109.71	79.18	-30.53	22.07
Barley	52.60	55.52	108.12	65.80	-42.32	10.28

¹Sources: Butterfield (1).

Withers, 1965 and 1966 (see footnote, table 10).

even if the numbers of contracts were reduced. The minimum hay and barley requirements represent amounts necessary for livestock production. Minimum wheat requirements serve to fulfill rotational practices and feed needs.

Barley acreage responded little to increased prices. Only at the Portland price of \$1.23 did barley returns cover variable costs. Below that price, no barley was estimated to be grown. At \$1.02 per bushel and below, it was estimated that no wheat would be grown. At the present time, government certificate payments for wheat keep the price above the minimum price needed for production. Barley acreage shows almost no response

to price changes, and the wheat acreage shows very little response at prices below \$2 per bushel (table 15).

Barley production was estimated to be 5.9 million bushels at \$1.23 per bushel, Portland price, with no production at \$1 or less. Wheat production varied from zero to 21.8 million bushels. Below \$1.02 per bushel, no wheat was produced. Wheat production would double, from 10 to 20.7 million bushels, as the Portland price increased from \$1.79 to \$2.05 per bushel (table 16).

Wheat and barley prices lower than current level would certainly have an adverse income effect on farmers in the southeast irrigated area.

Table 15. Southeast Idaho irrigated farms, wheat and barley acreage response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$ 1.00	\$ 1.23
	(acres)				
\$.77					
Wheat	0	0	0	0	0
Barley	0	0	0	0	92,600
1.02					
Wheat	0	0	0	0	0
Barley	0	0	0	0	92,600
1.28					
Wheat	138,900	138,900	138,900	138,900	138,900
Barley	0	0	0	0	92,600
1.54					
Wheat	138,900	138,900	138,900	138,900	138,900
Barley	0	0	0	0	92,600
1.79					
Wheat	178,718	178,718	178,718	178,718	178,718
Barley	0	0	0	0	92,600
2.05					
Wheat	369,872	369,872	369,872	369,872	369,872
Barley	0	0	0	0	92,600
2.30					
Wheat	369,872	369,872	369,872	369,872	369,872
Barley	0	0	0	0	92,600
2.56					
Wheat	369,872	369,872	369,872	369,872	369,872
Barley	0	0	0	0	92,600
2.82					
Wheat	369,872	369,872	369,872	369,872	369,872
Barley	0	0	0	0	92,600
3.07					
Wheat	369,872	369,872	369,872	369,872	369,872
Barley	0	0	0	0	92,600
3.33					
Wheat	369,872	369,872	369,872	369,872	369,872
Barley	0	0	0	0	92,600
3.58					
Wheat	388,264	388,264	388,264	388,264	388,264
Barley	0	0	0	0	92,600

Table 16. Southeast Idaho irrigated farms, wheat and barley production response at alternative market prices, 1970.¹

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$ 1.00	\$ 1.23
	(bushels)				
\$.77					
Wheat	0	0	0	0	0
Barley	0	0	0	0	5,884,730
1.02					
Wheat	0	0	0	0	0
Barley	0	0	0	0	5,884,730
1.28					
Wheat	7,800,624	7,800,624	7,800,624	7,800,624	7,800,624
Barley	0	0	0	0	5,884,730
1.54					
Wheat	7,800,624	7,800,624	7,800,624	7,800,624	7,800,624
Barley	0	0	0	0	5,884,730
1.79					
Wheat	10,036,803	10,036,803	10,036,803	10,036,803	10,036,803
Barley	0	0	0	0	5,884,730
2.05					
Wheat	20,772,012	20,772,012	20,772,012	20,772,012	20,772,012
Barley	0	0	0	0	5,884,730
2.30					
Wheat	20,772,012	20,772,012	20,772,012	20,772,012	20,772,012
Barley	0	0	0	0	5,884,730
2.56					
Wheat	20,772,012	20,772,012	20,772,012	20,772,012	20,772,012
Barley	0	0	0	0	5,884,730
2.82					
Wheat	20,772,012	20,772,012	20,772,012	20,772,012	20,772,012
Barley	0	0	0	0	5,884,730
3.07					
Wheat	20,772,012	20,772,012	20,772,012	20,772,012	20,772,012
Barley	0	0	0	0	5,884,730
3.33					
Wheat	20,772,012	20,772,012	20,772,012	20,772,012	20,772,012
Barley	0	0	0	0	5,884,730
3.58					
Wheat	21,804,906	21,804,906	21,804,906	21,804,906	21,804,906
Barley	0	0	0	0	5,884,730

¹Wheat yield 56.16 bu./ac. Barley yield 63.55 bu./ac.

Aggregate Irrigated Production

Aggregate irrigated acreage and production of wheat and barley are summarized in tables 17 and 18. Total acreage for wheat was estimated to vary between zero and 832,676 acres. At \$1.28 per bushel, some 266,612 acres would be planted to wheat. In 1966, when wheat was \$1.53 per bushel (8), the Statistical Reporting Service indicated that, of 3,585,000 acres of irrigated land in Idaho, 265,300 acres or 7.4 percent were planted to wheat (7). Since 1960, the most land planted to irrigated wheat was 379,000 acres in 1967, when the wheat price was \$1.32. If prices declined from \$1.28 to \$1.02 per bushel, the irrigated wheat acreage would decline by more than 50 percent, from 266,612 to 114,251 acres.

Total production of irrigated wheat was esti-

mated to vary from 7.9 million bushels at \$1.02 to 52.5 million bushels at \$3.58 per bushel. No wheat was produced below the Portland price of \$1.02 per bushel. Irrigated wheat production varied from a low of 9 million bushels in 1946 to 23.6 million bushels in 1967 (7).

Advanced technology (better varieties and fertilization) has increased the total production of irrigated or soft wheat even though the total acreage planted has not increased (4). No attempt has been made to evaluate the impact of future technological advances, although the aggregate production of wheat may continue to increase without increased acreage or increased prices.

The aggregate barley acreage varied from 89,187 to 181,787 acres at prices of \$.88 per bushel and above. Total production was estimated to vary between 6.3 and 12.2 million bushels.

Table 17. South Idaho irrigated farms, wheat and barley acreage response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(acres)				
\$.77					
Wheat	0	0	0	0	0
Barley	0	0	89,187	89,187	181,787
1.02					
Wheat	114,251	114,251	114,251	114,251	114,251
Barley	0	0	89,187	89,187	181,787
1.28					
Wheat	266,612	266,612	266,612	266,612	266,612
Barley	0	0	89,187	89,187	181,787
1.54					
Wheat	355,647	355,647	355,647	355,647	355,647
Barley	0	0	89,187	89,187	181,787
1.79					
Wheat	459,358	459,358	459,358	459,358	459,358
Barley	0	0	89,187	89,187	181,787
2.05					
Wheat	650,512	650,512	650,512	650,512	650,512
Barley	0	0	89,187	89,187	181,787
2.30					
Wheat	653,931	653,931	653,931	653,931	653,931
Barley	0	0	89,187	89,187	181,787
2.56					
Wheat	694,570	694,570	694,570	694,570	694,570
Barley	0	0	89,187	89,187	181,787
2.82					
Wheat	694,570	694,570	694,570	694,570	694,570
Barley	0	0	89,187	89,187	181,787
3.07					
Wheat	730,828	730,828	730,828	730,828	730,828
Barley	0	0	89,187	89,187	181,787
3.33					
Wheat	765,214	765,214	765,214	765,214	765,214
Barley	0	0	89,187	89,187	181,787
3.58					
Wheat	832,676	832,676	832,676	832,676	832,676
Barley	0	0	89,187	89,187	181,787

Table 18. South Idaho irrigated farms, wheat and barley production response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(bushels)				
\$.77					
Wheat	0	0	0	0	0
Barley	0	0	6,333,917	6,333,917	12,218,647
1.02					
Wheat	7,950,067	7,950,067	7,950,067	7,950,067	7,950,067
Barley	0	0	6,333,917	6,333,917	12,218,647
1.28					
Wheat	16,648,405	16,648,405	16,648,405	16,648,405	16,648,405
Barley	0	0	6,333,917	6,333,917	12,218,647
1.54					
Wheat	22,586,149	22,586,149	22,586,149	22,586,149	22,586,149
Barley	0	0	6,333,917	6,333,917	12,218,647
1.79					
Wheat	29,083,352	29,083,352	29,083,352	29,083,352	29,083,352
Barley	0	0	6,333,917	6,333,917	12,218,647
2.05					
Wheat	39,818,561	39,818,561	39,818,561	39,818,561	39,818,561
Barley	0	0	6,333,917	6,333,917	12,218,647
2.30					
Wheat	40,081,345	40,081,345	40,081,345	40,081,345	40,081,345
Barley	0	0	6,333,917	6,333,917	12,218,647
2.56					
Wheat	42,791,560	42,791,560	42,791,560	42,791,560	42,791,560
Barley	0	0	6,333,917	6,333,917	12,218,647
2.82					
Wheat	42,791,560	42,791,560	42,791,560	42,791,560	42,791,560
Barley	0	0	6,333,917	6,333,917	12,218,647
3.07					
Wheat	45,578,350	45,578,350	45,578,350	45,578,350	45,578,350
Barley	0	0	6,333,917	6,333,917	12,218,647
3.33					
Wheat	48,221,258	48,221,258	48,221,258	48,221,258	48,221,258
Barley	0	0	6,333,917	6,333,917	12,218,647
3.58					
Wheat	52,526,630	52,526,630	52,526,630	52,526,630	52,526,630
Barley	0	0	6,333,917	6,333,917	12,218,647

Dryland Areas

Dryland wheat production in Idaho is concentrated in two distinct areas. North Idaho, including the Palouse and Camas Prairie areas, produces primarily a soft wheat. Southeast Idaho produces hard winter wheat. Both areas have been discussed in previous publications (2, 5, 10). Work similar to that in the irrigated areas may be found in two of these sources (5, 10). For this reason, only information comparable to the aggregate summary data for the irrigated areas is presented here.

North Dryland

Wheat and barley compete for essentially the

same land in north Idaho, with no alternatives except peas, lentils and a few minor crops. Looking at acreage responses to alternative prices (table 19), both wheat and barley acreage increases until the price of wheat reaches \$1.28 per bushel. Above this price for wheat, the area tends to grow more and more wheat. When the wheat price is \$2.05 or higher, all acreage is planted to wheat. Barley production increased from 25.8 to 27.3 million bushels as the barley price increased from \$.66 to \$1.23 at the lowest wheat price (table 20). Wheat production increased from 6.7 to 28.9 million bushels with increasing wheat prices. Wheat is by far the better economic alternative in the area.

Table 19. North Idaho dryland farms, wheat and barley acreage response at alternative market prices, 1970.¹

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(acres)				
\$.77					
Wheat	148,825	130,222	130,222	130,222	126,839
Barley	437,795	470,866	470,866	470,866	477,165
1.02					
Wheat	480,298	201,251	148,825	130,222	130,222
Barley	211,024	387,402	437,795	470,866	470,866
1.28					
Wheat	520,886	520,886	294,267	201,251	130,222
Barley	0	0	299,213	437,795	470,866
1.54					
Wheat	520,886	520,886	520,886	427,871	130,222
Barley	0	0	0	297,638	470,866
1.79					
Wheat	620,666	620,666	620,666	620,666	299,340
Barley	0	0	0	0	302,362
2.05					
Wheat	642,652	642,652	642,652	642,652	642,652
Barley	0	0	0	0	0
2.30					
Wheat	642,652	642,652	642,652	642,652	642,652
Barley	0	0	0	0	0
2.56					
Wheat	642,652	642,652	642,652	642,652	642,652
Barley	0	0	0	0	0
2.82					
Wheat	642,652	642,652	642,652	642,652	642,652
Barley	0	0	0	0	0
3.07					
Wheat	664,637	664,637	664,637	664,637	664,637
Barley	0	0	0	0	0
3.33					
Wheat	664,637	664,637	664,637	664,637	664,637
Barley	0	0	0	0	0
3.58					
Wheat	664,637	664,637	664,637	664,637	664,637
Barley	0	0	0	0	0

¹Source: Whittlesey (10). Data extrapolated to include additional portions of northern Idaho.

Table 20. North Idaho dryland farms, wheat and barley production response at alternative market prices, 1970.¹

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(bushels)				
\$.77					
Wheat	6,728,248	5,812,236	5,812,236	5,812,236	5,656,192
Barley	25,865,115	27,153,845	27,153,845	27,153,845	27,329,498
1.02					
Wheat	22,615,516	8,869,464	6,728,248	5,812,236	5,812,236
Barley	2,292,835	23,331,848	25,865,115	27,153,845	27,153,845
1.28					
Wheat	24,428,635	24,428,635	13,454,894	8,869,464	5,812,236
Barley	0	0	17,836,817	25,865,115	27,153,845
1.54					
Wheat	24,428,635	24,428,635	24,428,635	19,392,788	5,812,236
Barley	0	0	0	17,772,861	27,153,845
1.79					
Wheat	27,559,174	27,559,174	27,559,174	27,559,174	13,696,472
Barley	0	0	0	0	17,974,367
2.05					
Wheat	28,575,404	28,575,404	28,575,404	28,575,404	28,575,404
Barley	0	0	0	0	0
2.30					
Wheat	28,575,404	28,575,404	28,575,404	28,575,404	28,575,404
Barley	0	0	0	0	0
2.56					
Wheat	28,575,404	28,575,404	28,575,404	28,575,404	28,575,404
Barley	0	0	0	0	0
2.82					
Wheat	28,575,404	28,575,404	28,575,404	28,575,404	28,575,404
Barley	0	0	0	0	0
3.07					
Wheat	28,930,516	28,930,516	28,930,516	28,930,516	28,930,516
Barley	0	0	0	0	0
3.33					
Wheat	28,930,516	28,930,516	28,930,516	28,930,516	28,930,516
Barley	0	0	0	0	0
3.58					
Wheat	28,930,516	28,930,516	28,930,516	28,930,516	28,930,516
Barley	0	0	0	0	0

¹Source: Whittlesey (10).

Southeast Dryland

In the dryland areas of southeast Idaho, wheat and barley are the only major alternatives and compete with each other for land. Some hay and small grains are also grown here, but in small amounts. Government programs for wheat and feed grains have reduced production of these crops considerably below the levels indicated in tables 21 and 22. This study assumes no government programs. Since these programs vary from year to year, the reduction in the base acreage could be accounted for if it were desirable to make such an adjustment. Here, as in north Idaho, barley acreage declined as wheat prices increased given a constant barley price. Both barley and wheat acreages responded very little to relative price chang-

es. With few alternatives, resources tend to be committed to quite specific acreages of wheat and barley.

Considerable variation was noted in levels of production. Barley production was estimated to range from 2.6 to 14.7 million bushels, while wheat production ranged from 4.9 to 13.1 million bushels. Barley is a poor alternative to wheat and is only grown in large amounts when wheat is at its lowest price (\$.77 per bushel). Once wheat reached the \$1.54 price level, only 2.6 million bushels of barley were grown. Production in this area varies widely with precipitation. In a wet year, production may be nearly 50 percent higher than table estimates; in a dry year, production may be considerably lower.

Table 21. Southeast Idaho dryland farms, wheat and barley acreage response at alternative market prices, 1970.¹

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(acres)				
\$.77					
Wheat	268,950	268,950	268,950	268,950	268,950
Barley	546,050	546,050	546,050	546,050	546,050
1.02					
Wheat	717,200	717,200	717,200	268,950	268,950
Barley	97,800	97,800	97,800	546,050	546,050
1.28					
Wheat	717,200	717,200	717,200	717,200	268,950
Barley	97,800	97,800	97,800	97,800	546,050
1.54					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
1.79					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
2.05					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
2.30					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
2.56					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
2.82					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
3.07					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
3.33					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800
3.58					
Wheat	717,200	717,200	717,200	717,200	717,200
Barley	97,800	97,800	97,800	97,800	97,800

¹Source: Long (5).

entially reflect their competitive positions relative to each other in terms of returns over variable costs. Returns from wheat and barley production were lowest of the six crops programmed at 1970 prices. These results indicate that only enough barley will be grown to supply the local cattle feeding industry, where it is marketed

through livestock. Wheat competes with alfalfa and field beans. As its price increases, wheat shows considerable elasticity of supply. Wheat production would remain close to current production levels until the price drops below \$1.02 per bushel. Specific acreage and production estimates are presented in tables 11 and 12.

Table 12. Southcentral Idaho irrigated farms, wheat and barley production response at alternative market prices, 1970.¹

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$ 1.00	\$ 1.23
	(bushels)				
\$.77					
Wheat	0	0	0	0	0
Barley	0	0	3,088,337	3,088,337	3,088,337
1.02					
Wheat	5,451,041	5,451,041	5,451,041	5,451,041	5,451,041
Barley	0	0	3,088,337	3,088,337	3,088,337
1.28					
Wheat	6,348,755	6,348,755	6,348,755	6,348,755	6,348,755
Barley	0	0	3,088,337	3,088,337	3,088,337
1.54					
Wheat	12,286,499	12,286,499	12,286,499	12,286,499	12,286,499
Barley	0	0	3,088,337	3,088,337	3,088,337
1.79					
Wheat	16,547,523	16,547,523	16,547,523	16,547,523	16,547,523
Barley	0	0	3,088,337	3,088,337	3,088,337
2.05					
Wheat	16,547,523	16,547,523	16,547,523	16,547,523	16,547,523
Barley	0	0	3,088,337	3,088,337	3,088,337
2.30					
Wheat	16,547,523	16,547,523	16,547,523	16,547,523	16,547,523
Barley	0	0	3,088,337	3,088,337	3,088,337
2.56					
Wheat	19,257,738	19,257,738	19,257,738	19,257,738	19,257,738
Barley	0	0	3,088,337	3,088,337	3,088,337
2.82					
Wheat	19,257,738	19,257,738	19,257,738	19,257,738	19,257,738
Barley	0	0	3,088,337	3,088,337	3,088,337
3.07					
Wheat	19,257,738	19,257,738	19,257,738	19,257,738	19,257,738
Barley	0	0	3,088,337	3,088,337	3,088,337
3.33					
Wheat	19,257,738	19,257,738	19,257,738	19,257,738	19,257,738
Barley	0	0	3,088,337	3,088,337	3,088,337
3.58					
Wheat	22,530,216	22,530,216	22,530,216	22,530,216	22,530,216
Barley	0	0	3,088,337	3,088,337	3,088,337

¹Wheat yield 66.69 bu./ac. Barley yield 71.26 bu./ac.

Aggregate Dryland Production

The bulk of Idaho's wheat producing capacity is found in the dryland areas. The land planted to wheat for both dryland areas was estimated to vary from about .4 to 1.4 million acres (table 23). The north Idaho wheat acreage was more flexible in terms of response to price change. The dryland acreage planted to wheat ranged from 126,839 to 664,637 acres in north Idaho, and from 268,950 to 717,200 acres in southeast Idaho.

Estimated wheat production was much greater in the north area than the southeast area because yields are greater. Over the range of prices programmed, aggregate dryland production was estimated to range from 10.5 to 42.0 million bushels.

North Idaho production went from 5.6 to 28.9 million bushels, while southeast production went from 4.9 to 13.1 million bushels, as wheat prices increased. Wheat production in the dryland areas could expand greatly should prices increase, from an estimated 10,725,966 bushels at \$1.28 to 42,033,766 bushels at \$3.07 per bushel (table 24).

A maximum of 1 million acres of barley would be planted at the highest barley price and the lowest wheat price. Barley acreage and production would decline rapidly with increasing wheat prices, however. Maximum estimated barley production was 42 million bushels, and minimum production some 2.6 million bushels. Production shifts emphasize the competition between these two crops for land in dryland areas.

Table 23. North Idaho and Southeast Idaho dryland farms, wheat and barley acreage response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(acres)				
\$.77					
Wheat	417,775	399,172	399,172	399,172	395,789
Barley	983,845	1,016,916	1,016,916	1,016,916	1,023,215
1.02					
Wheat	1,197,498	918,451	866,025	399,172	399,172
Barley	308,824	485,202	535,595	1,016,916	1,016,916
1.28					
Wheat	1,238,086	1,238,086	1,011,467	918,451	399,172
Barley	97,800	97,800	397,013	535,595	1,016,916
1.54					
Wheat	1,238,086	1,238,086	1,238,086	1,145,071	847,422
Barley	97,800	97,800	97,800	395,438	568,666
1.79					
Wheat	1,337,866	1,337,866	1,337,866	1,337,866	1,016,540
Barley	97,800	97,800	97,800	97,800	400,162
2.05					
Wheat	1,359,852	1,359,852	1,359,852	1,359,852	1,359,852
Barley	97,800	97,800	97,800	97,800	97,800
2.30					
Wheat	1,359,852	1,359,852	1,359,852	1,359,852	1,359,852
Barley	97,800	97,800	97,800	97,800	97,800
2.56					
Wheat	1,359,852	1,359,852	1,359,852	1,359,852	1,359,852
Barley	97,800	97,800	97,800	97,800	97,800
2.82					
Wheat	1,359,852	1,359,852	1,359,852	1,359,852	1,359,852
Barley	97,800	97,800	97,800	97,800	97,800
3.07					
Wheat	1,381,837	1,381,837	1,381,837	1,381,837	1,381,837
Barley	97,800	97,800	97,800	97,800	97,800
3.33					
Wheat	1,381,837	1,381,837	1,381,837	1,381,837	1,381,837
Barley	97,800	97,800	97,800	97,800	97,800
3.58					
Wheat	1,381,837	1,381,837	1,381,837	1,381,837	1,381,837
Barley	97,800	97,800	97,800	97,800	97,800

Table 24. North Idaho and Southeast Idaho dryland farms, wheat and barley production response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(bushels)				
\$.77					
Wheat	11,641,978	10,725,966	10,725,966	10,725,966	10,569,922
Barley	40,608,212	41,896,942	41,896,942	41,896,942	42,072,595
1.02					
Wheat	35,718,766	21,972,714	19,831,498	10,725,966	10,725,966
Barley	4,933,376	25,972,389	28,505,656	41,896,942	41,896,942
1.28					
Wheat	37,531,885	37,531,885	26,558,144	21,972,714	10,725,966
Barley	2,640,541	2,640,541	20,477,358	28,505,656	41,896,942
1.54					
Wheat	37,531,885	37,531,885	37,531,885	32,496,038	18,915,486
Barley	2,640,541	2,640,541	2,640,541	20,413,402	29,794,386
1.79					
Wheat	40,662,424	40,662,424	40,662,424	40,662,424	26,799,722
Barley	2,640,541	2,640,541	2,640,541	2,640,541	20,614,908
2.05					
Wheat	41,678,654	41,678,654	41,678,654	41,678,654	41,678,654
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
2.30					
Wheat	41,678,654	41,678,654	41,678,654	41,678,654	41,678,654
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
2.56					
Wheat	41,678,654	41,678,654	41,678,654	41,678,654	41,678,654
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
2.82					
Wheat	41,678,654	41,678,654	41,678,654	41,678,654	41,678,654
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
3.07					
Wheat	42,033,766	42,033,766	42,033,766	42,033,766	42,033,766
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
3.33					
Wheat	42,033,766	42,033,766	42,033,766	42,033,766	42,033,766
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541
3.58					
Wheat	42,033,766	42,033,766	42,033,766	42,033,766	42,033,766
Barley	2,640,541	2,640,541	2,640,541	2,640,541	2,640,541

Aggregate Idaho Production

The total area estimated to be committed to wheat at alternative prices ranged from nearly 400,000 to 2.2 million acres (table 25). This included considerably more dryland than irrigated acreage. Under most wheat prices, at least two dryland acres would be planted for every irrigated acre. In the dryland areas, land tends to be more committed to wheat. At the lowest programmed price, 395,789 acres were still planted to wheat while none was estimated to be grown in the irrigated areas. As wheat prices increased, land tended to be planted to wheat at a more constant rate in the irrigated areas than on dryland.

Dryland and irrigated wheat production levels remained remarkably similar as prices increased (table 26). Dryland production ranged from 10.5 to 42 million bushels and irrigated production from

zero to 52.5 million bushels. In the aggregate, production was estimated to range from 10.5 million bushels at the lowest price level to a high of 94.5 million bushels. Except at the two lower prices, irrigated production was estimated to be greater than dryland production. Recent production has been in the 40 to 50 million-bushel range which is about what would be expected considering price levels and government programs. Price changes below \$1.28, or above \$1.54, would change Idaho aggregate wheat production considerably.

The acreage estimated to be planted to barley varied from 97,800 to 1,205,002 acres, depending upon the relative prices of the two crops under consideration. Barley production varied from 2.6 to 54.3 million bushels and was inversely related to wheat prices in the aggregate.

Table 25. Idaho irrigated and dryland farms, wheat and barley acreage response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
\$.77			(acres)		
Wheat	417,775	399,172	399,172	399,172	395,789
Barley	983,845	1,016,916	1,106,103	1,106,103	1,205,002
1.02					
Wheat	1,311,749	1,032,702	980,276	513,423	513,423
Barley	308,824	485,202	624,782	1,106,103	1,198,703
1.28					
Wheat	1,504,698	1,504,698	1,278,079	1,185,063	665,784
Barley	97,800	97,800	486,200	624,782	1,198,703
1.54					
Wheat	1,593,733	1,593,733	1,593,733	1,500,718	1,203,069
Barley	97,800	97,800	186,987	484,625	750,453
1.79					
Wheat	1,797,224	1,797,224	1,797,224	1,797,224	1,475,898
Barley	97,800	97,800	186,987	186,987	581,949
2.05					
Wheat	2,010,364	2,010,364	2,010,364	2,010,364	2,010,364
Barley	97,800	97,800	186,987	186,987	279,857
2.30					
Wheat	2,013,783	2,013,783	2,013,783	2,013,783	2,013,783
Barley	97,800	97,800	186,987	186,987	279,857
2.56					
Wheat	2,054,422	2,054,422	2,054,422	2,054,422	2,054,422
Barley	97,800	97,800	186,987	186,987	279,857
2.82					
Wheat	2,054,422	2,054,422	2,054,422	2,054,422	2,054,422
Barley	97,800	97,800	186,987	186,987	279,857
3.07					
Wheat	2,112,665	2,112,665	2,112,665	2,112,665	2,112,665
Barley	97,800	97,800	186,987	186,987	279,857
3.33					
Wheat	2,147,051	2,147,051	2,147,051	2,147,051	2,147,051
Barley	97,800	97,800	186,987	186,987	279,857
3.58					
Wheat	2,214,513	2,214,513	2,214,513	2,214,513	2,214,513
Barley	97,800	97,800	186,987	186,987	279,857

Table 26. Idaho irrigated and dryland farms, wheat and barley production response at alternative market prices, 1970.

Portland price for wheat	Portland price for barley				
	\$.66	\$.77	\$.88	\$1.00	\$1.23
	(bushels)				
\$.77					
Wheat	11,641,978	10,725,966	10,725,966	10,725,966	10,569,922
Barley	40,608,212	41,896,942	48,230,859	48,230,859	54,291,242
1.02					
Wheat	43,668,833	29,922,781	27,781,565	18,676,033	18,676,033
Barley	4,933,376	25,972,389	34,839,573	48,230,859	54,115,589
1.28					
Wheat	54,180,290	54,180,290	43,206,549	38,621,119	27,374,371
Barley	2,640,541	2,640,541	26,811,275	34,839,573	54,115,589
1.54					
Wheat	60,118,034	60,118,034	60,118,034	55,082,187	41,501,635
Barley	2,640,541	2,640,541	8,974,458	26,747,319	42,013,033
1.79					
Wheat	69,745,776	69,745,776	69,745,776	69,745,776	55,883,074
Barley	2,640,541	2,640,541	8,974,458	8,974,458	32,883,555
2.05					
Wheat	81,497,215	81,497,215	81,497,215	81,497,215	81,497,215
Barley	2,640,541	2,640,541	8,974,458	8,974,458	14,859,188
2.30					
Wheat	81,759,999	81,759,999	81,759,999	81,759,999	81,759,999
Barley	2,640,541	2,640,541	8,974,458	8,974,458	14,859,188
2.56					
Wheat	84,470,214	84,470,214	84,470,214	84,470,214	84,470,214
Barley	2,640,541	2,640,541	8,974,458	8,974,458	14,859,188
2.82					
Wheat	84,470,214	84,470,214	84,470,214	84,470,214	84,470,214
Barley	2,640,541	2,640,541	8,974,458	8,974,458	14,859,188
3.07					
Wheat	87,612,116	87,612,116	87,612,116	87,612,116	87,612,116
Barley	2,640,541	2,640,541	8,974,458	8,974,458	14,859,188
3.33					
Wheat	90,255,024	90,255,024	90,255,024	90,255,024	90,255,024
Barley	2,640,541	2,640,541	8,974,458	8,974,458	14,859,188
3.58					
Wheat	94,560,396	94,560,396	94,560,396	94,560,396	94,560,396
Barley	2,640,541	2,640,541	8,974,458	8,974,458	14,859,188

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Appendix

Table A-1. Linear programming model for the 80-acre farm, southwest Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Alfalfa seed	Field beans	Field corn	Corn seed	Corn for veg.	Wheat	Barley	Red clover seed
Land (acres)	1	1	1	1	1	1	1	1	1	1	1
Capital	\$226.12	\$152.08	\$63.19	\$118.36	\$59.42	\$81.80	\$108.98	\$78.63	\$61.59	\$60.00	\$95.74
Labor needs (hours)											
Period 1	4.69	2.89	.37	.66	4.83	4.47	4.47	4.47	4.61	4.61	.71
Period 2	.97	1.05	.37	.73	.61	1.28	1.28	1.28	.44	.44	.44
Period 3	1.21	.93	1.24	2.24	1.05	.61	.61	.61	.44	.44	1.95
Period 4	1.08	.80	1.24	2.24	.88	.88	.88	.88	.88	.88	.44
Period 5	.72	.80	.73	0	0	.44	.44	.44	.50	.50	.44
Period 6	1.40	0	1.68	.99	1.94	0	0	0	0	0	2.44
Period 7	0	1.50	.18	2.24	0	0	0	0	0	0	.73
Period 8	0	3.92	0	0	1.00	0	0	0	0	0	0
Return over variable costs	\$286.28	\$193.42	\$45.49	\$172.51	\$71.42	\$42.55	\$89.90	\$115.48	\$32.57	\$21.78	\$59.80
Total resources available											
Land	80 acres										
Capital	\$8,400.										
Labor											
Period 1	400 hours										
Period 2	200 hours										
Period 3	262 hours										
Period 4	262 hours										
Period 5	262 hours										
Period 6	200 hours										
Period 7	250 hours										
Period 8	500 hours										
Bounds (acres)											
Potatoes	$\geq 4 \leq 8$										
Sugar beets	$\geq 6 \leq 12$										
Alfalfa hay	≥ 28										
Alfalfa seed	≤ 6										
Field beans	none										
Field corn	≥ 10										
Corn for seed	$\geq 1 \leq 3$										
Corn for veg.	$\geq 1 \leq 2$										
Wheat	≥ 6										
Barley	≥ 8										
Red clover seed	none										

Table A-2. Linear programming model for the 160-acre farm, southwest Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Alfalfa seed	Field beans	Field corn	Corn seed	Corn for veg.	Wheat	Barley	Red clover seed
Land (acres)	1	1	1	1	1	1	1	1	1	1	1
Capital	\$223.67	\$150.48	\$63.78	\$119.52	\$57.52	\$79.12	\$106.30	\$75.95	\$59.35	\$57.76	\$96.21
Labor needs (hours)											
Period 1	3.80	2.89	.37	.66	3.22	2.77	2.77	2.77	3.72	3.72	.71
Period 2	.97	1.05	.37	.73	.61	1.28	1.28	1.28	.44	.44	.44
Period 3	1.21	.93	1.24	2.24	1.05	.61	.61	.61	.44	.44	1.95
Period 4	1.08	.80	1.24	2.24	.88	.88	.88	.88	.88	.88	.44
Period 5	.72	.80	.74	0	0	.44	.44	.44	.50	.50	.44
Period 6	1.40	0	1.67	.88	1.94	0	0	0	0	0	2.09
Period 7	0	1.50	.18	2.24	0	0	0	0	0	0	.73
Period 8	0	2.62	0	0	.92	0	0	0	0	0	0
Return over variable costs	\$288.73	\$195.02	\$44.90	\$171.35	\$73.32	\$45.23	\$92.58	\$118.16	\$34.81	\$24.02	\$59.33
Total resources available						Bounds (acres)					
Land	160 acres					Potatoes	$\geq 8 \leq 16$				
Capital	\$17,600.					Sugar beets	$\geq 12 \leq 24$				
Labor						Alfalfa hay	≥ 56				
Period 1	450 hours					Alfalfa seed	≤ 13				
Period 2	225 hours					Field beans	none				
Period 3	287 hours					Field corn	≥ 19				
Period 4	287 hours					Corn for seed	$\geq 2 \leq 5$				
Period 5	287 hours					Corn for veg.	$\geq 1 \leq 3$				
Period 6	225 hours					Wheat	≥ 11				
Period 7	250 hours					Barley	≥ 16				
Period 8	500 hours					Red clover seed	none				

Table A-3. Linear programming model for the 240-acre farm, southwest Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Alfalfa seed	Field beans	Field corn	Corn seed	Corn for veg.	Wheat	Barley	Red clover seed
Land (acres)	1	1	1	1	1	1	1	1	1	1	1
Capital	\$221.10	\$148.82	\$63.51	\$119.22	\$54.79	\$81.93	\$104.86	\$74.51	\$57.11	\$55.52	\$95.93
Labor needs (hours)											
Period 1	2.96	2.89	.37	.66	2.73	2.01	2.01	2.01	2.85	2.85	.68
Period 2	.97	1.05	.37	.73	.61	1.28	1.28	1.28	.44	.44	.44
Period 3	1.21	.93	1.24	2.24	1.05	.61	.61	.61	.44	.44	1.95
Period 4	1.08	.80	1.24	2.24	.88	.88	.88	.88	.88	.88	.44
Period 5	.72	.80	.74	0	0	.44	.44	.44	.50	.50	.44
Period 6	1.40	0	1.54	.62	1.94	0	0	0	0	0	2.21
Period 7	0	1.50	.18	2.24	0	0	0	0	0	0	.37
Period 8	0	1.83	0	0	.63	0	0	0	0	0	0
Return over variable costs	\$291.30	\$196.68	\$45.17	\$171.65	\$76.05	\$42.42	\$94.02	\$119.60	\$37.05	\$26.26	\$59.61
Total resources available						Bounds (acres)					
Land	240 acres					Potatoes	$\geq 12 \leq 24$				
Capital	\$27,600.					Sugar beets	$\geq 18 \leq 36$				
Labor						Alfalfa hay	≥ 84				
Period 1	900 hours					Alfalfa seed	≤ 19				
Period 2	450 hours					Field beans	none				
Period 3	512 hours					Field corn	≥ 29				
Period 4	512 hours					Corn for seed	$\geq 4 \leq 7$				
Period 5	512 hours					Corn for veg.	$\geq 2 \geq 5$				
Period 6	450 hours					Wheat	≥ 17				
Period 7	500 hours					Barley	≥ 24				
Period 8	1000 hours					Red clover seed	none				

Table A-4. Linear programming model for the 160-acre farm, southcentral Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Field beans	Wheat	Barley
Land (acres)	1	1	1	1	1	1
Capital	\$201.73	\$132.15	\$54.65	\$75.12	\$60.89	\$60.89
Labor needs (hours)						
Period 1	1.98	1.84	.55	1.33	1.50	1.50
Period 2	4.03	5.33	3.35	4.30	3.63	3.63
Period 3	4.80	5.17	2.58	5.20	4.02	4.02
Period 4	5.77	6.55	.95	4.72	2.05	2.05
Return over variable costs	\$191.72	\$109.70	\$45.67	\$50.01	\$26.85	\$17.13
Total resources available			Bounds (acres)			
Land	160 acres		Potatoes	$\geq 5 \leq 16$		
Capital	\$12,000.		Sugar beets	$\geq 11 \leq 22$		
Labor			Alfalfa hay	≥ 56		
Period 1	510 hours		Field beans	$\geq 5 \leq 32$		
Period 2	920 hours		Wheat	≥ 21		
Period 3	1300 hours		Barley	≥ 10		
Period 4	690 hours					

Table A-5. Linear programming model for the 240-acre farm, southcentral Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Field beans	Wheat	Barley
Land (acres)	1	1	1	1	1	1
Capital	\$191.77	\$116.00	\$52.93	\$64.30	\$51.56	\$51.56
Labor needs (hours)						
Period 1	1.49	1.79	.50	1.13	1.47	1.47
Period 2	2.87	5.23	3.15	4.05	3.38	3.38
Period 3	4.99	4.92	2.15	4.75	3.55	3.55
Period 4	5.68	6.20	.63	4.62	1.80	1.80
Return over variable costs	\$201.68	\$125.85	\$47.39	\$60.83	\$36.18	\$26.46
Total resources available			Bounds (acres)			
Land	240 acres		Potatoes	$\geq 7 \leq 24$		
Capital	\$18,000.		Sugar beets	$\geq 17 \leq 34$		
Labor			Alfalfa hay	≥ 84		
Period 1	1010 hours		Field beans	$\geq 7 \leq 48$		
Period 2	1740 hours		Wheat	≥ 31		
Period 3	2395 hours		Barley	≥ 14		
Period 4	1530 hours					

Table A-6. Linear programming model for the 320-acre farm, southcentral Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Field beans	Wheat	Barley
Land (acres)	1	1	1	1	1	1
Capital	\$176.93	\$106.32	\$50.27	\$59.13	\$45.98	\$45.98
Labor needs (hours)						
Period 1	1.85	1.73	.48	1.00	1.40	1.40
Period 2	2.78	5.13	2.65	4.00	2.88	2.88
Period 3	4.47	4.62	1.85	4.60	3.06	3.06
Period 4	5.48	5.91	.45	3.95	1.61	1.61
Return over variable costs	\$216.52	\$135.53	\$50.05	\$66.00	\$41.76	\$32.04
Total resources available			Bounds (acres)			
Land	320 acres		Potatoes	≥ 10	≤ 32	
Capital	\$24,000.		Sugar beets	≥ 22	≤ 45	
Labor			Alfalfa hay	≥ 112		
Period 1	1010 hours		Field beans	≥ 10	≤ 64	
Period 2	2570 hours		Wheat	≥ 42		
Period 3	3345 hours		Barley	≥ 19		
Period 4	1850 hours					

Table A-7. Linear programming model for the 80-acre farm, southeast Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Wheat	Barley
Land (acres)	1	1	1	1	1
Capital	\$226.60	\$138.06	\$63.19	\$61.59	\$60.00
Labor needs (hours)					
Period 1	1.98	1.84	.55	1.50	1.50
Period 2	4.03	5.33	3.35	3.63	3.63
Period 3	4.80	5.17	2.58	4.02	4.02
Period 4	5.77	6.55	.95	2.05	2.05
Return over variable costs	\$148.55	\$103.79	\$24.59	\$17.59	\$5.80
Total resources available			Bounds (acres)		
Land	80 acres		Potatoes	≥ 5	≤ 14
Capital	\$6,000.		Sugar beets	≥ 3	≤ 6
Labor			Alfalfa hay	≥ 30	
Period 1	225 hours		Wheat	≥ 12	
Period 2	737 hours		Barley	≥ 8	
Period 3	799 hours				
Period 4	750 hours				

Table A-8. Linear programming model for the 160-acre farm, southeast Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Wheat	Barley
Land (acres)	1	1	1	1	1
Capital	\$201.73	\$131.04	\$63.78	\$59.35	\$57.76
Labor needs (hours)					
Period 1	1.49	1.79	.50	1.47	1.47
Period 2	2.87	5.23	3.15	3.38	3.38
Period 3	4.99	4.92	2.15	3.55	3.55
Period 4	5.68	6.20	.63	1.80	1.80
Return over variable costs	\$173.42	\$110.81	\$24.00	\$19.83	\$8.04
Total resources available			Bounds (acres)		
Land	160 acres		Potatoes	$\geq 10 \leq 29$	
Capital	\$12,000.		Sugar beets	$\geq 6 \leq 13$	
Labor			Alfalfa hay	≥ 61	
Period 1	510 hours		Wheat	≥ 24	
Period 2	920 hours		Barley	≥ 16	
Period 3	1300 hours				
Period 4	690 hours				

Table A-9. Linear programming model for the 240-acre farm, southeast Idaho irrigated area, 1970: per-acre requirements.

	Potatoes	Sugar beets	Alfalfa hay	Wheat	Barley
Land (acres)	1	1	1	1	1
Capital	\$191.77	\$115.13	\$63.51	\$57.11	\$55.52
Labor needs (hours)					
Period 1	1.85	1.73	.48	1.40	1.40
Period 2	2.78	5.13	2.65	2.88	2.88
Period 3	4.47	4.62	1.85	3.06	3.06
Period 4	5.48	5.91	.45	1.61	1.61
Return over variable costs	\$183.38	\$126.72	\$24.27	\$22.07	\$10.28
Total resources available			Bounds (acres)		
Land	240 acres		Potatoes	$\geq 14 \leq 43$	
Capital	\$18,000.		Sugar beets	$\geq 10 \leq 19$	
Labor			Alfalfa hay	≥ 91	
Period 1	1010 hours		Wheat	≥ 36	
Period 2	1740 hours		Barley	≥ 24	
Period 3	2395 hours				
Period 4	1530 hours				



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