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PRODUCTION CONTROL SYSTEMS FOR BEEF PROCESSING PLANTS

by

ALBERT EARLE LAWRENCE, JR.

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Approved by:

John H. McCoy
Major Professor

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INTRODUCTION

An innovation was introduced in 1964 which was to change the complexion of the beef industry in the years to follow. That innovation, the boxed beef concept, catapulated Iowa Beef Processors, only two years old at that time, to the position of industry leader, surpassing such traditional leaders as Swift, Armour, and Wilson, in just ten years.

Boxed beef has supplanted carcass beef as the standard form in which wholesale beef is traded. The percentage of wholesale beef sold as boxed beef has grown from virtually zero percent to between 65% and 75% in the last seventeen years.[1] As labor restrictions are lfted in more major city markets, this percentage will undoubtedly increase.

Although the boxed beef concept has been lauded for the economies it has brought to the market, it has had its critics. One of the major criticisms is that small and medium sized companies do not have the scale of operation to utilize this technique and have been forced out of business, and that this has led to greater concentration and abuses of monopolistic and monopsonistic power.

The basis of this criticism lies in two areas. First, large beef processing companies can afford to bid up live cattle prices to ensure a supply of live cattle in the numbers needed in their large volume operation. Secondly, large beef processing companies can afford to buy the expertise and technology to operate at low unit costs of production.

Perhaps with more refined management capabilities a significant proportion of the advantages above mentioned can be realized by small and medium sized beef processors. Lowering production costs would allow them to compete mor favorably in the live cattle market. Hammons and Brasingtion(19) noted that more accurate and complete information concerning boxed beef

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[1] Personal communication with Jerry Bohn, National Cattlemen's Association, Denver, Colo., Oct., 1979

production is needed so managers will have an improved basis for their decisions. In seven small and medium sized plants studied they found greatly varying labor efficiencies and percentage yields of product to carcass. In addition, they noted the lack of quality control in plants of this size.

Stigler (20) defined the purpose of a production organization as "... designed to bring passive agents through a series of processes that are linked together vertically." Large beef processing firms have developed very sophisticated systems employing computerized technology to serve this purpose. These systems are designed to accomplish four basic goals: 1) control the inflow of raw material, 2) ensure that proper boning procedures are followed, 3) ensure that the product meets company standards, and 4) account for each piece of product produced.

The purpose of this study will be to estimate the impact of management systems on the profitability of a medium sized beef processor. A system similar to those developed by large beef processing firms will be developed and applied in the following sections.

PRODUCTION CONTROL SYSTEM

Cost And Revenue Functions Versus Production Functions.

Production managers are faced daily with the problem of choosing the "right" production function; i.e., combining resources so as to maximize output at the least cost. This problem is especially acute in the boxed beef industry because of the nature of the manager's input.

In the boxed beef industry a single raw material input, a beef carcass, is disassembled into a number of different products; i.e., primal and subprimal wholesale cuts of beef. A single set of these products is produced at any given time. Many sets of products may be produced during the production day. There are production functions for each set of products, only one of which represents the most efficient combination of resources. Since a typical firm produces over one-hundred different products, it can be seen that choosing the least cost production function is a complex decision.

In practice, production managers seldomly view the production process in terms of a production function. Instead it is viewed in terms of costs and revenues. The common method presently used in small and medium sized firms is to compute the average value of a carcass from the value of the products processed from it. Costs for the four major inputs into the production process; carcasses, labor, packaging materials and overhead, are also computed on a per carcass basis. The difference between the average revenue per carcass and the sum of the average costs per carcass represents the gross profit (loss) per carcass for that company.

Decisions about the production process are based on the profitability of the production process. Simply put, if average revenue exceeds average costs, production is deemed profitable and is increased. If average costs exceed average revenue, production is deemed unprofitable and costs are cut by decreasing production.

The fallacy in basing production decisions on average costs and revenues is that the production manager tends to take the relationships between inputs and outputs as given because they are masked by lumping them into the averages. Profitability is determined solely outside of the production system in the marketplace and the relationships between inputs and outputs tend to be ignored.

Viewing the production process in terms of a production function requires the relationships between inputs and outputs to be specified in the units in which they are used or produced. Normative standards are derived from these specifications by which actual usage of inputs and production of outputs can be compared. Profitability is determined, at least in part, by the degree to which actual usage of inputs and production of outputs coincide with the standard.

What is proposed is a system which contains the information needed by management 1) to specify the least cost production function, and 2) to measure and specify the actual production function after production has occurred. But before the system is described, two fundamental points on which the system is based will be discussed. The first point concerns the relationship of the labor input to the production function. This relationship is necessary to specify the labor input in terms of production time. The second point concerns the relationship of each product to the whole carcass. This relationship is necessary to specify output in terms of the weight of the products.

Relationship Of The Labor Input To The Production Function.

Let us examine the relationship of one of the more important resources of the production manager, labor, to the production function.

Labor is a resource purchased by management in time increments; i.e., by the hour, week, month, etc. For the price of his time the laborer provides a flow of services to management. Within the bounds agreed upon by management and labor, the manager has free use of any part or all of the flow of services from labor. Hence, as Nicholls observed, "... the absolute devotion with which production men view volume of output. It is simply based upon the maximization of the quasi-rents of the purchase inputs" (16).

When labor costs are considered fixed, the profit maximizing manager will make the most use of labors' services by using labor until the marginal physical product of labors' services are zero because output would increase at no added expense to the firm. But two factors prevent management from obtaining the full use of the flow of services from each laborer, at least in the boxed beef industry.

The first factor is that the functions performed by labor are defined by engineering criteria. These criteria are based on the physical characteristics of the raw material input and the production process. This prevents the rate of output of each function from being constant.

The second factor concerns the nature of the output. The output is a food product subject to contamination and perishability. Therefore, there can be no storage of product between functions to allow for the unequal output rates noted above. The rate of output must be equal throughout the process.

These two conditions prevent the manager from fully utilizing the flow of services available to him. He cannot use each and every laborer to his maximum output.

Assumptions About The Labor Input.

Not all of the classic assumptions about inputs for a longrun production function hold for production functions in the shortrun. When some of the inputs become fixed, alterations of the assumptions are necessary to reflect this. The following assumptions concerning the labor input will be made.

1. The flow of labor services is perfectly divisible. Although laborers themselves are not divisible, the flow of services from them is divisible within the range of their limitations.
2. Laborers performing identical functions are homogeneous. Laborers are not homogeneous, but, to be fair, a manager must treat all individuals equally, expecting only an average output in terms of quality and quantity of output. A union contract may define these averages and set the limits agreed upon by both labor and management as mentioned earlier.
3. Each laborer performs only those functions defined by his job description. This assumption concerns the classic assumption of perfect adaptability of resources. Some laborers may be partially adaptable, but very few are fully adaptable; i.e., can perform all the functions in the production process. This assumption restricts all laborers to those functions defined in one job description for the purpose of this discussion.

Labor Use In Theory.

Figure 1 illustrates the use of labor performing two functions on one product. The numbers on the isoquants represent levels of output. The flow of services from laborer 1 performing function 1 is represented by

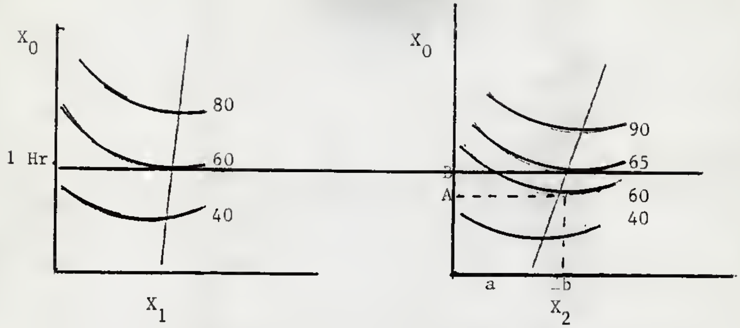

Figure 1: Two Functions Performed On One Product

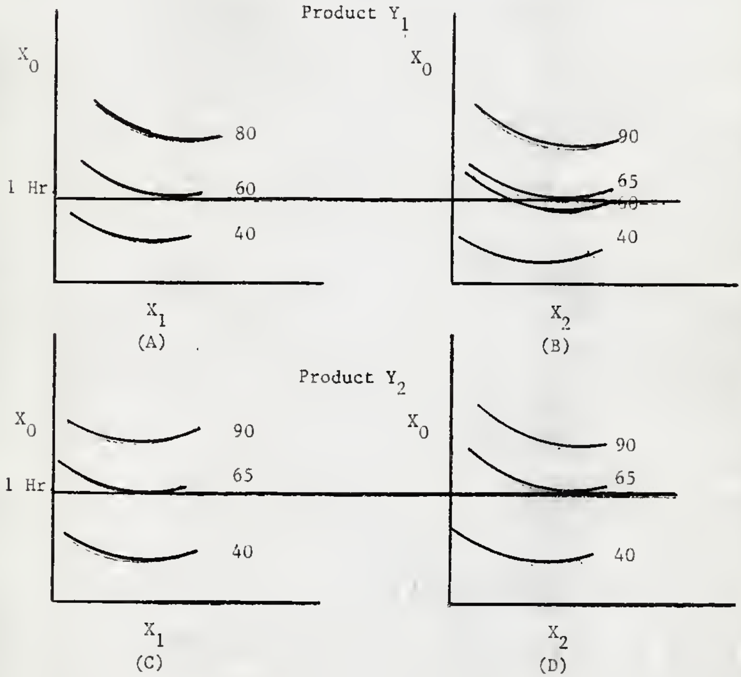

Figure 2: Two Products Fabricated From One Primal Or Subprimal

X_1. The flow of services from laborer 2 performing function 2 is represented by X_2. The amount of labor time purchased by management is represented by X_0. Isocline 1 and isocline 2 pass through the points where the marginal physical product of each laborer's services is zero. A line representing one hour has been drawn tangent to an isoquant at a point where both laborers' marginal physical product is zero in both graphs.

Management's objective is to attain the greatest amount of output in the one hour period. The highest level of output attainable is 60 since all of the flow of services from laborer 1 available is used in one hour. But $X_{2a}X_{2b}$ amount of the flow of services available from laborer 2 cannot be used by management (Fig. 1). The cost to management is AB times the hourly wage rate, yet this is the least cost combination of resources at which this level of output can be attained.

The relationship of inputs and output at various output levels for this product depicts its production function. In the same manner, a least cost production function for all products can be found.

Several different products are processed from the same primal or subprimal of the beef carcass. These products vary sometimes slightly, sometimes to a great degree. The function performed on the primal or subprimal cuts to produce these products also vary although the same laborer may perform the functions. These products compete for labor time.

Figure 2 illustrates the relationship of each of two products, Y_1 and Y_2, which are products from the same primal or subprimal and are produced in seperate time frames.

X_0 represents the amount of labor time purchased by management. X_1 represents the flow of services from laborer 1 while X_2 represents the flow of services from laborer 2. Figures 2A and 2B represent two functions in the production of product Y_1, and Figures 2C and 2D represent two functions in the production of product Y_2. A line is drawn through both sets of graphs representing a time period of one hour.

It can be seen from the previous discussion that the maximum output of Y_1 is 60 and the maximum output of Y_2 is 65. The difference in output is due to the difference in the two functions performed by laborer 1 in the production of Y_1 and the production of Y_2. It should be noted that the functions performed by laborer 2 may or may not be the same. The important fact is that the time required to perform the function(s) is the same in the production of both Y_1 and Y_2.

The processing plant's output is a set of products processed from a beef carcass. Each set of products has a least cost production function, but this production function is not the sum of production functions for the products in the set. In Kutish's words, "The effect of diminishing returns at one stage (for one product) would be transmitted through all stages comprising all the processes to the end of the vertical chain. In this manner, the instantaneous operation of diminishing return at one stage would be transmitted to the output of a large and complex combination lasting a finite period of time" (17).

Figure 3, constructed in the same manner as Figure 1, illustrates the relationship of each of two products, Y_1 and Y_2, to the output of a set of products, Y_1, Y_2, ..., Y_n, which are from different carcass primals or subprimals and are processed in the same time frame.

X_0 represents labor time purchased by management. X_1 represents the flow of services from labor to produce Y_1, and X_2 represents the flow of services to produce Y_2. Again a line is drawn through both graphs representing a time period of one hour.

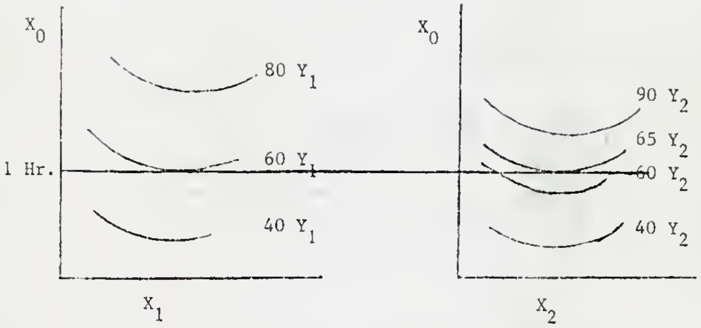

Figure 3: Two Products Fabricated From Different Primals Or Subprimals

The maximum output of Y_1 in one hour is 60 while the maximum output of Y_2 is 65. But the entire flow of services from labor used to produce Y_1 is used so that output of Y_2 is restricted to 60. This restriction of output extends to all products in the product set and further illustrates Kutish's observation.

The production function for each set of products can be constructed over varying levels of output in this manner. The production manager can schedule the sets of products to be produced to take full advantage of the varying rates of output for each product; e.g., he can arrange the production of those products with rate of output of under 60 head per hour together and the production of those products with a rate of over 60 head per hour together.

Application Of The Theory.

The principles discussed above will have broader application if some of the assumptions are relaxed. For instance, the production manager will have knowledge of which laborers are qualified to work in jobs other than their present job. This will give him greater flexibility and allow him to attain greater output in some circumstances.

The manager's knowledge of the abilities of the laborers coupled with his knowledge of the production functions for both individual products and sets of products will help to attain greater ouptut. By placing people with better than average ability in those jobs which limit the level of output attainable, the point at which zero marginal physical product is reached may be extended, thus allowing a higher level of output to be attained.

Finally, the production manager may be able to lower his unit labor costs by arranging production so that some laborers can be dismissed early, or by recommending that certain products not be produced. Examples of these circumstances appear in the analysis section of this paper.

Relationship Of Product Weight To Carcass Weight.

The second point on which the system is based concerns the ability of management to predict the weight of each product from the weight of the carcasses processed. It has long been known that the retail yield; i.e., the percentage of carcass weight comprised of retail products, varies both within and among the different quality grades of beef carcasses. During the 1950's and 1960's, quantification and prediction of the degree of variation became the focus of the efforts of many scientists and reserachers in the areas of animal science and industry and agricultural economics. Their efforts led to the inclusion of yield grade standards into the USDA grading system.

Basis Of Yield Percentages.

Estimates of the degree of variation in retail yield differed from study to study, although much of the variation in estimates was due to variation in the methodology used by the researchers. Kropf and Graf (10) reported a range of 11% among US Choice, Good, and Standard grade steer, heifer, and cow carcasses. Breidenstein (2) reported a range of 19% among US Choice and Good grade steer and heifer carcasses. Brungardt and Bray (4) reported a range of 7.6%, 6.7%, and 6% among steer carcass sides ranging in weight from 260 to 288 poinds, 300 to 325 pounds, and 332 to 360 poinds respectively.

The beef carcass is made up of three major tissue components: muscle, fat, and bone. An increase in the proportion of either fat or bone relative to muscle results in a decrease in retail yield. Researchers found that, of these three tissue components, variation in the proportion of fat is the most important variable accounting for the variation in retail yield. Miller, et. al. (11) found that an increase of 1.1% in fat trim was associated with a 1% decrease in retail yield. Similar results were found by other researchers (3,6,13).

Allen (1) used multiple regression analysis with a combination of fat thickness probes and carcass weight as variables to predict retail yield. He found as high as 96% of the variation in retail yield and fat trim yield could be accounted for by those variables.

The USDA uses a similar equation to determine yield grades for beef carcasses. Under this standard, retail yield varies approximately 5% within a yield grade. [1]

Because of physiological differences, retail yield varies between steer and heifer carcasses. This difference was reported by Breidenstein (2) and Kropf and Graf (10). Kropf and Graf estimated the difference to be approximately 2% of carcass weight.

Koch and Dikeman (9) studied the effect of breed on the yield of the wholesale and retail cuts of the beef carcass. They found the yield of retail product and bone contained in each wholesale cut to be strikingly similar and that changes in the proportion of wholesale cuts of the beef carcass is more likely to result from differences in the amount and distribution of fat than from muscle or bone. Their results agreed with similar studies by Butterfield (5), Carroll and Coniffe (7), Mukhoty and Berg (12), and Charles and Johnson (8).

These studies have established that the most important variable determining retail yield is the amount of fat contained in the beef carcass.

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[1] Personal communication with Dr. Michael Dikeman, Kansas State University. July, 1979.

They have led to and reconfirmed the validity of yield grade standards as a method of predicting retail yield of the beef carcass. And they have established the relative constance of the proportion of the muscle and bone groups from which wholesale and retail products are made across both breed and sex groups.

Based on these conclusions management can accurately predict from the weight of those carcasses processed the weight of each of the products produced. These predicted weights become the standard to which the actual weights of the products from the production process are compared.

An Overview Of The Proposed Production Control System.

As mentioned in the introduction, a production control system must accomplish four goals: 1) control the inflow of raw materials, 2) ensure that proper boning procedures are followed, 3) ensure that the products meet company standards, and 4) account for each piece of product produced. To accomplish these goals, the system must have the capabilities 1) to define a tentative production function based on assumed quantities of output and factors of production before the production process takes place, 2) measure output and usage of the factors of production after the production process has taken place, 3) define the least cost production function or standard based on the output and factors of production produced or used during the production process, and 4) arrange this information in an efficient and comprehensive format for management's use.

More than one characteristic of the products and inputs must be defined and measured for the system to accomplish these goals. Products are quantified by two characteristics, number and weight. Carcasses are also quantified by these same characteristics. Labor is quantified by the number of laborers used in each function and the amount of time they are used. Which characteristic is used is determined by which of the above goals is to be accomplished.

Figure 4 is a diagram of the major components of the production control system and illustrates the relationship of each of the components to the goals of the system.

Control of the inflow of raw materials is accomplished through production scheduling. The sales order defines the numbers of each product to be produced and the number of carcasses from which to produce them. The crewing guide is a matrix relating the number of laborers and the time required to produce the output defined by the sales order. The production schedule provides a tentative production function.

Assurance of proper boning procedures and accounting for each piece of product is accomplished by measuring the numbers and weights of both products and carcasses. The number and weight of carcasses is recorded on the carcass manifest. Product weight is recorded on the production manifest, and the numbers of each of the products are derived from the production manifest and the partial manifest. Actual output is compared to standard output in the piece count report and the yield report.

Labor input is accounted for by time cards and a downtime report. In conjunction with the crewing guide, a standard for labor usage, measured in production time, is defined and compared to actual labor usage in the production time report.

The least cost production function is defined and the actual production function compared to it in these three reports.

The function of quality control is to assure that company standards

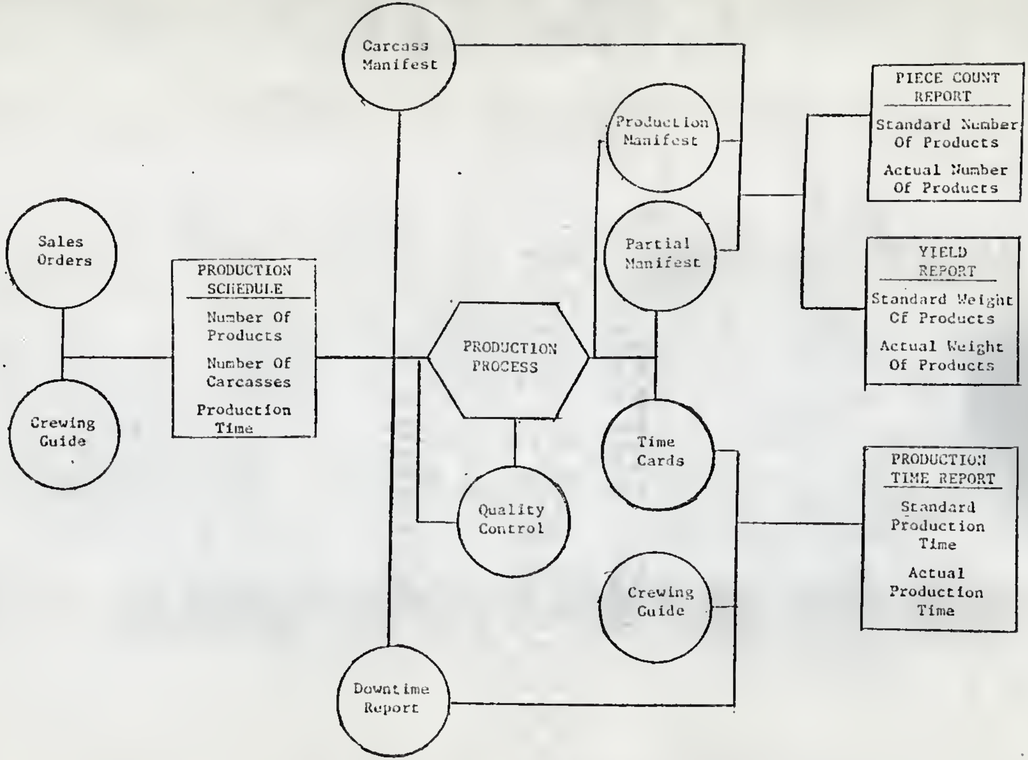

Figure 4: The Production Control System

are met by visual inspection of products. In addition quality control personnel assure that the standard regarding carcass temperature is met by measuring carcass temperatures before they enter the production process.

Production Control Subsystems.

Each of these components can be classified as subsystems; i.e., production scheduling subsystem, yield reporting and production time reporting subsystem. An additional, important component is the quality control subsystem. A discussion of these subsystems and procedures to develop the components in the subsystem follows.

Production Scheduling Subsystem.

The production schedule is a tentative least cost production function relating output as defined by sales orders to the inputs of carcasses and labor. The relationship between all outputs and levels of output within the capacity range of the plant and inputs can be tabulated in matrix form in a crewing guide.

A crewing guide relates the labor input to a level of output for each product in terms of the number of carcasses per hour required to produce the product. There are two forms of a crewing guide. The first form, a crewing guide by function, relates labor requirements for each function performed in the production process to a rate of output in carcasses per hour. This is the basic form of a crewing guide being produced from time-motion studies of each of the functions. The second form of the crewing guide is formulated by adding together all the functions required to produce each product. This form of the crewing guide relates the labor requirements for each product to a rate of output in carcasses per hour and is the form used to produce a production schedule.

Procedure For Constructing A Crewing Guide By Function.

The construction of the crewing guide requires a time-motion study for each function in the production process which is time restricted. Certain functions, such as clean up or fat belt picker, are jobs which rise because of a physical requirement of the process and are not time restricted.

The procedure used to construct the crewing guide is the following:

Step 1. Ascertain the average time required to perform each function. The procedures to accomplish this step vary widely. There are two approaches often used. The first is to obtain the average time required by all laborers performing the function. The second approach is to obtain the average of only those workers most skilled at performing the function. The latter approach has the advantage of setting a higher standard of achievement while the former approach may more accurately reflect the present state of labor's capability.

Timing should begin when the laborer begins the performance of the function and end when the laborer completes the function. For instance, when timing a tenderloin trimmer, the time should begin when the laborer makes his first cut and end when he has made his last cut instead of beginning when he retrieves the tenderloin from the conveyor and ending when he shoves the finished tenderloin back onto the conveyor.

Times should be taken at output rates as close as possible to the laborer's maximum ouptut rate to reflect his maximum ability to perform the function.

Step 2. After ascertaining the time required to perform the function, the rate of output at this time can be computed according to the following formula:

$$\text{Rate Of Output (Pieces Per Hour)} = \frac{\text{3600 Seconds Per Hour}}{\text{Time Required For One Piece (Seconds Per Hour)}}$$

Step 3. The rate of output found above does not allow for other functions necessary to the performance of the job. These include steeling the knife, cleaning the knife, retrieving product from the conveyor, etc. The percentage of time alloted for these functions is a function of the equipment used and facilities available. A commonly used percentage figure is 15%. To obtain the standard rate of output for the function, multiply the figure found in Step 2 by .85.

Step 4. List the various jobs (not differentiated by quality grade or weight range) by primal and subprimal on which the functions of the job are performed. If the standard rate of output varies sugnificantly for functions performed on different products but performed by the same laborer, list the job name followed by the product name. For instance, forty-one 109 ribs per hour can be boned by a rib boner while forty-eight ribeyes or lip-on ribeyes can be boned by a rib boner in the same amount of time. Both "bone rib-109" and "bone rib-lip-on" are listed under the column headed "Job Title" in the crewing guide in the analysis section. The standard output rate for boning ribeyes is understood to be the same as that for lip-on ribeyes.

Procedure For Constructing A Crewing Guide By Product.

A crewing guide by product relates labor requirements for each product to a rate of output in carcasses per hour. Not all labor functions can be directly related to products. Labor functions in the break area are related to a type of product mix while labor functions in the packaging area are related to the total number of products processed.

In this form of the crewing guide, all the functions related to a type of product mix or each of the products are added together to relate the labor requirements to a rate of output in carcasses per hour. An example of a crewing guide by product follows in the analysis section.

Procedure For Constructing A Production Schedule.

The tentative production function takes the form of an hourly schedule of the products to be produced, the number of carcasses to be processed, and the labor requirements for production. Figure 5 is an example of a production schedule.

The production schedule is broken into four major areas corresponding to the four areas in the production process: break, rib/chuck table, loin/round table, and packaging. The carcasses by quality grade and weight range to be processed are recorded in the break section. The products to be produced on each of the tables are recorded in their respective sections. Since labor requirements in the packaging area are not related to either specific products or product mixes, only labor requirements are recorded in the packaging section.

The production day is broken into hourly segments. In the break section of the production schedule, the number of carcasses to be processed in that hour from a quality grade and weight range is recorded in that row. The number of carcasses to be processed in that hour into the products named in the following two sections is recorded in their respective row. A

Figure 5: A Sample Production Schedule

PRODUCTION SCHEDULE

	1st Hour	2nd Hour	3rd Hour	4th Hour	5th Hour	6th Hour
BREAK		(Carcasses Per Hour)				
Good 700	50					
Choice 700	20	50				
Choice 600-700		25	80	80	70	
Choice 600					10	40
		(Number Of Laborers)				
Laborers Required	15	15	15	15	15	11
CHUCK/RIB		(Carcasses Per Hour)				
3 Pc. Chuck	50/20	75	80	80	70	
C-P Chuck					10	40
Lipon Ribeye	50/20	75	80	80	70	
C-P Rib					10	40
Short Rib/Spare Rib Inside/Outside Skirt Brisket	50/20	75	80	80	80	40
		(Number Of Laborers)				
Laborers Required	28	28	28	28	28	21
LOIN/ROUND		(Carcasses Per Hour)				
Tenderloin 180 Loinstrip	50/20	75	80	80	70	
Top Sirloin Ball, Tri, Flap	50/20	20				
Shell Sirloin		55	80	80	70	
C-P Loin					10	40
Flank Steak	70	75	80	80	80	40
I,O,K	50/20	75	80	25		
160 Round				55	70	
C-P Round					10	40
		(Number Of Laborers)				
Laborers Required	27	27	27	24	23	15
PACKAGING		(Number Of Laborers)				
Laborers Required	30	30	30	30	30	30

slash mark between numbers in the same row and column cell signifies that the same products are processed from carcasses of a different quality grade.

The procedure used to construct a production schedule follows.

Step 1. The rate of output; i.e., the number of carcasses which can be processed in an hour, is determined by referring to the crewing guide by product. The rate of output is determined by arranging the products into sets, locating each product in the crewing guide, and following across the row to the highest output rate attainable with the number of laborers assigned to producing that product. It is assumed that all laborers are available. The lowest rate of output attainable for all the products in the set is the maximum rate of output for that set of products.

Step 2. The number of carcasses to be processed are recorded in the respective row and column cells. When quality grade changes occur or when a change in products produced which results in a change in the rate of output attainable occurs, the number of carcasses to be processed is determined by computing the time required to process the first set of carcasses and then computing the number of carcasses which can be processed in the remaining time. For example, a product change in the loin area allows the chain speed, rate of output, to increase from 70 head per hour to 80 head per hour. Twenty carcasses are processed at the lower rate. To determine how many carcasses can be processed during the hour, the amount of time in minutes to process the twenty head is computed.

$$20 \text{ Head} \div \frac{70 \text{ Head Per Hour}}{60 \text{ Minutes Per Hour}} = 17 \text{ Minutes}$$

The time required is 17 minutes which leaves 43 minutes to process carcasses into the next set of products at a rate of output of 80 head per hour.

$$43 \text{ Minutes} \times \frac{80 \text{ Carcasses Per Hour}}{60 \text{ Minutes Per Hour}} = 56 \text{ Head}$$

Rounding to the nearest multiple of five gives an answer of 55 carcasses processed in that hour at the higher rate of output.

A change in the quality grade of carcasses processed occurs in the first hour, but the products produced from both grades of carcasses are produced at a rate of 70 head per hour. Thus, these computations are unnecessary.

Step 3. The number of laborers required for each product is totaled by the area in which they are required. When a product change occurs which results in a change in laborers required, the labor requirements are divided proportionately to the number of carcasses processed into each product set. For example, a product change in the round area during the fourth hour decreases the number of laborers required to process the round primal from eight to four. Twenty-five carcasses are processed into I,O,K (inside round, outside round, and knuckle) and fifty-five carcasses are processed into 160 rounds. The number of laborers is determined thusly:

$$(8 \text{ Laborers} \times \frac{25 \text{ For I,O,K}}{80 \text{ Carcasses}}) + (4 \text{ Laborers} \times \frac{55 \text{ For 160 Round}}{80 \text{ Carcasses}})$$

$$= 5.2 \text{ Laborers}$$

Rounding to the nearest whole unit gives five laborers required to process round primals during that hour.

<u>Yield Reporting And Production Time Reporting Subsystem.</u>

This subsystem is designed to measure output from and inputs into the production process; i.e., the actual production function, determine a standard; i.e., the least cost production function, and compare the two. The system is based on standard yield percentages and labor usage as discussed earlier and information gathered throughout the production day.

Standard Yield Percentages.

To establish standard yield percentages for each product requires periodic cutting tests of randomly selected carcasses. These cutting tests should be supervised by a quality control officer and performed by qualified personnel from each area in the production process, quality control personnel, or a combination of the above personnel. The results of each cutting test should be carefully recorded and retained as historical data for ensuing cutting tests by the quality control division.

A procedure for conducting cutting tests follows.

Step 1. A set of products from each primal of the carcass to be tested should be predetermined.

Step 2. An area located away from the processing area should be prepared for the tests. Sufficient table space and storage capacity for fat trim and bone trim should be available. A recently calibrated scale with a range of 0 to 100 pounds should be available.

Step 3. A set of ten carcasses should be selected from the processing holding cooler. These carcasses should be free of slaughter damage and conform to the average composition of carcasses by sex, yield grade, and weight processed by the plant. These characteristics are recorded for each carcass.

Step 4. Under the supervision of a quality control officer, a carcass is processed into the set of products determined in Step 1. Each product should rigidly comply with company product standards. All fat trim and bone trim should be carefully retained, storing each in a separate storage container.

Step 5. After each carcass has been processed, the individual products, fat trim, and bone trim should be weighed and recorded with the information recorded in Step 3.

Step 6. After all the carcasses have been processed, the quality control officer computes the yield percentage for the individual products, fat trim, bone trim, and cutting loss. Cutting loss is determined by subtracting the total weight of the products, fat trim and bone trim from the cracass weight.

The average of the yield percentages is computed for each product, fat trim, bone trim, and cutting loss after adding the results of this test to those of previous tests. These averages become the standard yield percentages for the products tested.

Data Gathering Components Of The Subsystem.

Computation of daily yield percentages requires the development of a data collection system. This same data is required to account for the product. A description of the elements of this system will be provided, followed by procedures to account for product and compute daily yield percentages.

Standard Pack List. A list of the standard number of pieces of each product packed in a box.

Processing Production Inventory Manifest. A manifest of processing production recorded by product code number and product weight; i.e., box weight less tare weight.

Partial Inventory Manifest. A manifest of the number of pieces of product left at the end of the production shift as a result of not having a standard pack of that product.

Processing Carcass Manifest. A manifest of the carcasses which have passed into processing recorded by carcass identification number, quality grade, yield grade, sex, and weight. A line should be drawn through the manifest to identify product changes within quality grade carcasses.

Yield Worksheet.

Accounting for product and calculation of daily yield percentages in accomplished by collecting the data listed above and employing a worksheet. An example of the yield worksheet appears in the analysis section of this paper. The procedure used is described below.

Step 1. The number of boxes of each product is totaled from the processing production inventory manifest and recorded on the line designated for that product.

Step 2. The weight of each product is totaled from the processing production inventory manifest and recorded on the line designated for that product.

Step 3. The number of pieces of each product on the partial inventory manifest is recorded on the line designated for that product.

Step 4. The number of pieces of each product on the partial inventory manifest for the preceding day is recorded on the line designated for that product.

Step 5. The number of boxes found in Step 1 is multiplied by the standard pack for that product and recorded.

Step 6. The number of pieces in Step 3 is added to the number in Step 5. The number of pieces in Step 4 is subtracted from this figure.

Step 7. The number of pieces and weights of products differing only by weight range in Steps 2 and 6 are totaled and recorded on the line designated for that product group. The number of pieces of product represents the number of pieces of that product group for which there is an accounting.

Step 8. The number of carcass sides processed into a product group is totaled from the processing carcass manifest and recorded on the line designated for that product group. It should be noted that this figure may not coincide with the figure in Step 7. Error could result due to the distance between the manifesting station and the cutting table causing the product change to occur shortly before or after the designated carcass arrives at a particular cutting station. This error is minimized in the following step.

Step 9. The weight of the carcass sides in Step 8 is totaled. The average weight of these carcass sides is entered on the line designated for that product group.

The data necessary to account for product and compute daily yield percentages is now recorded on the worksheet. Further computations are recorded on two reports: the piece count report and the yield report. An explanation of each report and the procedure used to complete the report follows.

Piece Count Report.

The piece count report compares the number of pieces of product for which there is to be an accounting to the number of pieces of product for which there is an accounting. The method used to accomplish this purpose is based upon a characteristic of the products to avoid the error noted in Step 8.

Each primal contains a set of subprimals which are themselves products which have a standard pack. All products processed from a given primal which have a standard pack contain one or more of these subprimals. An example of products from each primal will illustrate this.

Two product sets from the chuck primal are (1) chuck eye, clod, and tender and (2) three piece chuck. The basic units for the chuck primal are the chuck eye (three to a box), chuck clod (four to a box), and chuck tender (six tenders to a bag, five bags to a box). A box of three piece chuck contains a chuck blade (chuck eye and tender), chuck clod, and chuck arm.

Variations of a rib subprimal are processed from the rib primal. Each of these variations has a standard pack.

C-P loin, 189 tenderloin, 180 loinstrip, and boneless tip sirloin are all products with a standard pack processed from the loin primal. The C-P loin contains the other three subprimals which are the basic units of the loin primal.

Similarly, the 160 round, inside round, outside round, and knuckle are all products with a standard pack processed from the round primal. The 160 round contains the remaining three subprimals which comprise the basic units of the round primal.

Not all products have a standard pack with pieces of product as the standard. Most of the thin meat products are bagged with the weight of the bag as the packaging criterion. The number of bags packed in a box constitutes the standard pack. An accurate accounting by piece cannot be made for these products.

To complete the piece count report the following procedure is used.

Step 10. The number of basic unit subprimals contained in the total number of carcass sides processed for that day is recorded on the piece count report.

Step 11. The number of basic unit subprimals are totaled from Step 7 of the worksheet and recorded on the piece count report.

The difference in these two figures can indicate problem areas in the production process as patterns develop from day to day. For instance, if a shortage of pieces of one basic unit subprimal in multiples of a standard pack are noted, the problem may be that the processing production inventory manifester has missed recording some product. If the number of pieces of one of the basic unit subprimals is high while the number of pieces of another of the basic unit subprimals which is packed near the first one is low, the problem may be that a packer has mislabled some boxes. The value of the piece count report is that these problems are detected early and a study of the pattern of the errors can lead to promptly locating and correcting the problem.

Yield Report.

The yield report compares standard yield percentages, weights and product values to those yield percentages, weights, and product values actually attained over the processing shift. Exact measurements of yield percentages are difficult to obtain, but, with certain assumptions made about product and carcass weights, errors in measurements are minimized and the resulting estimates closely approximate actual yield percentages and can prove to be very useful to management.

The assumptions made concerning product and carcass weights concern the error noted in Step 8. This error is due to the addition and subtraction of pieces of product on the partial inventory manifests and the uncertainty of identifying the exact carcass side from which a product change begins. These two phenomena prevent the exact matching of carcass to product.

It will be assumed that the pieces of product derived in Step 7 were processed from the carcass sides derived in Step 8. It will be further assumed that each carcass side is the average carcass side weight calculated in Step 9.

The yield report, and example of which is presented in the analysis section of this paper, contains the following information: standard and actual yield percentages, standard and actual product weights and standard and actual product values. To complete the yield report the following procedure is used.

Step 12. The number of pieces of a product group found in Step 7 is multiplied by the average carcass side weight found in Step 9.

Step 13. The weight of product found in Step 7 is divided by the figure calculated in Step 12. This is the actual yield percentage figure for that product and is recorded next to the standard yield percentage on the yield report.

Step 14. The standard yield percentage is multiplied by the figure found in Step 12. This figure is the standard product weight for that product. This figure and the product weight found in Step 7 are recorded on the yield report.

Step 15. The two weights found in Step 14 are multiplied by the product price for that day to arrive at the standard and actual product values for the product. These figures are recorded on the yield report.

Step 16. The standard and actual weights and values are added for all products from each primal. The difference between the standard and actual figures is recorded on the yield report.

Step 17. The standard and actual weights and values are totaled across all primals. The difference between the standard and actual figures is recorded.

The manager will find the yield report to be one of his best tools for detecting problem areas and for evaluating the performance of his line supervisors.

Variation from the standard yield percentages is an indication that the product persistently fails to meet company standards. A study of the pattern of variation can lead to early detection and correction of a problem. For example, if the manager notices that the yield on loin strips is high while the yield on top sirloins is low, he has an indication that the shell saw operator, who makes the saw cut seperating the short loin and the tip loin, may be making his saw cut too much to the tip loin side. Observation in this area may or may not verify this hypothesis. If this proves not to be the cause of the variation in yield, he can observe the loin strip and top sirloin boners and trimmers. In either case, the manager has detected a problem area and he can move early to correct the problem.

The problems which can be detected with the yield report are problems concerning how the carcass is seperated and the products boned and trimmed. The performance of these functions is the responsibility of the line supervisers. Thus, the manager can evaluate the performance of his line supervisors using the yield report as an objective evaluation instrument.

Production Time Report.

The standard length of production time was determined in the production schedule. Occurances during the production period may lengthen or shorten the length of production time as determined in the production schedule. Deviations from the standard and reasons for these deviations are presented in the production time report.

The two most common sources of deviation in production time are absenteeism and downtime. Time cards reveal data concerning absenteeism. Downtime is recorded as part of the processing carcass manifest as this is the station at which the chain is stopped and started.

By identifying the problems which cause lengthening of production time, management can devise means of circumventing or eliminationg these problems. A discussion of downtime follows in the analysis section.

Quality Control.

When the responsibility for the quantity of product produced and the quality of that product lie in the same hands, a conflict of interest is produced. Too often the demands for quantity are met at the expense of quality and vice versa. For this reason the responsibilities should be separated so that each purpose can be adequately served.

Quality control of the product affects revenue in more ways than just price. Product which consistently meets the standards advertised by the company will keep and attract customers. In addition, costly rejection of product by customers can be avoided. Finally, a good company reputation can be enhanced by a sound quality control program.

The quality control personnel perform many functions. Basically, they check each product for proper fat cover, cutting damage, etc. They also ensure that the carcasses to be processed are of the proper temperature to avoid processing "hot meat". They conduct cutting tests to establish yield percentages. And they are available to management to collect and analyze information for any special projects which may arise.

A quality control system must be designed to meet the special needs of each plant. The number of quality control personnel depends on the number of cutting tables, their size, the product mix, etc. The range of their functions also depends to a great extent on these factors. A quality control system for the case plant will be developed and its impact on the plant operations will be estimated in the anaylsis section of this paper.

METHODOLOGY

The genesis of this study was a request by a medium size Midwestern packing plant to observe, analyse, define, and resolve some of the problems the firm had encountered with its beef processing operations. The company provided the following information for a six week period from June 19 through July 29, 1978.

Inventory Records. These records were maintained on a daily basis and contain the following information:

a. The number of boxes of each product produced during a production day.
b. The total weight of each product produced.
c. The number of boxes of each product shipped during the working day.
d. The total weight of each product shipped.
e. The number of boxes of each product remaining in inventory at the close of the working day.
f. The total weight of each product remaining in inventory.
g. The price of each product on the day the products were produced.

Weekly Production Report. This report summarized the following information on a weekly basis:

a. The number of carcasses processed each day.
b. The number of absentees for each day.
c. The total hours of production time for each day.
d. The amount of downtime and the reason for the downtime for each day.

Weekly Carcass Report. This report contained the following information:

a. The total number of carcasses processed during each week.
b. The total weight of carcasses processed during each week.
c. The total cost of carcasses processed after adjustments for slaughter damage for each week.

Schedule Of Pay Grades. This schedule contained the following:

a. Job titles.

b. Job pay grades.

c. Hourly wage rate for each pay grade.

The company also provided from their accounting records variable costs, fixed costs, average packaging cost, standard yield percentages and standard pack for each product.

In addition to these accounting records, the company's operations were observed for one week. During this time, a study of presently existing information gathering and control systems was made. Time-motion studies were initiated for many of the processing production functions.

Daily production, sales, expenses, yield percentages, and downtime figures were reconstructed from these records to analyze the company's processing operations. These figures were tabulated on a weekly basis and represent the actual production functions for the firm in terms of output in products and the inputs of labor and carcasses. From them, an operating income statement for the six week period was produced and is presented.

An analysis of the production process and the existing managerial production control system is then presented followed by the application of the system outlined in the introduction section. Standard production functions are estimated and presented in tabular form as well as a revised operating income statement for the period which is an estimate of possible earning capability.

Internal rate of return; i.e., the return to capital investment without regard to the financial structure of the investment, is one criterion by which profitability is gauged. Certain information, such as plant and equipment costs and credit policy, essential to the calculation of the internal rate of return were not made available. Therefore, the criterion used is the internal rate of return on the <u>additional</u> capital investment as computed using a program that does not rely on total capital investment costs to estimate internal rate of return.[1]

Finally, an estimate of the sensitivity of the internal rate of return on the <u>additional</u> capital investment to variations in the estimates of the impact of this proposed production control system is presented and discussed.

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[1] This program was developed by Dr. Richard Phillips, Kansas State University.

CASE STUDY AND ANALYSIS

Description Of The Production Process.

The case company is a medium sized beef processing plant designed to produce sixty carcasses per hour into an HRI (hotel, restaurant, and institutional) product mix. The company also produces a type of product mix for retail outlets as well as beef primals.

Figure 6 depicts the configuration of production processing personnel for an HRI product mix. Table 1 lists job descriptions, hourly wage rates, and total hourly wages. A number in Figure 6 corresponds to the number in Table 1 under the domumn heading Job No.

The company employs 134 people in processing and material handling. Four line supervisors and a production superintendent manage the processing operations.

The processing holding cooler has a seventy-five carcass capacity. Carcasses, which are hung on trolleys, are pushed onto the break chain where they pass the carcass manifesting station. Here they are manifested according to identification number, quality grade, yield grade, sex, weight, and slaughter damage if any. They are conveyed through the break area where the carcasses are separated into primals and subprimals.

These primals and subprimals are directed to one of two cutting tables; the chuck, rib, chuck clod, and brisket to table one, the loin, fround, flank, and knuckle to table two. There they are further processed into various wholesale cuts.

From the cutting tables the wholesale cuts move into the packaging area where they are palced in plastic barrier bags, vaccuum packaged, and boxed. Tha boxed product is placed on a conveyor and passes the processing production manifester who manifests them according to product code and product weight. They then move into the box storage cooler

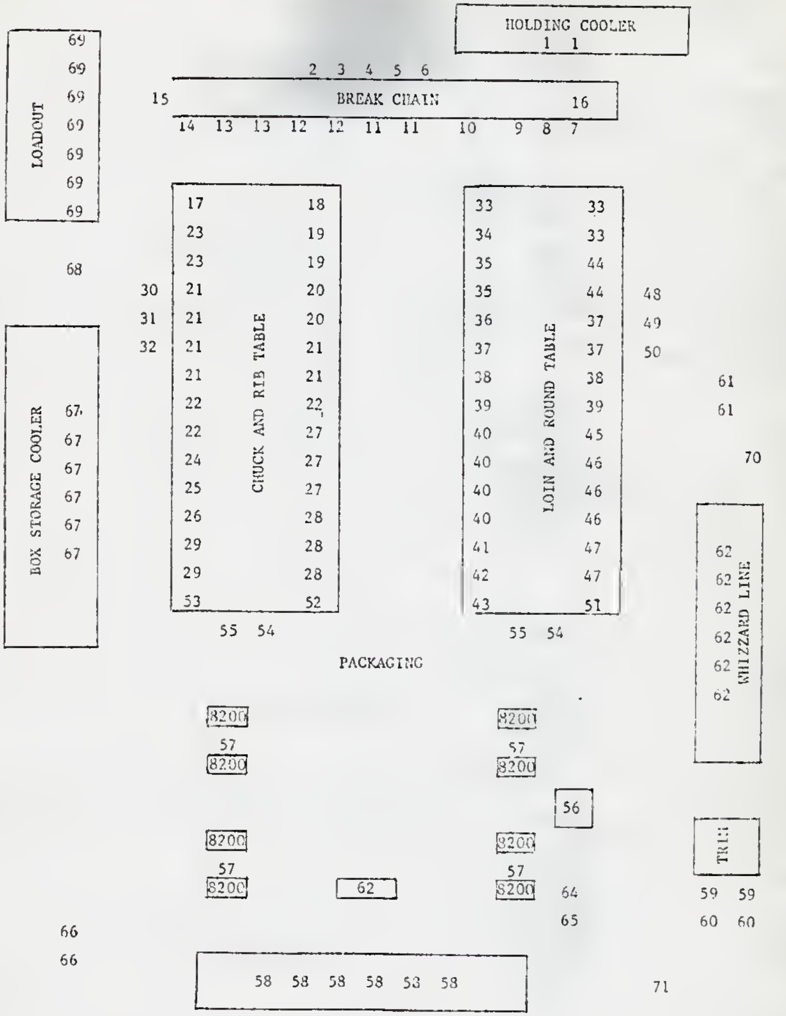

Figure 6: Processing Plant Configuration

Table 1: Production Processing Job Descriptions, Number Of Jobs, And Wage Rates

Job No.	Job Description	No. Of Jobs	Hourly Wage Rate	Total Hourly Wages
BREAK:				
1	Push Carcasses	2	$5.96	$11.92
2	Mark Forequarter	1	6.36	6.36
3	Saw Rib & Brisket	1	6.46	6.46
4	Manifest Carcass	1	6.16	6.16
5	Hangoff Forequarter	1	5.96	5.96
6	Trim	1	5.96	5.96
7	Knife Round	1	6.56	6.56
8	Drop Flank & Loin	1	6.36	6.36
9	Drop Knuckle	1	6.36	6.36
10	Drop Round	1	6.36	6.36
11	Pull Clod	1	6.36	12.72
12	Pull Blade Bone	2	6.26	12.52
13	Drop Brisket/ Bone Foreshank	2	6.36	12.72
14	Drop Wing/Chuck	1	6.36	6.36
15	Pop Trolley	1	5.86	5.86
16	Leadman	1	6.66	6.66
	Break Total	20		125.30
CHUCK/RIB TABLE				
17	Saw Chuck	1	6.36	6.36
18	Bone Brisket	1	6.31	6.31
19	Trim Brisket	2	6.26	12.52
20	Bone Chuck Arm	2	6.36	12.72
21	Bone Chuck	6	6.36	38.16
22	Trim Chuck Roll	3	6.26	18.78
23	Bone Plate	2	6.31	12.62
24	Trim Outside Skirt	1	6.16	6.16
25	Trim Inside Skirt	1	6.16	6.16
26	Saw & Trim Short Rib	2	6.26	6.26
27	Bone Rib	3	6.46	19.38
28	Clean White Bones	3	6.31	18.93
29	Trim Blade Meat	2	6.26	12.52
30	Cleanup	1	5.86	5.86
31	Fat Belt	1	5.86	5.86
32	Leadman	1	6.66	6.66
	Chuck/Rib Total	31		195.26

Job No.	Job Description	No. Of Jobs	Hourly Wage Rate	Total Hourly Wages
LOIN/ROUND TABLE				
33	Pull Tenderloin	3	6.56	18.68
34	Saw Loin	1	6.36	6.36
35	Trim Tenderloin	2	6.36	12.72
36	Saw Loin Chine Bone	1	6.36	6.36
37	Bone Loin Strip	3	6.46	19.38
38	Trim Lointail	2	6.31	12.62
39	Trim Loinstrip	2	6.26	12.52
40	Bone Round	4	6.36	25.44
41	Trim Inside Round	1	6.31	6.31
42	Trim Outside Round	1	6.31	6.31
43	Trim Knuckle	1	6.31	6.31
44	Bone Sirloin Butt	2	6.46	12.92
45	Trim Top Sirloin	1	6.31	6.31
46	Separate Bottom Sirloin	2	6.46	12.92
47	Pull & Trim Flank Steak	2	6.31	12.62
48	Cleanup	1	5.86	5.86
49	Fat Belt	1	5.86	5.86
50	Leadman	1	6.66	6.66
	Loin/Round Total	31		197.16
PACKAGING				
51	Bag Flank Steak/ Hanging Tender	1	5.86	5.86
52	Bag Blade Meat	2	5.86	5.86
53	Zipnet 109/Chuck Roll	1	5.86	5.86
54	Pullup	2	5.86	11.72
55	Bag Product	2	5.86	11.72
56	Bag Thin Meats	2	5.86	11.72
57	8200 Operators	4	5.86	23.44
58	Box Product	6	5.86	35.16
59	Box Rrim	2	5.86	11.72
60	Strap & Stack Trim	2	5.86	11.72
61	Bulk Boxes	2	5.86	11.72
62	Whizzard Knife	6	5.96	35.96
63	Rework Refects	1	5.86	5.86
64	Leadman	1	6.06	6.06
	Packaging Total	33		194.38

Table 1: (Cont.)

Job No.	Job Description	No. Of Jobs	Hourly Wage Rate	Total Hourly Wages
MATERIAL HANDLING				
65	Setup/Supplies	1	5.86	5.86
66	Box Manifest	2	6.16	12.32
67	Loadout Manifest	1	6.16	6.16
68	Loadout	7	6.06	42.42
69	Bone Truck	2	5.86	5.86
70	Box Maker	1	6.06	6.06
	Material Handling Total	19		110.04
	Processing Total	134		827.14

where they are retained for shipment.

Orders are filled by placing the boxes of product on a conveyor which moves them by the material handling shipping manifester who manifests them according to product code and product weight. The boxes are conveyed to the loadout crew where they are loaded into refrigerated trucks for shipment to the customer.

Observations On The Production Process.

The processing division processes only yield grades 1 and 2 carcasses of prime, choice, or good quality grade. These carcasses are procured from the case company's slaughter division located at the same plant site. Carcasses are transferred from the slaughter division's drip cooler to the processing division's holding cooler via the grading chain. Carcasses are graded by a USDA grading inspector as they are removed from the drip cooler so that, in the drip cooler, carcasses are indistinguishable as to quality and gield grade. Furthermore, not all carcasses in the drip cooler are suitable for processing. This means that carcasses must be separated into those designated for processing and those designated for sale as carcasses as they are transferred out of the drip cooler along the grading chain.

Carcasses of only one quality grade can be processed at a time. Therefore, those carcasses designated for processing must be separated according to quality grade. The processing holding cooler is used to separate carcasses of different quality grades. As carcasses of the other quality grades are stored in the holding cooler.

Processing production is halted during a changeover; i.e., changing from carcasses of one quality grade to carcasses of another quality grade, in order to avoid boxing products of one quality grade with products of another. To be efficient the length of the production halt should be no more than the length of time required for the last carcass in one set of carcasses to pass through the system before the first carcass of the next set enters the system, about 2.5 minutes in this plant.

The method above described for separating carcasses according to quality grade resulted in frequent changeovers as the holding cooler capacity was filled with carcasses of a quality grade not presently being processed.

Another consequence of this method was that three of the four line supervisors spent practically all of their time procuring carcasses from the grading chain in an effort to process as many carcasses of one quality grade as possible at a time. In addition, changeover times were considerably longer than the desired minimum.

Another consequence was that it was not possible to predetermine a schedule of sets of products to be produced together which would make the fullest use of the labor input. Consequently labor often was underemployed. Coupled with the absence of the supervisory staff from the cutting tables, bad work habits had developed among laborers and the quality of output had suffered.

Tension was observed between the sales department and the processing production supervisor which arose from what seemed to be a lack of understanding of the production process by the sales manager. This was frequently manifested by incompatabilities between sales orders for production and the ability to produce what was ordered. The high number of primal products ordered, on which processing production personnel perform few or no functions, added to the problem of underemployment mentioned above. Changes in sales orders during a production day were frequent and often led to misunderstandings.

There was obvious frustration expressed at all levels of management. This frustration was due to the inability to afix the responsibility for operating losses by the plant manager and the production superintendent, and the inability to control the flow of production by line supervisors.

Present Managerial Control System.

The case company had developed a cost accounting system as the source of management information. This system is used to determine costs in four major areas of the production process: carcasses, labor, packaging material, and overhead. It is also used to determine the gross value of the carvasses which have been processed; i.e., the value of a carcass in the form of the wholesale cuts into which it has been processed. These costs and returns are determined on a per head basis and are determined from the following data sources.

1. Processing Production Manifest. This manifest contains the number of boxes of each product and the product weight of each product produced during the production day.
2. Processing Carcass Manifest. This manifest contains the carcass identification number, quality grade, yield grade, sex, weight, and slaughter damage if any.
3. Accounting Records. Wages, salaries, costs of packaging materials, and overhead expenses all come from accounting records.

The gross value of a processed carvass is computed daily and presented to management in the Fabrication Yield Report. The procedure followed to calculate the figures in this report follows.

1. The value and weight of those carcasses processed during the production day are determined from the Processing Carcass Manifest.

2. The weight of each product processed during the production day is determined from the Processing Production Manifest.
3. The weight of each product is divided by the total weight of carcasses found in Step 1 to determine the percentage of carcass weight processed into each product.
4. This percentage figure is multiplied by the price of that product on that day.
5. The figures found in Step 4 are totaled over all the products produced during the production day. The sum represents the average value of carcasses as processed.

Costs for each of the four areas of production are also represented on a per carcass basis and cover weekly or monthly periods. This is accomplished by dividing labor costs, packaging material cost, and overhead cost for the period by the number of carcasses processed during the period. Total carcass cost is divided by the number of carcasses processed to obtain average cost per carcass.

This cost and revenue information is valuable ot management in that it is a measurement of the results of production processing. But this information provides no insights into the processes by which these results were obtained. In particular, this information cannot be used to accomplish the following managerial functions.

1. Assure and refulate the flow of carcasses through the production process.
2. Organize the labor force so as to minimize the unit cost of labor.
3. Assure proper disassembly of carcasses into the various primal and subprimal products in compliance with company standards.

4. Account for the various products in relation to the total carcass.
5. Provide objective standards by which to measure the performance of the supervisory staff.

The following managerial control system, based on the principles developed in the introduction section of this paper, is designed to accomplish these objectives.

Operating Income Statement.

Sales

Table 2 contains the computations of weekly sales figures. Value of production is the total value of the products found in Appendix Table A. The values of week ending inventories were totaled and presented in Table 2. This figure represents the value of inventory in the box storage cooler at the end of each week's production. The value of partial inventories are from Appendix Table B and represent the value of partial boxes of product at the end of each week's production.

Sales are assumed to be made on a cash basis. The value of each week's production is adjusted by adding the value of the previous week's production sold in the present week and subtracting the value of the present week's production sold in the following week.

Wages And Salaries

Labor costs are presented in Table 3. These costs are separated into labor wage costs and management salary cost.

Labor hours were computed by multiplying total production hours by the total number of laborers employed. Daily absentee hours were totaled for the week and subtracted from the above figure.

Hourly labor cost, computed from Table 1, was found to be $6.17 per hour. That figure was multiplied by the number of regular man-hours

Table 2: Computation Of Sales

Week Ending	6-23		7-1	
Value Of Production		$1,374,942.64		$1,116,897.93
Plus Inventory (Previous Week)	$822,379.98		$849,499.00	
Less Inventory (Present Week)	849,499.00		922,693.67	
		(26,119.03)		(73,104.67)
Plus Value Of Partials (Previous Week)	3,462.99		3,490.48	
Less Value Of Partials (Present Week)	3,490.48		3,004.02	
		(27.49)		486.46
Sales		1,348,796.12		1,044,279.72
Week Ending	7-8		7-15	
Value Of Production		$1,282,116.48		$2,144,263.56
Plus Inventory (Previous Week)	$922,693.67		$816,141.06	
Less Inventory (Present Week)	826,141.06		1,053,486.27	
		106,463.61		(236,344.21)
Plus Value Of Partials (Previous Week)	3,004.02		3,380.91	
Less Value Of Partials (Present Week)	3,380.91		3,972.72	
		(376.89)		(591.81)
Sales		1,388,202.20		1,906,327.54
Week Ending	7-22		7-29	
Value Of Production		$1,846,832.36		$1,627,271.65
Plus Inventory (Previous Week)	$1,053,485.27		$970,378.31	
Less Inventory (Present Week)	970,378.31		799,761.38	
		83,106.96		170,616.93
Plus Value Of Partials (Previous Week)	3,972.72		3,455.52	
Less Value Of Partials (Present Week)	3,455.52		3,474.31	
		517.20		(18.79)
Sales		1,930,456.52		1,797,869.79

Table 3: Actual Production Hours, Wages, And Salaries

Week Ending	6-23	7-1	7-8	7-15	7-22	7-29
Regular Production Hours	37.0	33.2	39.9*	40.0	37.0	36.3
Overtime Production Hours	0.0	1.7	4.0	15.0	12.8	8.5
Total Production Hours	37.0	34.9	43.9	55.0	49.8	44.9
Regular Man-hours	4,958.0	4,448.8	5,346.6	5,360.0	5,360.0	5,360.0
Less Absentee Man-hours	278.6	160.6	175.4	120.0	165.8	168.3
Net Regular Man-hours	4,679.4	4,288.2	5,171.2	5,240.0	5,194.2	5,191.7
Overtime Man-hours	0.0	227.8	536.0	2,010.0	1.313.2	656.6
Less Absentee Man-hours	0.0	8.5	24.0	78.0	86.7	79.8
Net Overtime Man-hours	0.0	219.3	512.0	1,932.0	1,226.5	576.8
Regular Hour Labor Cost	$38,871.90	$26,458.19	$31,906.30	$32,330.80	$32,048.21	$32,032.79
Overtime Hour Labor Cost	0.0	2,023.04	4,723.20	17,822.70	11,314.46	5,320.98
Net Labor Cost	28,871.90	28,481.23	36,629.50	50,153.50	43,362.67	37,353.77
Cost Of Benefits (30% of Labor Cost)	8,661.57	8,544.37	10,988.85	15,046.05	13,008.80	11,206.13
Total Labor Wages	$37,533.47	$37,025.60	$46,180.99	$65,199.55	$56,371.47	$48,559.90
Management Salaries	$1,750.00	$1,750.00	$1,750.00	$1,750.00	$1,750.00	$1,750.00
Cost Of Benefits (30% Of Salaries)	525.00	525.00	525.00	525.00	525.00	525.00
Total Salaries	$2,275.00	$2,275.00	$2,275.00	$2,275.00	$2,275.00	$2,275.00

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* Includes 8 hours holiday pay.

for that week. Overtime labor cost was computed by multiplying $6.17 by 1.5 and multiplying this figure; i.e., $9.225, by the number of overtime man-hours for that week.

The company estimates the total of F.I.C.A. taxes, Unemployment Compensation Insurance, and benefits to be thirty percent of wages and salaries. That amount was added to the total of the two figures above to arrive at total labor wages.

The salaries of the four line supervisors and the plant superintendent amounted to $1750.00 per week. Thirty percent was added to that figure to arrive at total weekly salary expense.

Cost Of Materials.

The cost of carcasses for this period was furnished by the case company. This figure was $8,840,349.00.

The case company estimates its packaging material cost to be $13.50 per head. Multiplying the number of carcasses processed during the six week period under study by that figure gave a packaging material cost of $213,603.76.

Variable Expenses.

The case company estimates its average cost of power, water, maintenance, etc. to be $20,326.00 per week.

Returned Product Expense.

Twice during this six week period, a truck load of product, having been rejected by a retail customer, was returned to the case company because the meat was "hot"; i.e., carcass temperature was above 50° F. at the time the carcasses were processed and packaged. The product was cooled and repackaged at the plant, then shipped back to the customer. The case company did not lose either of the sales. The cost to the company for packaging material, labor time and transportation was $4,817.75 and $4,627.09 respectively.

Table 4: Actual Operating Income Statement

June 23 Through July 29, 1978

OPERATING REVENUE		
Sales		$9,415,931.89
OPERATING EXPENSE		
Cost Of Materials:		
Carcass Expense	$8,840,349.00	
Packaging Expense	273,603.76	
Wages And Salaries:		
Wages	290,870.98	
Salaries	13,650.00	
Other Variable Expenses:	121,956.00	
Returned Product	9,444.84	
Total		9,489,874.58
NET OPERATING INCOME		($73,942.69)

The operating income statement presented in Table 4 reveals an operating loss for the six week period from June 19 through July 29, 1978 of $73,942.69. To verify this figure, total carcass weight for the six week period was multiplied by $0.06, the average processing cost per pound of carcass as estimated by the case company. This figure was computed to be $70,414.19, a difference of less than 5%.

Production Scheduling -- The Standard For Production Time.

The production scheduling subsystem consists of two components: a crewing guide and a production schedule. The subsystem is designed as a method for choosing the most efficient production function for any given set of beef products to be produced.

An essential element of a production scheduling system is a holding cooler with a capacity great enough to store one day's production of carcasses. The costs of a holding cooler will be discussed in a later section so that the impact of the production scheduling subsystem can more easily be seen.

Crewing Guide By Function.

Table 5 is a crewing guide developed for the case company. It shows the number of laborers required to perform each function at various chain speeds. The table is divided according to the major work areas in the production process itself: i.e., break, chuck and rib table, loin and round table, and packaging. It does not cover the holding cooler area or the material handling area since the work load in these areas is not determined, for the most part, by the chain speed.

The figures in Table 5 were derived from two sources: 1) time specifications were taken at the plant during the observation period, and 2) time specifications wer obtained from a list of boning times distributed by Cry-O-Vac Corp.(21). Those figures with an asterik in the column headed Std. Pcs. Per Hr. (standard pieces per hour) were derived from Cry-O-Vac Corp.; the other figures were derived from times taken at the plant.

Labor times at the plant were observed over a two day period. In order to include a fatigue factor, ten observations were made for each of the functions, five in the morning and five in the afternoon.

Table 5: Crewing Guide By Function

Job Title	Std. Pcs. Per Hour	Chain Speed (Carcasses Per Hour)									
		45	50	55	60	65	70	75	80	85	90
		(Number Of Laborers)									
BREAK:											
Forequarter Marker	340*	1	1	1	1	1	1	1	1	1	1
Rib/Brisket Saw	196*	1	1	1	1	1	1	1	1	1	1
Hangoff	186	1	1	1	1	1	1	1	1	1	1
Trim	S.F.	1	1	1	1	1	1	1	1	1	1
Round Splitter	340*	1	1	1	1	1	1	1	1	1	1
Flank/Loin Dropper	235	1	1	1	1	1	1	1	1	1	1
Knuckle Dropper	161	1	1	1	1	1	1	1	1	2	2
Round Dropper	204*	1	1	1	1	1	1	1	1	1	1
Clod Puller	90	1	2	2	2	2	2	2	2	2	2
Blade Bone Puller	117	1	1	1	2	2	2	2	2	2	2
Brisket Dropper	113	1	1	1	2	2	2	2	2	2	2
Wing/Chuck Dropper	S.F.	1	1	1	1	1	1	1	1	1	1
CHUCK/RIB TABLE											
Chuck/Rib Saw	S.F.	1	1	1	1	1	1	1	1	1	1
Chuck Blade Boner	21	5	5	6	6	7	7	7	7	8	9
Chuck Arm Boner	62	2	2	2	2	3	3	3	3	3	3
Chuck Roll Trimmer	47	2	3	3	3	3	3	4	4	4	4
C-P Chuck Blade Trimmer	117	1	1	1	2	2	2	2	2	2	2
C-P Chuck Arm Trimmer	222	1	1	1	1	1	1	1	1	1	1
C-P Chuck Blade Boneguard	S.F.	2	2	2	2	2	2	2	2	2	2
C-P Chuck Arm Boneguard	S.F.	2	2	2	2	2	2	2	2	2	2
Rib Boner- 109	41	3	3	3	3	4	4	4	4	5	5
Rib Boner- Lipon	48	2	3	3	3	3	4	4	4	4	5
Rib Bone Cleaner/ Blade Meat Trim	88	2	2	2	2	2	2	2	2	2	3
C-P Rib Trimmer	331	1	1	1	1	1	1	1	1	1	1
C-P Rib Boneguard	S.F.	1	1	1	1	1	1	1	1	1	1
Short Rib Saw	S.F.	1	1	1	1	1	1	1	1	1	1
Plate Boner	111	1	1	1	2	2	2	2	2	2	2
Outside Skirt Trimmer	288	1	1	1	1	1	1	1	1	1	1
Inside Skirt Trimmer	282	1	1	1	1	1	1	1	1	1	1

Table 5 (Cont.)

Job Title	Std. Pcs. Per Hour	Chain Speed (Carcasses Per Hour)									
		45	50	55	60	65	70	75	80	85	90
		(Number Of Laborers)									
CHUCK/RIB TABLE (CONT.)											
White Bone Cleaner	56	2	2	2	3	3	3	3	3	4	4
Brisket Boner	211	1	1	1	1	1	1	1	1	1	1
Brisket Trimmer	94	2	2	2	2	2	2	2	2	2	2
LOIN/ROUND TABLE											
Tenderloin Puller	66*	2	2	2	2	2	3	3	3	3	3
Tenderloin Trimmer	72	2	2	2	2	2	2	3	3	3	3
Loin Saw	S.F.	1	1	1	1	1	1	1	1	1	1
Shell Saw	S.F.	1	1	1	1	1	1	1	1	1	1
Loinstrip Boner	59	2	2	2	3	3	3	3	3	3	4
Loinstrip Trimmer	106	1	1	2	2	2	2	2	2	2	2
Loin Tail Trimmer	79	2	2	2	2	2	2	2	2	3	3
Sirloin Butt Boner	90*	1	2	2	2	2	2	2	2	2	2
Sirloin Butt Trimmer	200	1	1	1	1	1	1	1	1	1	1
Bottom Butt Separator	72*	2	2	2	2	2	2	3	3	3	3
C-P Loin Trimmer	36	3	3	4	4	4	4	5	5	5	5
C-P Loin Boneguard	S.F.2	2	2	2	2	2	2	2	2	2	2
Flank Steak Puller	119	1	1	1	2	2	2	2	2	2	2
Round Boner	35	3	3	4	4	4	4	5	5	5	6
Inside Round Trimmer	180*	1	1	1	1	1	1	1	1	1	1
Outside Round Trimmer	180*	1	1	1	1	1	1	1	1	1	1
Knuckle Trimmer	180*	1	1	1	1	1	1	1	1	1	1
C-P Round Boner	88	2	2	2	2	2	2	2	2	2	3
C-P Round Trimmer	202	1	1	1	1	1	1	1	1	1	1
C-P Round Boneguard	S.F.	1	1	1	1	1	1	1	1	1	1
PACKAGING											
Whizzard Knife	S.F.	6	6	6	6	6	6	6	6	6	6
Flank Steak/ Ball, Tri, Flap Bagger	S.F.	1	1	1	1	1	1	1	1	1	1
Blade Meat/Short Rib Bagger	S.F.	1	1	1	1	1	1	1	1	1	1
109/Chuck Roll Zipnetter	S.F.	1	1	1	1	1	1	1	1	1	1

Table 5 (Cont.)

Job Title	Std. Pcs. Per Hour	Chain Speed (Carcasses Per Hour)									
		45	50	55	60	65	70	75	80	85	90
		(Number Of Laborers)									
PACKAGING (CONT.)											
Chuck & Rib Table Product Pullup	S.F.	1	1	1	1	1	1	1	1	1	1
Chuck & Rib Table Product Bagger	S.F.	1	1	1	1	1	1	1	1	1	1
Chuck & Rib Table Product 8200 Operator	S.F.	2	2	2	2	2	2	2	2	2	2
Loin & Round Table Product Pullup	S.F.	1	1	1	1	1	1	1	1	1	1
Loin & Round Table Product Bagger	S.F.	1	1	1	1	1	1	1	1	1	1
Loin & Round Table Product 8200 Operator	S.F.	2	2	2	2	2	2	2	2	2	2
Box Product	S.F.	6	6	6	6	6	6	6	6	6	6
Box Trim Meats	S.F.	2	2	2	2	2	2	2	2	2	2
Strap & Stack Trim	S.F.	2	2	2	2	2	2	2	2	2	2
Pulk Box Makeup	S.F.	2	2	2	2	2	2	2	2	2	2
Rework Rejects	S.F.	1	1	1	1	1	1	1	1	1	1

* Figures derived from Cry-O-Vac Corp.

If two laborers performed the same function, three observations were made for one and two for the other in the morning. The procedure was reversed in the afternoon. If three or more laborers performed the same function, times were taken using the above procedure for two of them.

Times observed for each function were averaged and a rate of output was computed using the following formula:

$$\underset{\text{(Pcs. Per Hour)}}{\text{Rate Of Output}} = \frac{\text{3600 Seconds Per Hour}}{\text{Time Required For One Piece (In Seconds)}}$$

Eighty-five percent of this figure is considered to be the average (standard) output rate and was entered in the column headed Std. Pcs. Per Hour.

The number of laborers required at the various chain speeds is based on the capacity of labor as determined above For example, The capacity of a forequarter marker is 340 pieces per hour. The range covered in Table 5 is between 45 and 90 carcasses per hour; i.e., 90 and 180 pieces per hour, so that the capacity of the first forequarter marker is not exhousted in this range. Similarly, the capacity of a knuckle dropper is 161 pieces per hour and is exhausted between an output rate of 80 and 85 carcasses per hour; i.e., 160 and 170 pieces per hour. At a chain speed of 85 carcasses per hour an additional knuckle dropper is required. All of the figures for labor reqirements in the table were determined in this fashion except for those with S.F. (station fill)[1] in the Std. Pcs. Per Hr. column. The capacity of these functions are determined by criteria other than chain speed.

This form of a crewing guide is used to sdjust the chain speed according to the makeup of the labor force available. Another form of the crewing guide is used to determine the production schedule.

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[1] These jobs arise because of physical requirements of the production process and are not time restricted.

Crewing Guide By Product.

To facilitate the task of determining chain speeds for daily production schedules, labor requirements for the various products, other than the variety and thin meats, have been developed in Table 6. Production of the variety and thin meats tends to be the same for the three classes of product mix; i.e., HRI product mix, C-P product mix, and primal products, and so their labor requirements are not included in Table 6 although they would be included for a company's crewing guide.

Labor requirements in the break area cannot be related directly to any given product, but are related to a class of product mix. For this reason labor requirements in the break area are divided into HRI break and C-P and primal break.

Labor requirements in the packaging area are a function of the total number of pieces of product to be packaged. The number of pieces of product varies within as well as among classes of product mix. In addition, the capacity of the packaging area is such that it will not limit the rate of output within the feasible range determined by labor availability in the other areas.

Production Schedule.

Determination of what products are to be produced is made in the sales department. Determination of how and when these products are to be processed during the production shift; i.e., the production function, is the responsibility of the production manager. A production schedule is a record of the production function chosen by the production manager.

A crewing guide is a matrix relating the two most limiting inputs in the production process, carcasses and labor, to the output of a set

Table 6: Crewing Guide By Product

Product	Job Title	Chain Speed (Carcasses Per Hour)									
		45	50	55	60	65	70	75	80	85	90
		(Number Of Laborers)									
HRI BREAK	Forequarter Marker	1	1	1	1	1	1	1	1	1	1
	Rib/Brisket Saw	1	1	1	1	1	1	2	2	2	2
	Hangoff	1	1	1	1	1	1	1	1	1	1
	Trim	1	1	1	1	1	1	1	1	1	1
	Round Splitter	1	1	1	1	1	1	1	1	1	1
	Flank/Loin Dropper	1	1	1	1	1	1	1	1	1	1
	Knuckle Dropper	1	1	1	1	1	1	1	1	2	2
	Round Dropper	1	1	1	1	1	1	1	1	1	1
	Clod Puller	1	2	2	2	2	2	2	2	2	2
	Blade Bone Puller	1	1	1	2	2	2	2	2	2	2
	Brisket Dropper	1	1	1	2	2	2	2	2	2	2
	Wing/Chuck Dropper	1	1	1	1	1	1	1	1	1	1
	Total	12	13	13	15	15	15	16	15	17	17
C-P/ PRIMAL BREAK	Forequarter Marker	1	1	1	1	1	1	1	1	1	1
	Rib/Brisket Saw	1	1	1	1	1	1	2	2	2	2
	Hangoff	1	1	1	1	1	1	1	1	1	1
	Trim	1	1	1	1	1	1	1	1	1	1
	Round Splitter	1	1	1	1	1	1	1	1	1	1
	Flank/Loin Dropper	1	1	1	1	1	1	1	1	1	1
	Round Dropper	1	1	1	1	1	1	1	1	1	1
	Brisket Dropper	1	1	1	2	2	2	2	2	2	2
	Wing/Chuck Dropper	1	1	1	1	1	1	1	1	1	1
	Total	9	9	9	10	10	10	11	11	11	11
HRI CHUCK	Chuck/Rib Saw	1	1	1	1	1	1	1	1	1	1
	Chuck Blade Boner	5	5	6	6	7	7	7	7	8	9
	Chuck Arm Boner	2	2	2	2	3	3	3	3	3	3
	Chuck Roll Trimmer	2	3	3	3	3	3	4	4	4	4
	Total	10	11	12	12	14	13	15	15	16	17

Table 6: (Cont.)

Product	Job Title	Chain Speed (Carcasses Per Hour)									
		45	50	55	60	65	70	75	80	85	90
		(Number Of Laborers)									
3 PC. CHUCK	Chuck/Rib Saw	1	1	1	1	1	1	1	1	1	1
	Chuck Blade Boner	5	5	6	6	7	7	7	7	8	9
	Chuck Arm Boner	2	2	2	2	3	3	3	3	3	3
	Total	8	8	9	9	11	11	11	11	12	13
C-P CHUCK	Chuck/Rib Saw	1	1	1	1	1	1	1	1	1	1
	C-P Chuck Blade Trim	1	1	1	2	2	2	2	2	2	2
	C-P Chuck Arm Trim	1	1	1	1	1	1	1	1	1	1
	C-P Chuck Blade Boneguard	2	2	2	2	2	2	2	2	2	2
	C-P Chuck Arm Boneguard	2	2	2	2	2	2	2	2	2	2
	Total	7	7	7	8	8	8	8	8	8	8
PRIMAL CHUCK	Total	0	0	0	0	0	0	0	0	0	0
RIBEYE, LIPON, BI LIPON	Rib Boner	2	3	3	3	3	4	4	4	4	5
	Rib Bone Cleaner/ Blade Meat Trim	2	2	2	2	2	2	2	2	2	3
	Total	4	5	5	5	5	6	6	6	6	8
109 RIB	Rib Boner	3	3	3	3	4	4	4	4	5	5
	Rib Bone Cleaner/ Blade Meat Trim*	2	2	2	2	2	2	2	2	2	3
	Total	5	5	5	5	6	6	6	6	7	8
107 RIB C-P RIB	Rib Trimmer	1	1	1	1	1	1	1	1	1	1
	Rib Boneguard	1	1	1	1	1	1	1	1	1	1
	Total	2	2	2	2	2	2	2	2	2	2

* One rib boner trims blade meat. One rib bone cleaner boneguards 109 rib.

Table 6: (Cont.)

Product	Job Title	Chain Speed (Carcasses Per Hour)									
		45	50	55	60	65	70	75	80	85	90
		(Number Of Laborers)									
TENDERLOIN	Tenderloin Puller	2	2	2	2	2	3	3	3	3	3
	Tenderloin Trimmer	2	2	2	2	2	2	2	3	3	3
	Total	4	4	4	4	4	5	5	6	6	6
180 LOINSTRIP	Loin Saw	1	1	1	1	1	1	1	1	1	1
	Shell Saw	1	1	1	1	1	1	1	1	1	1
175 LOINSTRIP	Loinstrip Boner	2	2	2	3	3	3	3	3	3	4
	Loinstrip Trimmer	1	1	2	2	2	2	2	2	2	2
	Loin Tail Trimmer	2	2	2	2	2	2	2	2	3	3
	Total	7	7	8	9	9	9	9	9	10	11
TOP SIRLOIN	Sirloin Butt Boner	1	2	2	2	2	2	2	2	2	2
	Sirloin Butt Trim	1	1	1	1	1	1	1	1	1	1
	Total	2	3	3	3	3	3	3	3	3	3
FULL BUTT	Bottom Butt Separator	1	1	1	1	1	1	1	1	1	1
	Total	1	1	1	1	1	1	1	1	1	1
BALL, TRI, FLAP	Bottom Butt Separator	2	2	2	2	2	2	3	3	3	3
	Total	2	2	2	2	2	2	3	3	3	3
C-P LOIN	Shell Saw	1	1	1	1	1	1	1	1	1	1
	C-P Loin Trimmer	2	2	2	2	2	2	2	2	2	2
	C-P Loin Boneguard	1	1	1	2	2	2	2	2	2	2
	Loin Tail Trim	2	2	2	2	2	2	2	2	3	3
	Total	6	6	6	7	7	7	7	7	8	8

Table 6: (Cont.)

Product	Job Title	Chain Speed (Carcasses Per Hour)									
		45	50	55	60	65	70	75	80	85	90
		(Number Of Laborers)									
PRIMAL	Shell Saw	1	1	1	1	1	1	1	1	1	1
LOIN	Loin Tail Trimmer	2	2	2	2	2	2	2	2	3	3
	Total	3	3	3	3	3	3	3	3	4	4
HR1	Round Boner	3	3	4	4	4	4	5	5	5	6
ROUND	Inside Round Trimmer	1	1	1	1	1	1	1	1	1	1
	Outside Round Trimmer	1	1	1	1	1	1	1	1	1	1
	Knuckle Trimmer	1	1	1	1	1	1	1	1	1	1
	Total	6	6	7	7	7	7	8	8	8	9
160											
ROUND	Round Boner	2	2	2	2	2	2	2	2	2	3
C-P	Round Trimmer	1	1	1	1	1	1	1	1	1	1
ROUND	Round Boneguard	1	1	1	1	1	1	1	1	1	1
	Total	4	4	4	4	4	4	4	4	4	5
PRIMAL											
ROUND	Total	0	0	0	0	0	0	0	0	0	0

Table 7: Standard Production Hours And Wages

Week Ending	6-23	7-1	7-8	7-15	7-22	7-29
Regular Production Hours	32.9	26.8	36.8*	38.2	36.5	31.9
Overtime Production Hours	0.0	0.0	0.2	8.4	8.6	6.7
Total Production Hours	32.9	26.8	37.0	46.6	45.1	38.6
Regular Man-hours	4,408.6	3,591.2	4,931.2	5,118.8	4.891.0	4,274.6
Less Absentee Man-hours	238.6	130.7	160.6	115.2	163.7	149.0
Net Regular Man-houra	4,170.0	3,460.5	4,770.6	5,003.6	4,727.3	4,125.6
Overtime Man-hours	0.0	0.0	26.8	1,125.6	1,152.4	897.8
Less Absentee Man-hours	0.0	0.0	1.2	54.1	64.3	67.0
Net Overtime Man-hours	0.0	0.0	25.6	1,071.5	1,088.1	830.8
Regular Hour Labor Cost	$25,728.90	$21,351.28	$29,434.60	$30.852.21	$29,167.44	$25,454.95
Overtime Hour Labor Cost	0.0	0.0	236.16	9,884.59	10,037.72	7,664.13
Net Labor Cost	25,728.90	21,351.28	29,670.76	40,756.80	39,295.16	33,119.08
Cost Of Benefits (30% Of Labor Cost)	7,718.67	6,495.38	8,901.23	12,227.04	11,761.55	9.935.72
Total Labor Wages	$33,447.57	$27,846.66	$38,571.99	$52,983.84	$50,966.71	$43,054.80

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* Includes 8 hours holiday pay.

of products. The relationship is expressed in units per time period.

To determine the production schedule, the manager first arranges the products to be produced into sets. Then he determines a rate of output; i.e., chain speed, by referring to the crewing guide, by product, and assuming a full labor force. This is accomplished by reading across the row for each product to be produced to the column in which the number of laborers normally available for that product is found. The greatest chain speed attainable for a set of products is determined after this procedure has been followed for all the products in the set. It is the lowest chain speed attainable within the range of chain speeds for the products in the set.

Appendix Table D contains production schedules for a six week period and a detailed explanation of how they were derived. The products processed were taken from Appendix Table C which lists the products processed by the case company during the six week period.

Standard Versus Actual Production Time.

Proudction time as determined in Appendix Table D is summarized and labor wages are computed in Table 7. There is a difference of 38.5 production hours resulting in a savings of $43,999.41 for the six week period from the totals of Table 7 and Table 3. This represents a 14.5% reduction in production time and a 15.1% reduction in labor wages from that as computed in Table 3. Labor cost reductions can be attributed to two effects of production scheduling: 1) greater efficiency in labor usage, and 2) greatly reduced downtime.

Labor Usage.

Under the present system, production is not scheduled in advance of production. Rather, a list of products to be produced is given to the production superintendant at the beginning of the production day. He decides when to produce the various products as circumstances develop. Inefficiencies were observed to occur for two reasons.

Firstly, often two products processed from the same muscle group of a beef primal were produced at the same time. These products either required laborers to perform different functions for each product or differing numbers of laborers to process each product. In either case time was lost as laborers adjusted to the different products.

Secondly, when an uneven number of quarters were processed, the extra quarters were worked into production. This meant that laborers processing the one quarter were working at a higher rate of output then laborers processing the other. Time was lost as half the labor force worked at the slower rate of output.

Forty-two and one half percent of the 38.5 hour reduction in production time can be attributed to more efficient usage of labor. This increase in efficiency was gained by arranging products into sets and adjusting chain speeds accordingly as discussed earlier.

Another advantage of production scheduling is that it allows line supervisors to plan and coordinate changeovers and to manage problems in their areas which could otherwise result in downtime. Reduction of downtime resulted in 57.5% in the reduction of production time.

Downtime

The figures in Table 8 came from the Weekly Production Report which contains the amount of downtime and an explanation for the downtime for each week on a daily basis. The downtime has been divided into the categories identified by the column headings in Table 8.

The amount of downtime experienced by the case company, ranging from 2.8 hours to 4.3 hours per week, is truly exhorbitant when compared to the experience of leading firms in the industry. These firms average about one minute per month in downtime due to unscheduled maintenance or USDA Meat Inspection Division (USDA-MID). The average downtime due to changeovers is a function of plant size and these firms rarely exceed their minimum downtime. In addition, they seldom experience more than three changeovers per production shift.

The industry's leading firms are able to avoid downtime by employing production scheduling systems similar to that proposed in this paper. A system which assures and regulates the inflow of carcasses into the production process reduces the number of changeovers. More importantly, it allows line supervisors to foresee problems which could lead to downtime and, thus, prevent it, or to devise methods of circumventing problems which occur. Examples of ways to circumvent downtime in each of the categories in Table 8 follow.

1. Unscheduled Maintenance, Processing Area. The most common problem in this area was a hangup of a trolley from which a carcass is suspended. This problem is generally caused by a malfunctioning switch along the break chain. Locating the bad switch and having

Table 8: Actual Downtime

Date	Unscheduled Maintenance Processing Area Downtime (1)	Unscheduled Maintenance Packaging Area Downtime (2)	USDA-MID Downtime (3)	Out-Of Cattle Downtime (4)	Changeover Downtime (5)	Total Downtime (1) Thru (4)	Total Downtime (5)	Total Downtime Total
	(In Minutes)					(In Hours Per Week)		
6-19	3.5	5.5			13.5			
6-20	3.5	6.5	8.0	9.5				
6-21	11.5	14.0	7.0	9.0	18.5			
6-22	4.5				23.0			
6-23	5.5				53.0			
Total	28.5	26.0	7.0	17.0	117.5	2.0	1.9	2.9
6-27	7.0	22.0	47.0		26.5			
6-28	2.0			66.0				
6-29	4.0	20.0			23.0			
6-30	14.5				39.5			
7-1	14.5	6.0	3.0		15.5			
Total	42.0	48.0	50.0	66.0	104.5	2.3	1.7	4.0
7-3	3.5	33.5	9.0		20.0			
7-5	31.5	3.0			18.0			
7-6	14.5	52.5			16.5			
7-7	2.5	7.0	9.0		37.0			
Total	52.0	96.0	18.0		91.5	2.8	1.5	4.3
7-10	16.0	38.5			21.5			
7-11	7.5	12.0	19.0		12.5			
7-12	4.5	9.0			10.5			
7-13	4.0	14.5			32.5			
7-14	8.5	6.0	5.5		18.0			
7-15	19.5	2.5	5.0		4.0			
Total	60.0	42.5	29.5		103.0	2.9	1.7	4.6
7-24	6.5	4.0	1.5		11.0			
7-25	1.0	8.0	3.0		23.0			
7-26	3.0	4.5			11.5			
7-27	2.5	5.0		15.0	17.0			
7-28	9.5				32.0			
7-29	3.0	3.0			8.0			
Total	25.5	24.5	4.5	15.0	102.5	1.1	1.7	2.8

the maintenance department repair it promptly will avoid the problem. Another common problem was the failure of electric motors which drive a bone belt conveyor or a trim belt conveyor. Failure of a motor usually cannot be foreseen, but by employing supervisors and clean up personnel to manually pull the conveyor belt until the motor is repaired will circumvent downtime.

2. Unscheduled Maintenance, Packaging And Material Handling. The most common problem in the packaging area was a malfunction of 8200 packaging machine. As observed earlier, the capacity of all the 8200 packaging machines available exceeds requirements for the chain speeds attainable in this plant. By redirecting the flow of products around the disabled machine, most of this downtime could be avoided. Even when the malfunction of an 8200 packaging machine reduces capacity below requirements, product can be temporarily stored in stainless steel tubs until the machine is repaired.

   The most common problem in the material handling area was the malfunction of the box conveyor leading to the processing production manifester. In this case, boxes could be manually pushed along the conveyor or stacked on pallets until the conveyor is repaired. Both methods avoid unnecessary downtime.

3. USDA-MID Downtime. Downtime due to an infraction of USDA-MID regulations occur, for the most part, because of lack of supervision. An alert, responsible supervisor should never incur downtime for this reason.

4. Changeover Downtime. Not only can the number of changeovers be reduced in this plant, the length of downtime for each changeover can be reduced as line supervisors plan for and coordinate changeovers when production is scheduled.

5. Out-Of-Carcass Downtime. Downtime for this reason occurred when regrading occurred; i.e., the flow of carcasses from the hot box[1] was suspended and carcasses from the sales cooler were redirected to the grading inspector for regrading. A holding cooler with adequate capacity will avoid interuptions in the inflow of carcasses to the production process.

It was assumed in constructing Appendix Table E that downtime ascribed to unscheduled maintenance, USDA-MID, and out-of-carcass was eliminated, and that changeover downtime was reduced to 2.5 minutes per changeover. The effect of the 38.5 hour reduction of production time was 57.5%; the effect of eliminating unscheduled maintenance and USDA-MID downtime was 30.6%, the effect of reducing changeover time was 22.5%, and the effect of eliminating out-of-carcass downtime was 4.4%.

Standard Versus Actual Production Time With An Equal Number Of Forequarters And Hindquarters And Without Primals.

An examination of the production schedules in Appendix Table D reveals that the labor input remains to a large degree underemployed, especially when primal products are processed and when an uneven number of forequarters and hindquarters are processed.

The effect of underemployment of part of the labor force is to raise unit costs of production. One option to reduce unit costs is to send unneeded personnel home early. But there are objections arising from, or impediments to, excercising this option.

Union contracts may prohibit management from sending laborers home early. Some union contracts guarantee labor a minimum amount of time unless certain actions are taken by management. For instance, labor may be guaranteed four hours per day unless management posts work schedules

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[1] The hot box is the cooler in which freshly slaughtered carcasses are chilled.

for less than four hours three days in advance. Even then this may have to be applicable to all alborers, not just those in certain jobs.

Management may object to such a strategy. Those jobs most affected by the number of primals processed by the case company are among the most skilled jobs such as rib boners and tenderloin pullers. Any reduction in hours for laborers performing these jobs reduces their income and, therefore, diminishes the attraction of these jobs to the more able and talented workers. It would have the ultimate affect of reducing productivity since these jobs are critical in both the quality of the product and in attaining high chain speeds.

Another alternative is to reduce the number of primals[1] in the product mix and to process whole carcasses instead of an uneven number of forequarters and hindquarters.

In Appendix Table E products which could have been processed from the primals and the missing forequarters and hindquarters were added to those products found in Appendix Table C. Appendix Table F contains production schedules for the lists of products found in Appendix Table E.

Total production time required to produce the set of products in Appendix Table E is virtually the same as the production time required to produce the set of products found in Appendix Table C, the difference being .1 hour. Yet labor usage is increased by producting those products in Appendix Table E.

Production of these products changes the amount of revenue generated through sales. In addition, packaging materials are used. These changes have been extimated in Appendix Table G and Appendix Table H and are summarized in Table 9.

Net sales over the six week period were increased by $2,545.44 by processing subprimal products instead of primals. During some of the week,

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[1] Primal products as distinguished from subprimal products are those for which fabrication ceases after separation from the carcass.

Table 9: Change In Sales From Processing Primals And An Even Number Of Carcass Quarters

Primals To Products

Week Ending	Product Sales	Packaging Costs	Primal Sales	Net Sales
6-23	$57,908.27	$605.71	$56,668.95	
7-1	24,914.30	282.04	28,209.14	
7-8	26,695.42	294.16	23,917.19	
7-15	140,167.63	1514.61	151,326.60	
7-22	43,954.33	623.39	43,113.30	
7-29	132,413.66	1943.36	115,009.72	
	426,053.61	(5263.27)	(418,244.90)	$2545.44

Added Products From Quarters

Week Ending	Product Sales	Packaging Costs	Carcass Cost	Net Sales
6-23	$6,302.09	$118.13	$4,910.53	
7-1	2,043.11	47.25	1,830.14	
7-8	3,055.75	64.13	2,686.66	
7-15	4,452.91	91.13	3,803.04	
7-22	926.15	20.25	809.17	
7-29	20,733.21	337.50	13,869.04	
	37,513.22	(678.39)	(27,908.58)	$8,926.25

net sales declined. Processing primals into subprimals was indicated to be profitable with all primals except the loin primal. Sales of loin primals resulted in revenues consistantly higher than sales of its component subprimals.

The decision to produce primals is based on the expected revenue from the sale of primals versus the sale of the subprimal products processed from the primals. The sales manager for the case company estimates the difference in revenue based on labor productivity without production scheduling. The increased productivity of labor with production scheduling tends to reduce the profitability of primal sales although this reduction may not offset the advantage of primal sales in all cases.

An increase of $8,926.25 resulted from equalizing the number of forequarters and hindquarters processed. This increase in sales was accomplished with no added production time and greatly increased labor usage.

Yield Report.

Table 10 is a yield report for the six week period. The figures for actual product weights and values, and standard product weights and values, are drawn from Appendix Tables E and I respectively. The yield report is presented in the format in which it would be presented to management although it would be produced on a daily basis when used at the plant level. In addition, a piece count report, not presented here, would be produced in conjunction with the yield report.

The purpose of the yield report and the piece count report is to compare in terms of product weight, value, yield percentage, and number of pieces of product expected to that output actually produced. The accuracy of the comparison of expected output to actual output depends on the accuracy of the data used to compute the yield report and the piece count report. Some of this data, such as average carcass weight,

Table 10: Yield Report, June 19 Through July 29, 1978

Product	Act. Yld. %	Std. Yld. %	Act. lb.	Std. lb.	Difference Act.-Std. lb.	Act. $	Std. $	Difference Act.-Std. $
CHUCK								
Roll	6.27	7.0	52,708.7	58,709.1	(6,000.4)	59,534.96	66,358.17	(6,823.21)
Clod	5.70	5.15	47,085.0	43,193.1	3,891.9	52,020.50	47,737.63	4,282.87
Tender	.75	.75	6,276.2	6,290.2	(14.0)	7,476.58	7,495.93	(19.35)
3 Pc. Chuck	23.13	23.10	1,793,713.4	1,784,568.3	9,145.1	1,610,860.04	1,602,948.10	7,911.94
C-P Chuck	25.17	26.25	401,084.2	418,726.9	(17,642.7)	318,418.92	333,637.72	(15,218.80)
Chuck Total					(10,620.1)			(9,866.55)
PLATE								
Brisket	2.76	2.65	291,834.2	279,619.4	12,214.8	257,284.77	246,524.03	10,760.74
Inside Skirt	.23	.29	20,702.4	25,991.4	(5,289.0)	37,118.97	46,609.28	(9,490.31)
Outside Skirt	.50	.45	44,645.0	40,331.2	4,313.8	75,614.12	68,299.48	7,314.64
Plate Total					11,239.6			8,585.07
RIB								
Ribeye	2.40	2.50	17,009.1	17,426.7	(417.6)	60,078.29	61,497.63	(1,419.34)
Lipon Ribeye	3.08	3.25	120,233.1	125,853.3	(5,620.2)	303,044.41	317,304.48	(14,260.07)
BI Lipon Ribeye	4.01	4.25	22,241.3	23,317.2	(1,075.9)	47,696.39	49,994.15	(2,297.76)
107 Rib	6.91	6.75	9,798.9	8,107.0	1,691.9	14,642.29	12,100.74	2,541.55
109 Rib	5.50	5.65	74,541.3	75,754.7	(1,213.4)	129,597.88	131,465.84	(1,867.96)
C-P Rib	7.26	7.15	241,369.1	237,847.4	3,521.7	336,647.42	331,718.29	4,929.13
Short Rib	.23	.88	15,307.3	88,429.3	(73,122.0)	11,939.69	76,775.06	(64,835.37)
Spare Rib	.39	1.10	39,900.0	110,536.7	(70,636.7)	26,334.00	72,954.22	(46,620.22)
Rib Total					(157,772.2)			(123,830.04)

Table 10 (Cont.)

Product	Act. Yld. %	Std. Yld. %	Act. lb.	Std. lb.	Difference Act.-Std. lb.	Act. $	Std. $	Difference Act.-Std. $
LOIN								
Tenderloin	1.98	1.95	142,858.5	140,448.7	2,409.8	412,522.82	406,852.39	5,670.43
Peeled Tenderloin	1.52	1.35	14,271.1	12,727.7	1,543.4	52,068.78	46,429.11	5,639.67
#2 180 Loinstrip	3.09	3.35	10,985.6	11.822.3	(836.7)	25,452.51	27,390.23	(1,937.72)
180 Loinstrip	3.63	3.75	185,273.5	189,615.6	(4,342.1)	434,182.73	444,387.43	(10,204.70)
175 Loinstrip	5.44	5.50	150,398.8	151,888.0	(1,489.2)	252,544.14	255,054.27	(2,510.13)
Top Sirloin	3.35	3.20	152,523.0	146,267.0	6,256.0	273,278.50	262,523.75	10,754.75
BI Top Sirloin	4.66	4.80	12,992.7	13,679.2	(686.5)	14,182.45	14,928.54	(746.09)
Shell Sirloin	7.43	7.15	245,758.3	234,187.6	11,570.7	253,589.3	241.682.45	11,906.86
Full Bottom Butt	2.39	2.30	73,539.5	71,736.1	1,803.4	47,366.04	46,206.38	1,159.66
Ball	.48	.45	8,308.7	7,777.1	531.6	15,945.71	14,926.95	1,018.76
Tri	.53	.75	9,209.6	13,075.4	(3,865.8)	16,872.93	24,000.51	(7,127.58)
Flap	.51	.50	7,054.7	6,913.0	141.7	9,354.09	9,122.58	231.51
C-P Loin	14.20	13.60	247,133.5	134.470.6	12,662.9	363,133.04	350,475.73	12,657.31
Flank Steak	.41	.45	42,187.5	44,593.6	(2,406.1)	106,310.97	112,390.43	(6,079.46)
Kidney	.23	.25	23,820.0	24,774.1	(954.1)	5,240.40	5,450.31	(209.91)
Hanging Tender	.26	.25	27,444.9	24,774.1	2,670.8	45,284.08	40,877.26	4.406.82
Loin Total					25,009.9			24,620.18
ROUND								
Knuckle	2.89	2.80	134,034.0	131,310.5	2,723.5	156,619.01	153,469.44	3,149.57
Peeled Knuckle	2.62	2.50	55,819.2	54,608.9	1,210.3	69,811.48	68,261.10	1,550.38
Inside Round	5.76	5.70	394,564.2	379,783.3	14,780.9	542,854.47	536,237.44	6,617.03
Outside Round	6.78	7.20	463,362.6	492,357.8	(28,995.2)	512,618.97	544,892.45	(32,273.48)
160 Round	17.21	17.35	218,595.7	233,299.4	(14,703.7)	240,020.76	256,179.99	(16,149.23)
C-P Round	18.73	18.80	359,846.1	361,286.8	(1.440.7)	400,782.51	402,425.00	(1,642.49)
Round Total					(26,424.9)			(38,748.22)
CARCASS TOTAL					(158,567.7)			(139,229.56)

was furnished on a weekly basis instead of a daily basis while other data, such as partial product manifest, is not reported under the present data collection system. Therefore, the accuracy of a daily yield report would be dubious while the accuracy of this report covering the entire six week period under discussion could be expected to be much more accurate. The piece count for this six week period was assumed to be even for this analysis and, therefore, will not be presented.

The production manager can use the yield report as an indication of the performance of the line supervisors. By interpretting the relationships among the yield percentages and weights of the various products, he can form hypotheses to explain where causes of deviations from the standard arise and which line supervisors may be responsible. Observation in the suspected areas will confirm one or another of these hypotheses and remedial action can be taken.

Standard Versus Actual Yield.

Table 10 reveals that the actual weight of products processed from primals and subprimals was 158,567.7 pounds less than the standard resulting in a loss of $139,229.56 in sales revenues for these products. This figure does not represent the true loss in sales as the 158,567.7 pounds were sold as trim, tallow, and bone the estimated value of which is $46,963.00. If the case company had produced the output calculated according to standard yield percentages, it could have increased sales by $92,266.56 over the six week period under discussion.

Use Of The Yield Report.

Interpretation of the yield report is based on the relationship of each product to the carcass as a whole as explained in the introduction section of this paper. Variance of the yield percentage of a product from the standard arises from improper trimming of the fat, improper boning, or improper separation of the product from the carcass. Examples of each of these possibilities appear in the yield report in Table 10 and were confirmed by observation at the plant.

The first opportunity for error in the process is in the break area where the carcass is separated into the various primals. It was observed that the loin primal was improperly separated from the round primal. The laborer performing this function made the cut between the loin and the round at an angle cutting into the outside round side of the round primal. It can be seen that the yield percentages for most of those products processed from the sirloin end of the loin primal; i.e., top sirloin, bone-in top sirloin, shell sirloin, full bottom butt, ball tip, tri tip, flap meat, and C-P loin, are higher than their standard yield percentages while those for products processed from the outside round side of the round primal; i.e., outside round, 160 round, and C-P round, are lower than their standard yield percentages. (The loin products with yield percentages lower than their standards were lower due to trimming errors.) It should be noted that the added weight of the loin products does not offset the loss in weight of the round products. This is because the difference of fat trimmed and the amount of bone removed from the various products.

Another example of a "missplit" in the break area was observed, but interpretation of this error from the yield report is complicated by boning and trimming errors which were observed on the chuck and rib table. The "missplit" occurred between the chuck blade and the brisket, the split being made approximately one inch to the chuck blade side. This resulted in a higher yield percentage for the brisket and an overall lower yield percentage for products processed from the chuck blade; i.e., chuck roll, 3 Pc. chuck, and C-P chuck.

Part of the process of fabricating the chuck roll from the chuck primal is to remove the neck bone from the chuck blade. This is one of the more difficult functions in the production process because a chuck blade may weigh as much as ninety pounds and the neck bone, consisting of spinal vertebrae, requires working the knife around the individual vertebra. Excessive meat was observed on neck bones removed from the chuck blades, and this can be seen in the low yield percentage of the chuck roll compared to the standard.

Excessively meaty bones were observed from the processing of other products on both the chuck and rib table and the loin and round table. Indications of this problem appear in the low yield percentages for each of these products: ribeye, lipon ribeye, bone-in lipon ribeye, 180 loinstrip and 175 loinstrip.

Failure to meet trim standards for the fat cover of certain products is also indicated in the yield report. The 107 rib and C-P rib were observed to be undertrimmed as indicated by their yield percentages as were the tenderloin and inside round. The tri tip and flank steak yield percentages indicate overtrimming.

Further interpretations from the yield sheet must be in the form of hypotheses since not all of the products came under observation. For instance, the yield percentages for inside and outside skirts confirm the tendencies of skirt trimmers in general. The trim specification for the inside skirt requires the inside skirt trimmer to make a delicate trim cut along the side of the inside skirt which is easily missed. Similarly, the fat on the outside skirt is not solid and can be difficult to remove with a single cut of the knife.

The yield report revealed a practice which apparently arose from expediency on the chuck and rib table. Short ribs and spare ribs were allowed to be processed into 50-50 trim so that the short rib trimmer could perform other functions. This practice resulted in the loss of

$111,455.59 from these products. Assuming that one-half of these products was bone and one half was 50-50 trim, this loss was offset by revenues of $46,721.58. The net result to the company was a loss of $64,734.01 in sales revenue.

Quality Control.

The yield report becomes an even more powerful tool for management when used in conjunction with quality control. The quality control inspectors serve to maintain the specification of fat trim within narrow limits which limits this variable to a great extent. The manager can then interpret the yield report in light of "missplits" and "dirty bones".

Quality control is also responsible for assuring that the carcasses processed are of the proper temperature. The importance of temperature can be seen by the magnitude of the cost of returned product. The $9,436.82 expense of returned product experienced by the case company during this six week period could have been avoided.

Standard Versus Actual Operating Income Statement.

An operating income statement covering the six week period from June 19 through July 29, 1978 and based on the standards developed from the proposed system is presented in Table 11. The operating loss of $73,942.69 from Table 4 was reduced to a loss of $12,295.59. Although this figure represents an operating loss, there was a significant reduction in operating loss.

Table 11: Standard Operating Income Statement

June 19 Through July 29, 1978

OPERATING REVENUE			
Actual Sales		$9,415,931.80	
Change In Revenue:			
Primal Sales:			
Processed Primals	$426,053.61		
Less Primal Sales	418,244.90		
Net Primal Sales		7,808.71	
Quarter Sales		37,513.22	
Standard Yield		92,266.56	
Less 1% Shrink		(95,535.20)	
Standard Sales			$9,457,985.18
OPERATING EXPENSE			
Cost Of Materials:			
Actual Carcass Expense	8,840,249.00		
Plus Added Quarters	27,908.58		
Standard Carcass Expense		8,868,256.58	
Actual Packaging Expense	213,693.76		
Added Packaging Expense	5,941.66		
Standard Packaging Expense		219,545.42	
Wages And Salaries:			
Actual Wages	290,870.98		
Less Savings From Production Scheduling	43,999.41		
Standard Wages		246,871.57	
Salaries		13,650.00	
Other Variable Expense		121,956.00	
Total			9,470,280.57
NET OPERATING INCOME			(12,295.39)

Profitability Of Investment In The Proposed Production Control System.

Implementation of the proposed production control system was predictated on a holding cooler with capacity to hold one day's supply of carcasses. The cost of the investment in a holding cooler and one day's supply of carcasses was not considered in the presentation of the operating income statement. The profitability of this investment will now be analysed using the internal rate of return computer program mentioned earlier.

Internal rate of return is the rate of return to an investment without regard to the source and cost of the funds used to finance the investment or the method of depreciating or taxing the investment. Unlike an operating income statement, internal rate of return is a flow concept; i.e., the inflow of funds generated by the investment is related to the outflow of funds for the investment. A flow concept implies a time period in which inflows and outflows of funds occur. The year 1978 will define the period of time for which the internal rate of return for this investment was determined.

The value of each dollar generated by or spent for the investment depends on the time it is generated or spent. For this reason, inflows and outflows of funds are discounted to the initial period of investment so that the value of each dollar generated by or spent for the investment has equal value. The discount rate is determined in the program and is determined by the earning power of the funds in each period.

Not all the data needed to compute the internal rate of return for the case company's total investment in the beef processing plant was available. For instance, the cost of the plant and equipment was not made available. Therefore, only the internal rate of return on the additional investment required to implement the proposed production control system was computed. The data needed for this computation are the change in investment and the change in operating income generated by the investment.

Investment.

The additional investment needed to implement the proposed production control system is comprised of two elements: 1) capital in the form of a holding cooler and 2) working capital in the form of one day's supply of carcasses.

The size and cost of the holding cooler of the required capacity was obtained from an architect specializing in this area.[1] The size of the holding cooler was determined to be 8,832 square feet and the cost to be $706,650.00. The cost of the holding cooler was entered in Table 12 in period zero because this investment must be made before the proposed system can be implemented. A figure of $635,904.00 was entered in period ten. This figure represents the salvage value of the holding cooler at the end of the year and the $70,656.00 difference is not to be confused with depreciation on the holding cooler.

The additional amount of working capital required was determined to be $277,133.00. This represents the average daily value of carcasses for the six week period under study and was entered in the column headed Carcass Inventory in Table 12. It was entered in period one because this investment could not be made until the holding cooler had been constructed. The $277,133.00 was subtracted in period ten because the value of carcasses at the end of the year was assumed to be the same as the value of carcasses at the beginning of the year.

Operating Income.

The remaining columns in Table 12 represent the changes in operating revenue and operating expense resulting from the implementation of the proposed production control system. These changes were presented in Table 11 and were discussed earlier.

It will be noticed that the figures presented in Table 12 were repeated

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[1] Willis Regier, AIA, Omaha, Nebraska.

Table 12: Internal Rate Of Return On Additional Investment, Base Case.

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                                             RATE OF RETURN ON ADDITIONAL INVESTMENT
                                        PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS
         HOLDING  CARCASS   PRIMAL   QUARTER STANDARD  SHRINK   CARCASS    PACK.    LABOR   RETURNED
PERIOD _COOLER_ __INV.__ _SALES__ __SALES_ _YIELD__ __LOSS__ _EXPENSE _EXPENSE __WAGES_ PRODUCT_ ________ ________ ________

  0      706560.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
  1           0.  277133.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  2           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  3           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  4           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  5           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  6           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  7           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  8           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
  9           0.       0.    7809.   37513.   92267.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 10     -635904. -277133.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.


                           I N V E S T M E N T   F E A S I B I L I T Y   A N A L Y S I S

                                       RATE OF RETURN ON ADDITIONAL INVESTMENT
                                     PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS

                                     DIRECT RETURN ON TOTAL CAPITAL  __57.886_ PERCENT

               ______INVESTMENT (DOLLARS )_______    __________OPERATING (DOLLARS )_____     PRESENT  ___PRESENT VALUES____
___PERIOD___                  WORKING                   DIRECT   OPERATING        NET         VALUE       TOTAL          NET
_NO.__ IDENT.  FACILITIES ___CAPITAL ____TOTAL_     ___BENEFIT _EXPENSES_**___BENEFIT     _FACTOR   INVESTMENT  ___BENEFIT
   0              706560.        0.   706560.              0.          0.          0.      1.0000     706560.          0.
   1                   0.   277133.   277133.          42053.     -19594.      61647.      0.9487     262913.      58484.
   2                   0.        0.        0.          42053.     -19594.      61647.      0.9000          0.      55463.
   3                   0.        0.        0.          42053.     -19594.      61647.      0.8538          0.      52636.
   4                   0.        0.        0.          42053.     -19594.      61647.      0.8100          0.      49935.
   5                   0.        0.        0.          42053.     -19594.      61647.      0.7685          0.      47373.
   6                   0.        0.        0.          42053.     -19594.      61647.      0.7290          0.      44942.
   7                   0.        0.        0.          42053.     -19594.      61647.      0.6916          0.      42636.
   8                   0.        0.        0.          42053.     -19594.      61647.      0.6561          C.      40448.
   9                   0.        0.        0.          42053.     -19594.      61647.      0.6225          0.      38373.
  10            _-635904._ _-277133._ _-913037._  _______0._  _______0._  _______0._      0.5905  _-539162._  _______0._
       TOTAL       70656.        0.    70656.         378480.    -176346.     554826.                 430310.     430310.

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**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
BASE CASE: HOLDING COOLER COST FROM WILLIS REGEIR, AIA, OMAHA.  CARCASS INV. IS THE AVERAGE DAILY VALUE OF CARCASSES IN THE HOLDING
COOLER.  REVENUE AND EXPENSE FIGURES ARE FROM TABLE 11.
```

for periods one through nine. These changes were determined for the six week period from June 19 through July 29 and this period is assumed to be representative of the year 1978 with respect to the number of carcasses processed and the price spread between the price of carcasses and retail product. This assumption is based on the following observations.

It is assumed that the number of carcasses processed by the case company is directly proportional to the number of carcasses processed by all beef processors and that number is directly proportional to the number of marketings at federally inspected beef packing plants. Data for these marketings were obtained from The Western Livestock Roundup for the years 1963 through 1978 and seasonal variation in those marketings was analysed (22). The results are presented in Figure 7.

The index of average seasonal variation, the solid line in Figure 7, is established by computing a five quarter moving average of cattle marketings by federally inspected packing plants, and this is centered on the third quarter. The original value for each quarter is expressed as a percentage of the moving average for the corresponding quarter. The resulting percentages are then averaged for the individual quarters, and this is the index of the average seasonal for that quarter.

The index of irregularity, shown as the shaded portion in Figure 7, is the average deviation of the percentages of trend for particular quarters about the value of the index of average seasonal variation for that quarter. A band of the size of the index on either side of the index of average seasonal variation include approximately sixty percent of the individual years comprising the average. In more pronounced and regular seasonal movements, the shaded area may draw away from the base line represented by 100 in Figure 7. In these cases there is a reasonable expectation that a movement similar to the

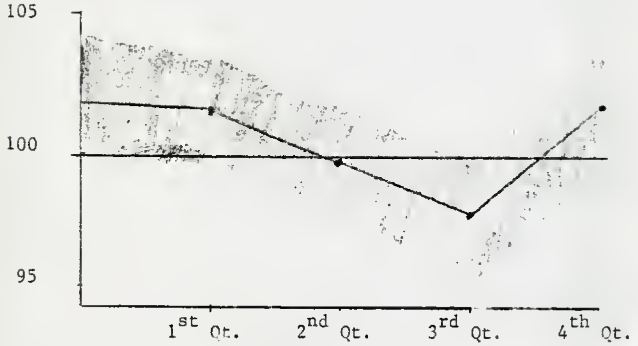

Figure 7: Seasonal Variation of Cattle Marketings At Federally Inspected Beef Packing Plants, 1963-1978.

average seasonal will prevail in each year. In this case, however, the base line lies almost entirely within the shaded portion. This means that, while there is an average seasonal movement present, there is little expectation that it will be realized in a particular year.

It is similarly assumed that the carcass to retail price spread, the difference in the value of beef in carcass form and in retail product form, for the case company is directly related to the carcass to retail price spread for the industry as a whole. Data for weekly carcass to retail price spreads for beef for the year 1978 were obtained from ESCS-CED of USDA (23). These figures were averaged for the year and for the six week period from June 19 through July 29. Price spreads ranged from 41.2 cents per pound in May to 73.8 cents per pound in August and again in October, but the average price spread for the six week period under study, 57.6 cents per pound, was only 1.3 cents per pound higher than the average for the year of 56.3 cents per pound.

Internal Rate Of Return On The Additional Investment.

Table 12 is the output from the computer program. Figures from the upper section of Table 12 are compiled under two general headings in the lower section according to use of the funds. These headings are Investment and Operating.

Investment is in the form of a holding cooler facility and working capital. Changes in revenue from Table 12 have been totaled under the heading Direct Benefit while changes in operating expenses from Table 12 have been totaled under that heading in the lower section. Under the heading Net Benefit is the net operating income per period.

The present value of both the investment and operating income for each period is also presented in Table 12 as well as a present value factor. The present value factor is one minus the discount rate up to that period. The discount rate is based on the earning power of funds used in that enterprise over time and is determined in the computer program. Multiplying the cash outflow for investment, or the net operating income, for each period by the present value factor for that period gives the present value for that period.

The internal rate of return on the additional investment required to implement the proposed production control system is 57.9%. The profitability of this enterprise is determined by comparing this rate of return to the internal rate of return for the use of these funds in an alternative enterprise. If the internal rate of return in an alternative use is greater, then the proposed production control system should be rejected even though this investment could earn 57.9 cents a year for each dollar invested.

It should be emphasized that the 57.9% rate of return is for only those dollars invested in a holding cooler and an inventory of carcasses, and not for the entire processing plant. The effect on the internal rate of return for the entire processing plant cannot be determined from the available data.

Sensitivity Of The Internal Rate Of Return.

The internal rate of return computed above is based on the assumption that the relationships among prices of inputs and outputs, product yield to carcass, and labor productivity remain constant. These relationships change through time and, therefore, changes in relationships were made to test the sensitivity of the internal rate of return to changes in the above cited relationships.

The varialbes chosen from Table 12 to test the sensitivity of internal rate of return on additional investment to changes in these relationships are those which change frequently in the beef processing industry. They represent yield percentage, production time, sales revenue, carcass cost, and labor cost.

The dollar value of these variables is affected in two ways: 1) by prices of inputs and outputs which are determined in the market place and are beyond the control of the individual firm, and 2) by the physical relationships among inputs and outputs which are controled in the firm through production control systems. The variables are treated in two ways to determine the value of a variable after an assumed change depending on which of the two factors is the basis for the change. If a change in price levels is assumed, a scaler factor is used to multiply each value in the column under the heading of the affected variable. If a change in a physical relationship is assumed, the degree of change in physical units; i.e., pounds or minutes, is computed and reconverted into monetary units.

These questions are posed to test the sensitivity of internal rate of return on additional investment. What is the effect when the price of products or an input changes relative to all other prices? What is the effect of attaining less than the standard calculated in previous sections of this paper?

Variances From Standard.

Yield Percentage.

The success with which line supervisors achieve standard yield of product from carcass varies from day to day. In those processing plants where accountability for yield is emphasised, the variance is small, ranging approximately ± 0.05% from standard. Because of the time required to discipline the labor force to achieve that degree of accuracy, it will be assumed that the case company will average 1% less than the standard in the first year.

To get an idea of the magnitude of a 1% decrease from standard yield, total product weight from a six hundred pound carcass fabricated into an HRI product mix according to actual yield percentages from Table 10 was calculated and compared to the standard. The HRI product mix consisted of 3 Pc. chuck, brisket, inside skirt, outside skirt, ribeye, short rib, spare rib, tenderloin, 180 loinstrip, shell sirloin, flank steak, kidney, hanging tender, knuckle, inside round, and outside round. The difference in weight is 8.76 pounds less than the standard, a difference of 1.46% of carcass weight. The assumption implies that the case company will improve its yield performance by approximately one third.

The change in value of standard yield is based on product weight and product price. It is calculated by totaling standard value of product from Table 10 and subtracting 1% of the total. Total actual value of product is subtracted but the difference, $61,863.72, represents only part of the change in the item Standard Yield in Table 13. The difference in actual and standard product weight, 62,261.0 pounds, is assumed to be divided among 50-60 trim, 25-75 trim, tallow, and bone in the same proportions as in Appendix Table A. The value of trim, tallow, and bone is $18,436.73 and is added to the $61,863.72 to arrive at a value of $80,300.45 which is a 1% decrease in Standard Yield from Table 12 under this assumption. This figure is entered under the Standard Yield heading in the upper section of Table 13.

The effect of a decrease of 1% from standard yield can be seen in the lower section of Table 13. Internal rate of return on additional investment is reduced to 42.6%. The change in net operating income, found under the heading Net Benefit, was reduced by $11,966.00. Even so, operating losses would have been reduced $49,682.00 from actual operating losses over the six week period under study by improving yield performance by approximately one third.

Production Time.

When production time was calculated in the previous analysis, the assumptions concerning downtime were restrictive, although not beyond reasonable expectation. A 1% increase in downtime is assumed to test the sensitivity of internal rate of return on additional investment to an increase in downtime. The item in Table 14 in which this change appears is under the heading Labor Wages.

For an eight hour production day, a 1% increase in production time translates into approximately five additional minutes. Regular man-hours and regular hourly wage rates are used to compute standard labor wages under this assumption. Actual labor wages are subtracted from this figure and the savings in labor wages is reduced from $43,999.00 in Table 12 to $41,294.00 in the upper section of Table 14.

Table 13: Internal Rate Of Return On Additional Investment Assuming A 1% Decrease In Standard Yield.

```
                                           RATE OF RETURN ON ADDITIONAL INVESTMENT
                                       PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS
         HOLDING  CARCASS   PRIMAL   QUARTER STANDARD  SHRINK   CARCASS   PACK.    LABOR  RETURNED
PERIOD _COOLER_ __INV.__ _SALES__ __SALES_ _YIELD__ __LOSS__ _EXPENSE _EXPENSE __WAGES_ PRODUCT_ ________ ________ ________

 0      706560.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 1           0.  277133.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 2           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 3           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 4           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 5           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 6           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 7           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 8           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
 9           0.       0.    7809.   37513.   80300.  -95535.   27909.    5942.  -43999.   -9445.       0.       0.       0.
10     -635904. -277133.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.


                          I N V E S T M E N T   F E A S I B I L I T Y   A N A L Y S I S

                                       RATE OF RETURN ON ADDITIONAL INVESTMENT
                                    PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS

                                    DIRECT RETURN ON TOTAL CAPITAL  __42.632_ PERCENT

             ______INVESTMENT (DOLLARS )_______   _________OPERATING (DOLLARS )_____      PRESENT  ___PRESENT VALUES_____
___PERIOD___             WORKING                      DIRECT   OPERATING        NET      VALUE      TOTAL          NET
_NO.__IDENT.  FACILITIES ___CAPITAL ____TOTAL_   ___BENEFIT _EXPENSES_**___BENEFIT      _FACTOR  INVESTMENT   ___BENEFIT
 0               706560.        0.    706560.           0.          0.          0.      1.0000     706560.          0.
 1                    0.   277133.    277133.       30087.     -19594.      49681.      0.9599     266012.      47688.
 2                    0.        0.         0.       30087.     -19594.      49681.      0.9214          0.      45774.
 3                    0.        0.         0.       30087.     -19594.      49681.      0.8844          0.      43937.
 4                    0.        0.         0.       30087.     -19594.      49681.      0.8489          0.      42174.
 5                    0.        0.         0.       30087.     -19594.      49681.      0.8148          0.      40481.
 6                    0.        0.         0.       30087.     -19594.      49681.      0.7821          0.      38857.
 7                    0.        0.         0.       30087.     -19594.      49681.      0.7507          0.      37296.
 8                    0.        0.         0.       30087.     -19594.      49681.      0.7206          0.      35801.
 9                    0.        0.         0.       30087.     -19594.      49681.      0.6917          0.      34364.
10           _-635904._  _-277133._ _-913037._  ________0._ _______0._ _______0._      0.6639  _-606195._  _______0._
      TOTAL       70656.        0.     70656.      270785.    -176346.     447131.                 366373.     366373.

____________
**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.1: 1% DECREASE IN STANDARD YIELD
ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.
```

13

Table 14: Internal Rate Of Return On Additional Investment Assuming A 1% Increase In Production Time.

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

PERIOD	HOLDING COOLER	CARCASS INV.	PRIMAL SALES	QUARTER SALES	STANDARD YIELD	SHRINK LOSS	CARCASS EXPENSE	PACK. EXPENSE	LABOR WAGES	RETURNED PRODUCT			
0	706560.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	0.	277133.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
2	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
3	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
4	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
5	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
6	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
7	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
8	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
9	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-41294.	-9445.	0.	0.	0.
10	-635904.	-277133.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

INVESTMENT FEASIBILITY ANALYSIS

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

DIRECT RETURN ON TOTAL CAPITAL 54.301 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (DOLLARS) DIRECT BENEFIT	OPERATING EXPENSES **	NET BENEFIT	PRESENT VALUE FACTOR	PRESENT VALUES TOTAL INVESTMENT	NET BENEFIT
0		706560.	0.	706560.	0.	0.	0.	1.0000	706560.	0.
1		0.	277133.	277133.	42053.	-16889.	58942.	0.9512	263610.	56066.
2		0.	0.	0.	42053.	-16889.	58942.	0.9048	0.	53330.
3		0.	0.	0.	42053.	-16889.	58942.	0.8606	0.	50728.
4		0.	0.	0.	42053.	-16889.	58942.	0.8186	0.	48252.
5		0.	0.	0.	42053.	-16889.	58942.	0.7787	0.	45898.
6		0.	0.	0.	42053.	-16889.	58942.	0.7407	0.	43658.
7		0.	0.	0.	42053.	-16889.	58942.	0.7046	0.	41528.
8		0.	0.	0.	42053.	-16889.	58942.	0.6702	0.	39501.
9		0.	0.	0.	42053.	-16889.	58942.	0.6375	0.	37574.
10		-635904.	-277133.	-913037.	0.	0.	0.	0.6064	-553635.	0.
	TOTAL	70656.	0.	70656.	378480.	-151597.	530417.		416535.	416535.

**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.2: 1% INCREASE IN PRODUCTION TIME.
ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.

The effect of a 1% increase in production time on internal rate of return on additional investment can be seen in the lower section of Table 14. Under this assumption internal rate of return is 54.3%, a 3.6% reduction from the rate of return with standard production time.

Variances In Price Relationships.

The following six tests of the sensitivity of internal rate of return on additional investment are for changes in price relationships. These changes are not controlable by the firm, but are determined in the marketplace.

The changes assumed in the following cases refer to changes in the value of a variable relative to the others, not in terms of an absolute value for a variable. For instance, a 1% increase in carcass cost means the cost of carcasses increases 1% more than sales revenue, labor cost, utilities, construction costs, etc. The effect on internal rate of return would be the same for a 1% increase in carcass cost if all variables increased by 10% and carcass cost increased by 11% as it would if only carcass cost increased by 1% from the levels presented in the base case. However, the change in net operating income shown in the column headed Net Benefit has relevance only for price levels presented in the base case.

Sales Revenue.

To test the sensitivity of internal rate of return on additional investment to a change in the price of all products relative to the other variables, a 1% increase(decrease) is assumed for each of the items in Table 12 from which a change in sales revenue is derived. These items are Primal Sales, Quarter Sales, Standard Yield, and Shrink Loss.

A list of data under the assumption of a 1% change in the price of products is shown in the upper sections of Tables 15 and 16. Notice that a row headed Scalers is added to the upper sections of these tables. Each number in this row multiplies the elements in the column in which it is. The value of this number represents the magnitude of the change assumed for each case. The number 1.01 represents an increase of 1% while the number .99 represents a decrease of 1%.

Table 15: Internal Rate Of Return On Additional Investment Assuming A 1% Increase In Product Price.

```
                                           RATE OF RETURN ON ADDITIONAL INVESTMENT
                                    PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS
           HOLDING   CARCASS   PRIMAL   QUARTER STANDARD  SHRINK   CARCASS    PACK.     LABOR   RETURNED
 PERIOD   _COOLER_  __INV.__  _SALES__ __SALES_ _YIELD__ __LOSS__ _EXPENSE_ _EXPENSE_ __WAGES_ PRODUCT_  _______  _______  _______

SCALERS:   1.0000    1.0000    1.0100   1.0100   1.0100   1.0100   1.0000    1.0000    1.0000   1.0000    0.0      0.0      0.0

   0      706560.       0.        0.       0.       0.       0.       0.        0.        0.       0.       0.       0.       0.
   1          0.   277133.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   2          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   3          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   4          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   5          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   6          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   7          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   8          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
   9          0.        0.     7887.   37888.   93189.  -96491.   27909.     5942.   -43999.   -9445.       0.       0.       0.
  10    -635904.  -277133.        0.       0.       0.       0.       0.        0.        0.       0.       0.       0.       0.


                           I N V E S T M E N T   F E A S I B I L I T Y   A N A L Y S I S

                                      RATE OF RETURN ON ADDITIONAL INVESTMENT
                                   PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS

                                     DIRECT RETURN ON TOTAL CAPITAL  __58.450_ PERCENT

             ______INVESTMENT_(DOLLARS_)______     _________OPERATING_(DOLLARS_)_____      PRESENT  ___PRESENT_VALUES_____
___PERIOD___                 WORKING                  DIRECT    OPERATING       NET        VALUE      TOTAL         NET
_NO.__ IDENT.  FACILITIES  ___CAPITAL   ____TOTAL_   ___BENEFIT _EXPENSES_**___BENEFIT     _FACTOR   INVESTMENT  ___BENEFIT
   0              706560.          0.     706560.           0.          0.          0.      1.0000     706560.          0.
   1                  0.      277133.     277133.       42474.     -19594.      62068.      0.9483     262804.      58859.
   2                  0.           0.          0.       42474.     -19594.      62068.      0.8993          0.      55816.
   3                  0.           0.          0.       42474.     -19594.      62068.      0.8528          0.      52930.
   4                  0.           0.          0.       42474.     -19594.      62068.      0.8087          0.      50193.
   5                  0.           0.          0.       42474.     -19594.      62068.      0.7669          0.      47598.
   6                  0.           0.          0.       42474.     -19594.      62068.      0.7272          0.      45137.
   7                  0.           0.          0.       42474.     -19594.      62068.      0.6896          0.      42803.
   8                  0.           0.          0.       42474.     -19594.      62068.      0.6540          0.      40590.
   9                  0.           0.          0.       42474.     -19594.      62068.      0.6202          0.      38492.
  10            _-635904._  _-277133._  _-513037._   _______0._  _______0._  _______0._    0.5881   _-536547._  _______0._
        TOTAL      70656.           0.      70656.      382265.    -176346.     558611.                432417.     432417.

____________
**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.3: 1% INCREASE IN PRODUCT PRICE.
ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.
```

Table 16: Internal Rate Of Return On Additional Investment Assuming A 1% Decrease In Product Price.

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

PERIOD	HOLDING COOLER	CARCASS INV.	PRIMAL SALES	QUARTER SALES	STANDARD YIELD	SHRINK LOSS	CARCASS EXPENSE	PACK. EXPENSE	LABOR WAGES	RETURNED PRODUCT			
SCALERS:	1.0000	1.0000	0.9900	0.9500	0.9500	0.9300	1.0000	1.0000	1.0000	1.0000	0.0	0.0	0.0
0	706560.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	0.	277133.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
2	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
3	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
4	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
5	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
6	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
7	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
8	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
9	0.	0.	7731.	37138.	91344.	-94580.	27909.	5942.	-43999.	-9445.	0.	0.	0.
10	-635904.	-277133.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

INVESTMENT FEASIBILITY ANALYSIS

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

DIRECT RETURN ON TOTAL CAPITAL 57.323 PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT VALUE	PRESENT VALUES	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	DIRECT BENEFIT	OPERATING EXPENSES **	NET BENEFIT	FACTOR	TOTAL INVESTMENT	NET BENEFIT
0		706560.	0.	706560.	0.	0.	0.	1.0000	706560.	0.
1		0.	277133.	277133.	41633.	-19594.	61227.	0.9491	263021.	58109.
2		0.	0.	0.	41633.	-19594.	61227.	0.9007	0.	55150.
3		0.	0.	0.	41633.	-19594.	61227.	0.8549	0.	52342.
4		0.	0.	0.	41633.	-19594.	61227.	0.8113	0.	49678.
5		0.	0.	0.	41633.	-19594.	61227.	0.7700	0.	47147.
6		0.	0.	0.	41633.	-19594.	61227.	0.7308	0.	44746.
7		0.	0.	0.	41633.	-19594.	61227.	0.6936	0.	42467.
8		0.	0.	0.	41633.	-19594.	61227.	0.6583	0.	40305.
9		0.	0.	0.	41633.	-19594.	61227.	0.6248	0.	38252.
10		-635904.	-277133.	-913037.	0.	0.	0.	0.5930	-541387.	0.
	TOTAL	70656.	0.	70656.	374695.	-176346.	551041.		428194.	428194.

**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.4: 1% DECREASE IN PRODUCT PRICE.
ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.

The number 1.0 shows there is no change in that column.

The effect on internal rate of return on additional investment is shown in the lower sections of Tables 15 and 16. An increase of 1% in product price relative to all other variables raises the internal rate of return from 57.9% in the base case to 58.5%. A decrease of 1% in product price lowers the internal rate of return on additional investment to 57.3%, the difference is ± 0.5%; the internal rate of return is relatively insensitive to this change.

The average price per poind was $1.20 during the six week period under study. A change of ± $0.012 increases (decreases) the change in net operating income by ± $420.00 which is the difference between the $61,647.00 under the Net Benefit heading in Table 12 and the figure under the same heading in Tables 15 and 16.

Carcass Cost.

Another variable that changes as frequently as product price is the price of carcasses. To test the sensitivity of internal rate of return on additional investment to a change in the price of carcasses, a 1% change is assumed for those items which reflect carcass price, Carcass Inventory and Carcass Expense. Carcass Inventory is included because this item reflects the value of carcasses held in the holding cooler.

The effect of a 1% change in the price of carcasses relative to all other variables is shown in the lower sections of Tables 17 and 18. The effect of a 1% change in carcass price is almost the same as a 1% change in product price discussed in the prefious section although the two effects are in opposite directions. The change in internal rate of return is identical, 58.5%, but the dollar value of the change is slightly less in the case of carcass price, ± $229.00 versus ± $420.00 for a change in product price.

Labor Cost.

Labor cost is a variable which varies in two ways: 1) with the price of labor and 2) with the productivity of labor. Variance due to the price of

Table 17: Internal Rate Of Return On Additional Investment Assuming A 1% Increase In Carcass Cost.

```
                                            RATE UF RETURN CN AOOITICNAL INVESTMENT
                                       PROPOSEO VS. PRESENT PRODUCTICN CONTROL  SYSTEMS
           HOLOING   CARCASS   PRIMAL   QUARTER STANOARD  SHRINK   CARCASS   PACK.     LABCR   RETURNED
 PERIOD  _COOLER_  __INV.__  _SALES__  __SALES_ _YIELD__ __LOSS__ _EXPENSE _EXPENSE __WAGES_ PRODUCT_  ________  ________  ________

 SCALERS:  1.0000    1.0100    1.0000    1.0000   1.0000   1.0000   1.C100   1.0000   1.0000   1.0000   0.0       0.0       0.0

   0      706560.        0.        0.        0.       0.       0.       0.       0.       0.       0.       0.        0.        0.
   1           0.   279904.     7809.    37513.   92267.  -95535.   28188.    5942.  -43999.   -9445.       0.        0.        0.
   2           0.        0.     7809.    37513.   92267.  -95535.   28186.    5542.  -43999.   -9445.       0.        0.        0.
   3           0.        0.     7809.    37513.   92267.  -95535.   28188.    5942.  -43999.   -9445.       0.        0.        0.
   4           0.        0.     7809.    37513.   92267.  -95535.   28188.    5942.  -43999.   -9445.       0.        0.        0.
   5           0.        0.     7809.    37513.   92267.  -95535.   28188.    5942.  -43999.   -9445.       0.        0.        0.
   6           0.        0.     7809.    37513.   92267.  -95535.   28188.    5942.  -43999.   -9445.       0.        0.        0.
   7           0.        0.     7809.    37513.   92267.  -95535.   28188.    5942.  -43999.   -9445.       0.        0.        0.
   8           0.        0.     7809.    37513.   92267.  -95535.   28188.    5542.  -43959.   -9445.       0.        0.        0.
   9           0.        0.     7809.    37513.   92267.  -95535.   28188.    5942.  -43999.   -9445.       0.        0.        0.
  10     -635904.  -279904.        0.        0.       0.       0.       0.       0.       0.       0.       0.        0.        0


                        I N V E S T M E N T   F E A S I B I L I T Y   A N A L Y S I S

                                      RATE OF RETURN CN ACOITIONAL INVESTMENT
                                     PROPOSEO VS. PRESENT PROOUCTION CONTROL  SYSTEMS

                                      CIRECT RETURN ON TOTAL CAPITAL   __57.323_ PERCENT

                  _____INVESTMENT (DOLLARS )_______      _________OPERATING (OOLLARS )_____       PRESENT  ___PRESENT VALUES_____
 ___PERIOD___                 WORKING                      OIRECT    OPERATING        NET        VALUE       TOTAL          NET
 _NO.__ IDENT.   FACILITIES  ___CAPITAL  ____TOTAL_     ___BENEFIT  _EXPENSES_**___BENEFIT     _FACTOR  INVESTMENT    ___BENEFIT
   0               706560.          0.    7C656C.             0.           0.          0.      1.0000     706560.             0.
   1                    0.     279904.    279904.         42053.      -19315.      61368.      0.9491     265651.         58243.
   2                    0.          0.         0.         42053.      -19315.      61368.      0.9007          0.         55277.
   3                    0.          0.         0.         42053.      -19315.      61368.      0.8549          0.         52463.
   4                    0.          0.         0.         42053.      -19315.      61368.      0.8113          0.         49791.
   5                    0.          0.         0.         42053.      -19315.      61368.      0.7700          0.         47256.
   6                    0.          0.         0.         42053.      -19315.      61368.      0.7308          0.         44849.
   7                    0.          0.         0.         42053.      -19315.      61368.      0.6936          0.         42565.
   8                    0.          0.         0.         42053.      -19315.      61368.      0.6583          0.         40398.
   9                    0.          0.         0.         42053.      -19315.      61368.      0.6248          0.         38341.
  10             _-635904._  _-279904._  _-915808._   _______0._   _______0._  _______0._    0.5929   _-543028._     _______0._
         TOTAL      70656.          0.     70656.        378480.     -173834.     552314.                 429183.        429183.

 ____________
 **EXCLUDING DEPRECIATICN, INTEREST, ANO INCUME TAX

 ALTERNATIVE:
 ALT.5: 1% INCREASE IN CARCASS COST.
 ALL OTHER BASE CASE CONOITICNS ARE UNCHANGED.
```

Table 18: Internal Rate Of Return On Additional Investment Assuming A 1% Decrease In Carcass Cost.

```
                                      RATE OF RETURN ON ADDITIONAL INVESTMENT
                                  PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS
         HOLDING  CARCASS  PRIMAL  QUARTER STANDARD  SHRINK   CARCASS   PACK.    LABOR   RETURNED
PERIOD  _COOLER_  __INV.__ _SALES_ __SALES_ _YIELD__ __LOSS__ _EXPENSE _EXPENSE __WAGES_ PRODUCT_ _______ _______ _______

SCALERS:  1.0000   0.9900  1.0000   1.0000   1.0000   1.0000   0.9900   1.0000   1.0000   1.0000   0.0     0.0     0.0

  0     706560.       0.       0.       0.       0.       0.       0.       0.       0.       0.      0.      0.      0.
  1         0.   274362.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  2         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  3         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  4         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  5         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  6         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  7         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  8         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
  9         0.       0.    7809.   37513.   92267.  -95535.   27629.    5942.  -43999.   -9445.      0.      0.      0.
 10   -635904. -274362.       0.       0.       0.       0.       0.       0.       0.       0.      0.      0.      0.


                        I N V E S T M E N T   F E A S I B I L I T Y   A N A L Y S I S

                               RATE OF RETURN ON ADDITIONAL INVESTMENT
                            PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS

                            DIRECT RETURN ON TOTAL CAPITAL  __58.453_ PERCENT

            ______INVESTMENT_(DOLLARS_)_______   __________OPERATING_(DOLLARS_)_____   PRESENT  ___PRESENT_VALUES_____
___PERIOD___                 WORKING                DIRECT    OPERATING       NET       VALUE      TOTAL          NET
_NO.__ IDENT.  FACILITIES  ___CAPITAL  ____TOTAL_ ___BENEFIT _EXPENSES_**___BENEFIT  _FACTOR  INVESTMENT  ___BENEFIT
  0              706560.        0.     706560.         0.          0.          0.    1.0000     706560.          0.
  1                  0.    274362.     274362.     42053.     -19873.      61926.    0.9483     260176.      58725.
  2                  0.         0.          0.     42053.     -19873.      61926.    0.8993          0.      55688.
  3                  0.         0.          0.     42053.     -19873.      61926.    0.8528          0.      52809.
  4                  0.         0.          0.     42053.     -19873.      61926.    0.8087          0.      50078.
  5                  0.         0.          0.     42053.     -19873.      61926.    0.7669          0.      47489.
  6                  0.         0.          0.     42053.     -19873.      61926.    0.7272          0.      45034.
  7                  0.         0.          0.     42053.     -19873.      61926.    0.6896          0.      42705.
  8                  0.         0.          0.     42053.     -19873.      61926.    0.6540          0.      40497.
  9                  0.         0.          0.     42053.     -19873.      61926.    0.6201          0.      38403.
 10           _-635904._ _-274362._ _-910266._ _______0._ _______0._ ________0._    0.5881  _-535308._  ________0._
      TOTAL       70656.        0.      70656.    378480.    -178858.     557338.                431426.     431428.
___________
**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.6: 1% DECREASE IN CARCASS COST.
ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.
```

labor is self explanatory. Variance due to productivity has to do with labor use. As labor productivity increases, more output is produced in the same period of time, or the same amount of output is produced in less time. In either case, the cost of labor decreases relative to sales revenue, carcass cost, packaging cost, etc.

The item Labor Wages, as well as the other revenue and expense items, represents the <u>change</u> in a variable from the situation as it was during the six week period under study to the situation as was calculated according to standards in the proposed production control system. In the case presented in Table 14 a change in labor cost relative to all other variables tests the sensitivity of internal rate of return to a change affecting both the actual situation and the proposed situation. This type of change arises from a change in price of labor or a change in productivity of labor which would occur under either situation.

The effect of a 1% change in labor cost relative to all other variables on internal rate of return is presented in Tables 19 and 20. The result, ± 0.06%, is again very close to the results for changes in product price and carcass price. The difference in the change of net operating income for the six week period under study is ± $440.00.

The effects of changes in price levels on internal rate of return are small compared to the effects of a change in yield percentage or a change in production time. This is due to the magnitude of the variance in the <u>difference</u> between the actual situation and the proposed situation. The effect of changes in these variables; i.e., product price, carcass cost, labor cost, on the internal rate of return for the entire plant under either the actual situation or the situation as calculated according to the standards in the proposed production control system would be much greater. Never-the-less, the profitability of the investment in a holding cooler and the working capital required for one day's supply of carcasses is based on the difference

Table 19: Internal Rate Of Return On Additional Investment Assuming A 1% Increase In Labor Cost.

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

PERIOD	HOLDING COOLER	CARCASS INV.	PRIMAL SALES	QUARTER SALES	STANDARD YIELD	SHRINK LOSS	CARCASS EXPENSE	PACK. EXPENSE	LABOR WAGES	RETURNED PRODUCT			
SCALERS:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0100	1.0000	0.0	0.0	0.0
0	706560.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	0.	277133.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
2	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
3	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
4	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
5	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
6	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
7	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
8	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
9	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-44439.	-9445.	0.	0.	0.
10	-635904.	-277133.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

DIRECT RETURN ON TOTAL CAPITAL 58.476 PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT VALUE	PRESENT VALUES	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	DIRECT BENEFIT	OPERATING EXPENSES **	NET BENEFIT	FACTOR	TOTAL INVESTMENT	NET BENEFIT
0		706560.	0.	706560.	0.	0.	0.	1.0000	706560.	0.
1		0.	277133.	277133.	42053.	-20034.	62087.	0.9483	262799.	58876.
2		0.	0.	0.	42053.	-20034.	62087.	0.8992	0.	55831.
3		0.	0.	0.	42053.	-20034.	62087.	0.8527	0.	52943.
4		0.	0.	0.	42053.	-20034.	62087.	0.8086	0.	50205.
5		0.	0.	0.	42053.	-20034.	62087.	0.7668	0.	47608.
6		0.	0.	0.	42053.	-20034.	62087.	0.7271	0.	45146.
7		0.	0.	0.	42053.	-20034.	62087.	0.6895	0.	42811.
8		0.	0.	0.	42053.	-20034.	62087.	0.6539	0.	40597.
9		0.	0.	0.	42053.	-20034.	62037.	0.6200	0.	38497.
10		-635904.	-277133.	-913037.	0.	0.	0.	0.5880	-546845.	0.
	TOTAL	70656.	0.	70656.	378480.	-180306.	558786.		432514.	432514.

**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.7: 1% INCREASE IN LABOR COST.
ALL OTHER BASE CASE CONDITIONS WILL REMAIN UNCHANGED.

Table 20: Internal Rate Of Return On Additional Investment Assuming A 1% Decrease In Labor Cost.

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

PERIOD	HOLDING CYCLES	CARCASS INV.	PRIMAL SALES	QUARTER SALES	STANDARD YIELD	SHRINK LOSS	CARCASS EXPENSE	PACK. EXPENSE	LABOR WAGES	RETURNED PRODUCT			
SCALERS:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9900	1.0000	0.0	0.0	0.0
0	706560.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1	0.	277133.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
2	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
3	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
4	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
5	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
6	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
7	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
8	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
9	0.	0.	7809.	37513.	92267.	-95535.	27909.	5942.	-43559.	-9445.	0.	0.	0.
10	-635904.	-277133.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

INVESTMENT FEASIBILITY ANALYSIS

RATE OF RETURN ON ADDITIONAL INVESTMENT
PROPOSED VS. PRESENT PRODUCTION CONTROL SYSTEMS

DIRECT RETURN ON TOTAL CAPITAL __57.297_ PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT VALUE FACTOR	PRESENT VALUES	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	DIRECT BENEFIT	OPERATING EXPENSES **	NET BENEFIT		TOTAL INVESTMENT	NET BENEFIT
0		706560.	0.	706560.	0.	0.	0.	1.0000	706560.	0.
1		0.	277133.	277133.	42053.	-19154.	61207.	0.9491	263026.	58092.
2		0.	0.	0.	42053.	-19154.	61207.	0.9008	0.	55135.
3		0.	0.	0.	42053.	-19154.	61207.	0.8549	0.	52326.
4		0.	0.	0.	42053.	-19154.	61207.	0.8114	0.	49664.
5		0.	0.	0.	42053.	-19154.	61207.	0.7701	0.	47136.
6		0.	0.	0.	42053.	-19154.	61207.	0.7309	0.	44737.
7		0.	0.	0.	42053.	-19154.	61207.	0.6937	0.	42459.
8		0.	0.	0.	42053.	-19154.	61207.	0.6584	0.	40298.
9		0.	0.	0.	42053.	-19154.	61207.	0.6249	0.	38247.
10		-635904.	-277133.	-913037.	0.	0.	0.	0.5931	-541490.	0.
	TOTAL	70656.	0.	70656.	378480.	-172386.	550866.		428096.	428096.

**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.8: 1% DECREASE IN LABOR COST.
ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.

between the two situations. And, as was seen by the analysis, a change in the distribution of product weight; i.e., standard yield, and increased efficiency of labor usage; i.e., production time, had a greater effect on internal rate of return; i.e., 15.3% for the former and 3.6% for the latter.

Variability Of Internal Rate Of Return On Additional Investment.

Two combinations of the variables tested above were formed to estimate the range of variability of internal rate of return on additional investment under the most favorable and the least favorable conditions assumed in the previous analysis.

The most favorable condition was formed by the following combination of variables: achieving standard yield in standard production time with a 1% increase in product price, a 1% decrease in carcass cost, and a 1% decrease in labor cost. The remaining variables were unchanged. A decrease in labor cost is assumed even though this caange lowers internal rate of return on additional investment because it benefits the operating income of the company as a whole.

The effect of this combination of variables in to raise internal rate of return on additional investment to 58.4%, an increase of 0.05% from the 57.9% found in Table 12. This rate of return is the highest rate of return that can be expected under the conditions assumed in Table 21.

The least favorable condition was formed by the following combination of variables: a decrease of 1% from standard yield and an increase of 1% in production time, also a 1% reduction of product price, a 1% increase in carcass cost, and a 1% increase in labor cost. The remaining variables were unchanged.

The effect of this combination of variables can be seen in Table 22. The effect of this combination of variables is to reduce internal rate of return on additional investment to 38.1%, a reduction of 19.8% from the 57.9% found in Table 12. This represents the lowest rate of return that can be expected under the conditions assumed.

Table 21: Variability Of Internal Rate Of Return Assuming The Most Favorable Combination Of Events.

```
                                                  RATE OF RETURN ON ADDITIONAL INVESTMENT
                                            PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS
         HOLDING   CARCASS    PRIMAL    QUARTER STANDARD  SHRINK    CARCASS    PACK.     LABOR   RETURNED
PERIOD  _COOLER_  __INV.__  _SALES__  __SALES_ _YIELD__  __LOSS__  _EXPENSE  _EXPENSE  __WAGES_  PRODUCT_  ________  ________  ________

SCALERS:  1.0000    0.9900    1.0100    1.0100    1.0100    1.0100    0.9900    1.0000    0.9900    1.0000    0.0       0.0       0.0

  0      706560.        0.        0.        0.        0.        0.        0.        0.        0.        0.
  1          0.   274362.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  2          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  3          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  4          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  5          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  6          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  7          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  8          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
  9          0.        0.     7887.    37888.    93189.   -96491.    27629.     5942.   -43559.    -9445.        0.        0.        0.
 10    -635904.  -274362.        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.        0.


                              I N V E S T M E N T   F E A S I B I L I T Y   A N A L Y S I S

                                        RATE OF RETURN ON ADDITIONAL INVESTMENT
                                      PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS

                                      DIRECT RETURN ON TOTAL CAPITAL  __58.426_ PERCENT

___PERIOD___  ------_INVESTMENT_(DOLLARS_)------   --------_OPERATING_(DOLLARS_)-----     PRESENT  ---PRESENT_VALUES-----
                            WORKING                   DIRECT    OPERATING       NET       VALUE      TOTAL          NET
_NO.__IDENT.  FACILITIES  ___CAPITAL  ____TOTAL_  ___BENEFIT  _EXPENSES_**___BENEFIT     _FACTOR   INVESTMENT  ___BENEFIT
  0              706560.         0.     706560.          0.          0.          0.      1.0000     706560.          0.
  1                  0.    274362.     274362.          0.          0.          0.      0.9483     260181.      58707.
  2                  0.         0.          0.      42474.     -19433.      61907.      0.8993          0.      55673.
  3                  0.         0.          0.      42474.     -19433.      61907.      0.8528          0.      52795.
  4                  0.         0.          0.      42474.     -19433.      61907.      0.8087          0.      50066.
  5                  0.         0.          0.      42474.     -19433.      61907.      0.7669          0.      47477.
  6                  0.         0.          0.      42474.     -19433.      61907.      0.7273          0.      45025.
  7                  0.         0.          0.      42474.     -19433.      61907.      0.6897          0.      42697.
  8                  0.         0.          0.      42474.     -19433.      61907.      0.6541          0.      40491.
  9                  0.         0.          0.      42474.     -19433.      61907.      0.6202          0.      38396.
 10          _-635904._ _-274362._ _-910266._      42474.     -19433.      61907.      0.5882  _-535410._  --------0._
      TOTAL       70656.         0.      70656.   -------0._  -------0._  -------0._                431331.     431331.
                                                    382265.    -174898.     557163.
-----------
**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.9: STANDARD YIELD.  STANDARD PRODUCTION TIME.  1% INCREASE IN PRODUCT PRICE.  1% DECREASE IN CARCASS COST.  1% DECREASE IN LABOR
COST.  ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.
```

Table 22: Variability Of Internal Rate Of Return Assuming The Least Favorable Combination Of Events.

```
                                        RATE OF RETURN ON ADDITIONAL INVESTMENT
                                  PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS
          HOLDING  CARCASS   PRIMAL   QUARTER STANDARD  SHRINK   CARCASS   PACK.    LABOR   RETURNED
 PERIOD   COOLER    INV.     SALES     SALES   YIELD     LOSS    EXPENSE  EXPENSE   WAGES   PRODUCT   _______  _______  _______
SCALERS:  1.0000   1.0100   0.9900    0.9900  0.9900   0.9900   1.0100    1.0000   0.9900   1.0000    0.0      0.0      0.0
   0     706560.       0.       0.        0.      0.       0.       0.        0.       0.       0.       0.       0.       0.
   1         0.   279904.    7731.    37138.  79497.  -94580.   28188.     5942.  -40881.      0.       0.       0.       0.
   2         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
   3         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
   4         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
   5         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
   6         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
   7         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
   8         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
   9         0.       0.     7731.    37138.  79497.  -94580.   28188.     5942.  -40881.   -9445.      0.       0.       0.
  10    -635904. -279904.       0.        0.      0.       0.       0.        0.       0.   -9445.      0.       0.       0.
                                                                                           0.       0.       0.       0.

                        I N V E S T M E N T   F E A S I B I L I T Y   A N A L Y S I S

                                    RATE OF RETURN ON ADDITIONAL INVESTMENT
                                 PROPOSED VS. PRESENT PRODUCTION CONTROL  SYSTEMS

                                    DIRECT RETURN ON TOTAL CAPITAL  __38.102_ PERCENT

___PERIOD___   ______INVESTMENT (DOLLARS )______     _________OPERATING (DOLLARS )_____    PRESENT   ___PRESENT VALUES_____
_NO.__IDENT.                  WORKING                  DIRECT     OPERATING       NET       VALUE        TOTAL        NET
                FACILITIES    CAPITAL     ___TOTAL_  ___BENEFIT _EXPENSES_**___BENEFIT    _FACTOR    INVESTMENT  ___BENEFIT
   0             706560.          0.       706560.         0.          0.          0.      1.0000      706560.          0.
   1                 0.      279904.       279904.     29786.     -16197.      45983.      0.9635      269674.      44302.
   2                 0.           0.           0.      29786.     -16197.      45983.      0.9282           0.      42683.
   3                 0.           0.           0.      29786.     -16197.      45983.      0.8943           0.      41123.
   4                 0.           0.           0.      29786.     -16197.      45983.      0.8616           0.      39620.
   5                 0.           0.           0.      29786.     -16197.      45983.      0.8301           0.      38172.
   6                 0.           0.           0.      29786.     -16197.      45983.      0.7998           0.      36777.
   7                 0.           0.           0.      29786.     -16197.      45983.      0.7706           0.      35432.
   8                 0.           0.           0.      29786.     -16197.      45983.      0.7424           0.      34137.
   9                 0.           0.           0.      29786.     -16197.      45983.      0.7153           0.      32890.
  10           _-635904._  _-279904._  _-915808._  _______0._ _______0._ _______0._    0.6891   _-631098._  ________0._
       TOTAL      70656.          0.        70656.    268077.    -145765.     413846.                 345136.     345136.
____________

**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE:
ALT.10: 1% DECREASE IN STANDARD YIELD.  1% INCREASE IN PRODUCTION TIME.  1% DECREASE IN PRODUCT PRICE.  1% INCREASE IN CARCASS COST.
1% INCREASE IN LABOR COST.  ALL OTHER BASE CASE CONDITIONS ARE UNCHANGED.
```

Appendix Table A.

Appendix Table A depicts actual weekly production, by product, for the processing unit. The figures in the table were derived from the inventory record and the weekly carcass report.

The procedure used to derive the figures in Appendix Table A was the following:

1. (a) The products were arranged according to the primal from which they were obtained. The products were segregated according to the quality grade and weight range.

   (b) To find the number of pieces of each product produced, the number of boxes of each product was multiplied by the stnadard number of pieces packed in each box.

   (c) The number of pieces and the daily total weight of each product was summed for the week.

   (d) The number of pieces of those products which differed only by weight range were summed as was their total weight.

2. (a) The average carcass side weight was derived from the weekly carcass report by dividing the weekly total carvass weight by the weekly total number of carcass sides.

   (b) The percentage yield of product to carcass was figured according to the formula discribed earlier.

3. (a) An estimate of the daily partial count was made by totalling all the products processed from the major subprimal groups as described earlier. These totals were segregated according to quality grade but summed over weight ranges.

   (b) Adjustments to the number of pieces of each product produced that day were made on the basis of the estimated partial count.

   (c) Adjustments to the daily total weight of each product were made by multiplying the adjustment number of pieces of the product by the average carcass side weight and multiplying this figure by the yield of product to carcass percentage found in Step 2(b). This figure was added to the previous daily total weight of each product.

4. (a) Since the company could not supply data for carcass sales, it was assumed that the difference between the number of carcasses processed and the number of primals accounted for after Step 3(b) was the number of primals produced for that day.

   (b) The number of primals derived -n the previous step were multiplied by the average carcass side weight and this figure was multiplied by the standard yield of primal to carcass to derive the total weight of primals produced.

5. (a) The daily total weight of each product was multiplied by its daily price. In the case of a price differential between weight ranges of the same product, the daily total weight was multiplied by a weighted average of the prices over all weight ranges. The weighted average price was found by multiplying each price by the weight found in Step 1(a) and dividing by the total of those weights. This price was then multiplied by the weight found in Step 3(c).

   (b) Prices for the primals were obtained from the "Yellow Sheet" for that day and are assumed to be the applicable prices. These prices were multiplied by the daily total weight of each primal as found in Step 4(b).

6. (a) All daily figures were summed for the week and are presented in Appendix Table A.

Appendix Table A
Actual Weekly Production By Number Of Carcasses,
Weight Of Product, Value Of Product, And Yield Of Product To Carcass

Week Ending	Unit	Chuck Roll	Chuck Clod	Chuck Tender	Choice 3 Pc. Chuck	Good 3 Pc. Chuck	Prime C-P Chuck
6-23	#	312.5	312.5	312.5	869.5	827.0	53.0
	lb	13,423.1	11,657.6	1,579.9	133,784.8	127,207.7	9,281.5
	$	14,765.41	12,357.06	1,801.09	121,279.70	114,486.93	10,517.21
	Yd[1]	6.37	5.53	.75	22.83	22.83	26.07
7-1	#	114.0	114.0	114.0	862.0	735.0	0
	lb	4,955.8	4,477.4	601.0	128,826.1	109,784.9	0
	$	5,054.92	4,535.50	701.56	108,213.93	94,138.96	0
	Yd	6.68	6.03	.81	22.95	22.95	0
7-8	#	180.5	180.5	180.5	1,183.5	295.0	34.5
	lb	8,100.3	6,971.5	919.1	186,248.9	46,416.5	5,968.0
	$	9,272.82	7,849.77	1,107.71	165,852.84	42,419.16	6,329.55
	Yd	6.62	5.70	.75	23.22	23.22	25.48
7-15	#	80.0	80.0	80.0	1,817.0	1,039.0	0
	lb	3,714.0	3,314.5	364.4	289,626.8	165,618.1	0
	$	4,419.65	3,762.79	444.57	267,686.34	155,275.55	0
	Yd	6.80	6.07	.67	23.34	23.34	0
7-22	#	362.0	362.0	362.0	1,305.5	869.5	10.0
	lb	14,452.6	13,447.6	1,818.5	200,460.0	137,714.3	1,642.0
	$	16,825.10	15,432.82	2,218.57	179,783.87	123,300.88	1,894.33
	Yd	6.04	5.62	.76	23.23	23.23	24.85
7-29	#	202.0	202.0	202.0	1,113.0	578.0	24.0
	lb	8,062.9	7,216.4	993.3	176,387.4	91,637.9	4,007.9
	$	9,197.06	8,082.37	1,203.08	156,895.79	81,557.73	4,161.06
	Yd	5.86	5.24	.72	23.27	23.27	24.94

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[1] Yd is the percentage yield of product to carcass.

Appendix Table A (Cont.)

Week Ending	Unit	Choice C-P Chuck	Good C-P Chuck	Primal Chuck	CHUCK TOTAL	Choice Ribeye	Good Ribeye
6-23	#	184.5	14.0	0	2,260.5	196.0	0
	lb	32,440.8	2,475.1	0	331,850.5	3,333.9	0
	$	24,303.83	1,856.32	0	302,367.54	12,668.82	0
	Yd	26.07	26.07	0		2.52	0
7-1	#	209.0	7.0	0	1,927.0	0	84.0
	lb	33,542.0	1,126.7	0	283,313.9	0	1,316.7
	$	26,162.76	845.02	0	239,652.65	0	4,147.60
	Yd	24.65	24.65	0		0	2.41
7-8	#	233.0	160.0	22.0	2,108.5	185.5	80.5
	lb	40,304.6	27,680.7	4,325.6	326,935.2	3,079.6	1,338.8
	$	31,437.58	20,760.52	3,298.27	288,296.78	11,428.41	4,217.21
	Yd	25.48	25.48	29.00		2.45	2.45
7-15	#	147.5	363.0	25.0	3,471.5	276.0	0
	lb	25,217.0	62,069.4	4,951.8	554,876.0	4,606.0	0
	$	19,911.55	46,552.03	3,812.89	601,865.37	16,666.99	0
	Yd	25.03	25.03	29.00		2.44	0
7-22	#	280.5	293.5	25.0	3,146.0	28.0	0
	lb	46,080.0	48,298.6	4,792.2	468,705.8	400.3	0
	$	36,864.00	37,062.24	3,522.27	416,904.08	1,421.07	0
	Yd	24.85	24.85	29.00		2.16	0
7-29	#	244.5	114.0	505.0	2,780.5	106.5	74.0
	lb	41,514.5	19,435.4	99,732.5	448,988.2	1,733.6	1,200.2
	$	33,211.60	15,548.32	71,308.74	381,165.75	5,807.57	3,720.62
	Yd	24.94	24.93	29.00		2.39	2.39

Appendix Table A (Cont.)

Week Ending	Unit	Choice Lipon Ribeye	Good Lipon Ribeye	Choice Bone-in Lipon	Good Bone-in Lipon	Choice 107 Rib	Choice 109 Rib
6-23	#	485.0	553.5	0	0	5.0	251.0
	lb	9,998.5	11,425.3	0	0	229.5	9,039.7
	$	27,595.83	29,486.49	0	0	344.25	17,356.22
	Yd	3.06	3.06	0	0	6.80	5.34
7-1	#	255.0	420.0	166.0	64.0	0	308.0
	lb	4,914.1	8,093.8	4,396.5	1,661.1	0	11,962.8
	$	12,766.66	20,234.50	9,672.30	3,405.25	0	22,297.72
	Yd	2.96	2.96	3.99	3.99	0	5.88
7-8	#	0	94.5	54.0	132.0	5.0	260.0
	lb	0	1,921.5	1,463.5	3.466.7	239.6	10,629.7
	$	0	4,793.55	3,146.52	7,453.41	359.40	19,346.02
7-15	#	1,061.0	1,086.5	120.0	80.0	160.0	90.0
	lb	22,576.5	23,115.7	3,331.1	2,151.0	8,560.1	2,855.1
	$	56,441.25	56,950.40	7,161.86	4,448.33	12,840.15	4,930.24
	Yd	3.12	3.12	3.93	3.94	7.83	4.65
7-22	#	797.0	321.5	0	0	5.0	442.0
	lb	16,300.7	6,567.9	0	0	209.1	16,419.6
	$	40,525.62	16,157.03	0	0	313.65	28,241.72
	Yd	3.09	3.09	0	0	6.33	5.62
7-29	#	923.5	0	200.0	0	13.0	84.0
	lb	20,233.2	0	5,771.5	0	560.6	3,123.6
	$	50,178.33	0	12,408.72	0	784.84	5,060.20
	Yd	3.22	0	4.24	0	6.52	5.48

Appendix Table A (Cont.)

Week Ending	Unit	Good 109 Rib	Prime 109 Rib	Choice C-P Rib	Good C-P Rib	Short Rib	Spare Rib
6-23	#	130.0	53.0	160.0	167.0	2,000.5	2,000.5
	lb	4,671.3	2,553.3	7,705.6	8,044.2	2,015.3	8,340.0
	$	7,707.64	2,947.75	11,096.07	10,859.66	1,571.93	5,594.40
	Yd	5.34	7.15	7.15	7.15	.15	.62
7-1	#	94.5	0	683.0	62.0	1,880.0	1,880.0
	lb	3,614.7	0	32,473.6	2,950.9	3,310.6	3,060.0
	$	5,855.81	0	46,761.98	3,983.71	1,724.27	2,019.60
	Yd	5.88	0	7.30	7.39	.18	.25
7-8	#	0	34.5	930.5	161.0	1,838.0	1,838.0
	lb	0	1,649.3	45,153.0	7,809.5	2,497.2	2,160.0
	$	0	1,830.73	65,020.32	10,777.22	1,947.82	1,425.60
	Yd	0	7.15	7.15	7.15	.10	.17
7-15	#	105.5	0	301.0	150.0	3,430.0	3,430.0
	lb	3,358.5	0	15,276.1	7,626.6	4,595.2	13,920.0
	$	5,362.44	0	21,997.58	10,528.71	3,584.25	9,187.20
	Yd	4.65	0	7.44	7.44	.40	.59
7-22	#	66.5	10.0	751.0	545.0	2,966.0	2,966.0
	lb	2,340.3	477.9	36,202.3	26,203.8	3,862.9	5,760.0
	$	3,650.87	530.47	50,683.22	35,113.09	3,013.06	3,801.60
	Yd	5.62	7.28	7.28	7.28	.20	.29
7-29	#	174.5	24.0	502.0	430.0	2,531.5	2,531.5
	lb	6,526.0	1,185.8	24,807.3	21,249.9	126.1	6,660.0
	$	9,789.00	1.316.24	34,729.81	28,474.87	98.36	4,395.60
	Yd	5.48	7.26	7.26	7.26	.01	.39

Appendix Table A (Cont.)

Week Ending	Unit	Primal Rib	RIB TOTAL	Tenderloin	Peeled Tenderloin	Choice #2 180 Loinstrip	Good #2 180 Loinstrip
6-23	#	260.0	2,260.5	1,812.5	0	60.0	30.0
	lb	15,771.6	83,128.2	24,288.9	0	1,171.9	585.9
	$	19,010.84	146,349.90	75,295.59	0	2,812.56	1,259.90
	Yd	9.0		1.99	0	2.90	2.90
7-1	#	45.5	1,927.0	1,453.0	0	6.0	9.0
	lb	2,665.8	74,406.5	18,963.5	0	114.6	171.9
	$	3,145.64	123,729.79	56,609.47	0	275.05	361.33
	Yd	9.0		2.00	0	2.93	2.93
7-8	#	171.0	2,108.5	1,792.0	0	60.0	9.0
	lb	10,434.4	91.842.8	24,300.3	0	1,263.6	189.5
	$	12,234.79	143,980.89	70,470.87	0	3,032.64	397.95
	Yd	9.0		2.00	0	3.11	3.11
7-15	#	41.5	3,471.5	2,248.0	283.5	108.0	60.0
	lb	2,551.0	114,522.9	30,282.6	3,040.0	1,350.6	1,305.7
	$	2,933.65	213,029.05	86,608.34	11,248.00	5,641.44	2,741.97
	Yd	9.0		1.97	1.57	3.19	3.10
7-22	#	180.0	3,146.0	1,517.0	780.0	66.0	15.0
	lb	10,780.2	125,453.0	19,653.6	7,776.9	1,389.7	315.9
	$	11,779.02	195,230.42	54,633.25	28,385.66	3,335.25	657.08
	Yd	9.0		1.96	1.51	3.19	3.19
7-29	#	249.0	2,780.5	1,920.0	343.0	73.5	25.5
	lb	15,261.2	108,439.0	25,369.6	3,454.2	1,579.6	546.7
	$	16,787.32	173,551.48	69,005.30	12,435.12	3,800.40	1,137.14
	Yd	9.0		1.94	1.48	3.15	3.15

Appendix Table A (Cont.)

Week Ending	Unit	Choice 180 Loinstrip	Good 180 Loinstrip	Choice 175 Loinstrip	Good 175 Loinstrip	Choice Top Sirloin	Good Top Sirloin
6-23	#	773.5	710.0	239.0	0	189.0	742.0
	lb	18,194.7	16,701.0	8,436.1	0	4,101.8	16,103.5
	$	46,942.33	36,742.20	14,172.65	0	8,203.60	32,207.00
	Yd	3.49	3.49	5.24	0	3.22	3.22
7-1	#	205.0	652.5	580.5	0	0	662.5
	lb	4,691.1	14,940.0	21,308.2	0	0	14,969.3
	$	12,103.14	29,581.20	35,797.77	0	0	28,995.12
	Yd	3.52	3.52	5.64	0	0	3.45
7-8	#	9.0	276.5	1,437.5	0	375.0	295.0
	lb	215.2	6,617.6	52,975.1	0	8,543.5	6,712.7
	$	555.31	13,896.96	88,998.16	0	15,895.47	12,352.31
	Yd	3.53	3.53	5.44	0	3.36	3.36
7-15	#	643.5	1,120.5	577.0	22.5	0	1,212.5
	lb	16,765.5	29,185.9	21,517.4	838.0	0	28,105.8
	$	42,584.37	61,290.39	36,149.28	1,340.80	0	50,590.92
	Yd	3.81	3.81	5.46	5.46	0	3.38
7-22	#	1,261.5	386.5	568.0	0	1,157.0	433.5
	lb	30,937.0	9,477.0	20,690.9	0	26,602.1	9,964.4
	$	78,579.98	19,901.70	34,760.71	0	45,755.63	17,537.34
	Yd	3.71	3.71	5.51	0	3.48	3.48
7-29	#	1,193.0	291.0	663.5	16.5	1,647.0	314.0
	lb	30,188.9	7,364.1	24,038.0	603.7	35,662.8	6,792.9
	$	75,472.25	15,096.41	40,385.85	965.92	60,626.76	10,868.64
	Yd	3.72	3.72	5.32	5.32	3.18	3.18

Appendix Table, A (Cont.)

Week Ending	Unit	Choice Bone-in Top	Bone-in Shell Sirloin	Full Bottom Butt	Ball Tip	Tri Tip	Flap Meat
6-23	#	0	881.5	40.0	931.0	931.0	931.0
	lb	0	42,777.4	609.5	2,949.2	3,263.0	2,384.5
	$	0	44,060.72	548.55	5,809.02	6,362.85	2,861.40
	Yd	0	7.20	2.26	.47	.52	.38
7-1	#	0	790.5	4.0	658.5	658.5	658.5
	lb	0	39,012.7	67.3	2,088.5	2,188.3	1,611.5
	$	0	39,792.95	47.11	3,968.73	4,267.18	2,094.95
	Yd	0	7.58	2.58	.49	.51	.38
7-8	#	0	1,122.0	0	670.0	670.0	670.0
	lb	0	56,455.0	0	2,226.5	2,483.1	1,961.3
	$	0	57,019.55	0	4,230.35	4,469.57	2,745.92
	Yd	0	7.42	0	.49	.55	.43
7-15	#	0	1,319.0	651.5	561.0	561.0	561.0
	lb	0	68,249.6	10,634.8	1,707.7	2,038.0	1,675.2
	$	0	71,662.08	9,444.36	3,288.63	3,260.80	2,345.28
	Yd	0	7.58	2.39	.45	.53	.44
7-22	#	120.0	586.5	1,710.5	0	0	0
	lb	3,874.7	28,554.6	26,463.7	0	0	0
	$	4,262.17	29,982.33	17,201.41	0	0	0
	Yd	4.88	7.37	2.34	0	0	0
7-29	#	302.0	0	2,263.0	0	0	0
	lb	9,118.0	0	36,417.1	0	0	0
	$	9,920.28	0	22,581.64	0	0	0
	Yd	4.43	0	2.36	0	0	0

Appendix Table A (Cont.)

Week Ending	Unit	Prime C-P Loin	Choice C-P Loin	Good C-P Loin	Loin Primal	LOIN TOTAL	Knuckle
6-23	#	53.0	155.5	109.0	115.0	2,245.0	761.5
	lb	5,083.5	15,256.9	10.600.2	17,052.2	192,292.2	14,681.0
	$	5,868.74	24,411.04	14,840.28	23,873.08	344,955.05	17,327.58
	Yd	14.46	14.46	14.46	25.00		2.86
7-1	#	0	317.0	27.0	125.0	1,922.0	1,420.5
	lb	0	29,384.9	2,506.7	17,902.5	169,820.9	15,134.5
	$	0	47,015.68	3,509.38	25,063.50	290,207.40	39,658.71
	Yd	0	14.24	14.24	25.00		2.72
7-8	#	34.5	114.0	158.5	0	2,099.0	719.0
	lb	3,329.8	10,798.6	15,080.6	0	193,152.6	14,838.8
	$	3,696.08	17,277.76	21,112.84	0	316,961.54	17,509.79
	Yd	14.03	14.03	14.03	0		2.95
7-15	#	0	208.5	183.0	535.0	3,458.0	1,413.5
	lb	0	20,729.2	18,035.6	80,389.1	337,421.6	27,872.7
	$	0	33,357.54	25,249.84	110,936.96	555,352.20	32,889.79
	Yd	0	14.44	14.44	25.00		2.89
7-22	#	10.0	208.0	553.0	75.0	3,143.0	2,012.0
	lb	1,081.2	19,425.4	52,064.7	10,906.5	269,178.3	38,856.2
	$	1,200.14	30,109.79	72,890.58	14,941.91	454,134.93	44,685.88
	Yd	14.24	14.24	14.24	25.00		2.92
7-29	#	24.0	145.0	294.5	50.0	2,776.5	636.0
	lb	2,317.2	13,376.2	27,963.2	7,271.5	231,963.2	12,649.8
	$	2,572.09	20,733.20	39,008.48	9,815.85	394,523.33	14,547.26
	Yd	13.80	13.80	13.80	25.00		2.92

Appendix Table A (Cont.)

Week Ending	Unit	Peeled Knuckle	Choice Inside Round	Good Inside Round	Choice Outside Round	Good Outside Round	Choice 160 Round
6-23	#	784.5	908.0	638.0	908.0	638.0	173.5
	lb	13,567.2	35,416.3	24,877.1	41,272.4	28,990.4	20,397.4
	$	16,959.00	50,999.48	34,832.28	42,923.30	31,309.63	22,437.14
	Yd	2.57	5.79	5.79	6.74	6.74	17.44
7-1	#	73.5	816.5	677.5	816.5	677.5	40.5
	lb	1,402.6	30,632.4	25,409.3	37,058.3	30,739.5	4,624.3
	$	1,753.25	43,498.10	35,573.02	38,540.63	30,739.50	5,086.73
	Yd	3.93	5.76	5.76	6.97	6.97	17.54
7-8	$	714.0	1,143.0	290.0	1,143.0	209.0	299.0
	lb	12,095.2	44,290.3	11,218.3	52,407.7	13,274.3	37,264.7
	$	15,119.00	61,563.52	15,705.62	58,696.63	13,274.30	40,991.17
	Yd	2.50	5.71	5.71	6.76	6.76	18.38
7-15	#	1,028.5	1,323.0	1,119.0	1,323.0	1,119.0	260.0
	lb	18,169.8	52,557.5	44,447.8	60,747.0	51,373.7	31,618.9
	$	22,71224	73,054.91	62,226.92	68,036.85	58,566.02	34,780.79
	Yd	2.59	5.82	5.82	6.72	6.72	17.80
7-22	#	0	1,635.0	377.0	1,635.0	377.0	237.5
	lb	0	62,523.5	14,409.6	63,376.2	16,910.7	27,882.0
	$	0	82,531.03	19,452.95	85,116.96	19,278.19	30,670.20
	Yd	0	5.78	5.78	6.79	6.79	17.76
7-29	#	618.5	1,003.5	351.0	1,003.5	251.0	834.5
	lb	10,614.4	39,025.7	9,756.4	45,769.9	11,442.5	81,566.5
	$	13.267.99	50,733.41	12,683.32	53,093.09	13,044.45	89,723.13
	Yd	2.52	6.71	5.71	6.70	6.70	14.35

Appendix Table A (Cont.)

Week Ending	Unit	Good 160 Round	Prime C-P Round	Choice C-P Round	Good C-P Round	Primal Round	ROUND TOTAL
6-23	#	0	53.0	160.0	212.5	100.0	2,245.0
	lb	0	6,677.4	20,157.3	26,773.9	15,434.6	248,245.0
	$	0	7,708.81	23,785.65	31,593.17	13,785.03	293,661.08
	Yd	0	18.69	18.69	18.69	22.90	
7-1	#	0	0	325.0	62.5	0	1,922.0
	lb	0	0	38,761.3	7,454.6	0	201,183.8
	$	0	0	43,412.66	8,796.43	0	237,059.04
	Yd	0	0	18.32	18.32	0	
7-8	#	0	34.5	115.5	157.0	60.0	2,099.0
	lb	0	4,474.6	14,720.9	19,973.7	9,315.7	233,873.9
	$	0	4,966.80	16,487.40	22,770.02	8,384.13	275,468.38
	Yd	0	18.82	18.82	18.82	22.90	
7-15	#	48.0	0	237.0	231.0	240.0	3,458.0
	lb	5,835.4	0	30,250.7	29,535.6	37,537.7	389,946.8
	$	6,302.23	0	33,880.78	33,670.58	33,643.10	459,764.26
	Yd	17.80	0	18.72	18.72	22.90	
7-22	#	17.0	10.0	227.5	544.0	95.0	3,143.0
	lb	1,995.8	1,262.6	28,674.5	68,702.5	14,380.0	348,977.6
	$	2,035.72	1,401.48	32.115.44	72,824.65	12,870.10	402,982.03
	Yd	17.76	19.09	19.09	19.09	22.90	
7-29	#	76.0	24.0	136.0	329.0	122.5	2,776.5
	lb	7,410.7	3,096.4	17,362.0	41,968.1	19,103.7	299,766.1
	$	8,003.55	3,437.00	19,445.44	44,486.19	17,097.81	339,562.54
	Yd	14.35	18.76	18.76	18.76	22.90	

Appendix Table A (Cont.)

Week Ending	Unit	Brisket	Outside Skirt	Inside Skirt	Primal Plate	Flank Steak	Kidney
6-23	lb	42,134.0	3,633.7	7,765.5	0	6,048.4	3,480.0
	$	34,813.90	6,395.31	13,186.05	0	15,423.42	765.60
7-1	lb	35,314.0	3,406.4	6,422.5	0	4,949.4	2,640.0
	$	30,016.90	5,051.52	10,918.25	0	12,620.96	580.80
7-8	lb	38,353.4	2,745.9	5,691.6	14,291.4	5,846.6	3,240.0
	$	34,901.32	4,942.62	9,675.72	7,645.90	14,908.83	712.80
7-15	lb	66,414.7	4,665.6	10,655.8	15,518.5	9,659.2	5,700.0
	$	60,437.64	8,398.08	18,114.86	8,379.99	24,148.00	1,254.00
7-22	lb	57,642.5	5,112.6	8,459.8	13.462.6	8,041.4	4,620.0
	$	52.454.66	7,402.68	14,212.46	7,135.18	20,103.50	1,016.40
7-29	lb	51,976.6	2,738.20	5,658.8	43,735.0	7,642.5	4,140.0
	$	43,660.34	4,928.76	9,506.78	22,742.20	19,106.25	910.80

Appendix Table A (Cont.)

Week Ending	Unit	Hanging Tender	VARIETY MEAT TOTAL	Chuck Trim	Blade Meat	Loin Trim	Shank Meat
6-23	lb	4,947.2	67,099.8	12,720.0	5,080.7	3,553.3	30,660.0
	$	6,677.88	78,262.16	8,522.40	7,112.98	4,619.29	26,287.40
7-1	lb	2,372.8	54,505.1	5,580.0	3,385.9	2,720.7	21,480.0
	$	3,915.12	63,103.56	3,738.60	4,740.26	3,536.91	19,117.20
7-8	lb	3.418.0	73,586.9	8,460.0	2,759.1	2,755.0	28,920.0
		5,639.70	78,426.89	5,668.20	3,862.74	3,471.30	25,738.80
7-15	lb	6,830.1	119,443.9	7,020.0	8,913.5	4,560.9	36,660.0
	$	11,269.66	132,002.23	4,703.40	12,478.90	5,746.74	32,627.40
7-22	lb	5,377.2	101,716.1	25,800.0	6,113.4	3,813.6	44,340.0
	$	8,872.38	111,197.27	17,286.00	8,558.76	4,805.01	39,462.60
7-29	lb	5,399.6	121,290.7	8,580.0	4,117.9	2,854.5	32,640.0
	$	8,909.34	109,764.47	5,748.60	5,765.06	3,596.67	29,049.60

Appendix Table A (Cont.)

Week Ending	Unit	25-75 Trim	50-50 Trim	TRIM TOTAL	Tallow	Bone	TALLOW BONE TOTAL
6-23	lb	6,840.0	224,829.5	283,683.5	64,747.0	253,334.0	318,082.0
	$	5,677.20	136,292.88	189,512.15	14,244.24	12,666.75	26,911.09
7-1	lb	5,520.0	179,539.9	218,226.5	59,479.0	178,015.0	237,494.0
	$	4,581.60	109,188.66	144903.23	13,085.38	8,900.75	21,986.13
7-8	lb	5,940.0	185,606.9	234,441.0	59,480.0	296,748.8	356,228.8
	$	5,227.20	111,364.14	155,332.38	13,085.60	14,837.44	27,923.04
7-15	lb	10,740.0	309,506.4	377,400.8	98,204.0	339,747.6	437,951.6
	$	8,592.00	192,281.10	256,429.54	21,604.88	16,987.38	38,592.26
7-22	lb	8,400.0	265,572.6	354,049.6	91,769.0	318,817.2	410,586.2
	$	6,720.00	160,235.80	237,068.25	20,189.18	15,950.86	36,130.04
7-29	lb	7,140.0	246,631.9	301,964.3	87,982.0	394,918.6	392,900.6
	$	5,712.00	148,724.04	198,595.97	19,356.04	15,245.93	34,601.97

Appendix Table B

Estimated Partials In Number Of Carcasses, Product Weight, And Product Value

Week Ending	Unit	Chuck Roll	Chuck Clod	Chuck Tender	3 Pc. Chuck	C-P Chuck	Ribeye	Lipon Ribeye	109 Rib	C-P Rib
6-23	#	4	2	18	5	2	5	16	11	3
	lb	85.8	37.3	45.5	384.7	175.7	42.5	165.0	198.0	72.4
	$	94.38	39.53	51.87	346.23	131.77	161.50	425.83	326.70	77.60
7-1	#	1	0	7	7	1	4	11	10	7
	lb	21.7	0	18.5	522.9	84.9	31.4	106.0	191.4	166.3
	$	22.13	0	21.59	407.86	63.67	98.91	265.00	310.07	224.50
7-8	#	0	4	26	5	5	9	5	4	2
	lb	0	77.3	40.7	393.6	431.9	74.7	50.8	81.8	48.5
	$	0	87.04	49.05	359.76	323.92	235.30	126.73	148.87	66.93
7-15	#	0	0	3	11	2	15	12	5	0
	lb	0	0	6.9	876.8	170.9	125.0	127.9	79.4	0
	$	0	0	8.42	822.05	128.17	452.32	315.11	126.78	0
7-22	#	2	5	21	6	4	0	18	14	5
	lb	39.9	92.9	52.7	460.7	328.5	0	283.8	260.0	120.3
	$	46.45	106.61	64.29	412.48	252.08	0	452.15	405.60	161.20
7-29	#	2	1	11	4	4	14	10	11	4
	lb	39.9	17.8	27.0	316.9	339.7	113.9	109.6	205.3	98.9
	$	45.51	19.94	32.70	282.04	271.76	353.09	271.81	307.95	132.53

Appendix Table B (Cont.)

Week Ending	Unit	Tender-loin	180 Loinstrip	175 Loinstrip	Top Sirloin	C-P Loin	Knuckle	Inside Round	Outside Round
6-23	#	17	14	3	11	5	14	6	4
	lb	114.0	164.7	52.0	119.4	243.6	134.9	117.1	90.9
	$	353.40	362.34	89.04	238.80	341.04	149.23	163.96	107.26
7-1	#	23	17	0	15	0	11	5	7
	lb	149.7	193.1	0	168.4	0	97.4	93.7	158.8
	$	446.09	382.33	0	328.38	0	114.93	131.18	187.38
7-8	#	21	23	2	6	2	20	8	11
	lb	142.4	242.5	36.9	68.3	95.1	200.0	154.9	252.1
	#	412.96	504.25	62.03	125.68	133.14	236.00	216.86	287.59
7-15	#	11	19	0	24	6	16	4	8
	lb	74.0	247.2	0	277.0	295.9	157.9	79.5	183.6
	$	211.64	519.12	0	498.60	414.26	186.32	90.63	209.30
7-22	#	9	17	2	18	1	19	7	3
	lb	58.3	208.4	36.4	207.0	47.1	183.4	133.7	67.3
	$	162.06	437.64	61.99	364.32	65.94	210.91	180.49	71.34
7-29	#	12	18	3	17	3	15	8	5
	lb	79.3	228.0	54.3	184.1	141.0	149.1	155.5	114.1
	$	215.70	467.40	86.88	295.14	197.40	171.46	202.15	120.95

Appendix Table C.

Appendix Table C lists the products processed by the case company during a six week period from June 19 through July 29, 1978. The number of carcasses processed into each product are taken from Appendix Table A.

Appendix Table D.

Appendix Table D contains production schedules for processing the products found in Appendix Table C. The following assumptions concerning the labor input were made in developing these production schedules.

1. All 134 laborers were assumed to be available for the initial construction of the production schedules.
2. Limited adaptability of certain laborers was assumed. These laborers are:
    a. Chuck Roll Trimmer. One chuck roll trimmer can bone chuck blades, one can bone chuck arms, and one can bone ribs.
    b. Chuck Blade Boner. Two chuck blade boners boneguard C-P chucks. One boneguards C-P chuck arms.
    c. Chuck Arm Boner. One chuck arm boner boneguards C-P chuck arms.
    d. Butt Boner. Two butt boners boneguard C-P loins.
    e. Bottom Butt Separator. One bottom butt separator can bone rounds.
    f. Round Boner. Two round boners boneguard C-P rounds.
3. It was assumed that working space limits the number of laborers on the cutting tables to that found in Figure 1.
4. It was assumed that the presence of supervisory staff in the work areas can eliminate downtime.
5. It was assumed that changeovers can be minimized and that the average length of changeovers can be reduced to the minimum.

for this plant; i.e., 2.5 minutes.

6. It was assumed that the production time will be increased in proportion to the number of absentees. This assumption is designed to balance the probability that some of the assentees may have no effect on chain speed as leadmen can perform their functions against the probability that, although downtime may be avoided completely, reduction in chain speed may occur as mechanical problems defelop.

Appendix Table E.

Appendix Table E lists the products to be produced after primals have been deleted and the number of forequarters and hindquarters have been equalized.

Appendix Table F.

Appendix Table F contains production schedules for a six week period after subprimal products have been substituted for primal products and the number of forequarters and hindquarters have been equalized.
It is constructed according to the dame assumptions as was Appendix Table D.

Appendix Table C

List Of Products Actually Produced
By Number Of Carcasses

Date	6-19		6-20			6-21		6-22		6-23		
Carcass Grade	Choice	Cood	Prime	Choice	Cood	Choice	Good	Choice	Good	Prime	Choice	Good
Product												
CHUCK												
Roll, Clod, Tender				115.0		165.0		30.0				
3 Pc. Chuck	325.0	50.0		135.0	200.0	16.5	190.0	159.5	240.0		226.5	160.0
C-P Chuck	50.0		24.0			75.0				29.0	60.0	10.0
RIB												
Ribeye								55.0			145.0	
Lipon Ribeye	225.0	50.0		245.0	200.0		150.0					160.0
107 Rib				5.0								
109 Rib						156.5		25.0	130.0		81.5	
C-P Rib	50.0		24.0			50.0	40.0		110.0	29.0	60.0	10.0
Primal Rib	100.0					50.0		109.5				
LOIN												
Tenderloin	325.0	50.0		250.0	200.0	176.5	170.0	95.0	160.0		219.0	160.0
175 Loinstrip								30.0			219.0	
180 Loinstrip	325.0	50.0		250.0	200.0	176.5	170.0	65.0	160.0			160.0
Shell Sirloin	285.0			250.0		176.5		95.0			75.0	
Top Sirloin	40.0	50.0			200.0		170.0		160.0		144.0	160.0
Full Bottom Butt	40.0											
Ball, Tri, Flap		50.0			200.0		170.0		160.0		144.0	160.0
C-P Loin	50.0		24.0			50.0	20.0		80.0	29.0	60.0	10.0
Primal Loin						39.0		84.5				
ROUND												
Inside/Outside Round	200.0	50.0		250.0	200.0	181.5	150.0	155.0	75.0		125.0	160.0
Knuckle	200.0	50.0				181.5	75.0	155.0	75.0			
Peeled Knuckle				250.0	200.0		75.0				125.0	160.0
160 Round	125.0										50.0	
C-P Round	50.0		24.0			50.0	40.0		165.0	29.0	60.0	10.0
Primal Round						25.0		24.5			50.0	

Appendix Table C (Cont.)

Date	6-27		6-28		6-29		6-30		7-1	
Carcass Grade	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
Product										
CHUCK										
Roll, Clod, Tender	45.0				25.0		65.0			
3 Pc. Chuck	166.0	150.0	62.0	95.0	209.0	45.0	188.0	180.0	235.0	250.0
C-P Chuck	155.0						40.0		10.0	7.0
RIB										
Ribeye		85.0								
Lipon Ribeye						45.0		120.0		257.0
Bone-in Lipon	166.0	65.0								
109 Rib			62.0	95.0			100.0		145.0	
C-P Rib	155.0				134.0		193.0	60.0	100.0	
Primal Rib	45.0									
LOIN										
Tenderloin	206.0	150.0	62.0	95.0	109.0	45.0	170.0	120.0	245.0	257.0
175 Loinstrip			62.0		109.0		170.0		245.0	
180 Loinstrip	206.0	150.0		95.0		45.0		120.0		257.0
Shell Sirloin	206.0		62.0		109.0		170.0		245.0	
Top Sirloin		150.0		95.0		45.0		120.0		257.0
Ball, Tri, Flap		150.0		95.0		45.0		120.0		257.0
C-P Loin	155.0				125.0		35.0		30.0	
Primal Loin							90.0	30.0		
ROUND										
Inside/Outside	206.0	150.0	62.0	95.0	109.0	45.0	240.0	120.0	215.0	257.0
Knuckle	206.0	150.0	62.0	95.0	109.0	45.0	165.0	120.0	215.0	257.0
Peeled Knuckle							75.0			
160 Round							15.0		30.0	
C-P Round	155.0				125.0		40.0	60.0		

Appendix Table C (Cont.)

Date	7-3		7-5		7-6		7-7		
Carcass Grade	Choice	Good	Choice	Good	Choice	Good	Prime	Choice	Good
Product									
CHUCK									
Roll, Clod, Tender	45.0		85.0					50.0	
3 Pc. Chuck	251.5		278.5	90.0	350.0	130.0		306.5	75.0
C-P Chuck	90.0	80.0			75.0		35.0	65.0	80.0
Primal Chuck			22.0						
RIB									
Ribeye				80.0				175.0	
Lipon Ribeye				10.0					75.0
Bone-in Lipon			55.0			130.0			
107 Rib			5.0						
109 Rib	261.5								
C-P Rib	125.0	80.0	200.0		425.0		35.0	205.0	80.0
Primal Rib			125.5					41.5	
LOIN									
Tenderloin	386.5		372.0	90.0	390.0	130.0		337.5	75.0
175 Loinstrip	386.5		372.0		390.0			337.5	
180 Loinstrip				90.0		130.0			75.0
Shell Sirloin	386.5				390.0			337.5	
Top Sirloin			372.0	90.0		130.0			75.0
Ball, Tri, Flap			372.0	90.0		130.0			75.0
C-P Loin		80.0	13.5		35.0		35.0	75.0	80.0
ROUND									
Inside/Outside	195.0		287.0	90.0	390.0	130.0		257.0	75.0
Knuckle	125.0		287.0		90.0	60.0		160.0	
Peeled Knuckle	60.0				330.0	130.0		197.0	75.0
160 Round	191.5		85.0					20.0	
C-P Round		80.0	13.5		35.0		35.0	75.0	80.0
Primal Round								60.0	

Appendix Table C (Cont.)

Oate	7-10		7-11		7-12		7-13		7-14		7-15	
Carcass Grade	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
Product												
CHUCK												
Roll, Clod, Tender	35.0		25.0				10.0		10.0			
3 Pc. Chuck	192.0	75.0	331.0	200.0	272.5	200.0	327.5	190.0	343.0	280.0	353.0	90.0
C-P Chuck	80.0	200.0		50.0	65.0			25.0	7.5			85.0
Primal Chuck											25.0	
RIB												
Ribeye	251.0						25.0					
Lipon Ribeye		190.0	351.0	250.0		200.0		190.0	345.5	240.0	378.0	90.0
Bone-in Lipon					120.0							
107 Rib			5.0				155.0					
109 Rib	15.0	85.0			20.0		67.5					
C-P Rib	40.0				155.0		90.0	25.0	15.0	40.0		85.0
Primal Rib					42.5							
LOIN												
Tenderloin	248.0	215.0	331.0	110.0	237.5	200.0	228.0	205.0	293.0	105.0		90.0
Peeled Tenderloin				140.0						140.0		
175 Loinstrip	248.0		90.0	25.0	137.5		40.0					
180 Loinstrip		215.0	241.0	225.0		200.0	188.0	205.0	293.0	245.0		90.0
Shell Sirloin	248.0		331.0		237.5		228.0		293.0			
Top Sirloin		215.0		250.0		200.0		205.0		245.0		90.0
Full Bottom Butt						200.0		205.0		245.0		
Ball, Tri, Flap		215.0		250.0								90.0
C-P Loin	40.0	50.0	25.0		50.0		85.0	10.0	7.5	35.0		85.0
Primal Loin	10.0	10.0			50.0		20.0		60.0		378.0	
ROUND												
Inside/Outside	143.0	210.0	291.0	250.0	132.5	200.0	248.0	150.0	305.5	215.0	218.0	90.0
Knuckle	143.0	210.0	35.0		132.5	200.0	248.0	150.0			218.0	90.0
Peeled Knuckle			256.0	250.0					305.5	215.0		
160 Round	75.0		40.0		125.0		50.0		20.0			
C-P Round	50 0	65.0	25.0		50.0		35.0	65.0	15.0	65.0		85.0
Primal Round	39.0				39.0				20.0		160.0	

Appendix Table C (Cont.)

Date	7-17			7-18		7-19		7-20		7-21		7-22	
Carcass Grade	Choice	Good	Prime	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
Product													
CHUCK													
Roll, Clod, Tender				75.0		210.0		200.0		75.0			
3 Pc. Chuck	131.0	20.0		172.5	95.0	145.0	90.0	290.0	117.0	252.0	180.0	313.5	165.0
C-P Chuck	225.0	195.0	10.0		15.0	30.0					85.0	30.0	
Primal Chuck												25.0	
RIB													
Lipon Ribeye		215.0		20.0	110.0	195.0	25.0			327.0		227.5	
107 Rib				5.0									
109 Rib	356.0			102.5			65.0						
C-P Rib			10.0	20.0		190.0		445.0	117.0		265.0	110.0	165.0
Primal Rib				100.0				45.0				30.0	
LOIN													
Tenderloin	356.0	215.0		227.5		255.0	90.0	445.0	17.0	295.0		184.5	
Peeled Tenderloin					110.0								
175 Loinstrip				227.5				155.0				184.5	
180 Loinstrip	356.0	215.0			110.0	355.0	90.0	290.0	17.0	295.0			
Shell Sirloin	356.0			35.0		195.0							
Top Sirloin		215.0		192.5	110.0	150.0	90.0	325.0	17.0	295.0		184.5	
Bone-in Top Sirloin								120.0					
Full Bottom Butt		215.0		192.5	110.0	160.0	90.0	445.0	17.0	295.0		184.5	
C-P Loin			10.0	20.0		30.0		45.0	55.0		265.0	180.0	165.0
Primal Loin									45.0	30.0			
ROUND													
Inside/Outside	356.0	215.0		207.5	110.0	305.0	90.0	400.0		295.0		47.0	
Knuckle	256.0	215.0		207.5	110.0	305.0	90.0	400.0		295.0		47.0	
160 Round						35.0						202.5	
C-P Round			10.0	20.0		30.0		90.0	117.0	5.0	265.0	80.0	165.0
Primal Round				20.0		15.0				25.0		35.0	

Appendix Table C (Cont.)

Date	7-24			7-25		7-26		7-27		7-28		7-29	
Carcass Grade	Choice	Good	Prime	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
Product													
CHUCK													
Roll, Clod, Tender	80.0									40.0		70.0	
3 Pc. Chuck	211.0	175.0		80.0	50.0	448.0		213.5	150.0	65.0	200.0	100.0	
C-P Chuck	10.0		24.0	90.0	25.0	15.0		125.0		29.0		5.0	85.0
Primal Chuck						35.0				260.0		209.0	
RIB													
Ribeye					75.0								
Lipon Ribeye	156.0			70.0		483.0		298.0					
Bone-in Lipon	100.0									100.0			
107 Rib										15.0			
109 Rib		175.0											
C-P Rib	5.0		24.0	100.0		15.0			150.0	109.0	200.0	384.0	85.0
Primal Rib	40.0							40.0		170.0			
LOIN													
Tenderloin	201.0			65.0	75.0	483.0		338.0	150.0	344.0	110.0	384.0	
175 Loinstrip	301.0					483.0		5.0	15.0				
180 Loinstrip				65.0	75.0			333.0	135.0	344.0	110.0	384.0	
Shell Sirloin	301.0												
Top Sirloin				65.0	75.0	483.0		338.0	150.0	344.0	110.0	384.0	
Full Bottom Butt				65.0	75.0	483.0		338.0	150.0	344.0	110.0	384.0	
C-P Loin	10.0	175.0	24.0	105.0		15.0					40.0		85.0
Primal Loin										50.0			
ROUND													
Inside/Outside	301.0			70.0	75.0	383.0		88.0	150.0		25.0	175.0	
Knuckle	251.0							23.0	150.0		25.0	175.0	
Peeled Knuckle	50.0			70.0	75.0	383.0		65.0					
160 Round						65.0		250.0		324.0	65.0	175.0	
C-P Round	10.0	175.0	24.0	80.0		15.0				40.0	60.0		85.0
Primal Round				30.0		35.0				130.0		34.0	

Appendix Table D

Actual Daily Production Schedules

	Products	BREAK: HRI	C-P/Primal	GOOD: 3 Pc Chuck	C-P Chuck	Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Ball, Tri,Flap	C-P Loin	HRI Round	C-P Round	CHIOCE: HRI Chuck	3 Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Lointrip	Shell Sirloin	Top Sirloin	Full Butt	Ball, Tri, Flap	C-P Loin	Primal Loin	HRI Round	160 Roun	C-P Round	Primal Round	PRIME: C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentee	Absentee Time	Change Over Time	Production Time
Date	Time Period	Total Number of Laborers																																									hd	hdhr	min	no	%	min	min	hr
6-19	1.	15		11		6			5	9	3	2		7																											50	70	43					
	2.	15														11			6					5		9		3	1				7								40	70	34					
	3.	15														11			6					6		9	2						8								63	80	120					
	4.	15														11			6					6		9	2							4							25	80	19					
	5.	15														11						2		6		9	2							4							50	80	37					
	6.	15														11							0	6		9	2							4							50	60	37					
	7.		11													8						0								8				5						50	80	33					
	Total																																											323	12	9.0	29.3	2.5	5.9
6-20	1.		11																																					8	2	8	5	24	90	16					
	2.	15		11		6			5	9	3	2		7																											200	70	171					
	3.	15													12				6					4		9	2						7								115	60	115					
	4.	15														11			6					6		9	2						8								130	80	97					
	5.	15														11				2				6		9	2						8								5	80	4					
	Total																																											403	5	3.7	14.9	5.0	7.0
6-21	1.	15		11		6			5	9	3	2		7																											150	70	129					
	2.	14		11				2	5	9	3	2			4																											20	70	17					
	3.	14		11				2					8		5																											20	80	15					
	4.	15													12						6			4		9	2						7								156.5	60	157					
	5.	15													12							2		4		9	2						7								8.5	60	8					
	6.	15														11						2		6		9	2						8								11.5	80	9					
	7.	15														11						2									8		8								5	80	4					
	8.		11													8					2									8				5						25	90	17					
	9.		11													8														8				5						20	90	13					
	10.		11													8															4			5						5	90	3					
	11.		11													8															4				0					25	90	17					
	Total																																											389	8	6.0	23.1	2.5	6.9
6-22	1.	15		11			6		5	9	3	2		7																											75	70	64					
	2.	14		11			6		5	9	3	2			4																											55	70	47					
	3.	14		11				2	5	9	3	2			4																											30	70	26					
	4.	15		11				2					8		5																											80	80	60					
	5.	15													12				6					4	9		2						7								30	60	30					
	6.	15														11			6					6		9	2						8								25	80	19					
	7.	15														11					6			6		9	2						8								25	80	19					
	8.	15														11							0	6		9	2						8								15	80	11					
	9.	15														11							0									4	8								60	80	45					
	10.	15														11							0									4				0					24.5	80	18					
	11.	17														13							0																			10	80	18					
	Total																																											352	8	6:0	21.1	2.5	6.2

Appendix Table D (Cont.)

	Products	BREAK:		GOOD:												CHOICE:																						PRIME:				Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentee	Absence Time	Change Over Time	Product Time
		HRI	C-P/Primal	3 Pc Chuck	C-P Chuck	Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Ball, Tri, Flap	C-P Loin	HRI Round	C-P Round	HRI Chuck	3 Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	Full Butt	Ball, Tri, Flap	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Primal Round	C-P Chuck	C-P Rib	C-P Loin	C-P Round								
Date	Time Period	Total Number of Laborers																																								hd	hd/hr	min	no	%	min	min	hr
6-23	1.		11																																			8	2	5	8	29	90	19					
	2.		11		8			2					8		5																											10	90	7					
	3.	15		11		6			5	9	3	2		7																												160	70	137					
	4.	15														11			6						5	9			3		2			8								125	70	107					
	5.	15														11			6						5	9			3		2				4							20	70	17					
	6.	15														11						6			6	9		2							4							30	80	22					
	7.	14														11						6			6	9		2								4						45	80	34					
	8.	14														11						6										8				4						6.5	80	5					
	9.		1															8					2									8				5						8.5	90	6					
	10.		1															8					2									8					0					50	90	33					
	11.		1															8					2																			7.5	90	5					
	Total																																											392	4	3.0	1.6	5.0	6.8

Appendix Table D (Cont.)

	Products	BREAK:	HRI	C-P Primal	GOOD:	3Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	BI Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Ball, Tri, Flap	C-P Loin	Primal Loin	HRI Round	C-P Round	CHOICE:	HRI Chuck	3Pc Chuck	C-P Chuck	Lipon Ribeye	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Total Number of Laborers																																				hd	hdhr	min	no.	%	min	min	hr
6-27	1.		15			11		6					5	9	3	2			7																			85	70	73					
	2.		15			11				6			5	9	3	2			7																			65	70	56					
	3.		15																			12			6				4		9	2			7			45	60	45					
	4.		15																				11		6				6		9	2			8			121	80	91					
	5.		15																				11				2		6		9	2			8			40	80	30					
	6.		14																				11				2						8				4	5	80	4					
	7.			11																				8			2						8				5	150	90	100					
	8.			11																				8			2											5	90	4					
	Total																																							410	5	3.7	15.0	2.5	7.1
6-28	1.		15			11					6		5	9	3	2			7																			95	70	81					
	2.		15																				11			6			5	9		2			8			62	80	46					
	Total																																							127	5	3.7	4.7	2.5	2.2
6-29	1.		15			11			6				5	9	3	2			7																			45	70	39					
	2.		15																			12					2		4	9		2			7			25	60	25					
	3.		15																				11				2		6	9		2			8			84	80	63					
	4.		15																				11				2						8				5	125	80	94					
	Total																																							221	4	1.0	6.6	2.5	1.8
6-30	1.		15			11			6				5	9	3	2			7																			120	70	103					
	2.		15			11						2								4																		30	80	23					
	3.		15			11						2						4		4																		30	80	22					
	4.		15																			12				6			5	9		2			7			65	60	65					
	5.		15																				11			6			6	9		2			8			35	80	26					
	6.		15																				11				2		6	9		2			8			35	80	53					
	7.		15																				11				2						8		8			15	80	26					
	8.		15																				11				2							4	8			35	80	26					
	9.		15																				11				2							4		4		15	80	11					
	10.			11																			11				2							4			5	38	80	25					
	11.			11																				8			2							4			5	2	90	2					
	Total																																							382	4	3.0	11.5	2.5	6.6
7-1	1.		15			11			6				5	9	3	2			7																			250	70	214					
	2.		13				8		6				5	9	3	2			7																			7	70	6					
	3.		15																				11			6			6	9		2			8			145	80	109					
	4.		15																				11				2		6	9		2			8			70	80	52					
	5.		15																				11				2		6	9		2				4		20	80	15					
	6.			11																				8			2		6	9		2					8	10	80	8					
	Total																																							404	6	4.5	18.2	2.5	7.1

Appendix Table D (Cont.)

	Products	BREAK: HRI	C-P/Primal	GOOD: 3Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	BI Lipon Ribeye	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Ball, Tri, Flep	C-P Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3 Pc Chuck	C-P Chuck	Primal Chuck	Ribeye	BI Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	Shell Sirloin	Top Sirloin	Ball, Tri, Flep	C-P Loin	HRI Round	160 Round	C-P Round	Primal Round	PRIME: C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentee	Absence Time	Change Over Speed	Production Time
Data	Time Period	Total Number Of Laborers																																							hd	hdhr	min	no	%	min	min	hr
7-3	1.		11		8				2					8		5																									80	90	53					
	2.	15															12							6			4	9	2				7								45	60	45					
	3.	15																11						6			6	9	2				8								150	80	112					
	4.	15																11						6			6	9	2					4							66.5	80	50					
	5.	15																11							2		6	9	2					4							35	80	26					
	6.		12																8						2		6	9	2					4							90	80	68					
	Total																																										354	4	3.0	10.6	2.5	6.1
7-5	1.	15		11		6				5	9	3	2		7																										80	70	69					
	2.	15		11			6			5	9	3	2		7																										10	70	9					
	3.	15															12					6					5	9		3	2		7								55	60	55					
	4.	15															12						2		2		5	9		3	2		7								5	60	5					
	5.	15															12								2		5	9		3	2		7								25	60	25					
	6.	15																11								0	5	9		3	2		7								175	70	150					
	7.	15																11								0	5	9		3	2		7								27	70	23					
	8.	15																11								0	6	9		3	3			4							59.5	80	45					
	9.		12															11								0	6	9		3	3			4							8.5	80	6					
	10.		12																	0						0	6	9		3	3	8			5						17	80	13					
	Total																																										400	6	4.5	18.4	2.5	7.2
7-6	1.	15		11				6		5	9	3	2		7																										130	70	111					
	2.	15																11							2		6	9	2				8								350	80	262					
	3.		12																8						2		6	9	2				8								40	80	30					
	4.		11																8						2						8				5						35	90	23					
	Total																																										426	6	4.5	19.2	2.5	7.5
7-7	1.		11																																		8	2	8	5	35	90	21					
	2.		11		8				2					8		5																									80	90	53					
	3.		15		11				6	5	9	3	2		7																										75	70	64					
	4.		11																8						2						8				5						65	90	43					
	5.	14															12								2						8				5						10	60	10					
	6.	15															12								2		4	9	2				7								40	60	40					
	7.	15																11							2		6	9	2				8								90	80	69					
	8.	15																11			6						6	9	2				8								127	80	95					
	9.	15																11			6						6	9	2					4							20	80	15					
	10.	14																11			6						6	9	2							0					28	80	21					
	11.	14																11								0	6	9	2							0					32	80	24					
	12.	10																13								0															9.5	90	13					
	Total																																										460	6	4.5	21.1	5.0	8.2

Appendix Table D (Cont.)

Products		BREAK: HRI	C-P Primal	GOOD: 3Pc Chuck	C-P Chuck	Lipon Ribeye	BI Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Top Sirloin	Full Butt	Ball, Tri, Flap	C-P Loin	Primal Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	BI Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Primal Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Total Number of Laborers																																						hd	hd/hr	min	no.	%	min	min	hr
7-10	1.	15		11						5		9	3		2			7																						75	70	64					
	2.	13			8	6				5		9	3		2			7																						115	70	99					
	3.	13			8	6				5		9	3		2			7																						20	70	17					
	4.	13			8			6		5		9	3		2				4																					5	70	4					
	5.		11		8			6								3			5																					50	80	37					
	6.		11		8			6									4		5																					20	80	8					
	7.	15																		12			6							4	9		2			7				35	60	35					
	8.	15																			11		6							6	9		2			8				108	80	81					
	9.	15																			11		6							6	9		2				4			75	80	56					
	10.	14																			11		6							6	9		2					4		9	80	7					
	11.		11																			8	6							6	9		2					4		21	80	16					
	12.		11																			8	6											8				4		4	80	3					
	13.		11																			8					6							8				5		15	80	11					
	14.		11																			8						2						8					0	20	90	13					
	15.		11																			8						2							4				0	10	90	7					
	16.		7																			8						2												9	90	62					
	Total																																									470	6	4.5	214	2.5	82
7-11	1.	15		11		6				5	9		3		2			7																						25	70	21					
	2.	15		11		6				5		9	3		2			7																						175	70	150					
	3.	13			8	6				5		9	3		2			7																						50	70	43					
	4.	15																		12				6						4	9		2			7				25	60	25					
	5.	15																			11			6						6	9		2			8				65	80	49					
	6.	15																			11			6						6		9	2			8				201	80	51					
	7.	15																			11			6						6		9	2				4			40	80	30					
	8.	14																			11			6										8				4		20	80	15					
	9.	14																			11					2								8				4		5	80	4					
	Total																																									488	2	1.5	7.3	2.5	8.3
7-12	1.	15		11		6				6		9	3	1				8																						200	80	150					
	2.	15																			11				6					6	9		2			8				120	80	90					
	3.	15																			11						6			6	9		2			8				125	80	9					
	4.	15																			11						5			6	9		2				4			8	80	6					
	5.	15																			11							2		6	9		2				4			97.5	80	73					
	6.	15																			11							2						8			4			20	80	15					
	7.	14																			11							2						8				4		14.5	80	11					
	8.		11																			8						2						8				5		15.5	90	10					
	9.		11																			8						2							4			5		7.5	90	5					
	10.		11																			8							0						4			5		12.5	90	8					
	11.		11																			8							0						4				0	30	90	20					
	Total																																									397	3	2.2	8.7	2.5	6.8

Appendix Table D (Cont.)

	Products	BREAK: HRI	C-P Primal	GOOD: 3Pc Chuck	C-P Chuck	Lipon Ribeye	BI Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Top Sirloin	Full Butt	Ball, Tri, Flap	C-P Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3PC Chuck	Primal Chuck	Ribeye	Lipon Ribeye	BI Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Primal Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Speed	Production Speed
Date	Time Period	Total Number Of Laborers																																				hd	hdhr	min	no	%	min	min	hr
7-13	1.	15		11		6				5		9	3	1			7																						150	70	12.9					
	2.	14		11		6				6		9	3	1				4																					40	80	10					
	3.		11		8				2	6		9	3	1				4																					15	80	11					
	4.		11		8				2							8		5																					10	90	7					
	5.	15																	12			6							4	9		2			7				10	60	10					
	6.	15																		11		6							6	9		2			8				15	80	11					
	7.	15																		11						6			6	9		2			8				15	80	11					
	8.	15																		11						6			6		9	2			8				52.5	80	39					
	9.	15																		11					2				6		9	2			8				135.5	80	102					
	10.	15																		11					2								8		8				20	80	15					
	11.	15																		11							2						8			4			50	80	38					
	12.	14																		11							2						8				4		35	80	26					
	13.	7																		11							2												4.5	80	7					
	Total																																								436	2	1.5	6.5	2.5	7.4
7-14	1.	15		11		6				5		9	3	1			7																						215	70	184					
	2.	14		11		6				6		9	3	1				4																					30	80	22					
	3.	14		11					2							8		4	12				6																35	80	26					
	4.	15																		11			6						4		9	2			7				10	60	10					
	5.	15																		11			6						6		9	2			8				283	80	212					
	6.	15																		11			6										8		8				7.5	80	6					
	7.	15																		11			6											4	4				5	80	4					
	8.	15																		11			6											4		4			20	80	15					
	9.	14																		11			6											4			4		15	80	11					
	10.	13																		11			6											4				0	5	80	4					
	11.		13																	11	8						2							4				0	7.5	80	6					
	12.		11																		8						2							4				0	7.5	90	5					
	Total																																								506	2	1.5	7.6	2.5	8.6
7-15	1.	15		11		6				5		9	3		2		7																						90	70	77					
	2.		11		8				2							8		5																					85	90	57					
	3.	15																		11			6											4	8				218	80	163					
	4.	14																		11			6											4				0	135	80	101					
	5.		11																		0		6											4				0	25	90	17					
	Total																																								415	7	5.2	21.6	2.5	7.3

Appendix Table D (Cont.)

	Products	BREAK: HRI	C-P Primal	GOOD: 3Pc Chuck	C-P Chuck	Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Full Butt	C-P Loin	Primal Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3Pc Chuck	C-P Chuck	Primal Chuck	Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	BI Top Sirloin	Full Butt	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Primal Round	PRIME: C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Total Number of Laborers																																									hd	hdhr	min	no	%	min	min	hr
7-17	1.	15		11		6			5	9	3	1			7																												20	70	17					
	2.	13			8	6			5	9	3	1			7																												195	70	167					
	3.	15																11					6			6		9	2						8								131	80	98					
	4.	13																	8				6			6		9	2						8								225	80	169					
	Total																																												451	4	13	13.9	2.5	7.8
7-18	1.	1																																					8	2	8	5	10	90	7					
	2.	15		11		6			5	9	3	1			7																												95	70	81					
	3.	13			8	6			5	9	3	1			7																												15	70	13					
	4.	15															12				6					5	9			3		1			7								20	60	20					
	5.	15															12						6			5	9			3		1			7								55	60	55					
	6.	15																11					6			5	9			3		1			7								47.5	70	41					
	7.	15																11				2				5	9			3		1			7								5	70	4					
	8.	15																11						2		5	9			3		1			7								20	70	17					
	9.	15																11							0	5	9			3		1			7								45	70	39					
	10.	14																11							0	6	9		2						8								15	60	11					
	11.	13																11							0	6	9		2								4						20	30	15					
	12.	13																11							0								8					0					20	30	15					
	Total																																												318	3	2.2	7.0	5.0	5.5
7-19	1.	15		11		6			5	9	3	1			7																												25	70	21					
	2.	15		11			6		5	9	3	1			7																												65	70	56					
	3.	15															12				6					4		9		3					7								160	60	160					
	4.	15															12				6					4		9	2						7								35	60	35					
	5.	15															12							2		4		9	2						7								15	60	15					
	6.	15																11						2		5		9	2						8								110	80	82					
	7.	14																11						2		6		9	2								4						35	80	26					
	8.	1																	8					2									8				5						15	90	10					
	9.	1																	8					2									8					0					15	90	10					
	Total																																												415	5	3.7	15.3	2.5	7.2
7-20	1.	14		11				2	6	9	3	1				4																											17	80	13					
	2.	14		11				2					8			4																											55	80	41					
	3.	14		11				2					1	4		4																											45	80	34					
	4.	15															12							2		4	9				3	1			7								120	60	120					
	5.	15															12							2		4	9			3		1			7								35	60	35					
	6.	15															12							2		4		9		3		1			7								45	60	45					
	7.	15																11						2		5		9		3		1			7								200	70	171					
	8.	14																11						2		6		9		3		1					4						45	80	34					
	9.	14																11							0								8				4						45	80	34					
	Total																																												527	5	3.7	19.5	2.5	9.1

Appendix Table D (Cont.)

	Products	BREAK	HRI	C-P Primal	GOOD:	3Pc Chuck	C-R Chuck	Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Full Butt	C-P Loin	HRI Round	C-P Round	CHOICE:	HRI Chuck	3Pc Chuck	C-P Chuck	Primal Chuck	Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	BI Top Sirloin	Full Butt	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Primal Round	PRIME:	C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Total Number of Laborers																																												hd	hdhr	min	no	%	min	min	hr
7-21	1.		14			11				2					8		4																													180	80	135					
	2.			11			8			2					8		5																													85	90	57					
	3.		15																12				6					4		9		3		1			7									75	60	75					
	4.		15																	11			6					5		9		3		1			7									220	70	189					
	5.		14																	11			6													4			4							5	80	4					
	6.		13																	11			6													4				0						25	80	19					
	7.		7																	11			6																							3	90	2					
	Total																																															484	5	3.7	17.4	2.5	8.4
7-22	1.			13		11				2					8		4																													165	80	124					
	2.		15																	11			6					5		9		3		1			7									50	70	43					
	3.		15																	11			6					5		9		3		1				4								137.5	80	103					
	4.		15																	11			6												8			4								40	80	30					
	5.		15																	11						2									8			4								25	80	19					
	6.		15																	11						2									8				4							60	80	45					
	7.			11																	8					2									8				5							20	90	13					
	8.			11																	8					2									8				5							5	90	3					
	9.			11																	8						0								8				5							5	90	3					
	10.			11																		0					0								8					0						25	90	17					
	Total																																															400	5	6.0	24.0	2.5	7.1

Appendix Table D (Cont.)

	Products	BREAK:		GOOD:														CHOICE:																				PRIME:											
Date	Time Period	HRI	C-P Primal	3Pc Chuck	C-P Chuck	Ribeye	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Top Sirloin	Full Butt	C-P Loin	HRI Round	160 Round	C-P Round	HRI Chuck	3 Pc Chuck	Primal Chuck	Lipon Ribeye	BI Lipon Ribeye	107 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	Full Butt	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Primal Round	C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
		Total Number of Laborers																																								hd	hdhr	min	no.	%	min	min	hr
7-24	1.	14		11			6							8			4																									175	80	131					
	2.	15																12			6					4	9		1					7								80	60	80					
	3.	15																	11		6					6	9		2					8								76	80	57					
	4.	15																	11			6				6	9		2					8								100	80	75					
	5.	15																	11					2		6	9		2					8								5	80	4					
	6.	15																	11						0	6	9		2					8								30	80	22					
	7.		11																	8					0							8				5						10	90	7					
	Total																																											376	7	5.2	19.6	2.5	6.6
7-25	1.		11																																			8	2	8	5	24	90	16					
	2.	15		11		6			5		9	3	1		7																											50	70	43					
	3.	13			8	6			5		9	3	1		7																											25	70	21					
	4.	15																	11		6					5		9		3	1			7								65	70	56					
	5.	15																	11		6											8		7								5	70	4					
	6.	14																	11					2								8				4						10	70	9					
	7.		11																	8				2								8				5						70	90	47					
	8.		11																	8				2								8					0					20	90	13					
	Total																																											209	2	1.5	3.1	5.0	3.6
7-26	1.	15																	11		6					5		9		3	1			7								381	70	328					
	2.	15																	11		6					6		9		3	1				4							65	80	49					
	3.		11																	8	6					6		9		3	1					5						15	80	11					
	4.		11																	0	6					6		9		3	1						0					20	80	15					
	5.		11																	0				2								8					0					15	90	10					
	Total																																											413	3	2.2	9.1	0.0	7.0
7-27	1.	15		11				2	5		9	3	1		7																											150	70	129					
	2.	15																	11		6					5		9		3	1			7								88	70	75					
	3.	15																	11		6					6		9		3	1				4							125.5	80	94					
	4.	13																		8	6					6		9		3	1				4							85	80	64					
	5.	14																		8					0	6		9		3	1				4							40	80	30					
	Total																																											392	4	3.0	11.8	2.5	6.8

Appendix Table D (Cont.)

	Products	BREAK: HRI	C-P/Primal	GOOD: 3Pc Chuck	C-P Chuck	Ribeye	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Top Sirloin	Full Butt	C-P Loin	HRI Round	160 Round	C-P Round	CHOICE: HRI chuck	3Pc Chuck	C-P Chuck	Primal Chuck	Lipon Ribeye	BI Lipon Ribeye	107 Rib	C-P Rib	Primal Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	Full Butt	C-P Loin	Primal Loin	HRI Round	160 Round	C-P Round	Primal Round	PRIME: C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Spedd	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Total Number of Laborers																																									hd	hdhr	min	no.	%	min	min	hr
7-28	1.	15		11				2	5		9	3	1		7																												25	70	19					
	2.	15		11				2	6		9	3	1			4																											65	80	49					
	3.	14		11				2	6		9	3	1				4																										20	80	15					
	4.		13	11				2						8			4																										40	30	30					
	5.	7		11				2																																			50	80	37					
	6	15																12					6				4		9		3	1				4							40	60	40					
	7.	15																	11				6				6		9		3	1				4							60	60	45					
	8.	15																	11					2			6		9		3	1				4							5	80	4					
	9.		12																	8				2			6		9		3	1				4							10	80	8					
	10.		12																	8					2		6		9		3	1				4							19	80	14					
	11.		12																	0					2		6		9		3	1				4							90	80	67					
	12.		12																	0						0	6		9		3	1				4							100	80	75					
	13.		11																	0						0	6		9		3	1					4						20	80	15					
	14.		11																	0						0								4			5						20	90	13					
	15.		11																	0						0								4				0					30	90	20					
	Total																																												451	6	4.5	20	2.4	7.9
7-29	1.		11		8			2						8			5																										85	90	57					
	2.	15																12							2		5		9		3	1			7								70	60	70					
	3.	15																	11						2		5		9		3	1			7								105	70	90					
	4.	13																		0					2		6		9		3	1				4							175	80	131					
	5.		11																	0					2		6		9		3	1						0					34	80	26					
	Total																																												374	10	7.5	28	2.5	6.7

Appendix Table E

Products Produced With An Even Number Of Quarters And Without Primals

Date	6-19		6-20			6-21		6-22		6-23		
Carcass Grade	Choice	Good	Prime	Choice	Good	Choice	Good	Choice	Good	Prime	Choice	Good
	Number Of Carcasses											
Product												
CHUCK												
Roll, Clod, Tender				115.0		165.0		30.0				
3 Pc. Chuck	325.0	50.0		135.0	200.0	16.5	190.0	159.5	240.0		226.5	160.0
C-P Chuck	50.0		24.0			75.0				29.0	60.0	10.0
RIB												
Ribeye								164.5			145.0	
Lipon Ribeye	325.0	50.0		245.0	200.0		150.0					160.0
107 Rib				5.0								
109 Rib						181.5		25.0	130.0		81.5	
C-P Rib	50.0		24.0			75.0	40.0		110.0	29.0	60.0	10.0
LOIN												
Tenderloin	325.0	50.0		250.0	200.0	181.5	170.0	189.5	160.0		226.5	160.0
175 Loinstrip								30.0			226.5	
180 Loinstrip	325.0	50.0		250.0	200.0	181.5	170.0	159.5	160.0			160.0
Shell Sirloin	285.0			250.0		181.5		189.5			81.5	
Top Sirloin	40.0	50.0			200.0		170.0		160.0		145.0	160.0
Full Bottom Butt	40.0											
Ball, Tri, Flap		50.0			200.0		170.0		160.0		145.0	160.0
C-P Loin	50.0		24.0			75.0	20.0		80.0	29.0	60.0	10.0
ROUND												
Inside/Outside Round	200.0	50.0		250.0	200.0	181.5	150.0	189.5	75.0		176.5	160.0
Knuckle	200.0	50.0				181.5	75.0	189.5	75.0			160.0
Peeled Knuckle				250.0	200.0		75.0				176.5	
160 Round	125.0										50.0	
C-P Round	50.0		24.0			75.0	40.0		165.0	29.0	60.0	10.0

Appendix Table E (Cont.)

Date	6-27		6-28		6-29		6-30		7-1	
Carcass Grade	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
	Number Of Carcasses									
Product										
CHUCK										
Roll, Clod, Tender	45.0				25.0	[illegible]	60.0			
3 Pc. Chuck	166.0	150.0	62.0	95.0	209.0	45.0	190.0	180.0	235.0	257.0
C-P Chuck	155.0						45.0		10.0	
RIB										
Ribeye		85.0								
Lipon Ribeye	45.0					45.0		120.0		257.0
Bone-in Lipon	166.0	65.0								
109 Rib			62.0	95.0			100.0		145.0	
C-P Rib	155.0				234.0		195.0	60.0	100.0	
LOIN										
Tenderloin	211.0	150.0	62.0	95.0	109.0	45.0	250.0	120.0	245.0	257.0
175 Loinstrip			62.0		109.0		250.0		245.0	
180 Loinstrip	211.0	150.0		95.0		45.0		120.0		257.0
Shell Sirloin	211.0		62.0		109.0		250.0		245.0	
Top Sirloin		150.0		95.0		45.0		120.0		257.0
Ball, Tri, Flap		150.0		95.0		45.0		120.0		257.0
C-P Loin	155.0				125.0		45.0	60.0		
ROUND										
Inside/Outside Round	211.0	150.0	62.0	95.0	109.0	45.0	240.0	120.0	215.0	257.0
Knuckle	211.0	150.0	62.0	95.0	109.0	45.0	165.0	120.0	215.0	257.0
Peeled Knuckle							75.0			
160 Round							10.0		30.0	
C-P Round	155.0				125.0		45.0	60.0		

Appendix Table E (Cont.)

Date	7-3		7-5		7-6		7-7		
Carcass Grade	Choice	Good	Choice	Good	Choice	Good	Prime	Choice	Good
	Number Of Carcasses								
Product									
CHUCK									
Roll, Clod, Tender	45.0		85.0					50.0	
3 Pc. Chuck	251.5		287.0	90.0	350.0	130.0		306.5	75.0
C-P Chuck	90.0	80.0	13.5		75.0		35.0	65.0	80.0
RIB									
Ribeye				80.0				216.5	
Lipon Ribeye				10.0					75.0
Bone-in Lipon			180.5			130.0			
107 Rib			5.0						
109 Rib	261.5								
C-P Rib	125.0	80.0	200.0		425.0		35.0	205.0	80.0
LOIN									
Tenderloin	386.5		372.0	90.0	390.0	130.0		346.5	75.0
175 Loinstrip	386.5		372.0		390.0			346.5	
180 Loinstrip				90.0		130.0			75.0
Shell Sirloin	386.5				390.0			346.5	
Top Sirloin			372.0	90.0		130.0			75.0
Ball, Tri, Flap			372.0	90.0		130.0			75.0
C-P Loin		80.0	13.5		35.0		35.0	75.0	80.0
ROUND									
Inside/Outside Round	195.0		287.0	90.0	390.0	130.0		326.5	75.0
Knuckle	125.0		287.0	90.0	60.0			220.0	75.0
Peeled Knuckle	70.0				330.0	130.0		106.5	
160 Round	191.5		85.0					20.0	
C-P Round		80.0	13.5		35.0		35.0	75.0	80.0

Appendix Table E (Cont.)

Date	7-10		7-11		7-12		7-13		7-14		7-15	
Carcass Grade	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
	Number Of Carcasses											
Product												
CHUCK												
Roll, Clod, Tender	35.0		25.0				10.0		10.0			
3 Pc. Chuck	192.0	75.0	331.0	200.0	272.5	200.0	327.5	190.0	343.0	280.0	378.0	90.0
C-P Chuck	80.0	200.0		50.0	65.0			25.0	7.5			85.0
RIB												
Ribeye	252.0						25.0					
Lipon Ribeye		190.0	351.0	250.0		200.0		190.0	345.5	240.0	378.0	90.0
Bone-in Lipon					162.5							
107 Rib			5.0				155.0					
109 Rib	15.0	85.0			20.0		67.5					
C-P Rib	40.0				155.0		90.0	25.0	15.0	40.0		85.0
LOIN												
Tenderloin	267.0	225.0	331.0	110.0	272.5	200.0	252.5	205.0	353.0	105.0	378.0	90.0
Peeled Tenderloin				140.0						140.0		
175 Loinstrip	267.0		90.0	25.0	272.5		40.0					
180 Loinstrip		225.0	241.0	225.0		200.0	212.5	205.0	353.0	245.0	378.0	90.0
Shell Sirloin	267.0		331.0		272.5		252.5		353.0		378.0	
Top Sirloin		225.0		250.0		200.0		205.0		245.0		90.0
Full Bottom Butt						200.0		205.0		245.0		
Ball, Tri, Flap		225.0		250.0								90.0
C-P Loin	40.0	50.0	25.0		65.0		85.0	10.0	7.5	35.0		85.0
ROUND												
Inside/Outside Round	182.0	210.0	291.0	250.0	147.5	200.0	252.5	150.0	325.5	215.0	378.0	90.0
Knuckle	182.0	210.0	35.0		147.5	200.0	252.5	150.0			378.0	90.0
Peeled Knuckle			256.0	250.0					325.5	215.0		
160 Round	75.0		40.0		125.0		50.0		20.0			
C-P Round	50.0	65.0	25.0		65.0		35.0	65.0	15.0	65.0		85.0

Appendix Table E (Cont.)

Date	7-17		7-18			7-19		7-20		7-21		7-22	
Carcass Grade	Choice	Good	Prime	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
	Number Of Carcasses												
Product													
CHUCK													
Roll, Clod, Tender				75.0		210.0		200.0		75.0			
3 Pc. Chuck	131.0	20.0		172.5	95.0	145.0	90.0	290.0	117.0	252.0	180.0	312.5	165.0
C-P Chuck	225.0	195.0	10.0		15.0	30:0					85.0	55.0	
RIB													
Lipon Ribeye		215.0		120.0	110.0	195.0	25.0			327.0		257.5	
107 Rib				5.0									
109 Rib	356.0			102.5			65.0						
C-P Rib			10.0	20.0		190.0		490.0	117.0		265.0	110.0	165.0
LOIN													
Tenderloin	356.0	215.0		227.5		355.0	90.0	445.0	17.0	295.0		187.5	
Peeled Tenderloin					110.0								
175 Loinstrip				227.5				155.0				187.5	
180 Loinstrip	356.0	215.0			110.0	355.0	90.0	290.0	17.0	295.0			
Shell Sirloin	356.0			35.0		195.0							
Bone-in Top Sirloin								120.0					
Top Sirloin		215.0		192.5	110.0	160.0	90.0	325.0	17.0	295.0		187.5	
Full Bottom Butt		215.0		192.5	110.0	160.0	90.0	445.0	17.0	295.0		187.5	
C-P Loin			10.0	20.0		30.0		45.0	100.0	32.0	265.0	180.0	165.0
ROUND													
Inside/Outside Round	356.0	215.0		227.5	110.0	320.0	90.0	400.0		295.0		45.0	
Knuckle	356.0	215.0		227.5	110.0	320.0	90.0	400.0		295.0		45.0	
160 Round						35.0						212.5	
C-P Round			10.0	20.0		30.0		99.0	117.0	32.0	265.0	110.0	165.0

Appendix Table E (Cont.)

Date	7-24		7-25			7-26		7-27		7-28		7-29	
Carcass Grade	Choice	Good	Prime	Choice	Good	Choice	Good	Choice	Good	Choice	Good	Choice	Good
	Number Of Carcasses												
Product													
CHUCK													
Roll, Clod, Tender	80.0									40.0		70.0	
3 Pc. Chuck	211.0	175.0		70.0	50.0	483.0		213.0	150.0	304.0	200.0	314.0	
C-P Chuck	10.0		24.0	100.0	25.0	15.0		125.0		50.0			85.0
RIB													
Ribeye					75.0								
Lipon Ribeye	191.0			70.0		483.0		338.0					
Bone-in Lipon	100.0									270.0			
107 Rib										15.0			
109 Rib		175.0											
C-P Rib	10.0		24.0	100.0		15.0			150.0	109.0	200.0	384.0	
LOIN													
Tenderloin	301.0			70.0	75.0	483.0		338.0	150.0	344.0	140.0	384.0	
175 Loinstrip	301.0					483.0							
180 Loinstrip				70.0	75.0			338.0	150.0	344.0	140.0	384.0	
Shell Sirloin	301.0												
Top Sirloin				70.0	75.0	483.0		338.0	150.0	344.0	140.0	384.0	
Full Bottom Butt				70.0	75.0	483.0		338.0	150.0	344.0	140.0	384.0	
C-P Loin	10.0	175.0	24.0	100.0		15.0				50.0	60.0		85.0
ROUND													
Inside/Outside Round	301.0			70.0	75.0	418.0		88.0	150.0		75.0	175.0	
Knuckle	301.0			70.0	75.0	418.0		88.0	150.0		75.0	175.0	
160 Round						65.0		250.0		344.0	65.0	209.0	
C-P Round	10.0	175.0	24.0	100.0		15.0				50.0	60.0		85.0

Appendix Table F

Production Schedules For Those Products In Appendix Table E

Date	Products Time Period	BREAK: HRI	C-P	GOOD: 3 Pc Chuck	C-P Chuck	Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Ball, Tri, Flap	C-P Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3 Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	Full Butt	Ball, Tri, Flap	C-P Loin	HRI Round	160 Round	C-P Round	PRIME: C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
		Number of Laborers																																					hd	hd/hr	min	no.	%	min	min	hr.
6-19	1.	15		11		6			5	9	3	2		7																									50	70	43					
	2.	15															11			6				5		9		3	1			7							40	70	34					
	3.	15															11			6				6		9	2					8							160	80	120					
	4.	15															11			6				6		9	2						4						125	80	94					
	5.		11															8					2								8			5					50	90	33					
	Total																																								323	12	9.0	29.2	2.5	5.9
6-20	1.	15														12				6				4		9	2					7							115	60	115					
	2.	15															11			6				6		9	2												130	80	197					
	3.	15															11				2			6		9	2												5	80	4					
	4.	15		11		6			5	9	3	2		7																									200	70	171					
	5.		11																																8	2	8	5	24	90	16					
	Total																																								403	5	3.7	14.9	5.0	7.0
6-21	1.	15		11		6			5	9	3	2		7																									130	70	129					
	2.	14		11				2	5	9	3	2			4																								20	70	17					
	3.	14		11				2					8		4																								20	80	15					
	4.	15														12						6		4		9	2					7							165	60	165					
	5.	15															11					6		6		9	2					8							16.5	80	13					
	6.		11															8					2								8			5					75	90	50					
	Total																																								389	8	6.0	23.3	2.5	6.9
6-22	1.	15														12			5					4	9		2					7							30	60	30					
	2.	15															11		6					6		9	2					8							134.5	80	101					
	3.	15															11					6		5		9	2					8							25	80	19					
	4.	15		11			6		5	9	3	2		7																									75	70	64					
	5.	14		11			6		5	9	3	2			4																								55	70	47					
	6.	14		11				2	5	9	3	2			4																								30	70	26					
	7.	14		11				2					8		4																								80	80	60					
	Total																																								342	8	6.0	20.8	2.5	6.2
6-23	1.		11																																8	2	8	5	29	90	19					
	2.		11		8			2					8		5																								10	90	7					
	3.	15		11		6			5	9	3	2		7																									150	70	137					
	4.	15															11			6				5	9			3		2		7							145	70	24					
	5.	15															11					6		6	9		2					8							31.5	80	24					
	6.	15															11					6		6	9		2						4						59	80	37					
	7.		11															8					2								8			5					60	90	40					
	Total																																								388	4	3.0	11.6	5.0	6.7

Appendix Table F (Cont.)

Date	Time Period	BREAK: HRI	C-P	GOOD: 3 Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	BI Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Ball, Tri, Flap	C-P Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3 Pc Chuck	C-P Chuck	Lipon Ribeye	BI Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	160 Loinstrip	Shells Sirloin	C-P Loin	HRI Round	160 Round	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
		Number of Laborers																															hd	hdhr	min	no.	%	min	min	hr
6-27	1.	15		11		6					5	9	3	2		7																	85	70	73					
	2.	15		11				6			5	9	3	2		7																	65	70	56					
	3.	15																12			6				4		9	2		7			45	60	45					
	4.	15																	11			6			6		9	2		8			166	80	125					
	5.		11																	8				2					8			5	155	90	103					
	Total																																		402	5	3.7	14.9	2.5	7.0
6-28	1.	15		11					6		5	9	3	2		7																	95	70	81					
	2.	15																	11				6		6	9		2		8			62	80	47					
	Total																																		128	5	3.7	4.7	2.5	2.2
6-29	1.	15		11			6				5	9	3	2		7																	45	70	39					
	2.	15																12						2	4	9		2		7			25	60	25					
	3.	15																	11					2	6	9		2		8			84	80	63					
	4.	15																	11					2					8			4	125	80	94					
	Total																																		221	4	3.0	6.6	2.5	3.8
6-30	1.	15		11		6					5	9	3	2		7																	120	70	103					
	2.	15		11						2					8		4																60	80	45					
	3.	15																12				5			4	9		2		7			60	60	60					
	4.	15																	11			6			6	9		2		8			40	80	30					
	5.	15																	11					2	6	9		2		8			140	80	105					
	6.	15																	11					2	6	9		2			4		10	80	8					
	7.		11																	8				2								5	45	90	30					
	Total																																		381	4	3.0	11.4	2.5	6.6
7-1	1.	15		11		6					5	9	3	2		7																	257	70	220					
	2.	15																	11				6		6	9		2		8			145	80	109					
	3.	15																	11					2	6	9		2		8			70	80	53					
	4.	15																	11					2	6	9		2			4		20	80	15					
	5.	13																		8				2	6	9		2			4		10	80	8					
	Total																																		405	6	4.5	18.2	2.5	7.1

Appendix Table F (Cont.)

	Products	BREAK:		GOOD:													CHOICE:																	PRIME:				Carcassed Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
		HRI	C-P	3 Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	BI Lipon Ribeye	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Ball, Tri, Flap	C-P Loin	HRI Round	C-P Round	HRI Chuck	3 Pc Chuck	C-P Chuck	Ribeye	BI Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	Shell Sirloin	Top Sirloin	Ball, Tri, Flap	C-P Loin	HRI Round	160 Round	C-P Round	C-P Chuck	C-P Rib	C-P Loin	C-P Round								
Date	Time Period	Number of Laborers																																				hd	hdhr	min	no	%	min	min	hr
7-3	1.		11		8				2					6		5																						80	90	53					
	2.	15															12						6		4	9	2				7							45	60	45					
	3.	15																11					6		6	9	2				8							150	80	113					
	4.	15																11					6		6	9	2					4						66.5	80	50					
	5.	15																11						2	6	9	2					4						35	80	26					
	6.		12																8						6	9	2					4						90	80	67					
	Total																																							354	4	3.0	10.6	2.5	6.1
7-5	1.	15		11		6				5	9	3	2		7																							80	70	69					
	2.	15		11			6			5	9	3	2		7																							10	70	9					
	3.	15															12				6				4	9		3	2			4						85	60	85					
	4.	15																11			6				5	9		3	2		7							95.5	70	82					
	5.	15																11				2			5	9		3	2		7							5	70	4					
	6.	15																11						2	5	9		3	2		7							186.5	70	160					
	7.		11																8					2						8			5					13.5	90	9					
	Total																																							418	6	4.5	18.8	2.5	7.3
7-6	1.	15		11				6		5	9	3	2		7																							130	70	111					
	2.	15																11						2	6	9	2				8							350	80	263					
	3.	13																	8					2	6	9	2				8							40	80	30					
	4.		11																8					2						8			5					35	90	23					
	Total																																							427	6	4.5	19.2	2.5	7.5
7-7	1.		11																															8	2	5	8	35	90	23					
	2.		11		8				2					8		5																						80	90	53					
	3.	15		11			6			5	9	3	2		7																							75	70	64					
	4.	15															12			6					4	9	2				7							50	60	50					
	5.	15																11		6					6	9	2				8							166.5	80	125					
	6.	15																11						2	6	9	2				8							110	80	82					
	7.	15																11						2	6	9	2					4						20	80	15					
	8.		13															11						2						8			4					10	80	8					
	9.		11																8					2						8			5					65	90	43					
	Total																																							463	6	4.5	20.8	5.0	8.1

Appendix Table F (Cont.)

	Products	BREAK: HRI	C-P	GOOD: 3 Pc Chuck	C-P Chuck	Lipon Ribeye	BI Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Top Sirloin	Full Butt	Ball, Tri, Flap	C-P Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3 Pc Chuck	C-P Chuck	Ribeye	Lipon Ribeye	BI Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	C-P Loin	HRI Round	160 Round	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Number of Laborers																																		hd	hdhr	min	no	%	min	min	hr
7-10	1.	15		11		6				5		9	3		2		7																			75	70	64					
	2.	13			8	6				5		9	3		2		7																			115	70	99					
	3.	13			9			6		5		9	3		2		7																			20	70	17					
	4.		11		8			6		5		9	3		2			4																		15	70	13					
	5.		11		8			6								8		4																		50	80	37					
	6.	15																	12			6						4	9		2		7			35	60	35					
	7.	15																		11		6						6	9		2		8			147	60	34					
	8.	15																		11		6						6	9		2			4		45	80	110					
	9.	13																			8	6						6	9		2			4		25	80	19					
	10.	13																			8					6		6	9		2			4		5	80	4					
	11.		11																		8					6		6	9		2				4	10	80	8					
	12.		11																		8						2					8			5	40	90	27					
	Total																																					467	6	4.5	21.0	2.5	8.2
7-11	1.	15		11		6				5	9		3		2		7																			25	70	21					
	2.	15		11		6				5		9	3		2		7																			175	70	150					
	3.	13			8					5		9	3		2		7																			50	70	43					
	4.	15																	12			6						4	9		2		7			25	60	25					
	5.	15																		11		6						6	9		2		8			65	80	49					
	6.	15																		11		6						6		9	2		8			201	80	151					
	7.	15																		11		6						6		9	2			4		40	80	30					
	8.	14																		11		6										8			4	20	80	15					
	9.	14																		11					2							8			4	5	80	4					
	Total																																					488	2	1.5	7.3	2.5	8.3
7-12	1.	15		11		6				5		9	3		1		8																			200	80	150					
	2.	15																		11				6				6	9		2		8			147	80	111					
	3.	15																		11				6		6		6	9		2			4		15	80	11					
	4.	15																		11							2	6	9		2			4		20	80	15					
	5.	15																		11							2	6	9		2			4		90	80	67					
	6.		11																		8														5	65	90	43					
	Total																																					397	3	2.2	8.7	2.5	6.8

Appendix Table F (Cont.)

	Products	BREAK: HRI	C-P	GOOD: 3Pc Chuck	C-p Chuck	Lipon Ribeye	Bi Lipon Ribeye	109 Rib	C-p Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Top Sirloin	Full Butt	Ball, Tri, Flap	C-p Loin	HRI Round	C-p Round	CHOICE: HRI Chuck	3 Pc Chuck	C-p Chuck	Ribeye	Lipon Ribeye	Bi Lipon Ribeye	107 Rib	109 Rib	C-p Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	C-p Loin	HRI Round	160 Round	C-p Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Speed	Production Time
Date	Time Period	Number of Laborers																																		hd	hdhr	min	no	%	min	min	hr
7-13	1.	15		11		6				5		9	3	1			7																			150	70	129					
	2.	15		11		6				6		9	3	1				4																		40	80	30					
	3.		11		8				2	6		9	3	1				4																		15	80	11					
	4.		11		8				2							8		5																		10	90	7					
	5.	15																	12			6						4	9		2		7			10	60	10					
	6.	15																		11		6						6	9		2		8			15	80	11					
	7.	15																		11						6		6	9		2		8			15	80	11					
	8.	15																		11						6		6		9	2		8			52.5	80	39					
	9.	15																		11					2			6		9	2		8			155	80	116					
	10.	15																		11							2	6		9	2		8			5	80	4					
	11.	15																		11							2					8		4		50	80	37					
	12.	14																		11							2					8			4	35	80	26					
	Total																																					431	2	1.5	6.5	2.5	7.3
7-14	1.	15		11		6				5		9	3	1			7																			215	70	184					
	2.	14		11		6				6		9	3	1				4																		25	80	19					
	3.	14		11					2	6		9	3	1				4																		5	80	4					
	4.	14		11					2							8		4																		35	80	26					
	5.	15																	12				6					4		9	2		7			10	60	10					
	6.	15																		11			6					5		9	2		8			315.5	80	237					
	7.	15																		11			6					6		9	2			4		20	80	15					
	8.	14																		11							2	6		9	2				4	7.5	80	6					
	9.		11																		8						2					8			5	7.5	90	5					
	Total																																					506	2	1.5	7.6	2.5	8.
7-15	1.	15																		11			6					6		9	2		8			378	80	284					
	2.	15		11		6				5		9	3		2		7																			90	70	77					
	3.		11		8				2							8		5																		85	90	57					
	Total																																					418	7	5.2	21.7	2.5	7.

Appendix Table F (Cont.)

	Products	BREAK: HRI	C-P	GOOD: 3pc Chuck	C-P Chuck	Lipon Ribeye	IC9 Rib.	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloin	Full Butt	C-P Loin	HRI Round	C-P Round	CHOICE: HRI Chuck	3Pc Chuck	C-P Chuck	Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	BI Top Sirloin	Full Butt	C-P Loin	HRI Round	160 Round	C-P Round	PRIME C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Number of Laborers																																				hd	hdhr	min	no	%	min	min	hr
7-17	1.	15		11		6			5	9	3	1		7																								20	70	17					
	2.	13			8	6			5	9	3	1		7																								195	70	167					
	3.	15															11				6		6		9	2					8							131	80	98					
	4.	13																8			6		6		9	2					8							225	80	169					
	Total																																							451	4	3.0	13.5	2.5	7.8
7-18	1.		11																															8	2	8	5	10	90	7					
	2.	15		11		6			5	9	3	1		7																								95	70	81					
	3.	13			8	6			5	9	3	1		7																								15	70	13					
	4.	15														12			6				4	9			3		1		7							75	60	75					
	5.	15															11		6				5	9			3		1		7							45	70	39					
	6.	15															11				6		5	9			3		1		7							72 5	70	62					
	7.	15															11				6		6	9		2					8							30	80	23					
	8.	15															11			2			6	9		2					8							5	80	4					
	9.	14															11					2								8			5					20	80	15					
	Total																																							319	3	2.2	7.0	5.0	5.5
7-19	1.	15		11		6			5	9	3	1		7																								25	70	21					
	2.	15		11		6			5	9	3	1		7																								65	70	56					
	3.	15														12			6				4		9		3		1		7							160	60	160					
	4.	15														12			6				4		9	2					7							35	60	35					
	5.	15														12						2	4		9	2					7							15	60	15					
	6.	15															11					2	6		9	2					8							110	80	82					
	7.	15															11					2	6		9	2						4						35	80	26					
	8.		11															8				2								8			5					30	90	20					
	Total																																							415	5	3.7	15.3	2.5	7.2
7-20	1.	14		11				2	6	9	3	1			4																							17	80	13					
	2.	14		11				2					8		4																							100	80	75					
	3.	15														12						2	4	9				3	1		7							120	60	120					
	4.	15														12						2	4	9			3		1		7							35	60	35					
	5.	15														12						2	4		9		3				7							45	60	45					
	6.	15															11					2					3				7							200	70	171					
	7.	14															11					2					3						4					45	80	34					
	8.	14															11					2								8			4					45	80	34					
	Total																																							527	5	3.7	19.5	2.5	9.1

Appendix Table F (Cont.)

	Products	BREAK:	HRI	C-P	GOOD:	3Pc Chuck	C-P Chuck	Lipon Ribeye	109 Rib	C-P Rib	Tenderloin	180 Loinstrip	Top Sirloio	Full Butt	C-P Loin	HRI Round	C-P Round	CHOICE:	HRI Chuck	3Pc Chuck	C-P Chuck	Lipon Ribeye	107 Rib	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	BI Top Sirloin	Full Butt	C-P Loin	HRI Round	160 Round	C-P Round	PRIME:	C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Number of Laborers																																								hd	hdhr	min	no	%	min	min	hr
7-21	1.		15			11				2					8		4																									180	80	135					
	2.			11			8			2					8		5																									85	90	57					
	3.		15																12			6				4		9		3		1		7								75	60	75					
	4.		15																	11		6				5		9		3		1		7								220	70	189					
	5.		14																	11		6											8			4						32	80	24					
	Total																																											484	5	3.7	17.9	2.5	8.4
7-22	1.		14			11				2					8		4																									165	80	124					
	2.		15																	11		6				5	9			3		1		7								45	70	39					
	3.		15																	11		6											8		4							142.5	80	107					
	4.		14																	11		6											8		4							70	80	52					
	5.			13																11					2								8			5						55	80	41					
	6.			14																	8				2																	55	90	37					
	Total																																											400	8	6.0	24.0	2.5	7.1

Appendix Table F (Cont.)

	Products	BREAK: HRI	C-P	GOOD: 3 Pc Chuck	C-P Chuck	Ribeye	109 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Top Sirloin	Full Butt	C-P Loin	HRI Round	160 Round	C-P Round	CHOICE: HRI Chuck	3 Pc Chuck	C-P Chuck	Lipon Ribeye	BI Lipon Ribeye	107 Rib	C-P Rib	Tenderloin	175 Loinstrip	180 Loinstrip	Shell Sirloin	Top Sirloin	Full Butt	C-P Loin	HRI Round	160 Round	C-P Round	PRIME: C-P Chuck	C-P Rib	C-P Loin	C-P Round	Carcasses Processed	Chain Speed	Elapsed Time	Absentees	% Absentees	Absentee Time	Change Over Time	Production Time
Date	Time Period	Number of Laborers																																					hd	hdhr	min	no	%	min	min	hr
7-24	1.	15		11			6							8			4																						175	60	131					
	2.	15																12			6				4	9		1				7							80	60	80					
	3.	15																	11		6				6	9		2				8							111	60	83					
	4.	15																	11			6			6	9		2				8							100	80	75					
	5.		11																	8				2							8			5					10	90	7					
	Total																																								376	7	5.2	196	2.5	6.6
7-25	1.		11																																8	2	8	5	24	90	16					
	2.		11																	8				2							8			5					100	90	67					
	3.	15																	11		6				5		9		3	1		7							70	70	60					
	4.	15		11		6			5		9	3	1		7																								75	70	64					
	Total																																								207	2	1.5	3.1	5.0	3.6
7-26	1.	15																	11		6				5		9		3	1		7							418	70	158					
	2.	15																	11		6				6		9		3	1			4						65	80	49					
	3.		11																	8				2							8			5					15	90	10					
	Total																																								417	3	2.2	9.2	0.0	7.1
7-27	1.	15		11				2	5		9	3	1		7																								150	70	129					
	2.	15																	11		6				5		9		3	1		7							88	70	75					
	3.	15																	11		6				6		9		3	1			4						125	80	94					
	4.	13																		8	6				6		9		3	1			4						125	80	94					
	Total																																								192	4	3.0	149	2.5	6.8
7-28	1.	15		11				2	5		9	3	1		7																								75	70	64					
	2.	15		11				2	6		9	3	1			4																							65	80	49					
	3.		13	11				2						8			4																						60	80	45					
	4.	15																12				6			4		9		3	1			4						40	60	40					
	5.	15																	11			6			6		9		3	1			4						230	80	173					
	6.	15																	11				2		6		9		3	1			4						15	80	11					
	7.	15																	11					2	6		8		3	1			4						59	80	44					
	8.		11																	8				2							8			5					50	90	33					
	Total																																								459	6	4.5	206	2.5	8.0
7-29	1.		11		8			2						8			5																						85	90	57					
	2.	15																12						2	4		9		3	1		7							70	60	70					
	3.	15																	11					2	5		9		3	1		7							105.	70	90					
	4.	15																	11					2	6		9		3	1			4						209	80	157					
	Total																																								374	10	7.5	281	2.5	6.7

Appendix Table G.

Appendix Table G contains the weight and value of primals deleted from the lists of products processed found in Appendix Table C. It also contains calculations for the value of the subprimal products processed in lieu of primals as found in Appendix Table E as well as the packaging costs involved in producing these products.

The procedure used to calculate the value of subprimal products was the following.

1. The number of head processed into each product was multiplied by the average carcass weight for that week. This figure was multiplied by the standard yield percentage to arrive at the weight of each product processed.
2. The weight of each product was multiplied by the average price per pound as computed from Appendix Table A by dividing the value of product by the weight of product.
3. The proportions of 25-75 trim, 50-50 trim, tallow, and bone are assumed to be the same as that in Appendix Table A. The total weight of subprimal products was subtracted from the total weight of the primals. This figure was then multiplied by the ratio of trim, tallow, and bone to arrive at the weight of each of these products. These weights were multiplied by their respective prices per pound.

Packaging costs were estimated using the same method the case company uses to estimate the packaging cost for repackaging returned product. The procedure used is the following.

1. The number of bags of each suze used was estimated by dividing the number of pieces of each product by the standard number

Appendix Table G

Change In Revenue By Processing Subprimal Products From Primals

For Week Ending 6-23

Product Name	Carcasses (Number)	Weight (Pounds)	Value (Dollars)	TOTAL
PRIMALS:				
Rib Primal	260.0	15,771.6	19,010.84	
Loin Primal	115.0	17,052.2	23,873.08	
Round Primal	100.0	15,434.6	13,785.03	
				56,668.95
SUBPRIMAL PRODUCTS:				
Choice Ribeye	110.0	1,853.5	7,043.30	
Choice Lipon Ribeye	100.0	2,190.5	6,089.59	
Choice 109 Rib	25.0	952.0	1,827.84	
Choice C-P Rib	25.0	1,204.8	1,734.91	
Short Rib	260.0	1,542.1	1,202.85	
Spare Rib	260.0	1,927.6	1,272.24	
Blade Meat	260.0	1,742.3	2,439.21	
Tenderloin	90.0	1,182.9	3,666.90	
Choice 180 Loinstrip	90.0	2,274.7	5,459.28	
Shell Sirloin	90.0	4,337.2	4,467.31	
Choice C-P Loin	25.0	2,291.6	3,666.56	
Flank Steak	115.0	348.8	889.43	
Loin Trim	115.0	271.3	341.82	
Choice Inside Round	75.0	2,881.3	4,149.07	
Choice Outside Round	75.0	3,639.6	3,785.18	
Knuckle	75.0	1,415.4	1,670.17	
Choice C-P Round	25.0	3,167.8	3,738.00	
25-75 Trim		195.4	162.18	
50-50 Trim		5,878.7	3,527.22	
Tallow		1,924.5	423.39	
Bone		7,036.4	351.82	
				57,908.27

PACKAGING COSTS

Bag/Box Size	Number Of Bags/Boxes	Cost Per Bag/Box	Cost	TOTAL
14/20	250	$ .12	$30.00	
16/28	1,060	.14	148.40	
18/30	300	.187	56.10	
22/36	50	.498	24.90	
				548.64

Appendix Table G (Cont.)

Product Name	For Week Ending 7-1 Carcasses (Number)	Weight (Pounds)	Value (Dollars)	TOTAL
PRIMALS:				
Rib Primal	45.5	2,665.8	3,145.64	
Loin Primal	125.0	17,902.5	25,063.50	
				28,209.14
SUBPRIMAL PRODUCTS:				
Choice Lipon Ribeye	45.5	962.7	2,503.02	
Short Rib	45.5	360.7	203.35	
Spare Rib	45.5	325.8	215.03	
Blade Meat	45.5	325.8	456.12	
Tenderloin	125.0	1,586.8	4,728.70	
Choice 175 Loinstrip	95.0	3,401.5	5,714.52	
Good 180 Loinstrip	30.0	732.4	1,450.15	
Shell Sirloin	95.0	4,421.9	4,510.36	
Good Top Sirloin	30.0	625.0	1,218.75	
Ball Tip	30.0	87.9	167.00	
Tri Tip	30.0	146.5	285.68	
Flap Meat	30.0	78.1	101.56	
Flank Steak	125.0	366.2	933.78	
Loin Trim	125.0	284.8	358.86	
25-75 Trim		90.5	75.12	
50-50 Trim		2,722.2	1,633.32	
Tallow		891.2	196.06	
Bone		3,258.3	162.92	
				24,914.30

PACKAGING COSTS

Bag/Box Size	Number Of Bags/Boxes	Cost Per Bag/Box	Cost	TOTAL
14/20	72	.12	8.64	
16/28	651	.14	91.14	
18/30	190	.187	35.53	
Sm.	201	.73	146.73	
				282.04

Appendix Table G (Cont.)

For Week Ending 7-8

Product Name	Carcasses (Number)	Weight (Pounds)	Value (Dollars)	TOTAL
PRIMALS:				
Chuck Primal	22.0	4,325.6	3,298.27	
Rib Primal	171.0	10,434.4	12,234.79	
Round Primal	60.0	9,315.7	8,384.13	
				23,917.19
SUBPRIMAL PRODUCTS:				
Choice 3 Pc Chuck	8.5	1,331.3	1,184.86	
Choice C-P Chuck	13.5	2,402.7	1,874.11	
Choice Ribeye	42.0	695.0	2,578.45	
Choice Bone-in Lipon	130.0	3,746.0	8,092.60	
Short Rib	171.0	1,020.3	795.83	
Spare Rib	171.0	1,275.3	841.70	
Blade Meat	171.0	1,275.9	1,785.42	
Choice Inside Round	60.0	2,318.8	3,223.13	
Choice Outside Round	60.0	2,929.0	3,280.48	
Knuckle	60.0	1,139.0	1,344.02	
25-75 Trim		77.3	64.16	
50-50 Trim		2,323.7	1,394.22	
Tallow		760.7	97.37	
Bone		2,781.3	139.07	
				26,695.42

PACKAGING COSTS

Bag/Box Size	Number Of Bags/Boxes	Cost Per Bag/Box	Cost	TOTAL
14/20	162	.12	19.44	
16/28	342	.14	47.88	
18/30	240	.187	44.88	
22/36	44	.498	21.91	
Sm.	168	.73	122.64	
Lg.	44	.85	37.40	
				294.16

Appendix Table C (Cont.)

For Week Ending 7-15

Product Name	Carcasses (Number)	Weight (Pounds)	Value (Dollars)	TOTAL
PRIMALS:				
Chuck Primal	25.0	4,951.8	3,812.89	
Rib Primal	41.5	2,551.0	2,933.65	
Loin Primal	535.0	80,389.1	110,936.96	
Round Primal	240.0	37,537.7	33,643.16	
				151,326.66
SUBPRIMAL PRODUCTS:				
Choice 3 Pc Chuck	25.0	3,944.3	3,628.76	
Shank Meat	25.0	725.7	653.12	
Choice Lipon Ribeye	41.5	1,294.6	2,589.89	
Short Rib	41.5	249.4	194.53	
Spare Rib	41.5	311.8	295.79	
Blade Meat	41.5	311.8	436.52	
Tenderloin	520.0	6,935.6	19,807.22	
Choice 175 Loinstrip	35.0	1,314.8	2,208.86	
Choice 180 Loinstrip	475.0	12,165.9	30,901.39	
Good 180 Loinstrip	10.0	756.1	537.81	
Shell Sirloin	510.0	24,905.6	26,150.88	
Good Top Sirloin	10.0	218.6	393.48	
Full Bottom Butt	10.0	157.1	109.97	
Choice C-P Loin	15.0	1,393.9	2,243.21	
Loin Trim	535.0	1,278.9	1,611.41	
Flank Steak	535.0	1,644.3	4,110.75	
Choice Inside Round	215.0	8,759.5	12,125.71	
Choice Outside Round	215.0	11,064.6	12,392.35	
Knuckle	225.0	4,302.9	5,077.42	
Choice C-P Round	15.0	1,926.1	2,157.23	
25-75 Trim		550.7	457.08	
50-50 Trim		16,566.2	9,939.71	
Tallow		5,423.2	1,193.10	
Bone		19,828.6	991.43	
				140,167.63

PACKAGING COSTS

Bag/Box Size	Number Of Bags/Boxes	Cost Per Bag/Box	Cost	TOTAL
14/20	231	.12	27.72	
16/28	3,573	.14	500.22	
18/30	970	.187	181.39	
22/30	30	.407	12.21	
22/36	80	.498	39.84	
Sm.	951	.73	694.23	
Lg.	80	.85	68.00	
				1,523.11

Appendix Table G (Cont.)

For Week Ending 7-22

Product Name	Carcasses (Number)	Weight (Pounds)	Value (Dollars)	TOTAL
PRIMALS:				
Chuck Primal	25.0	4,792.2	3,522.27	
Rib Primal	180.0	10,708.2	11,779.02	
Loin Primal	75.0	10,906.5	14,941.91	
Round Primal	95.0	14,380.0	12,870.10	
				43,113.30
SUBPRIMAL PRODUCTS:				
Choice 3 Pc. Chuck	25.0	3,817.3	3,435.57	
Shank Meat	25.0	702.3	625.05	
Choice Lipon Ribeye	130.0	2,792.7	6,953.82	
Choice C-P Rib	50.0	2,363.1	3,308.34	
Short Rib	180.0	1,047.0	816.66	
Spare Rib	180.0	1,308.8	863.81	
Blade Meat	180.0	1,308.8	1,832.32	
Good C-P Loin	45.0	4,045.3	5,663.42	
Choice C-P Loin	30.0	2,696.9	4,180.20	
Flank Steak	75.0	223.1	557.75	
Loin Trim	75.0	173.5	218.61	
Choice Inside Round	35.0	1,318.7	1,740.68	
Choice Outside Round	35.0	1,665.7	1,932.21	
Knuckle	35.0	647.8	744.97	
Choice C-P Round	60.0	7,456.1	8,350.83	
25-75 Trim		110.6	91.80	
50-50 Trim		3,604.9	2,162.94	
Tallow		1,180.1	259.61	
Bone		4,314.9	215.75	
				43,954.33

PACKAGING COSTS

Bag/Box Size	Number Of Bags/Boxes	Cost Per Bag/Box	Cost	TOTAL
14/20	145	.12	17.40	
16/28	360	.14	50.40	
18/30	140	.187	26.18	
22/30	120	.407	48.84	
22/36	200	.498	99.60	
Sm.	179	.73	130.67	
Lg.	200	.85	170.00	
				623.39

Appendix Table G (Cont.)

For Week Ending 7-29

Product Name	Carcasses (Number)	Weight (Pounds)	Value (Dollars)	TOTAL
PRIMALS:				
Chuck Frimal	505.0	99,732.5	71,308.74	
Rib Primal	249.0	15,261.2	16,787.32	
Loin Primal	50.0	1,271.0	9,815.85	
Round Primal	122.5	19,103.7	17,097.81	
				115,009.72
SUBPRIMAL PRODUCTS:				
Choice 3 Pc. Chuck	480.0	75,509.3	67,203.28	
Choice C-P Chuck	25.0	4,469.1	3,575.28	
Shank Meat	505.0	14,616.0	13,008.24	
Choice Lipon Ribeye	75.0	1,659.7	4,116.55	
Choice Bone-in Lipon	170.0	4,920.2	10,578.43	
Choice C-P Rib	5.0	243.5	340.90	
Short Rib	249.0	1,492.2	1,163.92	
Spare Rib	249.0	1,865.3	1,231.10	
Blade Meat	149.0	1,865.3	2,611,42	
Choice C-P Loin	50.0	4,630.8	7,177.74	
Flank Steak	59.0	153.2	383.00	
Loin Trim	50.0	119.2	150.19	
Choice Inside Round	35.0	1,358.6	1,766.18	
Choice Outside Round	35.0	1,716.1	1,990.68	
Knuckle	45.0	667.4	767.51	
Choice 160 Round	57.5	6,793.8	7,473.18	
Choice C-P Round	30.0	3,840.8	4,301.70	
25-75 Trim		185.4	153.88	
50-50 Trim		6,040.0	3,624.00	
Tallow		1,977.3	435.00	
Bone		7,229.5	361.48	
				132,413.66

PACKAGING COSTS

Bag/Box Size	Number Of Bags/Boxes	Cost Per Bag/Box	Cost	TOTAL
14/20	101	.12	12.12	
16/28	541	.14	75.74	
18/30	140	.187	26.18	
22/30	175	.407	71.23	
22/36	1,110	.498	552.78	
Sm.	357	.73	260.61	
Lg.	1,110	.85	943,50	
				1,943.36

of pieces per bag.

2. The cost of bags was estimated by multiplying the number of bags used by the price of each bag.
3. The number of boxes of each size was estimated by dividing the number of bags of each product by the standard number of bags per box.
4. The cost of boxes was estimated by multiplying the number of boxes used by the cost per box.

Appendix Table H.

Appendix Table H contains calculations of the value of products processed from forequarters and hindquarters added to the list of products found in Appendix Table E and calculations of the cost of the forequarters and hindquarters.

The procedure used to calculate the value of products is the following.

1. The number of quarters was multiplied by the average carcass weight for that week. Fifty percent of this figure was used as an estimate of the weight of quarters. This weight was multiplied by the standard yield percentage to arrive at the weight of each product processed.
2. The weight of each product was multiplied by the average price per pound as computed from Appendix Table A by dividing the value of product by the weight of product.
3. The proportion of 25-75 trim, 50-50 trim, tallow, and bone are assumed to be the same as that found in Appendix Table A.

   The total weight of products was subtracted from the total weight of quarters. This weight was then multiplied by the ratio of trim tallow, and bone to arrive at the weight of each of each of these products. These weights were multiplied by their respective prices per pound.

The cost of quarters was computed by multiplying the weight of carcasses found in Step 1 by the average cost per pound of carcasses which was furnished by the case company.

Packaging cost is assumed to be one half of the estimated $13.50 per head, or $6.75 per head.

Appendix Table H
Value Of Products Added To Production By Evening Numbers Of Forequarters And Hindquarters

Week Ending	Product Name	Carcasses (Number)	Weight (Pounds)	Value (Dollars)
6-23	35 Hindquarters[1]			
	Tenderloin	17.5	230.0	713.00
	Choice 180 Loinstrip	17.5	442.3	1,061.52
	Shell Sirloin	17.5	843.3	868.60
	Flank Steak	17.5	53.1	135.41
	Loin Trim	17.5	51.3	52.04
	Choice Inside Round	17.5	672.3	968.11
	Choice Outside Round	17.5	849.2	883.17
	Knuckle	10.0	188.7	222.68
	Peeled Knuckle	7.5	126.4	158.00
	25-75 Trim		54.3	45.07
	50-50 Trim		1,632.1	979.26
	Tallow		534.3	117.55
	Bone		1,953.6	97.68
	TOTAL			6,302.09
7-1	4 Forequarters			
	Choice 3 Pc. Chuck	2.0	300.8	252.67
	Shank Meat	2.0	55.3	49.77
	Choice C-P Rib	2.0	93.1	134.06
	10 Hindquarters			
	Tenderloin	5.0	63.5	189.23
	Choice 180 Loinstrip	5.0	122.1	241.76
	Shell Sirloin	5.0	232.7	237.35
	Flank Steak	5.0	14.6	37.23
	Loin Trim	5.0	11.4	14.36
	Choice Inside Round	5.0	185.5	257.83
	Choice Outside Round	5.0	234.4	262.53
	Knuckle	5.0	91.1	107.50
	25-75 Trim		10.5	8.72
	50-50 Trim		341.7	205.02
	Tallow		111.9	24.62
	Bone		409.0	20.45
	TOTAL			2,043.11
7-8	19 Hindquarters			
	Tenderloin	9.5	125.6	364.24
	Choice 175 Loinstrip	9.5	345.3	595.22
	Shell Sirloin	9.5	460.5	465.11
	Flank Steak	9.5	27.8	70.89
	Loin Trim	9.5	21.6	27.22
	Choice Inside Round	9.5	334.9	465.51
	Choice Outside Round	9.5	463.8	519.46
	Knuckle	9.5	180.3	212.75
	25-75 Trim		13.6	11.29
	50-50 Trim		442.8	265.68
	Tallow		144.9	31.88
	Bone		530.0	26.50
				4,452.91

[1] The number of quarters processed is divided by 2 to give the number of carcasses.

Appendix Table H (Cont.)

Week Ending	Product Name	Carcasses (Number)	Weight (Pounds)	Value (Dollars)
7-15	27 Hindquarters			
	Tenderloin	13.5	179.8	514.23
	Choice 175 Loinstrip	13.5	507.1	851.93
	Shell Sirloin	13.5	659.3	692.27
	Flank Steak	13.5	41.2	105.06
	Loin Trim	13.5	32.0	40.32
	Choice Inside Round	13.5	479.5	666.51
	Choice Outside Round	13.5	663.9	743.57
	Knuckle	13.5	258.2	304.68
	25-75 Trim		21.5	22.33
	50-50 Trim		699.6	419.76
	Tallow		229.0	50.38
	Bone		837.4	41.87
	TOTAL			4,452.91
7-22	6 Hindquarters			
	Tenderloin	3.0	38.7	107.59
	Choice 180 Loinstrip	3.0	74.4	188.98
	Shell Sirloin	3.0	141.8	148.89
	Flank Steak	3.0	4.5	11.48
	Loin Trim	3.0	3.5	4.41
	Choice 160 Round	3.0	344.1	350.98
	25-75 Trim		4.6	3.82
	50-50 Trim		150.3	90.18
	Tallow		49.2	10.82
	Bone		179.9	9.00
	TOTAL			926.15
7-29	100 Hindquarters			
	Tenderloin	39.9	398.4	1,083.65
	Good 180 Loinstrip	30.0	766.1	1,570.51
	Good Top Sirloin	30.0	653.8	1,046.08
	Full Bottom Butt	30.0	469.9	291.34
	Good C-P Loin	20.0	1,852.3	2,593.22
	Flank Steak	50.0	153.2	390.66
	Good Inside Round	50.0	1,940.9	2,523.17
	Good Outside Round	50.0	2,451.6	2,794.82
	Knuckle	50.0	953.4	1,096.41
	25-75 Trim		291.5	241.95
	50-50 Trim		9,497.9	5,698.74
	Tallow		3,109.3	684.05
	Bone		11,368.3	568.42
	TOTAL			20,733.21

Appendix Table I

Standard Weekly Production In Number Of Carcasses, Weight Of Product, And Value Of Product.

Week Ending	Unit	Chuck Roll	Chuck Clod	Chuck Tender	Choice 3 Pc. Chuck	Good 3 Pc. Chuck	Prime C-P Chuck
	Std.[1] Yd	(7.0)	(5.15)	(.75)	(23.10)	(23.10)	(26.25)
6-23	#	312.5	312.5	312.5	869.5	827.0	53.0
	lb	14,743.8	10,847.2	1,579.7	135,375.9	128,758.9	9,377.0
	$	16,218.18	11,498.03	1,801.08	123,192.07	115,883.01	11,917.44
7-1	#	114.0	114.0	114.0	862.0	735.0	0
	lb	5,195.0	3,822.0	556.6	129,628.4	110,530.0	0
	$	5,298.90	3,871.60	649.73	108,887.86	94,777.87	0
7-8	#	180.5	180.5	180.5	1,193.5	285.0	34.5
	lb	8,566.6	6,302.5	917.8	186,923.6	44,636.1	6,140.1
	$	9,806.50	7,096.67	1,106.14	166,452.88	40,798.20	6,512.08
7-15	#	80.0	80.0	80.0	1,817.0	1,039.0	0
	lb	3,824.8	2,814.0	409.8	286,673.5	163,926.1	
	$	4,551.50	3,194.60	499.96	264,956.77	153,689.21	0
7-22	#	362.0	362.0	362.0	1,305.5	869.5	10.0
	lb	16,749.7	12,323.0	1,794.6	199,338.1	132,764.8	1,735.1
	$	19,499.29	14,142.20	2,189.41	178,777.69	118,869.40	2,001.74
7-29	#	202.0	202.0	202.0	1,113.0	578.0	24.0
	lb	9,629.3	7,084.4	1,031.7	175,087.1	90,925.8	4,290.3
	$	10,983.80	7,934.53	1,249.61	155,739.18	80.923.96	4,454.25

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[1] Std. Yd is the standard yield percentage for each product.

Appendix Table I (Cont.)

Week Ending	Unit	Choice C-P Chuck	Good C-P Chuck	Primal Chuck	CHUCK TOTAL	Choice Ribeye	Good Ribeye
	Std Yd	(26.25)	(26.25)	(29.00)		(2.5)	(2.5)
6-23	#	184.5	15.0	0	2,260.5	196.0	0
	lb	32,642.7	2,477.0	0	335,802.2	3,302.6	0
	$	25,461.31	1,857.74	0	397828.86	12,549.88	0
7-1	#	209.0	7.0	0	1,927.0	0	84.0
	lb	35,715.5	1,196.2	0	286,643.7	0	1,367.1
	$	27,858.09	897.15	0	242,241.20	0	4,306.36
7-8	#	233.0	160.0	22.0	2,108.5	185.5	80.5
	lb	41,468.2	28,476.0	4,325.6	327,756.4	3,144.2	1,364.5
	$	32,345.19	21,356.99	3,298.27	288,772.92	11,668.14	4,298.16
7-15	#	147.5	363.0	25.0	3,471.5	276.0	0
	lb	26,444.9	65,081.4	4,951.8	554,126.2	4,712.7	0
	$	20,881.11	48,811.03	3,812.89	500,397.07	17,053.08	0
7-22	#	280.5	293.5	25.0	3,146.0	28.0	0
	lb	48,670.3	50,925.9	4,792.2	469,093.7	462.7	0
	$	38,936.24	39,078.32	3,522.27	417,016.56	1,642.59	0
7-29	#	244.5	114.0	505.0	2,780.5	106.5	74.0
	lb	43,707.4	20,378.9	99,732.5	451,867.14	1,813.1	1,259.8
	$	34,965.92	16,303.12	71,308.74	383,863.11	6,073.89	3,905.53

Appendix Table I (Cont.)

Week Ending	Unit	Choice Lipon Ribeye	Good Lipon Ribeye	Choice Bone-in Lipon	Good Bone-in Lipon	Choice 107 Rib	Choice 109 Rib
	Std Yd	(3.25)	(3.25)	(4.25)	(4.25)	(6.75)	(5.65)
6-23	#	485.0	553.5	0	0	5.0	251.0
	1b	10,623.9	12,124.4	0	0	227.5	9,558.3
	$	29,534.44	31,290.73	0	0	341.25	18,351.93
7-1	#	255.0	165.0	166.0	64.0	0	308.0
	1b	5,395.2	3,491.0	4,592.8	1,770.7	0	11,328.7
	$	14,016.54	8,727,50	10,104.16	3,629.93	0	21,11581
7-8	#	0	94.5	54.0	132.0	5.0	260.0
	1b	0	2,082.3	1,556.1	3,803.6	228.8	9,959.8
	$	0	5,194.70	3,345.60	8,177.74	343.20	18,126.80
7-15	#	1,061.0	1,086.5	120.0	80.0	160.0	90.0
	1b	23,551.5	24,117.5	3,483.3	2,322.2	6,830.0	3,473.0
	$	58,878.75	59,415.54	7,489.08	4,802.37	10,245.00	5,997.24
7-22	#	797.0	321.5	0	0	5.0	442.0
	1b	17,121.5	6,906.6	0	0	223.1	16,507.1
	$	42,566.35	16,990.23	0	0	334.65	28,302.22
7-29	#	923.5	0	200.0	0	13.0	84.0
	1b	20,439.4	0	5,788.5	0	597.6	3,232.6
	$	50,689.70	0	12,445.27	0	836.64	5,236.77

Appendix Table I (Cont.)

Week Ending	Unit	Good 109 Rib	Prime C-P Rib	Choice C-P Rib	Good C-P Rib	Short Rib	Spare Rib
	Std Yd	(5.65)	(7.15)	(7.15)	(7.15)	(.88)	(1.10)
6-23	#	130.0	53.0	160.0	167.0	2,200.5	2,200.5
	lb	4,950.5	2,554.1	7,710.6	8,047.9	13,051.6	16,314.5
	$	8,168.32	2,948.67	11,103.27	10,864.66	10,180.22	10,767.57
7-1	#	94.5	0	683.0	62.0	1,881.5	1,881.5
	lb	2,475.9	0	31,791.3	2,885.9	10,778.6	13,473.4
	$	5,630.95	0	45,779.47	3,895.96	8,407.40	8,892.44
7-8	#	0	34.5	930.5	161.0	1,937.5	1,937.5
	lb	0	1,672.4	45,083.6	7,804.8	11,559.9	14,449.9
	$	0	1,856.37	64,920.38	10,770.62	9,016.74	9,536.93
7-15	#	105.5	0	301.0	150.0	3,430.0	3,430.0
	lb	4,071.2	0	14,699.2	7,325.2	20,615.7	25,769.6
	$	6,500.39	0	21,266,84	10,108.77	23,880.21	17,007.94
7-22	#	66.5	10.0	751.0	545.0	2,966.0	2,966.0
	lb	2,483.5	472.6	35,493.4	25,757.5	17,252.6	21,563.8
	$	3,874.26	524.58	49,690.72	34,515.04	13,457.02	14,233.43
7-29	#	174.5	24.0	502.0	430.0	2,531.5	2,531.5
	lb	6,714.1	1,168.5	24,443.1	20,937.3	15,170.8	18,963.5
	$	10,071.15	1,297.03	34,219.93	28,055.98	11,833.46	12,515.91

Appendix Table 1 (Cont.)

Week Ending	Unit	Primal Rib	RIB TOTAL	Tenderloin	Peeled Tenderloin	Choice #2 180 Loinstrip	Good #2 180 Loinstrip
	Std Yd	(9.0)		(1.95)	(1.35)	(3.35)	(3.35)
6-23	#	260.0	2,260.5	1,812.5	0	60.0	30.0
	lb	15,771.6	195,237.5	23,821.6	0	1,354.7	677.3
	$	19,010.84	165,111.78	73,846.96	0	3,251.28	1,456.44
7-1	#	45.5	1,927.0	1,453.0	0	6.0	9.0
	lb	2,665.8	93,016.5	18,445.1	0	130.8	196.3
	$	3,145.64	137,652.16	54,964.68	0	313.93	412.61
7-8	#	171.0	2,108.5	1,792.0	0	60.0	9.0
	lb	10,434.4	113,144.3	23,692.0	0	1,362.8	204.4
	$	12,234.79	159,490.17	68,706.80	0	3,270.72	429.24
7-15	#	41.5	3,471.5	2,248.0	283.5	108.0	60.0
	lb	2,551.0	143,522.1	29,940.0	2,614.0	2,471.1	1,372.8
	$	2,933.65	245,478.86	85,628.50	9,671.80	5,930.64	2,882.88
7-22	#	180.0	3,146.0	1,517.0	780.0	66.0	15.0
	lb	10,780.2	155,026.6	19,553.4	6,960.3	1,461.4	332.2
	$	11,779.02	218,000.11	54,354.71	25,405.07	3,507.32	690.98
7-29	#	249.0	2,780.5	1,920.0	343.0	73.5	25.5
	lb	15,261.2	135,789.5	25,496.6	3,153.4	1,676.8	581.7
	$	16,787.32	193,968.58	69,350.74	11,352.24	4,034.25	1,209.94

Appendix Table 1 (Cont.)

Week Ending	Unit	Choice 180 Loinstrip	Good 180 Loinstrip	Choice 175 Loinstrip	Good 175 Loinstrip	Choice Top Sirloin	Good Top Sirloin
.	Std Yd	(3.75)	(3.75)	(5.50)	(5.50)	(3.20)	(3.20)
6-23	#	894.5	589.0	239.0	0	143.5	609.0
	lb	22,608.4	14,886.9	8,859.7	0	3,095.0	13,134.9
	$	58,329.67	32,751.18	14,884.20	0	6,190.00	26,269.80
7-1	#	265.0	592.5	580.5	0	0	662.5
	lb	6,469.3	14,464.4	20,784.8	0	0	13,801.2
	$	16,690.79	28,639.51	34,918.45	0	0	26,912.33
7-8	#	9.0	276.5	1,437.5	0	375.0	295.0
	lb	228.8	7,030.0	53,604.4	0	8,136.0	6,400.3
	$	590.30	14,763.00	90,055.38	0	15,051.60	11,777.10
7-15	#	603.5	1,160.5	577.0	22.5	0	1,172.5
	lb	15,457.1	29,723.3	21,675.0	843.1	0	25,626.2
	$	39,261.03	62,418.93	36,413.49	1,352.16	0	46,127.68
7-22	#	1,261.5	386.5	568.0	0	1,157.0	433.5
	lb	31,269.4	9,580.4	20,649.6	0	24,472.9	9,169.4
	$	79,424.28	20,118.84	34,691.33	0	42,093.40	16,138.14
7-29	#	1,193.0	291.0	663.5	16.5	1,647.0	314.0
	lb	30,466.2	7,431.4	24,851.4	618.0	35,891.4	6,842.7
	$	76,165.50	15,234.40	41,750.36	988.80	61,015.38	10,948.32

Appendix Table I (Cont.)

Week Ending	Unit	25-75 Trim	50-50 Trim	TRIM TOTAL	Tallow	Bone	TALLOW BONE TOTAL
6-23	lb	6,840.0	224,829.5	283,693.5	64,747.0	253,334.0	318,082.0
	$	5,677.20	136,292.88	189,512.15	14,244.24	12,666.75	26,911.09
7-1	lb	5,520.0	179,539.9	218,226.5	59,479.0	178,015.0	236,494.0
	$	4,581.60	109,188.66	144,903.23	13,085.38	8,900.75	21,986.13
7-8	lb	5,940.0	185,606.9	234,441.0	59,480.0	296,748.8	356,228.8
	$	5,227.20	111,364.14	155,332.38	13,085.60	14,837.44	27,923.04
7-15	lb	10,740.0	309,506.4	377,400.8	98,204.0	339,747.6	437,951.6
	$	8,592.00	192,281.10	256,429.54	21,604.88	16,987.38	38,592.26
7-22	lb	8,400.0	265,572.6	354,049.6	91,769.0	318,817.2	410,586.2
	$	6,720.00	160,235.80	237,068.25	20,189.18	15,950.86	36,130.04
7-29	lb	7,140.0	246,631.9	301,964.3	87,982.0	394,918.6	392,900.6
	$	5,712.00	148,724.04	198,595.97	19,356.04	15,245.93	34,601.97

Appendix Table I (Cont.)

Week Ending	Unit	Hanging Tender	VARIETY MEAT TOTAL	Chuck Trim	Blade Meat	Loin Trim	Shank Meat
	Std Yd	(.25)					
6-23	#	2,130.0					
	1b	3,589.0	65,287.6	12,720.0	5,080.7	3,553.3	30,660.0
	$	5,921.85	76,937.03	8,522.40	7,112.98	4,619.29	26,287.40
7-1	#	1,797.0					
	1b	2,924.6	63,640.2	5,580.0	3,385.9	2,720.7	21,480.0
	$	4,825.59	63,295.09	2,738.60	4,740.26	3,536.91	19,117.20
7-8	#	2,099.0					
	1b	3,557.8	74,341.6	8,460.0	2,759.1	2,755.0	28,920.0
	$	5,870.37	80,141.93	5,668.20	3,862.74	3,471.30	25,738.80
7-15	#	2,923.0					
	1b	4,991.0	112,764.8	7,020.0	8,913.5	4,560.9	36,660.0
	$	8,235.15	124,217.56	4,793.40	12,478.90	5,746.74	32,627.40
7-22	#	3,068.0					
	1b	5,069.9	101,403.9	25,800.0	6,113.4	3,813.6	44,340.0
	$	8,365.33	113,011.34	17,286.00	8,558.76	4,805.01	39,462.60
7-29	#	2,726.5					
	1b	4,641.8	119,653.2	8,580.0	4,117.9	2,854.5	32,640.0
	$	7,658.97	108,451.11	5,748.60	5,765.06	3,596.67	29,049.60

Appendix Table I (Cont.)

Week Ending	Unit	Brisket	Inside Skirt	Outside Skirt	Primal Plate	Flank Steak	Kidney
	Std Yd	(2.65)	(.29)	(.45)	(5.48)	(.45)	(.25)
6-23	#	2,260.5	2,260.5	2,260.5	0	2,130.0	2,130.0
	lb	40,374.8	4,418.4	6,856.1	0	6,460.3	3.589.0
	$	34,318.58	7,777.88	11,655.37	0	16,473.77	789.58
7-1	#	1,927.0	1,927.0	1,927.0	0	1,797.0	1,797.0
	lb	33,243.6	3,638.0	5,645.1	0	5,264.3	2,924.6
	$	28,257.06	6,548.40	9,596.67	0	13,423.96	643.41
7-8	#	2,108.5	1,723.5	1,723.5	385.0	2,099.0	2,099.0
	lb	37,883.4	3,388.8	5,258.4	14,291.4	6,404.0	3,557.8
	$	34,473.62	6,099.84	8,939.28	7,645.90	16,330.20	782.72
7-15	#	3,471.5	3,056.5	3,056.5	415.0	2,923.0	2,923.0
	lb	62,832.4	6,054.0	9,394.1	15,518.5	8,983.8	4,991.0
	$	57,177.73	10,897.20	15,969.97	8,379.99	22,459.50	1,098.02
7-22	#	3,146.0	2,774.0	2,774.0	372.0	3,068.0	3,068.0
	lb	55,106.9	5,317.5	8,251.3	13,462.6	9,125.8	5,069.9
	$	50,147.27	9,571.50	13,862.18	7,135.18	22,814.50	1,114.38
7-29	#	2,780.5	1,607.5	1,607.5	1,173.0	2,726.5	2,726.5
	lb	50,178.3	3,174.7	4,926.2	43,735.0	8,355.4	4,641.8
	$	42,149.77	5,714.46	8,276.01	22,742.20	20,888.50	1,021.20

Appendix Table A (Cont.)

Week Ending	Unit	Good 160 Round	Prime C-P Round	Choice C-P Round	Good C-P Round	Primal Round	ROUND TOTAL
	Std Yd	(17.35)	(18.80)	(18.80)	(18.80)	(22.90)	
6-23	#	0	53.0	110.0	262.5	100.0	2,245.0
	lb	0	6,715.7	13,938.3	33,261.9	15,434.6	251,647.7
	$	0	7,753.02	16,447.20	39,249.05	13,785.03	296,852.49
7-1	#	0	0	325.0	62.5	0	1,922.0
	lb	0	0	39,776.1	7,649.2	0	204,553.5
	$	0	0	44,549.24	9,026.06	0	240,432.65
7-8	#	0	34.5	115.5	157.0	60.0	2,099.0
	lb	0	4,397.5	14,722.1	20,011.8	9,315.7	235,704.2
	$	0	4,881.22	16,488.74	22,813.45	8,384.13	277,410.12
7-15	#	48.0	0	237.0	231.0	240.0	3,458.0
	lb	5,688.0	0	30,431.7	29,661.3	37,537.7	393,879.4
	$	6,143.04	0	34,083.50	33,813.88	33,643.16	463,605.43
7-22	#	17.0	10.0	227.5	544.0	95.0	3,143.0
	lb	1,949.6	1,242.7	28,271.0	67,601.8	14,380.0	349,481.7
	$	1,988.60	1,379.39	31,663.52	72,716.33	12,870.10	404,610.12
7-29	#	76.0	24.0	136.0	329.0	122.5	2,776.5
	lb	8,979.7	3,072.7	17,411.8	42,121.2	19,103.7	322,151.9
	$	9,698.17	3,410.70	19,501.22	44,648.48	17,097.81	364,334.84

Appendix Table I (Cont.)

Week Ending	Unit	Peeled Knuckle	Choice Inside Round	Good Inside Round	Choice Outside Round	Good Outside Round	Choice 160 Round
	Std Yd	(2,50)	(5.70)	(5.70)	(7.20)	(7.20)	(17.35)
6-23	#	784.5	908.0	638.0	908.0	638.0	173.5
	lb	13,218.8	34,883.5	24,510.7	44,063.4	30,960.9	20,288.9
	$	16,523.50	50,232.25	34,319.25	45,825.94	33,437.77	22,317.79
7-1	#	73.5	816.5	677.5	816.5	677.5	40.5
	lb	1,196.2	30,297.9	25,140.0	38,271.0	31,755.8	4,574.4
	$	1,495.25	43,023.00	35,196.00	39,801.84	31,755.80	5,031.84
7-8	#	714.0	1,143.0	290.0	1,143.0	290.0	299.0
	lb	12,102.3	44,172.4	11,207.3	55,796.7	14,156.6	35,172.3
	$	15,127.87	61,299.64	15,690.22	62,492.31	14,156.60	38,689.53
7-15	#	1,028.5	1,323.0	1,119.0	1,323.0	1,119.0	260.0
	lb	17,561.6	51,505.7	43,563.8	65,059.8	55,027.9	30,810.1
	$	21,951.99	71,592.91	60,989.32	72,867.20	62,731.79	33,891.11
7-22	#	0	1,635.0	377.0	1,635.0	377.0	237.5
	lb	0	61,601.9	14,204.2	77,812.9	17,942.2	27,237.3
	$	0	81,314.52	19,175.66	90,262.96	20,454.10	29,961.03
7-29	#	618.5	1,003.5	251.0	1,003.5	251.0	834.5
	lb	10,530.0	38,952.9	9,743.0	49,203.6	12,307.0	98,599.1
	$	13,162.49	50,638.77	12,665.90	57,076.18	14,029.96	108,458.98

Appendix Table I (Cont.)

Week Ending	Unit	Prime C-P Loin	Choice C-P Loin	Good C-P Loin	Primal Loin	LOIN TOTAL	Knuckle
	Std Yd	(13.60)	(13.60)	(13.60)	(25.00)		(2.80)
6-23	#	53.0	155.5	109.0	115.0	2,245.0	761.5
	lb	4,858.2	14,253.7	9,991.4	17,052.2	193,980.1	14,391.0
	$	5,608.63	22,805.92	13,987.96	23,873.08	350,012.38	16,961.69
7-1	#	0	317.0	27.0	125.0	1,922.0	1,420.5
	lb	0	28,065.9	2,390.5	17,902.5	166,478.2	25,892.9
	$	0	44,905.44	3,346.70	25,063.50	286,126.66	30,553.62
7-8	#	34.5	114.0	158.5	0	2,099.0	1,792.0
	lb	3,181.2	10,511.7	14,615.0	0	188,170.6	23,692.0
	$	3,531.13	16,818.72	20,461.00	0	310,262.67	68,706.80
7-15	#	0	208.5	183.0	535.0	3,458.0	1,413.5
	lb	0	19,367.1	16,998.5	80,389.1	328,582.0	27,031.8
	$	0	31,165.64	23,797.90	110,936.96	542,015.88	31,897.59
7-22	#	10.0	208.0	553.0	75.0	3,143.0	2,012.0
	lb	899.0	18,698.4	49,712.5	10,960.5	261,196.4	37,238.1
	$	997.90	28,982.92	69,597.50	14,941.91	441,140.34	42,823.91
7-29	#	24.0	145.0	294.5	50.0	2,776.5	636.0
	lb	2,222.8	13,429.3	27,275.4	7,271.0	232,525.3	12,127.2
	$	2,467.31	20,815.50	38,185.56	9,815.85	396,053.65	13,946.28

Appendix Table I (Cont.)

Week Ending	Unit	Choice Bone-in Top Sirloin	Shell Sirloin	Full Bottom Butt	Ball Tip	Tri Tip	Flap Meat
	Std Yd	(4.80)	(7.15)	(2.30)	(.45)	(.75)	(.40)
6-23	#	0	1,060.0	40.0	712.5	712.5	712.5
	lb	0	51,082.4	620.1	2,161.0	3,601.7	1,920.9
	$	0	52.614.86	558.09	4,255.83	7,023.30	2,305.08
7-1	#	0	790.5	4.0	658.5	658.5	658.5
	lb	0	36,795.0	59.9	1,929.1	3,328.7	1,714.7
	$	0	37,530.90	41.93	3,664.82	6,490.06	2,229.11
7-8	#	0	1,122.0	0	670.0	670.0	670.0
	lb	0	52,225.2	0	1,962.8	3,271.3	1,744.7
	$	0	52,747.45	0	3,729.32	5,888.33	2,442.58
7-15	#	0	1,359.0	611.5	561.0	561.0	561.0
	lb	0	66,366.1	9,606.0	1,724.2	2,873.7	1,532.7
	$	0	69,684.40	6,724.20	3,275.98	4,597.92	2,145.78
7-22	#	120.0	586.5	1,710.5	0	0	0
	lb	3,807.4	27,718.9	26,004.7	0	0	0
	$	4,188.14	29,104.84	16,903.06	0	0	0
7-29	#	302.0	0	2,263.0	0	0	0
	lb	9,871.8	0	35,445.4	0	0	0
	$	10,740.40	0	21,979.10	0	0	0

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PRODUCTION CONTROL SYSTEMS FOR BEEF PROCESSING PLANTS

by

ALBERT EARLE LAWRENCE, JR.

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ABSTRACT

A change in the structure of the beef processing industry which has occurred over the past ten years is a movement toward greater concentration. This change has been critisized because many small and medium sized firms have been forced out of business by larger firms who can fabricate beef at lower unit costs.

One of the reasons for this is the type of production control system used by larger firms. Their production control systems are based on production functions which define relationships between inputs and outputs and compare actual production to that as defined by the standard. Smaller firms often base their production control systems on average revenue and average cost functions. The disadvantage is that the relationships behind these functions are hidden and, therefore, lack control.

To compare the two types of production control systems, a medium sized beef processing firm whose production control system is based on average revenue and cost functions was studied over a six week period. An operating income statement was constructed from company records. This was compared to a standard operating income statement which was constructed from a production control system developed for this firm.

An operating income statement based on company records for the six week period revealed an operating loss of $73,942.69. Analysis showed that the firm would have reduced operating losses by $61,647.00 if it had met the standards over this six week period.

Implementation of the proposed production control system requires investment in a holding cooler and one day's supply of carcasses so that production can be scheduled. The profitability of this investment was analysed by determining the internal rate of return on the additional investment from the differences between actual and standard operation income statements. The internal rate of return on the additional investment, assuming that the standards for product and production time are met, is 57.9%.

Sensitivity of the internal rate of return on additional investment to changes in certain assumptions made during analysis was tested. These changes were of two types: 1) changes in variables which are determined in the marketplace; i.e., prices of products, carcasses and labor, and 2) changes in variables used to compute standards: i.e., product weight and production time. It was found that the internal rate of return is more sensitive to changes in the latter two variables; 15.3% and 3.6% respectively, than to the first three variables; 0.06%, 0.06%, and 0.05% respectively.

The range of variability of the internal rate of return on additional investment was also tested. Two combinations of the above changes were formed to represent the most favorable and the least favorable conditions based on a 1% change in the variables. Analysis showed the range in the internal rate of return on additional investment was from a high of 58.4% to a low of 38.1%.