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A Study of Factor Input Services in Cache County, Utah, 1969

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A STUDY OF FACTOR INPUT SERVICES

IN CACHE COUNTY, UTAH, 1969

by

Terry N. Peterson

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of the requirements for the degree

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ABSTRACT

A Study of Factor Input Services

in Cache County, Utah, 1969

by

Terry N. Peterson, Master of Science

Utah State University, 1971

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Department: Agricultural Economics

A study was made to analyze the extent of factor input services in Cache County, Utah, in 1969.

Fertilizer, feed and machinery dealers were interviewed to obtain the extent of the services which they provided to farmers in Cache County. One machinery dealer provided a service in the form of a rental program while all others provided none. Fertilizer dealers provided spreaders while feed dealers provided only a delivery service.

The Farm Service Division of the Amalgamated Sugar Company was examined as a case study. Budgets for different sizes of beet growers were formulated and compared to evaluate the services provided. It was determined that the farmers in the 0-10 acre category received a net return per acre of $107.36 while the farmers in the over 40 acre category who did not use the service received a net return per acre of $105.00. It was deduced that the Farm Service Division was a benefit to the smaller farmers.

Problems which the farmers encountered with the services were discussed, and a theoretical model of the services was presented. Recommendations were given for improvements in the services.

(72 pages)

INTRODUCTION

The need for research on agricultural factor markets has become increasingly important as agriculture has evolved from an almost complete dependence on resources available within the farm firm to an increasing dependence on inputs produced in the non-agricultural sector. As the proportion of all farm inputs that are purchased from the non-farm sector has increased, there is a definite need for factor markets to be organized or restructured so that these resources in the farm sector can compete successfully with the non-agricultural sector of the economy. Recent developments in agriculture are characterized by an expanded volume of output from fewer but larger firms. The market for input factors of production has also changed drastically in recent years.

A market in general can be defined as, "the sphere in which prices are forced out" (11). Markets for factors of production can be defined as, "those organizational characteristics which determine the relation of sellers in the market to each other, of the sellers to the buyers and the sellers established in the market to other actual or potential suppliers of input factors, including new firms which might enter the market" (11). In other words the markets for input factors of production means those unique characteristics of supply and demand which identify different components of the market for factors of production in the agricultural sector of the economy.

Farmers today are plagued with what is called the cost-price squeeze. This means the price of agricultural products has remained stable or

dropped while the cost of input factors of production like fertilizer, insecticides and labor has risen drastically. In 1964 about 44 percent of the 3.4 million farmers sold less than $2,500 worth of produce. An improved method is needed to increase output and profitability of these small operations and help them use their resources more effectively.

It is estimated that over 75 percent of cash farm receipts are spent for farm inputs including farm machinery, petroleum products, feed, seed, fertilizer and agricultural chemicals as well as major inputs of labor and credit. A decrease in these factor costs would considerably increase the profitability of many of these small farms. In many instances small farmers must pay higher prices for input factors because they do not receive the quantity discounts which are available to the larger farmers.

Many firms supply several input factors of production as one bundle, and the farmer pays a fixed amount for this total bundle of services. Services may be categorized into four general areas--product services, credit services, soil services and management services. The product services include such things as delivery and application of factor inputs of planting, cultivation, blending and many others. The credit services include an open line of credit, lease arrangements and prearranged financing. Soil services usually include such things as soil testing, fertilizer use, usage recommendations and technical advice. Management service includes the general area of crop management recommendations, financial management and computer management services. These bundles of input services could be a real salvation to the smaller operator by enabling him to forego the purchase of expensive machinery, minimize his labor and thus decrease his operating costs.

The sugar beet industry in Cache County, Utah, is an industry which is now using factor input services. Beginning in 1968, the Amalgamated Sugar Company in Cache County, Utah, offered an input bundle of services which included the four service types. The service division of the sugar company will drill, cultivate, apply herbicides and insecticides, irrigate, fumigate and harvest farmers' beets for set fees. The individual farmer can purchase parts or the entire bundle depending on his individual needs. This allows small farmers in Cache County to substitute these cost-per-acre custom charges for ownership and operation of specialized machinery thus permitting them to continue to produce a higher value cash crop.

In this study the input bundle of services which is provided by Amalgamated will be analyzed as a specific case study. General characteristics of this bundle will be determined, and possible recommendations and projections will be made to show how these types of services can be applied to similar situations with other crops or areas in agriculture.

OBJECTIVES

The objectives of this study are as follows:

1. To identify and assess the extent of the major types of factor input services which are available to farmers in Cache County, Utah.

2. To study the Farm Service Division of the sugar company in Cache Valley in order to appraise the performance of these services which the company provides.

3. To determine alternate methods or improvements which could be made in the services provided and to project how such services may be applied to other facets of agriculture in the future.

REVIEW OF LITERATURE

In reviewing literature pertinent to this study, no studies could be found which dealt specifically with bundles of input services. Three major areas of reference were reviewed for this study. First, studies dealing with economic factors which influence sugar beet production along with cost and return studies of sugar beets produced in Utah were considered. Second, general literature dealing with factor markets was reviewed with specific attention given to the machinery, fertilizer and feed markets. Third, articles were reviewed which pertained directly to costs of machinery used on a beet enterprise.

General Sugar Beet Studies

Sidhu (12) conducted a study of factors which influence farmers' decisions to grow sugar beets. The study included ten variables which were thought to be pertinent to such decisions. Two of the ten variables were found to be consistently significant. These were man hours of available family labor during the beet-growing season and suitable acreage for growing beets. Sidhu also determined that factors restricting the expansion of sugar beets were: rotation problems, nematode, equipment and water. He concluded that future price increases would be favorable to increased acreage for sugar beets in Utah.

McArthur (7) conducted a study of economic adjustments brought about by the termination of beet production in Ravalli County, Montana, in 1965. He found that the American Crystal Sugar Company found it necessary to discontinue operation because of the reduced acreage of

beets being grown. This study showed the economic impact on the growers, factory personnel and the area as a whole. The study has significance in that it projects what may happen to other areas which discontinue the production of sugar beets.

Morrison (8) in 1963 conducted a detailed cost and return study of sugar beet production in Utah. This study included interviews from 67 farms in Cache, Box Elder, Utah, Davis and Weber Counties. These farms produced 1,453 acres of beets with an average of 18.3 tons per acre. Costs of producing beets decreased from $256.80 to $214.99 as the size of the enterprise increased from 10 acres to 37.3 acres. On the smaller size category, the average net return from sugar beets was $44.79 while on the larger plots the average net return increased to $75.84. This study reflected yield and size difference as related to costs and returns of the beet enterprise.

Spaulding (13) estimated a supply response of sugar beets produced in Box Elder and Cache Counties. In his study enterprise budgets were developed and representative farm units assumed according to different sizes and production levels. Optimum enterprise combinations were determined according to linear programming. It was found that sugar beets were, for the two highest productivity levels, the most profitable enterprise in terms of net returns per acre to fixed investment and management and returns to water used. It was also found that sugar beets were unsurpassed in profitability in returns to labor and management and operating capital. This is particularly pertinent to this study because ways of reducing labor and operating costs are included in the overall objectives.

Allred (1) conducted a study similar to Spaulding which encompassed

the entire state of Utah. Linear programming was used to determine optimal budget combinations. He concluded that sugar beets were the most profitable crop in Cache Valley where family labor and management are relatively plentiful or where capital could be substituted for labor. The study also concluded that a change in technology should bring about an increase in the acreage of sugar beets in Utah.

General Literature on Factor Markets

Schultz (11) gave a general description of the economic organization of agriculture including the market for factors of production for the farm firm. He concluded that markets from which farmers buy and to which they sell factors of production work much less satisfactorily the farther away they get from the centers of development. He also stated that the uneven progress of economic development of regions and farming areas can be traced largely to major imperfections in the various factor markets on which the farm people depend. This seems to be very pertinent to a factor market study in Cache County, Utah. His major thesis on factor markets was that they are the key to the retardation that characterizes agriculture and the very uneven development that is typical of agriculture in an economy as large and diverse as that of the United States.

Phillips (10) wrote an article concerning the changing structure of markets for farm machinery. He attempted to show the leading characteristics of market structure as it developed prior to World War II and to indicate new changes which have taken place. He concluded that there has been a decline in the number of farmers in the last few decades. As farms have been consolidated and increased in size, he

observed that farmers require more expensive and better machinery. He discussed briefly the new phenomena of equipment rentals on a per-acre basis and joint or cooperative selling of machinery. It was concluded the idea had some merit, but a change in the farmer's independent attitude must be accomplished before large-scale success can be accomplished by implement-selling cooperatives.

A study reviewed by Baum and Clement (2) examined the changing structure of the fertilizer industry in the United States. Reasons for the phenomenal expansion and growth in the fertilizer industry were discussed; and the different facets of the fertilizer industry--like the nitrogen industry, phosphate industry and potash industry--were reviewed. Lastly, the present expanded research programs were discussed; and it was concluded that more research is needed with the main objectives being that of: (1) securing a better understanding of fertilizer marketing and (2) determining efficiencies in the marketing system that may be affected so that farmers may be able to secure plant nutrients at a lower cost per unit yet maintain a strong, expanding industry.

Brensike (4) discussed in detail the changing structure of markets for commercial feeds. First, the background of the industry was reviewed; and it was pointed out how the feed industry evolved into the complex mechanism which it is today. He concluded that the industry today is becoming decentralized and that this trend will continue. This industry is very competitive, and price wars are a common thing. Another important characteristic is the trend toward more vertical integration. He concluded that more attention must be given to the potential and occurring trends of vertical integration when doing

research on the commercial feeds market. The final observation was that as changes within factor markets occur, more and better marketing of these factors will result.

Studies of Machinery Costs

Pawson and Nielson (9) conducted a study in Arizona concerning the costs of special machinery and equipment needed for sugar beet production. Different types of equipment were tested on different size farms, and the most efficient sizes were recommended. Three alternate methods of performing sugar beet operations were analyzed: (1) buying 4-bed equipment, (2) buying 2-bed equipment and (3) hiring a custom operator to do the work. The costs of performing these different operations are shown in Figure 1.

The authors concluded that it would be cheaper to hire custom work done on farms with fewer than 70 acres of beets than to purchase either 2-bed or 4-bed equipment. On acreages under 80 acres, it was also concluded that it would be less expensive to purchase 2-bed equipment rather than the 4-bed machinery. If the equipment was to be used on more than approximately 80 acres of beets, 4-bed equipment would be more economical than the smaller equipment. The study also concluded that the savings that would accrue from the joint ownership and operation of a beet harvester, as compared to the costs that would be incurred for custom harvesting, would be large enough to pay for a beet harvester in one season.

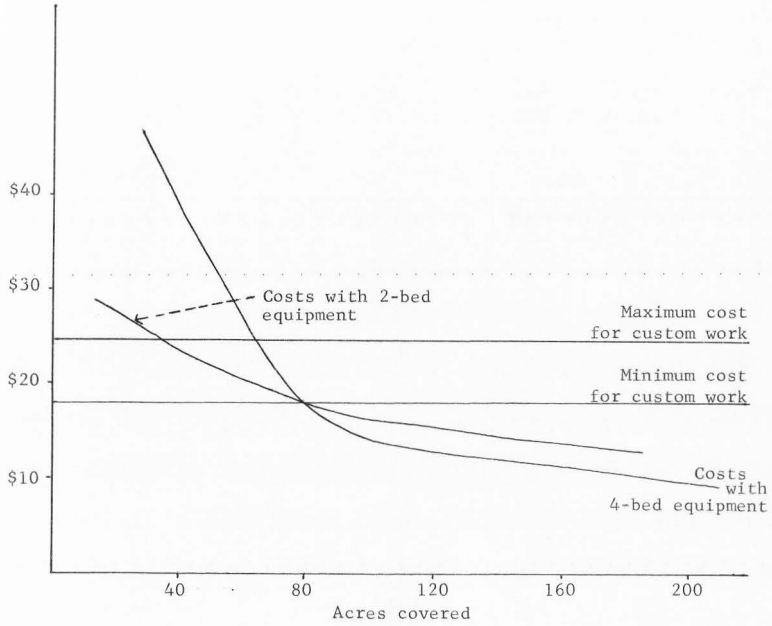

Figure 1. Estimated cost per acre for planting, thinning, cultivating and sidedressing beets as affected by size of equipment, acreage covered and ownership of machinery.

THEORETICAL MODELS OF FACTOR MARKETS

In elementary economic theory, the price of a commodity is determined by the intersection of the supply and demand functions of that particular commodity. This also holds true for factors of production. Demand for an input factor of production may be defined as the various quantities of a factor that buyers will take off the market at alternative prices, ceteres paribus. Supply of an input factor may be defined as the various quantities of a factor that sellers will place on the market at all possible alternative prices, ceteres paribus.

Lipsey and Steiner (6) present four extreme cases of factor markets. In the theory of pricing of inputs, the demand arises from the farmers; and the supply arises from the different sellers of the input factors of production. For this analysis the product market will be defined as the demand market. These firms are the demanders of the factor input so they can produce the final product. The factor market will be defined as the supply market. These firms supply the different input factors of production.

Situation I

In this situation there are many buyers and many sellers of the input. The demand curve is downward sloping. No buyer of the factor is large enough to exert any influence on the price. The supply curve is upward sloping because the sellers will sell more and more of the factor at higher prices. Also, none of the sellers of the factor are large enough to restrict the supply or influence price. The equilibrium

point or price of the factor is the point where these two curves intersect. The equilibrium price of the factor is Op_1, and the quantity supplied is Oq_1. At this point the demand for factors of production and the supply of factors are equal at Oq_1.

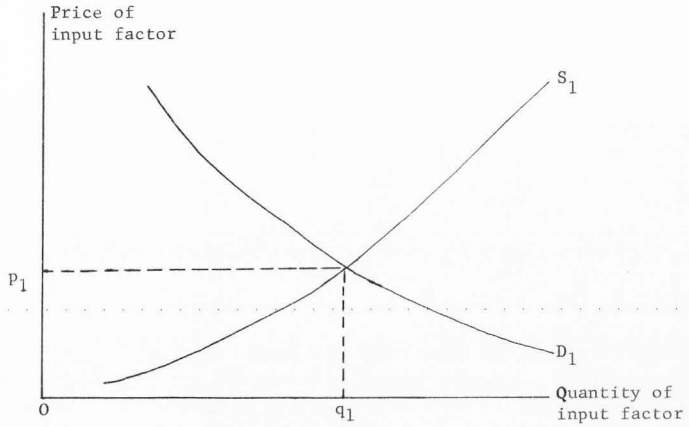

Figure 2. Competition in product and factor market (Situation 1).

Situation II

In this situation we assume there is a single supplier of the factor of production. The cost to him of supplying this is a rising function, so the supply curve is upward sloping. The supplier of the factor knows that there are many buyers and that the demand curve is downward sloping. The supplier of factor restricts the amount of the factor in the market to the point where the marginal revenue from the last unit is equal to the marginal cost of supplying the factor.

Marginal revenue is defined as the revenue which the last unit of the factor generates. Marginal cost is defined as the cost of supplying one additional unit of the factor. In this case the marginal cost is equivalent to the supply curve because of monopoly in the product market. Here the equilibrium price for the factor is Op_1, and the quantity of the factor supplied is Oq_1. Thus, with only one seller of the input factor of production, a higher price is paid for the factor; and fewer units are purchased.

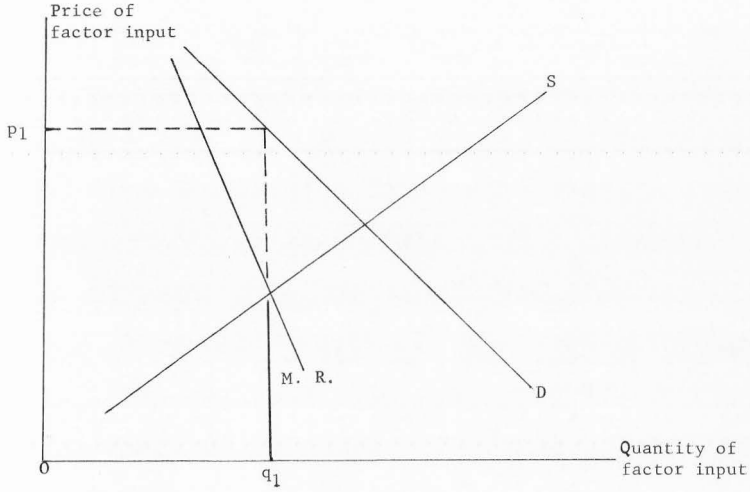

Figure 3. Monopoly in the product market and perfect competition in the factor market (Situation II).

Situation III

In this situation we have a monopsonist in the factor market who is the sole purchaser of the factor of production. The demand curve is downward sloping because of competition in the product market. The supply curve is upward sloping, and it shows how much of the factor is offered at various prices. In this situation the relevant curve for determining the price of the input factor is the M.C. curve. The reason for this is that the monopsonist can set the price he wants to pay because he is the sole purchaser of the input factor. Thus, the price paid to the factor is Op_1, and the quantity purchased is Oq_2. In this situation the suppliers of the factors of production are at the mercy of the buyer.

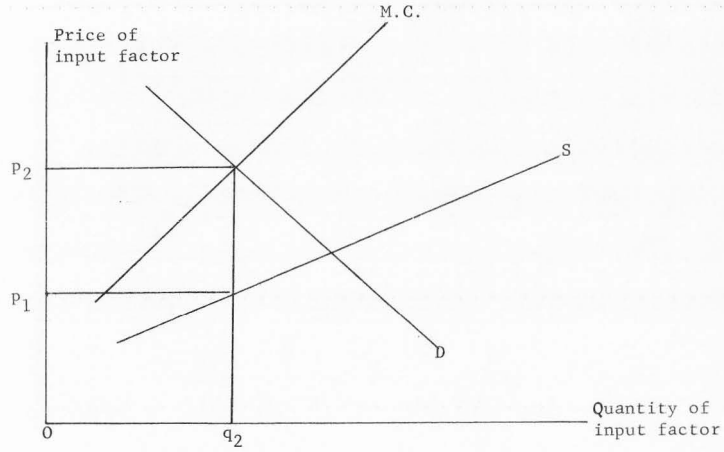

Figure 4. Competition in the product market and monopsony in the factor market (Situation III).

Situation IV

In this situation we have a monopsonist who is the sole purchaser of the factor and a monopolist who is the sole supplier of the factor. The monopolist wants to sell Oq_2 at price Op_2. The monopsonist wants to buy Oq_3 at price Op_1. Here, both have power within the market. In this situation the two will bargain, and a price of the factor will be determined.

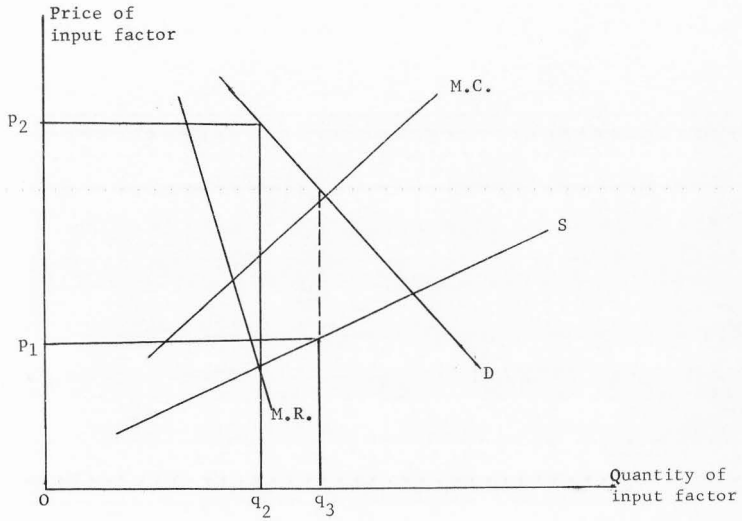

Figure 5. Monopoly in the product market and monopsony in the factor market (Situation IV).

These four models are extreme cases but are useful as background to developing a model to explain the input bundle of service of the Farm Service Division of the Sugar Company.

The most applicable theoretical model for this study is shown in Figure 6. In this model the supply curve is a horizontal straight line. This means that farmers can purchase all of the input factors they desire at the given price.

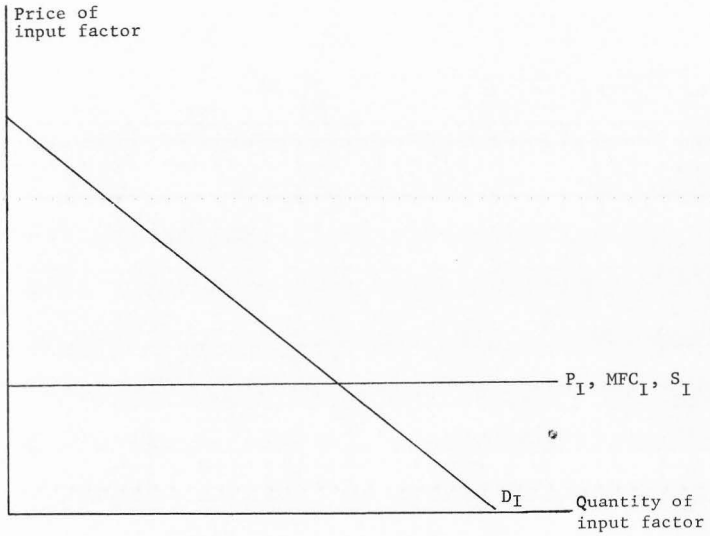

Figure 6. Optimal use of input factors of production.

The supply curve in this model is the marginal cost of the input. Marginal factor cost may be defined as the cost of purchasing one more or the last unit of the productive input.

The demand curve is downward sloping because of diminishing marginal physical product of the input. It is shown in Stigler (14 - page 239) that the demand curve for a productive factor is a derived demand. This means that the demand for input factors of production arises from the need to produce a product for sale. Boulding (3 - page 253) derived three propositions of what determines the magnitude of derived demand. The propositions may be stated as: (1) The demand for a factor is greater the more important the factor in the production process. (2) An expected rise in the demand for a product will cause a rise in the demand for any type of factor which produces the product. (3) The magnitude of demand for a factor will be larger the less substitutable it is for others.

In this model the equilibrium price of the factor is Op_1, and the firms purchase Oq_1 units of the factor of production. This equilibrium point is where an additional unit of the productive service equals the amount it adds to cost.

PROCEDURES AND SOURCES OF DATA

The purpose of this section is to discuss the procedures and methods of analysis used in this study.

Information for the first objective was obtained by interviewing machinery dealers, fertilizer dealers and feed dealers in Cache County. An attempt was made to contact all such dealers in the county. Interviews were conducted personally by the author. Secondary sources such as agriculture statistics and yellow pages of the telephone book were used to help identify and contact factor input suppliers. Questions were formulated to determine the extent of and trends in use of factor input services in Cache County. Services provided by farm machinery dealers, feed dealers and fertilizer dealers were examined; and an explanation was given by the dealers.

In attempting to accomplish objective two, difficulty was encountered in selecting a suitable choice indicator or "measuring stick." The purpose of objective two was to appraise the services of the Farm Service Division by comparing them to some alternate method of performing the operation.

Originally three types of choice indicators were considered. The first was to compare the costs and returns budget of farmers who used the service with farmers who did not. This method of comparison was not feasible; very few of the larger farmers used the services of the farm service division.

The second method of comparison considered was to compare a cost and returns budget of sugar beets, which was completed in earlier

studies in the Agricultural Economics Department, to a budget of farmers who used the services of the Farm Service Division. This method of analysis was not utilized for two reasons. First, budgets which have been completed in earlier studies were not considered accurate for this study because of a general change in costs and prices and the technological change which has occurred over the years. Second, the budgets prepared in the Agricultural Economics Department were not detailed enough to make comparisons of the different operations on the sugar beet crop.

The method of comparison which was utilized in this study was to compare per-acre costs and returns of different size categories of beet growers in the 1969 crop year. Budgets for each of five different size categories were calculated. The different size categories were 0-10 acres, 11-20 acres, 21-30 acres, 31-40 acres and over 40 acres. All farmers interviewed in each of the first four categories used services of the Farm Service Division while none of the farmers interviewed in the over 40 acre category utilized the service. The different size categories were then compared to determine if the services were of benefit to farmers.

Data for the second objective were gathered from a variety of sources. Several interviews were conducted with the District Manager and Fieldmen of the Amalgamated Sugar Company at Lewiston, Utah. A general description of the service was obtained along with its reasons for implementation and use. A complete list of growers who used services provided by the Farm Service Division was obtained. Individual acreages and sugar beet yields of farmers in the sample were also obtained from information provided by sugar company officials. Also,

a list of costs per acre of the different operations performed by the farm service division on each grower was obtained from the district manager.

Enterprise requirements, costs and returns which were used in preparing the individual budget in the five different size categories were obtained by interviewing a sample of sugar beet growers of each enterprise size who grew sugar beets in the crop year of 1969. Personal interviews were conducted with 30 growers in the County which represented approximately 16 percent of the beet growers in Cache County. The sample of farmers interviewed were stratified to include farmers who used many of the services provided by the sugar company.

In formulating the questions used during the interviews, an attempt was made first to get an idea of the farmer's entire operation. Questions were then asked as to labor requirements, power used and type of equipment to ascertain different costs for each individual operation performed on the beet enterprise. Machinery costs were obtained from published and unpublished data in the Agricultural Economics Department.

Personal interviews were an integral part of accomplishing objective three. The prime consideration in formulating the questions used during these interviews with the growers was to obtain farmers' personal reactions and opinions on the services provided by the Farm Service Division of the sugar company. The questions mainly concerned past experiences with the services and plans for the future.

The interviews with farmers were conducted in a friendly and conversational way. The interviewer attempted to ask only open questions and not to suggest alternate answers to the respondent. In some cases a good deal of probing was necessary to determine the farmer's reaction

to the service, and yet, still keep from leading the farmer in his thinking.

Interviews were also conducted with sugar company officials to determine their point of view on the problems encountered in the implementation of the service.

In developing the theoretical model for analyzing the factor input services, theoretical textbooks by Stigler (14), Boulding (3), Lipsey and Steiner (6) and Ferguson (5) were required. This model was explained previously under Theoretical Models for Factor Markets.

PRESENTATION AND ANALYSIS OF DATA

This section is divided into three main parts. First, the results of the survey of input factors will be presented. Second, a description of the "bundle of services" which is provided by the Amalgamated Sugar Company is given along with the comparison of the budgets of the different size categories of the beet enterprises. Third, a theoretical analysis of parts of the "bundle of services" is given. Problems with the service and recommendations for its improvement is also presented.

Part I

Results of machinery dealer survey

A questionnaire was formulated to determine the extent of renting, leasing and other custom services performed by machinery dealers in Cache County.

At the present time only one dealer in the County has a renting or leasing program for different types of machinery. This program was not carried out on any systematized basis. Another dealer has a lease program which is provided by the company which he represents, but he does not participate in the program.

From the survey three major reasons for machinery dealers not entering into a rental or lease program were determined. First, the dealers believed resale value of the rented equipment was too low to make it economically feasible to carry out such a program. Second, the dealers said the price which they would have to charge to obtain a return on their investment would be above the price which farmers could afford to pay. Third, the dealers do not have sufficient capital to

operate a rental system and receive a return on their capital outlay.

The dealers' attitudes toward renting and leasing was generally one of caution. The renting which is being carried out in Cache County is not done on any systematized basis. The dealers believed that if any renting programs are to be implemented used or reconditioned equipment rather than new equipment should be used.

All dealers in Cache County expressed the opinion that in the future there is a strong possibility that rental or lease arrangements will be increased.

Results of the fertilizer dealer survey

A questionnaire was prepared to determine the extent of custom services which are provided by fertilizer dealers to Cache County farmers.

At the time of the survey, 80 percent of the fertilizer dealers provided some services to the farmers in Cache Valley. The service was mainly in the form of providing a fertilizer spreader at a cost to the farmer of 50 cents per acre. Custom spreading service is provided by one dealer at a cost of $1.15 per acre for less than 50 acres and $1.00 per acre for more than 50 acres. Sixty percent of the dealers in the valley operate a fertilizer delivery service.

All dealers expressed the opinion that the future trend is toward more custom services being provided by fertilizer dealers.

Results of the feed dealer survey

At the time of the survey, 80 percent of the feed dealers in the County provided a delivery service to farmers. In each case the cost of delivery was included in the total cost of feed. No delivery

service was available in lots under three tons.

Sixty percent of the dealers foresaw a definite trend to providing more custom feeding services. One dealer expressed the possibility of custom feeding in the near future. All others said that farming operations in Cache County are too small to make a custom feeding venture economically possible.

Custom services by Del Monte Corporation

Del Monte Corporation in Smithfield, Utah, offers certain custom services to farmers in Cache Valley. The three main cash crops which they provide services for are peas, beans and corn. The company will provide seed, plant, harvest and haul the crops to the canning factory. A fixed charge is set for every operation performed, and these charges are deducted when the crop is delivered. If no crop is harvested, no charges are assessed. By this method Del Monte is able to obtain more vegetables for processing.

Part II

This section is discussed in three parts. First, some of the reasons for the implementation of the Farm Service Division is discussed. Second, a description is given of the operations performed on the beet enterprise by the individual farmer. Third, a description of the operations of the Farm Service Division is given along with costs of each operation performed.

Reasons for implementation of the Farm Service Division

In 1968 the officials of the Amalgamated Sugar Factory decided to provide custom services of certain operations performed on a sugar

beet enterprise. The sugar factory had found in previous years that the production of sugar beets in Cache County was dwindling. They determined that the farmers could not afford the initial outlay and operating expense of the precision beet equipment. Thus, they decided to buy this equipment, hire operators to operate it and do custom work for farmers as a "bundle of inputs." The two main reasons for the sugar factory to operate such a service is that they needed more beets to process, and some farmers could not afford to grow beets on small acreages with the existing structure of the factor input market.

Description of operations performed solely by the farmer

Preparing the seed bed. Land preparation must be thorough to provide a firm, fine seed bed to facilitate the germination of the beet seed. The land should be free from trash and heavy roots such as alfalfa that would disturb the seed and young plants during cultivation. In Cache Valley the farmers interviewed performed four main operations in the preparation of the seed bed -- fall plowing and spring digging, harrowing and leveling.

Fall plowing is usually the first operation performed. This is the initial breaking of the soil. The soil is heavy and bumpy; and when plowed in the fall, the clods break down during the winter. Spring plowing was done by some farmers interviewed, but in each case this was due to a lack of time in the fall. The plow sizes ranged from one to five bottoms among farmers interviewed.

Spring digging is best performed in the spring as soon as the operator is able to work the land. This operation helps break up the soil into finer particles. Digging is performed from one to three times depending on the soil.

The harrowing operation takes place immediately after digging to break up the soil further, level the field and loosen the soil. Most operators reported harrowing from one to four times.

Float leveling is usually the final operation in preparing the seed bed. Float leveling helps to level the ground and prepare a finely granular, firm seed bed that is not too packed.

Some fertilizing is done during the preparation of the seed bed. This is usually in the form of barnyard manure applied before plowing. Some operators reported the application of commercial fertilizers before planting.

Hand thinning. All farm operators interviewed reported hand thinning of their beet crop. This operation removes the excess beet plants from the rows and leaves the required space between each plant so it is able to mature. Family labor or hired migrant workers were the main source of the labor required to perform the operation.

Hand weeding. All growers reported hand weeding of their beet enterprise. Weeding is done as often as necessary to remove the weeds from within the rows of beet plants. Family labor and hired migrant workers were again the main source of labor for weeding.

Fertilization. Commercial fertilizer, mainly phosphate and nitrogen, are used in Cache County. Ninety-three percent of the farmers reported using this type of fertilizer in varying proportions and quantities. Fertilizers are applied in various stages of production of the crop from before the land is plowed until after it is cultivated.

Irrigation. Irrigating in Cache Valley is done by two different methods -- flooding and sprinkling. Fifty-four percent of the operators interviewed used a sprinkler system, and 46 percent used the flood

system. As a rule, the larger operators used a sprinkler system; and the smaller farmers utilized the flood system. The beet crop is usually irrigated from four to eight times per year depending on the soil and the amount of precipitation received during the growing season.

Ditching. This operation provides for the distribution of the water when flood irrigating. This is done after the crop has been planted and before the first irrigation. Water is carried along the sides of the field and allowed to run down the ditches which are constructed.

Harvesting and hauling. Harvesting is started in October and sometimes extends into late November. It is done mechanically with a beet harvester which is pulled behind a tractor. This involves lifting the beets from the ground, removing the tops and all excess dirt and loading them onto trucks. Tops are usually placed in windrows so they can be used for feed or silage. After the beets are loaded onto trucks, they are hauled to the factory for processing.

Operations performed by the Farm Service Division

The Farm Service Division performs a number of operations on the beet enterprise. These are usually done on a custom per-acre rate basis. Payment for these services is charged against the farmer's beet crop and is deducted when the crop is delivered to the factory. Table 1 shows the rate which is charged for each operation.

Table 1. Costs of operations performed by the Farm Service Division

Operation	Cost in dollars	Unit
Drilling	3.00	Acre
Cultivation	3.00	Acre
Drilling and herbicide application	4.50	Acre (plus herbicide)
Flex harrowing	.75	Acre
Fumigant application	4.00	Acre (plus fumigant
Spraying	1.50	Acre (plus spray)
Top saver	.75	Per ton of beets
Seed		
Raw	1.25	Pound
Pelleted	.50	Pound

Other services are also provided. In 1969 sprinkler systems were made available to farmers on an emergency basis to provide moisture for seed germination. Cash advances at going interest rates are provided to farmers who require additional capital. Fertilizer and herbicide can also be purchased from the Farm Service Division.

Description of operations performed by the Farm Service Division

Drilling. The operation takes place immediately after the seed bed is prepared. A hired tractor operator performs this operation. The drill is a six-row precision drill which is pulled by a tractor. The row spacings are 22 inches apart. This is necessary for the precision cultivation which is to follow. The seed is usually purchased from the Farm Service Division and is applied at the rate of

eight pounds per acre if it is raw seed and two pounds per acre if it is pelleted seed.

Herbicide. The application of herbicide is available to the farmers at the time of drilling the beets. A device is placed on the drill which allows the herbicide to be applied while drilling. The application of a herbicide eliminates much of the weeding of the beets. If applied too heavily, it may kill the young beets.

Cultivating. The operation is performed from three to six times during the growing season. As in drilling, a six-row precision cultivator is used. The first cultivation usually takes place as soon as the small beets have emerged and the rows are visible. This precision cultivating must be done on beet plots which have had the precision drilling. If not, the sugar company will not perform the operation.

Preparation of the budgets

The purpose of this section is to present and describe in detail the budgets of the different farm-size categories.

The aggregate budget

A sugar beet enterprise will be defined to include all acres under the control of the farm operator that are on about the same quality of soil and given equal treatment by the operators. In this study it will be assumed that all beet enterprises studied have similar soil types.

There were 181 farm operators in Cache Valley who grew beets in 1969. From records obtained from the sugar factory, the percentages of farmers who used different services of the Farm Service Division were calculated and presented in Table 2.

Table 2. Overall percentage of farmers using different services of the Farm Service Division

Operation	Percentage
Drilling	27.0
Fumigant	12.7
Seed	91.0
Herbicide	50.8
Cultivating	23.6
Insecticide	1.6
Fertilizer	18.8
Cash advance	12.2
Sprinkle	12.0

From the 181 growers in Cache County, a stratified sample of 30 farmers was interviewed to obtain a cost and return budget for sugar beets. The average size of farm in the sample was 267 acres with a range from 10 to 980 acres. The average size of the beet enterprise was 31.3 acres with a range of 5 to 130 acres. Normal yield per acre as an average of all growers in the sample was 14.9 tons.

The cost and return budget is broken down by each operation performed on the beet enterprise. No interest or depreciation was charged to land, water, buildings and risk overhead. For this reason the net return is higher than other studies including these costs. The aggregate budget is shown in Table 3.

Table 3. Aggregate budget for sugar beets in crop year 1969

OPERATION	Unit	No. Units	Per Unit			Per Acre									
						Labor		Power		Implement					
			Labor Hours	Power Hours	Implement Hours	Hours	Cost	Hours	Cost	Hours	Cost	Services & Materials	Total Variable Cost	Fixed Costs	Total Costs
Plow	Times	1	.93	.93	.93	.93	1.40	.93	.78	.93	.48		2.66	3.01	5.67
Dig	"	2	.74	.74	.74	.74	1.11	.74	.57	.74	.04		1.72	1.87	3.59
Disk															
Harrow	"	2	.46	.46	.46	.46	.69	.46	.26	.46			1.00	.60	1.60
Level	"	1	.36	.36	.36	.36	.54	.36	.31	.36			.90	.85	1.75
Seed												4.00			4.00
Plant	"	1				some custom + own									2.85
Cultivate	"	4													11.16
Weeding												10.38			10.38
Hand thin.												18.08			18.08
Fertilize												17.80			17.80
Manure															3.25
Irrigate															12.50
Water	Acres											5.00			5.00
Ditch	Times	1	.11	.11	.11	.11	.17	.11	.06	.11			.24	.16	.40
Herbicide		1													6.00
Spray	"	1										1.50			1.50
Harvest	Acres	1										37.81			37.81
Haul												13.45			13.45
2T Truck														2.40	2.40
Pick-up														2.00	2.00
Fencing														1.71	1.71
Taxes														4.44	4.44
Tools														.90	.90
Insurance														.25	.25
F.I.C.A.														.09	.09
TOTAL															168.58

Wage: $1.50/hr.
Yield: 14.9 T/acre

Tractor Sizes: 60 H.P., 40 H.P.
Average Size of Farm: 267 Acres

Net Return Per Acre: $99.62
Gross Receipts Per Acre: $268.20

Methods of calculating total receipts

Total receipts were calculated by multiplying the average price of the sugar reported by sugar company officials by the stated average yield and adding the estimated value of the tops. The value of the sugar beets used was $17.01 per ton. The value placed on the tops was $1.00 per ton of beets estimated by Allred (1).

Method of handling costs

Power cost. Power costs include the cost of operating tractors and trucks plus the cost of all equipment used on the beet enterprise. The cost of all repairs and depreciation on the equipment used on the beet enterprise was charged to the beet operation. A rate of seven percent interest was used. These figures were taken from unpublished data in the Economics Department at Utah State University.

Two sizes of tractors were used -- 60 H.P. and 40 H.P.

Barnyard manure. Barnyard manure included only the manure that was applied to the beet land in the current year. Only 16 percent of the operators applied manure. A cost of $2.00 per ton was used, Allred (1).

Commercial fertilizers. The beet enterprise was charged with all the current year's application of commercial fertilizer at the actual cost of the farmer. No attempt was made to determine whether the fertility balance was maintained, increased or decreased as a result of the beet operation.

Seed. The cost of seed was the actual cost to the farmer. Ninety-one percent of the farmers purchased their seed from the sugar company. Some farmers had seed left over from the previous year so they did not have to purchase seed in 1969.

Thinning and hoeing. The cost of thinning and hoeing was by two methods. If the farm operator hired his hoeing and weeding done, this cost per acre was used. If family labor did the weeding and hoeing, a rate of $1.50 per hour was used.

Irrigation and water. The cost of irrigating was determined by two methods. If the farm operator flood irrigated, the only cost was his time which was $1.50 per hour. If the sprinkler method was used, the costs of the sprinkler system were calculated in the same manner as other power and equipment costs. The cost of electricity or fuel and labor time was then added to the cost of the sprinkler system. Water used on the beet operation was charged to the beet enterprise at a cost of $5.00 per acre.

Fencing, taxes, tools, insurance and F.I.C.A. The costs of these items were taken from unpublished data in the Agricultural Economics Department at Utah State University.

Budget for 0-10 acre category

The budget for this size category was calculated in the same manner as the previous budget, and all assumptions remain the same.

There were 70 farmers in this size category who grew sugar beets in 1969. From records obtained from the sugar factory, the percentage of these farmers who utilized the Farm Service Division were calculated. See Table 4.

From the seventy farmers a stratified sample of growers in the 0-10 acre size category was chosen. All farmers interviewed used the services of drilling, herbicide, cultivation and seed. Some farmers also used other services. The average size of farm in the sample was 174 acres with a range of 10 to 400 acres. The average yield in the

Table 4. Percentage of farmers in the 0-10 acre category who used different operations of the Farm Service Division

Operation	Percentage
Drilling	28.0
Fumigant	4.2
Seed	92.8
Herbicide	51.4
Cultivating	22.8
Insecticide	0.0
Fertilizer	12.8
Cash advance	4.4
Sprinkle	7.1

crop year of 1969 was 15.8 tons per acre. The cost the return budget is shown in Table 5.

Total costs amounted to $177.04 while the gross receipts were $284.40. The net return per acre was $107.36.

Budget for 11-20 acre category

The budget for this size category was calculated in the same manner as the previous ones, and all assumptions remain the same.

There were 60 farmers in this category not including church and welfare farms. From records obtained from the sugar factory, the percentage of these farmers who utilized the different operations of the Farm Service Division were calculated, Table 6.

Table 5. 0-10 acre budget for sugar beets in crop year 1969

OPERATION	Unit	No. Units	Per Unit			Per Acre								
			Labor Hours	Power Hours	Implement Hours	Labor		Power		Implement		Services & Materials	Total Variable Cost	Fixed Costs	Total Costs
						Hours	Cost	Hours	Cost	Hours	Cost				
Plow	Times	1	1.37	1.37	1.37	1.37	2.06	1.37	.80	1.37	.40		3.26	3.44	6.70
Dig	"	2	1.19	1.19	1.19	1.19	1.79	1.19	.69	1.19	.04		2.52	1.73	4.25
Disk															
Harrow	"	2	.65	.65	.65	.65	.97	.65	.38	.65	.05		1.39	.90	2.28
Level	"	1	.41	.41	.41	.59	.89	.59	.58	.59	.05		1.55	.77	2.32
Seed												4.00			4.00
Plant												3.00			3.00
Cultivate	"	4										3.00			12.00
Weeding	"	1										12.16			12.16
Hand thin.	"	1										15.25			15.25
Fertilize	"	1										16.00			16.00
Manure							5.4T per acre at 1.50/T								8.10
Irrigate	"	6				5.3	1.50						8.91		8.10
Water	Acres	1										5.00			5.00
Ditch	Times	1	.27	.27	.27	.27	.41	.27	.15	.27	.01		.67	.35	1.02
Herbicide		1										6.00			6.00
Spray	"	1										1.50			1.50
Harvest	Acres	1					2.65	per T				4.87			41.87
Haul	"	1					1.00	per T				15.80			15.80
2T Truck	"	1												2.40	2.40
Pick-up	"	1												2.00	2.00
Fencing	"	1												1.71	1.71
Taxes	"	1												4.44	4.44
Tools	"	1												.90	.90
Insurance	"	1												.25	.25
F.I.C.A.	"	1												.09	.09
TOTAL															177.04

Wage: $1.50/hr. Tractor Sizes: 40 H.P. Net Return Per Acre: $107.36
Yield: 15.8 T/acre Average Size of Farm: 174 Acres Gross Receipts Per Acre: $284.40

Table 6. Percentage of farmers in the 11-20 acre category who used the different operations of the Farm Service Division

Operation	Percentage
Drilling	25.0
Fumigant	10.0
Seed	83.3
Herbicide	51.6
Cultivating	18.33
Insecticide	1.4
Fertilizer	21.6
Cash advance	8.0
Sprinkle	20.0

The sample was stratified to select farmers who used the services of drilling, cultivating, herbicide and as many other services as possible. Eighty-three percent of the farmers interviewed used the services of drilling, herbicide, cultivation and seed. Also, some farms used other services. The average size of farm in this sample was 215 acres with a range of 60 to 400 acres. The average size of the beet operation was 13.4 acres. The average yield of beets in 1969 was 14.5 tons per acre. The cost and return budget is shown in Table 7.

The total costs in this category amounted to $101.04, and the gross receipts were $261.00. The net return per acre was $99.96.

Budget for 21-30 acre category

The budget for this size category was calculated in the same manner as the previous budgets, and all assumptions remain the same.

Table 7. 11-20 acre budget for sugar beets in crop year 1969

OPERATION	Unit	No. Units	Per Unit			Per Acre									
			Labor Hours	Power Hours	Implement Hours	Labor		Power		Implement		Services & Materials	Total Variable Cost	Fixed Costs	Total Costs
						Hours	Cost	Hours	Cost	Hours	Cost				
Plow	Times	1	.78	.78	.78	.78	1.17	.78	.66	.78	.50		2.33	2.92	5.25
Dig	"	2	.71	.71	.71	.71	1.06	.71	.60	.71	.04		2.01	1.82	1.83
Disk															
Harrow	"	2	.64	.64	.64	.64	.96	.64	.37	.64	.05		1.38	.90	2.28
Level	"	1	.41	.41	.41	.41	.61	.41	.34	.64	.05		1.00	.96	1.96
Seed												4.00			4.00
Plant		1										3.00			3.00
Cultivate	"	4										3.00			3.00
Weeding	"	1										7.08			7.08
Hand thin.	"	1										13.78			13.78
Fertilize	"	1													16.00
Manure	"	1					3.7T	at 1.50/T							5.55
Irrigate	"	6				5.7	1.50								8.55
Water	Acres	1										5.00			5.00
Ditch	Times	1	.13	.13	.13	.13	.20	.13	.08	.13	.02		.30	.29	.59
Herbicide												6.00			6.00
Spray	"	1										1.50			1.50
Harvest	Acres	1						2.65	per T			38.42			38.42
Haul	"	1						1.00	per T			14.50			14.50
2T Truck	"	1												2.40	2.40
Pick-up	"	1												2.00	2.00
Fencing	"	1												1.71	1.71
Taxes	"	1												4.44	4.44
Tools	"	1												.90	.90
Insurance	"	1												.25	.25
F.I. C.A.	"													.09	.09
TOTAL															161.04

Wage: $1.50/hr. Tractor Sizes: 60 H. P., 40 H. P. Net Return Per Acre: $99.96
Yield: 14.5 T/acre Average Size of Farm: 215 Acres Gross Receipts Per Acre: $261.00

There were 20 farmers in this size category who grew sugar beets in 1969. From records obtained from the sugar factory, the percentage of farmers who used the different services of the Farm Service Division were calculated, Table 8.

Table 8. Percentage of farmers in the 21-30 acre category who used the different operations of the Farm Service Division

Operation	Percentage
Drilling	30.0
Fumigant	33.0
Seed	90.0
Herbicide	50.0
Cultivating	23.0
Insecticide	3.0
Fertilizer	33.0
Cash advance	20.0
Sprinkle	10.0

From the 30 farmers a stratified sample similar to the previous samples of growers in the 21-30 acre category was chosen. All farmers interviewed used the services of drilling, cultivating and seed. Some farmers also used other services. The average size of farm in the sample was 274 acres with a range of 105 to 500 acres. The average size of the beet operation was 23 acres with a range of 20.2 acres to 26.5 acres. The average yield in the crop year of 1969 was 14.8 tons per acre. The cost and return budget is shown in Table 9.

Table 9. 21-30 acre budget for sugar beets in crop year 1969

			Per Unit			Per Acre									
						Labor		Power		Implement			Total		
OPERATION	Unit	No. Units	Labor Hours	Power Hours	Implement Hours	Hours	Cost	Hours	Cost	Hours	Cost	Services & Materials	Variable Cost	Fixed Costs	Total Costs
Plow	Times	1	1.03	1.03	1.03	1.03	1.54	1.03	.87	1.03	.50		2.91	3.47	6.38
Dig	"	1	.87	.87	.87	.87	1.30	.87	.73	.87	.04		2.07	3.12	5.19
Disk															
Harrow	"	2	.49	.49	.49	.49	.73	.49	.28	.49	.05		1.06	.68	1.74
Level	"	1	.51	.51	.51	.51	.76	.51	.30	.51	.05		1.11	.69	1.80
Seed												4.00			4.00
Plant	"	1										3.00			3.00
Cultivate	"	4										12.00			12.00
Weeding	"	1													11.00
Hand thin.	"	1										22.00			22.00
Fertilize	"	1										17.50			17.50
Manure	"	1					2.5T	at 1.50 per T							2.67
Irrigate	"	5				6.9	10.35						10.35		10.35
Water	Acres	6										5.00			5.00
Ditch	Times	1				.15	.23	.15	.09	.15	.01		.33	.29	.62
Herbicide		1										6.00			6.00
Spray	"	1										1.50			1.50
Harvest	Acres	1					2.65	per T				39.22			39.22
Haul	"	1					1.00	per T							14.80
2T Truck	"														2.40
Pick-up	"	1													2.00
Fencing	"	1												1.71	1.71
Taxes	"	1												4.44	4.44
Tools	"	1												.90	.90
Insurance	"	1												.25	.25
F.I.C.A.	"	1												.09	.09
TOTAL															176.56

Wage: $1.50/hr. Tractor Sizes: 60 H.P., 40 H.P. Net Return Per Acre: $89.44
Yield: 14.8 T/acre Average Size of Farm: 274 Acres Gross Receipts Per Acre: $266.40

Total costs in this category were $178.56, and the gross receipts were $266.40. The net return per acre was $89.44.

Budget for 31-40 acre category

The budget for this size category was calculated in the same manner as the previous budgets, and all assumptions remain the same.

There were 13 farmers in this category who grew sugar beets in 1969. From records obtained from the sugar factory, the percentage of these farmers who utilized the different operations of the Farm Service Division was calculated, Table 10.

Table 10. Percentage of farmers in the 31-40 acre category who used different operations of the Farm Service Division

Operation	Percentage
Drilling	20.0
Fumigant	30.0
Seed	100.0
Herbicide	38.0
Cultivating	30.0
Insecticide	7.0
Fertilizer	7.0
Cash advance	23.0
Sprinkle	7.0

From the 13 farmers in this size category, a stratified sample similar to the previous sample of growers was chosen. Sixty-six per-

cent of the farmers interviewed used the services of drilling, cultivation and seed. The average size of farm in the sample was 307 acres with a range of 83 to 400 acres. The average size of the beet operation was 33 acres. The average yield in the crop year of 1969 was 14.9 tons per acre. The cost and return budget is shown in Table 11.

Total costs in this category amounted to $164.09 while the gross receipts were $268.20. The net return was $104.11 per acre.

Budget for over 40 acre category

The budget for this size category was calculated in the same manner as previous budgets, and all assumptions remain the same.

There were eight farmers in this size category. The percentages of farmers who utilized the Farm Service Division were calculated in Table 12.

From the eight farmers, a sample of six was chosen. The average size of farm was 467 acres with a range from 200 to 960. The average size of the beet operation was 79.2 acres with a range of 50 acres to 130 acres. The average yield was 14.5 tons per acre. The cost and return budget is shown in Table 13.

Total costs amounted to $156.00 while the gross receipts were $261.00. The net return per acre was $105.00.

A comparison of farmers in different categories who used operations of the Farm Service Division

A summary of the percentages of farmers who used the different operations of the Farm Service Division is given in Table 14 for each size category.

Table 11. 31-40 acre budget for sugar beets in crop year 1969

			Per Unit			Per Acre									
		No. Units	Labor Hours	Power Hours	Implement Hours	Labor		Power		Implement		Services & Materials	Total Variable Cost	Fixed Costs	Total Costs
OPERATION	Unit					Hours	Cost	Hours	Cost	Hours	Cost				
Plow	Times	1	.95	.95	.95	.95	1.43	.95	.80	.95	.50		2.70	3.30	6.00
Dig	"	2	.66	.66	.66	.66	.99	.66	.55	.66	.04		1.58	1.71	3.29
Disk															
Harrow	"	2	.35	.35	.35	.35	.53	.35	.20	.35	.05		.78	.51	1.29
Level	"	1	.29	.29	.29	.29	.44	.29	.17	.29	.05		.66	.40	1.06
Seed												4.00			4.00
Plant	"	1										3.00			3.00
Cultivate	"	4				part custom + part own equipment						3.00			8.53
Weeding	"	1													11.33
Hand thin.	"											19.14			19.14
Fertilize	"	1													18.77
Manure	"	1													
Irrigate	"	5													9.00
Water	Acres	1													5.00
Ditch	Times														
Herbicide												6.00			6.00
Spray	"	1										1.50			1.50
Harvest	Acres	1				2.65 per T						39.49			39.49
Haul	"	1				1.00 per T						14.90			14.90
2T Truck	"	1												2.40	2.40
Pick-up	"	1												2.00	2.00
Fencing	"	1												1.71	1.71
Taxes	"	1												4.44	4.44
Tools	"	1												.90	.90
Insurance	"	1												.25	.25
F.I.C.A.	"	1												.09	.09
TOTAL															164.09

Wage: $1.50/hr.
Yield: 14.9 T/acre

Tractor Sizes: 60 H.P., 40 H.P.
Average Size of Farm: 307 Acres

Net Return Per Acre: $104.11
Gross Receipts Per Acre: $268.20

Table 12. Percentage of farmers over 40 acres who used different operations of the Farm Service Division

Operation	Percentage
Drilling	12.5
Fumigant	12.5
Seed	87.0
Herbicide	62.5
Cultivating	25.0
Insecticide	0.0
Fertilizer	12.5
Cash advance	37.5
Sprinkle	0.0

It is shown that a larger proportion of the four smaller size categories utilized drilling service than was true of the over 40 acre size category. The fumigant service was used mainly by the 21-30 acre category and the 31-40 acre category which had percentages of 33.0 and 31.0 respectively. Most farmers in all categories purchased their seed from the Farm Service Division. Approximately 50% of the farmers purchased their herbicide from the sugar company. Little of the insecticide service was purchased.

Thirty-three percent of the farmers in the 21-30 acre category purchased fertilizer from the Farm Service Division while farmers in other size categories did not utilize the service to that extent. The larger farmers used the cash advances to a greater extent than smaller farmers. Thirty-seven percent of the farmers in the over 40 acre category

Table 13. Over 40 acre budget for sugar beets in crop year 1969

			Per Unit			Per Acre									
						Labor		Power		Implement					
OPERATION	Unit	No. Units	Labor Hours	Power Hours	Implement Hours	Hours	Cost	Hours	Cost	Hours	Cost	Services & Materials	Total Variable Cost	Fixed Costs	Total Costs
Plow	Times	1	.53	.53	.53	.53	.80	.53	.54	.53	.27		1.66	1.95	3.61
Dig	"	2	.31	.31	.31	.31	.47	.31	.35	.31	.07		.89	1.00	1.89
Disk															
Harrow	"	2	.18	.18	.18	.18	.27	.18	.11	.18	.10		.48	.32	.80
Level	"	1	.21	.21	.21	.21	.32	.21	.18	.21	.07		.57	.54	1.11
Seed												4.00			4.00
Plant	"	1	.40	.40	.40	.40	.60	.40	.50	.40	.13		1.23	.84	2.07
Cultivate	"	4	2.00	2.00	2.00	2.00	3.00	2.00	1.16	2.00	.16		4.32	3.52	7.84
Weeding	"	1										10.33			10.33
Hand thin.	"	1										20.25			20.25
Fertilize	"	1										20.78			20.78
Manure	"	1													
Irrigate	"	1													21.72
Water	Acres	6										5.00			5.00
Ditch	Times														
Herbicide		1										6.00			6.00
Spray	"	1										1.50			1.50
Harvest	Acres	1	1.00	1.00	1.00	1.00	1.50	1.00	.84	1.00	16.00		18.34	11.71	30.05
Haul	"	1										.50/T			7.25
2T Truck	"	1												2.40	2.40
Pick-up	"	1												2.00	2.00
Fencing	"	1												1.71	1.71
Taxes	"													4.44	4.44
Tools	"													.90	.90
Insurance	"													.25	.25
F.I.C.A.	"													.09	.09
TOTAL															156.00

Wage: $1.50/hr. Tractor Sizes: 80 H.P., 40 H.P. Net Return Per Acre: $105.00
Yield: 14.5 T/acre Average Size of Farm: 467 Acres Gross Receipts Per Acre: $261.00

Table 14. A comparison of farmers in different categories who used various operation of the Farm Service Division

Operation	Size category				
	0-10	11-20	21-30	31-40	over 40
Drilling	28.0	25.0	30.0	20.0	12.5
Fumigant	4.2	10.0	33.0	30.0	12.5
Seed	92.8	83.3	90.0	100.0	87.0
Herbicide	51.4	51.6	50.0	38.0	62.5
Cultivating	22.8	18.3	23.0	30.0	25.0
Insecticide	0.0	1.4	3.0	7.0	0.0
Fertilizer	12.8	21.6	33.0	7.0	12.5
Cash advance	4.4	8.0	20.0	23.0	37.5
Sprinkle	7.1	20.0	10.0	7.0	0.0

utilized this service while only 4.4 percent of the farmers in the 0-10 acre category made use of the cash advance service.

A comparison of costs and returns of the size categories of beet enterprises

Budgets of the five size categories show the average net return per acre of each category. A summary of the different net returns is given in Table 15 for the different size categories.

It is shown that the 0-10 acre category showed the highest return per acre while the 21-30 acre category showed the lowest return per acre on the beet enterprise. The over 40 acre category showed a return per acre almost as high as the 0-10 acre category. Theoretically, the larger enterprises should have a higher return per acre than small

Table 15. Costs and returns of the different size categories of beet enterprises

Size category in acres	Gross returns	Total variable cost	Net return per acre
0-10	$284.40	$177.04	$107.36
11-20	261.00	161.04	99.96
21-30	266.40	176.54	89.44
31-40	268.20	184.01	104.11
over 40	261.00	154.00	105.00
aggregate	268.20	168.58	99.62

enterprises because of the economies of size. In this case this is not so. A number of reasons may be given to explain this situation.

Possible reasons for the high return per acre on small acreages

Although it has not been proven conclusively, the high return per acre on the small acreages can be attributed to the custom services of the Farm Service Division. The smaller farmers are able to forego the cost of the expensive specialized machinery and hire it done on a custom basis. The cost of this machinery is spread over many farms, and thus the farmers are able to increase their net return per acre. The fact that the smaller farmers received a larger average yield per acre can also help account for the high net return per acre. Smaller farmers can care for their crops more attentively because of the smaller acreages and receive higher yields.

The farmers with the smaller enterprises usually used family labor to perform the thinning and hoeing operations. In this way they are

able to lower their costs per acre and also receive a higher yield through the quality work which they are able to perform on the beet enterprise.

The custom services of the Farm Service Division allows the smaller farmer to take advantage of the economies of scale which accrues to larger enterprises yet give the personal attention to their beet enterprise to receive higher yields.

Part III

This section will be discussed in three main parts. First, problems that the farmers encountered with the services of the Farm Service Division will be discussed. Second, a theoretical model of the services of the sugar company will be presented. Then, some general recommendations for improvement in the services will be presented.

Problems with the services

The Farm Service Division was first implemented in 1969. This study was conducted on the 1969 crop year so it should be noted that it was the first year of operation. This fact is pointed out to help explain or account for many of the problems which farmers encountered. Four major problem areas were derived from the interviews. These problems, along with the percentage of farmers who encountered them, are given in Table 16.

The two most important problems with the service are timeliness of operation and incompetent and inexperienced operators.

Sixty-eight percent of the farmers interviewed agreed that in general the service was a good thing and that it benefited both the farmer and the sugar company.

Table 16. Major problems farmers encountered with the services of the Farm Service Division

Problem	Percentage of farmers who encountered the problem
Timeliness of operation poor	56
Incompetent and inexperienced operators	56
Poor application of services	24
Machines not functioning properly	4

Farmers were asked if the service had increased, decreased or had no effect on the size of their beet acreages. Thirty-three percent of the farmers interviewed said it increased their acreage, 57 percent of the farmers said the services had no effect on the beet acreage and the remaining 10 percent of farmers interviewed said their beet acreage had decreased as a result of the service.

Farmers were also asked if the services had affected their total yield per acre. Twenty-four percent of the farmers said the services had increased their yield per acre, and the other 76 percent said that the services had no effect on their total yield per acre.

Theoretical Solution

The perfectly competitive factor market was considered the appropriate model for analyzing the services of the Farm Service Division.

The graph of the applicable theoretical model is shown in Figure 7. In thi model the demand for cultivations per acre is equal to the marginal value product of the factor input. The demand curve is downward sloping because of the diminishing marginal value product of the input service.

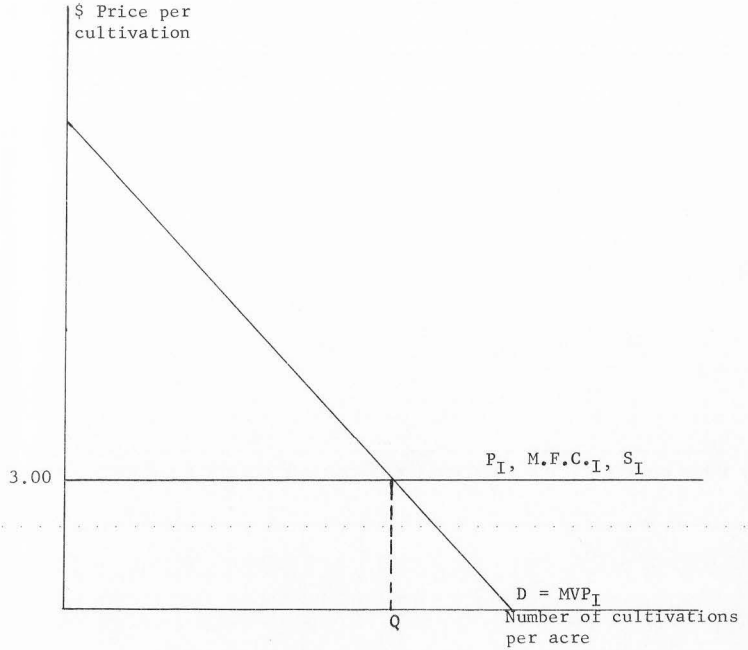

Figure 7. Graph illustrating the most profitable use of the custom cultivation service.

Comparison of the services of the Farmer Service Division with personal ownership of machinery

It was determined that as the best acreage increased the cost of using machinery decreased on a per acre basis. Figure 8 illustrates the different costs of performing the drilling operation. The curve labelled cost of ownership estimates the per acre costs for planting different size acreages of beets as affected by acreage covered. Table 17 shows the estimated cost per acre of drilling beets as the acreage increases.

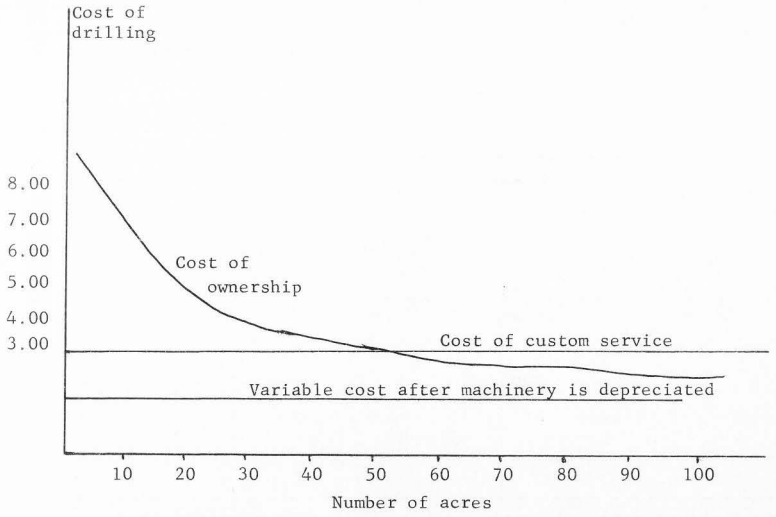

Figure 8. Estimated cost per acre of planting beets by methods of owning equipment and using the services provided by the sugar company.

Table 17. Ownership costs of drilling as affected by acreage size

Number of acres	Cost per acre
10	$7.76
20	4.86
30	3.90
40	3.41
50	3.01
60	2.92
70	2.78
80	2.68
90	2.59
100	2.53

From Figure 8 it is shown that the point where a farmer should own his own equipment instead of purchasing the services of the sugar company is just beyond 50 acres of beets. At this point the cost of owning the machinery becomes less than the cost of the service of the sugar company. In the survey there were many farmers who had fewer than 50 acres of beets yet they owned their own equipment. A number of reasons may be given to explain this phenomenon. This model is also applicable to other services like cultivating and irrigating.

Timeliness of operation. Timeliness of operation is an important factor which the farmer must consider. Many farmers expressed the opinion that it was more profitable for them to incur the extra expense of the machinery and assure that the work is completed on time.

The independent nature of the farmer. The independent nature of the farmer was another reason given for a farmer owning his own equipment. Farmers in Cache County are definitely independent by nature, and many expressed the opinion that they would rather perform the operation than have it done on a custom basis. Many also felt that by doing the operation themselves the work performed was of a better quality.

Previous investment in specialized beet equipment. The fact that farmers already had invested in the specialized equipment before the service was initiated is another important factor in explaining the phenomenon of farmers using their own equipment on small acreages. Some machines could be completely depreciated yet still be in good mechanical condition. In this case the only costs the farmer would incur would be variable costs like gas, oil and labor. This cost curve could be shown on Figure 8 as a horizontal straight line under the cost of the custom services curve. It is horizontal because

variable costs per acre are the same no matter how many acres are covered.

No alternative for labor. Many farmers expressed the opinion that they had no other alternative for their labor so they decided to use it on the beet enterprise. This would be included in the variable cost curve.

SUMMARY

As the agriculture industry is continually changing, there has become a need for further study into the area of factor markets. As the costs of input factors of production increase and the prices of agriculture products remain fairly stable, new methods of increasing the income of the farmer must be found. An alternative to raising the price of the product is to lower the costs of the input factors of production and thus increase the unit profitability of the farmers.

This study examined the input factors of production in Cache County, Utah. Three major types of supply firms were interviewed to determine the extent of the services provided. At the present time, only one machinery dealer in Cache County provides any services; and this is in the form of a rental service. Eighty percent of the fertilizer dealers provide some services to the farmers. This was mainly in the form of a fertilizer spreader at the cost to the farmer of 50 cents per acre. Some custom and delivery services were provided by different fertilizer dealers. Eighty percent of the feed dealers also provided custom services. This was in the form of a feed delivery service.

In this study the operation of the Farm Service Division of the Amalgamated Sugar Company was used as a case study, and budgets for five farm size categories were formulated. The size categories were 0-10 acres, 11-20 acres, 21-30 acres, 31-40 acres and over 40 acres. It was determined from the analysis that the 0-10 acre category showed the highest net return per acre at $107.36. The lowest net return per

acre was $89.44 in the 21-30 acre category. The budgets showed that the services of the Farm Service Division provide some custom operations at a rate low enough to allow the net returns per acre on the small size categories to be as high as on the larger beet enterprises.

Problems that the farmers encountered with the Farm Service Division were obtained. The four major problems were:

1. Poor timeliness of operation.
2. Incompetent and inexperienced operators.
3. Poor application of herbicides.
4. Machinery not functioning properly.

Recommendations for improvements in the services were given.

In the theoretical model, a perfectly competitive factor market was assumed. The equilibrium point was shown to be the point where the marginal value product intersects the supply curve. This point at which the farmer should purchase his own specialized beet equipment was just over 50 acres. The main reasons for a farmer owning specialized beet equipment on smaller acreages were:

1. Better timeliness of operation.
2. Previous investment in specialized equipment.
3. The independent nature of the farmer.
4. No alternative for labor.

CONCLUSIONS AND NEED FOR FURTHER RESEARCH

This study was undertaken to study factor markets in Cache County, Utah.

In compliance with objective number one, it was found that machinery, feed and fertilizer dealers provided a limited amount of input factor services to Cache County farmers. These were mainly in the form of custom and delivery services.

It can be concluded from objective number two that net return per acre on smaller enterprises is as high as with larger enterprises. This cannot be attributed solely to the bundle of input factors of production, but it is a factor which contributes to the profitability.

Farmers interviewed did encounter some problems with the services, but many of these problems stemmed from the fact that it was the first year of operation of many of the services.

There is a need for further study into the area of factor markets. There is a need to examine more closely the rental systems of farm machinery. A more sophisticated method is needed to evaluate custom services such as those provided by the Farm Service Division of the Amalgamated Sugar Company. A similar study should be conducted in a few years to then try to evaluate these types of custom services.

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APPENDIXES

Appendix A

Questionnaire for Dealers

1. Type of company.

2. Do you provide the type of services described? If so, to what extent?

3. At what charge do you render these services?

4. Do you foresee in the future a move toward or away from this type of operation?

5. Approximately what percentage of your total business does the provision of these services constitute?

Appendix B

Economics Department
Sugar Beet Production Survey
Cache County, 1970

Date_____

Enumerator_____

Name_____ Phone_____

Address_____

Size Category_____

A. Total acres operated_____

Acres of sugar beets grown_____

Other crops grown_____

Crop	Acreage	Yield	Price	Value

B. Livestock kept

Kind	Number

1. Are you a full-time farmer_____ or part-time_____?

2. If part-time, what other employment?_____

3. Hours spent on other income source. Per week_____ Per month_____

4. Acres of beets - 1968_____

5. Acres of beets - 1969_____

6. Acres of beets - 1970_____

Operations Performed on Sugar Beet Enterprise

Operation	Month	Wage Rate	Time Spent	Power Involved	Custom Rate
Fall Plowing					
Digging					
Disk					
Harrows					
Float Leveler					
Drilling					
Seed					
Cultivating					
Rotary Hoe					
Hand Thin					
House & Trans.					
Fertilizer					
Fertilize					
Manure					
Irrigation					
Water					
Ditch					
Spray					
Harvest					
Hauling					

Has your beet acreage increased or decreased because of the services being provided by the sugar company?

Has yield per acre increased because of these services?

What problems did you find with the services provided?

Comments:

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