

Research Project Technical Completion Report
Project A-002-Ida

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High - Lift Pumping and the Impact upon Economic Development of Desert Land in Idaho

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Moscow, Idaho
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PERIOD OF INVESTIGATION

April 1965 to June 1965

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ABSTRACT

This study was conducted in the Dry Lake area at Nampa, Idaho, where 5 or 6 companies are pumping irrigation water from the Snake River to a plateau 500 to 600 feet above the river surface.

Data was secured for 8 farms by interviewing each farm operator and land owner. To make comparisons between farms and also between enterprises, the data was broken down into per acre variable costs, fixed costs, total returns, net income and the cost of producing a dollar's worth of output. The term "cost per dollar of output" is the ratio of costs to returns. This ratio makes it possible to compare high-valued crops with low-valued crops on a per acre basis. This is a very sensitive measurement. For example, one cent change in the ratio for potato enterprise means a change in net income of \$3.25 per acre.

The budgeting method of estimating water values in irrigation was used in this study. Long-run planning cost curves were estimated from the budgets by using (curvi-linear) regression. From the regression equations for each of the four enterprises (grain, sugar beets, potatoes and alfalfa seed), 12 model farms were constructed. The long-run average total cost curve for the model farms, which incorporates a long-run rotation and long-run price and yield expectations, indicated economies of size up to a farm size of 2,400 acres.

Net income -- the measurement of how much money is left over to pay for irrigation water after all expenses, including remuneration for management, land and investment, have been paid -- varied from about \$50 to \$57 per acre for all model farms.

Lindeborg, K.H.

"High-Lift Pumping and the Impact upon Economic Development of Desert

Land in Idaho, Technical Completion Report, Project A-002-Ida., December, 1970.

Key Words: Water Pumping*/Arid Land*/Land reclamation/Economics*
Direct Benefits/Costs/Irrigation Operation and Maintenance*
Farm units.

OBJECTIVES AND PURPOSES

The objectives of the study were originally defined as follows:

1. To determine irrigation development cost for different-sized farm units, a) to determine per acre water costs for different sized farm units, b) to determine the economics of size by comparing average water costs of family farm units and large farm units.
2. To determine the economic maximum that water can be lifted in relation to different productivity of land and under different organization.

PROCEDURE

The study entailed the collection of primary data from the Dry Lake area, a new irrigated area in Southwestern Idaho where water is being pumped from the Snake River to supply 15,000 acres of land. This is done under a private enterprise effort of four or five companies divided into about ten large farms. Most of the information was obtained by direct interview and included actual costs, labor requirements, machinery requirements, farm organization, yields and production costs. These farms units included typical owner-operator farms, incorporated farm, a half-share lease system, a partnership, and combinations of these systems. A wide variety of crops was grown in the farms. Differences were due mainly to the proportion of the land within each farm that is a part of the development project. The "new" land has given yields of potatoes and sugar beets much higher than the county averages for the crops. Thus, in the short run,

extra high returns were being gained by devoting newly developed land to sugar beets and potatoes because of their extra yielding ability.

From the basic data the costs of input factors were calculated for each sample farm. Standardized real farms were designated and representative farm budgets developed. An example of a standardized farm budget for a 250 - acre farm is shown in Table 1. In order to make comparisons between farms and also between enterprises the budgetary costs were broken down into per acre variables costs, fixed costs, total returns, net profit and cost of producing a dollars worth of output. The term "cost per dollar output," is simply the ratio of costs to returns.

Regression analysis of standardized real farms, resulted in long-run average cost curves for total costs, variable costs and fixed costs. This is shown in Figure 1.

After making the regression analysis for major enterprises, budgets for twelve model farms were constructed from the data. The model farm is a prototype of farms that will be most likely in the future. Farm costs per acre, total returns, per acre with net return that can be applied to the cost of water, and comparison ratio of cost per dollar output were calculated.

RESULTS AND CONCLUSIONS

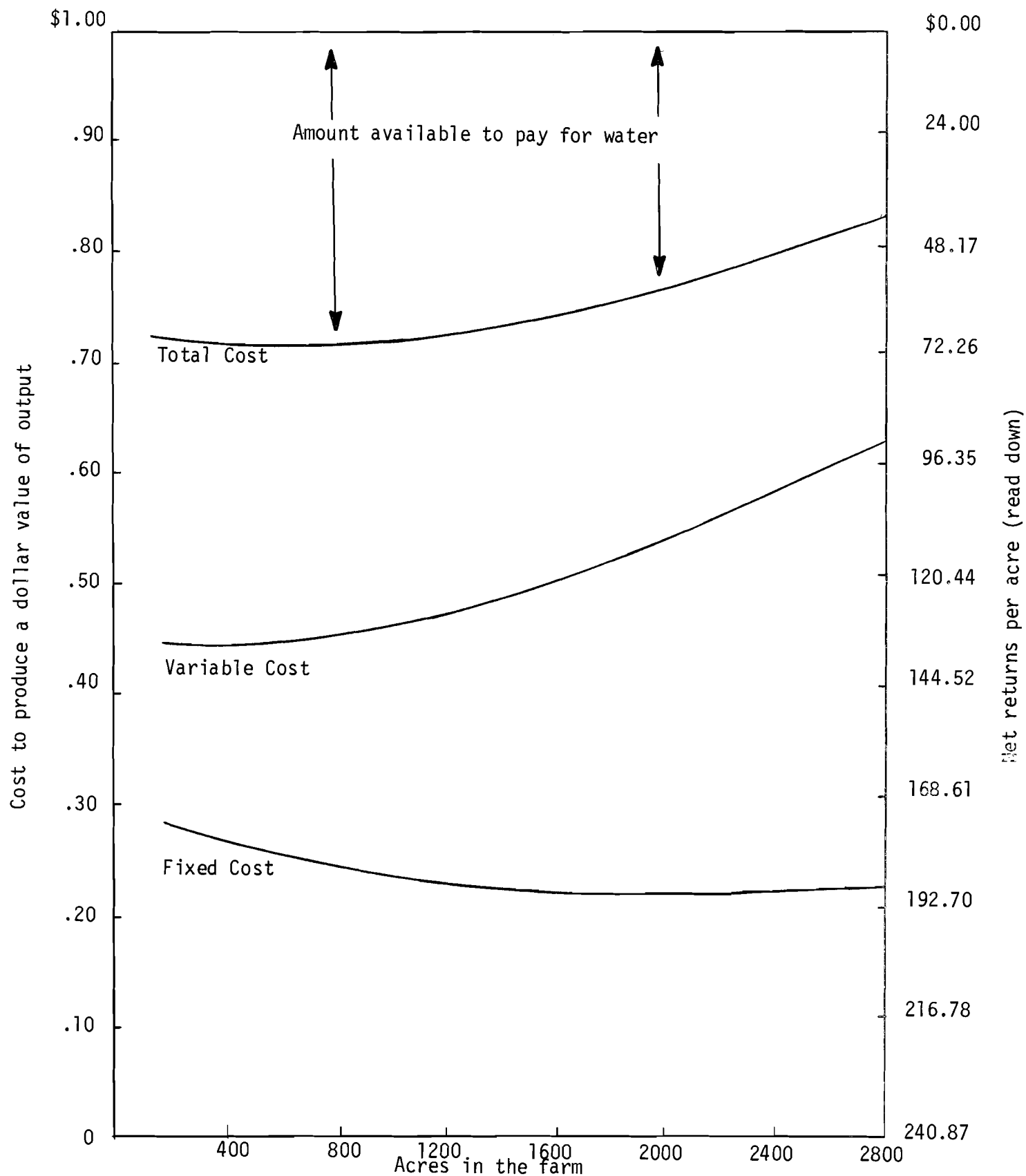
These studies met the first objective and provided very useful information on economies of size and average costs of family farm size units. The second objective was not met on this part of the research. The projected was terminated for support from the allotment funds of the Office of Water Resources Research and was continued under a modified

TABLE I. EXAMPLE OF STANDARDIZED FARM BUDGET FOR A 250 ACRE FARM

ITEM	COST ALLOCATION SYSTEM	YEARLY EXPENSES			
		ENTIRE FARM 250 acres	SUGAR BEETS 120 acres	POTATOES 80 acres	GRAIN 50 acres
Seed	Direct	\$ 4437	\$ 900.00	\$ 3312.00	\$ 225.00
Fertilizer	Direct	10040	6300.00	3740.00	0
Spray	Direct	2520	0	2520.00	0
Gas and oil	Tractor-hours	1605	502.04	1037.96	65.00
Machine Repairs	Tractor-hours	2299	736.11	1521.89	40.76
Machine Hire	Direct	3442	2040.00	1320.00	81.92
Labor	Direct	4862	3832.25	670.75	359.27
Farm supplies and travel	Acres	1154	630.00	420.00	104.03
Irrigation power	Direct	658	374.40	211.20	72.00
Total operating costs		31017	15314.80	14753.80	947.98
Interest charge on operating capital		1241	612.60	590.15	37.92
Total variable costs		32258	15927.40	15343.95	985.90
Irrigation equipment repairs	Acres	\$ 1163	\$ 558.00	\$ 372.00	\$ 232.50
Insurance	Direct	203	66.75	84.25	52.10
Irrigation equip. depreciation	Acres	1163	558.00	372.00	232.50
Machinery depreciation	Direct	4816	1549.00	2289.00	978.35
Building depreciation	Direct	587	205.04	154.96	227.48
Non-land taxes and licenses	Truck-hours	366	192.58	161.42	11.59
Land and building taxes	Acres	938	450.00	300.00	187.50
Opportunity cost on land	Acres	6000	2880.00	1920.00	1200.00
Opportunity cost on machinery	Direct	1547	495.75	690.25	361.00
Manager's salary	Man-hours	5000	2575.00	2295.80	129.22
Total fixed costs		21783	9530.12	8639.63	3612.24
Total Costs		54041.00	25457.52	23983.58	4598.14
Total Returns		72700.00	41940.00	26000.00	4760.00
*Net Returns		18659.00	16480.48	2016.42	161.86

* The cost of delivering water to the headgate should be deducted from this net return figure.

FIGURE 1



Long-run average cost curves for the standardized real farms. (Estimated by curvilinear regression)

schedule through support from Agricultural Experiment Station and later a matching grant research project B-006-IDA, entitled "Relationship of Pumping Lift to Economic Use of Ground Water for Irrigation," was proposed by Lindeborg and Corey through support and encouragement from the Idaho Department of Water Administration. This new project addressed itself to the original second objective of this project concerned with the economic maximum that water can be lifted for irrigation, in Idaho. This other research is now nearing completion.

Results of this research study showed through the model farms analysis that incorporate long-run rotation and long-run price and yield expectations that for farm sizes of 160 to 320 acres total costs tended to decrease due economies of size and at 1200 acre size the model farm total cost curve became almost constant. It was found that net income available to pay for irrigation water varied from \$36 to \$57 per acre depending on the production quotas used. The sugar beet enterprise contributes more to the relatively large net income than the other farm enterprises.

The conclusion that can be drawn from the study is that there is no good evidence that the larger farm has any particular advantage as far as farm operation goes. It may have some advantage in buying the inputs and also in selling the products of farm production. This advantage could also result if the farmer was associated with a buying and selling cooperative organization. The main problem in farm size may be procurement of capital. With growing amount of capital needed for a mechanized agriculture, it may be that large-scale operations will excel in keeping capital continuously employed in the operation.

The study results can be studied in more detail in the following publications and thesis.

LIST OF PUBLICATIONS

- Coffing, Arthur Lee, 1965, "The Relationship of Farm Size to Ability to Pay for Irrigation Water in the Dry Lake Area of Canyon County, Idaho" M.S., Thesis, Department of Agricultural Economics, University of Idaho; Moscow, Idaho, pp 111.
- Coffing, A. L. and Lindeborg, K. H., 1965, "Relationship Between Farm Size and Ability to Pay for Irrigation Water," Idaho Agricultural Research Progress Report No. 112, Agricultural Experiment Station, University of Idaho; Moscow, Idaho, pp. 29.
- Lindeborg, K. H., 1970, "The Economic Value of Irrigation Water in Four Areas along the Snake River in Idaho," Bulletin No. 513, Idaho Agricultural Experiment Station, University of Idaho; Moscow, Idaho, pp. 27.