THE UNIVERSITY OF MANITOBA

SIMULATION OF A DAIRY OPERATION FOR USE AS A DECISION MAKING AID FOR THE DAIRY OPERATOR

by

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ABSTRACT

The purpose of this study is to set up a dairy management technique that will aid producers in making more informed decisions. The uncertainty involved in the operation of a business has prompted the use of simulation as the tecnique most adept at fulfilling this requirement.

The model is a management tool that is used for comparative analysis to give a manager more information about a question or change that is being considered. Three pertinent questions are asked here about the dairy firm. They concern seasonal price fluctuations, seasonal production and optimal feed rations. The strength of the tool lies in its simplicity of use, its flexibility and its capacity to parallel these important issues at the firm level. The model is also useful for teaching and learning about various problems a dairy operation may face.

Input requirements have been maintained at as low a level as possible so that least cost of time and effort is required in satisfying the program requirements. With this feature it has the potential to be used as a means of getting answers quickly for even simple questions just for verification of initial reactions. An optimal feed linear program has been incorporated to satisfy the optimal feed ration scenario. This gives the manager an indication of his performance in an area of dairying that is forever changing through feed costs and changing availability of feed.

ACKNOWLEDGEMENTS

The support, help and guidance that have been incorporated into this study have come in varying degrees indirectly and directly from everyone I have associated with in my brief career in life. I would like to thank my parents Art and Lois for their everloving support and guidance. I would also say that had events not occurred as they did prior to my undergraduate work, I could not have completed this thesis. Thankyou Kim.

During the graduate process I have been blessed with Dr. Chuck Framingham's support on both a professional and a personal level. This strength and stability has been ever present at times when the process seemed terminal. Special appreciation also to Dr. Daryl Kraft and Professor Ralph Harris for their unending comments that have strengthened the argument into what it is.

For the editing, typing and format style my heart goes out to Gisele Perrault and her trusty crew without whom I could never have satisfied "those" guidelines. Last but not least I thank my collegues, friends and acquaintances for their part in keeping me on the straight and narrow during this process. In all the sole responsibility for what has been created in these next pages is that of the author.

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"We Perceive the world before we react to it,
and we react not to what we perceive,
but always to what we infer."

Descartes

Chapter I

INTRODUCTION

Management is an art that is learned through experience and in most instances has universal applications. The following quotation effectively portrays this universal nature of management.

> Many things learned early in life will be useful one day in the future though they are not immediately exchangable for goods and services. They are the laws which phenomena obey. Life is not a war of bugle calls and roaring engines and magnificient displays, but a patient enduring, ingenious application or modification of known laws so as to meet new situations and cope with new problems.[1]

Good management brings together and co-ordinates efficient and effective problem solving techniques to satisfy the desired end whatever it may be.

Operation of a firm is a mixture of inputs through a conversion process to create a salable product. The media that envelopes and controls the process is management. The changing environment of both input and output markets along with changes in the conversion process require decisions as to the correct course to follow.

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[1] Royal Bank of Canada Monthly Letter, 'In The Long Run', The Royal Bank of Canada Monthly Letter, (Volume 49, Number 4, Montreal April, 1968.)

The competitive position of the fluid milk producer is a function of the level of decision making capabilities in the management process. There are others such as location to plant, location to services and other cost reducing variables. Managing the inputs effectively is important to the flows within the operation. This management is required to obtain a predetermined goal. The management process of reaction to circumstances requires various decision tools. This requires a capacity of the manager to effectively interpret observed and calculated information before decisions are made. The more proficient the manager the better the competitive position of the unit **ceteris paribus**. The trade off made by managers between endogenous and exogenous information is a normative process. The ability to effectively utilize both to their maximum potential determines a manager's worth.

The management portfolio is decision making. These decisions are based on available alternatives to the firm. With these alternatives come expectations of the outcome. There are two groups of expectations that govern decision analysis. Those that are definitely known and those that are not. The ones that are known, are straight forward and a choice between alternatives based on **a priori** criterion will resolve the issue. Those that are not known can be categorized as risky and uncertain depending on the probability of occurrence. The risk can be costed out in that there is insurance that will cover it. Uncertainty is different. It does not have a known probability distribution. Statistical inference is not capable of determining the outcome to any significant degree. The characteristics of uncertainty are displayed in five areas that economics addresses. The five areas are technical, market, technology, institutional, and human uncertainty.[2]

Knowledge is the key to reducing uncertainty. Information of a specific nature in the area of concern reduces uncertainty through a more informed understanding of the characteristics creating the uncertain entity. Here is where management decision tools can be used to increase the information base.

The dairy manager has uncertainty in his operation. All five of the uncertainty categories affect his operation in some degree. The nature of a regulated industry creates a very complex mix of action reaction results. The effect of these on the firm requires the attention of the manager. His analysis of the situation and decisions based on the analysis determine how efficiently the operation utilize its resources. The manager is the key link in strengthening or weakening the efficiency of the operation. The capacity to help managers lies in making available information specific to the operation which can be used to more fully understand the implications of a decision. This is where decision tools are useful.

In Manitoba the dairy firm is faced with rigorous regulation, competitive factor markets and opportunity costs that can sway judgement as to the proper direction toward efficient resource use. There are no management tools which fully integrate the dairy operators position to help the decision making process.

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[2] Zentner,R.P. The Simulated Effects of Crop Rotations and Fertilizer Use in the Brouwn Soil Zone, (Unpublished MSc. thesis, Department of Agricultural Economics, Saskatoon Saskatchewan, 1976, p.18.)

1.1 THE PROBLEM

The complexity and sizeable information requirements of the majority of decision making aids available limit their effective use by the average milk producer. They in fact facilitate only a highly specialized group of dairy operations. The development of usable management decision aids allowing the majority of farmers to offset uncertainty through better information to compete effectively is the problem addressed in this study.

The need to develop a management decision aid which accomodates the less sophisticated operators in the milk sector is the impetus to setting up a dairy farm simulator. The simulator structure will take into consideration means to alleviate the void that seems to exist for this group of decision makers. The tool's usefulness over others will be the emphasis of eliminating complexity, knowledge of model operation and data input accumulation problems[3]. The motive is to simplify information aquisition to direct the operation to its "preferred" position. The particular position being a function of the individual operator's position respecting income, labor input, farm size and equity.

1.2 SPECIFICATION OF RESEARCH OBJECTIVES

The general objectives of the dairy simulation are to alleviate the management problems of the manager to the degree that the "ease of use concept" can be incorporated fully[4]. The objectives have been chosen to

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[3] The ease of use concept is considered to be a model which can be directly operated after the removal of these problems. In other words, ease of use means uncomplicated, light input and minimal knowledge model operation.

allow those who want a tool for rapid preliminary analysis of specific problems to check their decisions against their present position with less effort. They will also familiarize managers with computer simulation.

The objectives of the study are:

1. To establish the contectual framework within which the special characteristics of efficiency concerning dairy firms become apparent.

2. Develop a model to assist the pre and post evaluation of management efficiency of a dairy farm.

3. Specify a model which is:

   a) Easy to use

   b) Flexible

   c) Robust and

   d) Communicates well

4. Validate the model through a process of case farm analysis using comparison of the base position with three relevant scenarios. The base position of the dairy firm is an above average farm in Manitoba

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[4] The concept is defined to be a reduction in necessary knowledge for operation and use of the tool. The ease of use concept is footnoted in the problem statement of this paper on page 4.

The scenarios are:

a) The comparison of seasonal price effects to the base position.

b) The comparison of seasonal variation in production with the base position comparing daily entitlement problems.

c) The comparison of optimal feed rations with the base ration position.

5. Link the management efficiency concept to the case farm validity to bridge the conceptual and actual responses of the model.

The management component of any operation is the strength or weakness of the unit. The fact that dairying is such a regulated industry would seem to reduce the management requirement. In fact it is a shift rather than a removal of uncertainty. To this degree better knowledge of a firm's operation through decision analysis tools should increase the efficiency of the firm and strengthen the management position.

To understand the pressures a dairy manager faces, the business environment both industrially and at the firm level must be evaluated. This evaluation will allow certain theoretical conditions to be met that will be related to the three scenarios considered in the analysis. This will relate the efficiency potential that is possible through intelligent use of management tools in the decision process. Justification of the model on both a practical and a conceptual basis should be displayed by the outcome of the comparisons of the three scenarios to the basic position. Given this justification, the model will be useful in a practical sense to strengthen the decision base of the manager. This will affect efficiency and for a rational manager a positive direction is expected.

Chapter II

THE OPERATIONAL AND THEORETICAL ENVIRONMENT OF THE DAIRY FIRM

2.1 INTRODUCTION

The pressures that prevail in an environment influence the actions of a manager. The reaction may be obvious or obscure depending on the perceptions of the manager and the direction he requires his operation to follow. Here the assumptions of economics have application. A rational manager will regard efficient use of the factors available to him as sound management practice on economic grounds. True theoretical modeling is constrained and reshaped in many ways where complex decisions are to be made. The frequency upon which certain patterns occur determines the direction that firms eventually take and is shown through time by these patterns. This insight is important to an understanding of the pressures that managers are subject to and must comply with in dairying. These patterns define the general framework within which the manager operates. The trend toward larger, more capital intensive operations and uncertainty from regulation all increase the need for strong responsible management.

The operational environment will be discussed to show the pressures of the system that managers must contend with. This in turn coupled with the standard theory will indicate the areas a manager can influence for control of his firm. The three scenarios specified in the objectives will be subjected to the theoretical possibilities to determine the conceptual framework for a rational manager to follow. The hypothesis is that given these circumstances and a rational management scheme the model should allow movement in a specified direction to create a more economically efficient dairy firm. Economic efficiency is defined here in terms of "x efficiency" as used in industrial organization.[5]

2.2 TRENDS IN THE DAIRY INDUSTRY

Efficiency, both of a technical and an allocative nature is a major concern to a progressive firm's operational requirements. Proper collection of information, understanding and implementation regarding both technology and resource allocation are management responsibilities. Efficiency requires correct application of this management process. The alternative is eventual financial losses leading to possible business collapse. The dairy enterprise within agriculture is a prime example of operation of this process. Table 1 shows the decreasing number of farms in Manitoba and the parallel situation of dairy farms. Table 2 expands on this trend showing the figures for the number of farms in various size operations. The period looked at is 1951-1976. The solid line drawn across the time period in Table 2 shows the point where dairy herds either increase in size (below the line) or decrease in size (above the line). This stratification shows that farm herd size is increasing over time. The dotted line shows the rate of change. Any dairy herd increasing more rapidly between time periods is found below the line. This dichotomy suggests the trend is moving toward fewer

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[5] Shepherd,W.G., The Economics of Industrial Organization, (Prentice Hall Inc., Englewood Cliffs, N.J., 1979.) p.32

TABLE 1

Decline of Farm Numbers For The Period 1960-1976

Table 1

Decline of Farm Numbers in the Period 1960-1976

	Manitoba Farms[a]	Dairy Farms in Western Canada[b]	Dairy Farms in Manitoba[c]
1960	44,485		
1961	43,306	54,626	25,562
1962	42,594		
1963	41,882		
1964	41,171		
1965	40,459		
1966	39,747	38,316	13,881
1967	38,794		
1968	37,841		
1969	36,887		
1970	35,934		
1971	34,981	22,086	9,760
1972	34,406		
1973	33,830		
1974	33,255		
1975	32,679		
1976	32,104	13,550	4,302

[a] Finance Section, Agriculture Division, DBS.

[b] Census Canada, 1961-1976, Agriculture Canada.

[c] Census Canada, 1961-1976, Agriculture Manitoba.

TABLE 2

Dairy Farms Categorized by Herd Size

Table 2

Dairy Farms Categorized by Herd Size[a]

No. of Cows/Year	1951	1956	1961	1966	1971	1976
All	39,662	34,891	27,313	19,158	11,743	6,775[b]
1	4,855	3,910	2,922	2,345	2,011	
2	6,170	4,177	3,169	2,267	1,422	2,109[c]
3-7	19,545	16,211	11,723	7,623	3,759	1,705
8-12	6,527	7,138	5,747	3,828	2,004	807
13-17	1,571	2,030	2,000	1,424	868	394
18-32	849	1,262 (.33)[d]	1,475 (.14)	1,235	1,088	949
33-47	100	115 (.15)	192 (.40)	294 (.34)	382	438[e]
48-62	30	35	52 (.32)	91 (.43)	118 (.23)	201
63-77	6	6	15	26 (.35)	50 (.56)	91 (.43)
78-92	5	5	9	12 (.25)	20 (.40)	35 (.43)
93+	4	2	9	13	21 (.39)	46 (.63)[f]

[a] Statistics Canada, Census of Canada, Publication 96-537, 96-708, 96-807, Queen's Printer for Government of Canada 1961-1976.

[b] The overall drop in Dairy cow farms is to about 1/6 its size of 1951.

[c] The one and two cow farms are consolidated in 1976.

[d] Rate of change between years, i.e., (849-1262)/1262 = .33.

[e] The 33-47 herd size is still increasing in numbers in 1976.

[f] The 93+ herd size is increasing most rapidly as of 1976.

large farms more rapidly as time progresses. This trend is not unique to Manitoba, as has been shown by Matulich in California[6]. This suggests there is some aspect of large farms that is more efficient than smaller farms. Producers benefit directly from efficiency and with costs of change escalating rapidly, the basis for proper decision making is an important asset to overall efficiency. Proper decision making surrounds good management and good management remains in business to increase in size.

Substantiation of the need for efficiency is best illustrated by the increasing cost of inputs. Prices for capital, labor, feed, breeding stock, and institutional reform have become relatively more expensive in relation to the return to the firm as the basis for comparison. (see Figure 1) The increase in farm size requires an increasingly more important role from the manager to maintain the operation.

2.2.1 Price And Market Uncertainty

Capital and labor costs have had a direct influence on dairy management with their impact on the operation. Capital inputs such as specialized milking machines, storage tanks, waste removal equipment and animal housing units have all increased dramatically[7]. Labor is a slightly different problem. The attitude toward farm work, given the alternatives, is not the best.

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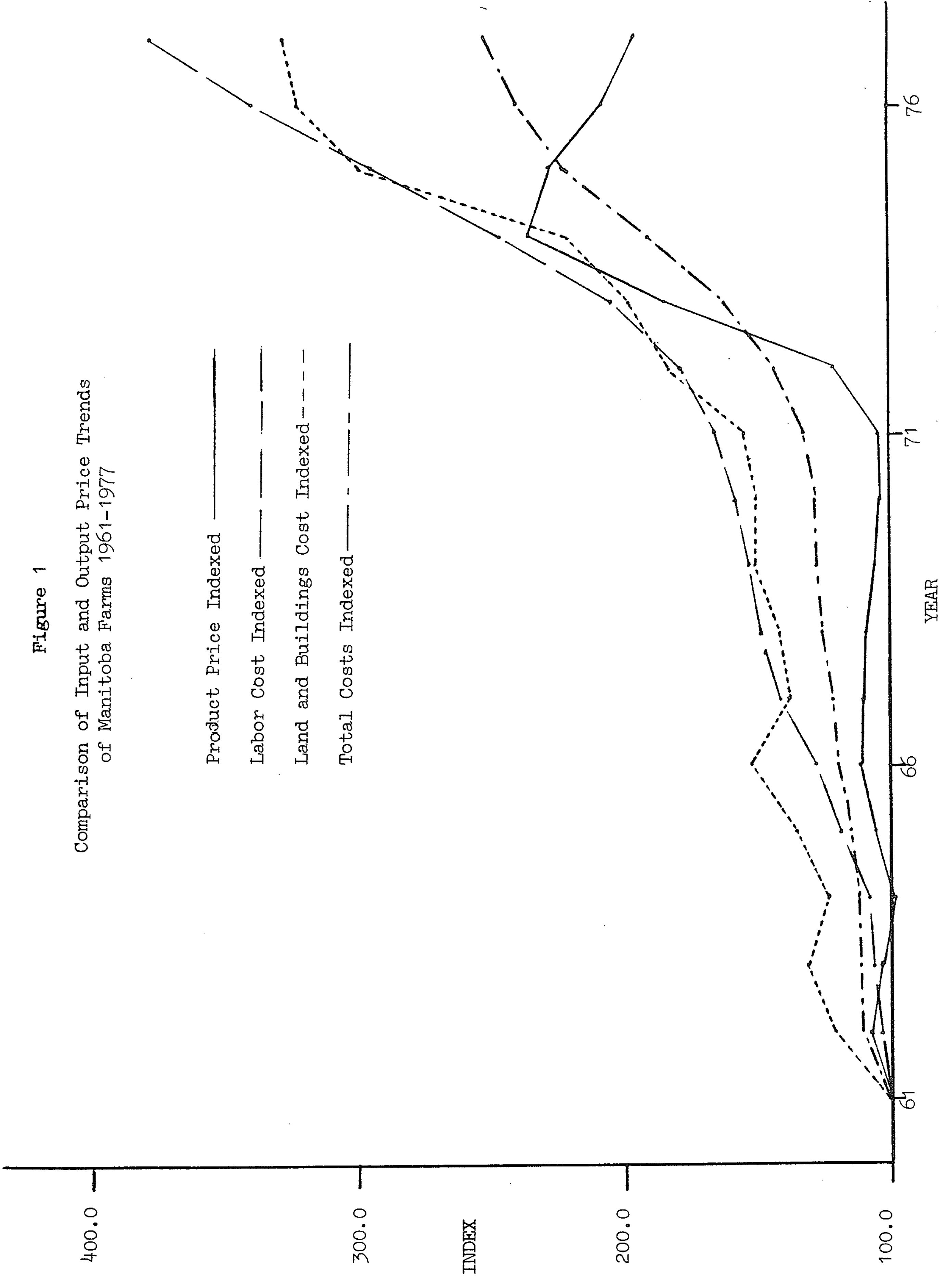
[6] Matulich,S.C., 'Efficiencies in Large Scale Dairying: Incentives for Future Structural Change', American Journal Of Agriculturall Economics Volume 60 number 4, November 1978. p 642.

[7] These trends are shown in Figure 1 The information is in tabular form in Table 4

Figure 1: Comparison on Input and Output Price Trends of Manitoba Farms 1961-1977



Source: See Table 1.

Farm work ranks lower on the list of one's employment choices. Although seasonality is not as great a problem, turn-over in personnel generally is. A major factor is the absense of competitive pay scales to attract competent help. Reduction in the potential labor base creates a situation of scarcity to further accent the rising cost of labor[8]. This induces the firm to seek alternate, more stable inputs generally of a capital intensive nature. Figure 2 shows the trend toward capital as well as the increased cost of labour over time. The dairy situation is affected more by labor conditions than most other farm enterprises due to the special skills required of a herdsman. In conversation with Manitoba dairy operators the concern for skilled labor was of foremost importance.[9]

Feed generally is grown on the farm but outside sources are used to meet shortages and specialized ration requirements. The wide swings well known to commodity prices can be very costly to the operational performance of a dairy farm[10]. These swings in forage prices are due generally to regional weather conditions while world weather affects international supply and subsequently feed grain prices. The unsettled feed price base creates added uncertainty for the business.

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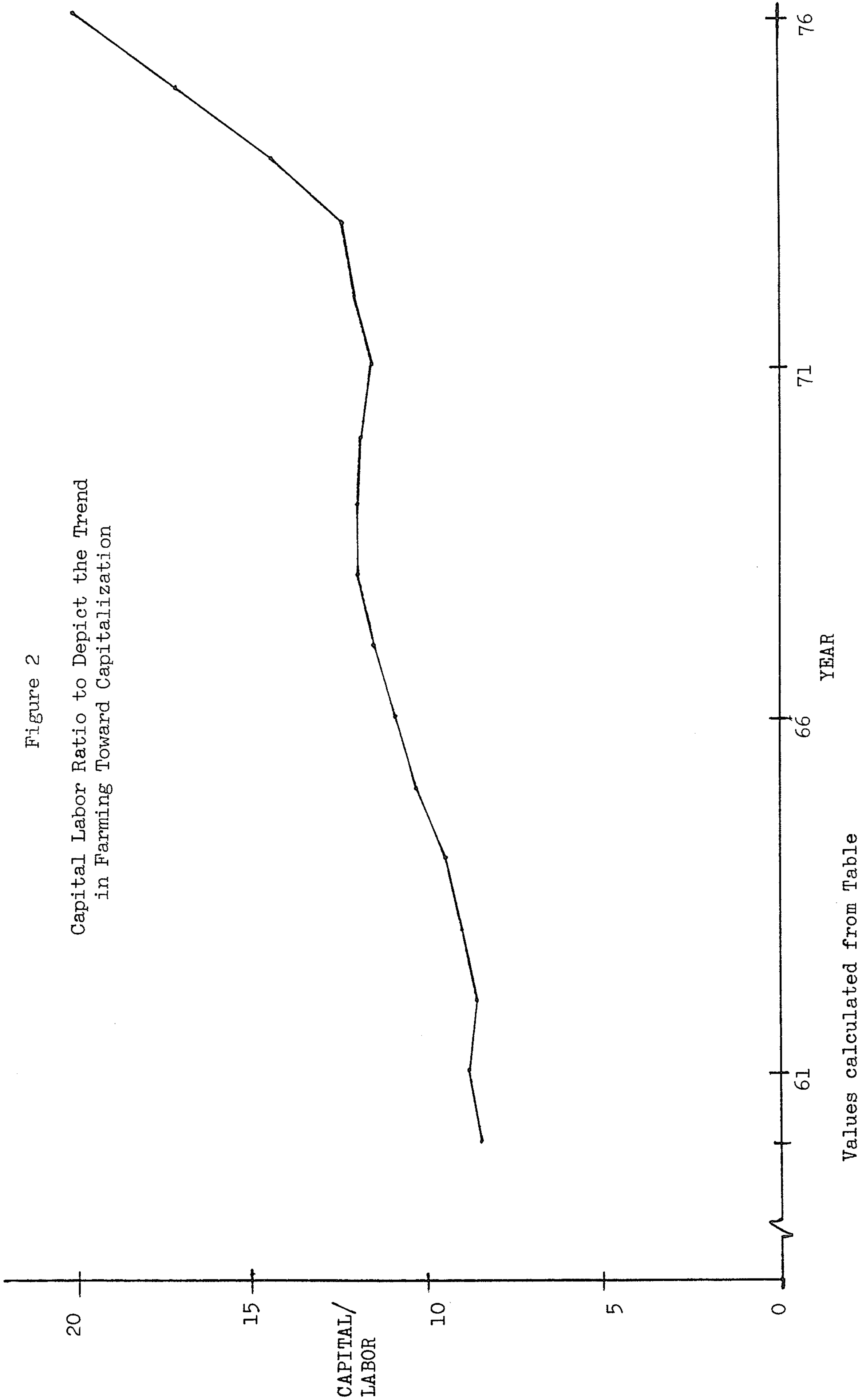
[8] The Manitoba minimum wage rates are given in Table 5 from 1965 to the present. The values come from: The Government of Manitoba, The Department of Labor, Annual Report, Queen's Printer for the Province of Manitoba, Winnipeg, 1964-1976

[9] Through private discussion with dairy operators concerning a Cost of Production Study for Manitoba Farms.

[10] This is because the decision is out of the firm's hands. The objectives are not always favorable to the firm either. Tomek,W.G., and Robinson,K.L., Agricultural Product Prices, Cornell University Press, London, U.K., 1972. p 88.

Figure 2: Capital Labor Ratio to Depict the Trend in Farming Toward Capitalization



These conditions can be offset somewhat through inventory management, feed supplements and crop insurance. Improved management in factor acquisition from these markets strengthens the firm's profit position and in effect promotes efficiency. This is most important in uncertain markets where variable farm yields require the acquisition of large quantities of total feed through the market-place.

The marketing of stock considers both quality and price. In dairying this function is used more for selling culls due to the intensive breeding programs required to produce high production animals. The market for bulls and cattle exhibiting high volume production is specialized and expensive. The cost of an average bull is approximately one dollar a pound. A bull with a pedigree and breeding for production volume can cost as much as three times that of normal value.[11] Many farms use artificial insemination as an alternative which introduces another market for consideration by the operator.

From this it becomes evident that the performance of dairy managers is being increasingly taxed. Larger, capital intensive farms are competing for more expensive input factors in a heavily regulated industry. Regulation and control are considered as components of the dairy industry. This trend has been in effect for almost three decades and due to the social significance of fluid milk is becoming more regulated as time progresses.

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[11] Personal communication with dairy farmers in the Eastern Region of Manitoba.

TABLE 3

Input Values For Calculating The Capital Labor Ratio

Table 3

Input Values for Calculating the
Capital Labor Ratio

Year	Machinery Investment[a]	Machinery Replacement Index[b]	Farm Numbers[c]	Capital/Labor[d]
1960	272,019	70.4	44,485	8.7
1961	279,890	72.2	43,306	8.9
1962	279,890	75.4	42,594	8.7
1963	297,545	78.1	41,882	9.1
1964	322,136	81.1	41,171	9.7
1965	350,070	83.5	40,459	10.4
1966	380,352	87.2	39,747	11.0
1967	405,762	90.0	38.794	11.6
1968	424,160	92.6	37,841	12.1
1969	426,558	95.4	36,887	12.1
1970	420,500	97.9	35,934	12.0
1971	411,471	100.0	34,981	11.8
1972	424,100	102.0	34,406	12.1
1973	455,739	107.0	33,830	12.6
1974	584,951	120.0	33,255	14.7
1975	787,518	139.0	32,679	17.3
1976	959,736	149.0	32,104	20.1

[a] Current Values of Farm Capital by Items in Thousands of Dollars, Manitoba Annual Farm Finance Section, Agriculture Division, Statistics Canada.

[b] Statistics Canada Farm Input Price Index (1971=100), Cat. No. 62-004.

[c] 1978 Yearbook, Manitoba Agriculture, p. 98.

[d] Calculation Machinery Investment/Machinery Replacement Index, Farm numbers.

TABLE 4

Indexed Farm Prices of Specified Inputs and Aggregated Products for Manitoba (1961=100)

Table 4

Indexed Farm Prices of Specified Inputs and Aggregated Products for Manitoba (1961=100)

Year	Product Price[a]	Input Prices[b]		
		Labor	Land and Buildings	Total
1961	100.0	100.0	100.0	100.0
1962	105.8	102.2	120.2	107.2
1963	102.6	104.7	131.8	110.6
1964	99.8	109.7	124.2	110.3
1965	103.9	117.0	136.7	114.1
1966	110.9	128.9	151.4	120.6
1967	109.5	140.2	137.9	121.6
1968	105.2	148.2	142.8	125.6
1969	103.4	155.7	153.0	130.2
1970	103.0	159.4	151.2	131.0
1971	102.1	167.9	159.7	135.9
1972	119.7	182.2	185.3	145.2
1973	189.3	208.3	199.9	162.9
1974	235.3	248.7	222.7	190.7
1975	226.6	295.3	298.6	224.6
1976	209.8	340.7	318.4	238.4
1977	196.5	378.0	329.1	251.0

[a] Statistics Canada, Publication 62:003 for Manitoba prices.

[b] Statistics Canada, Publication 62:004 for Western Canada prices.

TABLE 5

Minimum Wage Rates for the Province of Manitoba (18 Years and Over) 1965-1977

Table 5

Minimum Wage Rates for the Province
of Manitoba (18 years and over)
1965-1977

Year	Minimum Wage ($/Hr.)
1965	0.70
1966	1.00
1967	1.10
1968	1.25
1969	1.35
1970	1.50
1971	1.65
1972	1.75
1973	1.90
1974	2.15
1975	2.30
1976	2.60
1977	2.95

Source: Government of Manitoba, Department of Labor Annual Report, Queen's Printer for the Province of Manitoba, Winnipeg, Copies 1964:1976.

2.3 THE DAIRY INDUSTRY AND REGULATION

The institutional setting,the industry and the firm are all intertwined within the realm of milk production in Canada. To fully realize the impact of the institutional structure within dairying each level is discussed in relation to the effect on decision making by the producer.

The rationale behind application of any theoretical concept to a system is in understanding that system. The dairy industry of which the dairy operator is an integral component is no exception. To fully understand the basis for the specified theory, a description and explanation of the system follows. The dairy industry like any other is very complex and emphasis will be given to the explanation of the industry structure with minimal elaboration of the components. The one component that will be emphasized is the primary producer.

An overview of the industry is presented to illustrate the completely controlled nature of the dairy industry, to show the mechanisms developed by the controlling bodies and to reveal their influence on the dairy producer in dealing with them. The overview is then used as the basis for decison as to the theoretical concepts applicable to the problem with the given objectives.

In its simplest form the industry is comprised of producers, processors, marketers and consumers. All of these areas are influenced by government control of the industry. Producers and processors are very closely involved with government control while the marketers at the final demand stage are controlled mainly by pricing policies.

There are two levels of government involved. The Canadian Dairy Commission at the federal level integrates the industrial policies throughout the country. Control of international trade and of interprovincial agreements is overseen through this organization.[12] The CDC also decides on the percentages of product required by the provinces and allocates quota on this basis. This allocation process is further explained by Stonehouse.[13] The policies for pricing at the consumer level as well as the subsidy payments to the producer and processor are regulated by the commission. This gives the commission control to maintain a supply-demand level which should clear the market at a predetermined price.

Figure 3 shows graphically the supply demand equilibrium process used by the government since 1967. Subsidy for achievement of the required quantity at this price level is controlled by the federal government. Overall the factors influencing supply and demand are regulated by the commission to satisfy the mandate of maintaining a viable dairy industry in Canada and producing adequate product at a price that is acceptable.

The four graphs depict four different policies that through time were implemented by the C.D.C. to maintain the system in equilibrium. In Part A the implementation of a subsidized price Pf to producers and Pr to processors to increase output to Qs and allow Qs-Qd for export was

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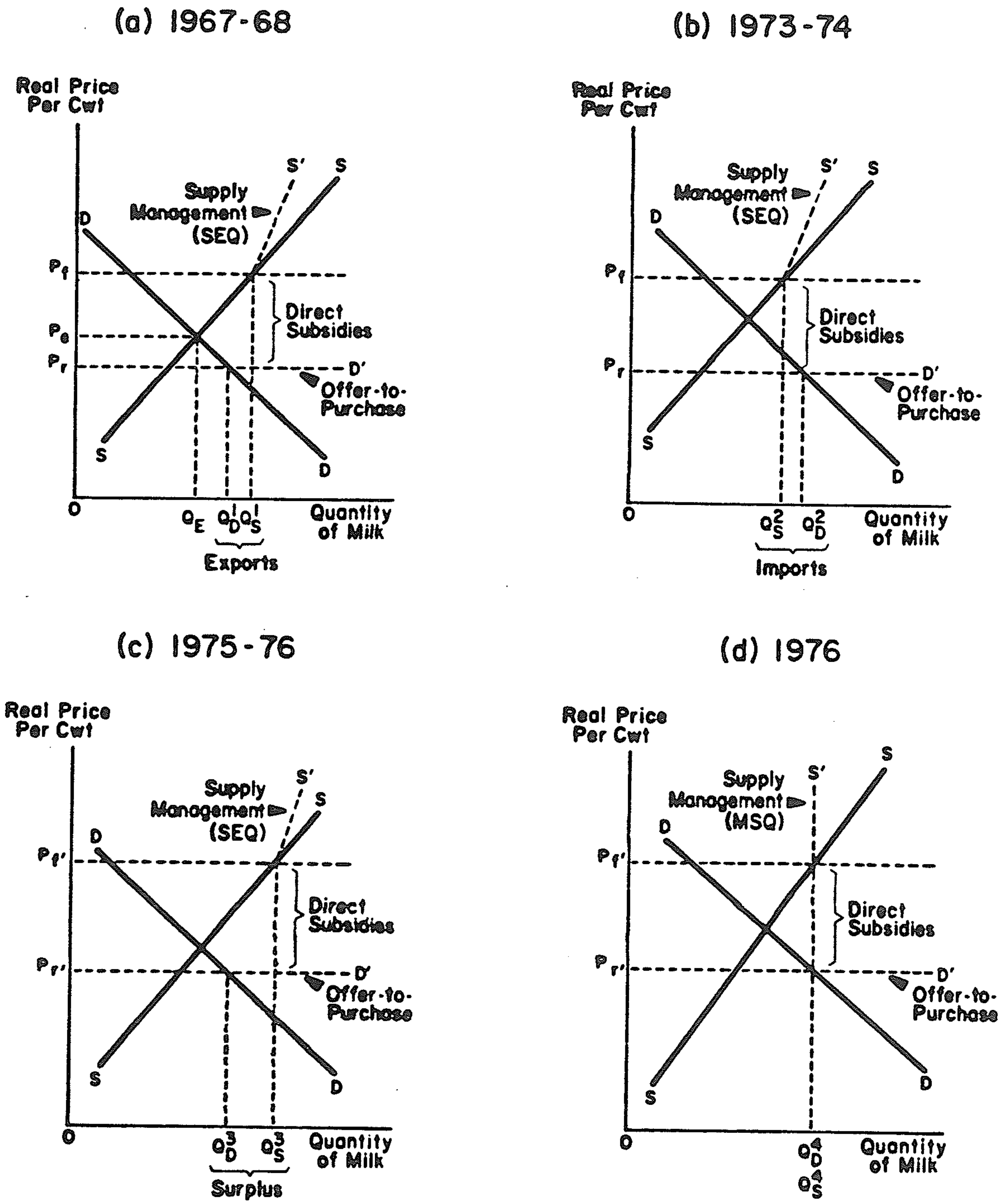
[12] Stonehouse D.P., Harrington D.H. and Saki R.K. "An Econometric Forecasting and Policy Analysis Model of the Canadian Dairy Industry" <u>Commodity Forecasting Models for Canadian Agriculture</u> Volume 1, Agriculture Canada, Ottawa, 1978. pp. 90,95.

[13] Stonehouse D.P., 'Government Policies For The Canadian Dairy Industry', <u>Canadian Farm Economics</u> Agriculture Canada, Vol. 14 No.1-2

Figure 3: The Impact of Government Policies on The Canadian Dairy Industry, 1967 To 1976

Figure 3

The Impact of Government Policies on the Canadian Dairy Industry, 1967 to 1976



Source: Commodity Forecasting Models for Canadian Agriculture, Vol. 1, Agriculture Canada.

implemented. The subsidized eligibility quota (SEQ) was installed to create a ceiling for Qs′.

Changes in demand reversed the relative positions of Qs and Qd by 1973-74 where Qd is the quantity demanded. Part B shows the net import position requiring an increase from Pf to Pf′ in part C to increase production. The decline in export demand that occured in the interm created a surplus.

Finally part D of the figure shows implementation of market share quota to try to create production in the marketing area of the produce. The quota set up by the C.D.C. is based on the market demand in an area. The use of market share quota (MSQ) and the costs of penalty are depicted as a vertical supply curve S′ at Qd and hence Qs fall at the same point. The specific deterrent for over MSQ production determines the slope of the curve to the point where Pf′ equals the deterrent at anything greater than Qd causing S′ to become vertical at Qd. This is specific to industrial milk sales, the fluid milk market being satisfied first with the slack picked up by the industrial segment.

The overall implication of the system of supply management through time is uncertainty to the producer. The mechanism in place is not fixed and the pressure to maintain a stable supply of product is not constant. The instability of policy is a cost that is incorporated into the industry. This cost is not easily separated from the cost of supply management. The idea that stable price and output remove uncertainty is quite acceptable. The uncertainty comes in the changing of policy through time.

The industrial milk price base is indexed using a formula including thirty-five percent of the Consumer Price Index, fourty-five percent of the Cash Input Price Index and twenty percent judgement factors. Stability in the sense of guaranteeing a target return for industrial milk, is achieved at the cost of uncertainty from its structure due to the output mixture not being properly priced. The fact that the system does not operate without price bias reduces its effectiveness and aggravates stability of the program. These are the policies dictated at the federal level influencing producer decision making at the firm level.

The present situation involves internal problems within the policy that the government feels should be corrected. Figure 4 shows the policy and its subsidy and offer to buy positions. The fact that a pool price is in effect for a market that is normally differentiated by price creates shortages or surplus depending on the price level. Specifically if butter fat is produced in sufficient quantity to satisfy the Canadian market, as is the present case, surplus skim milk powder is the byproduct of the policy. Both P.C.Douglas[14] and S.J.Menzies[15] criticize this situation for its inefficiency. The outcome if a change of policy is deemed necessary again brings the uncertainty of production back into the market place from which it is supposed to be removed.

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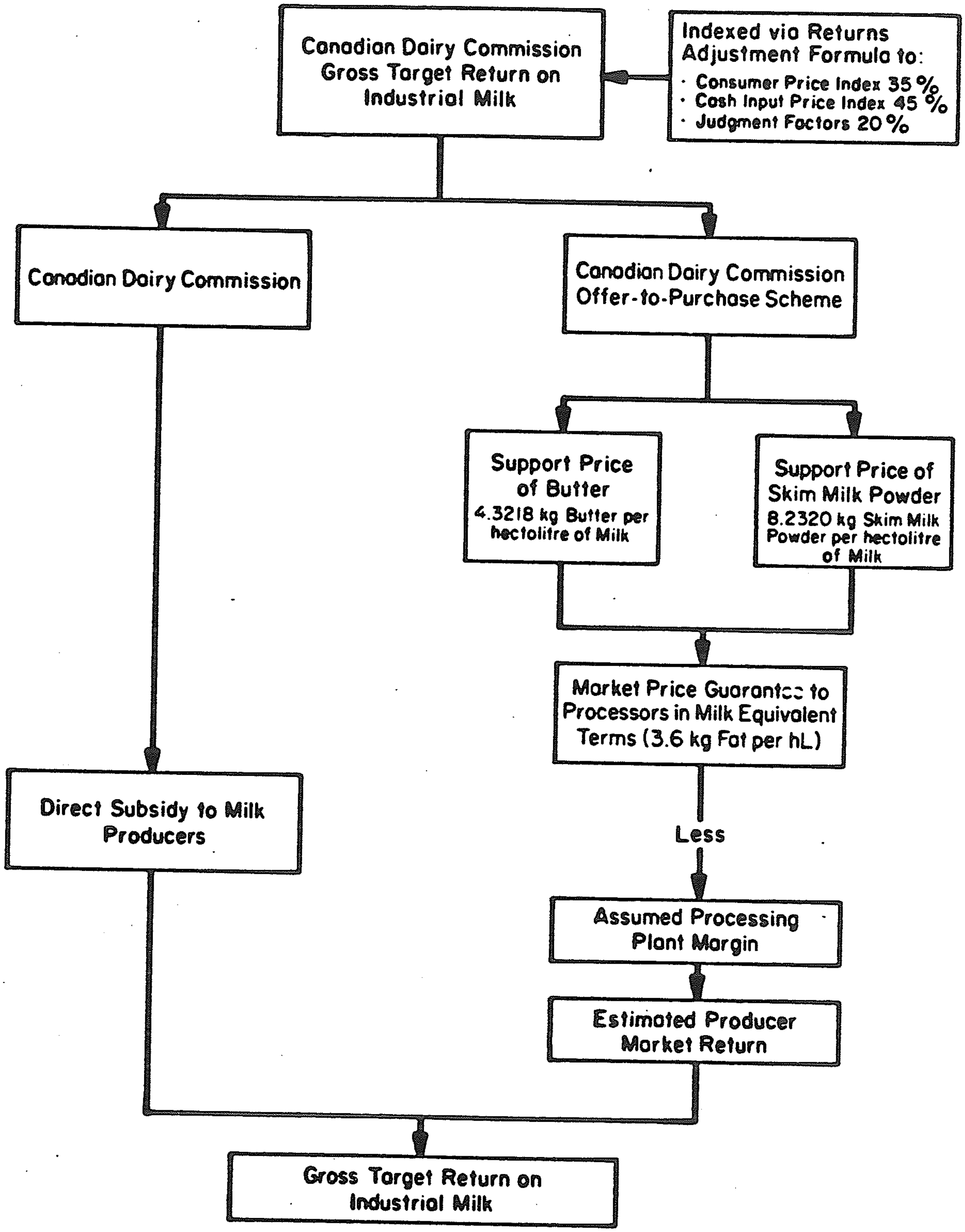
[14] R.C. Douglas, "Address to the National Dairy Council of Canada" (Centre for the Study of Inflation and Productivity, Economic Council of Canada, Ottawa, Sept. 26, 1978, p. 5-9).

[15] S.J. Menzies, "Competition Policy and its Relationship to Aspects of Economic Policy," <u>Competition and Public Policy on Competition in the Canadian Food Industry</u>, Department of Agricultural Economics, University of Manitoba, Occasional Series No. 7, 1977, pp. 9-13.

Figure 4: Unit Returns-Setting Mechanism For Industrial Milk

Figure 4

Unit Returns-Setting Mechanism for Industrial Milk



Source: Canadian Farm Economics, Vol. 14, No. 1-2, 1979.

Although this is not the argument of the National Dairy Council per se it adds to that part of their argument of producing for Canadians to maintain constant supplies.[16]

The second government level of control is the provincial boards. In Manitoba there are two government agencies.[17] The Manitoba Milk Producers' Marketing Board (MMPMB) and the Milk Control Board of Manitoba(MCBM). Each have their respective mandates. The MMPMB is in charge of the actual physical movements of milk and the operator components of the industry. In effect they regulate producer and processor volumes and quality of product. They also determine the destination of the product. In Manitoba the board is very closely involved in marketing and have imposed certain sanctions upon producers to obtain a more orderly flow.

The MCBM is in charge of the price received by the producer as well as the price charged by the processors, marketers and consumers. Due to regional differences in production costs an average price set by the CDC cannot be applied universally. The MCBM is in charge of reducing this discrepancy while maintaining the mandate of the CDC.

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[16] The National Dairy Council, National Dairy Council of Canada Presents The Substantiated Facts Refuting the Charges of Economic Inefficiencies in the Canadian Dairy Industry Levied by The Centre for the Study of Inflation and Productivity, Ottawa March 1979.

[17] There are actually two boards as of January 1980. The Milk Marketing board (producer board) controlling the quota's and varying them in relation to a federal government formula. The Milk Control Board is a consumer protection agency with the producers interests in mind. They specify the price paid in all levels of the industry. The Board has been replaced by a Review Commission with the same basic function.(See pp215-218) The Manitoba Gazette, June 10,1978 Volume 107 Number 23, pp. 215-221

The preceding explanation of the government system of control is for that of the industry. The dairy operator is affected by all of the policies developed at both levels of government. The controls specific to the dairy operator will be outlined below.

The producer is restricted in two general ways. First by quantity produced, second by price received for the product. These two components are what determine gross returns. They are further restricted by penalty for over supply on total product and for fluctuations in supply through time. The MMPMB have contol of total quota allocation. This removes any possible marketing of quota as an input factor.[18] The MSQ applies specifically to industrial milk as the fluid market is satisfied first. The MSQ is determined to keep yearly upper limits on production so that excess does not accumulate and shortages are curtailed. The mechanism for levelling production is called daily entitlement (DE) which penalizes the producer during the February to August period for excess production based on the September to January period's output. (see Appendix A) The seasonal fluctuation is due to the natural tendencies of animals and lower summer feed costs. Basset[19] shows that dairy production cost is substantially higher in the winter than in the summer. Through these two restrictions the producer is given a ceiling output coupled with an enforced levelling of output

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[18] The costless quota system does not even get included in the cost function. In general quota has a price and does show up in the cost function. The Manitoba Milk Producers' Marketing Board own all of the quota to try to reduce problems with charging for quota.

[19] Basset,Lorraine, An Evaluation Of The Effectiveness Of Selected Methods For Reducing Seasonal Fluctuations In Industrial Milk Supply, (unpublished MSc. Thesis, University of Alberta, 1980.) pp.117,126,127.

through time.

The dairy industry's supply and demand are controlled completely by the two government levels. The policies and tools are used to provide the country with fluid milk and to maintain a constant industrial milk industry. The dairy operator has no self control of either price or quantity produced by the industry and must rely on the government for them. This leaves the cost side of production as the only device he can influence.

2.4 THE THEORETICAL BASIS FOR MODELING THE DAIRY FIRM

The situation is thus one of almost complete control by outside agencies. The market is absolutely controlled at every level except that of the consumer. This market control affects the revenue side of the cost/revenue balance.

> Conventional theory of production and supply is focused on determining the factors which influence cost performance, output decisions, size of plant, factor returns and efficiency of the profit maximizing entrepreneur. The theoretical model for output determination describes a process where output is increased until the marginal cost of producing the last unit of product equals the price at which that product is sold. This price is typically assumed to be a market price determined by the interaction of competitive buyers and sellers. This is not the case for the Canadian dairy industry where price is set administratively. The response of each firm in the industry however, is still as a price taker; that is, the product price received is not a function of that particular firm's output level.[20]

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[20] Fox G. C., A Dairy Farm Classification System for use in Representative Farm Linear Programming Analysis an unpublished thesis , The University of Guleph, July 1979.

Thus a complete micro theoretical framework cannot be applied in this analysis. The cost side of the operation is the only aspect that is influenced by the manager. Cost of production theory is considered the basis for analysis of the problem.

The government policy discussed earlier was directed at the industry as a whole. Comparison of the industry reaction and the firm's reaction to these policies will illustrate the non-separable effect of policy on the two entities of dairying. This is important in that it reveals the strong influence government decision and in fact indecision have on the firm when the policy is directed more at the industry.

The second phase is to show the direct influence on producers and includes the individual influence producers themselves can have on their operation. The final situation is very much a management capability consideration. It is considered in this way to try to show why managers make the difference and should be given every possible incentive to do better.

2.4.1 Theoretical Industry - Firm Equilibrium

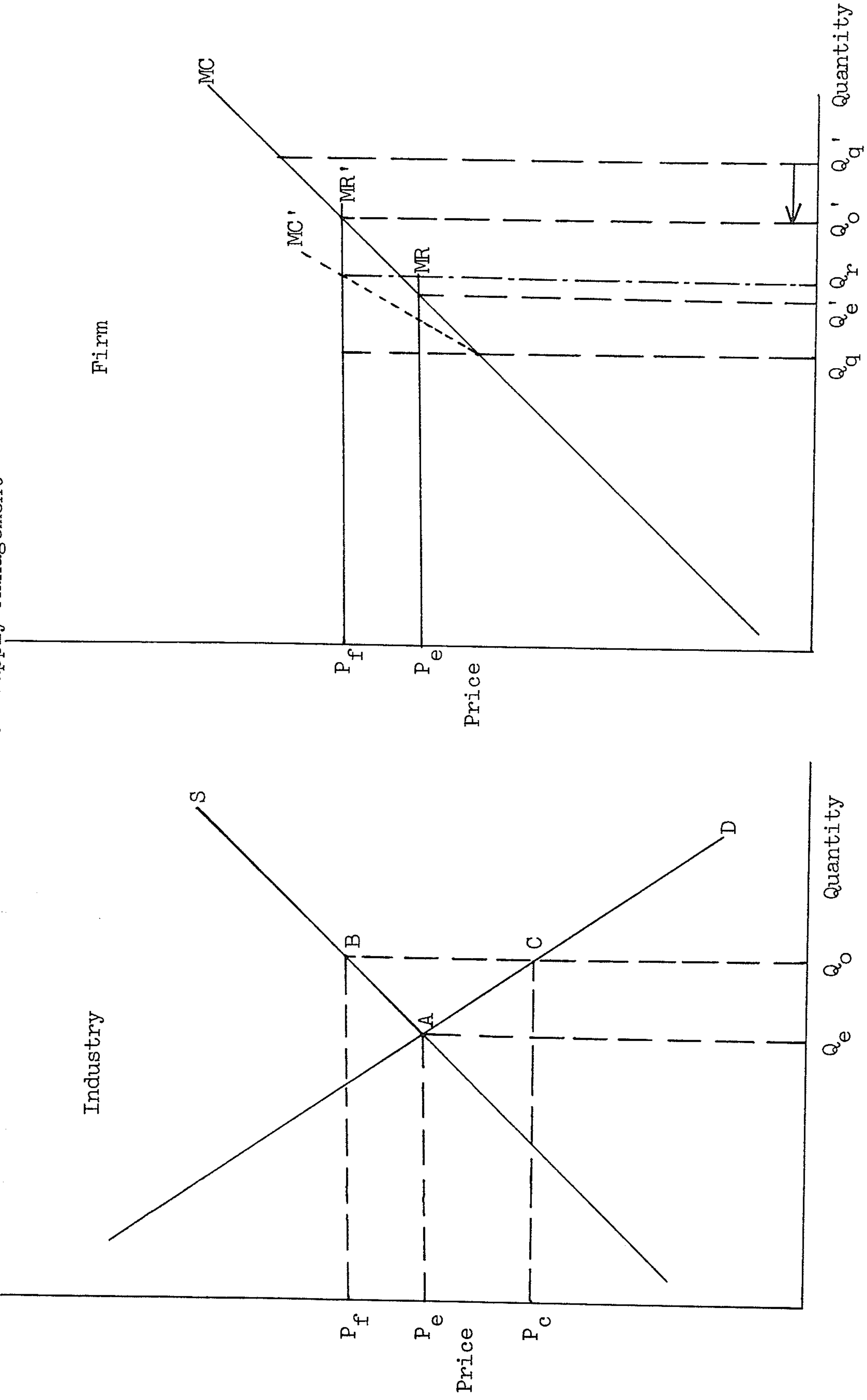
The industry and its regulations have been specified in an institutional setting. A link between the industry and the firm will give credence to the usefulness of the industrial theoretical base explained with the firm theory. In fact the two are so completely intertwined due to regulation, the segmentation is only for illumination of the theoretical base.

Figure 5 gives the industry and the firms cost and revenue curves. The long run is used as the basic time unit to remove the requirement for fixed costs. A starting point is at equilibrium for the industry and the firm. The equilibrium price Pe for the industry produces industry output Qe and firm output Qe′ This situation would be the profit maximum position if no controls were in force. Increase in price paid Pf for milk increase output to Qo and Qo′ for the industry and the producer respectively. The price rise in the case of the dairy industry is through regulation. Pc is the price that can be charged to clear the market when Qo is being produced.

Given a pre-determined Qo decided upon by CDC as the domestic and export (import) requirement a price can be determined as shown at Pf. This in turn determines the optimal output possible by the firm Qo′. A quota restriction on the firm of Qq suggests a lower than efficient position of output for the firm of Qq being less than Qo′. If Qq′ is greater than Qo′ as determined by the marginal cost curve of the firm an inefficient position exists. The firm in the first instance will produce Qq and whatever over Qq the preceived marginal cost curve MC′ suggests should be produced. This perception is determined by the severity of regulation on overquota produce. In dealing with the extra cost a change in the increase of the marginal cost curve occurs. This forces it to cross the MR=Pf curve before Qo′ at Qr. The position of Qr is determined again by the influence the overquota penalty has in the producer's perceived MC′ curve. It can fall anywhere between Qq and Qo′.

Figure 5: Industry-Firm Comparison of Price and Quantity Under Conditions of Supply Management

Figure 5
Industry-Firm Comparison of Price and Quantity Under Conditions of Supply Management



The second producer will only produce up to Qo′ since production of the excess quota available Qq′-Qo′ results in MC > MR. This quota will be sold in the long run given that the policy regulation does not change so Qo′ adjusts to Qq′ in the long run (shown by the arrow).

The supply management aspect of the industry is very much involved in the operation of the firm. Decision to overproduce or underproduce on quota restriction are based primarily on the regulated price and the costs associated with output. The uncertainty of operation is removed if the regulation body maintains the policy regulation without change. Any change associated with the policy will affect the producer. The uncertainty of change is a cost and must be included as such in the operation just as a cost margin for uncertainty is required in the free market. The theory as discussed here to be associated with this cost must include it in the marginal cost curve.

The analysis can be looked at as having this cost included and if it can be reduced or done away with an increase in output will occur. This uncertainty is one of the input costs that is not usually costed by regulation boards. In most instances it is assumed that uncertainty of production is reduced. The trade off between the cost of free enterprise uncertainty and supply management uncertainty is an important factor for consideration of system efficiency.

Another consideration is the question of where the initial equilibrium point is. Subsidies are paid based on this point. This is point A in Figure 6 Given the changes that occur when supply management is implemented the accuracy of determining this point determines the efficiency with which price and subsidy policy are regulated. The subsidy required is shown in Figure 5 as the area ABC paid to both producer and processors to clear the market. The subsidy actually paid given the price increase to Pf is PfBCPc. The difference is the economic rent.

It is apparent from the control imposed on the dairy industry that there is only one option open to the dairy firm. To become more efficient, the technical component of his operation is basically the only vehicle under his influence. At best the influence may occur between varying his technology to achieve a change in his technical compliment. Fox has done work in this area.[21] The main concern is to consider the practical technical changes set out in the three scenarios on a conceptual basis and specify the expectations of the changes to the base position.

2.4.2 Conceptual Cost Effects of Application of The Three Scenarios

The completely controlled nature of the industry leaves the producer with few options. With marketing and production level completely handled by the government agencies the producer is forced to rely on his skills as a manager to reduce costs. This is not to say the system is perfectly rigid. Changes in price and quota allocation are possible. The key is that the responsibility of changes lies not with the manager but with the government agencies. Cost reduction is the manager's responsibility and his capacity to affect them determines his returns. To understand his costs requires knowledge of accounting procedures.

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[21] Fox, G.C., op. cite. p.25.

Reduction of costs requires economic knowledge and practical application of the most efficient set of management techniques to the operation. This requires a theoretical framework which involves the theory of production. This theory is used to specify a model for estimates of the cost of a decision on the operation.

Three types of production costs can be associated with firms from neoclassical theory of supply of firms. The delineating characteristics are borne out in the factor inputs associated with these costs. The three classes of factors are variable, fixed and quasi fixed inputs. The basis for defining a factor as being fixed or variable is determined by the length of run concept. The period of time is determined by the variable or fixed factor being changed or unchanged in quantity over the long or short run respectively. The third class of quasi-fixed factors consists of those factors that can be moved within a multi-enterprise firm but total quantity remains unchanged for the firm as a whole.[22] Quota can be classified as a quasi-fixed factor at the producer level. It can be reallocated among existing firms but the total remains the same.

Normally the profit maximization criteria of the rational entrepreneur can be looked at from both the revenue and cost side of the production function. The position where MC=MR is the profit maximum from neoclassical marginalist theory. The constraint in the dairy industry on the revenue function through regulation of price and quantity fixes the maximum revenue possible to any producer at the set price times the

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[22] Ferguson C.E., The Neoclassical Theory of Production And Distribution Cambridge University Press, London, 1971. p.9.

quota allocation. There are restraining factors from the over quota levy, the DE dockage and the subsidy level paid which can affect this revenue level. The effect of regulation of price and quantity can affect the point where MC equals MR if certain conditions prevail.

The cost function is the important part of the theoretical analysis for the enterpreneur. This is the area where adjustment is open to his discretion. The restriction of movement along the cost curve by quota forces the producer to devise means of shifting the cost curve downward. In effect increased efficiency on the input side is promoted.

The initial position of the producer is given as that of a price taker before regulation is imposed. Figure 6 shown the price Pe that the market will bear and the marginal cost MC′ associated with this particular production enterprise. In this case MC=MR at Qe. This is the point where profit is maximized. This point corresponds to Qe in the previous comparison of the industry and the firm.

The manager is also responsible for his production to the boards. The actual effect is illustrated in figure 6 and 8 where over quota and DE are actual penalties to the operator. Overquota has the effect of increasing the cost curve rate of increase if production falls above specified limits illustrated by MC′. The marginal cost curve applied to the producer will be MC′ if Qq is the quota restriction. Above this overquota costs come into effect.

The next two applications are when price rises to Pf due to policy regulation subsidy. The new output will be Qo if no

Figure 6: Conventional Firm Profit Position With Quota Restrictions and Overquota Costs Associated With Price Control

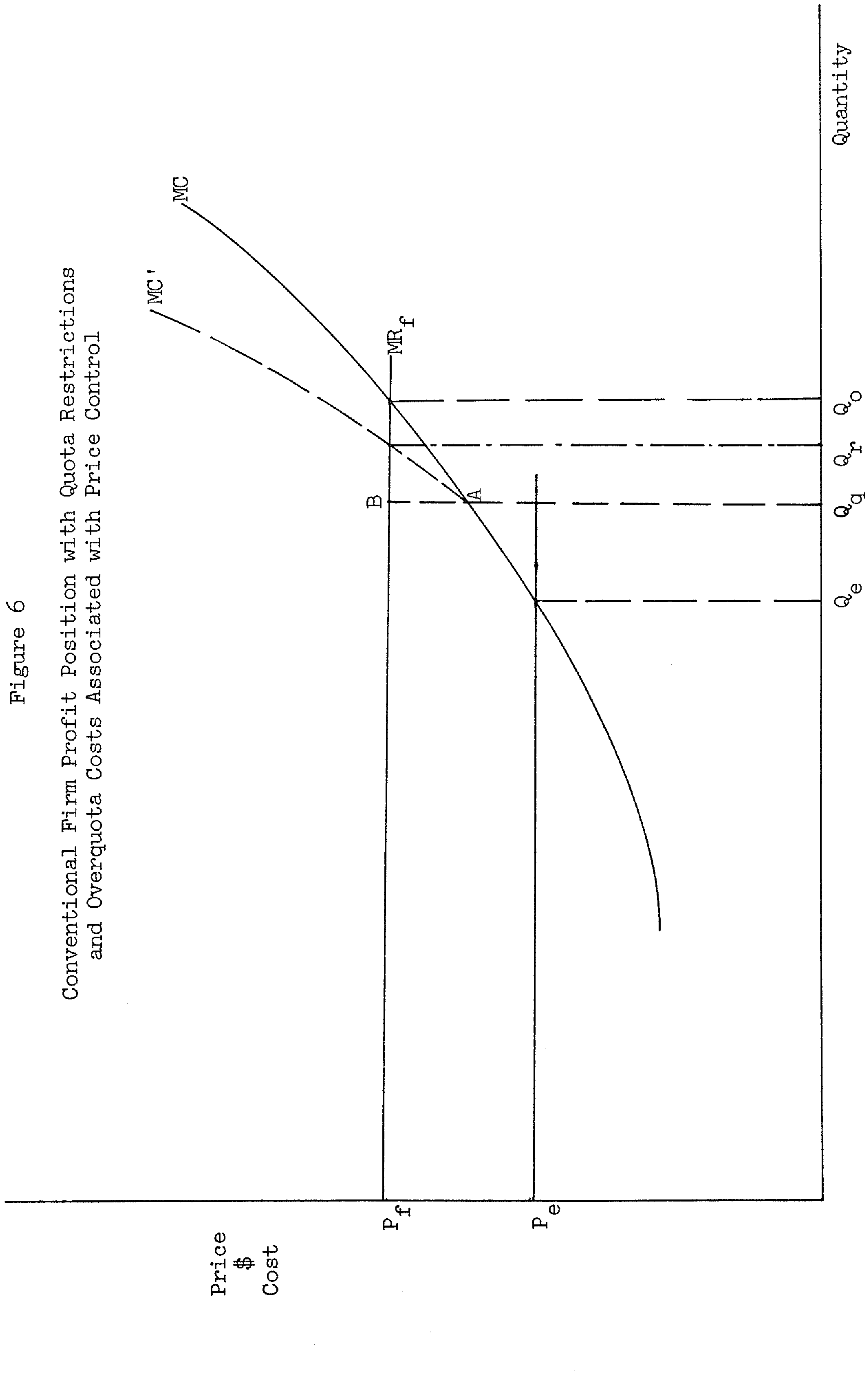

Figure 6

Conventional Firm Profit Position with Quota Restrictions and Overquota Costs Associated with Price Control restriction is placed on output. Given the quota restriction at Qq the producer is forced to remain below the profit maximizing point Qo and the required policy of overquota deterrents must be implemented to remove any incentive to produce at the efficiency point.

The deterrent must be high enough on an individual basis to meet the difference between Pf and Mc at Qq. The deterrent in Figure 6 required is given as AB. The deterrent shift as indicated by MC′ will allow the producer to produce up to Qr where profit is maximized. This can be considered one of the reasons that the Canadian dairy producer lacks the incentive to attain high production as is the case in the U.S., Japan and other high technology countries. This creates two hurdles for producers in the Canadian industry due to supply management compared to only one in the other countries.

The firm is effectively deterred from overproducing within the policy regulation specified at the present time with market share quota. This is important since any change in quota or price will change the producer′s position and will alter the analysis base.

The third consideration is that of the actual shift of the cost curve and the component that make up the present cost curve. Rational producers will try to shift the MC curve down in an effort to increase net returns. The curve does have specific idiosyncrasies specific to dairying. Here is where the three scenarios and the expected influence is hypothesized. The input costs associated with the operation are not constant through time and have seasonal variation which upsets the neat analysis of the previous section. Assuming the previous section dealt with an average of the marginal cost curves over a period of one year the producer is not affected based on yearly average input costs. Consideration of cash flow and optimal position for shorter periods of time is important to producers and the theoretical implications are given in Figure 7

The load placed on the firm by seasonal prices will be due to inventory costs as part of the extra cost associated with the change. This is to be expected if year end inventories are done on an accounting basis at December 31. Cash flow can also be expected to change. If the threshold cash holding is surpassed then a loan is required and the interest costs will increase the cost of the new position. These are basically accounting considerations. Economically if the average price is reflected as the average of winter and summer prices there should not be a change over the averaging period. Considering the accounting as part of the economic cost then the farm will look worse off and will be worse off if the loan is required in the winter months.

The winter MC curve MCw is considered higher than the summer cost curve MCs and is overlayed on the previous scenario. The incentive to produce given the two extremes becomes a region between Qs and Qw at the extremes if Qo were not restrictive. The situation is a seasonal fluctuation of output between Qw and Qs which averaged over the year will approximate Qo which reflects the average of the marginal costs for the year. Supply management requires a more level production through time and policies to regulate seasonal production have been set up.

Figure 7: Seasonality of Input Costs Associated With Dairying

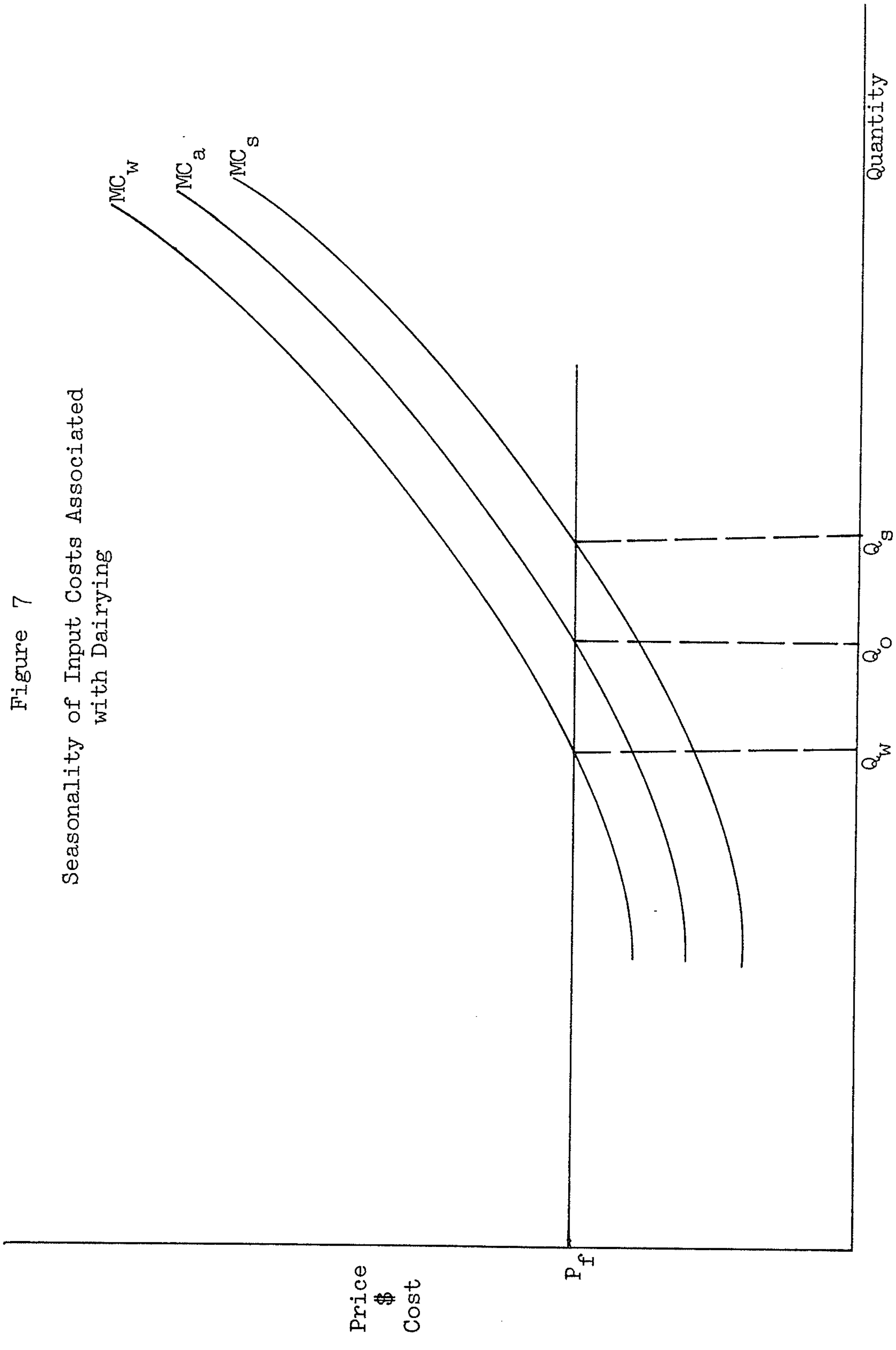

Figure 7

Seasonality of Input Costs Associated with Dairying

Manitoba has set up a daily entitlement scheme which takes daily winter production averaged and uses this benchmark to restrict summer production.

The cost of daily entitlement is felt through penalties on production over De in the summer months. Over time a trade off between the cost of daily entitlement penalties and high winter costs will determine the optimal production output cycle to maximize profit based on the variation in these costs.

Figure 8 shows MC on a daily increase basis. An increase in summer production will move along the MCs curve to QDE. Daily entitlement causes a disjoint MC function at this point from penalites on quantities over QDE. This jump occurs due to the limitation of daily production derived from the daily entitlement regulation during the high production season. The penalty is not calculated here in any empirical fashion and may cause its relative position to be above or below the winter MC curve. The winter curve MCw is higher than the summer curve before QDE due to increased input costs. This reduces the incentive to produce above Qw because of the price. If MCs′ is the end result of daily entitlement penalty there is an incentive to move up along MCs past QDE to QDE′. The area CDE is the surplus in this case and a reduction in winter production is possible to the degree that Qw and QDE′ on a daily basis aggregate to equal Qo the quota allocation. The movement will be back to Qw in the winter and up to QDE′ in the summer for profit maximization. Better understanding of this concept will aid in more efficient use of resources to obtain maximum profits.

Figure 8: Effect of Daily Entitlement Coupled With Seasonal Costs For Dairy Production Costs

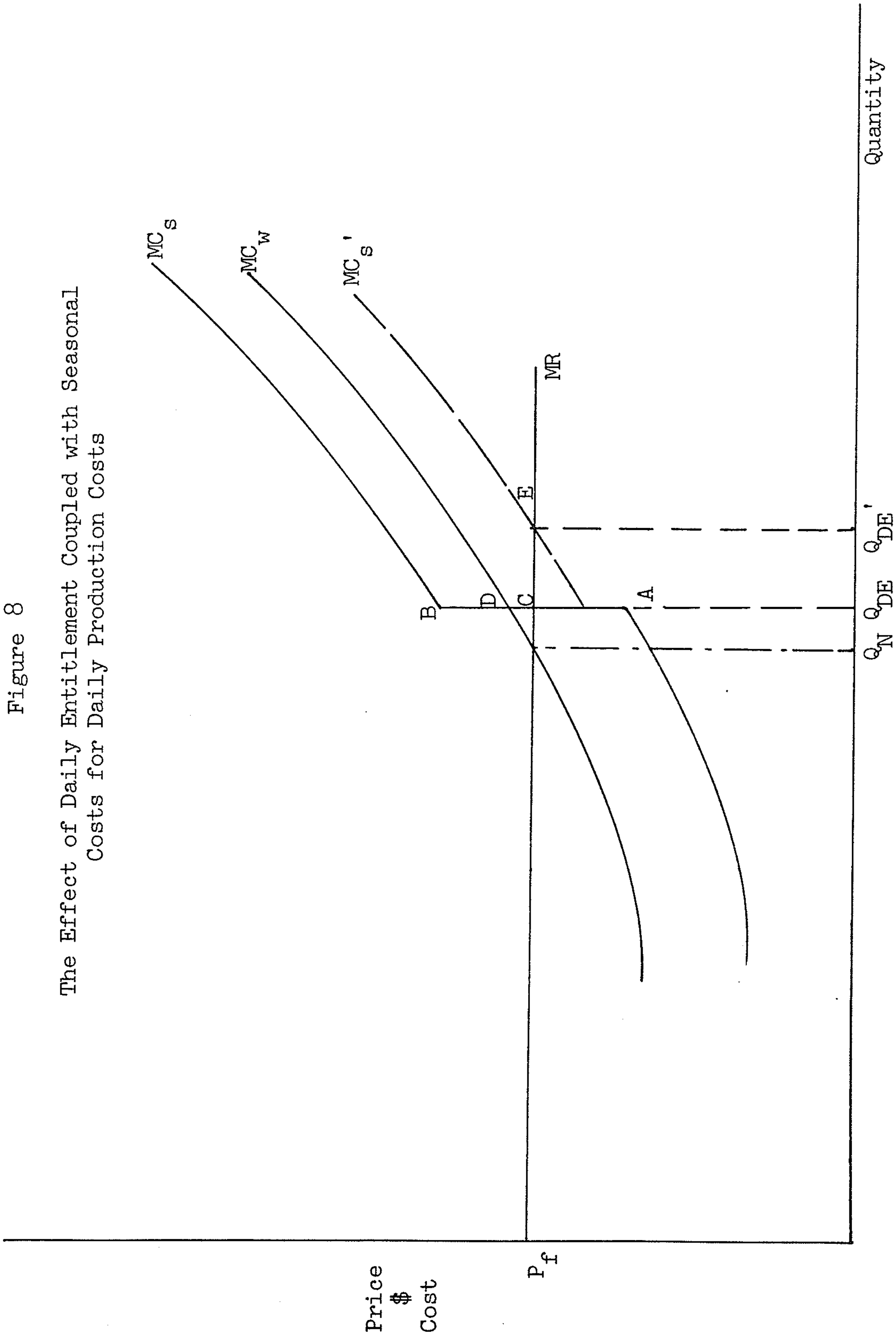

Figure 8

The Effect of Daily Entitlement Coupled with Seasonal Costs for Daily Production Costs

It would be expected that given more reasonable summer costs in areas other than feeding that a seasonal production schedule will reduce the producers costs ignoring the daily entitlement effect. Including the daily entitlement program will increase the cost of seasonal production and in effect will reduce the savings of the practice to a negative end result.

The third concept relates to feed ration use. The expectation is that given an optinal feed, costs should be lower by definition. Costs should fall with respect to output in an economic sense and as such a more efficient position is achieved. Using figure 7 the expectation would be for Mca to fall in the direction of Mcs. Although a higher cost per ton of feed may be required lower feed rates or higher production from eqivalant rates must be realized for efficiency to take place.

2.5 THEORY SUMMARY

The main institutional regulation affecting the firm in dairying occurs on the supply side with prices and quotas being dictated through government policies. This creates uncertainty in long run planning which although not the main consideration of a manager while planning his strategies do have minor considerations given to them. The input cost picture is not constrained through policy or regulation although the input suppliers do not show the characterisics of perfectly competitive operations. This creates the firms technical uncertainty that was discussed in the introduction. This depicts the dairy environment that the manager must make decisions within. The three scenarios on practical applications have cost curves associated with them. The conceptual framework of the cost curves and the expected changes have been dealt with to determine the economic strength of the model to direct operations toward efficiency. The analysis and conclusions will bear out this parallel if one exists. The practicality of the model will be two fold. First in its capacity to answer practical questions and secondly this economic consideration of efficiency motivation.

To summarize the theory requirements there are three things to consider. First, that the dairy industry is completely controlled with respect to the supply and pricing of milk products. Secondly, the viability of the industry must be maintained. There are two forces affecting retention of a viable industry. First, there is the individual drive to benefit the producer′s position through reduction of costs and the other is the subsidy between the price received and the price required to operate. The third consideration is also related to viability. Economic theory suggests that the incentive to reduce costs will continue as long as there is not a reduction in the dairy operations economic freedom. This position that drives managers to better themselves is protected and aided through intelligent handling of the restrained input factors to strengthen and maintain a viable dairy industry at the producer level. The protection and aid comes through this reduction of the uncertain climate affecting the producer. This is the one benefit that theory suggests is gained through supply management.

Chapter III

MODELING THE DAIRY FIRM FOR MANAGEMENT USE

3.1 INTRODUCTION

A good model is the key to being a good management tool. Its capacity to reduce the load on management decision making is the key to success or failure of the tool. The model in this instance is required to answer questions that are of practical importance to the dairy manager in a fashion that is acceptable to theoretical modeling and realistic to the expectations of a manager. The model should add to the manager's capacity to make decisions in an economic sense. It should reduce uncertainty by increasing the information base available to management without taxing the manager in time and effort to obtain the information. The model is a tool above all to broaden the management capacity to make decisions. The interaction between the manager and the model in concluding a decision is to follow a rational goal of greater efficiency for the firm. The capacity to do this is dependant on the manager's goals. In fulfilling them the efficiency criteria are met.

Present methods, the types of tools available and the choice of simulation as the most effective tool are discussed in this chapter. The choice between building a model or rearranging an existing one is considered. The latter action being the most economical and practical involves modifying an existing model to Manitoba conditions. The end result is a dairy simulation model that fulfills the above requirements and is a suggested tool for use by managers.

3.2 EXISTING INFORMATION ANALYSIS PROCEDURES

The dairy industry is one facet of agriculture which is very specialized, having the added feature of a controlled environment. This characteristic has allowed close scrutiny of factor inputs with fairly reliable outcome forecasts. Researchers have observed this and sophisticated models have been developed to implement the progressive farm manager's decision making process. They are discussed below.

Five examples of the most used to the most advanced management techniques are helpful in illustrating the large gap between the least and best informed managers. First the most universally used record keeping technique is portrayed appropriately in a quote from Reader's Digest: All in a Day's Work[23].

> For many years, a client of our accounting firm has been bringing in his receipts, invoices and tax papers rolled up tightly and stuffed inside a big pickle jar. For just as many years my employer has been hinting to him that perhaps using a filing system of some kind would make sorting the numerous documents a little easier for everyone concerned.
>
> This year he made his usual appearance, carrying a brand-new metal file box. Our elation was short lived. When he opened the file, there was the familiar pickle jar, stuffed to the brim with papers.

This type of procedure has in the past and presently is being used by many farmers. This procedural attitude is one of the biggest stumbling blocks small business have to overcome.

Secondly an illustration more specific to dairying is that of daily record keeping. The record sheet requires that feed type and input information, milk output, dry period, lactating period, gestation period

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[23] Davis,H.L., 'All in a Day's Work' Reader's Digest, Reader's Digest Magazine Ltd., Montreal, June 1978. p 146.

and calf quality information be kept[24]. The usefulness of this information is in it's interpretive value to show increases in productivity through change.

Third, various feed formulation techniques have been computerized to incorporate more efficient input use. CanFarm has an extensively used program[25]. Lovering has also devised a ration formulation for fed beef. The two programs are similar in their efficiency goal[26].

Fourth is the complete CanFarm management package. The system is essentially a budgeting technique that has been computerized. The main components related to are: management skills, cash flow forecasts, tax calculations, machinery compliment calculation, loans and feed formulation. The objective was to make the system universally available to farmers[27].

Fifth there are a variety of simulation models available to farmers. The complexity of the systems they simulate make them very useful to those who have the time to understand them[28]. Senkiw et al have a

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[24] McCullough,M.E., Optimum Feeding Of Dairy Animals, University of Georgia Press, Athens, 1969. p 133.

[25] The feed formulation program is a part of an overall management package available to all farmers. The feed tool is the most extensively used of all the programs. CanFarm is operated from The University of Guelph.

[26] Lovering,J. 'A Program For Calculating The Amount and Cost Of Feed for Feeder Cattle', Canadian Farm Economics, Volume 11, number 1, February 1976.

[27] CanFarm information was developed by the various university faculties of agriculture in Canada. The operation and computer facilities are based in Guelph, Ontario at the University of Guelph.

[28] Dairy Herd Improvement Association (DHIA) in the U.S. is very inter-

generalized simulator which includes dairying[29]. LaDue has specified a very complex dairy simulator model[30], and Sabourin has built a Cow/Calf simulator[31].

3.3 LITERATURE REVIEW

Understanding a dairy operation involves more than just monitoring financial measurements. The feed requirements, husbandry techniques, the finances required, the machinery necessary and system scheduling are all included in the dairy managers realm of control. To attain the proper usage of these elements a composite of information must come from the plant scientist, animal scientist, agricultural engineer as well as the agricultural economist. Although these groups may not be formally involved, their work and the final conclusions are most relevant to the systems study. Inputs from all of these areas are important and will become obvious from the output requirements of the model. Johnson[32]

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ested and deeply involved in generating knowledge to improve herd operations. Fowler,J.C., Management Study of New York Farms, With Dairy Herd Improvement and Farm Business Records,1974., Department of Agricultural Economics, Cornell University, Agricultural Experimentation Station, Cornell University, Ithica, New York. October 1978.

[29] Senkiw,M. and Pokrant,A., A Cost/Return Simulator for the Dairy, Cow/Calf and Stocker/Feeder enterprises. unpublished paper, Department of Agricultural Economics, University of Manitoba. Winnipeg, Manitoba, 1976. pg 5

[30] LaDue,E.L., A Computerized Farm Business Simulator for Research and Farm Planning, unpublished Ph.D. Thesis, Michigan State University, Economics,Agriculture. 1971 pg 88.

[31] Sabourin,S.R., A Computerized Simulation Model For Evaluating Alternative Cow-Calf Farm Plans, (unpublished Masters Thesis, University of Manitoba,1977.) p.30.

[32] Johnson,G.L., Nutritional and Economic Aspects of Feed Utilization by Dairy Cows, Iowa State College Press, Ames Iowa, 1959. pp. 3-7.

sets up an administrative system of dealing with the various groups, to accomplish a desired product. The literature as such is not directed toward agricultural economics based material. The approach taken is to determine the most useful structural framework, consider the literature relevant to that structure and then relate it specifically to dairying.

3.3.1 Structural Framework Choices

There are a variety of generalized structural frameworks which can be used to depict various aspects of a business. The four main types are Optimization Models, Econometrics, Budgeting Analysis and Simulation. Each of the first three can be termed as simulation substructures. They are analytical techniques used in simulation. The simulation technique would only use these as steps in its progressive delineation of the problem. The four structural techniques are those generally applied to problems in agriculture. A brief analysis of each is considered to support the use of simulation as the best overall structural framework of the four, for the purposes of this problem. Looking at the four types it will be shown for the specific objectives requested, simulation most closely meets the requirements.

Mathematical programming is a technique which has an objective function which is optimized within specified constraints. This procedure would not reflect the actual on-farm conditions which are in general suboptimal[33]. The actual suboptimal condition and the changes made to

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[33] Suboptimal is any position where the marginal physical products ratio of various inputs or the marginal rate of substitution does not equal the price ratio of these factors. Another way of saying this is that the marginal value products of the factors are not equal.

this system, even if its outcome is suboptimal, are of interest to the manager. Although the limitations of a situation can be defined exactly by linear programming through constraining variables, there is limited room for uncertainty in the structure. The inclusion of stochastic elements is possible and a requirement of simulation.[34] This characteristic was deemed superior in a model for use in decision analysis for these purposes.

Econometrics, to cite a specific example, ordinary least squares regression techniques with statistical testing are very useful in determining analytical solutions within statistical limits. The actual relationships of the average farm unit will likely be reflected by this procedure. The inadequacy in econometrics is that each farm is to be treated as much as possible as an individual entity. The basic make-up of ordinary least squares is through use of samples to derive coefficients. While these are useful to general input requirements and will be used to determine some of the coefficients, the overall model needs a more flexible approach. Certain farm inputs to the model are specific to the firm and do not have any specific distribution for determining a mean and a variance. The need to specify exact values to certain inputs reduces the ability of econometrics per se to deal with the problem completely.

Budget analysis is a third analytical tool which gives a picture specific to the historical records. It is a positional (time framework) procedure and is a likely candidate to show the farmer in analytical

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[34] Chu K., Computer Simulationships of Certain Stochastic Relationships..., University Microfilms, Inc., Ann Arbor, Michigan, 1964. p.2.

terms what changes will do to the operation[35]. The necessary data requirements are quite cumbersome if a manager is not in the habit of keeping very detailed records. Economically there is a trade off here between time and the value placed on the extra information obtained. This is possibly the strongest argument against this type of aid. The problem here is that the variability of future events is not considered. Again it is partially applicable to the overall requirements of the manager in decison making.

Simulation is a non-analytical procedure whereby as an iterative process it uses the various techniques previously discussed. The technique is nonanalytical since the various runs are elements of the analysis. Multiple elements make up a sample which become the basis for intercomparison. The comparison is a normative action taken by the manager interested in the sample. The reason for the sample requirements is that one or more of the parameters is of a stochastic nature requiring a variety of runs to be done based on a given distribution comparable to the parameters "actual" distribution. The end result is the choosing of an element of the sample satisfactory to the normative analysis. The various procedures are combined to give a solution which is not based completely on analytical grounds. A definition of this procedure is in order to try to clarify the more applicable nature of simulation to this problem.

X is a simulation of Y if[36]:

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[35] The positional nature of budgeting is to say the actual assets and liabilities are considered at a specific point in time.

[36] Winters,G.R., 'Simulation in Agricultural Economics Research', IBM 5th Agricultural Symposium Toronto, Ontario, October 1967. pp. 16-19.

1. Knowledge of X can be used to predict Y within error limits.
2. X is a formalized system with rules of validity.
3. The rules of validity are in part based on sampling.
4. Y is a formalized language (system) that can be taken to approximate reality.

This gives simulation a very flexible role in that it can incorporate analytical techniques as part of its iterative process. These are not the final outcomes. The iterations build on the previous information to derive a solution in keeping with the actual system being simulated. In this case econometrics and budget analysis can be used together with stochastic elements with particular probability distributions, to derive a solution. K. Chu agrees with J. Harling that simulation is defined such that:

> By simulation is meant the technique of setting up a stochastic model of a real situation, and then performing sampling experiments upon the model. The feature which distinguishes a simulation from a mere sampling experiment in the classical sense is that of the stochastic model. Whereas a classical sampling experiment in statistics is most often performed directly upon raw data, a simulation entails first of all the construction of an abstract model of the system to be studied.[37]

There are problems in simulation unique to itself. There is no definitive structure, the simplicity allows for quick inexpensive solutions but the more complex the simulation the more realistic. The actual route taken is based on what the tool is to be used for. What in fact occurs is a necessity of developing a new simulation for each new set of objectives[38]. The most complex simulation is the system itself

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[37] John Harling, "Simulation Techniques in Operations Research - A Review," Operation Research, Volume VI (May-June, 1958), p. 307.

[38] Sabourin,S.R., op.cit. p.30.

and the cost is the actual cost involved in the operation. Simulation does not in itself optimize and as such this function is left at the discretion of the operator. The simulation is useful in the dairy problem because it is able to give the required simplification to the system without requiring operator knowledge as to its inner functional components.

3.3.2 Review of Simulation Literature

Simulation is a very general and widely used concept. In order to reduce the broad base of knowledge to a manageable size the literature of interest is reviewed in two groups. Firstly, that which deals with discussion of the application techniques and secondly the literature which is relevant to a specific group of simulations for dairy enterprises which cover the spectrum of agriculture disciplines.

Each basic simulation is seen as a sub set of the system. It is considered to be very flexible, non- analytical, with stochastic variables and with iterative steps[39]. The fact that the solution of a simulator is determined through use of analytical techniques does not make it analytical per se. In fact Hillier and Liberman[40] suggest that if an analytical technique can quantify a situation "satisfactorily" then the solution is better than that determined by simulation. Howrey and Kelejian feel that both simulation and analytical technique have their

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[39] Meier,R.C., Newell,W.T. and Pazer,H.L., Simulation in Business and Economics, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1969. p 21.

[40] Hillier,F.S. and Liberman,G.L., Operations Research, Holden-Day Inc., SanFrancisco, California second edition, 1974. pp. 620-621.

strong points. The strength of simulation lies in its incorporation of stochastic elements to allow for risk and uncertainty.[41] The non-analytical nature of simulation is in the comparison of the various sample results (different runs). Through non-analytical value judgments (normative action) of the manager the decision is made. This aspect of simulation requires the user to have a good knowledge of the system[42]. The sample technique is the basis for simulation. The result of one run is basically meaningless but a group of results (sample) are extremely significant given the inadequacy of analytical techniques to "simulate" the system algebraically or analytically. In order for the worker to attain a working knowledge of this conception and the fundamental components of simulation a variety of viewpoints on the matter are exploited. All seem to agree simulation is very useful where an analytical application proves inadequate.

3.3.3 Literature Specific To Dairying

LaDue[43] introduced the interesting concept of incorporating stochastic variables to calculate herd size. This is a more realistic approximation of the herd over time and allows a closer proxy to be developed for the costing function. His model has been set up for use in research, practical application and teaching.

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[41] Naylor T.H., The Design of Computer Simulation Experiments, (1969, Duke University Press, Durham N.C.)

[42] Mize,J.H. and Cox,J.G., Essentials of Simulation, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1968. p. 139.

[43] LaDue,E.L., op cit. pp. 121-125.

Senkiw[44] et al have specified the required input to a dairy operation. The techniques of determining these inputs from the actual derived data (obtained from the farmer) would seem to be eligible for use in the problem as perceived.

Lovering[45] has developed a ration formulation model to determine the optional ration/cost mixture of various available feeds. The model itself is for fed beef. The concept is an important one to dairy management.

CanFarm[46] also has a very interesting feed formulation model which is more specific to the dairy industry. Incorporation of such a model would again facilitate the wanted flexibility and allow specificity if requested.

Funk[47] gathered feed nutrition requirements and applied them in a Fababean study. The linear program model used in his study is of interest due to its Manitoba base information. The model can be used for "optimizing" feed rations on a group of animals.

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[44] Senkiw,M. and Pokrant,A., op cit. pp. 5-9.

[45] Lovering,J., op cit. p. 27.

[46] CanFarm op cit. Feed Formulation, Brochure.

[47] Funk, R.A., Market Analysis for Fababeans, (1977, unpublished masters thesis, University of Manitoba.)

[48] Sabourin,S.R., op. cit. pp.45,46.

Sabourin[48] constructed a cow/calf simulation which although not directly related to the dairy industry, contains many of the required linkages which are common to both dairy and beef operations.

There is one other source of information which should be included here, that of the dairy operator himself. Through consultation with Manitoba dairy operators[49] it is clear a flexible model is necessary. Some require simplistic means of problem solving. These are the people with marginal or boarderline operations. There are those that are looking at expansion and a means of obtaining answers to the feasability of either labor or machinery increases. In some instances there are those that have very complex and accurate record keeping facilities. This information in another form could give very revealing and interesting answers to some of the questions raised at the time. The information is diverse in make up and origin. Thus farm operation information is very important to the realization of the need for a mechanism to respond to progressive managers.

3.3.4 Simulation Model Requirements

There are many applications of simulation each with its own merits. Even though the total concept is not the same, parts of various models with specific design characteristics are useful. Combination of the best components in modeling, including synthesis of the specific requirements in the model will help in reducing the overall cost of the simulation. The model will benefit from the "best" aspects of the bor-

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[49] Personal communication with dairy operators during interviews for a cost of production study for M.D.A.

rowed components and will be supplemented with the components unique to the system to solve the problem.

From simulation literature reviewed and in discussions therein, validity and verification are terms often used but generally in a loosely defined framework. Various articles[50] on this subject have suggested validity as being applicable in the sense that the results are viable while verification is more of a mechanical concept where statistical and economic tests are used to confirm the use of the parameters. To describe the actual simulation techniques and specificity of the parameters relevant to this particular problem a number of simulations applied to farm operations have been reviewed.

There are a variety of approaches to the subject of validity and verification. All have their merits, but the lack of clarity and continuity in the definitions makes conclusions concerning them somewhat ambiguous[51].

The method of determining the strength of the model both analytically and practically will follow four steps which can be categorized into two groups. The analysis of the model will follow the framework of: (1)

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[50] Johnson,G.L., Philisophical Foundations Of Agricultural Economic Thought, unpublished draft paper for Volume 3 of the Literature Review Series for A.A.E.A., May 1978. p. 8.

[51] There are a variety of views in: Hillier,F.S., and Liberman,G.L., Ibid. p. 633. Johnson S. R., 'Systems Analysis and Simulation: A Survey of Applications in Agriculture and Resource Economics', A Survey of Agricultural Economic Literature, Volume 2, A.A.E.A., University of Minnesota Press, Mineapolis, 1977. pp. 185-186 Johnson G.L., Ibid. pp. 5-9. Dent,J.B. and Anderson,J.R., Systems Analysis in Agriculture Management, John Wiley and Sons Australia Pty. Ltd. Sydney. 1971. pp. 27-28. Mize,J.H. and Cox,J.G., Ibid. pp. 180-181. Naylor, T.H. op cit.

Verification, (2) Validation, (3) Clarity acceptance, and (4) Workability. These four can be grouped into operational ability at the analytical level and acceptability at the practical level. This dichotomy allows for a discussion of the performance separate from the acceptance of the model. The area of acceptance is where the scenarios and the relevant analysis emphasize the models practicality as a management tool.

3.4 ANALYTIC CONSIDERATION OF THE OPERATIONAL ABILITY OF THE MODEL

The model must perform in an acceptable fashion both statistically and realisticially. The two terms most commonly used in this determination are verification and validation. The feelings toward how to approach each of these groups and their actual independance of one another have been argued in the literature to a great extent[52]. The actual clarity of the two terms is questionable and specification of their meaning as used in the context of the study will simpify these problems.

3.4.1 Verification

The usefulness and strength of the model is in the capacity to portray a realistic environment. Through the techniques of statistical tests and economic theory, verification and acceptability of the parameters is achieved. By dealing with the parameters in this way it is expected that the most realistic and responsive ones will be incorporated into the cost/revenue function. The verification is grounds for

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[52] The reference to the argument is found in the literature reviewed on page 58.

the workability of the model on a theoretical basis. The verification of the model is important in that it couples the mechanical operation and its outcomes (parametric values) to the theory. This makes the model action understandable to the economist and satisfies him that it is compatible to the system on theoretical basis.

Verification is used in conjunction with the methods of testing the parameters used. Testing the parameters using statistical tests is an integral part of verification through the acceptance or rejection by the test. Economic theory tests the various parameters in a less stringent fashion[53]. If the parameters do not conform to the expected outcomes then they are not verified and strong reservations are placed on their accuracy. The actual statistical tests used and the relevant economic theory applied as expected are unique to each parameter. The general theoretical concepts have been discussed previously as to how the functions should perform. In effect to verify the model, the parameters must be tested individually on economic and statistical grounds. The passing of these tests and expectations gives the model parameters the required verification. The calculated values are considered to be theoretically sound. In other words verification is another way of saying that the theory and the estimated parameters coincide (have coherence) and the variability of the parameters is acceptable by statistical standards. This aspect of model justification has been done by LaDue.[54]

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[53] Johnson,S.R., Ibid. p. 186.

[54] LaDue,E.L., op. cite. p.131.

3.4.2 Validation

Validation is more circumspect. The procedure is one of relating the outcomes of the model to those occurrences of the actual system. The comparison of the two in reflecting the realism of the model will determine the validity aspect. As well, the validity of a model is portrayed in its ability to correspond to an acceptable degree with the actual system outcome. This acceptable degree is a normative analysis at best. The more times a simulation simulates a system "acceptably" the stronger the basis for validation[55].

The actual validation process is an additive one in that each time the model is used more can be seen with respect to its realism. The time element is most important in the context of never limiting it. One simulation run will neither validate or nullify the usefulness of the model. Errors at this point must be included in the weight put on the strength of the model′s performance. Simulation of a prior occurrence will initially be used to determine the realism. This weighed against not having the tool is possibly the only test at this point to decide on the model′s validity. The simulation and the system will never be exact and the acceptance of the simulation with its inaccuracy is very judgemental. The value judgement is made by the recipient of the information. This being the case the strength of the model to communicate its outcomes is a deciding factor in validity.

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[55] Johnson,S.R., loc. cit.

3.5 ACCEPTABILITY OF MODEL FROM A PRACTICAL STANDPOINT

Once these two criterion are satisfied the next consideration is the ease of use of the model considering both flexibility of the model in accepting various questions and interpretation of the results from the given output. This is the reality of the two categories of workability and clarity.

3.5.1 Clarity

The interpretation of the output of the model is done by the manager. To be able to interpret the results he must understand them. This is where clarity comes in[56]. The output format must be set out to compliment the information understandably. Although validity is the most important aspect of the analysis, clarity is the strongest factor in the decision process to accept or reject the model on these grounds. The communication of information in a precise understandable form is achieved through use of common accounting terms. The inventory of animals, buildings and feed are all set out separately to alleviate any confusion with one another.

3.5.2 Workability

Workability is the last component of the analysis that is required. The verification and the validity both depend on it. There is also one other aspect that is important to this. The amount of information gained as related to the cost in time and money spent in obtaining the information. The feasibility of use in a real sense. The true test of

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[56] Johnson,G.L., Ibid. pg. 8-9.

the workable nature of the model is in its acceptance as an easy to use economical tool. Economical is used here in the sense that the information gained through this process is sufficiently useful and plentiful that the tool will be used and reused.

Use of simulation is facilitated if understood and used properly. In addition to meet the objectives of the study a simple understandable input and output format is required. In dealing with dairy operations of different sizes available information varies from very explicit data to more general data. To cover all dairy farmers and to produce usable results variation in input is required.

Normally most decision oriented models require considerable cost information. This increases the data base requirements substantially. To maintain accurate results and reduce input load requirements a data base of average costs is required. Allowance for change gives the flexibility of accuracy where required and simplicity with averaging costs used as the trade off.

In modeling there are various tehniques available. The criteria for determining the best simulation model for the job follow a fairly basic set of requirements. These have been stated in the objectives and will be restated here. The actual terminology varies slightly between authors however the main features are not lost between the definitions. The attributes of a good simlulation model should be:[57]

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[57] These definitions come from two sources. Little,J.D.C., "Models and Managers: Concepts of a Decision Calculus", Management Science, (Volume 16, Number 8, April 1970, pp.B466-B485.) Shannon,R.E., Systems Simulation; The Art and Science, (Prentice Hall Inc., Englewood Cliffs, N.J., 1975, p.22.)

1. Simple
2. Goal or purpose directed
3. Robust
4. Easy for user to control and manipulate
5. Complete on important issues
6. Adaptive
7. Evolutionary starts simple and becomes more complex

To define these terms J. Little's interpretation is used. Simple is for the ease of understanding the model itself. Goal or purpose oriented is more for the capacity to supplement a manager in acheivement of a goal that being the purpose. Robust is the model's strength in not giving absurd or bad answers. Easy to control implies that simple changes will give the required direction and outcome as opposed to reworking the model. Complete on important issues includes the important variables with significant emphasis to display their influence. Adaptive corresponds to ease of control for flexibility is a very important component to simplification and ease of use. Evolutionary can be interpreted as having the flexibility to become increasingly more specific to the system as more data and time allow for the inclusion of these components.

3.6 MODEL COMPARISON AND SELECTION

Four models reviewed are compared in determining the best procedure to handle the problem. They are all useful systems in their respective applications. Their strengths and weaknesses to deal with the problem given the objectives and the theory requirements are discussed here.

A central criterion on which the model's acceptability is judged is again the "ease of use concept," taking into consideration the usefulness of results.

The four models are:

1. Computer Methods for Development Budgets.[58] (Model A)
2. CanFarm's Computerized Farm Records.[59] (Model B)
3. Forage Dairy Composite Model.[60] (Model C)
4. Computerized Farm Business Simulator Model.[61] (Model D)

The four models are not all specifically simulation models as defined here but are management tools. The models will be discussed in the preceeding order.

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[58] Sanderson K.T. and McArthur A.T., Computer Methods for Development Budgets, (Lincon College, New Zealand 1967.)

[59] Bauer L., 'CanFarms Computerized Farm Records', Canadian Farm Economics (Agriculture Canada, Volume 7, Number 3,August 1977)

[60] McIssac J.A. and Russel D.G., Composite Forage-Dairy Simulator Computer Model, (Agriculture Canada, Charlottetown Research Station, Prince Edward Island, November 1977.)

[61] LaDue,E.L., op. cit.

Model A is a budget analysis with very simple input requirements. The model was developed in New Zealand for use in extension work. The primary strength of the model is its very simple input requirements. The farmer input requirements are labor, stock and capital inputs.[62] These values are run into a budgeting program with a given expansion request.[63] The results are available rapidly through use of the computer. The information obtained is however just that of a budget. Uncertainty is not considered and in this respect the model falls short of this problem requirement. In many cases the information is not specific and is used as a proxy for more detailed information.

Model B is the Canfarm record keeping operation. There are a variety of components in the model to give it the flexibility required for beginning farm records. The system is designed to include collection of data for research which creates a problem with the "ease of use concept". Here specific concise information is required which increases the demands of a farmer in the area of accounting. The generated information is useful and precise for the farmer. The most used module has been the ration generator.[64] In actual returns this has been the most profitable to the farmers. In terms of the problem given the input requirements are large for the realized returns. Realized returns being defined in the context of acceptance of increased work load.

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[62] Sanderson,K.T. and McArthur,A.T. op. cit. pg. 3.

[63] Ibid. pg. 16.

[64] Bauer,L., op. cit. pg. 4.

Model C is a simulation model using linear programming as the basis for determining the optimal operating procedures for a specific dairy operation. The model is complete in its coverage of the dairying system from a feeding output relationship base. It does not cover the uncertainty aspect of the operation. In constraining the operation a projection can be realized within given bounds excluding changes in conditions. The model's strength lies in spelling out the less efficient areas of the operation but its weakness is in giving supportive direction to changes due to its lack of consideration for uncertainty.

Model D is a simulator which is useful in extension, research and teaching. The flexibility required to encompass these three areas is almost universal within the model. The input requirements can be as simple as an inventory of labor, land and capital with few income requirements. They can be expanded to include specific wages, production levels and capital input prices for more precise evaluation of the unit. The model also considers uncertainty in herd size with respect to death and culling requirements. This model is useful over time in its capacity to allow for user changes in the input coefficients over time. This allows for realistic projection based on personal or observed expectations.

The four models discussed reveal some of the various management systems available to farmers. The uses of the models vary somewhat although the end results are all used in conjunction with a common goal of survival in the business arena of the firm. The model fitting the requirements of "ease of use" and flexibility with usable results most closely in all cases is model D.

LaDue's model was adapted because it was more flexible and exhibited the "ease of use concept". The modifications involve setting some of the required inputs at acceptable values to alleviate the problems of aquiring more data from the dairymen. The modifications are found in Appendix B with the relevant parameter definitions. The changes to the data bases are located in Appendix C. The capacity to include this information at the request of management, in the model is not lost. This maintains the flexibility of the model while reducing the cost information requirements to others not requesting it.

The model has been revised to accept 1980 agronomic and economic conditions for Manitoba. The model has also been upgraded to accommodate the optimal feed solution generated by the MPS ration generator specified by Funk.

The model operates as a budget analysis in its simplest form allowing for changes in most inputs over time. Parameter change is possible at the outset of the operation. The mechanical operations of changing parameters is documented in Appendix D. The changes made to the original program are instrumental on achievement of the stated objectives. These changes are documented in Appendix B.

A noteworthy part of LaDue's model is his stochastic approach to herd size. This will enable a dairyman to more accurately anticipate herd practices in his maintenance of level production. Presently this is one of the main concerns of the Manitoba industry.

3.7 MODEL SPECIFICATION

The model used in this study is an iterative process based on a monthly interval. The various changes to the system are incorporated one at a time or all at once over a specified period of time. This creates the flexibility in the model for specificity and for a wide spectrum of questions about an operation. This iterative procedure is shown in Figure 9 by a systematic flow charting procedure[65].

The model developed by LaDue is well documented in the model specification and associated appendices of his thesis. The changes required to the model for the purposes of this thesis are set out here. The two models to be combined include; The MPS Linear Programming ration generator devised by Funk and the Farm Business Simulator developed by LaDue. The two programs are combined to permit incorporation of optimal feed cost comparisons given restraints on a one year simulation basis, within the LaDue farm simulation. The linkage procedure is manually acheived by moving the feed prices and quantities between the two programs. The actual price and quantity figures will be discussed specifically in the analysis chapter.

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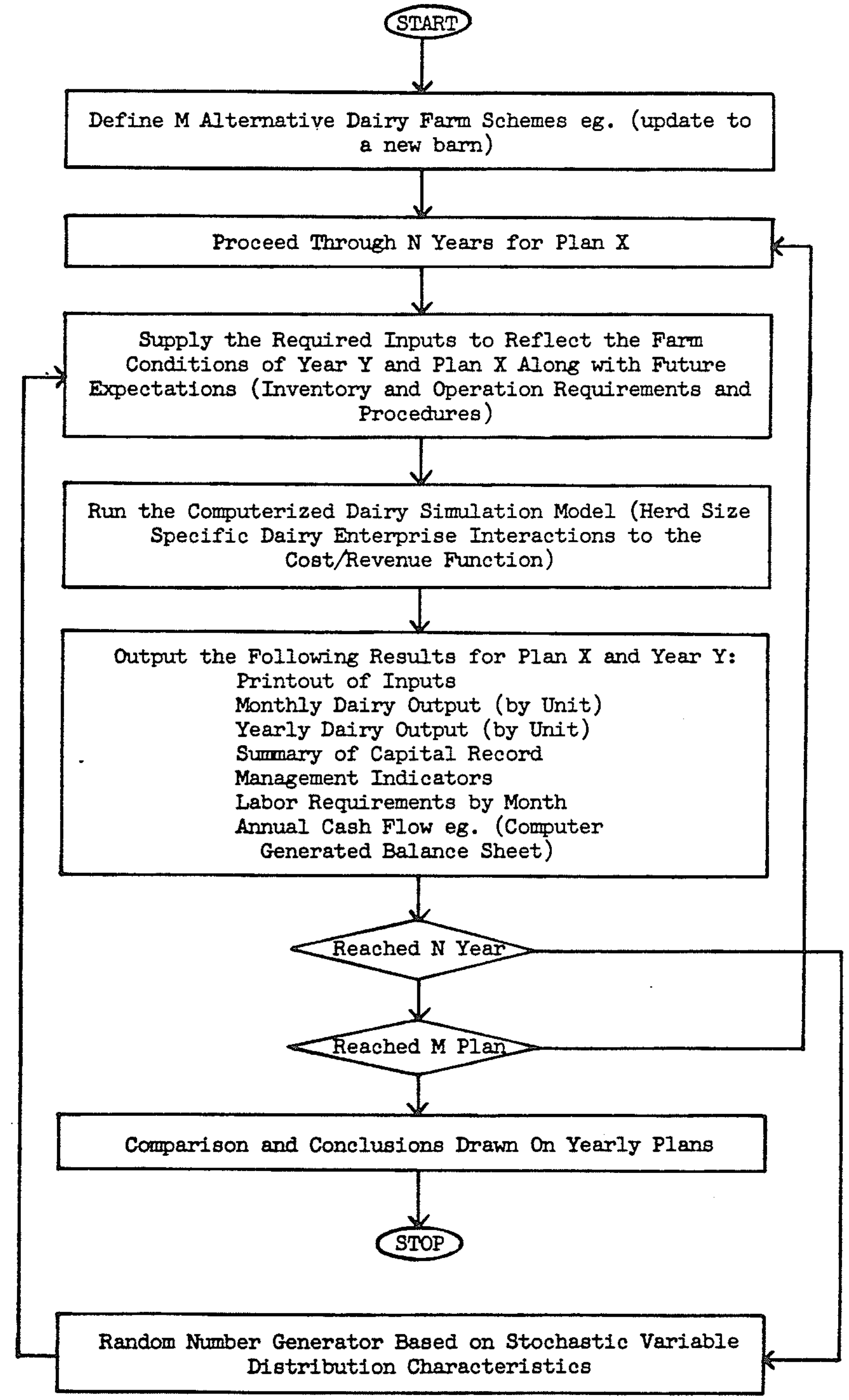
[65] The following diagram is base on the flow diagram of a cow/calf operation altered to correspond to the dairy firm. Sabourin, S. R., op.cit. p.40.

Figure 9: The Systematic Operation of the Model

Figure 9

The Systematic Operation of the Model



The specific routines involved are those involving the feed requirements and their respective prices in the simulation . The operations involved in the cost comparison can be seen in flow diagram form in figure 10 .

The inclusion of the linear program allows a farmer to determine the feasability of adjusting his feed requirements given costs, availability and production that is relevant to his operation. This aspect of dairying is one which allows for gains in output without increasing the herd size through more strenuous husbandry techniques. Increases in herd potential allow reduction on animal units, reducing costs.

Prices and quotas are of paramount interest to every dairy operation. These two variables are set in the program at the respective levels. Changes to these values will show the effect of raising or lowering prices and quantities on the operation. The values can be changed at any point within the program on a monthly basis, once or many times throughout the run.

The model has been changed to more closely associate Manitoba conditions in the simulator. The changes are explained in Appendix B. The feed use compliment has been changed to include barley in place of ear corn. Ear corn is not used in any significant proportion on Manitoba dairy farms. The program initially bought in grain corn when shortages of ear corn and wheat were encountered. This was changed to permit use of other feeds which may be available in addition to grain corn. The lower emphasis on corn as a feed in the simulator requires that the machinery use compliment be more closely considered on farms not growing corn. The capital cost requirements in these areas may differ substantially depending on the farm unit. The program is flexible enough to accept a user defined machinery compliment.

3.8 MODEL INPUT REQUIREMENTS

There are basically two groups of functional relationships which apply to the model requirements. The cost function group to determine the total cost given fixed and variable costs and the revenue function group to determine gross revenue. The inputs required to create these two functions are of two types,specific and general[66]. (See figure 11)

The specific parameters are those which are unique to each firm. They include such inputs as cattle herd with a specific breakdown into the respective categories, feed mix, labor usage, and housing. The general category of management practices specific to the firm covers this grouping. The general parameters are only general in that they apply to all firms using them. The coefficients of these parameters can be derived through econometric techniques without reducing the validity of the model to the firm.

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[66] These correspond to the necessary and optional requirements used by Sabourin, S. R., op. cit. p.47.

Figure 10: Simulated Feed Use Comparison

Figure 10

Simulated Feed Use Comparison

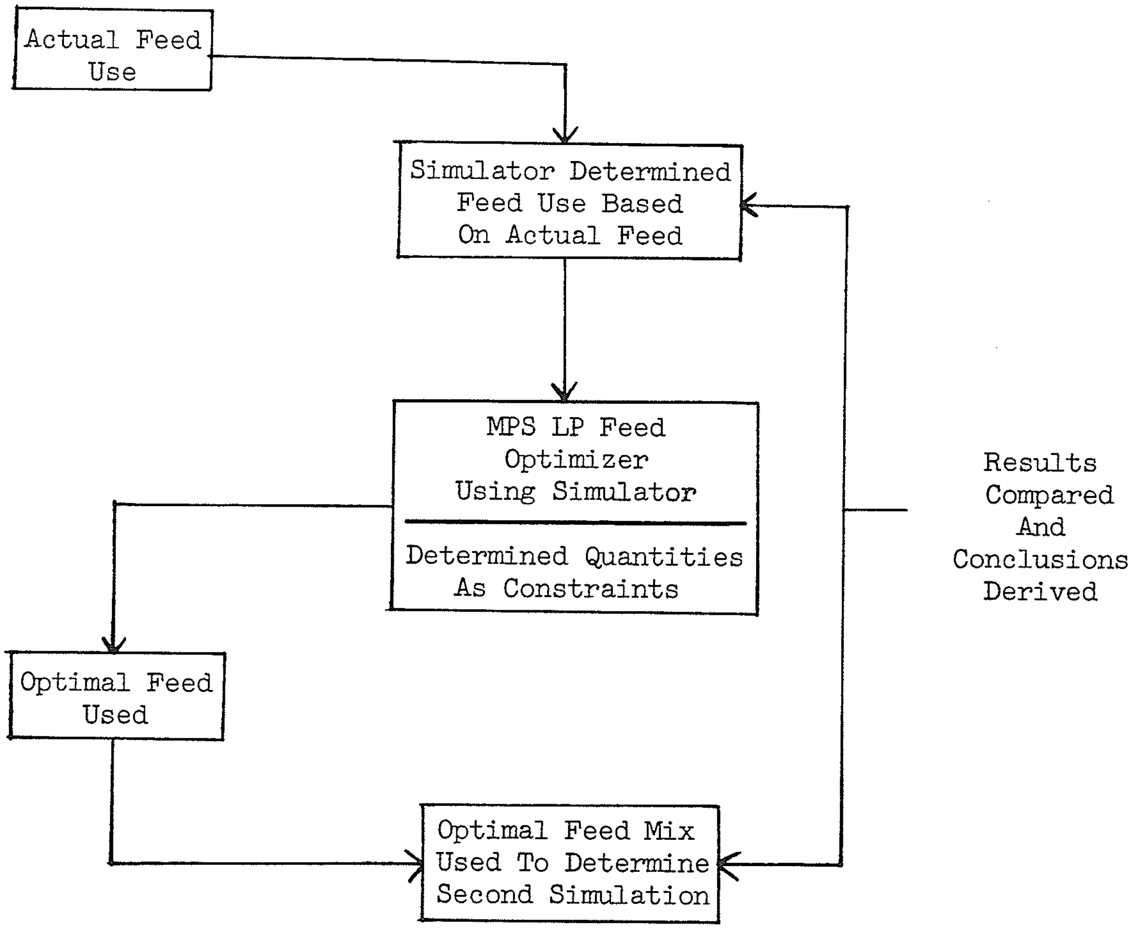
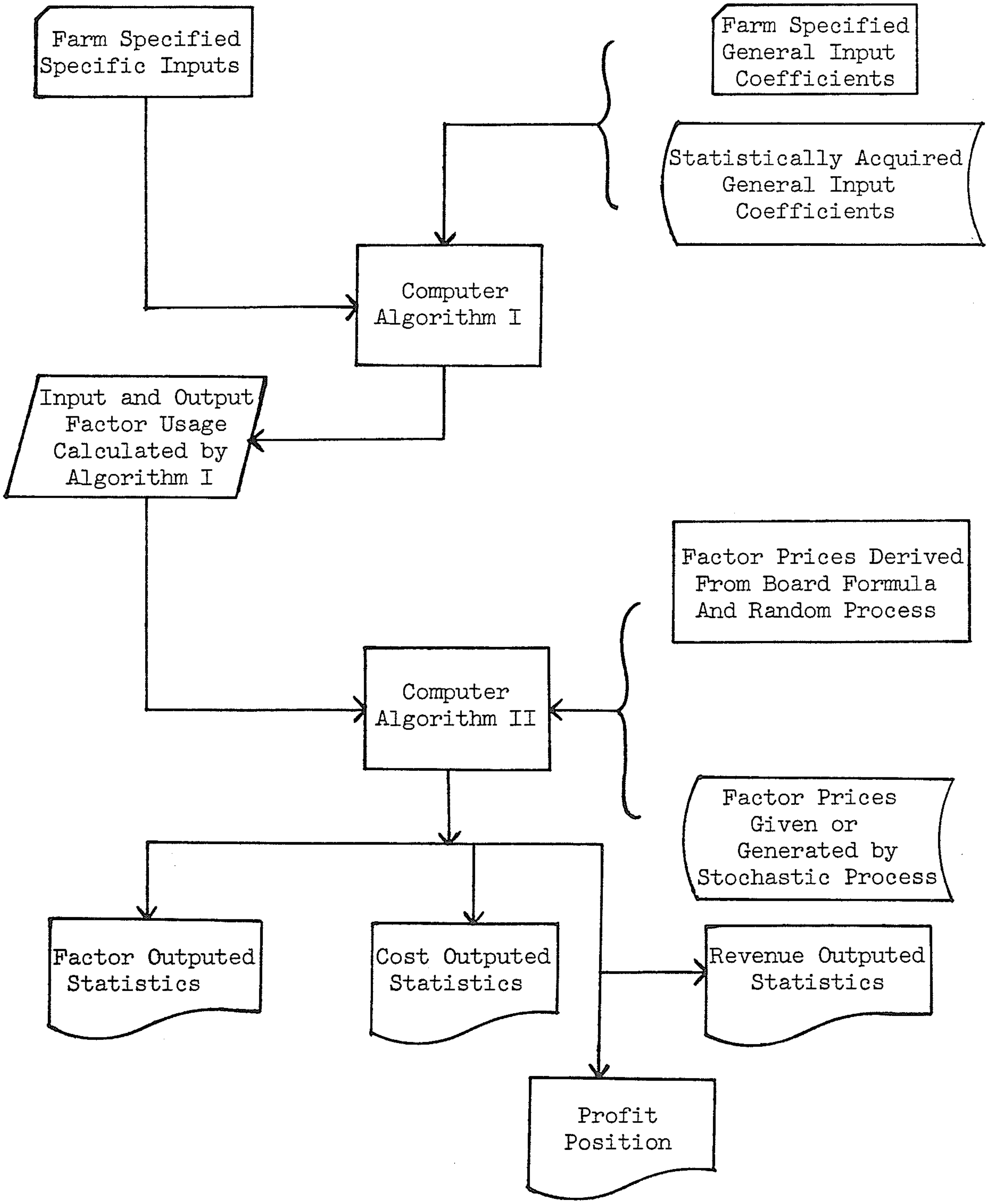


Figure 11: Simulation Computing Operations and Input Requirements

Figure 11

Simulator Computing Operations and Input Requirements



This group includes such things as various types of waste management, repair inputs to machinery and buildings, interest rates, and annual input and output prices[67].

The choice of using the models basic parameter coefficients or more closely related coefficients is an option to allow the flexibility and usefulness of the simulator to be realized[68]. The general inputs are derived from the Cost of Production Simulator[69] (COPS). The inputs for the dairy simulator can be of specific farm, regional or provincial significance depending on the level of exactness expected in the results. The cost and revenue values generated by COPS are based on average prices and should not be interpreted as those of a specific farm. Those of a specific farm are possible only through the use of the actual farm records of the operation. The use of the COPS output data is to maintain the 'ease of use concept'.

The inputs required of the farm manager are general farm knowledge information, specific to his farm operation. These specifics are related to normal dairy practices to determine the input costs of the various cost function parameters. In this way a small amount of information specific to the enterprise can be fitted into a basic costing function to derive the overall cost picture of the farm. The

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[67] It should be noted that the specifics for dairy herd management are more demanding and as such these components are dealt with in a manner that will accommodate the ease of use objective.

[68] The idea of user coefficient options is taken from Sabourin, S. R., op. cit. p. 47.

[69] Private communication with Professor C.F. Framingham, University of Manitoba, To obtain the relevant input price information available from the Cost of Poduction Study done in 1980.

general nature is a pre-requisite of the ease of use concept. To strengthen the cost function further through specific accounting information would be to weaken the simplicity objective and as such a trade off is required to give the optimal return to the individual. This trade off is determined by the amount of information the individual specifies.

The use of the COPS output of the specific farm gives the farmer a more specific set of results without the added requirement of accounting for all of his purchases and sales of the year which would provide an exact starting point for the dairy simulator. The revenue function is derived in much the same fashion substituting revenue information to the program. This revenue information is also available from the COPS program. This tends to give the simulator a starting point that is compatible from both the cost and revenue bases.

The use of stochastic variables pertaining to the dairy herd maintainance are dealt with by LaDue[70]. The culling, death rate, and other herd size characteristics are related to stochastic variables to give the herd a more realistic evaluation, over time. Deterministic variables are fine in dealing with static models. Simulation is a dynamic model structure and although deterministic variables have their place, loss of model credibility can result if the parameters are not represented realistically. The majority of variables are stochastic but the probability density function is unknown in many cases. Specifically

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[70] LaDue,E.L., A Computerized Farm Business Simulator for Research and Farm Planning, (unpublished Ph.D. Thesis, Michigan State University, Economics,Agriculture. 1971 p. 88.)

the requirements are:

1. Data collection of specific and general cost and revenue inputs[71].
    a) This step is accomplished with a questionaire, structured to delineate the managerial practices into the required input categories. (See questionaire in Appendix C)
2. Input the required changes to the general input group as requested by the extra information given by the manager.
3. Input these data values into the computer program which will generate the parameters required by the cost and revenue functions, from the inputed data of the specific application for the given inputs.
4. The program will use these values in the two functions to give a cost-revenue picture of the specific application for the given inputs.
    a) Application in this sense is the short run situation as preceived or expected by the producer.
5. A clear and representative output will be generated giving the picture in terms most understandable to the manager[72].

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[71] These variables have been categorized previously to facilitate more manageable input records, while retaining farm specificity.

[72] The exact input and output formats used are to be decided by elliciting farmers views as to the most understandable tabling of

The 'ease of use concept' is fully utilized here to give the input requirements their simplest handling. The usefulness of this is in allowing the farmer to spend his time reviewing the results and applying them to the operation rather than filling out questionaires. The information gathered as time progresses will enable him to become more specific as to his requests. This approach should ease the farmer into using the computer more to his advantage as time progresses.

3.9 SETTING UP THE MODEL FOR ANALYSIS

A flow diagram of the inputs, operations, outputs and comparisons given in figure 12 gives a systematic breakdown of the model application. The initial price data requirements for the simulator are derived from two sources. The feed and machinery available in the COPS program are used for compatability. Any prices which are not in the COPS data set are indexed in the simulator data base by the required index values. The information is used in conjunction with the specific farm information in the first run of the simulation. The output generated is the expected position of the farm at the end of 1980 based on it's position as of January 1, 1980 derived from the inputs.

The feed prices for the grains are given by the prices used to determine the returns in the COPS program. These prices are also used in the LP for the applicable inputs. The prices are shown in Table 21 in Appendix G

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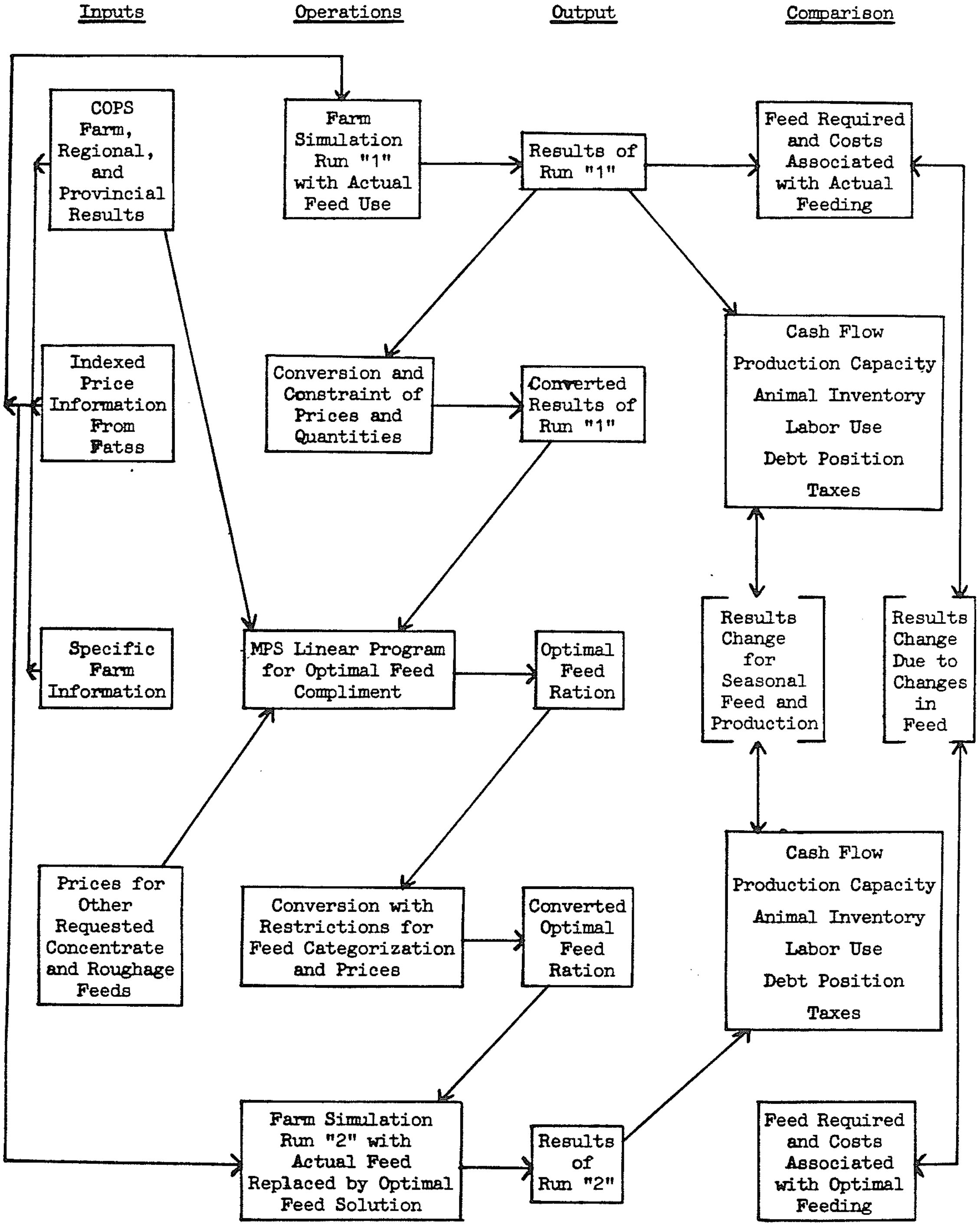
results.

Figure 12: Systematic Model Requirements, Operation and Results

Figure 12

Systematic Model Requirements, Operation and Results



The simulator is run once on this data base to determine the quantities required for the MPS LP.

The requirements for the MPS LP are three:

a) prices for the crops on farm;

b) quantities for the crops on farm restricted; and

c) the types of available feed.

The second run of the simulator requires the same basic inputs as the first run with changes in the feed inputs. The linear program output is used as the feed input requirements of the second run of the simulator. This completes the required inputs for the whole model.

The operation of the model is straight forward with two runs of the simulator one run of the linear program and two conversions of the output. The sequential operation can be seen in figure 12 . The operation and output columns depict the movement of output from one operation into the next step as input to generate the comparative outputs of the two simulation runs. The procedure of converting the output from the initial simulation run for use by the linear program and the procedure for converting the output from the linear program for use by the simulator in run two are found in Appendix E.

The last step is the one that would be normally performed by the manager. This is the comparison of the results of the two simulation runs. This step is shown in figure 12 in the comparison column. The feed choice application of the model holds constant all other factors allowing the feed to change. This gives the manager insight into the effects that change of rations have on the whole operation.

The model as set up is still capable of alternate analysis as described by LaDue.[73] This part of the simulation has not been altered except to conform to a Manitoba setting. The flexibility and accuracy of results are maintained with the added capacity of barley for feed use.

To conclude, the model has been expanded to allow for alternate feed ration comparisons with the available use of an optimizing feed ration linear program. The model has been adjusted for 1979 Manitoba conditions with respect to prices and farm practices that are internal to the program. Barley has been added as an alternate crop for production and feed as required. The overall model operation with respect to flexibility and ease of use has been maintained.

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[73] LaDue,E.L., op. cite. pp.2,3.

Chapter IV

ANALYSIS

4.1 INTRODUCTION

The purpose of the analysis is to relay the usefulness and strengths of the model to potential users based on three specific scenarios. The emphasis is placed on practical problems encountered by Manitoba producers. This is important in revealing the usefulness of the model to producers under Manitoba conditions be they environmental, economic or political. The variety of questions that can be answered by the model are not limited to these three questions by any means. The purpose is to give three diverse areas that the model can handle to introduce the model to potential users. The three questions under consideration are:

1. What is the effect of seasonality of a feed price on a dairy enterprise?

2. What effects does herd management have on an enterprise given feed and daily entitlement considerations?

3. Do optimal feed rations give better returns?

These three areas are of concern to producers and are used to illustrate the significance and strength of the model in doing its job; its job being that set out in the objective concerning ease of use, flexibility, reducing uncertainty, and the supplying of information to a manager that may not previously have been available.

The emphasis in this section is selection of diverse enough scenarios basic to dairy operators interests to provide observable proof to them, of the model's flexibility. Relevant topics are considered with seasonal feed cost variation, herd management and optimal feed ration options being chosen as the three scenarios. The comparison of these alternative uses of the model are made in the context of a manager. This capacity again will vary with individual interpretation. To relay these capabilities to the manager sufficient difference in the scenario's is required to give an idea of the broad base available from the model.

From these two general explanations of use of the model an understanding of how the model can be applied can now be demonstrated by answering the three questions initially posed. For the purposes of clear understanding for the comparison five specific answers or simulation scenarios will be considered.

Five scenarios follow from the relation of the base farm with the three questions. The scenarios follow sequentially starting with the case farm and ending with question 3. Scenario 1, the base position is set up with the normal operations of the case farm specified to the model. This is the norm from which the three deviations will be compared. Question 1 on seasonal feed prices and their effect in the operation is looked at first. Scenario 2 considers seasonal pricing of feed and demonstrates the changed outcome.

Question 2 considers the seasonal variation of production. Scenario 3 directs the bias toward heavy summer production and reveals the effect of this herd management practice on the operation.

The combination of Scenario 2 and 3 in Scenario 4 indicates the effect the farmer is trying to achieve in using his herd management with the seasonal price influence to gain a much as possible from it. Scenario 5 depicts the optimal feed ration use with the case farm. The five scenarios are as follows:

1. The actual farm situation of a Manitoba Dairy operation (the control).

2. Incorporation of seasonal feed prices into the initial run.

3. Incorporation of heavy summer production or seasonality of production to display the effects of herd management and daily entitlement.

4. Incorporation of both seasonal feed price and seasonal production.

5. Incorporation of optimal feed ration with the model.

Run one is considered as the control and the remaining four runs will be evaluated from this base. The control will give an indication as to the type of information generated by the model and how it can be applied to questions posed by a manager.

4.2 SET UP AND ANALYSIS OF THE THREE QUESTIONS BASED ON FIVE SCENARIOS

The procedure followed in each scenario is twofold. First, discuss the runs applicable to the questions for the appropriate alterations. Secondly, compare the run results to the control. The control or actual case farm is Run 1. Discussion as to the initial questions and format of the input for the model are found in Appendix C.

4.2.1 Scenario 1. The Norm

The information base used is that of a dairy farm in Western Manitoba. It consists of a proprietorship operation, a herd size of 46 to 50 head of cattle with 240 acres of supporting crop land. The main enterprise is the dairy with supplementary income from special crops, secondary in the operation. The results of the run can be found in Appendix F, Section 2.

The information that is used specifically from Scenario 1 is in Table 6 and Scenario 1. It consists of nine indicators that will be used in a comparative sense to describe the differences between scenarios. The nine are Capital Investment, Cash Income, Non Cash Income, Cash Expenses, Non Cash Expenses, Total Income, Total Expenses, Return to Management and Return on Investment. These are accounting terms and can be viewed by those definitions. The specific nature of the true accounting procedure is nullified through the use of simulated runs. The nine indicators are calculated by strict accounting procedures with the imputed values designated by the simulator. The actual values of the various accounts are therefore based not on specified transactions but on simulated transactions. This is the reason for comparative analyses as opposed to a more rigorous financial analysis in accounting terms. The economic efficiency possible from the process surfaces through the directive toward the perfect knowledge assumption. Closer appraisal of the indicators will be given in the comparative analysis.

TABLE 6

Base Farm Position Annual Expense and Income Summary

Table 6

Base Farm Position
Annual Income and Expense Summary

Item	Value	Item	Value
Capital Investment (Average)			
Land	147,600.	Vet	1,376.
Buildings	64,357.	Marketing	878.
Machinery	115,500.	Other Livestock	1,982.
Livestock	106,450.	Rent	1,982.
Feed & Supplies	10,438.	Taxes	87.
Total	444,345.	Utilities	819.
		Interest	10,328.
Cash Income		Miscellaneous	1,445.
		Feed Purchase	22,328.
Milk	90,320.	Total	70,307.
Cattle	13,754.		
Hay	0.	Non-Cash Expense	
Corn	1,239.		
Oats	0.	Operator Labor	10,000.
Wheat	4,534.	Family Labor	4,536.
Barley	18,886.	Mach. Depr.	24,244.
Soybeans	0.	Build. Depr.	4,829.
Field Beans	3,081.	Interest	26,051.
Gov't Payments	0.	Total	69,659.
Total	131,813.		
		Total Income	130,415.
Non-Cash Income			
		Total Expense	139,966.
Rise Land Value	7,200.		
Rise Cattle Inv.	-5,300.		
Rise Feed Inv.	-3,298.	Return to Mgt & Labor	4,985.
Total	-1,398.		
Cash Expense		Return on Investment	6.04
Hired Labor	4,000.		
Gas & Oil	2,117.		
Mach. Repairs	5,778.		
Custom Hire	0.		
Constn & Repairs	2,804.		
Insurance	1,493.		
Fertilizer	6,912.		
Seed	1,399.		
Spray	1,661.		
Other Crop	1,436.		
Breeding	1,482.		

4.3 QUESTION 1

This is the situation where seasonal prices and their effects are considered.

4.3.1 Parameter Changes Required for Analsysis

Scenario 2 requires prices to be seasonally adjusted to allow for a more accurate picture of buying in feed. The data acquired from Basset[74] is used to weight the prices in the simulator for summer and winter feed costs. The figures are found in Table 7. These numbers are weighted from the seasonal prices and these weights are used to specify the Manitoba seasonally adjusted feed prices.

The weighting formulation procedure is:

$$\frac{A}{A + B} = C \qquad \frac{B}{A + B} = D$$

where,

A = summer prices

B = winter prices

C = summer weighted average

D = winter weighted average

TABLE 7

Seasonal Prices Based on 1979 Manitoba Prices

Table 7

Seasonal Prices Based on 1979 Manitoba Prices

	Alberta Winter Price Per cwt Produced	Weight	Alberta Summer Price Per cwt Produced	Weight	Manitoba Price	Manitoba Summer Price	Manitoba Winter Price
Wheat	1.26	57.53	.93	42.47	4.48	3.81	5.15
Oats	1.26	57.53	.93	42.47	1.40	1.19	1.61
Barley	1.26	57.53	.93	42.47	2.46	2.09	2.83
Corn	1.26	57.53	.93	42.47	3.27	2.78	3.76
Supplement	0.56	57.14	.42	42.86	210.00	180.01	239.99
Hay	2.93	67.51	1.41	32.49	38.00	24.69	51.31

The Manitoba price is doubled and multiplied by the weights C and D to produce summer and winter seasonal prices. The seasons are assumed to run from June 1 to October 31 for summer and the remainder of the year for winter.

4.3.2 Comparison of the Results

Seasonal feed prices from Table 7 are run through the simulator to give the Run 2 results of Table 8 Capital Investment increases $1393. due to feed and supplies. This indicates there is an increase in feed stocks at the end of the year. This difference can be attributed to higher prices for winter feed since year end has been specified as December 31. This corresponds with actual buying of feed. Non-Cash Income is again attributed to feed. Here the ending inventory is substantially higher at $2785. This again can be attributed to the higher inventory value. There is an overall decrease in Cash Expense due to the lower feed costs in summer buying. Interest charges are slightly higher. The overall effect is a lower expense of $2654. Non-Cash Expenses are up by $119. solely from interest charges. The total expense and income difference of $2534. and $2103. respectively are the aggregate of the previous four indicators. Return to Management is the sum of Total Income and Total Expense. The Return on Investment is Total Cash plus Total Non-Cash Income minus (Total Cash and Non-Cash Expense minus all interest payments) divided by average Total Investment. The increased Return to Investment is 1.05 percent.

Seasonal price variation does create certain accounting inventory situations that make the operation look more reasonable. The most obvious saving is shown by the Cash Expense. This is the most significant figure for showing the change in buying. In reality, the seasonal price fluctuation is closer to the true practice.

The seasonal price position is the better of the two given that a higher Return to Management and a higher Return on Investment are the efficiency criteria. This is in effect a profit maximization motive. Economics does allow for alternate possibilities but these are the two that are used here due to their measurable value by the model. Any heuristic consideration of managers are not discussed here.

The comparison of run 1 of the control and run 2 of the seasonal pricing, all other inputs held constant creates an outcome where the farmer is better off than with his average yearly price derived in the control. Comparison of the annual income and expense summaries found in Table 8 show a reduction in feed costs of $2,665. An increase in feed and supply inventory of $1393. is created due to the changing seasonal price. The feed inventory also responds to the variation in price through an increase in return on wheat and corn. The overall effect is a substantial increase in return on investment through the purchase of feed and the sale of crops in the period when prices are lower and higher respectively. The total income and total expense changes offset each other so return to management increases by $4638. The outcome given here is that given fluctuations in feed prices comparable to the prices acquired, it is more expedient to purchase feeds through time than to use produced feed only. This is shown by the return on investment which jumps from 6.04 percent to 7.09 percent an increase of 1.05 percent.

TABLE 8

Comparative Results of Run 1 and Run 2 for Analysis of Seasonal Feed Prices

Table 8

Comparative Results of Run 1 and Run 2 for Analysis of Seasonal Feed Prices

	Run 1 (dollars)	Run 2 (dollars)	Difference
Capital Investment in Feed and Supplies	10,438	11,831	1,393
Non Cash Income:			
Rise in Feed Inventory	-3,298	-513	2,785
Cash Expense:			
Interest	10,328	10,339	11
Feed Purchase	22,328	19,663	-2,665
Non Cash Expense:			
Interest	26,051	26,170	119
Total Income	130,415	132,518	2,103
Total Expense	139,966	137,432	-2,534
Return to Management	4,985	9,623	4,638
Return on Investment	6.04	7.09	1.05

Source: Values derived from results in Appendix B, Section 2 and Section 3.

At this point the manager will relate his new information gained from this process to that information already available to him. The comments here are suggestions as to circumstances that must be considered when using this new information. From this procedure of workability it can be seen that the model is an information device which is another source to the manager. The capacity to react and utilize the information is still the manager's responsibility. Management will consider the alternatives of buying as opposed to producing given these conditions existing through time. The regularity of feed prices is a function of the market and supplies to that market. Changes in either component are reflected in the price which will either boost or reduce the relative positions of these two scenarios.

4.4 QUESTION 2

This is the situation where seasonal production and the effects of daily entitlement are considered.

4.4.1 Parameter Changes for Analysis

Husbandry techniques are very important to dairy producers. So much so that the heat cycles of cows are pressured into operation out of cycle to increase fertilization at the required time to bring the animal into production. This gives dairymen a better chance to achieve uniform production. Uniform production is a regulation that has been enforced to even out seasonal production. This evening out process is considered here. The production costs of the milk are considered in these terms. Table 9 shows the uniform distribution of bringing cows into production throughout the year. This is the case that occurs with Scenario 1 of the case farm norm. Table 9 shows the seasonal distribution of Scenario 3. This is an exaggeration of a non-uniform operation to emphasize the difference that occurs between the two situations. Once the simulation is complete, a calculation to determine the effects of daily entitlement on the seasonal production are given to indicate the direction the program gives to uniform production.

This is specifically a husbandry technique bringing the animals into production during the summer months. Table 9 shows the uniform production that the base position has incorporated. Table 10 is an exaggerated seasonal production in the period March to May where "natural" calving would occur.

TABLE 9

Basic Herd Calving Schedule for Uniform Production

Table 9

Basic Calving Schedule for Uniform Production

Lact.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	< Oct.
1			1		2	4			2		2	1				
2	1	2	3			2		1	2		2		1			
3	2			1	1		1		1		1		1			
4		2														
5		1	1		1											
6				1			1	1				1				
7											1					
8						1										
9																
10																

Source: Appendix B, Rune 1, Section 2.

TABLE 10

Basic Herd Calving Schedule for Seasonal Production

Table 10

Basic Herd Calving Schedule for Seasonal Production

Lact.	Dec.	Nov.	Oct.	Sept.	Aug.	July	June	May	Apr.	Mar.	Feb.	Jan.	Dec.	Nov.	Oct.	Oct.
1								5	4	3						
2								4	4	4	2					
3								3	1	2	1					
4									2							
5								1	1	1						
6								1	1	1						
7											1					
8									1							
9																
10																

Source: Appendix B, Run 3 results, Section 4.

The analysis of the numbers will also include a calculation for daily entitlement to change the milk returns and show the compounding pressure exerted on the operation.

4.4.2 Comparison of the Results

The nine indicators as shown in Table 12 are made up of somewhat different components for seasonal production. Livestock is the main capital investment with a drop of $1550. Cash Income consists of a drop in milk revenues of $2904. and a slight increase in cattle of $173. This is expected due to the lower year ending numbers of livestock. Non-Cash Income has a very large drop in cattle inventory of $3100. with a very slight change in feed of -$38. Cash Expenses have changed basically due to a shift in time use but also from fewer animals. The net change is an increase of $1102. Non-Cash interest dropped by $645. Total Income is down substantially at $5823. Expenses are up slightly at $451. The net drop of Return to Management is $6280. Return on Investment drops 1.34 percent.

The inefficiency that occurs in bunching of the herd for calving during the summer creates a situation where fewer cattle are producing at the end of the year. This is to be expected given the seasonal production. The difference is 54 cows in the control with 53 in the seasonal operation. Table 11 gives the difference in cattle herd statistics. There is a drop of one cow and four heifers under one year using this production schedule. This is important to the operation from a production efficiency perspective. This creates a lower overall production schedule based on the stochastic herd size option. The difference in production returns is found in Table 12 as $2,904. There is a reduction in feed because of fewer animals but the main influence is in altering the herd which changes the capital and inventory values of the operation. The return on investment falls substantially from 6.04 percent in the control to 4.70 percent with seasonal production. Table 13 gives the returns that are generated by the simulation run. Conversion of this to hundredweight and subsequently to a daily entitlement figure show the reduction of income to be $1,943. This changes the return on investment and the return to management from 4.70 and -$4279. to 4.26[75] and -$6,222.[76]

The daily entitlement policy is an incentive to produce in a uniform fashion throughout the year. A deviation from this by more than ten percent of winter production will initiate a cost to the operation through lower returns for the excess. It is fully explained in Appendix A. The values in table 13 show that the much lower winter production curtails any possible profit that higher summer production may have drawn.

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[75] Calculation of the Return on Investment is as follows: Total income both cash and non-cash minus (total expenses minus all interest charges) divided by Average Total Investment.

[76] The Return to Management is calculated as follows: Total income cash and non-cash minus (total expenses minus labor costs for operator and family).

TABLE 11

Comparison of Run 1 and Run 3 for Herd Changes Due to Seasonal Production

Table 11

Comparison of Run 1 and Run 3 for Herd Changes Due to Seasonal Production

	Beginning	Born	Bought	Sold	Died	End
Cattle Statistics for the Control Scenario Run						
Cows	45.	0.	0.	11.	0.	54.
Heifers over 1 year	29.	0.	0.	9.	0.	14.
Heifers under 1 year	20.	29.	0.	10.	4.	21.
Bull calves	0.	39.	0.	33.	6.	0.
Cattle Statistics for the Seasonal Production Scenario Run 3						
Cows	5.	0.	0.	11.	1.	53.
Heifers over 1 year	29.	0.	0.	10.	0.	14.
Heifers under 1 year	20.	31.	0.	14.	5.	17.
Bull calves	0.	40.	0.	32.	8.	0.
Difference of Run 1 and Run 3						
Cows	0	0	0	0	1	-1
Heifers over 1 year	0	0	0	1	0	0
Heifers under 1 year	0	2	0	4	1	-4
Bull calves	0	1	0	-1	2	0

TABLE 12

Comparison of Run 1 and Run 3 for The Effects of Seasonal Production

Table 12

Comparison of Run 1 and Run 3 for the
Effects of Seasonal Production

	Run 1 (dollars)	Run 3 (dollars)	Difference
Capital Investment:			
Livestock	106,450	104,900	-1,550
Feed and Supplies	10,438	10,419	-19
Cash Income:			
Milk	90,320	87,416	-2,904
Cattle	13,754	13,927	173
Non Cash Income:			
Rise in Cattle Inventory	-5,300	-8,400	-3,100
Rise in Feed Inventory	-3,298	-3,336	-38
Cash Expenses:			
Gas and Oil	2,117	2,123	6
Machinery Repairs	5,778	5,787	9
Breeding	1,482	1,365	-117
Veterinary	1,376	1,392	16
Other Livestock	1,982	2,004	22
Utilities	819	828	9
Interest	10,328	11,251	923
Miscellaneous	1,445	1,443	-2
Feed Purchase	22,328	22,564	236
Non Cash Expenses:			
Interest	26,051	25,406	-645
Total Income	130,415	124,592	-5,823
Total Expense	139,966	140,423	451
Return to Management	4,985	-1,295	-6,280
Return on Investment	6.04	4.70	-1.34

Source: Values taken from Appendix B, Section 2 and Section 4.

TABLE 13

Seasonal Production by Month and Daily Entitlement Costs

Table 13

Seasonal Production by Month and Daily Entitlement Costs

Month	Simulation Revenue	Monthly Production[a] cwt	Daily Entitlement[b]	Over Daily Entitlement	Payment For Milk in Daily Entitlement[c]	Payment For Milk Over Daily Entitlement[d]
Jan.	3,292	274.56	-	-	3,292	-
Feb.	3,847	320.85	500.65	-	3,847	-
Mar.	5,867	489.32	554.29	-	5,867	-
Apr.	8,586	716.10	536.41	179.68	6,431.6	1,877.7
May	9,940	829.02	554.29	274.73	6,646	2,870.9
June	9,774	815.18	536.41	278.77	6,431.6	2,913.1
July	9,947	829.61	554.29	275.32	6,646	2,877.1
Aug.	9,681	807.42	554.29	253.13	6,646	2,645.2
Sept.	8,892	741.62	-	-	8,892	-
Oct.	7,608	634.53	-	-	7,608	-
Nov.	5,801	483.82	-	-	5,801	-
Dec.	4,226	352.46	-	-	4,226	-
Total	87,461				72,334	13,184
					85,518	

Calculation of Daily Entitlement:

$$\sum_{i=\text{Sept.}}^{\text{Jan.}} \frac{\text{Monthly production cwt}}{\text{Sept. 1–Jan. 31 (days)}} + 10\% = \frac{2,487}{153} + 10\% = 16.25 + 10\% = 17.88$$

(Continued)

Table 13 (continued)

[a] Values derived by division of simulation revenues by $11.99 which is the price per cwt.

[b] Calculated by daily entitlement of 17.88 x days in month from February to August.

[c] Calculation is made on monthly production cwt if it is lower than daily entitlement or falls in the months January or September to December. If there is over daily entitlement, then the daily entitlement total is used times 11.99/cwt.

[d] Over daily entitlement is paid at the substandard price of 23.00/2.2 at 10.45/cwt.

The table indicates a total simulated revenue of $87,461. Using the formula at the bottom of the table, values of daily entitlements are found. The over daily entitlement figures are calculated by subtracting montly production from daily entitlement. Any positive values are retained. Payment for milk is made on the daily entitlement and on the montly production in months where daily entitlement does not apply. The final column is payment for over daily entitlement. The total actual payment is $72,334. for milk in daily entitlement and $13,184. for milk out of daily entitlement. The sum is $85,518. The difference is $1,943. This difference is the cost associated with heavy normal production with daily entitlement enforced. The objective is to equate market supply and demand and reduce losses in high production periods through spoilage. The penalty is reasonably stiff now that the system has been in operation for a few years. The level of husbandry management that is required is higher because of this policy and the incentive to act in a proficient manner in this area is borne out by this simulation run.

4.4.3 The Combination of Question 1 and 2 (Run 4)

The combination of the seasonal prices with the seasonal production is included to show the consistency of the two offsetting situations and their effect on the final position of the simulated run. The positive influence of the seasonal prices coupled with the negative seasonal production results will give an indication of the stronger influence of the two. The importance of model flexibility and comparison given the increase in information available is also illuminated here. There is no extra initial work required for this run. The extra load occurs in interpretation of the information gained.

The shifts that occur in the two preceeding scenarios are both here. The actual magnitudes do vary. This is because the two changes have varying influences and as such a simple addition of run 2 and 3 are not the same end result which occurs here. The nine indicators are compared to the base run in Table 6 Capital Investment drops $156. Capital Income drops $3412. Non-Cash Income drops $313. Cash Expense drops $1,524. Non-Cash Expense drops $526. The Total Income drops reasonably more than the Total Expense drops and as a result Return to Management drops $1,629. The change in Returns on Investment is a drop of 0.27 percent. In all, the poorer husbandry techniques still offset the better pricing schedule. This is not the same as if the two scenarios had been added to give a drop of 0.29 percent in Return on Investment. The problem is not as severe when looked at in these aggregate terms.

Scenario 4 with both of the changes found in run 2 and 3 for seasonal price and production show that there is somewhat of an offsetting effect between the seasonal production and the seasonal pricing, which although higher than just seasonal production does not meet the control. The difference between run 3 return in investment and run 4 is 1.07 up .02 percent from just a seasonal price change. The difference if daily entitlement is included becomes 1.50, further exaggerating the relative positions of the scenarios. Effectively the strengthening of both seasonality of price through market strategy and level production for herd management purposes with the daily entitlement incentive show a realistic direction a dairy producer should move to increase efficiency of the operation. The variation between the control and both seasonal price and production in run 4 are found in Table 14 . The overall relative position is lower than the control run. The actual strength of the two changes can be seen influencing each other. The rational choice of strenghtening one area first is the production situation. The relative pressures downward from production in this case is stronger than the upward pressures of price from seasonal buying of feed. These scenarios on the actual situation specify that if close attention is directed toward feed production and available markets are considered a higher return is possible. This is subject to markets remaining stable which is not normally the case.

4.5 QUESTION 3

The basic application of the model to be considered here is a feed ration change. The comparison is between the actual feed used on a specific farm and an optimal feed ration generated by the MPS linear program for feed rations. Run one of the simulator involves the present feed ration. The linear program is run with constraints set up by the simulator in run one. Run five takes the results of the linear program for it's feed component.

TABLE 14

Comparison of Run 1 and Run 4 for the Combined Effect of Seasonal Price and Production Change

Table 14

Comparison of Run 1 and Run 4 for the Combined Effect of Seasonal Price and Production

	Run 1 (dollars)	Run 4 (dollars)	Difference
Capital Investment:			
Livestock	106,450	104,900	-1,550
Feed and Supplies	10,438	11,832	1,394
Cash Income:			
Milk	90,320	87,416	-2,904
Cattle	13,754	13,927	173
Corn	1,239	1,236	-3
Wheat	4,534	3,856	-678
Non Cash Income:			
Rise in Cattle Inventory	-5,300	-8,400	-3,100
Rise in Feed Inventory	-3,298	-511	2,787
Cash Expense:			
Gas and Oil	2,117	2,123	6
Machinery Repairs	5,778	5,787	9
Breeding	1,482	1,365	-117
Veterinary	1,376	1,392	16
Other Livestock	1,982	2,004	22
Utilities	819	828	9
Interest	10,328	11,274	946
Miscellaneous	1,445	1,443	-2
Feed Purchase	22,328	19,915	-2,413
Non Cash Expense:			
Interest	26,051	25,525	-526
Total Income	130,415	126,736	-3,679
Total Expense	139,966	137,916	-2,050
Return to Management	4,985	3,356	-1,629
Return on Investment	6.04	5.77	-0.27

Source: Values taken from Appendix B, Section 2 and Section 5.

The model has been set up to accept this form of analysis and the example is set up to evaluate the usefulness of the model in that context. The optimal solution is used in the simulator to determine the change in cost portrayed through comparison of run one and run five. The input material used has come from a Manitoba farm to give the basic solution the required credibility. Actual financial records have been used to satisfy the input requirements. The process used to adjust ration feed is shown in Appendix G. The changes required by the simulator to incorporate the optimal feed solution are as follows:

1. The barley that was to be fed is sold at the time of production. Due to the constraints of the model in its inventory costing approach both simulation runs have the barley sold to exhibit the feed cost levels.

2. The price of supplement and quantity required are adjusted to the new values determined in the linear program.

3. Oats are bought to be included in the feed concentrate.

4. Fababeans are not required in the optimal feed and are sold at the time of production.

5. The price of hay is adjusted to correspond to the type of forage required. The hay required by the optimal solution is alfalfa brome hay and the price is adjusted from $37.50 to $32.10 per ton. This reflects the difference in price between the two types of hay required for feed by the optimal solution. The price is adjusted back to 37.50 at the end of the

simulation run to allow proper inventory pricing by the hay algorithm of unused forage produced.

6. The prices and quantities of feed are adjusted to correspond to those found in Appendix G.

The constraints required to force the program to conform to a specific feed ration are necessary to recognize the changes to the feed cost element of the program. The program will freely change the forage/grain requirements based on a change given by one or the other. The milk production output value is also based on grain feeding. It is capable of changing given sufficiently high changes in forage or grain quality and volume. In this particular analysis it does not affect production.

4.6 COMPARATIVE ANALYSIS OF THE RESULTS

Detailed output for the optimal feed ration and the two simulation runs are specified in Appendix F. Tables 15, 16, and 17 are derived from the information in Appendix F to be used specifically in the analysis. The following calculations are specified in these tables.

Feed purchases drop from $22,328. to $21,144. The difference of $1,184. is augmented by a $1,023. increase of inventory values of unused crops. Capital investment partially offset these two increases by a drop of $438.

The other expense reductions mainly in interest charges and miscellaneous cost, reduce the expenses further by $95.

TABLE 15

Comparison of The Variation In Income and Costs Between Run 1 and Run 5 of The Simulator

Table 15

Comparison of the Variation in Income and Costs Between Run 1 and Run 5 of the Simulator

	Run 1 (dollars)	Run 5 (dollars)	Difference
Capital Investment in Feed and Supplies	10,438	10,000	-438
Non Cash Income Rise in Feed Inventory	-1,398	-2,421	-1,023
Cash Expense:			
Insurance	1,493	1,480	-13
Interest	10,328	10,198	-130
Feed Purchase	22,328	21,144	-1,184
Non Cash Expense Interest	26,051	26,099	+48
Total Income	130,415	131,292	+877
Total Expense	139,966	138,688	-1,278
Return to Management	4,985	7,140	+2,155
Return on Investment	6.04	6.51	0.47

Source: Values taken from results in Appendix B, Section 2 and Section 6.

TABLE 16

Annual Crop Production And Feed Utilization Summary "Run 5"

Table 16

ANNUAL CROP PRODUCTION AND FEED UTILIZATION SUMMARY

Run 5

YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
HAY SILAGE (TONS)	15.	270.	0.	181.	0.	104.
CORN SILAGE (TONS)	15.	375.	0.	179.	0.	211.
HAY (TONS)	27.	83.	100.	138.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	401.	0.	0.	401.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	6133.	6133.	0.	0.
BARLEY (BU.)	2600.	5003.	0.	0.	7603.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	755.	0.	0.	789.	566.
STRAW (TONS)	20.	22.	0.	28.	0.	14.
SUPPLEMENT	4.	0.	69.	73.	0.	0.

TABLE 17

Annual Crop Production And Feed Utilization Summary "Run 1"

Table 17

ANNUAL CROP PRODUCTION AND FEED UTILIZATION SUMMARY

Run 1

YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
HAY SILAGE (TONS)	15.	270.	0.	181.	0.	104.
CORN SILAGE (TONS)	15.	375.	0.	179.	0.	211.
HAY (TONS)	27.	83.	100.	138.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	401.	0.	0.	401.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	5003.	5359.	5359.	7603.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	755.	0.	0.	789.	566.
STRAW (TONS)	20.	22.	0.	28.	0.	14.
SUPPLEMENT	4.	0.	17.	21.	0.	0.

The increase in income and the decrease in expenses give return to management and labor an increase of $2,155. which covers both completely. This is a 30.18% increase to management for the change in feed. The calculation of the return on investment shows that the overall change is to increase the return on investment by .47 of one percent. Considering the investment of $443,907. for the second run this is a substantial return increase of $2,086.36 for just altering the feed ration.

The values may seem small in aggregate terms but the change relative to the initial position is significant to suggest there can be savings realized by more rigorous feed ration application.

The change from barley to oats as a feed shows the respective quantities that are fed and sold to achieve the desired feed. The supplement requirement is also changed as per the procedure outlined in Appendix E. The total requirement is higher but the price is lower by $53 per ton. This allows for more to be fed but not at a significantly higher price. Alfalfa is included in the supplement and due to the lower price alfalfa demands the supplement price is greatly reduced although the quantities remain much the same.

The optimal feed ration does generate the nutritional feed requirement at a better price. The procedure indicates that just altering feed rations on a per unit cost basis of the feed itself is not a complete analysis. The other factors such as production increases, decreases in cash flow, lower inventories and variations in marketing and interest charges are all considerations that should be included in a management decision to change the feed use composition. Managers making decisions should be aware of other restrictive factors which may or may not influence decisions to change from present practices. The interrelationships of marketing, production, and finance are all integral to the operation. This integral position makes them just as important a consideration to decisions as the actual relationships themselves.

4.7 SUMMARY

Now that the comparisons have been made, understanding of the clarity and workability of the model for these two requirements has been specifically demonstrated. The whole ideal behind a model such as this one is to create an interaction between the manager and information derived from this tool to expand the knowledge available to him for decision analysis.

The three questions specified in terms of conceptual perception have been simulated using five scenarios. The expected direction of movement from the norm is satisfied by these five scenarios.

The answers have been compared to the base position to get the relative direction of movement as specified in economic terms of efficiency. This efficiency has been discussed earlier and is based on the assumptions that a stronger financial position is desired. Criteria that cannot be measured in an empirical sense have not been used to determine the efficiency. This is a normative step that involves manager model interaction.

Chapter V

CONCLUSIONS AND SUGGESTIONS FOR FURTHUR RESEARCH

5.1 CONCLUSIONS DRAWN FROM ANALYSIS

The main requirements of the model laid out in the objectives are demonstrated from the analysis as being part of the model. The ease of use is displayed by the type of input requirements. Flexibility is demonstrated by the various questions that are discussed. Robustness is displayed in the model's capacity to follow the conceptual expectations of change without the expertise of actual accounting figures to strengthen this stand. Communicates well is the last requirement and is shown through easily understood and universally used accounting procedures for the final results. The model in satisfying these four criteria is seen as a strong tool for management use.

The contextual framework portraying the dairy industry has given the basis for analysis of the dairy firm and the modelling of the questions simulated by the model in the most practical application possible. The conceptual framework of the scenario's is based on the restraints of the contextual framework as to affects on the dairy firm in 1980. The understanding of the restrictive environment surrounding the dairy operation allows for specification of the theoretical grounds available for analysis of the firm in its struggle toward efficiency. The uncertainty involved and the respective dealings with these unknowns are also important factors involved in dealing with operation of a dairy farm. The discussion reveals the shifts that occur with these uncertainties and expands on the one that is least restrained to the manager's control. This being the technical inputs, they are discussed in a cost of production context. Based on this knowledge the modelling tool is chosen.

The analysis also brings out the efficiency aspect of management model interaction. Although a rather nebulous concept, the assumption of higher return to management and higher return on investment being a step towards a more efficient operation reveal that there is a fundamental place for the simulation tool in the dairy operation. The true efficiency criteria are those of the manager. However, given the measurable nature of the two accounting values a starting point is specified for a manager. This in itself is important. It gives the manager the capacity to readjust the variables through simulation to determine their influence on the end result. The actual portrayal of more efficient economic conditions by the model satisfies the robustness. To satisfy the efficiency criteria completely, the normative position of management must interact with the model for the final decision.

The strength of a tool is in its displaying a comfortable role of use. The criteria of ease of use, flexibility, robustness and communication all make this model comfortable. The efficiency which arises from the steps taken in the analysis are examples of how a person can direct an operation or gain information beneficial to this expectation.

The questions were set up to ask, "Is this operation efficient now and can it be improved upon." The questions were answered in theoretical terms as to how costs must move to gain the efficiency desired.

From the results of the analysis, these directions were used to determine the actual changes that would accomplish the efficiency motive. The seasonal price is found to move the operation in this direction. Seasonal production is detrimental. The concentration of seasonal prices and seasonal production is also detrimental. Finally, the optimal feed choice is a more preferred ration.

The time required and the financial outlay of acquisition of these results is far less than actual implementation is to determine the results. This in itself is step toward acquiring information in an efficient manner. The efficiency is obtained through informed expectations. The model has the capacity and does in fact increase this information as the five scenarios have shown.

The main concern of setting up a model to allow producers a management tool that has the qualities of ease of use, practicality and understandable results has been met. The comparative analysis technique does show valuable information that might otherwise be overlooked. The value of analysis still lies mainly with the manager. The model gives the results and is a tool to be used by a manager. The interests of the manager are still forefront to the analysis and his perception of the actual numbers will determine the significance of the model as a useful tool.

The addition of the barley feed component and linkage to the MPS linear program are the significant additions in the model. First the barley allows for a feed common to the province and strengthens its base as a flexible program for use in feed analysis. The linear program further strengthens the model for use in the feed context due to its simple linkage to the simulator.

The model as a package gives the producer the capacity to determine changes as specified by LaDue initially and goes further to allow for rational changes in feed comparison based on availability, price and producer preference. The performance of the model has been shown as sound in its generation of numbers that are in line with the expected changes. This gives producers a new tecnigue unique to Manitoba that can be used for various problems.

The strength of the analysis has been based on two considerations one is the practical application possibilites of the model chosen to meet the needs of Manitoba dairy managers. The adjustments made to the model have been tested in a case farm study fashion. The results parallel those of the theoretical expectations discussed in the second chapter. The actual managenment efficiency has been displayed by the conceptual and modelling parallel of the three scenarios. The increases gained from the model agrees with the theoretical expectations the scenarios were devised to illuminate. This gives the model the potential to be a useful extension of a manager's decision making requirements. The requirements were to influence change in such a fashion that the operator would have a better return on his investment when the alternative was incorporated. This has occurred in the ration experiment and the model has displayed the expected outcome of the inclusion of regulation upon the system. The choice of "efficient" management is again left to the manager.

In the case of efficiency considerations the result may be either positive or negative. This is not a retreat from the question but a point of fact. The course of direction the decision creates is governed by the manager's opposition towards the outcome of the simulation results. If it is positive it strengthens the feeling of management when it is negative the outcome of decision becomes cloudy. The answer is dependant on the strength of the information gained. The increase in information may or may not sway the manager's judgement. He may require more runs with slight alterations to confirm the feelings that oppose the simulation answer. The weighting of the information is the manager's job and tools are to supplement as this one does. A note to close related to the usefulness of research relays an important comment; Although a model may be verifiable valid and hence useful it has no substance unless it is used[77].

5.2 LIMITATIONS AND SUGGESTIONS FOR FURTHER RESEARCH

In researching the problem it has come to my attention that there are a number of possible areas where further application of simulation is possible. These are in part borne out of the limitations of the model.

The limitations of the model are mainly those of increasing the automatic operation of the components. The linear program for feed rations is presently a manual link and the compatable nature of the simulator and the optimizer are not complete.

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[77] Dent,J.B. and Anderson,J.R. Ibid p. 386.

First the area of government intervention. With daily entitlement having a front seat in the producers life an analysis of its impact on dairy producers by size would answer the question; Does the concept really prove efficient to the system? The question's basis is the higher cost associated with winter feed. There must be a trade off between costs of daily entitlement and those of differential feed costs associated with the dairy operation.

The second suggestion is to strengthen the linear program in a way that it becomes animal specific with aggregation features to allow alignment with the simulator. This would give the dairy operator a more specific ration analysis rather than just an average analysis as is possible now.

The third is the flexibility of the simulator. The model allows for the inputs to be changed to almost anything a person might request. The rigid part of the model is in its acceptance of different feeds. Presently anything that is not handled by the subroutines present is aggregated into the supplement to generate results for feed use. To facilitate more specific results and to allow for any type of feed through specification in feeds would enable a large variety of feeds to be priced on an individual component basis. This would simplify the linkage between the linear program and the simulator further and add to the ease of use concept in the future.

The fourth area deals with the model linkages. The linkage between the simulator and the linear program are presently manual. Automation of these linkages to allow continuous machine operation will speed up the process of a final comparative run. The ease of use concept would be taken another step and in the event the model is used on an individual basis the turn around time for a solution is accelerated substantially.

The possibility of running the model many times based on various pricing schedules has been suggested. With the incorporation of a random number generator for pricing an idea of the farm's stability could be determined based on price changes through time. This would aid producers to more fully understand the effect of changes in feed base rations given uncertainty in the pricing of these alternative feed sources. The model lends itself to this type of change in that the price matrix can be altered manually and prices could be inserted quite easily.

In conclusion the dairy simulation as it now stands is specific to Manitoba. It is capable of feed choice analysis simulated on a farm specific basis. The ease of use of the model is maintained with simple input requirements.

> "Judge a man by his questions
> rather than by his answers."
>
> Voltaire(1694-1778)

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Appendix A

THE FUNCTIONAL OPERATION AND CALCULATION OF DAIRY ENTITLEMENT

A.1 DAILY ENTITLEMENT

The Manitoba Milk Producer's Marketing Board is heavily involved in supply management practice in the Manitoba dairy industry.[78] Their primary goal is to obtain an even flow of milk at a price which will ensure that volume is maintained. The board has set up various techniques to realize these goals or objectives. Daily entitlement is one of the tools used. The purpose of the mechanism is to influence farmers through monetary incentive to level yearly production. This will enable the marketing agency to obtain a more evenly distributed flow of milk over the year which conforms to the quite uniform demand for milk.

The mechanism is set up to introduce dairy operators to the concept gradually and at the same time to influence them through reduction in monetary returns to conform to the system. Milk production has a yearly cycle and summer production is the highest production period. The technique is simple; Aggregate the winter months production, weight the production for introductory purposes and specify restrictions for summer production on this basis.

The specific operation of D.E. is to take the months of September to January to be considered as the lowest production period. Aggregation of the production for this five month period divided by the number of days during this period will give the daily production for that period. Due to alternate day shipping in various areas the volumes shipped for the period must be considered so as not to subject a producer unfairly to a reduced return for part of his production. This figure in the past

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[78] The information obtained has been through private communication with The Manitoba Milk Producer's Marketing Board on several occasions.

has been weighted at an increased value to allow a transition period for adjustment to the leveling process.

As production shifts do not react instantaneously as we may wish they did, a buffer has been necessary during the implementation of the D.E. program. Over a five year period a buffer has been added to the D.E. to allow for time/change rigidities. Initially in 1975 it was sixty-five percent and yearly from then on decreased to fifty,twenty,twenty and fifteen percent respectivel to 1979. It is expected to be dropped to ten percent for 1980 and subsequent years.

The February to August period is where the restrictions are placed. Given the D.E. figure calculated in the low months through the weighting procedure this is the maximum allowable production for a day and a producer will receive the full pool price for that milk. Production above this D.E. value is subject to a reduced price comparable to low grade milk. In effect what occures is that pressure is placed on the producer to increase production in the September to January period to ensure adequate room for production in the February to August period. The process does not affect Market Share Quota (MSQ) in that it is not a maximum total but a maximum based on a daily production. The readjustment of production to the September-February months effectively levels production within a producer's MSQ. The 'desired' flat production curve is achieved through time by this tool. The adjustment does not create an incentive to increase MSQ because of the reduced price received for over D.E. production.

An example may be useful in portraying the operation of D.E. Given the initial position that a producer has 29,000 hectolitres of MSQ and his production is that of Table 18 The months of September to January summed on a calander day basis are 9,000 hectolitres and the average daily production is 58.82 hectolitres. From here two years are shown; 1975 and 1979. The D.E. is a weighted position. This shows the pressure over time that would occur to a constant production schedule. It is quite apparent that if the real price for milk remains at $10.00 per hectolitre and the return for over D.E. is $1.00 an extreme reduction in revenue is realized in 1979. The prices are given in Table 19 The incentive is definitely there to level production. In both cases if the system were not in force a realization of $290,000.00 was possible. As the system is implemented a rational operation would rearrange to offset the change shown of $40,437.00. If a person arranged his herd to remain within D.E. the full $290,000.00 can be realized.

This tool is to direct producers actions toward producing a more umiform level of output over the year. The problem arises when summer production and winter production are so far out of line that bottlenecks are created. The bottlenecks may be transportation redistribution changes, labor excess and shortage, and under utilization of processing plant facilities. All of these create costs that need not be incurred. As in everything there is a trade off in the increased revenue for one group being offset by the costs of another. Production costs in the dairy industry are generally higher in the winter months. The costs are there whichever route a producer takes.

TABLE 18

Production Volumes On A Calander Month Basis

Table 18

Production Volumes on a Calendar Month Basis

Month	Days	Hectolitres	D.E.	Over D.E. 1975	D.E.	Over D.E. 1979
September	30	2,000			--	--
October	31	2,000			--	--
November	30	1,750			--	--
December	31	1,500			--	--
January	31	1,750			--	--
February	28	2,000	2,000	--	1,894	106
March	31	2,500	2,500	--	2,097	403
April	30	3,000	2,912	88	2,029	971
May	31	3,500	3,009	491	2,097	1,403
June	30	4,000	2,912	1,088	2,029	1,971
July	31	3,000	3,000		2,097	903
August	31	2,500	2,500	--	2,097	403
ΣSept.-Jan.	153	9,000				

Average Daily Production = $\frac{9,000}{153}$ = 58.82

Add 65 percent for 1975 adjustment cycle = 38.24

Add 15 percent for 1979 adjustment cycle = 8.82

Daily Entitlement for 1975 = 97.06 hectolitres/day

Daily Entitlement for 1979 = 67.65 hectolitres/day

TABLE 19

Revenue Changes Created By Daily Entitlement Given Constant Production And Price

Table 19

Revenue Changes Created By Daily Entitlement
Given Constant Production and Price

	1975		1979	
	D.E. Revenue[a]	Over D.E. Revenue[b]	D.E. Revenue	Over D.E. Revenue
January	$ 17,500		$ 17,500	
February	20,000		18,940	$ 106
March	25,000		20,970	403
April	29,120	$ 88	20,290	971
May	30,090	491	20,970	1,403
June	29,120	1,088	20,290	1,971
July	30,000		20,970	903
August	25,000		20,970	403
September	20,000		20,000	
October	20,000		20,000	
November	17,500		17,500	
December	15,000		15,000	
Totals	$278,330	$1,667	$233,400	$6,160
Year Return	279,997		239,560	
Difference	40,437			

[a] Price for fluid pool milk is assumed to be $10.00 per hectolitre.

[b] Price for over D.E. production is assumed to be $1.00.

The overall effect is a transfer of cost from society to the milk producer. From the milk producers' position a look at the feed cost vs the loss from D.E. is important to determine his production schedule. To look at some of the larger producers it is obvious that this cost analysis has been overlooked or the type of operation does not warrant it. A close look at Table 20 shows the large producer as producing heavily in the winter and in doing so offsetting the small producer who has the opposite tendancy. The overall effect is to give the MMPMB the desired results of level supply. Again these are considerations that come to light when D.E. is introduced as is the case in Manitoba.

TABLE 20

The Effect of Daily Entitlement on Farmers Large And Small

Table 20

The Effect of Daily Entitlement on Farmers Large and Small[a]

	January	February			March			April			May		
	Actual production	Daily entitlement	In daily entitlement	Over/ -under	Daily entitlement	In daily entitlement	Over/ -under	Daily entitlement	In daily entitlement	Over/ -under	Daily entitlement	In daily entitlement	Over -under
Small													
1	3,197	2,184	2,184	2,025	2,496	2,496	2,469	2,340	2,340	1,287	2,340	2,340	1,291
2	140,132	2,492	2,492	807	2,848	2,848	2,656	2,314	2,314	1,825	3,026	3,026	1,546
3	21,064	4,760	4,629	-131	5,440	5,303	-137	5,100	5,100	83	5,100	5,100	1,463
4	3,235	1,428	1,281	-147	1,632	1,632	635	1,530	1,530	332	1,530	1,530	150
5	19,825	1,932	1,932	488	2,208	2,208	2,324	2,070	2,070	2,090	2,070	2,070	2,097
6	4,723	1,960	1,960	138	2,240	2,240	448	2,100	2,100	1,955	2,100	2,100	2,258
7	21,426	2,856	2,345	-511	3,264	3,264	2,623	3,060	3,060	2,943	3,060	3,060	3,401
Medium													
1	45,275	20,804	17,596	-3,208	23,033	19,207	-3,826	22,290	17,724	-4,566	22,290	17,612	-4,678
2	18,774	19,964	17,639	-2,325	22,816	19,230	-3,586	21,390	19,549	-1,841	21,390	19,914	-1,476
3	33,499	20,216	20,216	-3,294	23,104	23,104	1,641	21,660	20,265	-1,395	21,660	21,189	-471
4	70,200	19,236	19,236	1,293	21,984	21,984	2,735	20,610	20,610	2,155	20,610	20,610	1,025
5	811	21,252	21,252	1,554	22,770	22,307	-463	22,770	21,453	-1,267	24,288	21,286	-3,002
6	1,824	19,572	19,572	213	20,970	20,970	3,167	20,970	20,970	1,279	22,368	22,368	1,584
7	25,989	19,516	17,343	-2,173	22,304	18,951	-3,353	20,910	20,910	1,168	20,910	20,910	1,457
Large													
1	43,543	144,424	125,485	-18,939	165,056	141,625	-23,431	154,740	126,719	-28,021	154,740	119,467	-35,273
2	1,655	39,788	32,430	-7,358	45,472	36,278	-9,194	42,630	32,202	-10,428	42,630	31,793	-10,837
3	25,110	47,488	40,582	-6,906	54,272	47,754	-6,518	50,880	41,727	-9,153	50,880	38,790	-12,090
4	15,749	66,024	66,024	1,466	70,740	70,740	2,625	70,740	70,740	3,918	75,456	75,170	-286
5	90,418	41,636	41,410	-226	47,584	47,484	-100	44,610	41,238	-3,372	44,610	40,618	-3,992
6	19,019	26,158	16,158	1,351	27,060	27,060	5,766	27,060	27,060	6,531	28,864	28,864	4,088
7	1,909	91,588	83,840	-7,748	98,130	94,401	-3,729	98,130	96,005	-2,125	104,672	91,264	-13,408

(continued)

Table 20

(continued)

	June			July			August			September	October	November	December
	Daily entitlement	In daily entitlement	Over/ -under	Daily entitlement	In daily entitlement	Over/ -under	Daily entitlement	In daily entitlement	Over/ -under	Actual production	Actual production	Actual production	Actual production
Small													
1	2,340	2,340	1,376	2,496	2,496	1,780	2,340	2,340	1,921	5,617	5,443	4,566	4,575
2	2,670	2,670	1,540	2,868	2,868	1,194	2,759	2,759	1,335	118,294	119,582	110,137	103,744
3	5,100	5,100	1,457	5,440	5,440	1,588	5,100	5,100	1,057	21,482	21,037	19,317	21,087
4	1,530	1,530	1,183	1,632	1,632	1,214	1,530	1,530	788	3,836	4,561	4,443	4,463
5	2,070	2,070	3,593	2,208	2,208	3,394	2,070	2,070	2,557	18,167	19,058	19,251	21,769
6	2,100	2,100	3,194	-	-	(4,939)[b]	-	-	(4,091)[b]	5,302	4,068	2,731	2,994
7	3,060	3,060	3,615	3,264	3,264	3,054	3,060	3,060	3,143	23,143	21,061	17,732	19,016
Medium													
1	22,290	22,103	-187	23,776	22,060	-1,716	22,290	19,826	-2,464	41,783	46,437	47,439	54,281
2	21,390	21,390	512	22,816	21,480	-1,336	21,390	20,545	-845	19,450	21,436	19,198	18,128
3	21,660	20,998	-662	23,104	23,104	625				29,699	35,517	34,385	40,864
4	20,610	20,610	2,413	21,984	21,481	-503	18,123[c]	-	-	70,501	71,454	71,321	76,713
5	22,770	18,663	-4,107	22,770	16,066	-6,704	24,288	14,804	-9,484	2,090	1,949	1,538	1,517
6	20,970	20,970	1,050	20,970	20,970	2,846	22,368	22,368	6,415	3,873	3,201	1,959	2,075
7	20,910	20,910	1,663	22,304	22,304	14	20,910	19,390	-800	14,265	16,244	18,205	23,561
Large													
1	154,740	121,988	-32,752	165,056	119,531	-45,525	154,740	120,161	-34,579	48,877	49,556	43,971	44,265
2	42,630	32,130	-10,500	45,472	31,706	-13,755	42,630	29,271	-13,359	3,188	2,643	1,610	721
3	50,880	40,607	-10,273	54,272	46,015	-8,257	50,880	40,530	-10,350	17,974	14,423	10,122	13,044
4	70,740	70,740	1,368	70,740	70,740	1,640	75,456	74,695	-761	24,229	20,551	17,679	19,933
5	44,610	44,610	1,974	47,584	47,584	9,895	44,610	44,610	6,993	90,803	83,174	79,105	93,460
6	-	-	(32,397)[b]	27,060	26,912	-148	28,864	22,764	-6,100	19,317	19,173	16,315	14,168
7	98,130	86,334	-11,796	98,130	86,108	-12,022	104,672	95,226	-9,446	5,562	4,442	2,936	2,110

[a] The size categories are not specific other than being the largest, smallest or median of the group shown from. Random selection was used.

[b] Substandard milk is not used for anything and the whole month's produce is rejected based on tests.

[c] Open is not restricted by quota or daily entitlement.

Source: Private communication with the Manitoba Milk Producer's Marketing Board.

Appendix B

STRUCTURAL CHANGES IMPLEMENTED IN THE RESTRUCTURING OF FABS TO ACCEPT MANITOBA CONDITIONS

B.1 PROGRAM ROUTINE AND VARIABLE REQUIREMENTS

A separate subroutine Barley has been added to the simulator. This allows the model to conform more closely to the Manitoba situation.

The routine is based on the Oats routine in the program. Changes in seeding and harvest dates were required to meet the Manitoba environment and to give the monthly iterations credibility.

Various other routines have been affected to augment, feeding, buying, selling, as well as seeding and harvesting. Labor, machinery and building storage are also affected.

To understand the variables significance, reference to LaDue's thesis is given in Appendix D. Description of the variables is well documented here.

The variables in Barley are used in the same context as Wheat and Oats. Changes have been required in the actual months of seeding and harvest to the present variables to parallel Manitoba conditions. The variable names were changed by changing the O in Oats variables to a B. The various data matrices have been expanded and revised as per Appendix C to comply with the addition of the new variables.

In the case of addition of variables into vectors or arrays, they have been added to the end of the vector or array. As an example, the vector OFSTOR now[79] contains: (1) corn, (2) wheat, (3) oats, (4) soybeans, (5) field beans, and (6) barley.

---

[79] Ibid-Simulator-Thesis, page 401.

The variable additions are listed below by subroutine. The descriptions are the same as those given by LaDue in the appropriate section of Appendix D.

1. Subroutine FABS80

   Call Barley--The new subroutine addition.

2. Subroutine OUTIN80

   The required formating to include barley has been added to accept the input data discussed in Appendix C of this thesis.

3. Subroutine READI80

   The required formating to include barley has been added here as outlined in Appendix C of this thesis.

4. Subroutine YLDADJ80

   Variables added are: YELDB1, YIELDB, SYELDB, PFOODB, FOODB1, FOODB2.

5. Subroutine BARLEY

   Variables added are: BARLY1, OGROWB, OHRVB, PESTB, SEEDB BLS, FERTB, CUSTMB, ABHRV.

6. Subroutine STORES80

   Vectors and arrays are adjusted to accept barley for storage, sale, buying, feeding and offstorage.

7. Subroutine LABOR80

Variables added are: JBAC. Vectors and arrays are adjusted to accept barley for field labor requirements, both seeding and harvest.

8. Subroutine ACCOUNT80

Variables added are: BPUR, BUSE, BSLD, BPRO, BINC, ABYLD.

9. Subroutine PRINTH80

The required format changes have been made to allow printing of the required barley output values.

Appendix C

REQUIRED MODIFICATIONS AND ADAPTATIONS TO FABS DATA REQUIREMENTS

C.1 DATA REQUIREMENTS

The data changes[80] required to the program are set out in two sections. Section 1 gives the changes to the input requirements to incorporate barley. Section 2 gives the changes in value to 1979 values in Manitoba. These values have been derived in two ways. First, prices have been used from the Cost of Production Study to most closely associate to the producer in question. The second set of changes are to index the present values up to 1979 values.

The tables are given in Section 2. The tables and questions are just expansions of LaDue's User Guide, Section 1. The questionaire required by the program is given in section 1. with the proper format for its completion. Section 3 gives the code changes that can be made to the pertinent questions in section 1.

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[80] Original simulation appropriate to the U.S. situation is contained in FABS . LaDue,E.L., Farm Business Simulator, users guide, (Cornell university , Ithica, New York, 1973)

C.2 QUESTIONAIRE AND INPUT FORMAT (SECTION 1)

Section 1

Required Input and Formating

Card 0

1. Name: Swan River Example
(INAME) (1-24)[1]

Problem: Simulate Change in Rations:
(IPROB) (25-52)

Actual Fed Vs Optimal Possible
(53-80)

Card 1
(80)

2. First month to be simulated is /0/1/, 19/8/0/
(MO,IYR) (1-2) (3-4)

3. Number of years to be simulated is /0/1/
(IYEARS) (5-6)

4. Is summary information to be presented on a fiscal or calendar year basis (1=calendar, 0=fiscal). /1/ (7)
(IBASIS)

5. The data to be printed for each year is (enter 1 if desired, 0 if not).
(IOUTPT(I))

(a) labor summary /1/ (8)
(b) annual financial statement /1/ (9)
(c) annual crop production & feed utilization summary /1/ (10)
(d) annual dairy cattle numbers summary /1/ (11)
(e) annual income and expense statements /1/ (12)
(f) annual production and yields summary /1/ (13)
(g) brief monthly cash flow summary /1/ (14)
(h) monthly crop production and feed utilization /1/ (15)
(i) monthly dairy cattle numbers summary /1/ (16)
(j) monthly cash flow statement /1/ (17)
(k) brief debt and income summary /1/ (18)
(l) print out of data entered /1/ (19)
(Printed only first year - always recommended)

---

[1] Numbers in parentheses indicate the columns in which data are to be punched on cards and are placed on this form for use by key-punchers only.

6. Number of Cows in Herd by Lactation and Month of Freshening Month Prior to First Month to be Simulated (ICOWS(I,J))

CARD	Lactation	Dec[1]	Nov	Oct	Sept	Aug	July	June	May	Apr	Mar	Feb	Jan	Dec	Nov	Oct	Before Oct
		-1	-2	-3	-4	-5	-6	-7	-8	-9	-10	-11	-12	-13	-14	-15	Before -15
2	1	/ /0	/ /0	/ /1	/ /0	/ /2	/ /4	/ /0	/ /0	/ /2	/ /0	/ /2	/ /1	/ /0	/ /0	/ /0	/ /0
3	2	/ /1	/ /2	/ /3	/ /0	/ /0	/ /2	/ /0	/ /1	/ /2	/ /0	/ /2	/ /0	/ /1	/ /0	/ /0	/ /0
4	3	/ /2	/ /0	/ /0	/ /1	/ /1	/ /0	/ /1	/ /0	/ /1	/ /0	/ /1	/ /0	/ /1	/ /0	/ /0	/ /0
5	4	/ /0	/ /2	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0
6	5	/ /0	/ /1	/ /1	/ /0	/ /1	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0
7	6	/ /0	/ /0	/ /0	/ /1	/ /0	/ /0	/ /1	/ /1	/ /0	/ /0	/ /0	/ /1	/ /0	/ /0	/ /0	/ /0
8	7	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /1	/ /0	/ /0	/ /0	/ /0	/ /0
9	8	/ /0	/ /0	/ /0	/ /0	/ /0	/ /1	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0
10	9	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0
11	10 or Over	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0	/ /0
(79-80)		(1-3)	(4-6)	(7-9)	(10-12)	(13-15)	(16-18)	(19-21)	(22-24)	(25-27)	(28-30)	(31-33)	(34-36)	(37-39)	(40-42)	(43-45)	(46-48)

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[1] Month headings can be used only if January is the first month to be simulated. Enter the number of cows freshening in the month immediately preceding the first month to be simulated in the -1 column, those freshening two months prior to the first month simulated under -2, and so on until all animals in the herd are entered.

Card 12
(79-80)

7. Number of heifers by age (months) - month prior to first month simulated.
(IHEFER(I))

Age	1	2	3	4	5	6	7	8	9	10	11	12
Number	/3	/3	/1	/1	/1	/1	/0	/2	/0	/2	/2	/4
	(1-2)	(3-4)	(5-6)	(7-8)	(9-10)	(11-12)	(13-14)	(15-16)	(17-18)	(19-20)	(21-22)	(23-24)

Age	13	14	15	16	17	18	19	20	21	22	23	24
Number	/1	/2	/3	/1	/1	/0	/1	/1	/1	/2	/4	/4
	(25-26)	(27-28)	(29-30)	(31-32)	(33-34)	(35-36)	(37-38)	(39-40)	(41-42)	(43-44)	(45-46)	(47-48)

Age	25	26	27	28	29	30	31	32	33	34	35	36
Number	/2	/2	/1	/2	/1	/0	/0	/0	/0	/0	/0	/0
	(49-50)	(51-52)	(53-54)	(55-56)	(57-58)	(59-60)	(61-62)	(63-64)	(65-66)	(67-68)	(69-70)	(71-72)

Card 13 - blank

(ISTEER(I))

Card 14

8. Freshening Preference - Desired Age (months) at which animals born in month indicated should calve
(FRESH(I))

Month Birth	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Calving Age	2/4	2/4	2/4	2/4	2/4	2/4	2/4	2/4	2/4	2/4	2/4	2/4
	(1-2)	(3-4)	(5-6)	(7-8)	(9-10)	(11-12)	(13-14)	(15-16)	(17-18)	(19-20)	(21-22)	(23-24)

9. The average value of animals in the herd is:
VALUE(I)

Cows /1/5/0/0/ (25-28)

Bred Heifers /1/2/0/0/ (29-32)

Open Heifers / /8/0/0/ (33-36)

Calves / /4/0/0/ (37-40)

10. (a) The average annual actual historical production (lbs.) of the herd entered above is /1/5/0/4/0/ (41-45)
(ACTPR1)

(b) This level of production was achieved when:

1. Forage quality was (1=excellent, 2=medium, 3=poor) /2/ (46)
(FORAG1)

2. Pounds of concentrate (air dry basis) fed per cow per year was / /5/1/1/9/ (47-51)
(FEED1)

3. Culling rate (percent) was / / /3/1/ (52-55)
(CULL1)

11. For the simulation (at least the first period simulated):

1. Pounds of Concentrate (air dry basis, including HMC) to be fed per cow per year is /5/4/5/6/ (56-59)
(FEED2)

2. Quality of forage to be fed is /2/ (60)
(FORAG2)

3. Culling rate to be used is (percent) / / /3/1/ (61-64)
(CULL2)

Card 15
(79-80)

12. Composition of concentrate (lbs. per batch) to be fed is (exclude high moisture corn and supplement fed separately):
(GRIST(I))

(a) Ear Corn / / / /0/ (1-4)

(b) Shelled Corn / / / /0/ (5-8)

(c) Oats / / / /0/ (9-12)

(d) Wheat / / / /0/ (13-16)

(e) Supplement / /6/7/4/ (17-20)

(f) Barley /4/7/8/2/ (21-24)

Card 16
(79-80)

13. (a) Is high moisture corn to be fed (1=yes, 0=no) (HMCFED) /0/ (1)

(b) If so, the number of pounds per day to be fed is: (HMCLBS(I))

Month	Jan	Feb	Mar	Apr	May	June
lbs.	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /
	(2-6)	(7-11)	(12-16)	(17-21)	(22-26)	(27-31)

Month	July	Aug	Sept	Oct	Nov	Dec
lbs.	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /
	(32-36)	(37-41)	(42-46)	(47-51)	(52-56)	(57-61)

(c) The moisture content of high moisture corn when fed is (HMC20) / / / / / / (62-66)

(d) The pounds of supplement fed with HMC per cow per day is (HMCSUP) / / / / / / (67-71)

14. Percent of Hay Equivalent from various forages (excluding pasture) (HESORC(I,J))

Card	Jan	Feb	Mar	Apr	May	June
17 HAY	/ /3/0	/ /3/0	/ /3/0	/ /3/0	/ /3/0	/ /1/0
18 HCS	/ /2/5	/ /2/5	/ /2/5	/ /2/5	/ /2/5	/ /9/0
19 CS	/ /4/5	/ /4/5	/ /4/5	/ /4/5	/ /4/5	/ / /0
(79-80)	(1-4)	(5-8)	(9-12)	(13-16)	(17-20)	(21-24)

Card	July	Aug	Sept	Oct	Nov	Dec
17 HAY	/ / /0	/ / /0	/ /3/0	/ /3/0	/ /3/0	/ /3/0
18 HCS	/1/0/0	/1/0/0	/ /2/5	/ /2/5	/ /2/5	/ /2/5
19 CS	/ / /0	/ / /0	/ /4/5	/ /4/5	/ /4/5	/ /4/5
(79-80)	(25-28)	(29-32)	(33-36)	(37-40)	(41-44)	(45-48)

Card 20
(79-80)

15. The average calving interval (months) of the herd is / /1/2/./8/ (1-5)
(CALVIN)

16. The percentage of heifer calves to be raised as replacements is /1/0/0/ (6-8)
(PCTHEF)

17. The maximum (<u>at any time</u>) allowable number of

(a) cows is / / /5/5/ (9-12)
(COWMAX)

(b) heifers over 1 year is / / /2/5/ (13-16)
(HEFMAX)

(c) heifers under 1 year is / / /2/5/ (17-20)
(CAVMAX)

18. (a) The type of bedding (1=straw, 2=other) to be used for

(1) youngstock is /1/ (21)
(BEDYG)

(2) the dairy herd is /1/ (22)
(BEDCW)

(b) If bedding other than straw is used, the average cost per animal per month is:
(BEDCST(I,J))

Card		Jan	Feb	Mar	Apr	May	June
21	Cows	/ /./7/5	/ /./7/5	/ /./7/5	/ /./7/5	/ /./7/5	/ /./1/0
22	Heifers	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /
(79-80)		(1-5)	(6-10)	(11-15)	(16-20)	(21-25)	(26-30)

Card		July	Aug	Sept	Oct	Nov	Dec
21	Cows	/ /./1/0	/ /./1/0	/ /./2/0	/ /./2/5	/ /./7/5	/ /./7/5
22	Heifers	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /	/ / / /
(79-80)		(31-35)	(36-40)	(41-45)	(46-50)	(51-55)	(56-60)

Card 23
(79-80)

19. List below the machinery systems to be used on this farm. Indicate the system by number. See the users manual for a description of machinery systems. Use the last number (system) in each set of parenthesis (user defined systems) only if you plan to define it.
(SYS(J))

(a) Dairy Cows (1-7) /0/3/ (1-2)

(b) Dairy Replacements (8-10) /0/8/ (3-4)

(c) Corn Grow - April (1-4) /0/2/ (5-6)

(d) Corn Grow - May (5-8) /0/6/ (7-8)

(e) Corn Grow - June (9-12) /1/0/ (9-10)

(f) Corn Silage Harvest (1-5) /0/3/ (11-12)

(g) Corn Grain Harvest (6-11) /0/0/ (13-14)

(h) Wheat Grow - Sept. (13-15) /1/4/ (15-16)

(i) Wheat Grow - Oct. (16-18) /1/7/ (17-18)

(j) Wheat Harvest (12-15) /1/4/ (19-20)

(k) Oats Grow - April (19-21) /0/0/ (21-22)

(l) Oats Grow - May (22-24) /0/0/ (23-24)

(m) Oats Harvest (16-19) /0/0/ (25-26)

(n) Hay Crop Plant (25-28) /2/5/ (27-28)

(o) Hay Crop Silage Harvest (20-24) /2/1/ (29-30)

(p) Hay Crop Maintain (29-30) /2/9/ (31-32)

(q) Hay Harvest (25-28) /2/6/ (33-34)

(r) Fieldbean Grow - May (31-33) /3/1/ (35-36)

(s) Fieldbean Grow - June (34-36) /3/5/ (37-38)

(t) Fieldbean Harvest (29-32) /3/0/ (39-40)

(u) Soybean Grow - May (37-39) /0/0/ (41-42)

(v) Soybean Grow - June (40-42) /0/0/ (43-44)

(w) Soybean Harvest (33-35) /0/0/ (45-46)

(x) Barley Grow April (43-45) /4/4/ (47-48)

(y) Barley Grow May (46-48) /4/7/ (49-50)

(z) Barley Harvest (37-40) /3/9/ (51-52)

20. (a) Will you enter the specific machines presently on the farm in part B of the input form (1=yes, 0=no). If you enter "no", a representative set of machinery will be assumed. /0/
(MENTER) (47)

(b) Do you want additional (other than replacement) machines purchased as the program determines they are needed (1=yes, 0=no). /1/
(BUYMCH) (48)

21. (a) Present value of owned land (excluding buildings) is / /1/4/4/0/0/0/
(VLAND1) (49-55)

(b) Value of this land in 10 years is expected to be (or enter the annual rate of inflation (50 or less)) or less)) / / / / /5/./0/
(VLAND2) (56-62)

Card 24

22. (a) Acreages of crops to be grown
(CPACRE(I,J))

Crop	Owned or Cash Rent	Share Rent
Corn	/ /0/3/2/ (1-4)	/ / / / / (5-8)
Hay	/ /1/2/5/ (9-12)	/ / /4/0/ (13-16)
Oats	/ / / / / (17-20)	/ / / / / (21-24)
Wheat	/ / /5/5/ (25-28)	/ / / / / (29-32)
Soybeans	/ / /2/5/ (33-36)	/ / / / / (37-40)
Fieldbeans	/ / / / / (41-44)	/ / / / / (45-48)
Government Programs	/ / / / / (49-52)	/ / / / / (53-56)
Total	/ /4/5/0/ (57-60)	/ / /5/0/ (61-64)
Barley	/ / / / / (63-68)	/ / / / / (69-72)

Card 25
(79-80)

(b) Expected acreage for first year simulated

Hay Crop Silage (HSACRE) / /5/0/ (1-3)

Corn Silage (CSACRE) / /1/0/0/ (4-7)

23. (a) Acres cash rental (included in above) (ARENT) / / /7/5/ (8-11)

(b) Rental rate per acre (RENTRT) / / / /2/5/ (12-16)

Card 26
(79-80)

24. Value of buildings presently owned (BLDGS(I,J))

Purchase Period	Present Value	Average Age (yrs.)	Number of yrs. to be deprec. over
Within last 5 yrs.	/ /4/4/1/2/7/ (1-6)	/ / / / / /5/ (7-12)	/ / / / /2/0/ (13-18)
5 - 10 years	/ /2/2/6/4/4/ (19-24)	/ / / / / /8/ (25-30)	/ / / / /2/0/ (31-36)
More than 10 yrs.	/ /0/0/0/0/0/ (37-42)	/ / / / /0/0/ (43-48)	/ / / / /0/0/ (49-54)

Card 27
(79-80)

25. Present building capacity is:
(CAPCT(I))

(a) number of free stalls	/ / / /4/6/ (1-5)
(b) number of stanchions	/ / / / /0/ (6-10)
(c) milking parlor capacity (no. of men)	/ / / / /1/ (11-15)
(d) number of heifers and/or dry cows (max.)	/ / / /2/5/ (16-20)
(e) number of heifers under 1 yr. of age	/ / / /2/5/ (21-25)
(f) silage storage capacity - upright (tons)	/ / /3/7/5/ (26-30)
(g) silage storage capacity - horizontal (tons)	/ / /2/0/0/ (31-35)
(h) hay and straw storage capacity (tons)	/ / /1/4/0/ (36-40)
(i) ear corn storage (bushels)	/ /0/0/0/0/ (41-45)
(j) grain bin storage (bushels)	/ /5/0/0/0/ (46-50)
(k) high moisture corn storage (bu. dry equiv.)	/ / / / / / (51-55)

26. (a) Is additional capacity to be constructed as required (1=yes, 0=no):

(1) dairy cattle housing and silage capacity (BUILD) /0/ (56)

(2) grain storage (GSTOR) /0/ (57)

(3) hay and straw (HSTOR) /0/ (58)

(b) Is off-farm storage used for (0=not used, 1=used for all of crop, 2=used if farm capacity exceeded) (OFFS(I))

(1) fieldbeans /0/ (59)

(2) soybeans /1/ (60)

(3) wheat /2/ (61)

(4) shelled corn /0/ (62)

(5) oats /0/ (63)

(6) barley /0/ (64)

27. (a) Labor - hours available per month and number of workers (XLABOR(I,J))

Card	Number of Workers	Worker Type	Jan	Feb	Mar	Apr	May	June
			..................Hours available per worker....................					
28	////1/	Operator	//3/0/0/	//3/0/0/	//3/0/0/	//3/0/0/	//4/6/0/	//4/6/0/
29	////1/	Family	//1/2/0/	//1/2/0/	//1/2/0/	//1/2/0/	//1/2/0/	//1/2/0/
30	////1/	hired (1)	/////	/////	/////	/////	//3/0/0/	/////
31	////1/	hired (2)	/////	/////	/////	/////	/////	/////
32	/////	hired (3)	/////	/////	/////	/////	/////	/////
	Rate/hr.		................Hours available for specified wage....................					
33	/5/./0/0/	hourly (1)	/////	/////	/////	/////	/////	/////
34	/////	hourly (2)	/////	/////	/////	/////	/////	/////
35	/////	hourly (3)	/////	/////	/////	/////	/////	/////
(79-80)	(1-5)		(6-10)	(11-15)	(16-20)	(21-25)	(26-30)	(31-35)

Card	Worker Type	July	Aug	Sept	Oct	Nov	Dec
		......................Hours available per worker.........................					
28	Operator	//4/6/0/	//4/6/0/	//4/6/0/	//3/0/0/	//3/0/0/	//3/0/0/
29	Family	//1/2/0/	//1/2/0/	//1/2/0/	//1/2/0/	//1/2/0/	//1/2/0/
30	hired (1)	//2/0/0/	//1/0/0/	//2/0/0/	/////	/////	/////
31	hired (2)	/////	/////	/////	/////	/////	/////
32	hired (3)	/////	/////	/////	/////	/////	/////
		....................Hours available for specified wage......................					
33	hourly (1)	/////	/////	/////	/////	/////	/////
34	hourly (2)	/////	/////	/////	/////	/////	/////
35	hourly (3)	/////	/////	/////	/////	/////	/////
(79-80)		(36-40)	(41-45)	(46-50)	(51-55)	(56-60)	(61-65)

Card 36
(79-80)

(b) All additional labor will cost (per hour) (ADLABR) / /5/./0/0/ (1-5)

28. The wage rate for regular hired labor is:
(WAGERI(I,J))

Regular hired (1) = /3/3/3/./3/ (6-10) per /1/ (15) (1=month, 0-week)

Regular hired (2) = / / / / / / (16-20) per / / (25)

Regular hired (3) = / / / / / / (26-30) per / / (35)

Card 37
(79-80)

Crop yields. For questions 29 through 34 indicate the average yields that have been achieved when the crop is harvested on time. Indicate the fertilizer plant food applied to achieve these yields. Enter average yields, not "normal" or "good year" yields.

29. Oats planted in April

(PFOODO) (a) pounds of plant food applied / / / / /0/ (1-4)

(YIELDO) (b) yield (bushels per acre) / / / / /0/ (5-9)

30. Corn

(PERIOD) (a) planted in period (1=before May 1; 2=May 1-15; 3=May 16-31; 4=after May 31) / / (10)

(PFOODC) (b) pounds of plant food applied / / /3/0/0/ (11-14)

(YIELDC) (c) yield (bushels per acre) / / / /6/6/ (15-19)

31. Wheat planted in Sept

(PFOODW) (a) pounds of food applied at planting / / / /8/0/ (20-23)

(SPRNW) (b) pounds of nitrogen applied in spring / / /1/5/0/ (24-26)

(YIELDW) (c) yield (bushels per acre) / / / /2/0/ (27-31)

32.	**Hay** (PFOODH)	(a) pounds of plant food applied	/ / /1/0/0/	(32-35)
	(YIELD1)	(b) yield: tons of first cutting	/ /1/./3/1/	(36-39)
	(YIELD2)	tons of second cutting	/ / /./5/6/	(40-43)
	(YIELD3)	tons of third cutting	/ / / /./0/	(44-47)
33.	**Fieldbeans planted in June** (PFOODF)	(a) pounds of plant food applied	/ / /1/0/0/	(48-51)
	(YIELDF)	(b) yield (bushels per acre)	/ / / /2/0/	(52-56)
34.	**Soybeans planted in June** (YIELDS)	- yield (bushels per acre)	/ / / / /0/	(57-61)
35.	The number of hay cuttings (including pasturage) is (1, 2, or 3) (CUTS)		/2/	(62)
36.	The number of acres of hay crop pastured is:			
	(PAST1)	first cutting	/ / / /7/5/	(63-67)
	(PAST2)	second cutting	/ / / /7/5/	(68-72)
	(PAST3)	third cutting	/ / / / / /	(73-77)

Card 38
(79-80)

Barley planted in April (PFOODB)	(a) pounds of plant food	/ / /2/3/0/	(1-5)
(YIELDB)	(b) yield (bushels per acre)	/ / / /4/0/	(6-10)

Card 39
(79-80)

37. (a) The amount of hay crop silage to be harvested is[1]
(HCSHRV) / / /2/7/0/ (1-5)

(b) The amount of corn silage to be harvested is[1]
(CSHRV) / / /3/7/5/ (6-10)

(c) The amount of corn to be harvested as high moisture corn is[1]
(HMC) / / / / /0/ (11-15)

38. The beginning inventory on hand is
(CPINV(I))

(a) hay crop silage (tons, 70% moisture) / / / /1/5/ (16-20)

(b) corn silage (tons) / / / /1/5/ (21-25)

(c) hay (tons) / / / /2/7/ (26-30)

(d) high moisture corn (bushels dry equivalent) / / / / /0/ (31-35)

(e) ear corn (bushels) / / / / / / (36-40)

(f) corn grain (bushels) / / / / /0/ (41-45)

(g) wheat (bushels) / / / / / / (46-50)

(h) oats (bushels) / / / / / / (51-55)

(i) soybeans (bushels) / / / / / / (56-60)

(j) fieldbeans (bushels) / / / / /0/ (61-65)

(k) straw / / / / / / (66-70)

---

[1] Enter (1) -1 if enough is to be harvested to fill the silos or (2) the number of tons of silage per cow ($0 \leq$ tons ≤ 25) or the number of bushels (dry equivalent) of HMC per cow ($0 \leq$ bushels ≤ 200) if a certain amount per cow is desire or (3) the number of tons of silage (> 25) or bushels (dry equivalent) of HMC (> 200) to be harvested.

(l) supplement (tons) / / / /2/0/ (71-75)

(m) barley / /2/6/0/0/ (76-80)

Card 40
(79-80)

39. The amount of N, P_2O_5 and K_2O (lbs./acre) to be applied is:
(FERT(I,J))

	Lbs. N	Lbs. P_2O_5	Lbs. K_2O
(a) corn	/ /5/7/ (1-3)	/ /5/5/ (4-6)	/ /0/0/ (7-9)
(b) soybeans	/ / / / (10-12)	/ /0/0/ (13-15)	/ /0/0/ (16-18)
(c) fieldbeans	/ /1/1/ (19-21)	/ /5/5/ (22-24)	/ / / / (25-27)
(d) wheat	/ /7/8/ (28-30)	/ /4/4/ (31-33)	/ / /0/ (34-36)
(e) oats	/ /0/0/ (37-39)	/ /0/0/ (40-42)	/ /0/0/ (43-45)
(f) hay (seeding)	/ /0/0/ (46-48)	/ /0/0/ (49-51)	/ /0/0/ (52-54)
(g) hay (topdress)	/ /5/1/ (55-57)	/ /2/8/ (58-60)	/ /0/0/ (61-63)
(h) barley	/ /7/8/ (64-66)	/ /4/4/ (67-69)	/ / / / (70-72)

40. The Soil Management Group for this farm is (39=Group A, 40=Group B, 41=Group C, 54=very responsive soils):
(ASR) /4/0/ (64-65)

Card 41
(79-80)

41. Withdrawals - <u>If</u> the business is a <u>proprietorship</u> or <u>partnership</u>, indicate the total monthly withdrawal for the farm family (families). Exclude income taxes but include personal insurance.
(XLIVNG(I))

Jan	Feb	Mar	Apr	May	June
/ /8/0/0/	/ /8/0/0/	/ /8/0/0/	/ /8/0/0/	/ /8/0/0/	/ /8/0/0/
(1-5)	(6-10)	(11-15)	(16-20)	(21-25)	(26-30)

July	Aug	Sept	Oct	Nov	Dec
/ /8/0/0/	/ /8/0/0/	/ /8/0/0/	/ /8/0/0/	/ /8/0/0/	/1/0/0/0/
(31-35)	(36-40)	(41-45)	(46-50)	(51-55)	(56-60)

Card 42
(79-80)

42. If the business is a proprietorship, indicate:

(a) expected annual off-farm income
(OINCOM)
/ / / /0/0/0/
(1-6)

(b) number of exemptions for tax purposes
(EXM)
/ /6/
(7-8)

43. (a) Estimated taxes to be paid on income for year previous to simulation (for corporation include only corporate taxes).
(TAXEST)
/ /1/5/0/0/
(9-13)

(b) If the first month to be simulated is not January, indicate the estimated taxable income for the first part of the first year simulated.
(ESTINC)
/ / / / /0/
(14-19)

Card 43
(79-80)

44. (a) The depreciation method to be used (1=straight line, 2=double-declining balance, 3=150% declining balance)

(DEPRMD) Machinery /1/ (1)

(DEPRCT) Cattle /1/ (2)

(DEPRBL) Buildings /1/ (3)

(b) Is special 20% first year depreciation to be used. (1=yes, 0=no)
(SPECL)
/0/
(4)

45. The pension plan rate is (percent)
(PRT)
/ /0/5/
(5-7)

46. The form of business organization used is (1=proprietorship, 2=partnership, 3=Subchapter S corporation, 4=regular corporation).
(BUSFRM)
/1/
(8)

47. If the business is a regular corporation, the present level of retained earnings is: / / / / / / /0/
(RTEARN) (9-15)

48. If the business is a partnership, Subchapter S corporation, or regular corporation, provide the following salary and tax information.
(PINFO(I))

C A R D	Partner or Tax Family	Salary[1] or % of Profits[2]	Other Income	Number of Exemptions	Percent of Shares Owned[1]	Annual Residence Value[1]	Health Insurance[1]
44	1	/ / / / / /	/ / / / / /	/ /	/ /	/ / / /	/ / /
45	2	/ / / / / /	/ / / / / /	/ /	/ /	/ / / /	/ / /
46	3	/ / / / / /	/ / / / / /	/ /	/ /	/ / / /	/ / /
47	4	/ / / / / /	/ / / / / /	/ /	/ /	/ / / /	/ / /
48	5	/ / / / / /	/ / / / / /	/ /	/ /	/ / / /	/ / /
(79-80)		(1-6)	(7-12)	(13-14)	(15-17)	(18-22)	(23-26)

[1] Regular or Subchapter S Corporations only.

[2] Partnerships only.

49. (a) Current debts outstanding are:
(DEBT(I,J))

C A R D	Balance Due	Interest Rate (%)	No. Payments /yr.	Amount of Payment[1]	Type of Loan[2]	Term of Loan[3]	Months Payments are to be made[4]						Age of[5] Loan (mo.)	Loan Period (yr.)
							1	2	3	4	5	6		
49	////6/0/0/0/0	/1/4/./0	1/2	////1/0/0/0	0/2	3	/0	/	/	/	/	/	//0	//5
50	////1/5/0/0/0	/1/4/./0	/2	////2/5/0/0	0/2	2	/3	/8	/	/	/	/	//0	//3
51	/////8/0/0/0	/1/4/./0	1/2	////2/0/0/0	0/2	1	/0	/	/	/	/	/	//6	//1
52	////////	////	/	///////	/		/	/	/	/	/	/	//	//
53	////////	////	/	///////	/		/	/	/	/	/	/	//	//
54	////////	////	/	///////	/		/	/	/	/	/	/	//	//
55	////////	////	/	///////	/		/	/	/	/	/	/	//	//
56	////////	////	/	///////	/		/	/	/	/	/	/	//	//
(79-	(1-9)	(10-14)	(15-16)	(17-24)	(25-26)	(27)	(28-29)	(30-31)	(32-33)	(34-35)	(36-37)	(38-39)	(40-42)	(43-45)

(b) Current cash and checking account balance is /////5/0/0/0/
(CASH) (46-53)

Card 57 - blank
(79-80)

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[1] Includes principal and interest for equal payment loans but only principal for loans requiring constant principal payment plus interest accumulated. May be omitted if age of loan and loan period are both entered.

[2] 1=equal payments including principal and interest; 2=amount of payment is principal, interest due is added; 11=pay interest only first year and equal payments thereafter; 12=pay interest only first two years and equal payments thereafter; 13=pay interest only first three years and equal payments thereafter; 14=pay interest only first four years and equal payments thereafter; 15=pay interest only first five years and equal payments thereafter; 21=pay interest only first year and principal payments plus interest thereafter; 22=pay interest only first two years and principal payment plus interest thereafter; 23=pay interest only first three years and principal payments plus interest thereafter; 24=pay interest only first four years and principal payments plus interest thereafter; 25=pay interest only first five years and principal payment plus interest thereafter.

[3] 1=short term; 2=intermediate term; 3=long term.

[4] Enter months in which payments are to be made. Zero in column 1 indicates monthly payments.

[5] Required only when amount of payment is not entered and when type of loan is 11-15 or 21-25. This is the number of months between the date the loan was made and the first month simulated.

[6] Years, required only when type of loan is 11-15 or 21-25 and when amount of payment is not entered.

Machinery and Housing System Descriptions

To be used in answering question 19, (Input Form Part A). Choose the systems that most nearly represent the farm being simulated.

Livestock Systems

System Number	Dairy Cows
1	Stanchion or tie stall barn with gutter cleaner, milk transfer system, bulk tank and silo unloader.
2	Cold covered free stall system, herringbone parlor, manure scraper and silo unloader.
3	Warm covered free stall system, herringbone parlor, manure scraper and silo unloader.
4	Cold covered free stall system, herringbone parlor, liquid manure and silo unloader.
5	Warm covered free stall system, herringbone parlor, liquid manure and silo unloader.
6	Loose housing open lot, herringbone parlor, manure scraper and silo unloader.
7	User defined.
	Dairy Replacements
8	Conventional pens cleaned by manure loader, silage fed to older animals. In outside lots during summer.
9	Free stalls for animals over 6-9 months, manure scraper into conventional spreader, silage fed.
10	User defined.

Crop Grow Systems

System Number	Corn Grow - April, May and June Planting
1, 5, 9	2 row system, 2, 3 and 4 plow tractors, 3-16" plow, 10' disc, 12' harrow, 1 spray, 1 cultivation.
2, 6, 10	4 row system, 2, 3 and 4 plow tractors, 4-16" plow, 12' disc, 12' harrow, 1 spray, 1 cultivation, fertilizer spreader.

System Number	
3, 7, 11	6 row system, 2, 3, 4 and 5 plow tractors, 5-16" plow, 16' disc, 16' harrow, 1 spray, 1 cultivation, fertilizer spreader.
4, 8, 12	User defined.
	Wheat Grow - September and/or October Planting
13, 16	2, 3 and 4 plow tractors, 4-16" plow, drill, 12' disc 12' harrow, compatible with 2 or 4 row corn grow system.
14, 17	Large equipment, compatible with 6 row corn grow, 2, 4 and 5 plow tractors, 16' disc, 16' harrow, drill.
15, 18	User defined.
	Oats Grow - April and/or May Planting
19, 22	2, 3 and 4 plow tractors, 4-16" plow, drill. Compatible with 2 or 4 row corn grow system.
20, 23	Large equipment. Compatible with 6 row corn grow, 2, 4, 5 plow tractors, 16' disc, 16' harrow, drill, 5-16" plow.
21, 24	User defined.
	Hay Crop Plant
25	Direct seeding, 2, 3 and 4 plow tractors, 4-16" plow, drill, 12' disc, 12' harrow, compatible with 2 or 4 row corn grow.
26	Direct seeding, 2, 4 and 4 plow tractors, 5-16" plow, 16' disc, 16' harrow, drill. Compatible with 6 row corn grow.
27	Companion crop, spring seeding, 2 plow tractor, seeder.
28	User defined.
	Hay Crop Maintain
29	Fertilizer spreader for summer application.
30	User defined.
	Fieldbean Grow - May and/or June Planting
31, 34	4 row, spray, 1 cultivation, 2, 3 and 4 plow tractors, 4-16" plow, 12' disc, 12' harrow.
32, 35	6 row, sprayer, 1 cultivation, 2, 3, 4 and 5 plow tractors, 16' disc, 16' harrow, 5-16" plow.
33, 36	User defined.

System Number	Soybean Grow - May and/or June Planting
37, 40	4 row, 2, 3 and 4 plow tractors, spray, cultivate, 12' disc, 12' harrow, 4-16" plow.
38, 41	6 row, 2, 4 and 5 plow tractors, 16' disc, 16' harrow, 5-16" plow, spray, 1 cultivation.
39, 42	User defined.
	Barley Grow - April and/or May Planting
43, 46	2, 3 and 4 plow tractors, 4-16" plow, drill. Compatible with 2 or 4 row corn grow system.
44, 47	Large equipment. Compatible with 6 row corn grow, 2, 4, 5 plow tractors, 16' disc, 16' harrow, drill, 5-16" plow.
45, 48	User defined.

Harvest Systems

System Number	Corn Silage Harvest
1	Custom harvest, all men and machines provided by the custom operator.
2	1 row chopper, 2, 3 and 4 plow tractors, unloading wagons, blower.
3	2 row chopper, 2, 3 and 4 plow tractors, unloading wagons and blower.
4	Self propelled chopper, 2 and 3 plow tractors, unloading wagons, blower.
5	User defined.
	Corn Grain Harvest
6	Custom, custom combine and trucks, man and elevator required for unloading.
7	1 row picker, 2 and 3 plow tractor, grain wagons, elevator.
8	2 row picker, 3 and 4 plow tractors, grain wagons, elevator.
9	2 row combine, 3 plow tractor, grain wagons, elevator.
10	3 row combine, 3 plow tractor, 2 grain wagons, elevator.
11	User defined.

System Number	Wheat Harvest
12	Custom hire of combining and trucks, one man and elevator required.
13	S.P. Combine, spread straw, grain wagons, 2 plow tractor, elevator.
14	S.P. Combine, bale straw, grain wagons, hay wagons, 2 and 4 plow tractors, grain elevator, hay elevator, baler.
15	User defined.
	Oats Harvest
16	Custom combine, one man and elevator required.
17	S.P. Combine, spread straw, grain wagons, 2 plow tractor, elevator.
18	S.P. Combine, bale straw, grain wagons, hay wagons, 2 and 4 plow tractors, grain elevator, hay elevator, baler.
19	User defined.
	Hay Crop Silage Harvest
20	Mow, crush, rake, chop with 1 row corn chopper with hay head, 2 unloading wagons, blower, 2, 3 and 4 plow tractors.
21	Windrower, chop with 2 row corn chopper with hay head, 2 unloading wagons, blower, 2, 4 and 5 plow tractors.
22	Windrower, S.P. Chopper, 2 unloading wagons, blower, 2 and 4 plow tractors.
23	Windrower, 1 row chopper with hay head, 2 unloading wagons, blower, 2, 3 and 4 plow tractors.
24	User defined.
	Hay Harvest
25	Mower, crusher, rake, baler, wagons, load behind the baler, elevator. Hand bale handling.
26	Windrower, bale with kicker, user mow conveyor, elevator, wagons.
27	PTO windrower, bale with kicker, place bales in mow by hand.
28	User defined.

System Number	Fieldbean Harvest
29	Custom combine, 4 row pull, rake, 2 and 3 plow tractors, grain elevator.
30	4 row pull rake, combine with bean head, 2 and 3 plow tractors, grain elevator, grain wagons.
31	6 row pull, rake, bean combine, 2 and 3 plow tractors, grain elevator, grain wagons.
32	User defined.
	Soybeans Harvest
33	Custom combine, 1 man and elevator for unloading.
34	Combine, elevator, grain wagons, 2 plow tractor.
35	User defined.
	Barley Harvest
36	Custom combine, one man and elevator required.
37	S.P. Combine, spread straw, grain wagons, 2 plow tractor, elevator.
38	S.P. Combine, bale straw, grain wagons, hay wagons, 2 and 4 plow tractors, grain elevator, hay elevator, baler.
39	User defined.

C.3 CODES AND RELEVANT INFORMATION FOR CHANGES TO THE BASE DATA FILE (SECTION 2)

Section 2

Coefficients Assumed by Model

The statements and tables below define variables which are used in the program. The value found in the upper half of the matrix cell or in parentheses preceeding the line is the identification number for that variable. The number in the bottom of the matrix cell or on the line is the value used by the program unless it is changed. Zero means a statement is not used. Changes in these values are made by entering a type 01 coefficient changes management decision, to occur during the first month simulated.

The statements and tables in this part have been ordered so that those questions most important for most problem situations come first and those least likely to require change appear last. It is suggested that the first 68 questions be carefully evaluated by most users.

1. The opportunity value of operator's labor is (1-362) $10,000.
(VOLABR)

2. The opportunity value of family labor (per hour) is (1-363) $5.00.
(VFLABR)

3. The opportunity rate of interest (percent) on equity investment in the farm business in (1-364) 13.0.
(EQINT)

Purchases and Sales

4. Sell all hay in excess of (1-365) .5 tons per cow in month (1-366) 6.
(EXSHAY) (SELMOH)

5. In month (1-367) 4 sell all corn grain in excess of (1-368) 6.0 times the amount of corn used during that month.
(SELMOC) (EXSC)

6. (a) In month (1-369) 4 sell all oats in excess of (1-370) 4 times the amount of oats used during that month.
(SELMOO) (EXSO)

(b) In month (1-393) 4 sell all barley in excess of (1-672) 4 times the amount of barley used during that month.
(SELMOB) (EXSB)

7. (a) Sell all wheat in month (1-371) 2[1]
(b) Sell all corn in month (1-372) 0[1]
(c) Sell all oats in month (1-373) 0[1]
(d) Sell all soybeans in month (1-374) 3[1]
(e) Sell all fieldbeans in month (1-375) 2[1]
(f) Sell all barley in month (1-673) 0
(SELMO) (SELMO6)

---

[1] Use 13 to indicate sale of entire crop at harvest.

8. Purchase (1-389) 0 bushels of shelled corn grain in month (1-390) 10.
(CORNBT) (BTMOC)

9. Purchase (1-391) 0 bushels of high moisture corn in month (1-392) 10.
(HMCBT) (BTMHMC)

10. Purchase (2-3215) 0 tons of supplement in month (2-3216) 11. (If the number of tons entered is less than 2.0, that much supplement per cow will be purchased.)
(TONSUP) (SUPMO)

11. In each year the following number of cows or bred heifers (1 = bred heifers, 2 = fresh cows) (1-405) 0 are to be purchased in the month indicated[1] at an average age of (1-406) 27 months.
(CWORBH) (AGEBT)

Jan. (1-407) 0
Feb. (1-408) 0
Mar. (1-409) 0
Apr. (1-410) 0
May (1-411) 0
June (1-412) 0

July (1-413) 0
Aug. (1-414) 0
Sept (1-415) 0
Oct. (1-416) 0
Nov. (1-417) 0
Dec. (1-418) 0

(XNBRT)

Loan Terms

12. Standard loan terms for intermediate term credit used to purchase machinery and livestock are:
(PERODI) (RATEI) (TYPEI) (PMISI)

(a) Period of loan in years (1-438) 10.
(b) Interest rate in percent (1-439) 13.
(c) Type of loan[2] (1-440) 3.
(d) Payments per year[3] (1-441) 4.

13. Intermediate term loans are defined as loans with loan period greater than (1-442) 15 year(s) and up through (1-443) 15 years. Loans with shorter loan periods are short term loans. Loans with longer loan periods are long term loans.
(STMAX) (XITMAX)

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[1] It is assumed that bred heifers are purchased the month prior to freshening and fresh cows the month of freshening.

[2] 1 = short term, 2 = intermediate term, 3 = long term.

[3] May be 1, 2, 3, 4, 6 or 12.

14. Standard loan terms for long term credit used for land and building purchase are:
(PERODL) (RATEL) (TYPEL) (DEPRLF) (PMTSL)

(a) Period of loan in years (1-444) 20
(b) Interest rate in percent (1-445) 1.3
(c) Type of loan (1-446) 3
(d) Depreciation life (building) (1-447) 20
(e) Payments per year (1-448) 12

15. Interest rate on short term capital in percent in (1-449) 13.
(SRATE)

16. (a) Minimum checking account balance to be maintained is (1-450) $100.
(BALMIN)

(b) Money remaining in the checking account at the end of the month in excess of (1-451) $1,000 is used to reduce debt.
(BALMAX)

Cropping Program

17. The percentage of the hay crop that is reseeding each year is (1-625) 20.
(RESEED)

18. The cost, labor and machinery requirements for 2nd and 3rd cuttings as a percent of 1st cutting requirements are:
(CUTCOF)

Hay	Hay Crop Silage
2nd cutting (1-626) 65	1(628) 75
3rd cutting (1-627) 50	1(629) 65

19. Hay equivalent produced by pasture is used as follows:
(PASTHE)

(a) 1st cutting (1-394) 35% May (1-395) 50% June (1-396) 15% July.

(b) 2nd cutting with 2 cut system (1-397) 30% July (1-398) 50% Aug. (1-399) 20% Sept.

(c) 2nd cutting with 3 cut system (1-400) 60% July (1-401) 40% Aug.

(d) 3rd cutting (1-402) 60% Aug. (1-403) 40% Sept.

20. (a) The loss in feeding value when hay crop is harvested as pasture rather than hay is (2-3208) 8 percent.
(PLOSS)

(b) The gain in feeding value when hay crop is harvested as hay crop silage rather than hay is (2-3209) 15 percent.
(HSAV)

21. (a) The wheat straw yield is (2-2826) .4 .
(WSYELD)

(b) The oat straw yield is (2-2827) .75.
(OSYELD)

(c) The barley straw yield is .25.
(BSYELD)

22. The percentage of total acreage planted or harvested during each month and the relative yield coefficients for different planting and harvesting dates are:
(CROPCO(I, J))

	% of Crop	Relative Yield
Corn planted in April	(1-489) 0	(1-537) 100
May 1-15	(1-490) 40	(1-538) 102
May 15-30	(1-491) 55	(1-539) 90
June	(1-492) 5	(1-540) 79
Oats planted in April	(1-493) 50	(1-541) 100
May	(1-494) 50	(1-542) 100
Wheat planted in Sept.	(1-495) 50	(1-543) 100
Oct.	(1-496) 50	(1-544) 100
Soybeans planted in May	(1-497) 50	(1-545) 90
June 1-15	(1-498) 50	(1-546) 100
after June 15	(1-499) 0	(1-547) 85
Fieldbeans planted in May	(1-500) 0	(1-548) 100
June	(1-501) 100	(1-549) 100
Corn silage harvest in Sept.	(1-502) 50	(1-550) 100[1]
Oct.	(1-503) 50	(1-551) 100
Nov.	(1-504) 0	(1-552) 94
Corn grain harvest in Oct.	(1-505) 50	(1-553) 100[1]
Nov.	(1-506) 50	(1-554) 95
Dec.	(1-507) 0	(1-555) 90
Wheat harvest in July	(1-508) 100	(1-556) 100[1]
Aug.	(1-509) 0	(1-557) 100
Oat harvest in July	(1-510) 0	(1-558) 100
Aug.	(1-511) 100	(1-559) 100

---

[1] Relative yield for harvest of this crop must relate to the yield input in Part I. That is, if the yield input assumed harvest in a particular month (Sept.) then the relative yield for that harvest month must equal 100.

	% of Crop	Relative Yield
Soybean harvest in Sept.	(1-512) 50	(1-560) 100[1]
Oct.	(1-513) 50	(1-561) 100
Fieldbean harvest in Aug.	(1-514) 0	(1-562) 100[1]
Sept.	(1-515) 25	(1-563) 100
Oct.	(1-516) 75	(1-564) 100
1st cutting Hay crop		
Silage harvest in May	(1-517) 15	(1-565) 100[1]
June	(1-518) 85	(1-566) 100
July	(1-519) 0	(1-567) 75
2nd cutting hay crop		
Silage harvested in July	(1-520) 75	(1-568) 100[1]
Aug.	(1-521) 25	(1-569) 100
Sept.	(1-522) 0	(1-570) 100
3rd cutting Hay crop		
Silage harvested in Aug.	(1-523) 60	(1-571) 100[1]
Sept.	(1-524) 40	(1-572) 100
1st cut Hay harvested in May	(1-525) 0	(1-573) 100[1]
June	(1-526) 75	(1-574) 100
July	(1-527) 25	(1-575) 75
2nd cut Hay harvested in July	(1-528) 45	(1-576) 100[1]
Aug.	(1-529) 55	(1-577) 100
Sept.	(1-530) 0	(1-578) 100
3rd cut Hay harvested in Aug.	(1-531) 60	(1-579) 100[1]
Sept.	(1-532) 40	(1-580) 100
Barley planted in April	(1-533) 40	(1-581) 100
May	(1-534) 60	(1-582) 100
Barley harvested in Aug.	(1-535) 80	(1-583) 100
Sept.	(1-537) 20	(1-584) 100

23. Specific Variable Crop Costs Per Acre (SVCC)

Cost Item	Corn	Wheat	Oats	Soy-beans	Field-beans	Seed Hay	Hay	Barley
Seed	1-585 10.20	1-590 7.30	1-595 3.12	1-600 4.50	1-605 27.60	1-610 4.46	1-615 --	1-620 3.12
Pesticide	1-596 24.91	1-591 14.87	1-596 9.89	1-601 5.00	1-606 8.12	1-611 0	1-616 0	1-621 9.89

(Continued)

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[1] Relative yield for harvest of this crop must relate to the yield input in Section I. That is, if the yield input assumed harvest in a particular month (Sept.) then the relative yield for that harvest month must equal 100.

Cost Item	Corn	Wheat	Oats	Soy-beans	Field-beans	Seed Hay	Hay	Barley
Other Variable (grow)[1]	1-587 2.89	1-592 2.50	1-597 1.22	1-602 3.10	1-607 3.40	1-612 4.59	1-617 2.09	1-622 1.22
Other Variable (harvest)[1]	1-588 3.95	1-593 3.94	1-598 4.14	1-603 1.75	1-608 4.63	1-613 --	1-618 2.50	1-623 4.14
Other Variable (silage harvest)[1]	1-589 1.00	1-594 --	1-599 --	1-604 --	1-609 --	1-614 --	1-619 1.00	1-624 --

Operating Expense and Income

24. (a) Milk hauling charge per cwt. is (1-487) $0 .
(HAULMK)

(b) Milk is picked up (1 = every other day, 0.5 = every day)
(1-488) 1 .
(PKUP)

25. Annual dairy herd costs per cow for

(BRDFEE)	breeding fees	(1-484)	19.50
(ZVET)	Vet., Medicine	(1-485)	25.00
(OTHERD)	Other dairy	(1-486)	36 .

26. Cost per newborn heifer calf for milk replacer, feed supplement, antibiotics, etc., is (1-455) $22 .
(REPLAC)

27. Monthly utility expenses are (1-633) $1.25 per cow per month.
(UTILRT)

28. Annual miscellaneous expenses are (1-634) $60 plus (1-635) 4.3 percent of other cash operating expenses (excluding interest).
ZMISC(1)) (XMISC(2))

29. Property taxes are (1-636)[2] 1.97.
Months paid are (1-651) 10 and (1-638) 2 .
(PTYTAX) (TAXM1) (TAXM2)

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[1] Excluding labor, machinery, equipment and fertilizer, i.e., crop insurance, drying costs, overhead misc.

[2] Use a number between 0 and 10 for per acre owned value. If a number greater than 10 is used this will be assumed to be the total annual tax bill.

30. Expenses for conservation and fence repair are (1-639) $0.75 per tillable acre for conservation plus (1-640) $1.00 per acre of crop land pasture.
(ZCONS1) (ZCONS2)

31. Land rent is paid in the months of (1-641) 5 and (1-642) 11.
(RENTM1) (RENTM2)

32. The landlord share for share rent acreage is (1-643) 0.
(SHARE)

33. Price per pound for fertilizer
(PRICEN) (PRICEP) (PRICEK)

N is	(1-644)	20.2	cents
P_2O_5 is	(1-645)	20.2	cents
K_2O is	(1-646)	8.4	cents

34. Cost of hauling the following commodities is:
(HAUL)

Hay or straw (per ton)	(1-376)	7.00
Corn grain (per bu.)	(1-377)	.08
Oats (per bu.)	(1-378)	.05
Wheat (per bu.)	(1-379)	.09
Soybeans (per bu.)	(1-380)	.08
Fieldbeans (per cwt.)	(1-381)	.15
Barley (per bu.)	(1-382)	.09

35. Off-farm storage cost per month is:
(STORE)

Corn grain (per bu.)	(1-383)	.015
Oats (per bu.)	(1-384)	.015
Wheat (per bu.)	(1-385)	.015
Soybeans (per bu.)	(1-386)	.015
Fieldbeans (per cwt.)	(1-387)	.02
Barley (per bu.)	(1-388)	.015

36. Custom harvest rates per acre are
(CUSTOM)

(a) Corn silage	(2-2634)	35.69
(b) Corn grain	(2-2635)	21.42
(c) Wheat	(2-2636)	12.85
(d) Oats	(2-2637)	12.85
(e) Fieldbeans	(2-2638)	35.69
(f) Soybeans	(2-2639)	12.85
(g) Barley	(2-2640)	12.85

37. (a) Machinery is insured at (2-2591) 100 percent of depreciated value.
(PCTINM)

(b) Machinery insurance cost as percent of amount of insurance is (2-2592) .782.
(RTINSM)

(c) Months insurance is paid (2-599) 3 (2-600) 9.
(XINMO1) (XINMO2)

38. (a) Amount of building insurance as a percent of new value is (1-661) .60.
(BIAMT)

(b) Building insurance rate as a percent of amount of insurance is (1-662) .65.
(BINSRT)

(c) Fire insurance on buildings, livestock and produce is paid during the month of (1-633) 3.
(XINSMO)

39. (a) Cost of insurance on livestock is (2-3211) 9.89 per $1,000 value.
(LVINS)

(b) Cost of insurance on produce and supplies is (2-3212) $14.95 per $1,000 value.
(SUPINS)

40. The market value of new buildings is (1-647) 60 percent of the purchase price.
(EQUITY)

41. (a) Distribution of Building Maintenance Repair Cost and Labor Requirements.
(BLDRD)

Month

	Jan	Feb	Mar	Apr	May	June
% of annual total	1-648 7	1-649 8	1-650 10	1-651 11	1-652 8	1-653 5

(Continued)

	July	Aug	Sept	Oct	Nov	Dec
% of annual total	1-654 8	1-655 9	1-656 8	1-657 8	1-658 8	1-659 10

(b) Annual building repair cost as a percent of new value is (1-660) 2.5.
(BREPAR)

42. Average sale weight per animal (pounds) is:
(CALFWT) (COWWT) (STERWT)

(a) Dairy calves (2-2823) 100
(b) Cull cows (2-2824) 1,300
(c) Steer (2-2825)

43. Ag program payments are (1-630)[1] $0. Months payments are received is (1-631) 5 and (1-632) 11.
(GOVTPA) (GOVTMD) (GOVTMZ)

44. Machinery sold is valued at (2-2593) 90 percent of its depreciated value.
(VMSOLD)

45. All machines have a (2-598) 10 percent salvage value.
(SALVAG)

46. (a) Income from the sale of land is distributed over (2-3213) 3 years.
(TAXYRS)

(b) Annual income from the sale of land is received in month (2-3214) 3.
(CLDMO)

(c) For tax purposes, cows are depreciated over (2-3220) 5 years and assumed to have a depreciated value of (2-3221) $200.

(d) The investment credit rate is (2-3222) 13 percent.
(RTIVCD)

---

[1] Use a number between 0 and 10 for per crop acre value. If a number greater than 10 is used this will be assumed to be the total annual farm Ag. program payment.

(e) The method of accounting is (2-3224) 1.0 (1 = cash, 2 = accrual) and if the accrual method of accounting is used, inventory values for cattle are:
(ACCMD)

1. Animals born during current tax year (2-3225) $125.
(ACRUV)

2. Animals one year of age to freshening (2-3226) $800.

3. Animals at freshening (2-3227) $1,200.

Mortality and Feed Requirements

47. (a) Calf mortality rate is (1-434) 15 percent.
(CMORTL)

(b) Heifer mortality rate is (1-435) 2 percent.
(HMORTL)

(c) Percent of heifers sold for infertility is (1-436) 4.
(XINFRT)

(d) Conception rate for heifers is (1-437) 70.
(CONCEP)

48. (a) Approximately (2-3186) 2.8 percent of the cow herd is expected to die each year.
(CWMORT)

(b) Approximately (2-3187) 4.1 percent of the cow herd will be sold because of physical injury or disease each year. These animals are sold at one-half the price of normal animals.
(SINVOL)

49. Dairy Herd Forage and Grain Requirements.

Level of Grain Feeding (lbs.)			Tons H.E. Required	
1	(2-601)	2,000	(2-613)	7.0
2	(2-602)	2,500	(2-614)	6.9
3	(2-603)	3,000	(2-615)	6.8
4	(2-604)	3,500	(2-616)	6.6
5	(2-605)	4,000	(2-617)	6.4
6	(2-606)	4,500	(2-618)	6.2
7	(2-607)	5,000	(2-619)	6.0
8	(2-608)	5,500	(2-620)	5.8
9	(2-609)	6,000	(2-621)	5.6
10	(2-610)	6,500	(2-622)	5.3
11	(2-611)	7,000	(2-623)	5.1
12	(2-612)	7,500	(2-624)	4.8

50. (a) The average amount of feed in pounds fed per month to heifers under 12 months of age is (1-452) 120 .
(CALFED)

(b) Annual hay equivalent requirements (tons) for heifers:

Birth to 12 months (1-453) 1.5 .
12 months to freshening (1-454) 4.0 .
(CALFHE) (HEIFHE)

51. Straw Requirements for Cows Per Animal Per Season
(STRAWR)

Season	Machinery and Housing System Number						
	1	2	3	4	5	6	7
Winter (Oct.-Apr.)	1-456 .5	1-460 .2	1-464 .2	1-468 .2	1-472 .2	1-476 .6	1-480 0
Summer (May Sept.)	1-457 0	1-461 .05	1-465 .05	1-469 .05	1-473 .05	1-477 .4	1-481 0

52. Straw Requirements for Heifers Per Animal Per Season (STRAWR)

	Age of Animals					
	Under One Year			Over One Year		
Season	System 8	System 9	System 10	System 11	System 12	System 13
Winter (Oct.-Apr.)	1-458 .2	1-462 .10	1-466 0	1-470 .40	1-474 .15	1-478 0
Summer (May-Sept.)	1-459 .15	1-463 .05	1-467 0	1-471 0	1-475 0	1-479 0

53. Monthly Price Coefficients[1] and Average Price Levels (PRICE(I,J))

Month	Milk (cwt.)	Corn (bu.)	Wheat (bu.)	Oats (bu.)	Dry Beans (cwt.)	Soy-beans (bu.)	Hay (ton)	Cull Cows (cwt.)	Dairy Calves (cwt.)	Milk Cows (head)	Straw (ton)	Supple-ment (tons)	Barley (bu.)
Jan.	2-2641 .99	2-2654 1.00	2-2667 1.04	2-2680 1.04	2-2693 1.02	2-2706 1.02	2-2719 1.00	2-2732 .89	2-2745 .90	2-2758 .98	2-2771 1.03	2-2784 .99	2-2797 1.04
Feb.	2-2642 .99	2-2655 1.02	2-2668 1.05	2-2681 1.05	2-2694 1.03	2-2707 1.02	2-2720 1.01	2-2733 .95	2-2746 .98	2-2759 .98	2-2772 1.03	2-2785 1.00	2-2798 1.05
Mar.	2-2643 .95	2-2656 1.02	2-2669 1.05	2-2682 1.04	2-2695 1.03	2-2708 1.02	2-2721 1.02	2-2734 1.00	2-2747 .94	2-2760 .98	2-2773 1.04	2-2786 .99	2-2799 1.04
Apr.	2-2644 .92	2-2657 1.01	2-2670 1.01	2-2683 1.04	2-2696 1.04	2-2709 1.03	2-2722 1.04	2-2735 1.01	2-2748 .97	2-2761 .99	2-2774 1.05	2-2787 .98	2-2800 1.04
May	2-2645 .90	2-2658 1.03	2-2671 1.00	2-2684 1.05	2-2697 1.05	2-2710 1.05	2-2723 1.00	2-2736 1.06	2-2749 1.06	2-2762 .99	2-2775 1.04	2-2788 .98	2-2801 1.05
June	2-2646 .89	2-2659 1.03	2-2672 .98	2-2685 1.04	2-2698 .99	2-2711 1.04	2-2724 .97	2-2737 1.14	2-2750 1.10	2-2763 .98	2-2776 1.00	2-2789 1.00	2-2802 1.04
July	2-2647 .98	2-2660 1.03	2-2673 .96	2-2686 .98	2-2699 .98	2-2712 1.03	2-2725 .94	2-2738 1.10	2-2751 1.06	2-2764 1.00	2-2777 .90	2-2790 1.01	2-2803 .98
Aug.	2-2648 1.05	2-2661 1.00	2-2674 .92	2-2687 .89	2-2700 .99	2-2713 1.05	2-2726 .96	2-2739 1.05	2-2752 1.01	2-2765 1.01	2-2778 .90	2-2791 1.02	2-2804 .89
Sept.	2-2649 1.09	2-2662 .99	2-2675 .95	2-2688 .93	2-2701 .93	2-2714 .92	2-2727 .99	2-2740 .99	2-2753 1.03	2-2766 1.03	2-2779 .95	2-2792 1.02	2-2805 .93
Oct.	2-2650 1.10	2-2663 .94	2-2676 .97	2-2689 .94	2-2702 .91	2-2715 .93	2-2728 1.01	2-2741 .96	2-2754 1.01	2-2767 1.01	2-2780 1.01	2-2793 1.02	2-2806 .94

53. (Cont'd) Monthly Price Coefficients and Average Price Levels

Month	Milk (cwt.)	Corn (bu.)	Wheat (bu.)	Oats (bu.)	Dry Beans (cwt.)	Soy-beans (bu.)	Hay (ton)	Cull Cows (cwt.)	Dairy Calves (cwt.)	Milk Cows (head)	Straw (ton)	Supple-ment (ton)	Barley (bu.)
Nov.	2-2651 1.08	2-2664 .95	2-2677 1.02	2-2690 .99	2-2703 .96	2-2716 .94	2-2729 1.03	2-2742 .91	2-2755 1.02	2-2768 1.02	2-2781 1.02	2-2794 .99	2-2807 .99
Dec.	2-2652 1.06	2-2665 .98	2-2678 1.05	2-2691 1.01	2-2704 1.07	2-2717 .95	2-2730 1.03	2-2743 .94	2-2756 1.03	2-2769 1.03	2-2782 1.03	2-2795 1.00	2-2808 1.01
Average Price ($)	2-2653 11.99	2-2666 3.27	2-2679 4.48	2-2682 1.40	2-2705 7.00	2-2718 2.40	2-2731 38.00	2-2744 27.67	2-2757 97.28	2-2770 719.42	2-2783 24.00	2-2796 210.00	2-2809 2.46

[1] Monthly price coefficients indicate the percent (expressed as a decimal) that the monthly price is of the average annual price. That is, if the average price of milk is $11.99 per cwt. and the January price coefficient is .99, the January milk price is $11.87.

54. Dairy Herd Labor Requirements - hours per cow per year
(DCS)

No. of Cows	Dairy Cow System						
	1	2	3	4	5	6	7
Less than 30	2-781 100	2-786 60	2-791 60	2-796 59	2-801 59	2-806 66	2-811 0
31 - 49	2-782 90	2-787 52	2-792 52	2-797 51	2-802 51	2-807 57	2-812 0
50 - 79	2-783 80	2-788 48	2-793 48	2-798 46	2-803 46	2-808 53	2-813 0
80 - 149	2-784 70	2-789 45	2-794 45	2-799 43	2-804 43	2-809 50	2-814 0
150 and over	2-785 70	2-790 42	2-795 42	2-800 39	2-805 39	2-810 46	2-815 0

55. Livestock Monthly Labor Distribution Coefficients - Percent (expressed as decimal) of Average Monthly Requirement[1]
(XMDC)

Animal	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cows	2-816 1	2-818 1	2-820 1	2-822 1	2-824 1	2-826 1	2-828 1	2-830 1	2-832 1	2-834 1	2-836 1	2-838 1
Heifers	2-817 1.2	2-819 1.2	2-821 1.2	2-823 1.2	2-825 .8	2-827 .8	2-829 .8	2-831 .8	2-833 .8	2-835 .8	2-837 1.2	2-839 1.2

56. Annual Labor Requirements (hours) for Dairy Replacements
(DRS)

Age of Heifers	Dairy Replacement System Number		
	8	9	10
Under 12 months	2-840 15	2-842 13	2-844 0
12 mo. to fresh	2-841 10	2-843 8	2-845 0

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[1] Weighted average value for the year must equal 1. For example, data indicate that stanchion systems for cows might use - 1.2 for months 11, 12, 1, 2, 3, 4, and .8 for months 5, 6, 7, 8, 9, 10.

57. Crop Systems Annual Labor Requirements (CPS(I))

System	Hours
Corn Grow, April, 2-row	(2-846) 4.31
Corn Grow, April, 4-row	(2-847) 3.56
Corn Grow, April, 6-row	(2-848) 2.76
Corn Grow, April, User	(2-849)
Corn Grow, May, 2-row	(2-850) 4.31
Corn Grow, May, 4-row	(2-851) 3.56
Corn Grow, May, 6-row	(2-852) 2.76
Corn Grow, May, User	(2-853)
Corn Grow, June, 2-row	(2-854) 4.31
Corn Grow, June, 4-row	(2-855) 3.56
Corn Grow, June, 6-row	(2-856) 2.76
Corn Grow, June, User	(2-857)
Wheat Grow, Sept., 2-4 row	(2-858) 1.93
Wheat Grow, Sept., 6-row	(2-859) 1.81
Wheat Grow, Sept., User	(2-860)
Wheat Grow, Oct., 2-4 row	(2-861) 1.93
Wheat Grow, Oct., 6-row	(2-862) 1.81
Wheat Grow, Oct., User	(2-863)
Oats Grow, April, 2-4 row	(2-864) 1.66
Oats Grow, April, 6-row	(2-865) 1.53
Oats Grow, April, User	(2-866)
Oats Grow, May, 2-4 row	(2-867) 1.66
Oats Grow, May, 6-row	(2-868) 1.53
Oats Grow, May, User	(2-869)
Hay crop plant, direct, 2-4 row	(2-870) .80
Hay crop plant, direct, 6-row	(2-871)
Hay crop plant, companion crop	(2-872) .39
Hay crop plant, User	(2-873)
Hay crop maintain - fertilizer	(2-874) .90
Hay crop maintain - User	(2-875)
Fieldbean Grow, May, 4-row	(2-876) 3.92
Fieldbean Grow, May, 6-row	(2-877) 3.02
Fieldbean Grow, May, User	(2-878)
Fieldbean Grow, June, 4-row	(2-879) 3.92
Fieldbean Grow, June, 6-row	(2-880) 3.02
Fieldbean Grow, June, User	(2-881)

57. (Cont'd.) Crop Systems Annual Labor Requirements

System	Hours
Soybeans Grow, May, 4-row	(2-882) 3.22
Soybeans Grow, May, 6-row	(2-883) 2.57
Soybeans Grow, May, User	(2-884)
Soybeans Grow, June, 4-row	(2-885) 3.22
Soybeans Grow, June, 6-row	(2-886) 2.57
Soybeans Grow, June, User	(2-887)
Corn silage harvest, custom	(2-888) .50
Corn silage harvest, 1-row	(2-889) 4.65
Corn silage harvest, 2-row	(2-890) 4.01
Corn silage harvest, S.P. chopper	(2-891) 3.13
Corn silage harvest, User	(2-892)
Corn grain harvest, custom	(2-893) .25
Corn grain harvest, 1-row picker	(2-894) 3.11
Corn grain harvest, 2-row picker	(2-895) 2.51
Corn grain harvest, 2-row combine	(2-896) 2.28
Corn grain harvest, 3-row combine	(2-897) 2.02
Corn grain harvest, User	(2-898)
Wheat harvest, custom	(2-899) .20
Wheat harvest, S.P. combine, spread straw	(2-900) 1.08
Wheat harvest, S.P. combine, bale straw	(2-901) 2.04
Wheat harvest, User	(2-902)
Oats harvest, custom	(2-903) .20
Oats harvest, S.P. combine, spread straw	(2-904) 1.16
Oats harvest, S.P. combine, bale straw	(2-905) 2.07
Oats harvest, User	(2-906)
Hay crop silage harvest, mow, 1-row	(2-907) 3.00
Hay crop silage harvest, windrow, 2-row	(2-908) 2.60
Hay crop silage harvest, windrow, S.P. chopper	(2-909) 2.40
Hay crop silage harvest, windrow, 1-row	(2-910) 2.80
Hay crop silage harvest, User	(2-911)
Hay harvest, mow, bale, load behind wagon	(2-912) 4.66
Hay harvest, windrow, mow conveyor	(2-913) 3.22
Hay harvest, windrow, kicker	(2-914) 3.72
Hay harvest, User	(2-915)
Fieldbean harvest, custom	(2-916) .30
Fieldbean harvest, 4-row, bean head	(2-917) 2.38
Fieldbean harvest, 6-row, combine	(2-918) 1.98
Fieldbean harvest, User	(2-919)

57. (Cont'd) Crop Systems Annual Labor Requirements

Systems		Hours
Soybeans harvest, custom	(2-920)	.25
Soybeans harvest, combine	(2-921)	1.47
Soybeans harvest, User	(2-922)	
Barley Grow, April, 2-4 row	(2-923)	1.93
Barley Grow, April, 6-row	(2-924)	1.81
Barley Grow, April, User	(2-925)	
Barley Grow, May, 2-4 row	(2-926)	1.93
Barley Grow, May, 6-row	(2-927)	1.81
Barley Grow, May, User	(2-928)	
Barley harvest, custom	(2-929)	.20
Barley harvest, S.P. spread straw	(2-930)	1.08
Barley harvest, S.P. bale straw	(2-931)	2.04
Barley harvest, User	(2-932)	

Building Investment Costs and Requirements

58. (a) Cow capacity in a stanchion barn will be defined as the number of stanchions plus (1-419) 15 percent if there is enough space for (1-420) 100 percent of the additional animals in with the heifers.
(COWCAP)

(b) Cow capacity in a free stall or user defined barn will be defined as the number of freestalls plus (1-421) 25 percent, if there is enough room for (1-422) 60 percent of these animals with the heifers.

59. (a) If dairy buildings are to be purchased by the program, they will be purchased (1-423) 0 months after capacity is first exceeded and the cow building capacity purchased will equal (1-424) 20 animals, (1-425) 50 percent of the present building capacity or facilities for the animal numbers at the end of this month, whichever is larger.
(DELAY) (BLDMIN) (AMTBLD)

60. When dairy building construction is calculated by the program, forage storage is constructed as follows:
(STORAG)

	Silo Storage (tons)	Dry Hay Storage (tons)
Cows	(1-426) 12	(1-429) 0
Heifers over 1 yr.	(1-427) 9	(1-430) 0
Heifers under 1 yr.	(1-428) 0	(1-431) 1.5

61. The maximum number of cows that can be handled with
(PARLR1) (PARLR2)

one 1-man parlor is (1-432) 100
one 2-man parlor is (1-433) 200

62. When grain storage capacity is to be built by the program, high moisture corn storage will be built only if at least (1-404) 60 percent of that capacity will be used in the year built.
(HMCMIN)

63. (a) Cost of hay storage capacity (per ton) is (1-664) $40.00
(SCOST1)

(b) Cost of ear corn storage (per bushel) is (1-665) 2.00
(SCOST2)

(c) Cost of grain bin storage (per bushel) is (1-666) 2.50
(SCOST3)

64. The cost of milking parlors is:

(a) One man parlor (double-four herringbone) Building (PCOST1) (1-667) $12,300

(b) One man parlor (double-four herringbone) Equipment (PCOST2) (1-668) $ 7,700

(c) Two man parlor (double eight herringbone) Building (PCOST3) (1-669) $16,300

(d) Two man parlor (double-eight herringbone) Equipment (PCOST4) (1-670) $13,700

(e) Life for parlor and barn equipment is (years) (PLIFE) (1-671) 8

65. **Heifer and Calf Building Costs**

(HCBC)

Type of Animal	Cost per Stall		
	Conventional Pens	Free Stall	User Defined
Heifers & Dry Cows	(2-1) $499	(2-3) $499	(2-5) 0
Calves	(2-2) $375	(2-4) $375	(2-6) 0

66. (a) **Per Cow Cost of Building Equipment - Includes Feeders, Ventilation System, etc.**

(BC)

Number of Stalls	Tie Stall Stanchion 1	Cold Covered 2	Warm Covered 3	Liquid Cold Covered 4	Liquid Warm Covered 5	Open Lot 6	User Defined 7
Under 70	(2-7) 325	(2-12) 222	(2-17) 300	(2-22) 295	(2-27) 373	(2-32) 222	(2-37) 0
70-89	(2-8) 325	(2-13) 194	(2-18) 270	(2-23) 246	(2-28) 325	(2-33) 194	(2-38) 0
90-109	(2-9) 325	(2-14) 154	(2-19) 227	(2-24) 181	(2-29) 254	(2-34) 154	(2-39) 0
Over 109	(2-10) 325	(2-15) 134	(2-20) 207	(2-25) 152	(2-30) 225	(2-35) 134	(2-40) 0

(b) (BC) **Per Cow Cost of Dairy Building Excluding Equipment**

Tie Stall Stanchion 1	Cold Covered 2	Warm Covered 3	Liquid Cold Covered 4	Liquid Warm Covered 5	Open Lot 6	User Defined 7
(2-11) 624	(2-16) 371	(2-21) 946	(2-26) 471	(2-31) 546	(2-36) 328	(2-41) 0

67. Upright and Horizontal Silo Costs

(SC)

Upright Silos			Bunker Silos	
Capacity				
Tons	Bushels	Cost	Minimum Tons[1]	Cost Per Ton
2-42 150	2-53 4,280	2-64 7,044	2-75 0	2-86 $18.59
2-43 193	2-54 5,350	2-65 8,758	2-76 250	2-87 16.73
2-44 320	2-55 8,850	2-66 11,477	2-77 750	2-88 13.07
2-45 394	2-56 10,900	2-67 12,922	2-78 1,250	2-89 10.22
2-46 483	2-57 13,080	2-68 16,040	2-79 1,750	2-90 8.37
2-47 570	2-58 15,700	2-69 17,480	2-80 2,250	2-91 7.62
2-48 697	2-59 18,840	2-70 20,409	2-81 2,750	2-92 7.44
2-49 827	2-60	2-71 21,681	2-82 3,250	2-93 7.25
2-50 974	2-61	2-72 26,499	2-83 3,750	2-94 7.06
2-51 1,087	2-62	2-73 29,718	2-84	2-95
2-52 1,290	2-63	2-74 32,763	2-85	2-96

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[1] Number of tons capacity that must be built to achieve costs as low as that indicated under "cost per ton."

Machinery Costs

68. Machine Purchase Price, Life and Normal Month of Replacement (XMP(I, J))

Machine	Machine Code	Purchase Price	Life (Years)	Month of Replacement
40 H.P. Tractor	1	(2-268) 12,500	(2-378) 10	(2-488) 10
41-60 H.P. Tractor	2	(2-269) 15,625	(2-379) 10	(2-489) 4
61-80 H.P. Tractor	3	(2-270) 21,875	(2-380) 10	(2-490) 4
81-100 H.P. Tractor	4	(2-271) 28,125	(2-381) 10	(2-491) 4
100 H.P. Tractor	5	(2-272) 31,250	(2-382) 10	(2-492) 4
	6	(2-273)	(2-383)	(2-493)
	7	(2-274)	(2-384)	(2-494)
	8	(2-275)	(2-385)	(2-495)
Pick-up Truck	9	(2-276) 6,100	(2-386) 5	(2-496) 3
Large Truck	10	(2-277) 9,800	(2-387) 5	(2-497) 7
	11	(2-278)	(2-388)	(2-498)
Unloading Wagons	12	(2-279) 5,325	(2-389) 10	(2-499) 9
Unloading Trucks	13	(2-280) 4,200	(2-390) 8	(2-500) 9
Small Spreader	14	(2-281) 2,400	(2-391) 10	(2-501) 10
Large Spreader	15	(2-282) 3,850	(2-392) 10	(2-502) 10
Liquid Spreader	16	(2-283) 6,950	(2-393) 5	(2-503) 12
Gutter Cleaner (30 cows)	17	(2-284) 2,758	(2-394) 8	(2-504) 2
Scraper (loader)	18	(2-285) 1,542	(2-395) 10	(2-505) 10
Liquid Pump	19	(2-286) 2,798	(2-396) 5	(2-506) 12
	20	(2-287)	(2-397)	(2-507)
	21	(2-288)	(2-398)	(2-508)
14' Silo Unloader	22	(2-289) 2,231	(2-399) 8	(2-509) 10
16' Silo Unloader	23	(2-290) 2,556	(2-400) 8	(2-510) 10
18' Silo Unloader	24	(2-291) 2,718	(2-401) 8	(2-511) 10
20' Silo Unloader	25	(2-292) 2,880	(2-402) 8	(2-512) 10
24' Silo Unloader	26	(2-293) 3,570	(2-403) 8	(2-513) 10
28' Silo Unloader	27	(2-294) 3,749	(2-404) 8	(2-514) 10
30' Silo Unloader	28	(2-295) 3,838	(2-405) 8	(2-515) 10
Trench Unloader	29	(2-296) 3,732	(2-406) 8	(2-516) 10
400 Gal. Bulk Tank	30	(2-297) 6,167	(2-407) 10	(2-517) 6
600 Gal. Bulk Tank	31	(2-298) 7,424	(2-408) 10	(2-518) 6
800 Gal. Bulk Tank	32	(2-299) 8,925	(2-409) 10	(2-519) 6
1000 Gal. Bulk Tank	33	(2-300) 10,548	(2-410) 10	(2-520) 6
1400 Gal. Bulk Tank	34	(2-301) 13,794	(2-411) 10	(2-521) 6
2000 Gal. Bulk Tank	35	(2-302) 16,228	(2-412) 10	(2-522) 6
Milk Transfer	36	(2-303) 1,339	(2-413) 8	(2-523) 9
Barn Equipment	37	(2-304) 2,596	(2-414) 8	(2-524) 11
Parlor Equipment	38	(2-305) 10,224	(2-415) 8	(2-525) 11
	39	(2-306)	(2-416)	(2-526)
2 Row Cultivator	40	(2-307) 837	(2-417) 10	(2-527) 6
4 Row Cultivator	41	(2-308) 1,625	(2-418) 10	(2-528) 6
6 Row Cultivator	42	(2-309) 2,775	(2-419) 10	(2-529) 6
Sprayer	43	(2-310) 1,086	(2-420) 10	(2-530) 6
2-14" Plow	44	(2-311) 678	(2-421) 10	(2-531) 3
2-16" Plow	45	(2-312) 718	(2-422) 10	(2-532) 3
3-14" Plow	46	(2-313) 1,037	(2-423) 10	(2-533) 3

68. Machine Purchase Price, Life and Normal Month of Replacement (cont.)

Machine	Machine Code	Purchase Price		Life (Years)		Month of Replacement	
3-16" plow	47	(2-314)	1,117	(2-424)	10	(2-534)	3
4-14" plow	48	(2-315)	1,836	(2-425)	10	(2-535)	3
4-16" plow	49	(2-316)	1,931	(2-426)	10	(2-536)	3
5-14" plow	50	(2-317)	2,554	(2-427)	10	(2-537)	3
5-16" plow	51	(2-318)	2,674	(2-428)	10	(2-538)	3
6-14" plow	52	(2-319)	2,953	(2-429)	10	(2-539)	3
6-16" plow	53	(2-320)	3,232	(2-430)	10	(2-540)	3
7-14" plow	54	(2-321)	3,671	(2-431)	10	(2-541)	3
7-16" plow	55	(2-322)	3,871	(2-432)	10	(2-542)	3
8-14" plow	56	(2-323)	4,310	(2-433)	10	(2-543)	3
8-16" plow	57	(2-324)	4,629	(2-434)	10	(2-544)	3
	58	(2-325)		(2-435)		(2-545)	
	59	(2-326)		(2-436)		(2-546)	
10' Disc	60	(2-327)	3,230	(2-437)	12	(2-547)	3
12' Disc	61	(2-328)	5,016	(2-438)	12	(2-548)	3
14' Disc	62	(2-329)	5,852	(2-439)	12	(2-549)	3
16' Disc	63	(2-330)	6,688	(2-440)	12	(2-550)	3
18' Disc	64	(2-331)	7,524	(2-441)	12	(2-551)	3
8' Harrow	65	(2-332)	488	(2-442)	15	(2-552)	3
12' Harrow	66	(2-333)	732	(2-443)	15	(2-553)	3
16' Harrow	67	(2-334)	976	(2-444)	15	(2-554)	3
20' Harrow	68	(2-335)	1,220	(2-445)	15	(2-555)	3
24' Harrow	69	(2-336)	1,464	(2-446)	15	(2-556)	3
	70	(2-337)		(2-447)		(2-557)	
2 Row planter	71	(2-338)	753	(2-448)	10	(2-558)	4
4 Row planter	72	(2-339)	2,060	(2-449)	10	(2-559)	4
6 Row planter	73	(2-340)	3,011	(2-450)	10	(2-560)	4
Fertilizer Spreader	74	(2-341)	1,109	(2-451)	8	(2-561)	7
Grain Drill	75	(2-342)	2,219	(2-452)	12	(2-562)	3
	76	(2-343)		(2-453)		(2-563)	
1 Row Chopper	77	(2-344)	5,607	(2-454)	8	(2-564)	9
2 Row Chopper	78	(2-345)	6,597	(2-455)	8	(2-565)	9
2 Row Chopper (S.P.)	79	(2-346)	2,639	(2-456)	8	(2-566)	9
Blower	80	(2-347)	1,319	(2-457)	10	(2-567)	9
3 Row Corn Head (Grain)	81	(2-348)	5,360	(2-458)	10	(2-568)	10
1 Row Corn Picker	82	(2-349)	3,546	(2-459)	10	(2-569)	10
2 Row Corn Picker	83	(2-350)	5,937	(2-460)	10	(2-570)	10
2 Row Corn Combine	84	(2-351)	12,616	(2-461)	10	(2-571)	10
3 Row Corn Combine	85	(2-352)	16,575	(2-462)	10	(2-572)	10
Grain Wagons	86	(2-353)	891	(2-463)	10	(2-573)	7
Grain Elevator	87	(2-354)	2,020	(2-464)	10	(2-574)	7
2 Row Corn Head (Grain)	88	(2-355)	3,793	(2-465)	10	(2-575)	10
10' Grain Combine	89	(2-356)	13,029	(2-466)	10	(2-576)	7
12' Grain Combine	90	(2-357)	15,008	(2-467)	10	(2-577)	7
14' Grain Combine	91	(2-358)	17,152	(2-468)	10	(2-578)	7
Bale Kicker	92	(2-359)	1,484	(2-469)	12	(2-579)	3
PTO Windrower	93	(2-360)	3,793	(2-470)	8	(2-580)	5
10' S.P. Windrower	94	(2-361)	8,741	(2-471)	8	(2-581)	5

68. Machine Purchase Price, Life and Normal Month of Replacement (Cont.)

Machine	Machine Code	Purchase Price	Life (Years)	Month of Replacement
14' S.P. Windrower	95	(2-362) 11,050	(2-472) 8	(2-582) 5
Windrow Turner	96	(2-363) 346	(2-473) 10	(2-583) 5
Baler	97	(2-364) 4,535	(2-474) 10	(2-584) 5
Wagons	98	(2-365) 907	(2-475) 12	(2-585) 5
Hay Elevator	99	(2-366) 701	(2-476) 10	(2-586) 5
Mow Conveyor (50A, Hay)	100	(2-367) 1,649	(2-477) 10	(2-587) 5
Mower	101	(2-368) 1,154	(2-478) 10	(2-588) 5
Rake	102	(2-369) 1,154	(2-479) 10	(2-589) 5
Crusher	103	(2-370) 1,567	(2-480) 8	(2-590) 5
Hay Head (1 Row Chopper)	104	(2-371) 1,319	(2-481) 8	(2-591) 5
Hay Head (2 Row Chopper)	105	(2-372) 1,979	(2-482) 8	(2-592) 5
Bean Puller Attach	106	(2-373) 981	(2-483) 10	(2-593) 8
Bean Puller Attach(6 row)	107	(2-374) 1,418	(2-484) 10	(2-594) 8
Bean Combine	108	(2-375) 21,770	(2-485) 10	(2-595) 8
Bean Attach (Combine)	109	(2-376) 2,210	(2-486) 10	(2-596) 8
	110	(2-377)	(2-487)	(2-597)

69. Annual Machine Repair and Gas and Oil Costs

(XMRGO I, J))

System	Repair Costs Per Unit	Gas & Oil Cost Per Unit
Dairy Cows		
Stanchion or tie stall	(2-1704) $19.01	(2-1791) $ 9.18
Cold covered free stall	(2-1705) 20.91	(2-1792) 16.72
Warm enclosed free stall	(2-1706) 20.91	(2-1793) 16.72
Cold, free stall, liquid	(2-1707) 18.06	(2-1794) 19.38
Warm, free stall, liquid	(2-1708) 18.06	(2-1795) 19.38
Loose housing, open lot	(2-1709) 23.34	(2-1796) 17.74
Dairy Cow-User	(2-1710)	(2-1797)
Dairy Replacements		
Conventional Pens	(2-1711) 5.23	(2-1798) 4.28
Free stall	(2-1712) 9.51	(2-1799) 7.54
User	(2-1713)	(2-1800)

69. Annual Machine Repair and Gas and Oil Costs (cont.)

System	Repair Costs Per Unit	Gas & Oil Costs Per Unit
Corn Grow		
April, 2-row	(2- 1714) $ 4.59	(2- 1801) $ 1.83
April, 4-row	(2- 1715) 3.85	(2- 1802) 2.54
April, 6-row	(2- 1716) 3.22	(2- 1803) 2.10
April, User	(2- 1717)	(2- 1804)
May, 2-row	(2- 1718) 4.59	(2- 1805) 3.43
May, 4-row	(2- 1719) 3.85	(2- 1806) 2.54
May, 6-row	(2- 1720) 3.22	(2- 1807) 2.10
May, User	(2- 1721)	(2- 1808)
June, 2-row	(2- 1722) 4.59	(2- 1809) 3.03
June, 4-row	(2- 1723) 3.85	(2- 1810) 2.54
June, 6-row	(2- 1724) 3.22	(2- 1811) 2.10
June, User	(2- 1725)	(2- 1812)
Wheat Grow		
Sept., med.	(2- 1726) 3.01	(2- 1813) 1.61
Sept., large	(2- 1727) 2.85	(2- 1814) 1.54
Sept., User	(2- 1728)	(2- 1815)
Oct., med.	(2- 1729) 3.01	(2- 1816) 1.61
Oct., large	(2- 1730) 2.85	(2- 1817) 1.54
Oct., User	(2- 1731)	(2- 1818)
Oats Grow		
April, med.	(2- 1732) 3.01	(2- 1819) 1.61
April, large	(2- 1733) 2.85	(2- 1820) 1.54
April, User	(2- 1734)	(2- 1821)
May, med.	(2- 1735) 3.01	(2- 1822) 1.61
May, large	(2- 1736) 2.85	(2- 1823) 1.54
May, User	(2- 1737)	(2- 1824)
May Crop Plant		
Direct, med.	(2- 1738) 2.38	(2- 1825) 1.61
Direct, large	(2- 1739) 2.54	(2- 1826) 1.52
Companion Crop	(2- 1740) .29	(2- 1827) .20
User	(2- 1741)	(2- 1828)
Hay Crop Maintain		
Fertilizer	(2- 1742) .29	(2- 1829) .22
User	(2- 1743)	(2- 1830)

69. Annual Machine Repair and Gas and Oil Costs (cont.)

System	Repair Costs Per Unit	Gas & Oil Cost Per Unit
Fieldbeans Grow		
May, 4-row	(2-1744) $ 5.39	(2-1831) $ 3.55
May, 6-row	(2-1745) 4.88	(2-1832) 3.25
May, User	(2-1746)	(2-1833)
June, 4-row	(2-1747) 5.39	(2-1834) 3.55
June, 6-row	(2-1748) 4.88	(2-1835) 3.25
June, User	(2-1749)	(2-1836)
Soybeans Grow		
May, 4-row	(2-1750) 4.36	(2-1837) 2.80
May, 6-row	(2-1751) 4.20	(2-1838) 2.12
May, User	(2-1752)	(2-1839)
June, 4-row	(2-1753) 4.36	(2-1840) 2.80
June, 6-row	(2-1754) 4.20	(2-1841) 2.72
June, User	(2-1755)	(2-1842)
Corn Silage Harvest		
Custom	(2-1756) 3.33	(2-1843) 3.00
1-row	(2-1757) 13.59	(2-1844) 4.82
2-row	(2-1758) 10.14	(2-1845) 4.74
2-row S.P.	(2-1759) 10.14	(2-1846) 4.74
User	(2-1760)	(2-1847)
Corn Grain Harvest		
Custom	(2-1761) .24	(2-1848) .30
1-row pick	(2-1762) 3.01	(2-1849) 2.69
2-row pick	(2-1763) 2.66	(2-1850) 2.12
2-row combine	(2-1764) 4.17	(2-1851) 1.49
3-row combine	(2-1765) 3.53	(2-1852) 1.36
User	(2-1766)	(2-1853)
Wheat Harvest		
Custom	(2-1767) .13	(2-1854) .15
Combine, spread straw	(2-1768) 2.38	(2-1855) .98
Combine, bale straw	(2-1769) 2.69	(2-1856) 1.18
User	(2-1770)	(2-1857)
Oat Harvest		
Custom	(2-1771) .13	(2-1858) .15
Combine, spread straw	(2-1772) 2.38	(2-1859) .98
Combine, bale straw	(2-1773) 2.69	(2-1860) 1.18
User	(2-1774)	(2-1861)

69. Annual Machine Repair and Gas and Oil Costs (cont.)

System	Repair Costs Per Unit		Gas & Oil Cost Per Unit	
Hay Crop Silage Harvest				
Mow, 1-row chopper	(2-1775)	$ 7.49	(2-1862)	$ 3.90
Windrow, 2-row chopper	(2-1776)	6.46	(2-1863)	2.20
Windrow, S.P. chopper	(2-1777)	8.29	(2-1864)	2.54
Windrow, 1-row chopper	(2-1778)	6.62	(2-1865)	2.75
User	(2-1779)		(2-1866)	
Hay Harvest				
Mow, rake, bale	(2-1780)	3.69	(2-1867)	2.40
Windrow, thrower, mow-conveyor	(2-1781)	6.07	(2-1868)	2.12
Windrow, bale, thrower	(2-1782)	2.77	(2-1869)	2.04
User	(2-1783)		(2-1870)	
Fieldbean Harvest				
Pull, rake, custom combine	(2-1784)	.13	(2-1871)	.15
Pull, rake, combine, 4-row	(2-1785)	3.64	(2-1872)	1.28
Pull, rake, combine, 6-row	(2-1786)	4.48	(2-1873)	1.56
User	(2-1787)		(2-1874)	
Soybean Harvest				
Custom	(2-1788)	.13	(2-1875)	.15
Combine	(2-1789)	1.90	(2-1876)	.65
User	(2-1790)		(2-1877)	

Distribution and Relative Efficiency Coefficient for Machine Costs and Labor

The following tables contain the coefficients used for distributing machinery repair, gas and oil costs, and labor requirements throughout the year. Table 72 contains the relative efficiency coefficients for labor requirements for different sizes of operation. The labor distribution and relative efficiency coefficients relate to questions (table) 57. That is, the total labor for a given enterprise listed in question 57 is distributed throughout the year by the labor distribution coefficients. The actual amount of labor required for different size farms is determined as the coefficient from question 57 multiplied by the appropriate relative efficiency coefficient.

70. Monthly Distribution of Gas, Oil and Machinery Repair Costs

Month	Dairy Cows		Dairy Replacements		Corn Grow April		Corn Grow May		Corn Grow June	
	Stanchion or Free Stall 1-6	User 7	Pen or Free Stall 8-9	User 10	2,4, or 6 row 1-3	User 4	2,4, or 6 row 5-7	User 8	2,4, or 6 row 9-11	User 12
Jan.	2-1878 8.34	2-1890	2-1902 8.34	2-1914	2-1926 0	2-1938	2-1950 0	2-1962	2-1974 0	2-1986
Feb.	2-1879 8.34	2-1891	2-1903 8.34	2-1915	2-1927 0	2-1939	2-1951 0	2-1963	2-1975 0	2-1987
Mar.	2-1880 8.34	2-1892	2-1904 8.34	2-1916	2-1928 14.43	2-1940	2-1952 4.12	2-1964	2-1976 2.06	2-1988
Apr.	2-1881 8.33	2-1893	2-1905 8.33	2-1917	2-1929 50.52	2-1941	2-1953 24.74	2-1965	2-1977 12.37	2-1989
May	2-1882 8.33	2-1894	2-1906 8.33	2-1918	2-1930 12.37	2-1942	2-1954 42.27	2-1966	2-1978 46.39	2-1990
June	2-1883 8.33	2-1895	2-1907 8.33	2-1919	2-1931 6.19	2-1943	2-1955 15.46	2-1967	2-1979 22.68	2-1991
July	2-1884 8.33	2-1896	2-1908 8.33	2-1920	2-1932 3.09	2-1944	2-1956 7.22	2-1968	2-1980 13.40	2-1992
Aug.	2-1885 8.33	2-1897	2-1909 8.33	2-1921	2-1933 0	2-1945	2-1957 0	2-1969	2-1981 0	2-1993
Sept.	2-1886 8.33	2-1898	2-1910 8.33	2-1922	2-1934 0	2-1946	2-1958 0	2-1970	2-1982 0	2-1994
Oct.	2-1887 8.33	2-1899	2-1911 8.33	2-1923	2-1935 0	2-1947	2-1959 0	2-1971	2-1983 0	2-1995
Nov.	2-1888 8.33	2-1900	2-1912 8.33	2-1924	2-1936 11.34	2-1948	2-1960 5.15	2-1972	2-1984 3.10	2-1996
Dec.	2-1889 8.34	2-1901	2-1913 8.34	2-1925	2-1937 2.06	2-1949	2-1961 1.03	2-1973	2-1985 0	2-1997

70. Monthly Distribution of Gas, Oil and Machinery Repair Costs (cont.)

	Wheat Grow Sept.		Wheat Grow Oct.		Oats Grow April		Oats Grow May		Hay Crop Plant		
Month	M or L 13-14	User 15	M or L[1] 16-17	User 18	M or L[1] 19-20	User 21	M or L[1] 22-23	User 24	Direct 25-26	Companion 27	User 28
Jan.	2-1998 0	2-2010	2-2022 0	2-2034	2-2046 0	2-2058	2-2070 0	2-2081	2-2093 0	2-2105 0	2-2117
Feb.	2-1999 0	2-2011	2-2023 0	2-2035	2-2047 0	2-2059	2-2071 0	2-2082	2-2094 0	2-2106 0	2-2118
Mar.	2-2000 3.95	2-2012	2-2024 3.95	2-2036	2-2048 11.84	2-2060	2-2071 7.89	2-2083	2-2095 0	2-2107 0	2-2119
Apr.	2-2001 14.47	2-2013	2-2025 14.47	2-2037	2-2049 28.95	2-2061	2-2072 35.53	2-2084	2-2096 0	2-2108 100.00	2-2120
May	2-2002 0	2-2014	2-2026 0	2-2038	2-2050 5.26	2-2062	2-2073 25.00	2-2085	2-2097 0	2-2109 0	2-2121
June	2-2003 0	2-2015	2-2027 0	2-2039	2-2051 0	2-2063	2-2074 5.26	2-2086	2-2098 0	2-2110 0	2-2122
July	2-2004 0	2-2016	2-2028 0	2-2040	2-2052 0	2-2064	2-2075 0	2-2087	2-2099 43.48	2-2111 0	2-2123
Aug.	2-2005 32.89	2-2017	2-2029 0	2-2041	2-2053 0	2-2065	2-2076 0	2-2088	2-2100 56.52	2-2112 0	2-2124
Sept	2-2006 48.69	2-2018	2-2030 39.47	2-2042	2-2054 0	2-2066	2-2077 0	2-2089	2-2101 0	2-2113 0	2-2125
Oct.	2-2007 0	2-2019	2-2031 42.11	2-2043	2-2055 0	2-2067	2-2078 0	2-2090	2-2102 0	2-2114 0	2-2126
Nov.	2-2008 0	2-2020	2-2032 0	2-2044	2-2056 53.95	2-2068	2-2079 26.32	2-2091	2-2103 0	2-2115 0	2-2127
Dec.	2-2009 0	2-2021	2-2033 0	2-2045	2-2057 0	2-2069	2-2080 0	2-2092	2-2104 0	2-2116 0	2-2128

70. Monthly Distribution of Gas, Oil and Machinery Repair Costs (cont.)

	Hay Crop Maintain		Fieldbean Grow May		Fieldbean Grow June		Soybean Grow May		Soybean Grow June	
Month	Summer Fert. 29	User 30	4 or 6 Row 31-32	User 33	4 or 6 Row 34-35	User 36	4 or 6 Row 37-38	User 39	4 or 6 Row 40-41	User 42
Jan.	2-2129 0	2-2141	2-2153 0	2-2165	2-2177 0	2-2189	2-2201 0	2-2213	2-2225 0	2-2237
Feb.	2-2130 0	2-2142	2-2154 0	2-2166	2-2178 0	2-2190	2-2202 0	2-2214	2-2226 0	2-2238
Mar.	2-2131 0	2-2143	2-2155 2.94	2-2167	2-2179 0	2-2191	2-2203 0	2-2215	2-2227 0	2-2239
Apr.	2-2132 0	2-2144	2-2156 22.06	2-2168	2-2180 7.34	2-2192	2-2204 25.45	2-2216	2-2228 9.09	2-2240
May	2-2133 14.29	2-2145	2-2157 37.50	2-2169	2-2181 26.47	2-2193	2-2205 49.09	2-2217	2-2229 45.45	2-2241
June	2-2134 57.14	2-2146	2-2158 12.50	2-2170	2-2182 42.65	2-2194	2-2206 15.46	2-2218	2-2230 22.73	2-2242
July	2-2135 28.57	2-2147	2-2159 11.77	2-2171	2-2183 16.18	2-2195	2-2207 10.00	2-2219	2-2231 14.55	2-2243
Aug.	2-2136 0	2-2148	2-2160 4.41	2-2172	2-2184 5.88	2-2196	2-2208 0	2-2220	2-2232 8.18	2-2244
Sept.	2-2137 0	2-2149	2-2161 0	2-2173	2-2185 0	2-2197	2-2209 0	2-2221	2-2233 0	2-2245
Oct.	2-2138	2-2150	2-2162	2-2174	2-2186	2-2198	2-2210	2-2222	2-2234	2-2246
Nov.	2-2139 0	2-2151	2-2163 8.83	2-2175	2-2187 1.47	2-2199	2-2211 0	2-2223	2-2235 0	2-2247
Dec.	2-2140 0	2-2152	2-2164 0	2-2176	2-2188 0	2-2200	2-2212 0	2-2224	2-2236 0	2-2248

71. Monthly Distribution of Labor for Crop Grow Systems

	Corn Grow						Wheat Grow				Oats Grow			
	Plant April		Plant May		Plant June		Plant Sept.		Plant Oct.		Plant April		Plant May	
Month	2, 4 or 6 Row	User	2, 4 or 6 Row	User	2, 4 or 6 Row	User	2, 4 or 6 Row	User	2, 4 or 6 Row	User	2, 4 or 6 Row	User	2, 4 or 6 Row	User
Jan.	2-933 3.09	2-945	2-957 3.09	2-969	2-981 3.09	2-993	2-1005 3.11	2-1017	2-1029 3.11	2-1041	2-1053 3.61	2-1065	2-1077 3.01	2-1089
Feb.	2-934 2.25	2-946	2-958 2.25	2-970	2-982 2.25	2-994	2-1006 4.15	2-1018	2-1030 4.14	2-1042	2-1054 4.82	2-1066	2-1078 3.61	2-1090
Mar.	2-935 5.06	2-947	2-959 5.05	2-971	2-983 5.06	2-995	2-1007 7.25	2-1019	2-1031 7.25	2-1043	2-1055 26.51	2-1067	2-1079 5.42	2-1091
Apr.	2-936 34.83	2-948	2-960 17.70	2-972	2-984 5.62	2-996	2-1008 7.77	2-1020	2-1032 7.77	2-1044	2-1056 36.15	2-1068	2-1080 38.56	2-1092
May	2-937 19.66	2-949	2-961 23.60	2-973	2-985 27.25	2-997	2-1009 0	2-1021	2-1033 0	2-1045	2-1057 5.42	2-1069	2-1081 29.52	2-1093
June	2-938 9.27	2-950	2-962 19.66	2-974	2-986 26.40	2-998	2-1010 0	2-1022	2-1034 0	2-1046	2-1058 7.83	2-1070	2-1082 10.24	2-1094
July	2-939 5.62	2-951	2-963 9.27	2-975	2-987 14.04	2-999	2-1011 0	2-1023	2-1035 0	2-1047	2-1059 0	2-1071	2-1083 0	2-1095
Aug.	2-940 2.81	2-952	2-964 8.43	2-976	2-988 9.27	2-1000	2-1012 21.76	2-1024	2-1036 0	2-1048	2-1060 0	2-1072	2-1084 0	2-1096
Sept.	2-941 0	2-953	2-965 0	2-977	2-989 0	2-1001	2-1013 46.63	2-1025	2-1037 28.50	2-1049	2-1061 0	2-1073	2-1085 0	2-1097
Oct.	2-942 0	2-954	2-966 0	2-978	2-990 0	2-1002	2-1014 3.11	2-1026	2-1038 41.97	2-1050	2-1062 3.01	2-1074	2-1086 3.01	2-1098
Nov.	2-943 12.36	2-955	2-967 6.74	2-979	2-991 4.21	2-1003	2-1015 3.11	2-1027	2-1039 4.15	2-1051	2-1063 9.64	2-1075	2-1087 3.01	2-1099
Dec.	2-944 5.05	2-956	2-968 4.21	2-980	2-992 2.81	2-1004	2-1016 3.11	2-1028	2-1040 3.11	2-1052	2-1064 3.01	2-1076	2-1088 3.62	2-1100

71. Cont'd Monthly Distribution of Labor for Crop Grow Systems

Month	Hay Crop Plant			Hay Crop Maintain		Fieldbean Grow				Soybeans Grow				Barley Grow			
						Plant May		Plant June		Plant May		Plant June		Plant April		Plant May	
	Direct 2, 4 or 6 Row	Companion Crop	User	Fert.	User	4 or 6 Row	User	4 or 6 Row	User	4 or 6 Row	User	4 or 6 Row	User	4 or 6 Row	User	4 or 6 Row	User
Jan.	2-1101 0	2-1113 0	2-1125	2-1137 0	2-1149	2-1161 2.81	2-1173	2-1185 2.81	2-1197	2-1209 1.55	2-1221	2-1233 1.55	2-1245	2-1257 3.61	2-1269	2-1281 3.01	
Feb.	2-1102 0	2-1114 0	2-1126	2-1138 0	2-1150	2-1162 2.04	2-1174	2-1186 2.04	2-1198	2-1210 2.17	2-1222	2-1234 2.17	2-1246	2-1258 4.82	2-1270	2-1282 3.61	
Mar.	2-1103 0	2-1115 48.72	2-1127	2-1139 0	2-1151	2-1163 4.59	2-1175	2-1187 4.59	2-1199	2-1211 5.28	2-1223	2-1235 2.18	2-1247	2-1259 6.51	2-1271	2-1283 5.42	
Apr.	2-1104 0	2-1116 51.28	2-1128	2-1140 0	2-1152	2-1164 16.07	2-1176	2-1188 5.10	2-1200	2-1212 20.50	2-1224	2-1236 5.28	2-1248	2-1260 6.15	2-1272	2-1284 38.56	
May	2-1105 0	2-1117 0	2-1129	2-1141 11.11	2-1153	2-1165 21.43	2-1177	2-1189 22.19	2-1201	2-1213 30.13	2-1225	2-1237 22.98	2-1249	2-1261 5.42	2-1273	2-1285 29.52	
June	2-1106 2.50	2-1118 0	2-1130	2-1142 66.66	2-1154	2-1166 19.39	2-1178	2-1190 29.08	2-1202	2-1214 20.19	2-1226	2-1238 30.44	2-1250	2-1262 7.83	2-1274	2-1286 10.24	
July	2-1107 47.50	2-1119 0	2-1131	2-1143 22.22	2-1155	2-1167 16.07	2-1179	2-1191 19.39	2-1203	2-1215 17.08	2-1227	2-1239 24.22	2-1251	2-1263 0	2-1275	2-1287 0	
Aug.	2-1108 47.50	2-1120 0	2-1132	2-1144 0	2-1156	2-1168 7.65	2-1180	2-1192 8.42	2-1204	2-1216 0	2-1228	2-1240 8.08	2-1252	2-1264 0	2-1276	2-1288 0	
Sept.	2-1109 2.50	2-1121 0	2-1133	2-1145 0	2-1157	2-1169 0	2-1181	2-1193 0	2-1205	2-1217 0	2-1229	2-1241 0	2-1253	2-1265 0	2-1277	2-1289 0	
Oct.	2-1110 0	2-1122 0	2-1134	2-1146 0	2-1158	2-1170 0	2-1182	2-1194 0	2-1206	2-1218 0	2-1230	2-1242 0	2-1254	2-1266 3.01	2-1278	2-1290 3.01	
Nov.	2-1111 0	2-1123 0	2-1135	2-1147 0	2-1159	2-1171 6.12	2-1183	2-1195 3.83	2-1207	2-1219 1.55	2-1231	2-1243 1.55	2-1255	2-1267 9.64	2-1279	2-1291 3.01	
Dec.	2-1112 0	2-1124 0	2-1136	2-1148 0	2-1160	2-1172 3.83	2-1184	2-1196 2.55	2-1208	2-1220 1.55	2-1232	2-1244 1.55	2-1256	2-1268 3.01	2-1280	2-1292 3.62	

72. **Relative Labor Efficiency of Systems by Size**
(RLE (I, J))

Acres of Crop	Corn Grow				Corn Harvest				Oats Grow			Hay Crop Main.	
	2 row	4 row	6 row	User	1 row	2 row	Custom 3 row or SP	User	2-4 row	6 row	User	Fert.	User
less than 26	2-1305 1.04	2-1312 1.05	2-1319 1.10	2-1326	2-1333 1.00	2-1340 1.05	2-1347 1.06	2-1354	2-1361 1.00	2-1368 1.02	2-1375	2-1382 1.05	2-1389
26-50	2-1306 1.00	2-1313 1.02	2-1320 1.06	2-1327	2-1334 .98	2-1341 1.00	2-1348 1.03	2-1355	2-1362 .97	2-1369 1.00	2-1376	2-1383 1.00	2-1390
51-75	2-1307 .98	2-1314 1.00	2-1321 1.03	2-1328	2-1335 .96	2-1342 .97	2-1349 1.02	2-1356	2-1363 .95	2-1370 .97	2-1377	2-1384 .95	2-1391
76-100	2-1308 .96	2-1315 .97	2-1322 1.01	2-1329	2-1336 .95	2-1343 .95	2-1350 1.00	2-1357	2-1364 .93	2-1371 .95	2-1378	2-1385 .95	2-1392
101-150	2-1309 .95	2-1316 .95	2-1323 1.00	2-1330	2-1337 .95	2-1344 .94	2-1351 .98	2-1358	2-1365 .92	2-1372 .93	2-1379	2-1386 .95	2-1393
151-200	2-1310 .94	2-1317 .94	2-1324 .97	2-1331	2-1338 .95	2-1345 .93	2-1352 .96	2-1359	2-1366 .91	2-1373 .91	2-1380	2-1387 .95	2-1394
Over 200	2-1311 .94	2-1318 .93	2-1325 .93	2-1332	2-1339 .95	2-1346 .93	2-1353 .94	2-1360	2-1367 .91	2-1374 .90	2-1381	2-1388 .95	2-1395

72. Relative Labor Efficiency of Systems by Size (cont.)

Acres of Crop	Wheat Grow			Fieldbeans Grow			Soybeans Grow			Hay Crop Plant			
	2-4 row	6 row	User	4 row	6 row	User	4 row	6 row	User	2-4 row	6 row	Companion	User
less than 26	2-1396 1.00	2-1403 1.02	2-1410	2-1417 1.02	2-1424 1.03	2-1431	2-1438 1.04	2-1445 1.05	2-1452	2-1459 1.00	2-1466 1.02	2-1473 1.00	2-1480
26-50	2-1397 .97	2-1404 1.00	2-1411	2-1418 1.00	2-1425 1.01	2-1432	2-1439 1.00	2-1446 1.02	2-1453	2-1460 .98	2-1467 1.00	2-1474 1.00	2-1481
51-75	2-1398 .95	2-1405 .97	2-1412	2-1419 .98	2-1426 1.00	2-1433	2-1440 .97	2-1447 1.00	2-1454	2-1461 .97	2-1468 .98	2-1475 1.00	2-1482
76-100	2-1399 .93	2-1406 .95	2-1413	2-1420 .97	2-1427 .98	2-1434	2-1441 .95	2-1448 .97	2-1455	2-1462 .97	2-1469 .97	2-1476 1.00	2-1483
101-150	2-1400 .92	2-1407 .93	2-1414	2-1421 .96	2-1428 .97	2-1435	2-1442 .93	2-1449 .94	2-1456	2-1463 .97	2-1470 .97	2-1477 1.00	2-1484
151-200	2-1401 .91	2-1408 .91	2-1415	2-1422 .95	2-1429 .96	2-1436	2-1443 .91	2-1450 .92	2-1457	2-1464 .97	2-1471 .97	2-1478 1.00	2-1485
over 200	2-1402 .91	2-1409 .90	2-1416	2-1423 .95	2-1430 .95	2-1437	2-1444 .90	2-1451 .90	2-1458	2-1465 .97	2-1472 .97	2-1479 1.00	2-1486

72. Relative Labor Efficiency of Systems by Size (cont.)

Acres of Crop	Wheat Harvest				Oat Harvest				Fieldbean Harvest			
	Custom	Com- bine spread	Com- bine bale	User	Custom	Com- bine spread	Com- bine bale	User	Custom	4 row	6 row	User
less than 26	2-1487 1.00	2-1494 1.00	2-1501 1.00	2-1508	2-1515 1.00	2-1522 1.00	2-1529 1.00	2-1536	2-1543 1.00	2-1550 1.02	2-1557 1.03	2-1564
26-50	2-1488 1.00	2-1495 .97	2-1502 .98	2-1509	2-1516 1.00	2-1523 .97	2-1530 .98	2-1537	2-1544 1.00	2-1551 1.00	2-1558 1.01	2-1565
51-75	2-1489 1.00	2-1496 .95	2-1503 .96	2-1510	2-1517 1.00	2-1524 .95	2-1531 .96	2-1538	2-1545 1.00	2-1552 .98	2-1559 1.00	2-1566
76-100	2-1490 1.00	2-1497 .93	2-1504 .95	2-1511	2-1518 1.00	2-1525 .93	2-1532 .95	2-1539	2-1546 1.00	2-1553 .97	2-1560 .98	2-1567
101-150	2-1491 1.00	2-1498 .92	2-1505 .94	2-1512	2-1519 1.00	2-1526 .92	2-1533 .94	2-1540	2-1547 1.00	2-1554 .96	2-1561 .97	2-1568
151-200	2-1492 1.00	2-1499 .91	2-1506 .93	2-1513	2-1520 1.00	2-1527 .91	2-1534 .93	2-1541	2-1548 1.00	2-1555 .95	2-1562 .96	2-1569
over 200	2-1493 1.00	2-1500 .91	2-1507 .93	2-1514	2-1521 1.00	2-1528 .91	2-1535 .93	2-1542	2-1549 1.00	2-1556 .95	2-1563 .95	2-1570

72. Relative Labor Efficiency of Systems by Size (cont.)

Acres of Crop	Hay Crop Silage Harvest					Hay Harvest				Soybean Harvest		
	Mow 1 row	Wind-row 2 row	Wind-row S.P. Chopper	Wind-row 1 row	User	Mower Baler	Wind-row Con-veyor	Wind-row Kicker	User	Custom	Combine	User
less than 26	2-1571 1.00	2-1578 1.05	2-1585 1.06	2-1592 1.00	2-1599	2-1606 1.02	2-1613 1.04	2-1620 1.03	2-1627	2-1634 1.00	2-1641 1.04	2-1648
26-50	2-1572 .98	2-1579 1.00	2-1586 1.03	2-1593 .98	2-1600	2-1607 1.00	2-1614 1.02	2-1621 1.01	2-1628	2-1635 1.00	2-1642 1.00	2-1649
51-75	2-1573 .96	2-1580 .97	2-1587 1.02	2-1594 .96	2-1601	2-1608 .98	2-1615 1.01	2-1622 1.00	2-1629	2-1636 1.00	2-1643 .97	2-1650
76-100	2-1574 .95	2-1581 .95	2-1588 1.00	2-1595 .95	2-1602	2-1609 .97	2-1616 1.00	2-1623 .98	2-1630	2-1637 1.00	2-1644 .95	2-1651
101-150	2-1575 .95	2-1582 .94	2-1589 .98	2-1596 .95	2-1603	2-1610 .96	2-1617 .98	2-1624 .96	2-1631	2-1638 1.00	2-1645 .93	2-1652
151-200	2-1576 .95	2-1583 .93	2-1590 .96	2-1597 .95	2-1604	2-1611 .96	2-1618 .96	2-1625 .95	2-1632	2-1639 1.00	2-1646 .91	2-1653
over 200	2-1577 .95	2-1584 .93	2-1591 .96	2-1598 .96	2-1605	2-1612 .96	2-1619 .96	2-1626 .95	2-1633	2-1640 1.00	2-1647 .91	2-1654

72. Relative Labor Efficiency of Systems by Size (cont.)

Acres of Crop	Barley Grow			Barley Harvest			
	2-4 row	6 row	User	Custom	Combine Spread	Combine Bale	User
less than 26	2-1655 1.00	2-1662 1.02	2-1669	2-1676 1.00	2-1683 1.00	2-1690 1.00	2-1697
26-50	2-1656 .97	2-1663 1.00	2-1670	2-1677 1.00	2-1684 .97	2-1691 .98	2-1698
51-75	2-1657 .95	2-1664 .97	2-1671	2-1678 1.00	2-1685 .95	2-1692 .96	2-1699
76-100	2-1658 .93	2-1665 .95	2-1672	2-1679 1.00	2-1686 .93	2-1693 .95	2-1700
101-150	2-1659 .92	2-1666 .92	2-1673	2-1680 1.00	2-1687 .92	2-1694 .94	2-1701
151-200	2-1660 .91	2-1667 .91	2-1674	2-1681 1.00	2-1688 .91	2-1695 .93	2-1702
over 200	2-1661 .91	2-1668 .90	2-1675	2-1682 1.00	2-1689 .91	2-1696 .93	2-1703

73. Increase (or decr[illegible]) in production resulting from a stated increase (or decrease) in forage quality with [illegible]el of grain feeding held constant.

(FTC)

Change in Forage Quality	[illegible]el of production (1000 pounds)	Level of Grain Feeding (pounds)											
		2000	2500	3000	3500	4000	4500	5000	5500	6000	6500	7000	7500
		Change in Milk Production - Pounds											
Ex.-med.	over 13	2-196 800	2-202 650	2-208 600	2-214 450	2-220 400	2-226 350	2-232 350	2-238 350	2-244 350	2-250 350	2-256 300	2-262 300
Ex.-med.	11-13	2-197 700	2-203 600	2-209 600	2-215 450	2-221 400	2-227 350	2-233 350	2-239 300	2-245 300	2-251 300	2-257 250	2-263 200
Ex.-med.	less than 11	2-198 450	2-204 450	2-210 400	2-216 400	2-222 350	2-228 300	2-234 300	2-240 300	2-246 300	2-252 250	2-258 200	2-264 0
Med.-poor	over 13	2-199 750	2-205 650	2-211 600	2-217 550	2-223 500	2-229 500	2-235 400	2-241 350	2-247 350	2-253 300	2-259 300	2-265 200
Med.-poor	11-13	2-200 700	2-206 550	2-212 450	2-218 400	2-224 350	2-230 400	2-236 350	2-242 350	2-248 300	2-254 250	2-260 250	2-266 200
Med.-poor	less than 11	2-201 450	2-207 400	2-213 400	2-219 350	2-225 300	2-231 300	2-237 300	2-243 250	2-249 200	2-255 200	2-261 200	2-267 0

74. Increase (or decrease) in production resulting from a stated increase (or decrease) in grain feeding with forage quality held constant. (GTC)

Forage Quality	Level of Production (1000 pounds)	Change in Level of Grain Feeding (pounds)										
		2000 to 2500 1	2500 to 3000 2	3000 to 3500 3	3500 to 4000 4	4000 to 4500 5	4500 to 5000 6	5000 to 5500 7	5500 to 6000 8	6000 to 6500 9	6500 to 7000 10	7000 to 7500 11
		Change in Milk Production - Pounds										
ex.	over 13	2-97 450	2-106 400	2-115 300	2-124 250	2-133 250	2-142 250	2-151 200	2-160 200	2-169 150	2-178 100	2-187 50
ex.	11-13	2-98 400	2-107 400	2-116 250	2-125 250	2-134 250	2-143 200	2-152 150	2-161 150	2-170 100	2-179 50	2-188 0
ex.	less than 11	2-99 350	2-108 350	2-117 250	2-126 250	2-135 150	2-144 150	2-153 100	2-162 100	2-171 50	2-180 50	2-189 0
med.	over 13	2-100 600	2-109 450	2-118 450	2-127 350	2-136 300	2-145 200	2-154 200	2-163 200	2-172 150	2-181 150	2-190 100
med.	11-13	2-101 500	2-110 400	2-119 400	2-128 300	2-137 300	2-146 200	2-155 200	2-164 150	2-173 100	2-182 100	2-191 50
med.	less than 11	2-102 350	2-111 350	2-120 250	2-129 250	2-138 200	2-147 200	2-156 100	2-165 100	2-174 100	2-183 100	2-192 0
poor	over 13	2-103 700	2-112 500	2-121 500	2-130 400	2-139 300	2-148 300	2-157 250	2-166 200	2-175 200	2-184 150	2-193 100
poor	11-13	2-104 650	2-113 500	2-122 450	2-131 350	2-140 250	2-149 250	2-158 200	2-167 200	2-176 150	2-185 100	2-194 100
poor	less than 11	2-105 400	2-114 400	2-123 300	2-132 300	2-141 200	2-150 200	2-159 150	2-168 150	2-177 100	2-186 100	2-195 0

75. Effect on production of reducing culling rate*
(PRAD)

Change in Culling Rate	producer exceeds that of marginal unculled animal
(2-625) 1	(2-640) 500
(2-626) 2	(2-641) 1000
(2-627) 3	(2-642) 1500
(2-628) 4	(2-643) 2000
(2-629) 5	(2-644) 2500
(2-630) 6	(2-645) 3000
(2-631) 7	(2-646) 3500
(2-632) 8	(2-647) 4000
(2-633) 9	(2-648) 4500
(2-634) 10	(2-649) 5000
(2-635) (11-)12	(2-650) 5500
(2-636) (13-)14	(2-651) 6000
(2-637) (15-)16	(2-652) 6500
(2-638) (17-)18	(2-653) 7000
(2-639) 19 and over	(2-654) 7500

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*These coefficients are also used when the culling rate is increased.

76. Mature Equivalent Coefficients
(XMATUR)

Age of Freshening (month)	M.E. Coefficient
(2-3188) 23	(2-3198) 1.35
(2-3189) 24-35	(2-3199) 1.26
(2-3190) 36-47	(2-3200) 1.15
(2-3191) 48-59	(2-3201) 1.06
(2-3192) 60-71	(2-3202) 1.02
(2-3193) 72-101	(2-3203) 1.00
(2-3194) 102-119	(2-3204) 1.01
(2-3195) 120-131	(2-3205) 1.03
(2-3196) 132-155	(2-3206) 1.05
(2-3197) 156-240	(2-3207) 1.10

77. Milk Lactation Curves

Percent of Total Lactation Production Produced each Month

Month of Lactation[1]	Calving Interval (months)					
	11	12	13	14	15	16
1	2-3084 5	2-3101 5	2-3118 5	2-3135 5	2-3152 5	2-3169 5
2	2-3085 12	2-3102 12	2-3119 12	2-3136 12	2-3153 11	2-3170 11
3	2-3086 14	2-3103 13	2-3120 13	2-3137 12	2-3154 12	2-3171 11
4	2-3087 13	2-3104 13	2-3121 12	2-3138 11	2-3155 11	2-3172 11
5	2-3088 13	2-3105 12	2-3122 11	2-3139 10	2-3156 11	2-3173 10
6	2-3089 12	2-3106 12	2-3123 11	2-3140 10	2-3157 10	2-3174 10
7	2-3090 10	2-3107 10	2-3124 9	2-3141 9	2-3158 9	2-3175 9
8	2-3091 9	2-3108 9	2-3125 8	2-3142 8	2-3159 8	2-3176 8
9	2-3092 7	2-3109 7	2-3126 7	2-3143 7	2-3160 7	2-3177 7
10	2-3093 5	2-3110 5	2-3127 6	2-3144 6	2-3161 6	2-3178 5
11	2-3094 0	2-3111 2	2-3128 4	2-3145 5	2-3162 4	2-3179 5
12	2-3095 0	2-3112 0	2-3129 2	2-3146 4	2-3163 4	2-3180 4
13	2-3096 -	2-3113 0	2-3130 0	2-3147 1	2-3164 2	2-3181 3
14	2-3097 -	2-3114 -	2-3131 0	2-3148 0	2-3165 0	2-3182 1
15	2-3098 -	2-3115 -	2-3132 -	2-3149 0	2-3166 0	2-3183 0
16	2-3099 -	2-3116 -	2-3133 -	2-3150 -	2-3167 0	2-3184 0
17	2-3100 -	2-3117 -	2-3134 -	2-3151 -	2-3168 -	2-3185 0

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[1] Assumes freshening takes place on the 15th of the month.

78. Frequency Distribution of Length of Lactation for Given Calving Interval (FQD)

Calving Interval (months)	Length of Lactation (months)					
	11	12	13	14	15	16
12.0	2-655 25	2-676 60	2-697 8	2-718 4	2-739 3	2-760 0
12.1	2-656 23	2-677 59	2-698 9	2-719 5	2-740 4	2-761 0
12.2	2-657 21	2-678 57	2-699 10	2-720 6	2-741 5	2-762 1
12.3	2-658 19	2-679 55	2-700 12	2-721 7	2-742 6	2-763 1
12.4	2-659 17	2-680 52	2-701 15	2-722 8	2-743 6	2-764 2
12.5	2-660 16	2-681 50	2-702 16	2-723 9	2-744 7	2-765 2
12.6	2-661 14	2-682 47	2-703 18	2-724 10	2-745 8	2-766 3
12.7	2-662 12	2-683 45	2-704 20	2-725 11	2-746 8	2-767 3
12.8	2-663 9	2-684 44	2-705 22	2-726 12	2-747 9	2-768 4
12.9	2-664 7	2-685 42	2-706 24	2-727 13	2-748 10	2-769 4
13.0	2-665 5	2-686 40	2-707 25	2-728 15	2-749 10	2-770 5
13.1	2-666 4	2-687 36	2-708 26	2-729 18	2-750 11	2-771 5
13.2	2-667 4	2-688 32	2-709 26	2-730 21	2-751 12	2-772 5
13.3	2-668 4	2-689 27	2-710 29	2-731 22	2-752 13	2-773 5
13.4	2-669 3	2-690 22	2-711 32	2-732 24	2-753 13	2-774 6
13.5	2-670 3	2-691 19	2-712 32	2-733 26	2-754 14	2-775 6
13.6	2-671 2	2-692 16	2-713 32	2-734 29	2-755 14	2-776 7
13.7	2-672 1	2-693 14	2-714 30	2-735 33	2-756 15	2-777 7
13.8	2-673 0	2-694 12	2-715 28	2-736 36	2-757 16	2-778 8
13.9	2-674 0	2-695 10	2-716 27	2-737 38	2-758 17	2-779 8
14.0	2-675 0	2-696 7	2-717 25	2-738 40	2-759 19	2-780 9

79. Fertilizer Rates and Relative Yields

(RELYLD)

Crop	Soil Management Group[1]							
	A	B	C	D	A	B	C	D
	Lbs. of N, P_2O_5 and K_2O				Relative Yield[2]			
Corn	2-2828 0	2-2842 0	2-2856 0	2-2870 0	2-2884 100	2-2898 100	2-2913 100	2-2927 100
	2-2829 55	2-2843 55	2-2857 55	2-2871 55	2-2885 121	2-2899 128	2-2914 140	2-2928 152
	2-2830 70	2-2844 70	2-2858 70	2-2872 70	2-2886 126	2-2900 135	2-2915 150	2-2929 165
	2-2831 140	2-2845 140	2-2859 140	2-2873 140	2-2887 128	2-2901 138	2-2916 153	2-2930 170
Soybeans	2-2832 0	2-2846 0	2-2860 0	2-2874 0	2-2888 100	2-2902 100	2-2917 100	2-2931 100
	2-2833 77	2-2847 77	2-2861 77	2-2875 77	2-2889 107	2-2903 119	2-2918 139	2-2932 139
	2-2834 124	2-2848 124	2-2862 124	2-2876 124	2-2890 111	2-2904 124	2-2919 144	2-2933 144
	2-2835 148	2-2849 148	2-2863 148	2-2877 148	2-2891 113	2-2905 128	2-2920 150	2-2934 150
Fieldbeans	2-2836 0	2-2850 0	2-2864 0	2-2878 0	2-2892 100	2-2906 100	2-2921 100	2-2935 100
	2-2837 88	2-2851 88	2-2865 88	2-2879 88	2-2893 125	2-2907 167	2-2922 200	2-2936 250
	2-2838 151	2-2852 151	2-2866 151	2-2880 151	2-2894 166	2-2908 221	2-2923 266	2-2937 332
	2-2839 190	2-2853 190	2-2867 190	2-2881 190	2-2895 182	2-2910 242	2-2924 291	2-2938 364
	2-2840 195	2-2854 195	2-2868 195	2-2882 195	2-2896 182	2-2911 242	2-2925 291	2-2939 364
	2-2841 200	2-2855 200	2-2869 200	2-2883 200	2-2897 182	2-2912 242	2-2926 291	2-2940 364

[1] Soil Management Group A = Limited response soils or soils of high natural fertility.
B = Medium response soils.
C = High response soils.
D = Very high response soils or soils depleted of natural fertility (run down).

[2] Expressed as a percent of yield with no fertilizer.

79. Fertilizer Rates and Relative Yields (cont.)

Crop	Soil Management Groups[1]							
	A	B	C	D	A	B	C	D
	Lbs. of N, P_2O_5 and K_2O				Relative Yield[2]			
Wheat	2-2941 0	2-2959 0	2-2973 0	2-2987 0	2-3001 100	2-3015 100	2-3029 100	2-3043 100
	2-2942 60	2-2960 60	2-2974 60	2-2988 60	2-3002 117	2-3016 130	2-3030 140	2-3044 159
	2-2943 100	2-2961 100	2-2975 100	2-2989 100	2-3003 123	2-3017 137	2-3031 148	2-3045 168
	2-2944 120	2-2962 120	2-2976 120	2-2990 120	2-3004 127	2-3018 141	2-3032 152	2-3046 172
	2-2945 140	2-2963 140	2-2977 140	2-2991 140	2-3005 127	2-3019 141	2-3033 152	2-3047 172
Oats	2-2946 0	2-2964 0	2-2978 0	2-2992 0	2-3006 100	2-3020 100	2-3034 100	2-3048 100
	2-2947 100	2-2965 100	2-2979 100	2-2993 100	2-3007 117	2-3021 129	2-3035 148	2-3049 182
	2-2948 120	2-2966 120	2-2980 120	2-2994 120	2-3008 121	2-3022 134	2-3036 154	2-3050 189
	2-2949 140	2-2967 140	2-2981 140	2-2995 140	2-3009 124	2-3023 137	2-3037 158	2-3051 193
Hay	2-2950 0	2-2968 0	2-2982 0	2-2996 0	2-3010 100	2-3024 100	2-3038 100	2-3052 100
	2-2951 75	2-2969 75	2-2983 75	2-2997 75	2-3011 195	2-3025 260	2-3039 325	2-3053 390
	2-2952 130	2-2970 130	2-2984 130	2-2998 130	2-3012 200	2-3026 267	2-3040 333	2-3054 400
	2-2953 165	2-2971 165	2-2985 165	2-2999 165	2-3013 205	2-3027 273	2-3041 342	2-3055 410
	2-2954 200	2-2972 200	2-2986 200	2-3000 200	2-3014 208	2-3028 277	2-3042 349	2-3056 418

[1] Soil Management Group A = Limited response soils or soils of high natural fertility.
B = Medium response soils.
C = High response soils.
D = Very high response soils or soils depleted of natural fertility (run down).

[2] Expressed as a percent of yield with no fertilizer.

Machine Capacities

80. (a) Animals and Acres Handled by User Defined Machines[1]

(URQ)

Machine Code	Livestock Numbers	Crop Grow Acres	Harvest Acres
7	(2-2532) 2000	(2-2541) 2000	(2-2550) 2000
8	(2-2533) 2000	(2-2542) 2000	(2-2551) 2000
11	(2-2534) 2000	(2-2543) 2000	(2-2552) 2000
20	(2-2535) 2000	(2-2544) xxxx	(2-2553) xxxx
39	(2-2536) xxxx	(2-2545) 2000	(2-2554) 2000
58	(2-2537) xxxx	(2-2546) 2000	(2-2555) xxxx
70	(2-2538) xxxx	(2-2547) 2000	(2-2556) xxxx
76	(2-2539) xxxx	(2-2548) xxxx	(2-2557) xxxx
110	(2-2540) xxxx	(2-2549) xxxx	(2-2558) xxxx

80. (b) Capacity of Silo Unloaders

(TONS)

Silo Size (ft.)	Tons silo capacity handled
12	(2-2559) 106
14	(2-2560) 200
16	(2-2561) 261
18	(2-2562) 428
20	(2-2563) 483
24	(2-2564) 827
28	(2-2565) 974
30	(2-2566) 1290

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[1] All values must be non-zero.

80. (c) Number of Acres and Animals that can be Handled by Certain Machines[a,b]
(TCRC)

Tractor H.P. or Machine	Machine Code	Dairy System										Acres Spring Crops				Acres Fall Harvested			
		1	2	3	4	5	6	7	8	9	10	2 row	4 row	6row	U	2row	4 row	6row	U
less than 41	1	2298 600	2306 1300	2314 1300	2322 1300	2330 1300	2338 570	2346	2354 1200	2362 1700	2370	2378 300	2386 450	2394 600	2402	2410 150	2418 300	2426 450	2434
41-60	2	2299 800	2307 800	2315 800	2323 1400	2331 1400	2339 800	2347	2355 1200	2363 1200	2371	2379 300	2387 450	2395 600	2403	2411 150	2419 300	2427 450	2435
61-80	3	2300 800	2308 800	2316 800	2324 1400	2332 1400	2340 800	2348	2356 1200	2364 1200	2372	2380 300	2388 450	2396 600	2404	2412 150	2420 300	2428 450	2436
81-100	4	2301 800	2309 800	2317 800	2325 1400	2333 1400	2341 800	2349	2357 1200	2365 1200	2373	2381 350	2389 500	2397 650	2405	2413 175	2421 325	2429 475	2437
100+	5	2302 800	2310 800	2318 800	2326 1400	2334 1400	2342 800	2350	2358 1200	2366 1200	2374	2382 450	2390 600	2398 750	2406	2414 200	2422 250	2430 500	2438
	6	2303 0	2311 0	2319	2327	2335	2343	2351	2359	2367	2375	2383	2391	2399	2407	2415	2423	2431	2439
Pick-up truck	9	2304 2000	2312 2000	2320 2000	2328 2000	2336 2000	2344 2000	2352	2360 2000	2368 2000	2376	2384 2000	2392 2000	2400 2000	2403	2416 2000	2424 2000	2432 2000	2440
lg. truck	10	2305 2000	2313 2000	2321 2000	2329 2000	2337 2000	2345 2000	2353	2361 2000	2369 2000	2377	2385 2000	2393 2000	2401 2000	2409	2417 2000	2425 2000	2433 2000	2441
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

[a] The number of tractors and trucks required will be assumed to be the maximum of the number required by the dairy plus spring crops and the number required by the dairy plus fall crops.

[b] Each identification number in this table must be preceded by 2- to be complete. Only the last four digits of the number are listed above the coefficient.

80. (d) Number of Animals that can be Handled by Dairy Machines (DMR)

Machine	Machine Code	Dairy System Number									
		1	2	3	4	5	6	7	8	9	10
Small Spreader	14	2-2442 700	2-2452 800	2-2461 800	2-2470 2000	2-2479 2000	2-2488 800	2-2497	2-2506 1200	2-2515 1200	2-2524
Large Spreader	15	2-2443 800	2-2453 900	2-2462 900	2-2471 2000	2-2480 2000	2-2489 900	2-2498	2-2507 1200	2-2516 1200	2-2525
Liquid Spreader	16	2-2444 1400	2-2454 1400	2-2463 1400	2-2472 1400	2-2481 1400	2-2490 1400	2-2499	2-2508 1700	2-2517 1700	2-2526
Gutter Cleaner	17	2-2445 30	2-2455 30	2-2464 30	2-2473 30	2-2482 30	2-2491 30	2-2500	2-2509 40	2-2518 40	2-2527
Scraper	18	2-2446 1300	2-2456 1300	2-2465 1300	2-2474 1300	2-2483 1300	2-2492 1300	2-2501	2-2510 1700	2-2519 1700	2-2528
Liquid Pump	19	2-2447 1400	2-2457 1400	2-2466 1400	2-2475 1400	2-2484 1400	2-2493 1400	2-2502	2-2511 2000	2-2520 2000	2-2529
Milk Transfer	36	2-2448 50	2-2458 50	2-2467 50	2-2476 50	2-2485 50	2-2494 50	2-2503	2-2512 ----	2-2521 ----	2-2530
Barn Equipment	37	2-2449 50	2-2459 60	2-2468 35	2-2477 60	2-2486 35	2-2495 60	2-2504	2-2513 200	2-2522 240	2-2531
Parlor Equipment	38	2-2450 100	2-2460 100	2-2469 100	2-2478 100	2-2487 100	2-2496 100	2-2505	2-2514 ----	2-2523 ----	2-2532

80. (e) Maximum Acres Handled by Various Machines
(XMACP)

Machine	Machine Code(s)		Maximum Acres	Crop
2-row Cultivator	40	(2-2567)	350	Corn & Beans
4-row Cultivator	41	(2-2568)	550	Corn & Beans
6-row Cultivator	42	(2-2569)	750	Corn & Beans
Sprayer	43	(2-2570)	1500	Crops
Plows (per bottom)	44-57	(2-2571)	60	Spring Plant Crops
Disc (per foot width)	59-64	(2-2572)	40	Spring Plant Crops
Harrow (per 4 ft. section)	65-69	(2-2573)	160	Spring Plant Crops
Planter (per 2 rows)	71-73	(2-2574)	150	Corn & Beans
Fertilizer Spreader	74	(2-2575)	1500	Spring Plant Crops
Grain Drill	75	(2-2576)	200	Small Grains & Hay Seeding
Pull Chopper (per row)	77-78	(2-2577)	100	Corn Silage
Pull Chopper (per row)	77-78	(2-2578)	200	Corn Silage
S.P. Chopper (per row)	79	(2-2579)	150	Hay Crop Silage
S.P. Chopper (per row)	79	(2-2580)	300	Hay Crop Silage
Blower	80	(2-2581)	3000[1]	Upright Silo Cap.
Corn Picker (per row)	82-83	(2-2582)	150	Corn Grain
Corn Combine (per row)	84-85	(2-2583)	200	Corn Grain
2 Grain Wagons	86	(2-2584)	200	Grain
Grain Combine (per 10' width)	89-91	(2-2585)	300	Small Grains or Beans (plus corn if used)
Windrowers (10' width)	93-95	(2-2586)	3000	Hay Crop
Baler	97	(2-2587)	400	Hay
Wagon (hay)	98	(2-2588)	25	Hay
Bean Puller (per row)	106-107	(2-2589)	25	Fieldbeans
Bean Combine	108	(2-2590)	200	Fieldbeans

[1] Tons

Machinery Use Matrices

The following matrices indicate which machines are used with each livestock, crop grow or harvest system. A one in the cell at the intersection of a machine row and a system column means that particular machine is used by that system. A zero or blank means that machine is not used by that system. To change the machines used by a system, the value (coefficient) in the appropriate cell is changed from one to zero or vice versa.

Identification numbers do not appear above the coefficient value as is the case for previous matrices. Identification numbers are developed using a matrix number code plus the row and column numbers of the coefficient. The matrix number codes are 4 for tables 81, 5 for table 82, and 6 for table 83. The row numbers are indicated in a column labeled "i" at the extreme right hand side of the table. The column numbers appear at the top if each column. The matrix number code is the first digit of the identification number. This is followed by a dash. The second and third digits are the row numbers. The fourth and fifth digits are the column numbers. Thus the identification number for the use of a 41-60 horsepower tractor with a warm enclosed free stall dairy system is 4-0203. The zeros must be included.

81. Livestock Systems Machinery Use Matrix[1] (LSM(38,10))

Machine	Machine Code	Dairy Cows							Dairy Replacements			
		Stanchion or Tie Stall	Cold Covered Free Stall	Warm Enclosed Free Stall	Cold Free Stall Liquid	Warm Free Stall Liquid	Loose Housing Open Lot	U	Conven-tional Pens	Free Stalls	U	i
		01	02	03	04	05	06	07	08	09	10	
0-40 H.P. Tractor	1		1	1	1	1	1			1		01
41-60 H.P. Tractor	2	1	1	1	1	1	1		1	1		02
61-80 H.P. Tractor	3				1	1						03
81-100 H.P. Tractor	4											04
100+ H.P. Tractor	5											05
	6											06
	7											07
	8											08
Pick-up Truck	9	1	1	1	1	1	1		1	1		09
Large Truck	10											10
	11											11
Unloading Wagon	12											12
Unloading Truck	13											13
Small Spreader	14											14
Large Spreader	15	1	1	1			1		1	1		15
Liquid Spreader	16				1	1						16
Gutter Cleaner	17	1										17
Scraper (loader)	18		1	1	1	1	1		1	1		18
Liquid Pump	19				1	1						19
	20											20
12' Silo Unloader	21											21
14' Silo Unloader	22	1							1	1		22
16' Silo Unloader	23											23
18' Silo Unloader	24						1					24
20' Silo Unloader	25		1	1	1	1						25

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[1] The matrix number code for the table is 4.

81. **Livestock Systems Machinery Use Matrix (cont.)**[1]

		Dairy Cows							Dairy Replacements			
Machine	Machine Code	Stanchion or Tie Stall	Cold Covered Free Stall	Warm Enclosed Free Stall	Cold Free Stall Liquid	Warm Free Stall Liquid	Loose Housing Open Lot	U	Conven-tional Pens	Free Stalls	U	1
		01	02	03	04	05	06	07	08	09	10	
24' Silo Unloader	26											26
28' Silo Unloader	27											27
30' Silo Unloader	28											28
Trench Silo Unloader	29											29
400 Gal. Bulk	30											30
600 Gal. Bulk	31	1										31
800 Gal. Bulk	32						1					32
1000 Gal. Bulk	33		1	1	1	1						33
1400 Gal. Bulk	34											34
2000 Gal. Bulk	35											35
Milk Transfer	36	1										36
Barn Equipment	37	1	1	1	1	1	1		1	I		37
Parlor Equipment	38		1	1	1	1	1					38

---

[1] The matrix number code for this table is 4.

82. (a) **Grow Systems Machinery Use Matrix**[1] (JGSM(I,J))

Machine	Machine Code	Corn Grow-April				Corn Grow-May				Corn Grow-June				
		2-row	4-row	6-row	U	2-row	4-row	6-row	U	2-row	4-row	6-row	U	i
		01	02	03	04	05	06	07	08	09	10	11	12	
0-40 H.P. Tractor	1	1	1	1		1	1	1		1	1	1		01
41-60 H.P. Tractor	2	1	1	1		1	1	1		1	1	1		02
61-80 H.P. Tractor	3	1	1	1		1	1	1		1	1	1		03
81-100 H.P. Tractor	4			1				1				1		04
100+ H.P. Tractor	5													05
	6													06
	7													07
	8													08
Pick-up Truck	9	1	1	1		1	1	1		1	1	1		09
Large Truck	10													10
	11													11
Unloading Wagon	12													12
Unloading Truck	13													13
	39													14
2-row Cultivator	40	1				1				1				15
4-row Cultivator	41		1				1				1			16
6-row Cultivator	42			1				1				1		17
Sprayer	43	1	1	1		1	1	1		1	1	1		18
2-14" Plow	44													19
2-16" Plow	45													20
3-14" Plow	46													21
3-16" Plow	47	1				1				1				22
4-14" Plow	48													23
4-16" Plow	49		1				1				1			24
5-14" Plow	50													25

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[1] The matrix number code for the table is 5.

82. (a) Grow Systems Machinery Use Matrix (cont.)[1]

Machine	Machine Code	Corn Grow-April				Corn Grow-May				Corn Grow-June				i
		2-row	4-row	6-row	U	2-row	4-row	6-row	U	2-row	4-row	6-row	U	
		01	02	03	04	05	06	07	08	09	10	11	12	
5-16" Plow	51			1				1				1		26
6-14" Plow	52													27
6-16" Plow	53													28
7-14" Plow	54													29
7-16" Plow	55													30
8-14" Plow	56													31
8-16" Plow	57													32
	58													33
8' Disc	59													34
10' Disc	60													35
12' Disc	61	1	1			1	1			1	1			36
14' Disc	62													37
16' Disc	63			1				1				1		38
18' Disc	64													39
9' Harrow	65													40
12' Harrow	66	1	1			1	1			1	1			41
16' Harrow	67			1				1				1		42
20' Harrow	68													43
24' Harrow	69													44
	70													45
2-row Planter	71	1				1				1				46
4-row Planter	72		1				1				1			47
6-row Planter	73			1				1				1		48
Fert. Spreader	74		1	1			1	1			1	1		49
Grain Drill	75													50

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[1] The matrix number code for this table is 5.

82. (b) Grow Systems Machinery Use Matrix[1]

														Hay Crop Plant				
		Wheat Grow						Oats Grow						Fall Direct Seeding		Spring Companion Crops		
	Machine Code	September			October			April			May							
Machine		Med.	Lg.	U	Med.	Lg.	U	Med.	Lg.	U	Med.	Lg.	U	Med.	Lg.	Crops	U	i
		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
0-40 H.P. Tractor	1	1	1		1	1		1	1		1	1		1	1			01
41-60 H.P. Tractor	2	1			1			1			1			1				02
61-80 H.P. Tractor	3	1	1		1	1		1	1		1	1		1	1			03
81-100 H.P. Tractor	4		1			1			1			1			1			04
100+ H.P. Tractor	5																	05
	6																	06
	7																	07
	8																	08
Pick-up Truck	9	1	1		1	1		1	1		1	1		1	1			09
Large Truck	10																	10
	11																	11
Unloading Wagon	12																	12
Unloading Truck	13																	13
	39																	14
2-row Cultivator	40																	15
4-row Cultivator	41																	16
6-row Cultivator	42																	17
Sprayer	43							1	1		1	1						18
2-14" Plow	44																	19
2-16" Plow	45																	20
3-14" Plow	46																	21
3-16" Plow	47																	22
4-14" Plow	48																	23
4-16" Plow	49	1			1			1			1			1				24
5-14" Plow	50																	25

---

[1] The matrix number code for this table is 5.

82. (b) **Grow Systems Machinery Use Matrix (cont.)**[1]

		Wheat Grow						Oats Grow						Hay Crop Plant				
		September			October			April			May			Fall		Spring		
														Direct Seeding		Companion Crops		
Machine	Machine Code	Med.	Lg.	U	Med.	Lg.	U	Med.	Lg.	U	Med.	Lg.	U	Med.	Lg.		U	1
		13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
5-16" Plow	51		1			1			1			1			1			26
6-14" Plow	52																	27
6-16" Plow	53																	28
7-14" Plow	54																	29
7-16" Plow	55																	30
8-14" Plow	56																	31
8-16" Plow	57																	32
	58																	33
8' Disc	59																	34
10' Disc	60																	35
12' Disc	61	1			1			1			1			1				36
14' Disc	62																	37
16' Disc	63		1			1			1			1			1			38
18' Disc	64																	39
9' Harrow	65																	40
12' Harrow	66	1			1			1			1			1				41
16' Harrow	67		1			1			1			1			1			42
20' Harrow	68																	43
24' Harrow	69																	44
	70																	45
2-row Planter	71																	46
4-row Planter	72																	47
6-row Planter	73																	48
Fert. Spreader	74		1			1			1			1			1			49
Grain Drill	75	1			1			1			1			1				50

---

[1] The matrix number code for this table is 5.

82. (c) Grow Systems Machinery Use Matrix[1]

Machine	Machine Code	Hay Crop Maintain		Fieldbeans Grow						Soybeans Grow						
		Summer		May			June			May			June			
		Fert.	U	4-row	6-row	U	4-row	6-row	U	4-row	6-row	U	4-row	6-row	U	1
		29	30	31	32	33	34	35	36	37	38	39	40	41	42	
0-40 H.P. Tractor	1			1	1		1	1		1	1		1	1		01
41-60 H.P. Tractor	2	1		1	1		1	1		1	1		1	1		02
61-80 H.P. Tractor	3			1			1			1			1			03
81-100 H.P. Tractor	4				1			1			1			1		04
100+ H.P. Tractor	5															05
	6															06
	7															07
	8															08
Pick-up Truck	9	1		1	1		1	1		1	1		1	1		09
Large Truck	10															10
	11															11
Unloading Wagon	12															12
Unloading Truck	13															13
	39															14
2-row Cultivator	40															15
4-row Cultivator	41			1			1			1			1			16
6-row Cultivator	42				1			1			1			1		17
Sprayer	43	1		1	1		1	1		1	1		1	1		18
2-14" Plow	44															19
2-16" Plow	45															20
3-14" Plow	46															21
3-16" Plow	47															22
4-14" Plow	48															23
4-16" Plow	49			1			1			1			1			24
5-14" Plow	50															25

---

[1] The matrix number code for this table is 5.

82. (c) Grow Systems Machinery Use Matrix (cont.)[1]

Machine	Machine Code	Hay Crop Maintain		Fieldbeans Grow						Soybeans Grow						i
		Summer		May			June			May			June			
		Fert.	U	4-row	6-row	U	4-row	6-row	U	4-row	6-row	U	4-row	6-row	U	
		29	30	31	32	33	34	35	36	37	38	39	40	41	42	
5-16" Plow	51				1			1			1			1		26
6-14" Plow	52															27
6-16" Plow	53															28
7-14" Plow	54															29
7-16" Plow	55															30
8-14" Plow	56															31
8-16" Plow	57															32
	58															33
8' Disc	59															34
10' Disc	60															35
12' Disc	61			1			1			1			1			36
14' Disc	62															37
16' Disc	63				1			1			1			1		38
18' Disc	64															39
9' Harrow	65															40
12' Harrow	66			1			1			1			1			41
16' Harrow	67				1			1			1			1		42
20' Harrow	68															43
24' Harrow	69															44
	70															45
2-row Planter	71															46
4-row Planter	72			1			1			1			1			47
6-row Planter	73				1			1			1			1		48
Fert. Spreader	74	1			1			1			1			1		49
Grain Drill	75															50

---

[1] The matrix number code for this table is 5.

82. (d) Grow Systems Machinery Use Matrix[1]

Machine	Machine Code	Barley Grow					
		April			May		
		Med.	Lg.	U	Med.	Lg.	U
		43	44	45	46	47	48
0- 40 H.P. Tractor	1	1	1		1	1	
41- 60 H.P. Tractor	2	1			1		
61- 80 H.P. Tractor	3	1	1		1	1	
81-100 H.P. Tractor	4		1			1	
100+ H.P. Tractor	5						
	6						
	7						
	8						
Pick-up Truck	9	1	1		1	1	
Large Truck	10						
	11						
Unloading Wagon	12						
Unloading Truck	13						
	39						
2-row Cultivator	40						
4-row Cultivator	41						
6-row Cultivator	42						
Sprayer	43	1	1		1	1	
2-14" Plow	44						
2-16" Plow	45						
3-14" Plow	46						
3-16" Plow	47						
4-14" Plow	48						
4-16" Plow	49	1			1		
5-14" Plow	50						

---

[1] The matrix number code for this table is 5.

82. (d) Grow Systems Machinery Use Matrix (cont)[1]

Machine	Machine Code	Barley Grow					
		April			May		
		Med.	Lg.	U	Med.	Lg.	U
		43	44	45	46	47	48
5-16" Plow	51		1			1	
6-14" Plow	52						
6-16" Plow	53						
7-14" Plow	54						
7-16" Plow	55						
8-14" Plow	56						
8-16" Plow	57						
	58						
8' Disc	59						
10' Disc	60						
12' Disc	61	1			1		
14' Disc	62						
16' Disc	63		1			1	
18' Disc	64						
9' Harrow	65						
12' Harrow	66	1			1		
16' Harrow	67		1			1	
20' Harrow	68						
24' Harrow	69						
	70						
2-row Planter	71						
4-row Planter	72						
6-row Planter	73						
Fert. Spreader	74		1			1	
Grain Drill	75	1			1		

---

[1] The matrix number code for this table is 5.

83. (a) **Harvest Systems Machinery Use Matrix**[1] (JHSM(I,J))

		Corn Silage Harvest					Corn Grain Harvest						
Machine	**Machine Code**	Custom	1-row	2-row	2-row S.P.	U	Custom	1-row Pick	2-row Pick	2-row Combine	3-row Combine	U	i
		01	02	03	04	05	06	07	08	09	10	11	
0-40 H.P. Tractor	1		1	1	1			1					01
41-60 H.P. Tractor	2		1	1	1			1	1	1	1		02
61-80 H.P. Tractor	3		1	1					1				03
81-100 H.P. Tractor	4												04
100+ H.P. Tractor	5												05
	6												06
	7												07
	8												08
Pick-up Truck	9	1	1	1	1		1	1	1	1	1		09
Large Truck	10												10
	11												11
Unloading Wagon	12		1	1	1								12
Unloading Truck	13												13
	39												14
2-row Cultivator	40												15
4-row Cultivator	41												16
6-row Cultivator	42												17
Sprayer	43												18
	76												19
1-row Chopper	77		1										20
2-row Chopper	78			1									21
2-row S.P. Chopper	79				1								22
Blower	80		1	1	1								23
3-row Corn Hd. (Grain)	81										1		24
1-row Corn Pick.	82							1					25
2-row Corn Pick	83								1				26
2-row Corn Com.	84												27

[1] The matrix number code for this table is 6.

83. (a) Harvest Systems Machinery Use Matrix (cont.)[1]

		Corn Silage Harvest					Corn Grain Harvest						
Machine	Machine Code	Custom	1-row	2-row	2-row S.P.	U	Custom	1-row Pick	2-row Pick	2-row Combine	3-row Combine	U	i
		01	02	03	04	05	06	07	08	09	10	11	
3-row Corn Combine	85												28
Grain Wagon	86							1	1	1	1		29
Grain Elevator	87							1	1	1	1		30
2-row Corn Hd. (Grain)	88									1			31
10' Grain Combine	89												32
12' Grain Combine	90									1	1		33
14' Grain Combine	91												34
Bale Thrower	92												35
12' PTO Windrower	93												36
12' S.P. Windrower	94												37
14' S.P. Windrower	95												38
Windrow Turner	96												39
Baler	97												40
Wagons	98												41
Hay Elevator	99												42
Mow Conveyor	100												43
Mower	101												44
Rake	102												45
Conditioner	103												46
Hay Hd. (1-row Chop.)	104												47
Hay Hd. (2-row Chop.)	105												48
4-row Bean Pull Att.	106												49
6-row Bean Pull Att.	107												50
Bean Combine	108												51
Bean Attachment	109												52
	110												53

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[1] The matrix number code for this table is 6.

83. (b) Harvest Systems Machinery Use Matrix[1]

Machine	Machine Code	Wheat Harvest				Oat Harvest				Hay Crop Silage Harvest					i
			Combine				Combine			Mow	Windrow				
		Custom	Spread Straw	Bale Straw	U	Custom	Spread Straw	Bale Straw	U	1-row Chop	2-row Chop	S.P. Chop	1-row Chop	U	
		12	13	14	15	16	17	18	19	20	21	22	23	24	
0-40 H.P. Tractor	1		1	1			1	1		1	1	1	1		01
41-60 H.P. Tractor	2									1					02
61-80 H.P. Tractor	3			1				1		1	1	1	1		03
81-100 H.P. Tractor	4										1				04
100+ H.P. Tractor	5														05
	6														06
	7														07
	8														08
Pick-up Truck	9														09
Large Truck	10														10
	11														11
Unloading Wagon	12									1	1	1	1		12
Unloading Truck	13														13
	39														14
2-row Cultivator	40														15
4-row Cultivator	41														16
6-row Cultivator	42														17
Sprayer	43														18
	76														19
1-row Chopper	77									1			1		20
2-row Chopper	78										1				21
2-row S.P.	79											1			22
Blower	80									1	1	1	1		23
3-row Corn Head	81														24
1-row Corn Pick.	82														25
2-row Corn Pick.	83														26
2-row Combine	84														27

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[1] The matrix number code for this table is 6.

83. (b) Harvest Systems Machinery Use Matrix (cont.)[1]

		Wheat Harvest				Oat Harvest				Hay Crop Silage Harvest					
			Combine				Combine			Mow	Windrow				
Machine	Machine Code	Cus-tom	Spread Straw	Bale Straw	U	Cus-tom	Spread Straw	Bale Straw	U	1-row Chop	2-row Chop	S.P. Chop	1-row Chop	U	i
		12	13	14	15	16	17	18	19	20	21	22	23	24	
3-row Combine	85														28
Grain Wagons	86		1	1			1	1							29
Grain Elevator	87		1	1			1	1							30
2-row Corn Head	88														31
10' Grain Com.	89														32
12' Grain Com.	90		1	1			1	1							33
14' Grain Com.	91														34
Bale Thrower	92														35
PTO Windrower	93										1	1	1		36
12' S.P. Windrower	94														37
14' S.P. Windrower	95														38
Windrow Turner	96														39
Baler	97			1				1							40
Wagons	98			1				1							41
Hay Elevator	99			1				1							42
Mow Conveyor	100														43
Mower	101									1					44
Rake	102									1					45
Conditioner	103									1					46
Hay Hd. (1-row Chop)	104												1		47
Hay hd. (1-row Chop)	105										1	1			48
4-row Bean Pull Att.	106														49
6-row Bean Pull Att.	107														50
Bean Combine	108														51
Bean Att. (Comb.)	109														52
	110														53

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[1] The matrix number code for this table is 6.

83. (c) Harvest Systems Machinery Use Matrix[1]

		Hay Harvest				Fieldbean Harvest				Soybean Harvest			
		Mow	Windrow	Windrow		Pull and Rake							
Machine	Machine Code	Rake Bale	Thrower Mow-Conv.	Bale Thrower	U	Custom Combine	Comb. 4-row	Comb. 6-row	U	Custom	Combine	U	i
		25	26	27	28	29	30	31	32	33	34	35	
0-40 H.P. Tractor	1	1	1	1		1	1	1					01
41-60 H.P. Tractor	2	1	1	1		1	1	1					02
61-80 H.P. Tractor	3												03
81-100 H.P. Tractor	4												04
100+ H.P. Tractor	5												05
	6												06
	7												07
	8												08
Pick-up Truck	9	1	1	1		1	1	1					09
Large Truck	10												10
	11												11
Unloading Wagon	12												12
Unloading Truck	13												13
	39												14
2-row Cultivator	40												15
4-row Cultivator	41					1	1						16
6-row Cultivator	42							1					17
Sprayer	43												18
	76												19
1-row Chopper	77												20
2-row Chopper	78												21
2-row S.P. Chopper	79												22
Blower	80												23
3-row Corn Head	81												24
1-row Corn Picker	82												25
2-row Corn Picker	83												26
2-row Corn Combine	84												27

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[1] The matrix number code for this table is 6.

83. (c) Harvest Systems Machinery Use Matrix (cont.)[1]

Machine	Machine Code	Hay Harvest				Fieldbean Harvest				Soybean Harvest			i
		Mow Rake Bale	Windrow Thrower Mow-Conv.	Windrow Bale Thrower	U	Pull and Rake Custom Combine	Pull and Rake Comb. 4-row	Pull and Rake Comb. 6-row	U	Custom	Combine	U	
		25	26	27	28	29	30	31	32	33	34	35	
3-row Corn Combine	85						1	1			1		28
Grain Wagons	86					1	1	1		1	1		29
Grain Elevator	87												30
2-row Corn Hd.(Grain)	88												31
10' Grain Combine	89												32
12' Grain Combine	90						1				1		33
14' Grain Combine	91												34
Bale Thrower	92		1	1									35
PTO Windrower	93			1									36
12' S.P. Windrower	94		1										37
14' S.P. Windrower	95												38
Windrow Turner	96		1	1									39
Baler	97	1	1	1									40
Wagons	98	1	1	1									41
Hay Elevator	99	1	1	1									42
Mow Conveyor	100		1										43
Mower	101	1											44
Rake	102	1				1	1	1					45
Conditioner	103	1											46
Hay Hd. (1-row Chop)	104												47
Hay Hd. (2-row Chop)	105												48
4-row Bean Pull Att.	106					1	1						49
6-row Bean Pull Att.	107							1					50
Bean Combine	108							1					51
Bean Attach.(Comb.)	109						1						52
	110												53

---

[1] The matrix number code for this table is 6.

83. (d) Harvest Systems Machinery Use Matrix[1]

Machine	Machine Code	Barley Harvest			
		Combine			
		Cus- tom	Spread Straw	Bale Straw	U
		36	37	38	39
0- 40 H.P. Tractor	1		1	1	
41- 60 H.P. Tractor	2				
61- 80 H.P. Tractor	3			1	
81-100 H.P. Tractor	4				
100+ H.P. Tractor	5				
	6				
	7				
	8				
Pick-up Truck	9				
Large Truck	10				
	11				
Unloading Wagon	12				
Unloading Truck	13				
	39				
2-row Cultivator	40				
4-row Cultivator	41				
6-row Cultivator	42				
Sprayer	43				
	76				
1-row Chopper	77				
2-row Chopper	78				
2-row S.P.	79				
Blower	80				
3-row Corn Head	81				
1-row Corn Pick.	82				
2-row Corn Pick.	83				
2-row Combine	84				

---

[1] The matrix number code for this table is 6.

83. (d) Harvest Systems Machinery Use Matrix (cont.)[1]

Machine	Machine Code	Barley Harvest			
		Combine			
		Cus-tom	Spread Straw	Bale Straw	U
		36	37	38	39
3-row Combine	85				
Grain Wagons	86		1	1	
Grain Elevator	87		1	1	
2-row Corn Head	88				
10' Grain Com.	89				
12' Grain Com.	90		1	1	
14' Grain Com.	91				
Bale Thrower	92				
PTO Windrower	93				
12' S.P. Windrower	94				
14' S.P. Windrower	95				
Windrow Turner	96				
Baler	97			1	
Wagons	98			1	
Hay Elevator	99			1	
Mow Conveyor	100				
Mower	101				
Rake	102				
Conditioner	103				
Hay Hd. (1-row Chop)	104				
Hay Hd. (1-row Chop)	105				
4-row Bean Pull Att.	106				
6-row Bean Pull Att.	107				
Bean Combine	108				
Bean Att. (Comb.)	109				
	110				

---

[1] The matrix number code for this table is 6.

C.4 CODES AND RELEVANT INFORMATION FOR CHANGES TO THE INPUT DATA (SECTION 3)

Section 3

Coding for Data Change Requirements[1]

General

5. The output desired is: (enter 1 if desired; 0 if not)

(a) labor summary (7-1)______
(b) annual financial statement (7-2)______
(c) annual crop production & feed utilization summary (7-3)______
(d) annual dairy cattle numbers summary (7-4)______
(e) annual income and expense statements (7-5)______
(f) annual production and yields summary (7-6)______
(g) brief monthly cash flow summary (7-7)______
(h) monthly crop production and feed utilization (7-8)______
(i) monthly dairy cattle numbers summary (7-9)______
(j) monthly cash flow statement (7-10)______
(k) brief debt and income summary (7-11)______
(l) print-out of data entered (this helps locate input errors and provides a record of simulation conditions) ______

Dairy

9. The average value per animal is:

Cows (1-13)$______
Bred Heifers (1-14)$______
Open Heifers (over 1 year) (1-15)$______
Calves (under 1 year) (1-16)$______

10. (a) The average annual actual historical production (lbs. per cow) of herd entered above is (1-17)______

(b) This level of production was achieved when:

1. forage quality was (1=excellent, 2=medium, 3=poor) (1-18)______
2. pounds of concentrate fed per cow per year was (1-19)______
3. culling rate (percent) was (1-20)______

---

[1] All input values with change codes are given here. Those questions from Section I, not shown here, cannot be altered.

11. For the simulation (at least the first period simulated):

    1. pounds of concentrate (air dry basis - includes high moisture corn) to be fed per cow per year is (1-21)______
    2. quality of forage to be fed is (1-22)______
    3. culling rate to be used is (percent) (1-23)______

12. Composition of concentrate (lbs. per batch) to be fed is (excluding high moisture corn and supplyment fed separately):

Grain	Lbs.
Ear corn[1]	(1-24)______
Shelled corn	(1-25)______
Oats	(1-26)______
Wheat[1]	(1-27)______
Supplement	(1-28)______
Barley	(1-29)______

13. (a) Is high moisture corn to be fed (1=yes, 0=no)? (1-30)______

    (b) If so, the pounds fed per cow per day by month is:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Lbs.[2]	1-31	1-32	1-33	1-34	1-35	1-36	1-37	1-38	1-39	1-40	1-41	1-42

    (c) The moisture content of high moisture corn as fed is (percent) (1-43)______

    (d) Pounds of supplement fed with HMC per cow per day (1-44)______

14. Percent of Hay Equivalent from Various Forages by Month (excluding hay equivalent from pasture). Each month column should add to 100.

Forage	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Hay	1-45	1-48	1-51	1-54	1-57	1-60	1-63	1-66	1-69	1-72	1-75	1-78
Hay Crop Silage	1-46	1-49	1-52	1-55	1-58	1-61	1-64	1-67	1-70	1-73	1-76	1-79
Corn Silage	1-47	1-50	1-53	1-56	1-59	1-62	1-65	1-68	1-71	1-74	1-77	1-80

---

[1] If ear corn or wheat supply becomes exhausted, shelled corn will be used.

[2] If there is insufficient HMC to meet this requirement, dry corn will be used instead.

15. The average calving interval of this herd is (1-81)_____months.

16. The % of heifer calves to be kept for replacements (raised) is (1-82)______

17. (a) The maximum number of cows to be allowed is[1] (1-83)______
    (b) The maximum number of heifers over 1 year to be allowed is[1] (1-84)______
    (c) The maximum number of heifers under 1 year to be allowed is[1] (1-85)______

18. (a) Type of bedding (1=straw, 2=other) to be used for:
    1. young stock is (1-86)______
    2. the dairy herd is (1-87)______

    (b) <u>If</u> bedding other than straw is used, the average cost per animal per month is:

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Cows	1-88	1-90	1-92	1-94	1-96	1-98	1-100	1-102	1-104	1-106	1-108	1-110
Heifers	1-89	1-91	1-93	1-95	1-97	1-99	1-101	1-103	1-105	1-107	1-109	1-111

<u>Machinery</u>

19. List below the machinery and housing systems to be used on this farm. See pages 16 through 19 for a description of machinery and housing systems. Indicate systems by number. Use the last number (system) in each set of parentheses (user defined system) only if you plan to define it.

1. Dairy Cows (1-7) (3-112)______
2. Dairy Replacements (8-10) (3-113)______
3. Corn Grow - April (1-4) (3-114)______
4. Corn Grow - May (5-8) (3-115)______
5. Corn Grow - June (9-12) (3-116)______

6. Corn Silage Harvest (1-5) (3-117)______
7. Corn Grain Harvest (6-11) (3-118)______
8. Wheat Grow (Sept.) (13-15) (3-119)______
9. Wheat Grow (Oct.) (16-18) (3-120)______
10. Wheat Harvest (12-15) (3-121)______

---

[1] This is the maximum number to be allowed at any time under any conditions. Unless there is good reason for setting such a limit, it is suggested that a multiple of the expected maximum number be entered.

11. Oats Grow (Apr.) (19-21) (3-122)______
12. Oats Grow (May) (22-24) (3-123)______
13. Oats Harvest (16-19) (3-124)______
14. Hay Crop Plant (25-28) (3-125)______
15. Hay Crop Silage Harvest (20-24) (3-126)______

16. Hay Crop Maintain (29-30) (3-127)______
17. Hay Harvest (25-28) (3-128)______
18. Fieldbean Grow - May (31-33) (3-129)______
19. Fieldbean Grow - June (34-36) (3-130)______
20. Fieldbean Harvest (29-32) (3-131)______

21. Soybeans Grow - May (37-39) (3-132)______
22. Soybeans Grow - June (40-42) (3-133)______
23. Soybeans Harvest (33-35) (3-134)______

24. Barley Grow - May (43-45) (3-135)______
25. Barley Grow - June (46-48) (3-136)______
26. Barley Harvest (36-40) (3-137)______

20. (b) Do you want additional (other than replacement) machines purchased as the program determines that they are needed to handle any increased size of business (1=yes, 0=no). (3-138)______

21. (b) The value of this land (by itself) in 10 years is expected to be[1] (3-139)______

22. (a) Acreages of crops to be grown.

	Owned or Cash Rent Acreage	Share Rent Acreage
Corn	(1-140)______	(1-149)______
Hay Crop (including silage and pasture)	(1-141)______	(1-150)______
Oats	(1-142)______	(1-151)______
Wheat	(1-143)______	(1-152)______
Soybeans	(1-144)______	(1-153)______
Fieldbeans	(1-145)______	(1-154)______
Government Programs	(1-146)______	(1-155)______
Total	(1-147)______	(1-156)______
Barley	(1-148)______	(1-157)______

---

[1] If the value in 10 years is unknown, enter the expected rate of inflation (percent) in land value expected over the next ten years. If a number less than 50 is used, the simulator will assume this to be the rate of inflation over the ten years.

23. Acres cash rented (included in above acreage) (1-158)______
Rental rate per acre (1-159)______

Buildings

25. Present Building Capacity is:

(a) Number of freestalls (1-160)______
(b) Number of stanchions (1-161)______
(c) Milking parlor capacity (no. of men)[1] (1-162)______
(d) Number of dry cows and/or heifers over one year (max) (1-163)______
(e) Number of heifers under one year of age (max) (1-164)______
(f) Silage storage capacity-upright (tons) (1-165)______
(g) Silage storage capacity-horizontal (tons) (1-166)______
(h) Hay and straw storage capacity (tons) (1-167)______
(i) Ear corn storage (bushels) (1-168)______
(j) Grain bin storage (bushels) (1-169)______
(k) High moisture corn storage (bu. dry equiv.) (1-170)______

26. (a) Is additional building capacity to be constructed as required for (1=yes, 2=no)

1. Dairy cattle housing and silage storage (1-171)______

2. Grain storage (1-172)______

3. Hay and straw storage (1-173)______

(If you answer no to part (1), (2) or (3), animals or crops in excess of capacity will be sold at calving or harvest respectively.)

(b) Is off-farm storage to be used for:[2]

1. Fieldbeans (1-174)______

2. Soybeans (1-175)______

3. Wheat (1-176)______

4. Shelled Corn (1-177)______

5. Oats (1-178)______

6. Barley (1-179)______

---

[1] A 1 indicates a one-man parlor, 2 indicates a two-man parlor, 3 indicates a one-man parlor and a two-man parlor.

[2] Enter 0 if off-farm storage is not used for this crop; enter 1 if off-farm storage is used for all this crop; enter 2 is off-farm storage is used for any amount of this crop in excess of farm storage capacity.

Labor

27. (a) Hours of Labor Available per Month and Number of Workers[1]

Number	Worker Type	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
		....Hours available per worker....											
180	Operator	188	196	204	212	220	228	236	244	252	260	268	276
181	Family	189	197	205	213	221	229	237	245	253	261	269	277
182	Regular Hired (1)	190	198	206	214	222	230	238	246	254	262	270	278
183	Regular Hired (2)	191	199	207	215	223	231	239	247	255	263	271	279
184	Regular Hired (3)	192	200	208	216	224	232	240	248	256	264	272	280
Rate per Hour[2]		.....Total hours available for specified wage.....											
185	Hourly (1)[3]	193	201	209	217	225	233	241	249	257	265	273	281
186	Hourly (2)[3]	194	202	210	218	226	234	242	250	258	266	274	282
187	Hourly (3)[3]	195	203	211	219	227	235	243	251	259	267	275	283

(b) All additional labor will cost (1-284)________ per hour.

28. The wage rate is:

Regular hired (1) = (1-286)______ per (1-289)________[4]
Regular hired (2) = (1-287)______ per (1-290)________[4]
Regular hired (3) = (1-288)______ per (1-291)________[4]

---

[1] Each identification number in this table must be preceded by 1- to be complete. Only the last three digits of the number are listed above the coefficient.

[2] The least expensive (lowest hourly rate) hourly labor is used first. Enter all labor to be hired regardless of labor requirements as regular hired labor.

[3] It is assumed that this labor is hired only when needed.

[4] 1=monthly, 0=weekly.

36. (a) The number of acres of hay crop pastured is:

(1-308)________acres first cutting
(1-309)________acres second cutting
(1-310)________acres third cutting

(b) Barley planted in April

Pounds of plant food applied (1-340)______
Yield (bushels per acre) (1-285)______

37. (a) The amount of hay crop silage to be harvested is (1-311)______[1]

(b) The amount of corn silage to be harvested is (1-312)______[1]

(c) The amount of corn to be harvested as high moisture corn is (1-313)______[2]

39. (a) The amount of N, P_2O_5 and K_2O (lbs./acre) to be applied by crop is:

	Lbs. N	Lbs. P_2O_5	Lbs. K_2O
(1) Corn	(1-314)_____	(1-322)_____	(1-330)______
(2) Soybeans	(1-315)_____	(1-323)_____	(1-331)______
(3) Fieldbeans	(1-316)_____	(1-324)_____	(1-332)______
(4) Wheat	(1-317)_____	(1-325)_____	(1-333)______
(5) Oats	(1-318)_____	(1-326)_____	(1-334)______
(6) Hay (seeding)[3]	(1-319)_____	(1-327)_____	(1-335)______
(7) Hay topdress	(1-320)_____	(1-328)_____	(1-336)______
(8) Barley	(1-321)_____	(1-329)_____	(1-337)______

40. The Soil Management Group for this farm is (1-338)______

If soil is	Enter
Group A (low response - or high natural fertility)	39
Group B (moderate response)	40
Group C (high response - or low natural fertility)	41
Other (very high response - or run down soils)	54

---

[1] Enter -1 if enough is to be harvested to fill the silos. Enter number of tons per cow ($0 \leq$ tons ≤ 25) if a certain amount per cow is desired (up to silo capacity). Enter number of tons (> 25) if a certain absolute tonage is to be harvested as silage (up to silo capacity).

[2] Enter -1 if enough is to be harvested to fill the silos. Enter number of bushels (dry equivalent) per cow ($0 \leq$ bushels ≤ 200) if a certain amount per cow is desired. Enter number of bushels (dry equivalent) if a certain absolute number of bushels is to be harvested as HMC.

[3] Excluding top dressing.

Crops

For questions 29 through 34 indicate the average yields that have been achieved when the crop is harvested on time. Also indicate the fertilizer plant food applied to achieve these yields. It is important that average yields be entered, not "normal" yields or "good year" yields.

29. Oats planted in April

(a) Pounds of plant food applied (1-292)______
(b) Yield (bushels per acre) (1-293)______

30. Corn

(a) Planted in planting period[1] (1-294)______
(b) Pounds of plant food applied (1-295)______
(c) Yield (bushels per acre) (1-296)______

31. Wheat planted in September

(a) Pounds of plant food applied at planting (1-297)______
(b) Pounds of nitrogen applied in spring (1-298)______
(c) Yield (bushels per acre) (1-299)______

32. Hay

(a) Pounds of plant food applied (1-300)______
(b) Yield: Tons of first cutting (1-301)______
Tons of second cutting (1-302)______
Tons of third cutting (1-303)______

33. Fieldbeans planted in June

(a) Pounds of plant food applied (1-304)______
(b) Yield (bushels per acre) (1-305)______

34. Soybeans planted in June

(a) Yield (bushels per acre) (1-306)______

35. The number of hay cuttings (including pasturage) is:
(This number may be either 1, 2 or 3.) (1-307)______

---

[1] 1=before May 1; 2=May 1 to May 15; 3=May 16 to May 31; and 4=after May 31.

41. If the business is a proprietorship or partnership, indicate the total monthly withdrawal for the farm family (families). Exclude income taxes but include personal insurance.[1]

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Withdrawal	341	342	343	344	345	346	347	348	349	350	351	352

42. If the business is a proprietorship, indicate:

(a) expected annual off-farm income[2] (1-353)______

(b) number of exemptions to be claimed for tax purposes (1-354)______

43. (a) The estimated income taxes to be paid on income for the year previous to the first year simulated is (for a corporation indicate only corporate taxes). (1-355)______

(b) If the first month to be simulated is not January, indicate the estimated net taxable income for the first part of the first year simulated. (1-356)______

44. (a) The depreciation method to be used is (1=straight line, 2=double declining balance, 3=150% declining balance).

1. machinery (2-3217)______
2. cattle (2-3218)______
3. buildings (2-3219)______

(b) Is special 20% first year depreciation to be used? (1=yes, 0=no) (2-3220)______

45. The pension plan rate (percent) is (2-3223)______

46. The form of business organization to be used is 1, 2, 3, 4 (2-3228)______

---

[1] Each identification number in this table must be preceded by 1- to be complete. Only the last three digits of the number are listed above the coefficient.

[2] Taxes will be calculated assuming that all off-farm income is in the form of wages, tips, etc. Divide capital gain by two before entering.

48. If the business is a partnership, Subchapter S Corporation or regular corporation, enter the following salary and tax information for each partner or member of the corporation. Enter as tax families, i.e., if a husband and wife are corporate members but file a joint tax return, their combined interests should be entered on one line.

Partner or Tax Family	Salary[1] or % of Profits[2]	Other Income	Number of Exemptions	Percent of Shares Owned[1]	Annual Residence Value[1]	Health Insurance[1]
1	2-3229	2-3234	2-3239	2-3244	2-3249	2-3254
2	2-3230	2-3235	2-3240	2-3245	2-3250	2-3255
3	2-3231	2-3236	2-3241	2-3246	2-3251	2-3256
4	2-3232	2-3237	2-3242	2-3247	2-3252	2-3257
5	2-3233	2-3238	2-3243	2-3248	2-3253	2-3258

49. (b) Current cash and checking account balance is (1-339)$________

---

[1] Regular or subchapter S corporations only.

[2] Partnerships only.

Appendix D

INPUT DATA CHANGE CAPABILITIES OF THE MODEL AND THEIR FORMAT STRUCTURE

D.1 MODEL PARAMETER CHANGES

To fully utilize the model one must be aware of the flexibility of LaDue's model. There are two sets of data. One is the set required by the farmer before the model is run. This conformation is discussed more fully in Appendix C. These values are basically the starting point or centralization of the program. The second set which is dealt with here is the data on which the changes are made as the model programs through time. LaDue's user guide[81] lays out the technical procedure of changes. It is important to realize that this is the most powerful application tool of the simulator. This is where the flexibility and the decision changes are achieved. The data changes incorporated into dhe model to conform to Manitoba are found in Appendix C, Section 2. These changes allow for the feeding of barley as another feed. This is the data base which is assessed and where the changes are inserted to comply with user requirements.

---

[81] E.L. LaDue, FABS Farm Business Simulator: A Computer Program (Department of Agricultural Economics, Cornell University Agricultural Experimental Station, Ithaca, New York) October 1973.

D.2 INFORMATION ON CODING OF REQUIRED CHANGES.

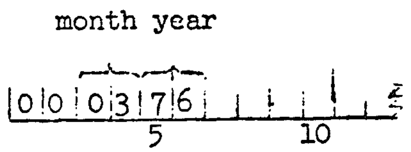
Entering Management Decisions and Changing Assumed Coefficients

There are two ways that management decisions or changes in the farm firm situation at specific points in time during the simulated period can be reflected. One way is by changing the value of some of the coefficients listed in Part I or III of this publication. The second is by purchase or sale of assets. These changes are accomplished by data input on Part B of the FABS Input Form. Each numbered set of two lines on Part B of the FABS Input Form is used for one record (entry). Only one date, parameter change or management decision is to be placed in each record (entry).

Date Records

The date (month) during which each parameter change or decision is to take place is indicated by the date record which preceeds it. A date record has zeros in the first two spaces, the month of the year the change is made in the third and fourth spaces and the last two digits of the year of the change in spaces five and six. For example, if the first changes are to occur during March of 1976, the first record would appear as follows:

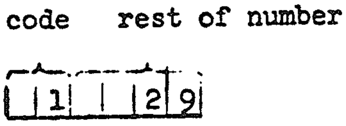
1.



This record would be followed by decision records indicating the changes and decisions to be carried out for that month. All changes (decision records) following a date record should be listed in the order in which they are to occur. Only one date record is to be entered for each month changes are made. No date record is required for months in which no change is made.

Identification Numbers

Each coefficient in Part III has an identification number just to the left (in parentheses) or just above (when data is in table or matrix form) the coefficient value listed. Similar identification numbers are placed to the left of the line or above the space provided for most coefficients in Part I. Each of these identification numbers consists of two parts separated by a hyphen. That part of the number to the left of the hyphen is the identification number code. When identification numbers are being entered on the Input Form the code part of the identification number must be entered separate from the rest of the number. There are always six spaces provided for entering identification numbers. The code goes in the first two spaces. The rest of the number goes in the last four spaces. Both the code and the rest of the number are right justified, i.e., entered in the right hand portion of the space provided for each entry. For example, if the identification number is 1-29, the code part of the number is 1 and the number would be entered in the proper spaces as



Those coefficients in Part I which have no identification number can not be changed after the initial value is entered. In most cases these coefficients are required to specify the initial situation for the business but will normally change through time. Examples include the beginning inventory values which are of value only as starting values. There would be no reason to specify a new beginning inventory after the first year.

Changes and Decisions

There are eleven different types of changes or decisions that can be used. Each type of change is identified by a number and represents a different purchase, sell or parameter change action. Only the first nine will be used for most simulation problems. The eleven types of change are:

Number	Type of Change
01	Change in value of a coefficient
02	Building purchase (detailed)
03	Building purchase (brief)
04	Machine purchase
05	Machine sale
06	Livestock purchase
07	Livestock sale
08	Land purchase
09	Land sale
10	Machinery inventory input (detailed)
11	Machinery inventory input (brief)

For each decision or parameter change, one decision record must be entered indicating the data necessary to make that change. Each type of change and the data record required to represent that change is discussed below. The numbers below each data line segment shown indicate the spaces or columns in which the data is to be placed. Right justify all entries, i.e., whenever the space allowed exceeds that required, place the number entered in the right hand portion of the space provided. If there is a decimal point in the number, it occupies one space.

1. Change in Coefficient Value

Data required:

(a) Type of change number |0|1|
2

(b) Identification number of coefficient changed |_|_|_|_|_|_|
5 10

(c) New value of coefficient |_|_|_|_|_|_|_|_|_|_|_|_|
15 20

Example: a b c

4. |0|1|_|_|_|1|_|_|2|3|_|_|_|_|_|_|_|_|_|_|_|_|2|7|_|_|_|
5 10 15 20 25

Explanation: This changes the coefficient indicated to the new value entered. The new value will be used for the simulated month in which the change is made (except for decisions entered prior to this one) as well as future months. In the example given, the culling rate is changed to 27 percent.

2. Building Purchase (Detailed)

Data required:

(a) Type of change number 0 2
2

(b) Building cost
5 10

(c) Expected building life (years)
12

(d) Loan period (years)
14

(e) Interest rate
17

(f) Loan type[1]
19

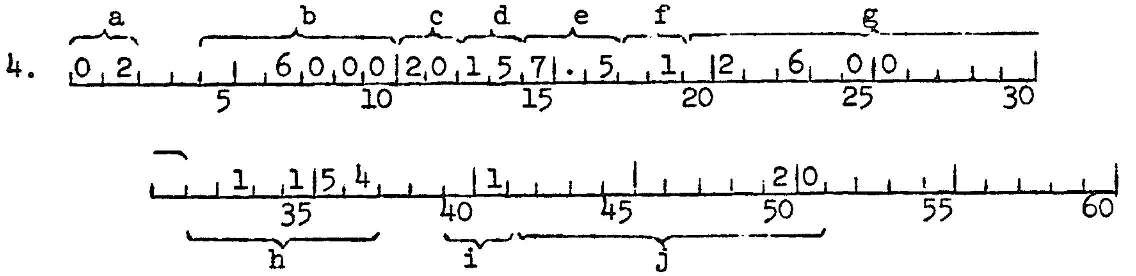
(g) Months payments made[3]
20 23 25 27 29 30

(h) Building capacity coefficient changed[2]
32 35 37

(i) New coefficient value is 0 = new total capacity
1 = amount added to capacity
41

(j) New value of coefficient
42 45 51

Example:



Explanation: This will purchase the buildings and change the value of buildings, the financial position, the building capacity and depreciation. In the example given, a 20 cow free stall addition with an expected life of 20 years was constructed for $6,000 and financed over 15 years at 7.5 percent interest with equal payments including principle and interest due in February, June and October.

---

[1] Use same loan type definitions and entry methods as shown in question 49 Part I.

[2] From question 25 Part I. If more than one is changed, list the additional ones with type 01 changes. Leave blank if no capacity coefficient is changed.

[3] Enter 13 in columns (spaces) 20 and 21 if payments are monthly.

3. **Building Purchase (Brief)**

Data required:

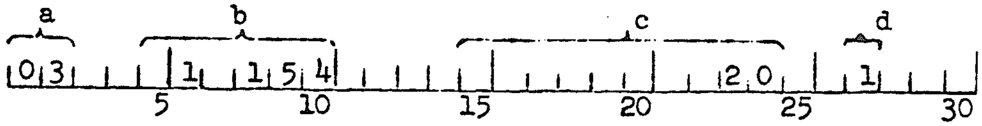
(a) Type of change number 0 3
2

(b) Building capacity coefficient changed[1/]
5 10

(c) New value of coefficient
15 20 24

(d) New value is 0 = new total capacity
1 = amount added to capacity
27

Example:



Explanation: This will purchase buildings to increase the building capacity indicated to the level or by the amount entered as the new value. Costs incurred and loan conditions are determined by coefficients found in Part III. The value of buildings, depreciation and the financial situation will be adjusted. In the example given, a 20 cow addition to the free stall barn is made.

Note: The type and characteristics of buildings purchased will depend on the systems being used. If this represents a change in machinery or housing systems, be sure that the system change is indicated before the building purchase change.

4. **Machine Purchase**

Data required:

(a) Type of change number 0 4
2

(b) Machine code[2/]
5 7

(c) Machine life (years)
11

(d) Age (years)
15

(e) Purchase price[3/]
18 27

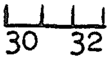
[1/] From question 25, Part I. If more than one coefficient is changed, list the additional ones with type 01 changes. Leave blank if no capacity coefficient is changed.

[2/] From question 68, Part III.

[3/] Enter -1 if a simulator generated price is to be used. If trade-in is in-

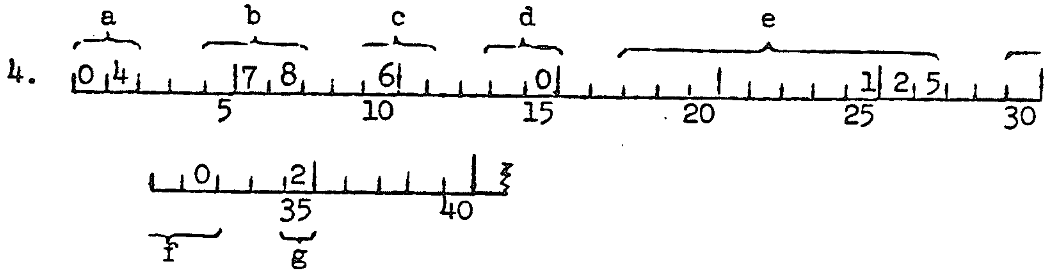
4. Machine Purchase (cont.)

(f) Code number of machine traded in[1]



(g) Cash (=1) or Loan (=2)[2]

Example:



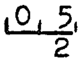
Explanation: This purchases the machine indicated, enters it in the machinery inventory and makes the appropriate cash or loan transactions. If a machine is traded in, the oldest machine with the code number indicated will be traded. In the example given, a new 2 row chopper with an expected life of six years was purchased for $4,125. There was no trade-in and the entire purchase price was borrowed.

Note: If purchase of the machine involves a change in a machinery system being used, be sure to change the machinery systems matrix (questions 81, 82 or 83, Part III).

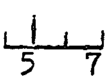
5. Machine Sale

Data required:

(a) Type of change number

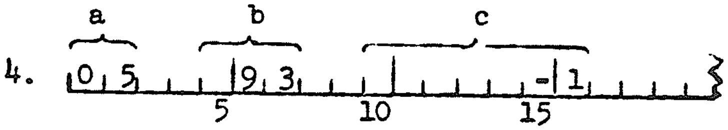


(b) Machine code of machine sold[3]



(c) Sale price[4]

Example:



---

[1] Enter 0 to indicate no trade-in. Use machine codes from question 68, Part III.

[2] If loan is indicated, standard loan conditions from question 12, Part II will be used.

[3] From question 68, Part III.

[4] Enter -1 if machine is to be sold at depreciated value minus 10%.

Explanation: The oldest machine of the code indicated is sold at the price indicated. If sale of the machine involves a change in a system used, be sure to change the systems matric accordingly. In the example given, a PTO Windrower is being sold for its depreciation value minus 10 percent.

6. Livestock Purchase

Data required:

(a) Type of change number 0 6 — 2

(b) Number of animals — 5 8

(c) Age (months) — 10 12

(d) Price each[1] — 13 18

(e) Months since last fresh[2] — 21

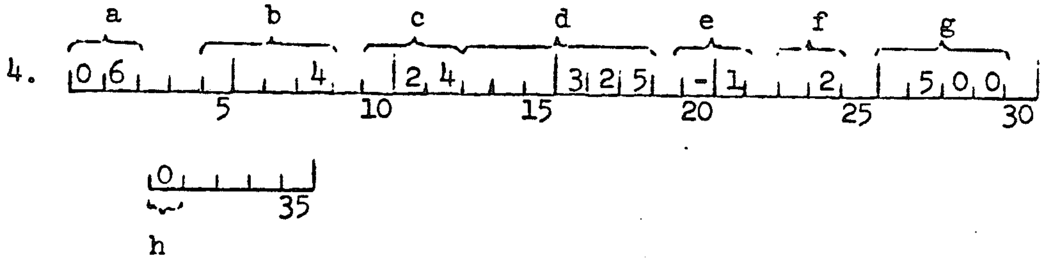
(f) Months until next fresh (if bred)[3] — 24

(g) Genetic superiority or inferiority (lbs. per lactation) — 26 29

(h) Cash (=1) or loan (=0) — 31

Example:

4.



Explanation: This purchases the number of animals indicated and adds them to the herd. If bred heifers are purchased "months until next fresh" must be given a value. Not more than 10 livestock purchase decisions can be made during any one month. In the example given, 4 bred heifers that are expected to produce 500 pounds above herd average and will freshen in two months are purchased for $325 each. All the purchase price is borrowed.

---

[1] Enter -1 if a simulator generated price is to be used.

[2] Enter 0 if fresh cows are purchased, -1 if animals have never calved.

[3] Enter -1 if the animal is to freshen in the month purchased, leave blank if the next freshening date is unknown.

7. Livestock Sale

Data required:

(a) Type of change number |0|7|
2

(b) Number of animals |_|_|_|_|
5 8

(c) Age (months) |_|_|_|
10 12

(d) Price each[1/] |_|_|_|_|_|_|
13 18

Example:

```
         a            b              c         d
       ____      ___________      _____ ___________
4.    |0|7| | | | | |2| | |1|4| | | |1|7|5| | | | |
                 5         10        15         20
```

Explanation: This sells the number of animals indicated. The animals sold are those whose age is closest to the age indicated. If there are not enough animals of the age indicated available, those one month older will be sold, then those one month younger, then those two months older. This process continues until the required number are sold. If cows are being sold and there is more than one animal of that age, those fresh over ten months are sold first, followed by those fresh the shortest period of time. In the example given, two heifers approximately 14 months of age are sold for $175 each.

8. Land Purchase

Data required:

(a) Type of change number |0|8|
2

(b) Value of land[2/] |_|_|_|_|_|_|_|_|
5 12

(c) Cash Down payment |_|_|_|_|_|_|_|_|
15 20

New acreages (owned or cash rented only)

(d) Corn |_|_|_|_|
25 28

(e) Hay Crop |_|_|_|_|
29 32

(f) Oats |_|_|_|_|
33 36

(g) Wheat |_|_|_|_|
37 40

(h) Soybean |_|_|_|_|
41 44

(i) Fieldbeans |_|_|_|_|
45 48

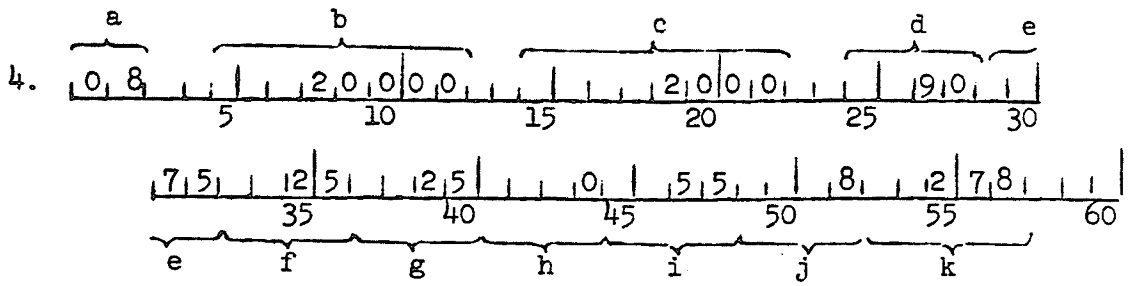
(j) Gov't programs |_|_|_|_|
49 52

(k) Total |_|_|_|_|_|
53 57

[1/] Enter -1 if simulator generated price is to be used.

[2/] If borrowing is necessary, loan terms from question 14, Part III will be used.

Example:



Explanation: The value of the land minus the down payment will be added to loans outstanding. The down payment will be added to cash land expenditures. The acresages indicated will be the new <u>total</u> owned and cash rented acreage. If the share-rented or cash rented acreage changes at the same time, this should be indicated by entering decision records with type 01 changes. In the example given, land is purchased for $20,000 with $2,000 down. The new acreages of crops is 90 of corn, 75 of hay, 25 of oats, 25 of wheat, 55 of field-beans and 8 acres of government programs for a total of 278 acres.

9. <u>Land Sale</u>

Data required:

(a) Type of change number 09 2

(b) Value of land sold 5 12

New normal acreages (owned and cash-rented only)

(c) Corn 15 18

(d) Hay Crop 19 22

(e) Oats 23 26

(f) Wheat 27 30

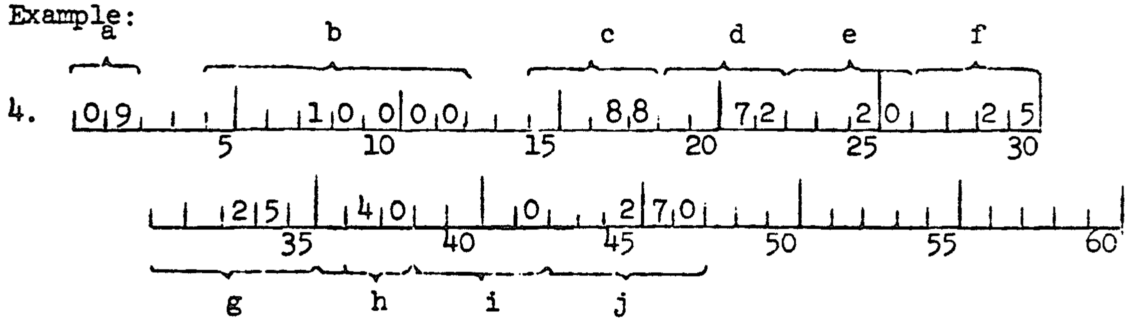
(g) Soybeans 31 34

(h) Fieldbeans 35 38

(i) Gov't payments 39 42

(j) Total 43 47

Example:



Explanation: The acreages indicated are the new total acreages of crops grown on owned or rented land. If the share-rent or cash rent acreage changes at the same time this should be indicated with a number 01 type change decision record. The value received for the land will be distributed over the number of years indicated in question 46, Part III with not more than 30 percent of the total received during the first year and interest received as indicated in question 14, Part III. In the example given, land is sold for $10,000. The acreage of crops after the sale are 88 of corn, 72 of hay crop, 20 of oats, 25 of wheat, 25 of soybeans, 40 of fieldbeans and zero in government programs for a total of 270 acres.

10. Machinery Inventory Input (Detailed)

Data required:

(a) Type of change number 1 0
2

(b) Machinery code[1/]
5 7

(c) Approximate purchase price
10 16

(d) Life
20

(e) Age
24

(f) Present value
27 33

Example:

a b c d e f

4. 1 0 1 3 85 0 1 0 7
5 10 15 20 25 30

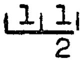
8 0 0
35
f

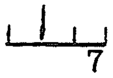
Explanation: This decision record is used to input present machinery inventory when the asnwer to question 20, Part I is yes (=1), i.e., when the user inputs the beginning machinery inventory. This can be used only in the first month of simulation. One record is used for each machine. In the example given, the machine being entered is a 7 year old 40 H.P. tractor with an expected life of 10 years which had been purchased for $3,850 and is now worth $800.

[1/] From question 68, Part III.

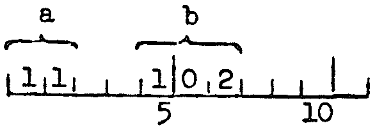
11. Machinery Inventory Input (Brief)

Data required:

(a) Type of change number 

(b) Machine code 

Example:

4. 

Explanation: This is used to input the beginning machinery inventory when the user does not what to specify the life, age and present value of each machine but wants to enter the specified machinery contained in the beginning inventory. Values for these items will be assigned by the program. Type 11 changes can be combined with type 10 changes to enter the complete inventory. This type of change can be used only in the first month of simulation. In the example given, the machinery inventory includes a rake.

Appendix E

SPECIFICATION OF THE LINKAGE OPERATION BETWEEN COMPONENTS OF THE MODEL

There are two linkage operations involved in the model. First the link from the simulation output to the linear program. Equation one and two are involved in this linkage operation. The second is to link the output from the linear program to the simulator input. Equation three and four are used in this linkage operation. A detailed explanation of these steps follows.

The quantities of on farm crops upper limit are determined by taking the whole yield dividing by the number of days in the feeding cycle, i.e., 300 for lactating cows. Since a 21 kg. ration/day is specified this value can be related as a percentage by dividing the daily value by 21 kg.

The formula is as follows:

$$Q = \left[\left(\frac{Yi \times Ai \times Ci}{Dj \times U} \right) / 21.0 \right] \times 100 \qquad \text{Equation 1.}$$

where:

Yi = the yield per acre

Ci = the conversion of the specified crop unit (i.e., bushels or pounds) to kilograms

Ai = the particular crop acreage

Dj = the duration of the feed required by the specified group of animals

U = the number of cow units

The price formula is:

$$PN = [Po/Bi] \times 2.52 \qquad \text{Equation 2.}$$

PN = the required price in dollars per kilogram

Po = the original price determined from a per bushel cost

Bi = the bushel weight of the feed

The types of available feed are determined by the feeds a producer would like are used in determining the optimal feed ration. The compliment used here is made up of:

a) The farm produced feeds

   i) barley

   ii) hay

   iii) corn silage

   iv) hay silage

v) wheat

vi) fababeans

b) Canola (rapeseed) at 3% availability

c) Corn grain - unlimited

d) Alfalfa hay at 10% availability

The prices of the respective feeds are given in Table 21 .

This fulfills the MPS LP requirement and the optimal solution is generated on this base.

An optimal solution is shown in Appendix F, Section 1.

The optimal solution is now converted into usable simulator terms. The simulator requires quantities and prices.

The types of feed that make up the concentrates are:

1. ear corn
2. corn
3. oats
4. wheat
5. barley
6. supplement

The supplement includes the LP output of anything that cannot be included in the other categories.

The roughage consists of:

1. corn silage

2. hay silage

3. hay

4. high moisture corn

The prices for the buying of the supplement is the only price that change. The rest are converted from kilograms to the appropriate price for either bushels or tons. Quantities are specified on a percentage basis. Because the optimal solution is set up on 100 kg., the percentage of feed used can easily be translated to the simulator. The price for supplement is calculated as follows:

$$PN = \sum_{i=1}^{n} Pi \times (Qi / \sum_{i=1}^{n} Qi) \times 100 \qquad \text{Equation 3.}$$

where:

Pi = price of feed

Qi = quantity of feed required as a percentage of the total feed ration.

The total quantity of feed required must be re-specified in the simulator program. This value is calculated by 7 kg. x 2.54 x 300 animal days to give 5,334 pounds of feed/year required. This required value will involve only concentrate so the percentage of roughage must be removed.

The required feed concentrate is:

$$QC = 5{,}334(100 - \sum_{i=1}^{n} Pri) \qquad \text{Equation 4.}$$

where:

Qc = quantitv of concentrate

Pri = the percentage of roughage for feed i

Appendix F

FINAL ANALYSIS RESULTS OF THE FIVE SCENARIOS FOR THE THREE QUESTIONS ASKED

F.1 RESULTS

The results of the three questions posed required to analyze the problem follow. Section 1 contains the linear program optimal feed results for scenario 5. Section 2 contains the initial run of the simulator, the control, to get the basic simulation results. Section 3 contains the seasonal feed price variation scenario. Section 4 contains the seasonal production scenario. Section 5 contains the results of both seasonal price and production variations from scenario 4. Section 6 contains the results of the optimal feed ration scenario for scenario 5 relating to question three.

F.2 LINEAR PROGRAM RESULTS ANSWERING QUESTION 3.(SECTION 1)

Optimal Solution Nutrient Component
from the MPS Linear Program

```
NUMBER  ...ROW..  AT  ...ACTIVITY...  SLACK ACTIVITY  ..LOWER LIMIT.  ..UPPER LIMIT.  .DUAL ACTIVITY

      1 METABOLZ  BS     37.42022        37.42022-           .             NONE             .
      2 DIGESTCT  BS    291.32830         1.32830-      290.00000          NONE             .
      3 DIGESTSW  BS    117.34601       117.34601-           .             NONE             .
      4 METABCT   BS     99.88564        99.88564-           .             NONE             .
      5 METABSW   BS    105.48971       105.48971-           .             NONE             .
      6 PROTEIN   BS   1698.14016       198.14016-     1500.00000          NONE             .
      7 CALCIUM   BS     76.97536        29.97536-       47.00000          NONE             .
      8 PHOSPHOR  LL     35.00000            .           35.00000          NONE          .55882-
      9 FIBRE     BS   2029.84375       970.15625          NONE        3000.00000           .
     10 LYSINE    BS     54.38368        54.38368-           .             NONE             .
     11 HYSTADIN  BS     22.37325        22.37325-           .             NONE             .
     12 ARGININE  BS     63.71695        63.71695-           .             NONE             .
     13 THREONIN  BS     35.76486        35.76486-           .             NONE             .
A    14 GLYCINE   EQ         .               .               .               .              .
A    15 CEPTINE   EQ         .               .               .               .              .
     16 VALINE    BS     47.99302        47.99302-           .             NONE             .
     17 METHIONI  BS     23.86011        23.86011-           .             NONE             .
     18 ISOLEUCI  BS     45.37697        45.37697-           .             NONE             .
     19 LEUCINE   BS     69.98395        69.98395-           .             NONE             .
A    20 TYROCINE  EQ         .               .               .               .              .
     21 PHENYLAL  BS     73.16251        73.16251-           .             NONE             .
A    22 SERIN     EQ         .               .               .               .              .
     23 TRYPTOPH  BS      9.89443         9.89443-           .             NONE             .
     24 WEIGHTL   BS    155.16000        55.66000-       99.50000          NONE             .
     25 WEIGHT    UL    100.50000            .              NONE         100.50000       .07685
     26 TRANMC    BS     10.86478        49.13522           NONE          60.00000          .
     27 TRANPT    BS     27.77511        42.22489           NONE          70.00000          .
     28 GLYCSER   BS     60.34241        60.34241-           .             NONE             .
     29 MKTPR76   BS      7.55607         7.55607-          NONE           NONE             .
     30 MKTPR70   BS      8.11792         8.11792-          NONE           NONE          1.00000
     31 MKTPR73   BS     10.58200        10.58200-          NONE           NONE             .
     32 MKTPR78   BS      8.50622         8.50622-          NONE           NONE             .
     33 CORNCHGE  BS         .               .              NONE           NONE             .
     34 FABACHGE  BS         .               .              NONE           NONE             .
     35 TRITCHGE  BS         .               .              NONE           NONE             .
     36 FIBREG    BS   2029.84375       429.84375-     1600.00000          NONE             .
     37 FORAGE    LL     60.00000         6.00000        60.00000        66.00000        .01979-
     38 MEATMEAL  BS         .               .              NONE             .              .
     39 FISHMEAL  BS         .               .              NONE             .              .
```

Optimal Solution Feed Component
from the MPS Linear Program

```
  NUMBER  .COLUMN.  AT  ...ACTIVITY...  ..INPUT COST..  ..LOWER LIMIT.  ..UPPER LIMIT.  .REDUCED COST.

      40  SOYMEAL   BS     14.29065          .18580           .              NONE             .
      41  SOY49     LL       .            1714.00000          .              NONE         1713.73038
      42  BUYCORN   LL       .               .11810           .              NONE            .08877
      43  FARMCORN  LL       .            1000.00000          .              NONE          999.97067
      44  CANOLA    UL      3.00000          .17500           .             3.00000          .13933-
      45  FISHMEAL  LL       .            1000.00000          .              NONE          999.21626
      46  MEBNMEAL  LL       .            1000.90000          .              .00010        999.02096
      47  POULFEAT  LL       .            1000.90000          .              .00010       1000.66391
      48  BLDMEAL   LL       .            1000.00000          .              .00010        999.99079
      49  DISTSOL   LL       .            1000.90000          .             9.00000       1000.83211
      50  OYSTER    LL       .            1000.00000          .              NONE         1000.03773
      51  LIMESTON  LL       .            1000.00000          .              NONE         1000.06567
      52  PHOSROCK  LL       .            1000.10000          .              NONE          990.11802
      53  TALLOW    LL       .               .40320           .              .00010          .48005
      54  ALFA      LL       .               .10840           .              NONE            .00642
      55  WHEAT     LL       .               .16460           .              NONE            .08498
      56  FRMWHEAT  LL       .               .15050           .             4.31000          .07088
      57  BARLEY    LL       .               .11300           .              NONE            .03338
      58  FRMBARLY  LL       .               .17820           .              NONE            .09858
      59  RYE       LL       .            1000.00000          .            30.00000        999.90920
      60  MIDDLNG   UL      .00010           .07740           .              .00010          .04693-
      61  SHORTS    UL      .00010           .12410           .              .00010          .09523-
      62  OATS      BS     23.20915          .09080           .              NONE             .
      63  FARMOATS  LL       .            1000.00000          .              NONE          999.90920
      64  METHION   LL       .            1000.00000          .              NONE         1000.07685
      65  LYSINE    LL       .            1000.00000          .              NONE         1000.07685
      66  TRANSMCA  BS     10.86478           .               .              NONE             .
A     67  TRANSMCB  LL       .                .               .              NONE             .
      68  TRANSPTA  BS     27.77511           .               .              NONE             .
A     69  TRANSPTB  LL       .                .               .              NONE             .
      70  TRANG     BS     45.15829           .               .              NONE             .
      71  TRANS     BS     15.18412           .               .              NONE             .
      72  ALFABROM  UL     10.00000          .02380           .            10.00000          .05829-
      73  FMALFBRM  LL       .            1000.00000          .              NONE          999.91791
      74  ALFAHAY   BS     19.56000          .04130           .              NONE             .
      75  FMALFHAY  LL       .               .05100           .            10.86000          .00970
      76  BARSTW    LL       .               .01760           .              NONE            .02995
      77  OATSTRW   LL       .               .01380           .             2.88000          .02056
      78  MOLASSS   LL       .               .11870           .             1.00000          .14944
      79  FRMCNSIL  UL     49.10000          .02080           .            49.10000          .00108-
      80  HAYLAGE   UL     36.00000          .02120           .            36.00000          .10698-
      81  FABABEAN  LL       .               .15420           .              NONE            .15281
      82  FARMFABA  LL       .               .27950           .             2.76000          .27811
      83  TRITICAL  LL       .            1000.00000          .            50.00000       1000.05002
```

F.3 SCENARIO 1 INITIAL SIMULATION RESULTS.(SECTION 2)

```
NAME:SWAN RIVER DAIRY

PROBLEM:FEED COST COMPARISON:  ACTUAL USE
COWS

LACT.   DEC.  NOV.  OCT. SEPT.  AUG.  JULY  JUNE   MAY  APR.  MAR.  FEB.  JAN.  DEC.  NOV.  OCT. <OCT.

 1         0     0     1     0     2     4     0     0     2     0     2     1     0     0     0     0

 2         1     2     3     0     0     2     0     1     2     0     2     0     1     0     0     0

 3         2     0     0     1     1     0     1     0     1     0     1     0     1     0     0     0

 4         0     2     0     0     0     0     0     0     0     0     0     0     0     0     0     0

 5         0     1     1     0     1     0     0     0     0     0     0     0     0     0     0     0

 6         0     0     0     1     0     0     1     1     0     0     0     1     0     0     0     0

 7         0     0     0     0     0     0     0     0     0     0     1     0     0     0     0     0

 8         0     0     0     0     0     1     0     0     0     0     0     0     0     0     0     0

 9         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

10         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

HEIFERS

    AGE   1   2   3   4   5   6   7   8   9  10  11  12
 NUMBER   3   3   1   1   1   1   0   2   0   2   2   4

    AGE  13  14  15  16  17  18  19  20  21  22  23  24
 NUMBER   1   2   3   1   1   0   1   1   1   2   4   4

    AGE  25  26  27  28  29  30  31  32  33  34  35  36
 NUMBER   2   2   1   2   1   0   0   0   0   0   0   0

BUILDINGS            VALUE        AGE      YEARS
          YEARS     44127.         5.        20.
          YEARS     22644.         8.        20.
          YEARS         0.         0.         0.
```

```
MO. 1     YR. 80

YEARS  1

FISCAL OR CALENDAR 1

OUTPUT (A) 1
       (B) 1
       (C) 1
       (D) 1
       (E) 1
       (F) 1
       (G) 1
       (H) 1
       (I) 1
       (J) 1
       (K) 1
       (L) 1

FRESHENING PREFERENCE
BORN    JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
AGE      24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.

VALUE  COWS            1500.
       BRED HEIFERS    1200.
       OPEN HEIFERS     800.
       CALVES           400.

HISTORICAL PRODUCTION  PRODUCTION      15040.
                       FORAGE QUALITY     2.
                       LBS. FEED        5119.
                       CULLING RATE     0.31

FIRST PERIOD  LBS. FEED       5606.
              FORAGE QUALITY     2.
              CULLING RATE    0.31

CONCENTRATE LBS.  EAR CORN          0.
                  SHELLED CORN      0.
                  OATS              0.
                  WHEAT             0.
                  BARLEY         4782.
                  SUPPLEMENT      674.
```

```
CORN   CORN FED?  0.

       AMOUNT OF CORN

                 JAN.    FEB.    MAR.    APR.     MAY    JUNE
       LBS.       0.      0.      0.      0.      0.      0.

                 JULY    AUG.   SEPT.    OCT.    NOV.    DEC.
       LBS.       0.      0.      0.      0.      0.      0.

       % MOISTURE    0.0

       HMC SUPPLEMENT      0.0

PORTION OF HAY EQUIVALENT FROM EACH FORAGE

            JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

  HAY       0.30  0.30  0.30  0.30  0.30  0.30  0.0   0.0   0.30  0.30  0.30  0.30

  HCS       0.25  0.25  0.25  0.25  0.25  0.25  1.00  1.00  0.25  0.25  0.25  0.25

   CS       0.45  0.45  0.45  0.45  0.45  0.45  0.0   0.0   0.45  0.45  0.45  0.45

CALVING INTERVAL          12.80

% HEIFER RAISED              1.00

MAX. COWS                     55.

MAX. HEIFERS UNDER 1 YR.      25.

MAX. HEIFERS OVER 1 YR.       25.

YOUNGSTOCK BEDDING             1.

COW BEDDING                    1.

BEDDING COST
                JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     COWS       0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

  HEIFERS       0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
```

```
MACH. SYSTEMS  COWS             3.
               HEIFERS          8.
               CORN-APR.        2.
               CORN-MAY         6.
               CORN-JUNE       10.
               C.S.             3.
               C. GRAIN         0.
               WHEAT-SEPT.     14.
               WHEAT-OCT.      17.
               WHEAT-HAR.      14.
               OATS-APR.        0.
               OATS-MAY         0.
               OATS-HAR.        0.
               HAY PLANT       25.
               HCS             21.
               HAY GROW        29.
               HAY             26.
               F.BEANS-MAY     31.
               F.BEANS-JUNE    35.
               F.BEANS-HAR.    30.
               SOYBEANS-MAY     0.
               SOYBEANS-JUNE    0.
               SOYBEANS-HAR.    0.
               BARLEY-APR.     44.
               BARLEY-MAY      47.
               BARLEY-HAR.     38.

ENTER MACH.?  0.

BUY MACH.?    1.

LAND VALUE NOW     144000.

LAND VALUE 10 YRS.        0.050

ACREAGES                     OWN OR RENT  SHARE RENT
                      CORN           32.          0.
                       HAY          125.         40.
                      OATS            0.          0.
                     WHEAT           55.          0.
                    BARLEY            0.        128.
                  SOYBEANS            0.          0.
                   F.BEANS            0.         40.
              GOVT. PROGS.            0.          0.
                     TOTAL          212.        208.

HCS    90.

CS     60.

ACRES RENTED   168.


RENT RATE 12.
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```
BUILDING CAPACITY  FREE STALLS     46.
                   STANCHIONS       0.
                   PARLOR           1.
                   HEIFERS         25.
                   CALVES          25.
                   U-SILO         375.
                   H-SILO         200.
                   HAY            140.
                   E.CORN           0.
                   GRAIN         6000.
                   HMC              0.

PURCHASE  DAIRY BUILDINGS?  2.
          GRAIN STORAGE?    1.
          HAY STORAGE?      1.

OFF-FARM STORAGE  F.BEANS  0.
                  SOYBEANS 0.
                  WHEAT    0.
                  CORN     0.
                  OATS     0.
                  BARLEY   0.

LABOR HOURS AVAILABLE

 NUMBER     TYPE  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     1. OPERATOR  300.  300.  300.  300.  460.  460.  460.  460.  460.  300.  300.  300.

     1.   FAMILY  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.

     1.  HIRE(1)    0.    0.    0.    0.  300.    0.  200.  100.  200.    0.    0.    0.

     0.  HIRE(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

     0.  HIRE(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   RATE

   5.00  HOUR(1)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

LABOR COST    5.00

HIRE(1)    333.      1.
HIRE(2)      0.      0.
HIRE(3)      0.      0.
```

```
YIELDS  PLANT FOOD     0.
        BU. OATS       0.

        PERIOD         4.
        PLANT FOOD   300.
        BU. CORN      66.

        PLANT FOOD    80.
        SPRING N     150.
        BU. WHEAT     20.

        PLANT FOOD   230.
        BU. BARLEY    40.

        PLANT FOOD   100.
        TONS 1ST     1.31
        TONS 2ND     0.56
        TONS 3RD     0.0

        PLANT FOOD     100.
        BU. F.BEANS     20.

        BU. SOYBEANS     0.

CUTTINGS  2.

ACRES  PASTURE 1ST     75.
       PASTURE 2ND     75.
       PASTURE 3RD      0.

HARVEST   HCS    270.00
          CS     375.
          HMC      0.

BEGINNING  HCS                15.
           CS                 15.
           HAY                27.
           HMC                10.
           EAR CORN            0.
           SHELLED CORN        0.
           WHEAT               0.
           OATS                0.
           BARLEY           2600.
           SOYBEANS            0.
           F.BEANS           600.
           SUPPLEMENT         20.

PLANT FOOD                 N  P205   K20
                CORN     57.   55.    0.
            SOYBEANS      0.    0.    0.
             F.BEANS     11.   55.    0.
               WHEAT     78.   44.    0.
                OATS      0.    0.    0.
            HAY-SEED      0.    0.    0.
                 HAY     51.   28.    0.
              BARLEY     78.   44.    0.


SOIL GROUP 41
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```
WITHDRAWALS
  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
  800.  800.  800.  800.  800.  800.  800.  800.  800.  800.  800. 1000.

OFF-FARM INCOME         0.

EXEMPTIONS              6.

ESTIMATED TAX        1500.

ESTIMATED INCOME        0.

DEPR MACHINERY     1.
DEPR CATTLE        1.
DEPR BUILDINGS     1.
SPECIAL 20 PCT?    0.

PENSION RATE       0.

BUSINESS FORM           1.
RETAINED EARNINGS       0.

PARTNERSHIP - CORP INFO

SALARY OR        OTHER   NUMBER OF   PCT OF SHARES  RESIDENCE    HEALTH
PCT OF PROFITS   INCOME  EXEMPTIONS      OWNED        VALUE     INSURANCE

      0.0             0.0      0.0          0.0           0.0         0.0

      0.0             0.0      0.0          0.0           0.0         0.0

      0.0             0.0      0.0          0.0           0.0         0.0

      0.0             0.0      0.0          0.0           0.0         0.0

      0.0             0.0      0.0          0.0           0.0         0.0

DEBTS OUTSTANDING

   BALANCE    RATE  NO.     AMOUNT TYPE TERM  M1   M2   M3   M4   M5   M6   AGE  YRS.

    60000.  0.140  12.      1000.   2.   3.   0.   0.   0.   0.   0.   0.   0.    5.

   15000.  0.140  2.       2500.   2.   2.   3.   8.   0.   0.   0.   0.   0.    3.

    8000.  0.140 12.       2000.   2.   1.   0.   0.   0.   0.   0.   0.   6.    1.

       0.  0.0    0.          0.   0.   0.   0.   0.   0.   0.   0.   0.   0.    0.

       0.  0.0    0.          0.   0.   0.   0.   0.   0.   0.   0.   0.   0.    0.

       0.  0.0    0.          0.   0.   0.   0.   0.   0.   0.   0.   0.   0.    0.

       0.  0.0    0.          0.   0.   0.   0.   0.   0.   0.   0.   0.   0.    0.

       0.  0.0    0.          0.   0.   0.   0.   0.   0.   0.   0.   0.   0.    0.

CASH       5000.
```

LABOR SUMMARY

YEAR OF 1/80 TO 12/80

	HRS. LABOR REQUIRED			SOURCE LABOR (HOURS)				SUR-	LABOR COST	
MONTH	LIVE-STOCK	CROPS	TOTAL	OPER-TOR	FAMILY	REGU-LAR	HOUR-LY	PLUS HOURS	REGU-LAR	HOUR-LY
JAN.	269.	18.	287.	300.	120.	0.	0.	133.	333.	0.
FEB.	276.	19.	295.	300.	120.	0.	0.	125.	333.	0.
MAR.	267.	52.	319.	300.	120.	0.	0.	101.	333.	0.
APR.	264.	117.	381.	300.	120.	0.	0.	39.	333.	0.
MAY	254.	103.	357.	460.	120.	300.	0.	523.	333.	0.
JUNE	252.	277.	529.	460.	120.	0.	0.	51.	333.	0.
JULY	256.	175.	431.	460.	120.	200.	0.	349.	333.	0.
AUG.	248.	375.	623.	460.	120.	100.	0.	57.	333.	0.
SEPT.	255.	130.	385.	460.	120.	200.	0.	395.	333.	0.
OCT.	243.	154.	397.	300.	120.	0.	0.	23.	333.	0.
NOV.	262.	28.	291.	300.	120.	0.	0.	129.	333.	0.
DEC.	261.	18.	280.	300.	120.	0.	0.	140.	333.	0.
TOTAL	3110.	1465.	4575.	4400.	1440.	800.	0.	2065.	4000.	0.

ANNUAL FINANCIAL STATEMENT

YEAR OF 1/80 TO 12/80

TYPE OF LOAN	PRINCIPAL PAID	INTEREST PAID
LONG TERM	12000.	7630.
INTERMEDIATE TERM	26755.	2555.
SHORT TERM	9877.	143.

DEBTS OUTSTANDING (END OF YEAR)

	BALANCE DUE	INTEREST RATE	LOAN PERIOD	AGE (MONTHS)
INT. TERM	6820.	14.	3.	7.
INT. TERM	1800.	14.	3.	5.
INT. TERM	12975.	14.	3.	3.
LONG TERM	48000.	14.	5.	12.

FINANCIAL SITUATION

TYPE OF DEBT OR ASSET	TOTAL ASSET	TOTAL DEBT	EQUITY RATIO
LONG TERM	213142.	48000.	0.77
INT. TERM	230324.	21595.	0.91
SHORT TERM	8789.	0.	1.00
TOTAL	452256.	69595.	0.85

ANNUAL CROP PRODUCTION AND FEED UTILIZATION SUMMARY

YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
HAY SILAGE (TONS)	15.	270.	0.	181.	0.	104.
CORN SILAGE (TONS)	15.	375.	0.	179.	0.	211.
HAY (TONS)	27.	83.	100.	138.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	401.	0.	0.	401.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	5003.	5359.	5359.	7603.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	755.	0.	0.	789.	566.
STRAW (TONS)	20.	22.	0.	28.	0.	14.
SUPPLEMENT	4.	0.	17.	21.	0.	0.

ANNUAL DAIRY CATTLE NUMBERS SUMMARY

YEAR OF 1/80 TO 12/80

	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
COWS	45.	0.	0.	11.	0.	54.
HEIFERS OVER 1 YR	29.	0.	0.	9.	0.	14.
HEIFERS UNDER 1 YR	20.	29.	0.	10.	4.	21.
BULL CALVES	0.	39.	0.	33.	6.	0.

```
                   ANNUAL INCOME AND EXPENSE SUMMARY

                      YEAR OF  1/80 TO 12/80
------------------------------------------------------------------------
     ITEM                     VALUE        ITEM                  VALUE
------------------------------------------------------------------------
CAPITAL INVESTMENT (AVERAGE)             CASH     EXPENSE
  LAND                      147600.        HIRED LABOR           4000.

  BUILDINGS                  64357.        GAS + OIL             2117.

  MACHINERY                 115500.        MACH. REPAIRS         5778.

  LIVESTOCK                 106450.        CUSTOM HIRE              0.

  FEED + SUPPLIES            10438.        CONSTN + REPAIRS      2804.

  TOTAL                     444345.        INSURANCE             1493.

CASH    INCOME                             FERTILIZER            6912.

  MILK                       90320.        SEED                  1399.

  CATTLE                     13754.        SPRAY                 1661.

  HAY                            0.        OTHER CROP            1436.

  CORN                        1239.        BREEDING              1482.

  OATS                           0.        VET.                  1376.

  WHEAT                       4534.        MARKETING              878.

  BARLEY                     18886.

  SOYBEANS                       0.        OTHER LIVESTOCK       1982.

  FIELD BEANS                 3081.        RENT                  1982.

  GOV'T PAYMENTS                 0.        TAXES                   87.

  TOTAL                     131813.        UTILITIES              819.

NON-CASHINCOME                             INTEREST             10328.

  RISE    LAND    VALUE       7200.        MISCELLANEOUS         1445.

  RISE    CATTLE  INV.       -5300.        FEED    PURCHASE     22328.

  RISE    FEED    INV.       -3298.        TOTAL                70307.

  TOTAL                      -1398.      NON-CASH EXPENSE

                                           OPERATOR LABOR       10000.

  TOTAL   INCOME            130415.        FAMILY LABOR          4536.

  TOTAL    EXPENSE          139966.        MACH. DEPR.          24244.

RETURN TO MGT. + LABOR        4985.        BUILD. DEPR.          4829.

RETURN ON INVESTMENT          6.04         INTEREST             26051.

                                           TOTAL                69659.
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INCOME TAX INFORMATION:

                         TOTAL INCOME TAXES=      0.0

                         INVESTMENT CREDIT =      0.0

                         PENSION PLAN PAYMT=    515.06

                         TAX DEPRECIATION TAKEN:

                                        MACHINERY  =  26607.79

                                        BUILDINGS  =   4828.80

                                        CATTLE     =      0.0

                                        SPECIAL 20%=      0.0

                         RETURN ON INVESTMENT AFTER TAXES    =      6.04

                         LOSSES CARRIED FORWARD      =       0.0

                         UNINCORPORATED BUSINESS TAX =       0.0
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PRODUCTION YIELDS SUMMARY

YEAR OF 1/80 TO 12/80

CROP OR ANIMAL	NO. OR ACRES	YIELD	LANDLORD SHARE
HAY (TONS)	27.	3.0	0.
HAY SILAGE (TONS)	63.	4.3	0.
CORN	6.	70.	0.
CORN SILAGE (TONS)	26.	14.3	0.
OATS	0.	0.	0.
WHEAT	55.	20.	0.
BARLEY	128.	39.	0.
SOYBEANS	0.	0.	0.
FIELD BEANS	40.	19.	0.
COWS	55.	13855.	0.

BRIEF MONTHLY CASH FLOW SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME	14022.	8382.	13036.	8552.	7215.	8077.	8265.	24954.	13836.	9810.	8039.	7625.	131813.
EXPENSE	3530.	4706.	6911.	5775.	7134.	6736.	7063.	7638.	6445.	5800.	5098.	3469.	70307.
CASH INVEST.	0.	0.	0.	978.	0.	0.	0.	883.	5591.	0.	0.	0.	7451.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	13691.	1376.	5325.	1000.	1000.	1000.	1000.	14733.	1000.	3210.	2692.	2604.	48632.
BORROWED	0.	0.	0.	3586.	15808.	459.	2399.	0.	12975.	0.	0.	0.	35227.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	100.	100.	1000.	1000.	1000.	448.	1000.	0.

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           MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
                       YEAR OF  1/80 TO 12/80
-------------------------------------------------------------------------
     CROP           BEGINNING  PRODUCED   BOUGHT      FED      SOLD    END
-------------------------------------------------------------------------

                             ---JANUARY ---

HAY SILAGE (TONS)       15.        0.        0.       15.       0.      0.
CORN SILAGE (TONS)      15.        0.        0.       15.       0.      0.
HAY (TONS)              27.        0.        0.       24.       0.      3.
HIGH M. CORN (BU.)      10.        0.        0.        0.       0.     10.
EAR CORN (BU.)           0.        0.        0.        0.       0.      0.
SH. CORN (BU.)           0.        0.        0.        0.       0.      0.
WHEAT (BU.)              0.        0.        0.        0.       0.      0.
OATS (BU.)               0.        0.        0.        0.       0.      0.
BARLEY (BU.)          2600.        0.      401.      401.    2600.      0.
SOYBEANS (BU.)           0.        0.        0.        0.       0.      0.
FIELD BEANS (CUT.)     600.        0.        0.        0.       0.    600.
STRAW (TONS)            20.        0.        0.        3.       0.     17.
SUPPLEMENT               4.        0.        0.        2.       0.      2.

                             ---FEBRUARY---

HAY SILAGE (TONS)        0.        0.        0.        0.       0.      0.
CORN SILAGE (TONS)       0.        0.        0.        0.       0.      0.
HAY (TONS)               3.        0.       32.       26.       0.      0.
HIGH M. CORN (BU.)      10.        0.        0.        0.       0.     10.
EAR CORN (BU.)           0.        0.        0.        0.       0.      0.
SH. CORN (BU.)           0.        0.        0.        0.       0.      0.
WHEAT (BU.)              0.        0.        0.        0.       0.      0.
OATS (BU.)               0.        0.        0.        0.       0.      0.
BARLEY (BU.)             0.        0.      455.      455.       0.      0.
SOYBEANS (BU.)           0.        0.        0.        0.       0.      0.
FIELD BEANS (CUT.)     600.        0.        0.        0.       0.    600.
STRAW (TONS)            17.        0.        0.        3.       0.     13.
SUPPLEMENT               2.        0.        0.        2.       0.      1.

                             ---MARCH    ---

HAY SILAGE (TONS)        0.        0.        0.        0.       0.      0.
CORN SILAGE (TONS)       0.        0.        0.        0.       0.      0.
HAY (TONS)               0.        0.       34.       26.       0.      0.
HIGH M. CORN (BU.)      10.        0.        0.        0.       0.     10.
EAR CORN (BU.)           0.        0.        0.        0.       0.      0.
SH. CORN (BU.)           0.        0.        0.        0.       0.      0.
WHEAT (BU.)              0.        0.        0.        0.       0.      0.
OATS (BU.)               0.        0.        0.        0.       0.      0.
BARLEY (BU.)             0.        0.      453.      453.       0.      0.
SOYBEANS (BU.)           0.        0.        0.        0.       0.      0.
FIELD BEANS (CUT.)     600.        0.        0.        0.       0.    600.
STRAW (TONS)            13.        0.        0.        3.       0.     10.
SUPPLEMENT               1.        0.        1.        2.       0.      0.
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MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---APRIL ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	33.	24.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	10.	0.	0.	3.	0.	7.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---MAY ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	1.	1.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	7.	0.	0.	1.	0.	6.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---JUNE ---						
HAY SILAGE (TONS)	0.	238.	0.	0.	0.	238.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	27.	0.	0.	0.	27.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	6.	0.	0.	1.	0.	5.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JULY ---						
HAY SILAGE (TONS)	238.	32.	0.	34.	0.	236.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	27.	29.	0.	0.	0.	56.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	458.	458.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	5.	0.	0.	1.	0.	3.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---AUGUST ---						
HAY SILAGE (TONS)	236.	0.	0.	41.	0.	195.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	56.	27.	0.	0.	0.	83.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	4503.	453.	453.	4503.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	3.	22.	0.	1.	0.	24.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---SEPT. ---						
HAY SILAGE (TONS)	195.	0.	0.	19.	0.	176.
CORN SILAGE (TONS)	0.	187.	0.	34.	0.	154.
HAY (TONS)	83.	0.	0.	7.	0.	76.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	500.	458.	458.	500.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	189.	0.	0.	789.	0.
STRAW (TONS)	24.	0.	0.	1.	0.	23.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---OCTOBER ---						
HAY SILAGE (TONS)	176.	0.	0.	24.	0.	152.
CORN SILAGE (TONS)	154.	187.	0.	43.	0.	299.
HAY (TONS)	76.	0.	0.	10.	0.	66.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	206.	0.	0.	206.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	444.	444.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	0.	566.	0.	0.	0.	566.
STRAW (TONS)	23.	0.	0.	3.	0.	20.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---NOVEMBER---						
HAY SILAGE (TONS)	152.	0.	0.	24.	0.	128.
CORN SILAGE (TONS)	299.	0.	0.	43.	0.	255.
HAY (TONS)	66.	0.	0.	10.	0.	57.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	195.	0.	0.	195.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	442.	442.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---DECEMBER---						
HAY SILAGE (TONS)	128.	0.	0.	25.	0.	104.
CORN SILAGE (TONS)	255.	0.	0.	44.	0.	211.
HAY (TONS)	57.	0.	0.	10.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	438.	438.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	17.	0.	0.	3.	0.	14.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JANUARY ---						
COWS	45.	0.	0.	0.	0.	49.
HEIFERS OVER 1 YR	29.	0.	0.	0.	0.	25.
HEIFERS UNDER 1 YR	20.	5.	0.	4.	0.	21.
BULL CALVES	0.	7.	0.	6.	1.	0.
---FEBRUARY---						
COWS	49.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	25.	0.	0.	0.	0.	18.
HEIFERS UNDER 1 YR	21.	4.	0.	2.	0.	23.
BULL CALVES	0.	5.	0.	4.	1.	0.
---MARCH ---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	18.	0.	0.	7.	0.	12.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	2.	21.
BULL CALVES	0.	3.	0.	3.	0.	0.
---APRIL ---						
COWS	56.	0.	0.	2.	0.	55.
HEIFERS OVER 1 YR	12.	0.	0.	1.	0.	10.
HEIFERS UNDER 1 YR	21.	2.	0.	0.	0.	23.
BULL CALVES	0.	1.	0.	0.	1.	0.
---MAY ---						
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	10.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	0.	23.
BULL CALVES	0.	1.	0.	1.	0.	0.
---JUNE ---						
COWS	56.	0.	0.	1.	0.	55.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	0.	25.
BULL CALVES	0.	4.	0.	3.	1.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
		---JULY ---				
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	25.	3.	0.	2.	0.	25.
BULL CALVES	0.	2.	0.	2.	0.	0.
		---AUGUST ---				
COWS	56.	0.	0.	3.	0.	54.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	25.	1.	0.	0.	0.	25.
BULL CALVES	0.	2.	0.	1.	1.	0.
		---SEPT. ---				
COWS	54.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	11.	0.	0.	1.	0.	9.
HEIFERS UNDER 1 YR	25.	3.	0.	2.	0.	25.
BULL CALVES	0.	4.	0.	4.	0.	0.
		---OCTOBER ---				
COWS	56.	0.	0.	3.	0.	53.
HEIFERS OVER 1 YR	9.	0.	0.	0.	0.	10.
HEIFERS UNDER 1 YR	25.	0.	0.	0.	0.	24.
BULL CALVES	0.	1.	0.	1.	0.	0.
		---NOVEMBER---				
COWS	53.	0.	0.	0.	0.	55.
HEIFERS OVER 1 YR	10.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	24.	0.	0.	0.	0.	21.
BULL CALVES	0.	5.	0.	4.	1.	0.
		---DECEMBER---				
COWS	55.	0.	0.	1.	0.	54.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	14.
HEIFERS UNDER 1 YR	21.	5.	0.	0.	2.	21.
BULL CALVES	0.	4.	0.	4.	0.	0.

MONTHLY CASH FLOW STATEMENT

YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME						
MILK	6412.	7625.	8109.	7809.	7112.	7051.
CATTLE	1277.	757.	4928.	743.	103.	1026.
HAY	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	0.	0.	0.
OATS	0.	0.	0.	0.	0.	0.
WHEAT	0.	0.	0.	0.	0.	0.
SOYBEANS	0.	0.	0.	0.	0.	0.
BARLEY	6332.	0.	0.	0.	0.	0.
FIELD BEANS	0.	0.	0.	0.	0.	0.
GOVT	0.	0.	0.	0.	0.	0.
EXPENSE						
LABOR	333.	333.	333.	333.	333.	333.
GAS AND OIL	81.	88.	121.	193.	174.	364.
MACH. REPAIRS	106.	116.	205.	373.	262.	713.
BUILD. REPAIR	169.	193.	241.	266.	193.	121.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.
CONSERVATION	0.	0.	0.	130.	52.	52.
INSURANCE	10.	10.	976.	10.	10.	10.
FERTILIZER	0.	0.	0.	0.	434.	823.
SEED	0.	0.	0.	0.	196.	655.
SPRAY	0.	0.	0.	0.	1296.	365.
OTHER CROP	11.	11.	21.	30.	92.	398.
BREEDING	98.	137.	59.	234.	215.	98.
VET	102.	117.	118.	117.	117.	116.
MARKETING	234.	0.	0.	0.	0.	0.
OTHER LIVESTOCK	147.	168.	170.	168.	168.	167.
RENT	0.	0.	0.	0.	991.	0.
TAXES	0.	43.	0.	0.	0.	0.
UTILITIES	61.	70.	70.	69.	70.	69.
MISCELLANEOUS	49.	46.	90.	73.	189.	175.
FEED	1063.	2660.	3021.	3114.	1689.	1628.
INTEREST-SHORT	93.	0.	0.	0.	0.	10.
INTEREST-INT.	274.	26.	811.	0.	0.	0.
INTEREST-LONG	700.	688.	677.	665.	653.	642.
CAPITAL SALES						
MACHINERY	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
CASH INVESTMENT						
LIVESTOCK	0.	0.	0.	0.	0.	0.
MACHINERY	0.	0.	0.	978.	0.	0.
BUILDINGS	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
PRINCIPAL						
SHORT	8000.	0.	0.	0.	0.	0.
INT.	4691.	376.	4325.	0.	0.	0.
LONG	1000.	1000.	1000.	1000.	1000.	1000.
BORROWED						
SHORT	0.	0.	0.	0.	819.	459.
INT.	0.	0.	0.	3586.	14989.	0.
LONG	0.	0.	0.	0.	0.	0.
TOTALS						
INCOME	14022.	8382.	13036.	8552.	7215.	8077.
EXPENSE	3530.	4706.	6911.	5775.	7134.	6736.
CASH INVESTMENT	0.	0.	0.	978.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	13691.	1376.	5325.	1000.	1000.	1000.
BORROWED	0.	0.	0.	3586.	15808.	459.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	100.

MONTHLY CASH FLOW STATEMENT

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME							
MILK	7852.	8079.	8306.	8043.	7035.	6886.	90320.
CATTLE	412.	1042.	1194.	1134.	397.	739.	13754.
HAY	0.	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	632.	607.	0.	1239.
OATS	0.	0.	0.	0.	0.	0.	0.
WHEAT	0.	4534.	0.	0.	0.	0.	4534.
SOYBEANS	0.	0.	0.	0.	0.	0.	0.
BARLEY	0.	11299.	1255.	0.	0.	0.	18886.
FIELD BEANS	0.	0.	3081.	0.	0.	0.	3081.
GOVT	0.	0.	0.	0.	0.	0.	0.
EXPENSE							
LABOR	333.	333.	333.	333.	333.	333.	4000.
GAS AND OIL	244.	279.	199.	200.	89.	84.	2117.
MACH. REPAIRS	467.	2371.	556.	383.	118.	110.	5778.
BUILD. REPAIR	193.	217.	193.	193.	193.	241.	2414.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.	0.
CONSERVATION	52.	52.	52.	0.	0.	0.	390.
INSURANCE	10.	10.	418.	10.	10.	10.	1493.
FERTILIZER	2633.	0.	1511.	1511.	0.	0.	6912.
SEED	0.	147.	201.	201.	0.	0.	1399.
SPRAY	0.	0.	0.	0.	0.	0.	1661.
OTHER CROP	278.	404.	75.	91.	15.	11.	1436.
BREEDING	78.	78.	137.	117.	78.	156.	1482.
VET	117.	116.	117.	114.	115.	114.	1376.
MARKETING	0.	504.	108.	16.	16.	0.	878.
OTHER LIVESTOCK	168.	167.	168.	164.	165.	164.	1982.
RENT	0.	0.	0.	0.	991.	0.	1982.
TAXES	0.	0.	0.	43.	0.	0.	87.
UTILITIES	70.	68.	70.	66.	69.	68.	819.
MISCELLANEOUS	190.	195.	169.	139.	85.	46.	1445.
FEED	1584.	1469.	1532.	1494.	1529.	1542.	22328.
INTEREST-SHORT	16.	23.	0.	0.	0.	0.	143.
INTEREST-INT.	0.	588.	0.	129.	708.	19.	2555.
INTEREST-LONG	630.	618.	607.	595.	583.	572.	7630.
CAPITAL SALES							
MACHINERY	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
CASH INVESTMENT							
LIVESTOCK	0.	0.	0.	0.	0.	0.	0.
MACHINERY	0.	883.	5591.	0.	0.	0.	7451.
BUILDINGS	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
PRINCIPAL							
SHORT	0.	1877.	0.	0.	0.	0.	9877.
INT.	0.	11856.	0.	2210.	1692.	1604.	26755.
LONG	1000.	1000.	1000.	1000.	1000.	1000.	12000.
BORROWED							
SHORT	599.	0.	0.	0.	0.	0.	1877.
INT.	1800.	0.	12975.	0.	0.	0.	33350.
LONG	0.	0.	0.	0.	0.	0.	0.
TOTALS							
INCOME	8265.	24954.	13836.	9810.	8039.	7625.	131813.
EXPENSE	7063.	7638.	6445.	5800.	5098.	3469.	70307.
CASH INVESTMENT	0.	883.	5591.	0.	0.	0.	7451.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	14733.	1000.	3210.	2692.	2604.	48632.
BORROWED	2399.	0.	12975.	0.	0.	0.	35227.
CASH ON HAND	100.	1000.	1000.	1000.	448.	1000.	0.

BRIEF ANNUAL SUMMARY
YEAR OF 1/80 TO 12/80

ITEM	VALUE
NO. COWS	55.
TOTAL INVESTMENT	444345.
CASH INCOME	131813.
CASH EXPENSE	70307.
RETURN ON INVESTMENT	6.04
RETURN TO LABOR AND MANAGEMENT	4985.
TOTAL DEBT	69595.
TOTAL DEBT HIGHEST MONTH	80859.

F.4 SCENARIO 2 SEASONAL FEED PRICE RESULTS.(SECTION 3)

```
MO.  1      YR. 80

YEARS  1

FISCAL OR CALENDAR 1

OUTPUT (A) 1
       (B) 1
       (C) 1
       (D) 1
       (E) 1
       (F) 1
       (G) 1
       (H) 1
       (I) 1
       (J) 1
       (K) 1
       (L) 1

FRESHENING PREFERENCE
BORN    JAN.   FEB.   MAR.   APR.    MAY   JUNE   JULY   AUG.  SEPT.   OCT.   NOV.   DEC.
AGE      24.    24.    24.    24.    24.    24.    24.    24.    24.    24.    24.    24.

VALUE   COWS              1500.
        BRED HEIFERS      1200.
        OPEN HEIFERS       800.
        CALVES             400.

HISTORICAL PRODUCTION   PRODUCTION        15040.
                        FORAGE QUALITY       2.
                        LBS. FEED          5119.
                        CULLING RATE       0.31

FIRST PERIOD   LBS. FEED        5606.
               FORAGE QUALITY      2.
               CULLING RATE     0.31

CONCENTRATE LBS.   EAR CORN          0.
                   SHELLED CORN      0.
                   OATS              0.
                   WHEAT             0.
                   BARLEY         4782.
                   SUPPLEMENT      674.
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NAME:SWAN RIVER DAIRY

PROBLEM:SEASONAL VARIATION IN FEED PRICE
COWS

LACT.   DEC.  NOV.  OCT. SEPT.  AUG.  JULY  JUNE   MAY  APR.  MAR.  FEB.  JAN.  DEC.  NOV.  OCT. <OCT.

 1         0     0     1     0     2     4     0     0     2     0     2     1     0     0     0     0

 2         1     2     3     0     0     2     0     1     2     0     2     0     1     0     0     0

 3         2     0     0     1     1     0     1     0     1     0     1     0     1     0     0     0

 4         0     2     0     0     0     0     0     0     0     0     0     0     0     0     0     0

 5         0     1     1     0     1     0     0     0     0     0     0     0     0     0     0     0

 6         0     0     0     1     0     0     1     1     0     0     0     1     0     0     0     0

 7         0     0     0     0     0     0     0     0     0     0     1     0     0     0     0     0

 8         0     0     0     0     0     1     0     0     0     0     0     0     0     0     0     0

 9         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

10         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

HEIFERS

    AGE   1   2   3   4   5   6   7   8   9  10  11  12
 NUMBER   3   3   1   1   1   1   0   2   0   2   2   4

    AGE  13  14  15  16  17  18  19  20  21  22  23  24
 NUMBER   1   2   3   1   1   0   1   1   1   2   4   4

    AGE  25  26  27  28  29  30  31  32  33  34  35  36
 NUMBER   2   2   1   2   1   0   0   0   0   0   0   0

BUILDINGS            VALUE        AGE     YEARS
           YEARS    44127.         5.       20.
           YEARS    22644.         8.       20.
           YEARS        0.         0.        0.
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BUILDING CAPACITY  FREE STALLS     46.
                   STANCHIONS       0.
                   PARLOR           1.
                   HEIFERS         25.
                   CALVES          25.
                   U-SILO         375.
                   H-SILO         200.
                   HAY            140.
                   E.CORN           0.
                   GRAIN         6000.
                   HMC              0.

PURCHASE  DAIRY BUILDINGS?  2.
          GRAIN STORAGE?    1.
          HAY STORAGE?      1.

OFF-FARM STORAGE  F.BEANS  0.
                  SOYBEANS 0.
                  WHEAT    0.
                  CORN     0.
                  OATS     0.
                  BARLEY   0.

LABOR HOURS AVAILABLE

 NUMBER      TYPE  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     1. OPERATOR  300.  300.  300.  300.  460.  460.  460.  460.  460.  300.  300.  300.

     1.    FAMILY 120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.

     1.  HIRE(1)    0.    0.    0.    0.  300.    0.  200   100.  200.    0.    0.    0.

     0.  HIRE(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

     0.  HIRE(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   RATE

   5.00  HOUR(1)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

LABOR COST    5.00

HIRE(1)    333.       1.
HIRE(2)      0.       0.
HIRE(3)      0.       0.
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CORN   CORN FED?  0.

       AMOUNT OF CORN

                 JAN.     FEB.     MAR.     APR.     MAY      JUNE
       LBS.       0.       0.       0.       0.       0.       0.

                 JULY     AUG.     SEPT.    OCT.     NOV.     DEC.
       LBS.       0.       0.       0.       0.       0.       0.

       % MOISTURE    0.0

       HMC SUPPLEMENT      0.0

PORTION OF HAY EQUIVALENT FROM EACH FORAGE

          JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

  HAY     0.30  0.30  0.30  0.30  0.30  0.30  0.0   0.0   0.30  0.30  0.30  0.30

  HCS     0.25  0.25  0.25  0.25  0.25  0.25  1.00  1.00  0.25  0.25  0.25  0.25

   CS     0.45  0.45  0.45  0.45  0.45  0.45  0.0   0.0   0.45  0.45  0.45  0.45

CALVING INTERVAL          12.80

% HEIFER RAISED              1.00

MAX. COWS                  55.

MAX. HEIFERS UNDER 1 YR.   25.

MAX. HEIFERS OVER 1 YR.    25.

YOUNGSTOCK BEDDING           1.

COW BEDDING                  1.

BEDDING COST
              JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     COWS     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

  HEIFERS     0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
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```
YIELDS  PLANT FOOD     0.
        BU. OATS       0.

        PERIOD         4.
        PLANT FOOD   300.
        BU. CORN      66.

        PLANT FOOD    80.
        SPRING N     150.
        BU. WHEAT     20.

        PLANT FOOD   230.
        BU. BARLEY    40.

        PLANT FOOD   100.
        TONS 1ST     1.31
        TONS 2ND     0.56
        TONS 3RD     0.0

        PLANT FOOD     100.
        BU. F.BEANS     20.

        BU. SOYBEANS     0.

CUTTINGS  2.

ACRES   PASTURE 1ST     75.
        PASTURE 2ND     75.
        PASTURE 3RD      0.

HARVEST    HCS     270.00
           CS      375.
           HMC       0.

BEGINNING  HCS                 15.
           CS                  15.
           HAY                 27.
           HMC                 10.
           EAR CORN             0.
           SHELLED CORN         0.
           WHEAT                0.
           OATS                 0.
           BARLEY            2600.
           SOYBEANS             0.
           F.BEANS            600.
           SUPPLEMENT          20.

PLANT FOOD                N    P205    K20
                 CORN    57.    55.     0.
             SOYBEANS     0.     0.     0.
              F.BEANS    11.    55.     0.
                WHEAT    78.    44.     0.
                 OATS     0.     0.     0.
             HAY-SEED     0.     0.     0.
                  HAY    51.    28.     0.
               BARLEY    78.    44.     0.

SOIL GROUP   41.
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MACH. SYSTEMS  COWS            3.
               HEIFERS         8.
               CORN-APR.       2.
               CORN-MAY        6.
               CORN-JUNE      10.
               C.S.            3.
               C. GRAIN        0.
               WHEAT-SEPT.    14.
               WHEAT-OCT.     17.
               WHEAT-HAR.     14.
               OATS-APR.       0.
               OATS-MAY        0.
               OATS-HAR.       0.
               HAY PLANT      25.
               HCS            21.
               HAY GROW       29.
               HAY            26.
               F.BEANS-MAY    31.
               F.BEANS-JUNE   35.
               F.BEANS-HAR.   30.
               SOYBEANS-MAY    0.
               SOYBEANS-JUNE   0.
               SOYBEANS-HAR.   0.
               BARLEY-APR.    44.
               BARLEY-MAY     47.
               BARLEY-HAR.    38.

ENTER MACH.?  0.

BUY MACH.?    1.

LAND VALUE NOW     144000.

LAND VALUE 10 YRS.        0.050

ACREAGES                   OWN OR RENT  SHARE RENT
                     CORN          32.          0.
                      HAY         125.         40.
                     OATS           0.          0.
                    WHEAT          55.          0.
                   BARLEY           0.        128.
                 SOYBEANS           0.          0.
                  F.BEANS           0.         40.
              GOVT. PROGS.          0.          0.
                    TOTAL         212.        208.

HCS   90.

CS    60.

ACRES RENTED   168.

RENT RATE       12.
```

LABOR SUMMARY
YEAR OF 1/80 TO 12/80

	HRS. LABOR REQUIRED			SOURCE LABOR (HOURS)				SUR-	LABOR COST	
MONTH	LIVE-STOCK	CROPS	TOTAL	OPER-TOR	FAMILY	REGU-LAR	HOUR-LY	PLUS HOURS	REGU-LAR	HOUR-LY
JAN.	269.	18.	287.	300.	120.	0.	0.	133.	333.	0.
FEB.	276.	19.	295.	300.	120.	0.	0.	125.	333.	0.
MAR.	267.	52.	319.	300.	120.	0.	0.	101.	333.	0.
APR.	264.	117.	381.	300.	120.	0.	0.	39.	333.	0.
MAY	254.	103.	357.	460.	120.	300.	0.	523.	333.	0.
JUNE	252.	277.	529.	460.	120.	0.	0.	51.	333.	0.
JULY	256.	175.	431.	460.	120.	200.	0.	349.	333.	0.
AUG.	248.	375.	623.	460.	120.	100.	0.	57.	333.	0.
SEPT.	255.	130.	385.	460.	120.	200.	0.	395.	333.	0.
OCT.	243.	154.	397.	300.	120.	0.	0.	23.	333.	0.
NOV.	262.	28.	291.	300.	120.	0.	0.	129.	333.	0.
DEC.	261.	18.	280.	300.	120.	0.	0.	140.	333.	0.
TOTAL	3110.	1465.	4575.	4400.	1440.	800.	0.	2065.	4000.	0.

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WITHDRAWALS
  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
  800.  800.  800.  800.  800.  800.  800.  800.  800.  800.  800. 1000.

OFF-FARM INCOME       0.

EXEMPTIONS            6.

ESTIMATED TAX      1500.

ESTIMATED INCOME      0.

DEPR MACHINERY     1.
DEPR CATTLE        1.
DEPR BUILDINGS     1.
SPECIAL 20 PCT?    0.

PENSION RATE       0.

BUSINESS FORM         1.
RETAINED EARNINGS     0.

PARTNERSHIP - CORP INFO

SALARY OR      OTHER   NUMBER OF   PCT OF SHARES  RESIDENCE    HEALTH
PCT OF PROFITS INCOME  EXEMPTIONS     OWNED         VALUE    INSURANCE

     0.0          0.0      0.0          0.0           0.0        0.0

     0.0          0.0      0.0          0.0           0.0        0.0

     0.0          0.0      0.0          0.0           0.0        0.0

     0.0          0.0      0.0          0.0           0.0        0.0

     0.0          0.0      0.0          0.0           0.0        0.0

DEBTS OUTSTANDING

  BALANCE   RATE  NO.   AMOUNT TYPE TERM  M1   M2   M3   M4   M5   M6   AGE  YRS.

   60000.  0.140  12.    1000.  2.   3.   0.   0.   0.   0.   0.   0.   0.   5.

  15000.  0.140   2.    2500.  2.   2.   3.   8.   0.   0.   0.   0.   0.   3.

   8000.  0.140  12.    2000.  2.   1.   0.   0.   0.   0.   0.   0.   6.   1.

      0.  0.0     0.       0.  0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

      0.  0.0     0.       0.  0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

      0.  0.0     0.       0.  0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

      0.  0.0     0.       0.  0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

      0.  0.0     0.       0.  0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

CASH      5000.
```

ANNUAL CROP PRODUCTION AND FEED UTILIZATION SUMMARY

YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
HAY SILAGE (TONS)	15.	270.	0.	181.	0.	104.
CORN SILAGE (TONS)	15.	375.	0.	179.	0.	211.
HAY (TONS)	27.	83.	100.	138.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	401.	0.	0.	401.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	5003.	5359.	5359.	7603.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	755.	0.	0.	789.	566.
STRAW (TONS)	20.	22.	0.	28.	0.	14.
SUPPLEMENT	4.	0.	17.	21.	0.	0.

ANNUAL FINANCIAL STATEMENT

YEAR OF 1/80 TO 12/80

TYPE OF LOAN	PRINCIPAL PAID	INTEREST PAID
LONG TERM	12000.	7630.
INTERMEDIATE TERM	28339.	2598.
SHORT TERM	8605.	112.

DEBTS OUTSTANDING (END OF YEAR)

	BALANCE DUE	INTEREST RATE	LOAN PERIOD	AGE (MONTHS)
INT. TERM	5288.	14.	3.	7.
INT. TERM	1800.	14.	3.	5.
INT. TERM	12536.	14.	3.	3.
LONG TERM	48000.	14.	5.	12.

FINANCIAL SITUATION

TYPE OF DEBT OR ASSET	TOTAL ASSET	TOTAL DEBT	EQUITY RATIO
LONG TERM	213142.	48000.	0.77
INT. TERM	230324.	19624.	0.91
SHORT TERM	11574.	0.	1.00
TOTAL	455041.	67624.	0.85

ANNUAL INCOME AND EXPENSE SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	VALUE	ITEM	VALUE
CAPITAL INVESTMENT (AVERAGE)		CASH EXPENSE	
LAND	147600.	HIRED LABOR	4000.
BUILDINGS	64357.	GAS + OIL	2117.
MACHINERY	115500.	MACH. REPAIRS	5778.
LIVESTOCK	106450.	CUSTOM HIRE	0.
FEED + SUPPLIES	11831.	CONSTN + REPAIRS	2804.
TOTAL	445738.	INSURANCE	1493.
CASH INCOME		FERTILIZER	6912.
MILK	90320.	SEED	1399.
CATTLE	13754.	SPRAY	1661.
HAY	0.	OTHER CROP	1436.
CORN	1236.	BREEDING	1482.
OATS	0.	VET.	1376.
WHEAT	3856.	MARKETING	878.
BARLEY	18886.		
SOYBEANS	0.	OTHER LIVESTOCK	1982.
FIELD BEANS	3081.	RENT	1982.
GOV'T PAYMENTS	0.	TAXES	87.
TOTAL	131131.	UTILITIES	819.
NON-CASHINCOME		INTEREST	10339.
RISE LAND VALUE	7200.	MISCELLANEOUS	1445.
RISE CATTLE INV.	-5300.	FEED PURCHASE	19663.
RISE FEED INV.	-513.	TOTAL	67654.
TOTAL	1387.	NON-CASH EXPENSE	
		OPERATOR LABOR	10000.
TOTAL INCOME	132518.	FAMILY LABOR	4536.
TOTAL EXPENSE	137432.	MACH. DEPR.	24244.
RETURN TO MGT. + LABOR	9623.	BUILD. DEPR.	4829.
RETURN ON INVESTMENT	7.09	INTEREST	26170.
		TOTAL	69778.

ANNUAL DAIRY CATTLE NUMBERS SUMMARY

YEAR OF 1/80 TO 12/80

	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
COWS	45.	0.	0.	11.	0.	54.
HEIFERS OVER 1 YR	29.	0.	0.	9.	0.	14.
HEIFERS UNDER 1 YR	20.	29.	0.	10.	4.	21.
BULL CALVES	0.	39.	0.	33.	6.	0.

PRODUCTION YIELDS SUMMARY

YEAR OF 1/80 TO 12/80

CROP OR ANIMAL	NO. OR ACRES	YIELD	LANDLORD SHARE
HAY (TONS)	27.	3.0	0.
HAY SILAGE (TONS)	63.	4.3	0.
CORN	6.	70.	0.
CORN SILAGE (TONS)	26.	14.3	0.
OATS	0.	0.	0.
WHEAT	55.	20.	0.
BARLEY	128.	39.	0.
SOYBEANS	0.	0.	0.
FIELD BEANS	40.	19.	0.
COWS	55.	13855.	0.

```
INCOME TAX INFORMATION:

                         TOTAL INCOME TAXES=      0.0

                         INVESTMENT CREDIT =      0.0

                         PENSION PLAN PAYMT=    554.48

                         TAX DEPRECIATION TAKEN:

                                         MACHINERY  =  26607.79

                                         BUILDINGS  =   4828.80

                                         CATTLE     =      0.0

                                         SPECIAL 20%=      0.0

                         RETURN ON INVESTMENT AFTER TAXES    =       7.09

                         LOSSES CARRIED FORWARD       =      0.0

                         UNINCORPORATED BUSINESS TAX =       0.0
```

BRIEF MONTHLY CASH FLOW SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME	14022.	8382.	13036.	8552.	7215.	8077.
EXPENSE	3530.	5129.	7150.	5826.	6737.	6306.
CASH INVEST.	0.	0.	0.	926.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	13691.	1000.	5040.	1000.	1000.	1000.
BORROWED	0.	0.	0.	3638.	15411.	29.
CASH ON HAND	1000.	953.	1000.	1000.	100.	100.

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME	8265.	24276.	13836.	9715.	8130.	7625.	131131.
EXPENSE	6619.	7240.	6006.	5393.	4647.	3070.	67654.
CASH INVEST.	0.	883.	6030.	0.	0.	0.	7838.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	14454.	1000.	3522.	2682.	3555.	48944.
BORROWED	1954.	0.	12536.	0.	0.	0.	33568.
CASH ON HAND	100.	1000.	1000.	1000.	1000.	1000.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JANUARY ---						
HAY SILAGE (TONS)	15.	0.	0.	15.	0.	0.
CORN SILAGE (TONS)	15.	0.	0.	15.	0.	0.
HAY (TONS)	27.	0.	0.	24.	0.	3.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	0.	401.	401.	2600.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	4.	0.	0.	2.	0.	2.
---FEBRUARY---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	3.	0.	32.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	455.	455.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	17.	0.	0.	3.	0.	13.
SUPPLEMENT	2.	0.	0.	2.	0.	1.
---MARCH ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	34.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	13.	0.	0.	3.	0.	10.
SUPPLEMENT	1.	0.	1.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---APRIL ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	33.	24.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	10.	0.	0.	3.	0.	7.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---MAY ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	1.	1.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	7.	0.	0.	1.	0.	6.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---JUNE ---						
HAY SILAGE (TONS)	0.	238.	0.	0.	0.	238.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	27.	0.	0.	0.	27.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	6.	0.	0.	1.	0.	5.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JULY ---						
HAY SILAGE (TONS)	238.	32.	0.	34.	0.	236.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	27.	29.	0.	0.	0.	56.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	458.	458.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	5.	0.	0.	1.	0.	3.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---AUGUST ---						
HAY SILAGE (TONS)	236.	0.	0.	41.	0.	195.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	56.	27.	0.	0.	0.	83.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	4503.	453.	453.	4503.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	3.	22.	0.	1.	0.	24.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---SEPT. ---						
HAY SILAGE (TONS)	195.	0.	0.	19.	0.	176.
CORN SILAGE (TONS)	0.	187.	0.	34.	0.	154.
HAY (TONS)	83.	0.	0.	7.	0.	76.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	500.	458.	458.	500.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	189.	0.	0.	789.	0.
STRAW (TONS)	24.	0.	0.	1.	0.	23.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---OCTOBER ---						
HAY SILAGE (TONS)	176.	0.	0.	24.	0.	152.
CORN SILAGE (TONS)	154.	187.	0.	43.	0.	299.
HAY (TONS)	76.	0.	0.	10.	0.	66.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	206.	0.	0.	206.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	444.	444.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	0.	566.	0.	0.	0.	566.
STRAW (TONS)	23.	0.	0.	3.	0.	20.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---NOVEMBER---						
HAY SILAGE (TONS)	152.	0.	0.	24.	0.	128.
CORN SILAGE (TONS)	299.	0.	0.	43.	0.	255.
HAY (TONS)	66.	0.	0.	10.	0.	57.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	195.	0.	0.	195.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	442.	442.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---DECEMBER---						
HAY SILAGE (TONS)	128.	0.	0.	25.	0.	104.
CORN SILAGE (TONS)	255.	0.	0.	44.	0.	211.
HAY (TONS)	57.	0.	0.	10.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	438.	438.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	17.	0.	0.	3.	0.	14.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JANUARY ---						
COWS	45.	0.	0.	0.	0.	49.
HEIFERS OVER 1 YR	29.	0.	0.	0.	0.	25.
HEIFERS UNDER 1 YR	20.	5.	0.	4.	0.	21.
BULL CALVES	0.	7.	0.	6.	1.	0.
---FEBRUARY---						
COWS	49.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	25.	0.	0.	0.	0.	18.
HEIFERS UNDER 1 YR	21.	4.	0.	2.	0.	23.
BULL CALVES	0.	5.	0.	4.	1.	0.
---MARCH ---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	18.	0.	0.	7.	0.	12.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	2.	21.
BULL CALVES	0.	3.	0.	3.	0.	0.
---APRIL ---						
COWS	56.	0.	0.	2.	0.	55.
HEIFERS OVER 1 YR	12.	0.	0.	1.	0.	10.
HEIFERS UNDER 1 YR	21.	2.	0.	0.	0.	23.
BULL CALVES	0.	1.	0.	0.	1.	0.
---MAY ---						
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	10.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	0.	23.
BULL CALVES	0.	1.	0.	1.	0.	0.
---JUNE ---						
COWS	56.	0.	0.	1.	0.	55.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	0.	25.
BULL CALVES	0.	4.	0.	3.	1.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JULY ---						
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	25.	3.	0.	2.	0.	25.
BULL CALVES	0.	2.	0.	2.	0.	0.
---AUGUST ---						
COWS	56.	0.	0.	3.	0.	54.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	25.	1.	0.	0.	0.	25.
BULL CALVES	0.	2.	0.	1.	1.	0.
---SEPT. ---						
COWS	54.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	11.	0.	0.	1.	0.	9.
HEIFERS UNDER 1 YR	25.	3.	0.	2.	0.	25.
BULL CALVES	0.	4.	0.	4.	0.	0.
---OCTOBER ---						
COWS	56.	0.	0.	3.	0.	53.
HEIFERS OVER 1 YR	9.	0.	0.	0.	0.	10.
HEIFERS UNDER 1 YR	25.	0.	0.	0.	0.	24.
BULL CALVES	0.	1.	0.	1.	0.	0.
---NOVEMBER---						
COWS	53.	0.	0.	0.	0.	55.
HEIFERS OVER 1 YR	10.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	24.	0.	0.	0.	0.	21.
BULL CALVES	0.	5.	0.	4.	1.	0.
---DECEMBER---						
COWS	55.	0.	0.	1.	0.	54.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	14.
HEIFERS UNDER 1 YR	21.	5.	0.	0.	2.	21.
BULL CALVES	0.	4.	0.	4.	0.	0.

MONTHLY CASH FLOW STATEMENT
YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME						
MILK	6412.	7625.	8109.	7809.	7112.	7051.
CATTLE	1277.	757.	4928.	743.	103.	1026.
HAY	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	0.	0.	0.
OATS	0.	0.	0.	0.	0.	0.
WHEAT	0.	0.	0.	0.	0.	0.
SOYBEANS	0.	0.	0.	0.	0.	0.
BARLEY	6332.	0.	0.	0.	0.	0.
FIELD BEANS	0.	0.	0.	0.	0.	0.
GOVT	0.	0.	0.	0.	0.	0.
EXPENSE						
LABOR	333.	333.	333.	333.	333.	333.
GAS AND OIL	81.	88.	121.	193.	174.	364.
MACH. REPAIRS	106.	116.	205.	373.	262.	713.
BUILD. REPAIR	169.	193.	241.	266.	193.	121.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.
CONSERVATION	0.	0.	0.	130.	52.	52.
INSURANCE	10.	10.	976.	10.	10.	10.
FERTILIZER	0.	0.	0.	0.	434.	823.
SEED	0.	0.	0.	0.	196.	655.
SPRAY	0.	0.	0.	0.	1296.	365.
OTHER CROP	11.	11.	21.	30.	92.	398.
BREEDING	98.	137.	59.	234.	215.	98.
VET	102.	117.	118.	117.	117.	116.
MARKETING	234.	0.	0.	0.	0.	0.
OTHER LIVESTOCK	147.	168.	170.	168.	168.	167.
RENT	0.	0.	0.	0.	991.	0.
TAXES	0.	43.	0.	0.	0.	0.
UTILITIES	61.	70.	70.	69.	70.	69.
MISCELLANEOUS	49.	46.	90.	73.	189.	175.
FEED	1063.	3110.	3229.	3166.	1293.	1203.
INTEREST-SHORT	93.	0.	0.	0.	0.	5.
INTEREST-INT.	274.	0.	842.	0.	0.	0.
INTEREST-LONG	700.	688.	677.	665.	653.	642.
CAPITAL SALES						
MACHINERY	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
CASH INVESTMENT						
LIVESTOCK	0.	0.	0.	0.	0.	0.
MACHINERY	0.	0.	0.	926.	0.	0.
BUILDINGS	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
PRINCIPAL						
SHORT	8000.	0.	0.	0.	0.	0.
INT.	4691.	0.	4040.	0.	0.	0.
LONG	1000.	1000.	1000.	1000.	1000.	1000.
BORROWED						
SHORT	0.	0.	0.	0.	422.	29.
INT.	0.	0.	0.	3638.	14989.	0.
LONG	0.	0.	0.	0.	0.	0.
TOTALS						
INCOME	14022.	8382.	13036.	8552.	7215.	8077.
EXPENSE	3530.	5129.	7150.	5826.	6737.	6306.
CASH INVESTMENT	0.	0.	0.	926.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	13691.	1000.	5040.	1000.	1000.	1000.
BORROWED	0.	0.	0.	3638.	15411.	29.
CASH ON HAND	1000.	953.	1000.	1000.	100.	100.

MONTHLY CASH FLOW STATEMENT

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME							
MILK	7852.	8079.	8306.	8043.	7035.	6886.	90320.
CATTLE	412.	1042.	1194.	1134.	397.	739.	13754.
HAY	0.	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	538.	698.	0.	1236.
OATS	0.	0.	0.	0.	0.	0.	0.
WHEAT	0.	3856.	0.	0.	0.	0.	3856.
SOYBEANS	0.	0.	0.	0.	0.	0.	0.
BARLEY	0.	11299.	1255.	0.	0.	0.	18886.
FIELD BEANS	0.	0.	3081.	0.	0.	0.	3081.
GOVT	0.	0.	0.	0.	0.	0.	0.
EXPENSE							
LABOR	333.	333.	333.	333.	333.	333.	4000.
GAS AND OIL	244.	279.	199.	200.	89.	84.	2117.
MACH. REPAIRS	467.	2371.	556.	383.	118.	110.	5778.
BUILD. REPAIR	193.	217.	193.	193.	193.	241.	2414.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.	0.
CONSERVATION	52.	52.	52.	0.	0.	0.	390.
INSURANCE	10.	10.	418.	10.	10.	10.	1493.
FERTILIZER	2633.	0.	1511.	1511.	0.	0.	6912.
SEED	0.	147.	201.	201.	0.	0.	1399.
SPRAY	0.	0.	0.	0.	0.	0.	1661.
OTHER CROP	278.	404.	75.	91.	15.	11.	1436.
BREEDING	78.	78.	137.	117.	78.	156.	1482.
VET	117.	116.	117.	114.	115.	114.	1376.
MARKETING	0.	504.	108.	16.	16.	0.	878.
OTHER LIVESTOCK	168.	167.	168.	164.	165.	164.	1982.
RENT	0.	0.	0.	0.	991.	0.	1982.
TAXES	0.	0.	0.	43.	0.	0.	87.
UTILITIES	70.	68.	70.	66.	69.	68.	819.
MISCELLANEOUS	190.	195.	169.	139.	85.	46.	1445.
FEED	1150.	1036.	1094.	1069.	1120.	1132.	19663.
INTEREST-SHORT	6.	8.	0.	0.	0.	0.	112.
INTEREST-INT.	0.	638.	0.	147.	667.	30.	2598.
INTEREST-LONG	630.	618.	607.	595.	583.	572.	7630.
CAPITAL SALES							
MACHINERY	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
CASH INVESTMENT							
LIVESTOCK	0.	0.	0.	0.	0.	0.	0.
MACHINERY	0.	883.	6030.	0.	0.	0.	7838.
BUILDINGS	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
PRINCIPAL							
SHORT	0.	605.	0.	0.	0.	0.	8605.
INT.	0.	12849.	0.	2522.	1682.	2555.	28339.
LONG	1000.	1000.	1000.	1000.	1000.	1000.	12000.
BORROWED							
SHORT	154.	0.	0.	0.	0.	0.	605.
INT.	1800.	0.	12536.	0.	0.	0.	32963.
LONG	0.	0.	0.	0.	0.	0.	0.
TOTALS							
INCOME	8265.	24276.	13836.	9715.	8130.	7625.	131131.
EXPENSE	6619.	7240.	6006.	5393.	4647.	3070.	67654.
CASH INVESTMENT	0.	883.	6030.	0.	0.	0.	7838.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	14454.	1000.	3522.	2682.	3555.	48944.
BORROWED	1954.	0.	12536.	0.	0.	0.	33568.
CASH ON HAND	100.	1000.	1000.	1000.	1000.	1000.	0.

BRIEF ANNUAL SUMMARY
YEAR OF 1/80 TO 12/80

ITEM	VALUE
NO. COWS	55.
TOTAL INVESTMENT	445738.
CASH INCOME	131131.
CASH EXPENSE	67654.
RETURN ON INVESTMENT	7.09
RETURN TO LABOR AND MANAGEMENT	9623.
TOTAL DEBT	67624.
TOTAL DEBT HIGHEST MONTH	80318.

F.5 SCENARIO 3 SEASONAL PRODUCTION RESULTS.(SECTION 4)

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NAME:SWAN RIVER DAIRY

PROBLEM:SEASONAL PRODUCTION:  BASIC FEED PRICES
COWS

LACT.   DEC.  NOV.  OCT. SEPT.  AUG.  JULY  JUNE   MAY  APR.  MAR.  FEB.  JAN.  DEC.  NOV.  OCT. <OCT.

 1         0     0     0     0     0     0     0     5     4     3     0     0     0     0     0     0

 2         0     0     0     0     0     0     0     4     4     4     2     0     0     0     0     0

 3         0     0     0     0     0     0     0     3     2     2     1     0     0     0     0     0

 4         0     0     0     0     0     0     0     0     2     0     0     0     0     0     0     0

 5         0     0     0     0     0     0     0     1     1     1     0     0     0     0     0     0

 6         0     0     0     0     0     0     0     1     2     1     0     0     0     0     0     0

 7         0     0     0     0     0     0     0     0     0     0     1     0     0     0     0     0

 8         0     0     0     0     0     0     0     0     1     0     0     0     0     0     0     0

 9         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

10         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0
HEIFERS

     AGE    1   2   3   4   5   6   7   8   9  10  11  12
  NUMBER    3   3   1   1   1   1   0   2   0   2   2   4

     AGE   13  14  15  16  17  18  19  20  21  22  23  24
  NUMBER    1   2   3   1   1   0   1   1   1   2   4   4

     AGE   25  26  27  28  29  30  31  32  33  34  35  36
  NUMBER    2   2   1   2   1   0   0   0   0   0   0   0

BUILDINGS           VALUE       AGE      YEARS
          YEARS    44127.        5.        20.
          YEARS    22644.        8.        20.
          YEARS        0.        0.         0.
```

```
MO.  1     YR. 80

YEARS  1

FISCAL OR CALENDAR 1

OUTPUT (A) 1
       (B) 1
       (C) 1
       (D) 1
       (E) 1
       (F) 1
       (G) 1
       (H) 1
       (I) 1
       (J) 1
       (K) 1
       (L) 1

FRESHENING PREFERENCE
BORN   JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
AGE     24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.

VALUE  COWS            1500.
       BRED HEIFERS    1200.
       OPEN HEIFERS     800.
       CALVES           400.

HISTORICAL PRODUCTION  PRODUCTION      15040.
                       FORAGE QUALITY      2.
                       LBS. FEED        5119.
                       CULLING RATE     0.31

FIRST PERIOD  LBS. FEED       5606.
              FORAGE QUALITY     2.
              CULLING RATE    0.31

CONCENTRATE LBS.  EAR CORN         0.
                  SHELLED CORN     0.
                  OATS             0.
                  WHEAT            0.
                  BARLEY        4782.
                  SUPPLEMENT     674.
```

```
CORN   CORN FED?  0.

       AMOUNT OF CORN

                  JAN.    FEB.    MAR.    APR.    MAY     JUNE
       LBS.        0.      0.      0.      0.      0.      0.

                  JULY    AUG.    SEPT.   OCT.    NOV.    DEC.
       LBS.        0.      0.      0.      0.      0.      0.

       % MOISTURE    0.0

       HMC SUPPLEMENT      0.0

PORTION OF HAY EQUIVALENT FROM EACH FORAGE

          JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

   HAY    0.30  0.30  0.30  0.30  0.30  0.30  0.0   0.0   0.30  0.30  0.30  0.30

   HCS    0.25  0.25  0.25  0.25  0.25  0.25  1.00  1.00  0.25  0.25  0.25  0.25

    CS    0.45  0.45  0.45  0.45  0.45  0.45  0.0   0.0   0.45  0.45  0.45  0.45

CALVING INTERVAL          12.80

% HEIFER RAISED              1.00

MAX. COWS                   55.

MAX. HEIFERS UNDER 1 YR.    25.

MAX. HEIFERS OVER 1 YR.     25.

YOUNGSTOCK BEDDING           1.

COW BEDDING                  1.

BEDDING COST
             JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     COWS    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

  HEIFERS    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
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```
MACH. SYSTEMS  COWS            3.
               HEIFERS         8.
               CORN-APR.       2.
               CORN-MAY        6.
               CORN-JUNE      10.
               C.S.            3.
               C. GRAIN        0.
               WHEAT-SEPT.    14.
               WHEAT-OCT.     17.
               WHEAT-HAR.     14.
               OATS-APR.       0.
               OATS-MAY        0.
               OATS-HAR.       0.
               HAY PLANT      25.
               HCS            21.
               HAY GROW       29.
               HAY            26.
               F.BEANS-MAY    31.
               F.BEANS-JUNE   35.
               F.BEANS-HAR.   30.
               SOYBEANS-MAY    0.
               SOYBEANS-JUNE   0.
               SOYBEANS-HAR.   0.
               BARLEY-APR.    44.
               BARLEY-MAY     47.
               BARLEY-HAR.    38.

ENTER MACH.?  0.

BUY MACH.?    1.

LAND VALUE NOW     144000.

LAND VALUE 10 YRS.       0.050

ACREAGES                    OWN OR RENT  SHARE RENT
                     CORN           32.          0.
                      HAY          125.         40.
                     OATS            0.          0.
                    WHEAT           55.          0.
                   BARLEY            0.        128.
                 SOYBEANS            0.          0.
                  F.BEANS            0.         40.
             GOVT. PROGS.            0.          0.
                    TOTAL          212.        208.

HCS   90.

CS    60.

ACRES RENTED   168.

RENT RATE       12.
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BUILDING CAPACITY  FREE STALLS     46.
                   STANCHIONS       0.
                   PARLOR           1.
                   HEIFERS         25.
                   CALVES          25.
                   U-SILO         375.
                   H-SILO         200.
                   HAY            140.
                   E.CORN           0.
                   GRAIN         6000.
                   HMC              0.

PURCHASE  DAIRY BUILDINGS?  2.
          GRAIN STORAGE?    1.
          HAY STORAGE?      1.

OFF-FARM STORAGE  F.BEANS  0.
                  SOYBEANS 0.
                  WHEAT    0.
                  CORN     0.
                  OATS     0.
                  BARLEY   0.

LABOR HOURS AVAILABLE

 NUMBER     TYPE  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     1. OPERATOR  300.  300.  300.  300.  460.  460.  460.  460.  460.  300.  300.  300.

     1.   FAMILY  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.

     1.  HIRE(1)    0.    0.    0.    0.  300.    0.  200.  100.  200.    0.    0.    0.

     0.  HIRE(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

     0.  HIRE(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   RATE

   5.00  HOUR(1)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

LABOR COST     5.00

HIRE(1)    333.      1.
HIRE(2)      0.      0.
HIRE(3)      0.      0.
```

```
YIELDS  PLANT FOOD     0.
        BU. OATS       0.

        PERIOD         4.
        PLANT FOOD   300.
        BU. CORN      66.

        PLANT FOOD    80.
        SPRING N     150.
        BU. WHEAT     20.

        PLANT FOOD   230.
        BU. BARLEY    40.

        PLANT FOOD   100.
        TONS 1ST     1.31
        TONS 2ND     0.56
        TONS 3RD     0.0

        PLANT FOOD     100.
        BU. F.BEANS     20.

        BU. SOYBEANS     0.

 CUTTINGS  2.

 ACRES  PASTURE 1ST     75.
        PASTURE 2ND     75.
        PASTURE 3RD      0.

 HARVEST   HCS     270.00
           CS      375.
           HMC       0.

 BEGINNING  HCS                15.
            CS                 15.
            HAY                27.
            HMC                10.
            EAR CORN            0.
            SHELLED CORN        0.
            WHEAT               0.
            OATS                0.
            BARLEY           2600.
            SOYBEANS            0.
            F.BEANS           600.
            SUPPLEMENT         20.

 PLANT FOOD              N   P205   K20
                CORN   57.   55.    0.
            SOYBEANS    0.    0.    0.
             F.BEANS   11.   55.    0.
               WHEAT   78.   44.    0.
                OATS    0.    0.    0.
            HAY-SEED    0.    0.    0.
                 HAY   51.   28.    0.
              BARLEY   78.   44.    0.

 SOIL GROUP   41.
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WITHDRAWALS
  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
  800.  800.  800.  800.  800.  800.  800.  800.  800.  800.  800. 1000.

OFF-FARM INCOME        0.

EXEMPTIONS             6.

ESTIMATED TAX       1500.

ESTIMATED INCOME       0.

DEPR MACHINERY      1.
DEPR CATTLE         1.
DEPR BUILDINGS      1.
SPECIAL 20 PCT?     0.

PENSION RATE        0.

BUSINESS FORM          1.
RETAINED EARNINGS      0.

PARTNERSHIP - CORP INFO

SALARY OR       OTHER    NUMBER OF   PCT OF SHARES  RESIDENCE    HEALTH
PCT OF PROFITS  INCOME  EXEMPTIONS       OWNED        VALUE     INSURANCE

     0.0            0.0      0.0           0.0           0.0        0.0

     0.0            0.0      0.0           0.0           0.0        0.0

     0.0            0.0      0.0           0.0           0.0        0.0

     0.0            0.0      0.0           0.0           0.0        0.0

     0.0            0.0      0.0           0.0           0.0        0.0

DEBTS OUTSTANDING

   BALANCE     RATE   NO.     AMOUNT TYPE TERM   M1   M2   M3   M4   M5   M6   AGE  YRS.

    60000.    0.140   12.      1000.   2.   3.   0.   0.   0.   0.   0.   0.   0.   5.

   15000.    0.140    2.      2500.   2.   2.   3.   8.   0.   0.   0.   0.   0.   3.

    8000.    0.140   12.      2000.   2.   1.   0.   0.   0.   0.   0.   0.   6.   1.

       0.    0.0      0.         0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

       0.    0.0      0.         0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

       0.    0.0      0.         0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

       0.    0.0      0.         0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

       0.    0.0      0.         0.   0.   0.   0.   0.   0.   0.   0.   0.   0.   0.

CASH       5000.
```

LABOR SUMMARY
YEAR OF 1/80 TO 12/80

	HRS. LABOR REQUIRED			SOURCE LABOR (HOURS)				SUR-	LABOR COST	
MONTH	LIVE-STOCK	CROPS	TOTAL	OPER-TOR	FAMILY	REGU-LAR	HOUR-LY	PLUS HOURS	REGU-LAR	HOUR-LY
JAN.	252.	18.	270.	300.	120.	0.	0.	150.	333.	0.
FEB.	274.	19.	293.	300.	120.	0.	0.	127.	333.	0.
MAR.	275.	52.	327.	300.	120.	0.	0.	93.	333.	0.
APR.	273.	117.	390.	300.	120.	0.	0.	30.	333.	0.
MAY	256.	103.	359.	460.	120.	300.	0.	521.	333.	0.
JUNE	255.	277.	532.	460.	120.	0.	0.	48.	333.	0.
JULY	251.	175.	425.	460.	120.	200.	0.	355.	333.	0.
AUG.	254.	375.	629.	460.	120.	100.	0.	51.	333.	0.
SEPT.	253.	130.	382.	460.	120.	200.	0.	398.	333.	0.
OCT.	252.	154.	406.	300.	120.	0.	0.	14.	333.	0.
NOV.	263.	28.	292.	300.	120.	0.	0.	128.	333.	0.
DEC.	251.	18.	270.	300.	120.	0.	0.	150.	333.	0.
TOTAL	3110.	1465.	4575.	4400.	1440.	800.	0.	2065.	4000.	0.

ANNUAL FINANCIAL STATEMENT

YEAR OF 1/80 TO 12/80

TYPE OF LOAN	PRINCIPAL PAID	INTEREST PAID
LONG TERM	12000.	7630.
INTERMEDIATE TERM	24905.	3426.
SHORT TERM	11711.	194.

DEBTS OUTSTANDING (END OF YEAR)

	BALANCE DUE	INTEREST RATE	LOAN PERIOD	AGE (MONTHS)
SHORT TERM	1694.	15.	0.	0.
INT. TERM	2244.	14.	3.	8.
INT. TERM	12894.	14.	3.	7.
INT. TERM	680.	14.	3.	5.
INT. TERM	12744.	14.	3.	3.
LONG TERM	48000.	14.	5.	12.

FINANCIAL SITUATION

TYPE OF DEBT OR ASSET	TOTAL ASSET	TOTAL DEBT	EQUITY RATIO
LONG TERM	213142.	48000.	0.77
INT. TERM	227224.	28562.	0.87
SHORT TERM	8751.	1694.	0.81
TOTAL	449117.	78256.	0.83

ANNUAL CROP PRODUCTION AND FEED UTILIZATION SUMMARY

YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
HAY SILAGE (TONS)	15.	270.	0.	183.	0.	102.
CORN SILAGE (TONS)	15.	375.	0.	180.	0.	210.
HAY (TONS)	27.	83.	103.	140.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	401.	0.	0.	401.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	5003.	5388.	5388.	7603.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	755.	0.	0.	789.	566.
STRAW (TONS)	20.	22.	0.	28.	0.	14.
SUPPLEMENT	4.	0.	17.	21.	0.	0.

ANNUAL DAIRY CATTLE NUMBERS SUMMARY

YEAR OF 1/80 TO 12/80

	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
COWS	45.	0.	0.	11.	1.	53.
HEIFERS OVER 1 YR	29.	0.	0.	10.	0.	14.
HEIFERS UNDER 1 YR	20.	31.	0.	14.	5.	17.
BULL CALVES	0.	40.	0.	32.	8.	0.

ANNUAL INCOME AND EXPENSE SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	VALUE	ITEM	VALUE
CAPITAL INVESTMENT (AVERAGE)		CASH EXPENSE	
LAND	147600.	HIRED LABOR	4000.
BUILDINGS	64357.	GAS + OIL	2123.
MACHINERY	115500.	MACH. REPAIRS	5787.
LIVESTOCK	104900.	CUSTOM HIRE	0.
FEED + SUPPLIES	10419.	CONSTN + REPAIRS	2804.
TOTAL	442776.	INSURANCE	1493.
CASH INCOME		FERTILIZER	6912.
MILK	87461.	SEED	1399.
CATTLE	13927.	SPRAY	1661.
HAY	0.	OTHER CROP	1436.
CORN	1239.	BREEDING	1365.
OATS	0.	VET.	1392.
WHEAT	4534.	MARKETING	878.
BARLEY	18886.		
SOYBEANS	0.	OTHER LIVESTOCK	2004.
FIELD BEANS	3081.	RENT	1982.
GOV'T PAYMENTS	0.	TAXES	87.
TOTAL	129129.	UTILITIES	828.
NON-CASHINCOME		INTEREST	11251.
RISE LAND VALUE	7200.	MISCELLANEOUS	1443.
RISE CATTLE INV.	-8400.	FEED PURCHASE	22564.
RISE FEED INV.	-3336.	TOTAL	71409.
TOTAL	-4536.	NON-CASH EXPENSE	
		OPERATOR LABOR	10000.
TOTAL INCOME	124592.	FAMILY LABOR	4536.
TOTAL EXPENSE	140423.	MACH. DEPR.	24244.
RETURN TO MGT. + LABOR	-1295.	BUILD. DEPR.	4829.
RETURN ON INVESTMENT	4.70	INTEREST	25406.
		TOTAL	69014.

```
INCOME TAX INFORMATION:

                   TOTAL INCOME TAXES=      0.0

                   INVESTMENT CREDIT =      0.0

                   PENSION PLAN PAYMT=    441.95

                   TAX DEPRECIATION TAKEN:

                                  MACHINERY  =  26607.79

                                  BUILDINGS  =   4828.80

                                  CATTLE     =       0.0

                                  SPECIAL 20%=       0.0

                   RETURN ON INVESTMENT AFTER TAXES    =      4.70

                   LOSSES CARRIED FORWARD       =      0.0

                   UNINCORPORATED BUSINESS TAX =       0.0
```

PRODUCTION YIELDS SUMMARY

YEAR OF 1/80 TO 12/80

CROP OR ANIMAL	NO. OR ACRES	YIELD	LANDLORD SHARE
HAY (TONS)	27.	3.0	0.
HAY SILAGE (TONS)	63.	4.3	0.
CORN	6.	70.	0.
CORN SILAGE (TONS)	26.	14.3	0.
OATS	0.	0.	0.
WHEAT	55.	20.	0.
BARLEY	128.	39.	0.
SOYBEANS	0.	0.	0.
FIELD BEANS	40.	19.	0.
COWS	55.	13387.	0.

BRIEF MONTHLY CASH FLOW SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME	10814.	5926.	9178.	10811.	10510.	10338.
EXPENSE	3292.	4535.	7230.	5914.	7354.	7006.
CASH INVEST.	0.	0.	0.	0.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	10721.	1000.	3850.	3197.	2356.	2532.
BORROWED	0.	1009.	8192.	4564.	14989.	0.
CASH ON HAND	1000.	100.	100.	1000.	1000.	1000.

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME	10144.	26095.	13963.	8973.	6735.	5641.	129129.
EXPENSE	7225.	7846.	6341.	5875.	5434.	3356.	71409.
CASH INVEST.	1120.	883.	5822.	0.	0.	0.	7825.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	16566.	1000.	2298.	3095.	1000.	48616.
BORROWED	680.	0.	12744.	0.	1694.	0.	43873.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	385.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JANUARY ---						
HAY SILAGE (TONS)	15.	0.	0.	15.	0.	0.
CORN SILAGE (TONS)	15.	0.	0.	15.	0.	0.
HAY (TONS)	27.	0.	0.	24.	0.	3.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	0.	405.	405.	2600.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	4.	0.	0.	2.	0.	2.
---FEBRUARY---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	3.	0.	32.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	452.	452.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	17.	0.	0.	3.	0.	13.
SUPPLEMENT	2.	0.	0.	2.	0.	1.
---MARCH ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	35.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	466.	466.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	13.	0.	0.	3.	0.	10.
SUPPLEMENT	1.	0.	1.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---APRIL ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	34.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	467.	467.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	10.	0.	0.	3.	0.	7.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---MAY ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	2.	2.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	7.	0.	0.	1.	0.	6.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---JUNE ---						
HAY SILAGE (TONS)	0.	238.	0.	0.	0.	238.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	27.	0.	0.	0.	27.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	6.	0.	0.	1.	0.	4.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JULY ---						
HAY SILAGE (TONS)	238.	32.	0.	34.	0.	236.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	27.	29.	0.	0.	0.	56.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	447.	447.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	4.	0.	0.	1.	0.	3.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---AUGUST ---						
HAY SILAGE (TONS)	236.	0.	0.	42.	0.	194.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	56.	27.	0.	0.	0.	83.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	4503.	451.	451.	4503.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	3.	22.	0.	1.	0.	24.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---SEPT. ---						
HAY SILAGE (TONS)	194.	0.	0.	19.	0.	175.
CORN SILAGE (TONS)	0.	187.	0.	34.	0.	153.
HAY (TONS)	83.	0.	0.	8.	0.	76.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	500.	462.	462.	500.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	189.	0.	0.	789.	0.
STRAW (TONS)	24.	0.	0.	1.	0.	23.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---OCTOBER ---						
HAY SILAGE (TONS)	175.	0.	0.	24.	0.	151.
CORN SILAGE (TONS)	153.	187.	0.	44.	0.	297.
HAY (TONS)	76.	0.	0.	10.	0.	66.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	206.	0.	0.	206.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	454.	454.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	0.	566.	0.	0.	0.	566.
STRAW (TONS)	23.	0.	0.	3.	0.	20.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---NOVEMBER---						
HAY SILAGE (TONS)	151.	0.	0.	24.	0.	127.
CORN SILAGE (TONS)	297.	0.	0.	44.	0.	254.
HAY (TONS)	66.	0.	0.	10.	0.	56.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	195.	0.	0.	195.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	449.	449.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---DECEMBER---						
HAY SILAGE (TONS)	127.	0.	0.	24.	0.	102.
CORN SILAGE (TONS)	254.	0.	0.	44.	0.	210.
HAY (TONS)	56.	0.	0.	10.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	430.	430.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	17.	0.	0.	3.	0.	14.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JANUARY ---						
COWS	45.	0.	0.	0.	0.	50.
HEIFERS OVER 1 YR	29.	0.	0.	0.	0.	24.
HEIFERS UNDER 1 YR	20.	4.	0.	4.	1.	19.
BULL CALVES	0.	5.	0.	5.	0.	0.
---FEBRUARY---						
COWS	50.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	24.	0.	0.	2.	0.	17.
HEIFERS UNDER 1 YR	19.	7.	0.	1.	2.	22.
BULL CALVES	0.	10.	0.	8.	2.	0.
---MARCH ---						
COWS	56.	0.	0.	1.	1.	56.
HEIFERS OVER 1 YR	17.	0.	0.	3.	0.	14.
HEIFERS UNDER 1 YR	22.	7.	0.	2.	0.	25.
BULL CALVES	0.	10.	0.	8.	2.	0.
---APRIL ---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	14.	0.	0.	1.	0.	12.
HEIFERS UNDER 1 YR	25.	8.	0.	7.	1.	25.
BULL CALVES	0.	6.	0.	5.	1.	0.
---MAY ---						
COWS	56.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	12.	0.	0.	1.	0.	13.
HEIFERS UNDER 1 YR	25.	0.	0.	0.	0.	23.
BULL CALVES	0.	0.	0.	0.	0.	0.
---JUNE ---						
COWS	56.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	13.	0.	0.	1.	0.	12.
HEIFERS UNDER 1 YR	23.	0.	0.	0.	0.	23.
BULL CALVES	0.	0.	0.	0.	0.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JULY ---						
COWS	56.	0.	0.	1.	0.	55.
HEIFERS OVER 1 YR	12.	0.	0.	0.	0.	13.
HEIFERS UNDER 1 YR	23.	0.	0.	0.	0.	22.
BULL CALVES	0.	0.	0.	0.	0.	0.
---AUGUST ---						
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	13.	0.	0.	1.	0.	12.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	0.	22.
BULL CALVES	0.	0.	0.	0.	0.	0.
---SEPT. ---						
COWS	56.	0.	0.	3.	0.	56.
HEIFERS OVER 1 YR	12.	0.	0.	0.	0.	10.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	0.	22.
BULL CALVES	0.	2.	0.	2.	0.	0.
---OCTOBER ---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	10.	0.	0.	1.	0.	9.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	0.	22.
BULL CALVES	0.	0.	0.	0.	0.	0.
---NOVEMBER---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	9.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	1.	19.
BULL CALVES	0.	0.	0.	0.	0.	0.
---DECEMBER---						
COWS	56.	0.	0.	3.	0.	53.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	14.
HEIFERS UNDER 1 YR	19.	1.	0.	0.	0.	17.
BULL CALVES	0.	7.	0.	4.	3.	0.

MONTHLY CASH FLOW STATEMENT
YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME						
MILK	3292.	3847.	5867.	8586.	9940.	9774.
CATTLE	1190.	2079.	3312.	2224.	570.	564.
HAY	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	0.	0.	0.
OATS	0.	0.	0.	0.	0.	0.
WHEAT	0.	0.	0.	0.	0.	0.
SOYBEANS	0.	0.	0.	0.	0.	0.
BARLEY	6332.	0.	0.	0.	0.	0.
FIELD BEANS	0.	0.	0.	0.	0.	0.
GOVT	0.	0.	0.	0.	0.	0.
EXPENSE						
LABOR	333.	333.	333.	333.	333.	333.
GAS AND OIL	81.	88.	123.	196.	175.	365.
MACH. REPAIRS	106.	115.	207.	377.	262.	715.
BUILD. REPAIR	169.	193.	241.	266.	193.	121.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.
CONSERVATION	0.	0.	0.	130.	52.	52.
INSURANCE	10.	10.	976.	10.	10.	10.
FERTILIZER	0.	0.	0.	0.	434.	823.
SEED	0.	0.	0.	0.	196.	655.
SPRAY	0.	0.	0.	0.	1296.	365.
OTHER CROP	11.	11.	21.	30.	92.	398.
BREEDING	20.	20.	0.	195.	371.	312.
VET	104.	117.	119.	118.	117.	117.
MARKETING	234.	0.	0.	0.	0.	0.
OTHER LIVESTOCK	150.	168.	171.	170.	168.	168.
RENT	0.	0.	0.	0.	991.	0.
TAXES	0.	43.	0.	0.	0.	0.
UTILITIES	63.	70.	70.	70.	70.	70.
MISCELLANEOUS	46.	41.	88.	72.	195.	184.
FEED	1073.	2639.	3107.	3237.	1726.	1628.
INTEREST-SHORT	93.	0.	13.	46.	19.	2.
INTEREST-INT.	100.	0.	1084.	0.	0.	48.
INTEREST-LONG	700.	688.	677.	665.	653.	642.
CAPITAL SALES						
MACHINERY	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
CASH INVESTMENT						
LIVESTOCK	0.	0.	0.	0.	0.	0.
MACHINERY	0.	0.	0.	0.	0.	0.
BUILDINGS	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
PRINCIPAL						
SHORT	8000.	0.	0.	2197.	1356.	158.
INT.	1721.	0.	2850.	0.	0.	1374.
LONG	1000.	1000.	1000.	1000.	1000.	1000.
BORROWED						
SHORT	0.	1009.	2702.	0.	0.	0.
INT.	0.	0.	5490.	4564.	14989.	0.
LONG	0.	0.	0.	0.	0.	0.
TOTALS						
INCOME	10814.	5926.	9178.	10811.	10510.	10338.
EXPENSE	3292.	4535.	7230.	5914.	7354.	7006.
CASH INVESTMENT	0.	0.	0.	0.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	10721.	1000.	3850.	3197.	2356.	2532.
BORROWED	0.	1009.	8192.	4564.	14989.	0.
CASH ON HAND	1000.	100.	100.	1000.	1000.	1000.

MONTHLY CASH FLOW STATEMENT

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME							
MILK	9947.	9681.	8892.	7608.	5801.	4226.	87461.
CATTLE	198.	581.	735.	733.	327.	1415.	13927.
HAY	0.	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	632.	607.	0.	1239.
OATS	0.	0.	0.	0.	0.	0.	0.
WHEAT	0.	4534.	0.	0.	0.	0.	4534.
SOYBEANS	0.	0.	0.	0.	0.	0.	0.
BARLEY	0.	11299.	1255.	0.	0.	0.	18886.
FIELD BEANS	0.	0.	3081.	0.	0.	0.	3081.
GOVT	0.	0.	0.	0.	0.	0.	0.
EXPENSE							
LABOR	333.	333.	333.	333.	333.	333.	4000.
GAS AND OIL	243.	281.	198.	203.	90.	81.	2123.
MACH. REPAIRS	464.	2374.	555.	387.	119.	107.	5787.
BUILD. REPAIR	193.	217.	193.	193.	193.	241.	2414.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.	0.
CONSERVATION	52.	52.	52.	0.	0.	0.	390.
INSURANCE	10.	10.	418.	10.	10.	10.	1493.
FERTILIZER	2633.	0.	1511.	1511.	0.	0.	6912.
SEED	0.	147.	201.	201.	0.	0.	1399.
SPRAY	0.	0.	0.	0.	0.	0.	1661.
OTHER CROP	278.	404.	75.	91.	15.	11.	1436.
BREEDING	293.	0.	20.	20.	39.	78.	1365.
VET	116.	117.	120.	118.	118.	114.	1392.
MARKETING	0.	504.	108.	16.	16.	0.	878.
OTHER LIVESTOCK	167.	168.	173.	170.	170.	164.	2004.
RENT	0.	0.	0.	0.	991.	0.	1982.
TAXES	0.	0.	0.	43.	0.	0.	87.
UTILITIES	69.	70.	70.	70.	70.	66.	828.
MISCELLANEOUS	199.	192.	164.	135.	84.	42.	1443.
FEED	1546.	1463.	1544.	1531.	1554.	1516.	22564.
INTEREST-SHORT	0.	0.	0.	0.	0.	21.	194.
INTEREST-INT.	0.	896.	0.	248.	1049.	0.	3426.
INTEREST-LONG	630.	618.	607.	595.	583.	572.	7630.
CAPITAL SALES							
MACHINERY	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
CASH INVESTMENT							
LIVESTOCK	0.	0.	0.	0.	0.	0.	0.
MACHINERY	1120.	883.	5822.	0.	0.	0.	7825.
BUILDINGS	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
PRINCIPAL							
SHORT	0.	0.	0.	0.	0.	0.	11711.
INT.	0.	15566.	0.	1298.	2095.	0.	24905.
LONG	1000.	1000.	1000.	1000.	1000.	1000.	12000.
BORROWED							
SHORT	0.	0.	0.	0.	1694.	0.	5405.
INT.	680.	0.	12744.	0.	0.	0.	38467.
LONG	0.	0.	0.	0.	0.	0.	0.
TOTALS							
INCOME	10144.	26095.	13963.	8973.	6735.	5641.	129129.
EXPENSE	7225.	7846.	6341.	5875.	5434.	3356.	71409.
CASH INVESTMENT	1120.	883.	5822.	0.	0.	0.	7825.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	16566.	1000.	2298.	3095.	1000.	48616.
BORROWED	680.	0.	12744.	0.	1694.	0.	43873.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	385.	0.

BRIEF ANNUAL SUMMARY
YEAR OF 1/80 TO 12/80

ITEM	VALUE
NO. COWS	55.
TOTAL INVESTMENT	442776.
CASH INCOME	129129.
CASH EXPENSE	71409.
RETURN ON INVESTMENT	4.70
RETURN TO LABOR AND MANAGEMENT	-1295.
TOTAL DEBT	78256.
TOTAL DEBT HIGHEST MONTH	90630.

F.6 SCENARIO 4 SEASONAL PRICE AND PRODUCTION RESULTS.(SECTION 5)

```
NAME: SWAN  RIVER DAIRY

 PROBLEM:SEASONAL PRODUCTION:  SEASONAL FEED PRICES
 COWS

 LACT.   DEC.  NOV.  OCT. SEPT.  AUG.  JULY  JUNE   MAY  APR.  MAR.  FEB.  JAN.  DEC.  NOV.  OCT. <OCT.

  1         0     0     0     0     0     0     0     5     4     3     0     0     0     0     0     0

  2         0     0     0     0     0     0     0     4     4     4     2     0     0     0     0     0

  3         0     0     0     0     0     0     0     3     2     2     1     0     0     0     0     0

  4         0     0     0     0     0     0     0     0     2     0     0     0     0     0     0     0

  5         0     0     0     0     0     0     0     1     1     1     0     0     0     0     0     0

  6         0     0     0     0     0     0     0     1     2     1     0     0     0     0     0     0

  7         0     0     0     0     0     0     0     0     0     0     1     0     0     0     0     0

  8         0     0     0     0     0     0     0     0     1     0     0     0     0     0     0     0

  9         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

 10         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

 HEIFERS

     AGE   1   2   3   4   5   6   7   8   9  10  11  12
  NUMBER   3   3   1   1   1   1   0   2   0   2   2   4

     AGE  13  14  15  16  17  18  19  20  21  22  23  24
  NUMBER   1   2   3   1   1   0   1   1   1   2   4   4

     AGE  25  26  27  28  29  30  31  32  33  34  35  36
  NUMBER   2   2   1   2   1   0   0   0   0   0   0   0

 BUILDINGS             VALUE        AGE      YEARS
            YEARS     44127.         5.        20.
            YEARS     22644.         8.        20.
            YEARS         0.         0.         0.
```

```
MO.  1     YR. 80

YEARS  1

FISCAL OR CALENDAR 1

OUTPUT (A) 1
       (B) 1
       (C) 1
       (D) 1
       (E) 1
       (F) 1
       (G) 1
       (H) 1
       (I) 1
       (J) 1
       (K) 1
       (L) 1

FRESHENING PREFERENCE
BORN   JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
AGE     24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.

VALUE  COWS            1500.
       BRED HEIFERS    1200.
       OPEN HEIFERS     800.
       CALVES           400.

HISTORICAL PRODUCTION  PRODUCTION      15040.
                       FORAGE QUALITY      2.
                       LBS. FEED        5119.
                       CULLING RATE     0.31

FIRST PERIOD  LBS. FEED       5606.
              FORAGE QUALITY     2.
              CULLING RATE    0.31

CONCENTRATE LBS.  EAR CORN          0.
                  SHELLED CORN      0.
                  OATS              0.
                  WHEAT             0.
                  BARLEY         4782.
                  SUPPLEMENT      674.
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CORN  CORN FED?  0.

      AMOUNT OF CORN

                JAN.    FEB.    MAR.    APR.     MAY    JUNE
      LBS.        0.      0.      0.      0.      0.      0.

                JULY    AUG.   SEPT.    OCT.    NOV.    DEC.
      LBS.        0.      0.      0.      0.      0.      0.

      % MOISTURE    0.0

      HMC SUPPLEMENT      0.0

PORTION OF HAY EQUIVALENT FROM EACH FORAGE

         JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

  HAY    0.30  0.30  0.30  0.30  0.30  0.30  0.0   0.0   0.30  0.30  0.30  0.30

  HCS    0.25  0.25  0.25  0.25  0.25  0.25  1.00  1.00  0.25  0.25  0.25  0.25

   CS    0.45  0.45  0.45  0.45  0.45  0.45  0.0   0.0   0.45  0.45  0.45  0.45

CALVING INTERVAL          12.80

% HEIFER RAISED              1.00

MAX. COWS                   55.

MAX. HEIFERS UNDER 1 YR.    25.

MAX. HEIFERS OVER 1 YR.     25.

YOUNGSTOCK BEDDING           1.

COW BEDDING                  1.

BEDDING COST
             JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     COWS    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

  HEIFERS    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
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MACH. SYSTEMS  COWS             3.
               HEIFERS          8.
               CORN-APR.        2.
               CORN-MAY         6.
               CORN-JUNE       10.
               C.S.             3.
               C. GRAIN         0.
               WHEAT-SEPT.     14.
               WHEAT-OCT.      17.
               WHEAT-HAR.      14.
               OATS-APR.        0.
               OATS-MAY         0.
               OATS-HAR.        0.
               HAY PLANT       25.
               HCS             21.
               HAY GROW        29.
               HAY             26.
               F.BEANS-MAY     31.
               F.BEANS-JUNE    35.
               F.BEANS-HAR.    30.
               SOYBEANS-MAY     0.
               SOYBEANS-JUNE    0.
               SOYBEANS-HAR.    0.
               BARLEY-APR.     44.
               BARLEY-MAY      47.
               BARLEY-HAR.     38.

ENTER MACH.?  0.

BUY MACH.?    1.

LAND VALUE NOW     144000.

LAND VALUE 10 YRS.        0.050

ACREAGES                     OWN OR RENT  SHARE RENT
                    CORN             32.          0.
                     HAY            125.         40.
                    OATS              0.          0.
                   WHEAT             55.          0.
                  BARLEY              0.        128.
                SOYBEANS              0.          0.
                 F.BEANS              0.         40.
            GOVT. PROGS.              0.          0.
                   TOTAL            212.        208.

HCS   90.

CS    60.

ACRES RENTED   168.

RENT RATE       12.
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BUILDING  CAPACITY   FREE STALLS     46.
                     STANCHIONS       0.
                     PARLOR           1.
                     HEIFERS         25.
                     CALVES          25.
                     U-SILO         375.
                     H-SILO         200.
                     HAY            140.
                     E.CORN           0.
                     GRAIN         6000.
                     HMC              0.

PURCHASE   DAIRY BUILDINGS?  2.
           GRAIN STORAGE?    1.
           HAY STORAGE?      1.

OFF-FARM STORAGE   F.BEANS  0.
                   SOYBEANS 0.
                   WHEAT    0.
                   CORN     0.
                   OATS     0.
                   BARLEY   0.

LABOR HOURS AVAILABLE

 NUMBER      TYPE  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     1. OPERATOR  300.  300.  300.  300.  460.  460.  460.  460.  460.  300.  300.  300.

     1.    FAMILY 120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.

     1.  HIRE(1)    0.    0.    0.    0.  300.    0.  200.  100.  200.    0.    0.    0.

     0.  HIRE(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

     0.  HIRE(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   RATE

   5.00  HOUR(1)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

LABOR COST    5.00

HIRE(1)   333.      1.
HIRE(2)     0.      0.
HIRE(3)     0.      0.
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```
YIELDS   PLANT FOOD     0.
         BU. OATS       0.

         PERIOD         4.
         PLANT FOOD   300.
         BU. CORN      66.

         PLANT FOOD    80.
         SPRING N     150.
         BU. WHEAT     20.

         PLANT FOOD   230.
         BU. BARLEY    40.

         PLANT FOOD   100.
         TONS 1ST     1.31
         TONS 2ND     0.56
         TONS 3RD     0.0

         PLANT FOOD     100.
         BU. F.BEANS     20.

         BU. SOYBEANS     0.

CUTTINGS  2.

ACRES   PASTURE 1ST     75.
        PASTURE 2ND     75.
        PASTURE 3RD      0.

HARVEST   HCS    270.00
          CS     375.
          HMC      0.

BEGINNING  HCS               15.
           CS                15.
           HAY               27.
           HMC               10.
           EAR CORN           0.
           SHELLED CORN       0.
           WHEAT              0.
           OATS               0.
           BARLEY          2600.
           SOYBEANS           0.
           F.BEANS          600.
           SUPPLEMENT        20.

PLANT FOOD                N   P205    K20
                 CORN   57.   55.     0.
             SOYBEANS    0.    0.     0.
              F.BEANS   11.   55.     0.
                WHEAT   78.   44.     0.
                 OATS    0.    0.     0.
             HAY-SEED    0.    0.     0.
                  HAY   51.   28.     0.
               BARLEY   78.   44.     0.

SOIL GROUP   41.
```

WITHDRAWALS

JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.
800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	800.	1000.

OFF-FARM INCOME	0.
EXEMPTIONS	6.
ESTIMATED TAX	1500.
ESTIMATED INCOME	0.

DEPR MACHINERY	1.
DEPR CATTLE	1.
DEPR BUILDINGS	1.
SPECIAL 20 PCT?	0.
PENSION RATE	0.

BUSINESS FORM	1.
RETAINED EARNINGS	0.

PARTNERSHIP - CORP INFO

SALARY OR PCT OF PROFITS	OTHER INCOME	NUMBER OF EXEMPTIONS	PCT OF SHARES OWNED	RESIDENCE VALUE	HEALTH INSURANCE
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	0.0

DEBTS OUTSTANDING

BALANCE	RATE	NO.	AMOUNT	TYPE	TERM	M1	M2	M3	M4	M5	M6	AGE	YRS.
60000.	0.140	12.	1000.	2.	3.	0.	0.	0.	0.	0.	0.	0.	5.
15000.	0.140	2.	2500.	2.	2.	3.	8.	0.	0.	0.	0.	0.	3.
8000.	0.140	12.	2000.	2.	1.	0.	0.	0.	0.	0.	0.	6.	1.
0.	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

CASH 5000.

LABOR SUMMARY
YEAR OF 1/80 TO 12/80

	HRS. LABOR REQUIRED			SOURCE LABOR (HOURS)				SUR-	LABOR COST	
MONTH	LIVESTOCK	CROPS	TOTAL	OPERTOR	FAMILY	REGULAR	HOURLY	PLUS HOURS	REGULAR	HOURLY
JAN.	252.	18.	270.	300.	120.	0.	0.	150.	333.	0.
FEB.	274.	19.	293.	300.	120.	0.	0.	127.	333.	0.
MAR.	275.	52.	327.	300.	120.	0.	0.	93.	333.	0.
APR.	273.	117.	390.	300.	120.	0.	0.	30.	333.	0.
MAY	256.	103.	359.	460.	120.	300.	0.	521.	333.	0.
JUNE	255.	277.	532.	460.	120.	0.	0.	48.	333.	0.
JULY	251.	175.	425.	460.	120.	200.	0.	355.	333.	0.
AUG.	254.	375.	629.	460.	120.	100.	0.	51.	333.	0.
SEPT.	253.	130.	382.	460.	120.	200.	0.	398.	333.	0.
OCT.	252.	154.	406.	300.	120.	0.	0.	14.	333.	0.
NOV.	263.	28.	292.	300.	120.	0.	0.	128.	333.	0.
DEC.	251.	18.	270.	300.	120.	0.	0.	150.	333.	0.
TOTAL	3110.	1465.	4575.	4400.	1440.	800.	0.	2065.	4000.	0.

ANNUAL FINANCIAL STATEMENT

YEAR OF 1/80 TO 12/80

TYPE OF LOAN	PRINCIPAL PAID	INTEREST PAID
LONG TERM	12000.	7630.
INTERMEDIATE TERM	25066.	3429.
SHORT TERM	12369.	215.

DEBTS OUTSTANDING (END OF YEAR)

	BALANCE DUE	INTEREST RATE	LOAN PERIOD	AGE (MONTHS)
SHORT TERM	1187.	15.	0.	0.
INT. TERM	2083.	14.	3.	8.
INT. TERM	12894.	14.	3.	7.
INT. TERM	256.	14.	3.	5.
INT. TERM	12302.	14.	3.	3.
LONG TERM	48000.	14.	5.	12.

FINANCIAL SITUATION

TYPE OF DEBT OR ASSET	TOTAL ASSET	TOTAL DEBT	EQUITY RATIO
LONG TERM	213142.	48000.	0.77
INT. TERM	227224.	27535.	0.88
SHORT TERM	11576.	1187.	0.90
TOTAL	451943.	76722.	0.83

ANNUAL CROP PRODUCTION AND FEED UTILIZATION SUMMARY

YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
HAY SILAGE (TONS)	15.	270.	0.	183.	0.	102.
CORN SILAGE (TONS)	15.	375.	0.	180.	0.	210.
HAY (TONS)	27.	83.	103.	140.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	401.	0.	0.	401.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	5003.	5388.	5388.	7603.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	755.	0.	0.	789.	566.
STRAW (TONS)	20.	22.	0.	28.	0.	14.
SUPPLEMENT	4.	0.	17.	21.	0.	0.

ANNUAL DAIRY CATTLE NUMBERS SUMMARY

YEAR OF 1/80 TO 12/80

	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
COWS	45.	0.	0.	11.	1.	53.
HEIFERS OVER 1 YR	29.	0.	0.	10.	0.	14.
HEIFERS UNDER 1 YR	20.	31.	0.	14.	5.	17.
BULL CALVES	0.	40.	0.	32.	8.	0.

ANNUAL INCOME AND EXPENSE SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	VALUE	ITEM	VALUE
CAPITAL INVESTMENT (AVERAGE)		CASH EXPENSE	
LAND	147600.	HIRED LABOR	4000.
BUILDINGS	64357.	GAS + OIL	2123.
MACHINERY	115500.	MACH. REPAIRS	5787.
LIVESTOCK	104900.	CUSTOM HIRE	0.
FEED + SUPPLIES	11832.	CONSTN + REPAIRS	2804.
TOTAL	444189.	INSURANCE	1493.
CASH INCOME		FERTILIZER	6912.
MILK	87461.	SEED	1399.
CATTLE	13927.	SPRAY	1661.
HAY	0.	OTHER CROP	1436.
CORN	1236.	BREEDING	1365.
OATS	0.	VET.	1392.
WHEAT	3856.	MARKETING	878.
BARLEY	18886.		
SOYBEANS	0.	OTHER LIVESTOCK	2004.
FIELD BEANS	3081.	RENT	1982.
GOV'T PAYMENTS	0.	TAXES	87.
TOTAL	128447.	UTILITIES	828.
NON-CASHINCOME		INTEREST	11274.
RISE LAND VALUE	7200.	MISCELLANEOUS	1443.
RISE CATTLE INV.	-8400.	FEED PURCHASE	19915.
RISE FEED INV.	-511.	TOTAL	68783.
TOTAL	-1711.	NON-CASH EXPENSE	
		OPERATOR LABOR	10000.
TOTAL INCOME	126736.	FAMILY LABOR	4536.
TOTAL EXPENSE	137916.	MACH. DEPR.	24244.
RETURN TO MGT. + LABOR	3356.	BUILD. DEPR.	4829.
RETURN ON INVESTMENT	5.77	INTEREST	25525.
		TOTAL	69133.

```
INCOME TAX INFORMATION:

                         TOTAL INCOME TAXES=      0.0

                         INVESTMENT CREDIT =      0.0

                         PENSION PLAN PAYMT=    480.83

                         TAX DEPRECIATION TAKEN:

                                        MACHINERY  =  26607.79

                                        BUILDINGS  =   4828.80

                                        CATTLE     =      0.0

                                        SPECIAL 20%=      0.0

                         RETURN ON INVESTMENT AFTER TAXES    =      5.77

                         LOSSES CARRIED FORWARD      =       0.0

                         UNINCORPORATED BUSINESS TAX =       0.0
```

PRODUCTION YIELD SUMMARY
YEAR OF 1/80 TO 12/80

CROP OR ANIMAL	NO. OR ACRES	YIELD	LANDLORD SHARE
HAY (TONS)	27.	3.0	0.
HAY SILAGE (TONS)	63.	4.3	0.
CORN	6.	70.	0.
CORN SILAGE (TONS)	26.	14.3	0.
OATS	0.	0.	0.
WHEAT	55.	20.	0.
BARLEY	128.	39.	0.
SOYBEANS	0.	0.	0.
FIELD BEANS	40.	19.	0.
COWS	55.	13387.	0.

BRIEF MONTHLY CASH FLOW SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME	10814.	5926.	9178.	10811.	10510.	10338.
EXPENSE	3292.	4980.	7443.	5984.	6978.	6588.
CASH INVEST.	0.	0.	0.	0.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	10721.	1000.	3850.	3127.	2732.	2950.
BORROWED	0.	1454.	8405.	4564.	14989.	0.
CASH ON HAND	1000.	100.	100.	1000.	1000.	1000.

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME	10144.	25417.	13963.	8878.	6826.	5641.	128447.
EXPENSE	6801.	7402.	5899.	5452.	5018.	2947.	68783.
CASH INVEST.	1544.	883.	6264.	0.	0.	0.	8691.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	16332.	1000.	2627.	3095.	1000.	49435.
BORROWED	256.	0.	12302.	0.	1187.	0.	43157.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	795.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JANUARY ---						
HAY SILAGE (TONS)	15.	0.	0.	15.	0.	0.
CORN SILAGE (TONS)	15.	0.	0.	15.	0.	0.
HAY (TONS)	27.	0.	0.	24.	0.	3.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	2600.	0.	405.	405.	2600.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	4.	0.	0.	2.	0.	2.
---FEBRUARY---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	3.	0.	32.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	452.	452.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	17.	0.	0.	3.	0.	13.
SUPPLEMENT	2.	0.	0.	2.	0.	1.
---MARCH ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	35.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	466.	466.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	13.	0.	0.	3.	0.	10.
SUPPLEMENT	1.	0.	1.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---APRIL ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	34.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	467.	467.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	10.	0.	0.	3.	0.	7.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---MAY ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	2.	2.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	7.	0.	0.	1.	0.	6.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---JUNE ---						
HAY SILAGE (TONS)	0.	238.	0.	0.	0.	238.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	27.	0.	0.	0.	27.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	453.	453.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	6.	0.	0.	1.	0.	4.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JULY ---						
HAY SILAGE (TONS)	238.	32.	0.	34.	0.	236.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	27.	29.	0.	0.	0.	56.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	447.	447.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	4.	0.	0.	1.	0.	3.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---AUGUST ---						
HAY SILAGE (TONS)	236.	0.	0.	42.	0.	194.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	56.	27.	0.	0.	0.	83.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	4503.	451.	451.	4503.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	3.	22.	0.	1.	0.	24.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---SEPT. ---						
HAY SILAGE (TONS)	194.	0.	0.	19.	0.	175.
CORN SILAGE (TONS)	0.	187.	0.	34.	0.	153.
HAY (TONS)	83.	0.	0.	8.	0.	76.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	500.	462.	462.	500.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	189.	0.	0.	789.	0.
STRAW (TONS)	24.	0.	0.	1.	0.	23.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---OCTOBER ---						
HAY SILAGE (TONS)	175.	0.	0.	24.	0.	151.
CORN SILAGE (TONS)	153.	187.	0.	44.	0.	297.
HAY (TONS)	76.	0.	0.	10.	0.	66.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	206.	0.	0.	206.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	454.	454.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	0.	566.	0.	0.	0.	566.
STRAW (TONS)	23.	0.	0.	3.	0.	20.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---NOVEMBER---						
HAY SILAGE (TONS)	151.	0.	0.	24.	0.	127.
CORN SILAGE (TONS)	297.	0.	0.	44.	0.	254.
HAY (TONS)	66.	0.	0.	10.	0.	56.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	195.	0.	0.	195.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	449.	449.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	0.	0.	2.	2.	0.	0.
---DECEMBER---						
HAY SILAGE (TONS)	127.	0.	0.	24.	0.	102.
CORN SILAGE (TONS)	254.	0.	0.	44.	0.	210.
HAY (TONS)	56.	0.	0.	10.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	0.	0.	0.	0.
BARLEY (BU.)	0.	0.	430.	430.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	566.	0.	0.	0.	0.	566.
STRAW (TONS)	17.	0.	0.	3.	0.	14.
SUPPLEMENT	0.	0.	2.	2.	0.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JANUARY ---						
COWS	45.	0.	0.	0.	0.	50.
HEIFERS OVER 1 YR	29.	0.	0.	0.	0.	24.
HEIFERS UNDER 1 YR	20.	4.	0.	4.	1.	19.
BULL CALVES	0.	5.	0.	5.	0.	0.
---FEBRUARY---						
COWS	50.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	24.	0.	0.	2.	0.	17.
HEIFERS UNDER 1 YR	19.	7.	0.	1.	2.	22.
BULL CALVES	0.	10.	0.	8.	2.	0.
---MARCH ---						
COWS	56.	0.	0.	1.	1.	56.
HEIFERS OVER 1 YR	17.	0.	0.	3.	0.	14.
HEIFERS UNDER 1 YR	22.	7.	0.	2.	0.	25.
BULL CALVES	0.	10.	0.	8.	2.	0.
---APRIL ---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	14.	0.	0.	1.	0.	12.
HEIFERS UNDER 1 YR	25.	8.	0.	7.	1.	25.
BULL CALVES	0.	6.	0.	5.	1.	0.
---MAY ---						
COWS	56.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	12.	0.	0.	1.	0.	13.
HEIFERS UNDER 1 YR	25.	0.	0.	0.	0.	23.
BULL CALVES	0.	0.	0.	0.	0.	0.
---JUNE ---						
COWS	56.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	13.	0.	0.	1.	0.	12.
HEIFERS UNDER 1 YR	23.	0.	0.	0.	0.	23.
BULL CALVES	0.	0.	0.	0.	0.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JULY ---						
COWS	56.	0.	0.	1.	0.	55.
HEIFERS OVER 1 YR	12.	0.	0.	0.	0.	13.
HEIFERS UNDER 1 YR	23.	0.	0.	0.	0.	22.
BULL CALVES	0.	0.	0.	0.	0.	0.
---AUGUST ---						
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	13.	0.	0.	1.	0.	12.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	0.	22.
BULL CALVES	0.	0.	0.	0.	0.	0.
---SEPT. ---						
COWS	56.	0.	0.	3.	0.	56.
HEIFERS OVER 1 YR	12.	0.	0.	0.	0.	10.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	0.	22.
BULL CALVES	0.	2.	0.	2.	0.	0.
---OCTOBER ---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	10.	0.	0.	1.	0.	9.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	0.	22.
BULL CALVES	0.	0.	0.	0.	0.	0.
---NOVEMBER---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	9.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	22.	1.	0.	0.	1.	19.
BULL CALVES	0.	0.	0.	0.	0.	0.
---DECEMBER---						
COWS	56.	0.	0.	3.	0.	53.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	14.
HEIFERS UNDER 1 YR	19.	1.	0.	0.	0.	17.
BULL CALVES	0.	7.	0.	4.	3.	0.

MONTHLY CASH FLOW STATEMENT
YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME						
MILK	3292.	3847.	5867.	8586.	9940.	9774.
CATTLE	1190.	2079.	3312.	2224.	570.	564.
HAY	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	0.	0.	0.
OATS	0.	0.	0.	0.	0.	0.
WHEAT	0.	0.	0.	0.	0.	0.
SOYBEANS	0.	0.	0.	0.	0.	0.
BARLEY	6332.	0.	0.	0.	0.	0.
FIELD BEANS	0.	0.	0.	0.	0.	0.
GOVT	0.	0.	0.	0.	0.	0.
EXPENSE						
LABOR	333.	333.	333.	333.	333.	333.
GAS AND OIL	81.	88.	123.	196.	175.	365.
MACH. REPAIRS	106.	115.	207.	377.	262.	715.
BUILD. REPAIR	169.	193.	241.	266.	193.	121.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.
CONSERVATION	0.	0.	0.	130.	52.	52.
INSURANCE	10.	10.	976.	10.	10.	10.
FERTILIZER	0.	0.	0.	0.	434.	823.
SEED	0.	0.	0.	0.	196.	655.
SPRAY	0.	0.	0.	0.	1296.	365.
OTHER CROP	11.	11.	21.	30.	92.	398.
BREEDING	20.	20.	0.	195.	371.	312.
VET	104.	117.	119.	118.	117.	117.
MARKETING	234.	0.	0.	0.	0.	0.
OTHER LIVESTOCK	150.	168.	171.	170.	168.	168.
RENT	0.	0.	0.	0.	991.	0.
TAXES	0.	43.	0.	0.	0.	0.
UTILITIES	63.	70.	70.	70.	70.	70.
MISCELLANEOUS	46.	41.	88.	72.	195.	184.
FEED	1073.	3084.	3314.	3299.	1341.	1203.
INTEREST-SHORT	93.	0.	18.	55.	28.	6.
INTEREST-INT.	100.	0.	1084.	0.	0.	50.
INTEREST-LONG	700.	688.	677.	665.	653.	642.
CAPITAL SALES						
MACHINERY	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
CASH INVESTMENT						
LIVESTOCK	0.	0.	0.	0.	0.	0.
MACHINERY	0.	0.	0.	0.	0.	0.
BUILDINGS	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
PRINCIPAL						
SHORT	8000.	0.	0.	2127.	1732.	510.
INT.	1721.	0.	2850.	0.	0.	1440.
LONG	1000.	1000.	1000.	1000.	1000.	1000.
BORROWED						
SHORT	0.	1454.	2915.	0.	0.	0.
INT.	0.	0.	5490.	4564.	14989.	0.
LONG	0.	0.	0.	0.	0.	0.
TOTALS						
INCOME	10814.	5926.	9178.	10811.	10510.	10338.
EXPENSE	3292.	4980.	7443.	5984.	6978.	6588.
CASH INVESTMENT	0.	0.	0.	0.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	10721.	1000.	3850.	3127.	2732.	2950.
BORROWED	0.	1454.	8405.	4564.	14989.	0.
CASH ON HAND	1000.	100.	100.	1000.	1000.	1000.

MONTHLY CASH FLOW STATEMENT

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME							
MILK	9947.	9681.	8892.	7608.	5801.	4226.	87461.
CATTLE	198.	581.	735.	733.	327.	1415.	13927.
HAY	0.	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	538.	698.	0.	1236.
OATS	0.	0.	0.	0.	0.	0.	0.
WHEAT	0.	3856.	0.	0.	0.	0.	3856.
SOYBEANS	0.	0.	0.	0.	0.	0.	0.
BARLEY	0.	11299.	1255.	0.	0.	0.	18886.
FIELD BEANS	0.	0.	3081.	0.	0.	0.	3081.
GOVT	0.	0.	0.	0.	0.	0.	0.
EXPENSE							
LABOR	333.	333.	333.	333.	333.	333.	4000.
GAS AND OIL	243.	281.	198.	203.	90.	81.	2123.
MACH. REPAIRS	464.	2374.	555.	387.	119.	107.	5787.
BUILD. REPAIR	193.	217.	193.	193.	193.	241.	2414.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.	0.
CONSERVATION	52.	52.	52.	0.	0.	0.	390.
INSURANCE	10.	10.	418.	10.	10.	10.	1493.
FERTILIZER	2633.	0.	1511.	1511.	0.	0.	6912.
SEED	0.	147.	201.	201.	0.	0.	1399.
SPRAY	0.	0.	0.	0.	0.	0.	1661.
OTHER CROP	278.	404.	75.	91.	15.	11.	1436.
BREEDING	293.	0.	20.	20.	39.	78.	1365.
VET	116.	117.	120.	118.	118.	114.	1392.
MARKETING	0.	504.	108.	16.	16.	0.	878.
OTHER LIVESTOCK	167.	168.	173.	170.	170.	164.	2004.
RENT	0.	0.	0.	0.	991.	0.	1982.
TAXES	0.	0.	0.	43.	0.	0.	87.
UTILITIES	69.	70.	70.	70.	70.	66.	828.
MISCELLANEOUS	199.	192.	164.	135.	84.	42.	1443.
FEED	1122.	1031.	1102.	1096.	1138.	1112.	19915.
INTEREST-SHORT	0.	0.	0.	0.	0.	15.	215.
INTEREST-INT.	0.	884.	0.	260.	1049.	0.	3429.
INTEREST-LONG	630.	618.	607.	595.	583.	572.	7630.
CAPITAL SALES							
MACHINERY	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
CASH INVESTMENT							
LIVESTOCK	0.	0.	0.	0.	0.	0.	0.
MACHINERY	1544.	883.	6264.	0.	0.	0.	8691.
BUILDINGS	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
PRINCIPAL							
SHORT	0.	0.	0.	0.	0.	0.	12369.
INT.	0.	15332.	0.	1627.	2095.	0.	25066.
LONG	1000.	1000.	1000.	1000.	1000.	1000.	12000.
BORROWED							
SHORT	0.	0.	0.	0.	1187.	0.	5556.
INT.	256.	0.	12302.	0.	0.	0.	37601.
LONG	0.	0.	0.	0.	0.	0.	0.
TOTALS							
INCOME	10144.	25417.	13963.	8878.	6826.	5641.	128447.
EXPENSE	6801.	7402.	5899.	5452.	5018.	2947.	68783.
CASH INVESTMENT	1544.	883.	6264.	0.	0.	0.	8691.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	16332.	1000.	2627.	3095.	1000.	49435.
BORROWED	256.	0.	12302.	0.	1187.	0.	43157.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	795.	0.

BRIEF ANNUAL SUMMARY
YEAR OF 1/80 TO 12/80

ITEM	VALUE
NO. COWS	55.
TOTAL INVESTMENT	444189.
CASH INCOME	128447.
CASH EXPENSE	68783.
RETURN ON INVESTMENT	5.77
RETURN TO LABOR AND MANAGEMENT	3356.
TOTAL DEBT	76722.
TOTAL DEBT HIGHEST MONTH	90981.

F.7 SCENARIO 5 OPTIMAL FEED CONSIDERATIONS RESULTS.(SECTION 6)

```
NAME:SWAN RIVER DAIRY

PROBLEM:FEED COST COMPARISON:OPTIMAL  USE
COWS

LACT.   DEC.  NOV.  OCT. SEPT.  AUG.  JULY  JUNE   MAY  APR.  MAR.  FEB.  JAN.  DEC.  NOV.  OCT. <OCT.

 1         0     0     1     0     2     4     0     0     2     0     2     1     0     0     0     0

 2         1     2     3     0     0     2     0     1     2     0     2     0     1     0     0     0

 3         2     0     0     1     1     0     1     0     1     0     1     0     1     0     0     0

 4         0     2     0     0     0     0     0     0     0     0     0     0     0     0     0     0

 5         0     1     1     0     1     0     0     0     0     0     0     0     0     0     0     0

 6         0     0     0     1     0     0     1     1     0     0     0     1     0     0     0     0

 7         0     0     0     0     0     0     0     0     0     0     1     0     0     0     0     0

 8         0     0     0     0     0     1     0     0     0     0     0     0     0     0     0     0

 9         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

10         0     0     0     0     0     0     0     0     0     0     0     0     0     0     0     0

HEIFERS

   AGE   1   2   3   4   5   6   7   8   9  10  11  12
NUMBER   3   3   1   1   1   1   0   2   0   2   2   4

   AGE  13  14  15  16  17  18  19  20  21  22  23  24
NUMBER   1   2   3   1   1   0   1   1   1   2   4   4

   AGE  25  26  27  28  29  30  31  32  33  34  35  36
NUMBER   2   2   1   2   1   0   0   0   0   0   0   0

BUILDINGS            VALUE       AGE      YEARS
          YEARS      44127.       5.        20.
          YEARS      22644.       8.        20.
          YEARS         0.        0.         0.
```

```
MO. 1     YR. 80

YEARS  1

FISCAL OR CALENDAR 1

OUTPUT (A) 1
       (B) 1
       (C) 1
       (D) 1
       (E) 1
       (F) 1
       (G) 1
       (H) 1
       (I) 1
       (J) 1
       (K) 1
       (L) 1

FRESHENING PREFERENCE
BORN   JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
AGE     24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.   24.

VALUE  COWS            1500.
       BRED HEIFERS    1200.
       OPEN HEIFERS     800.
       CALVES           400.

HISTORICAL PRODUCTION  PRODUCTION       15040.
                       FORAGE QUALITY       2.
                       LBS. FEED         5119.
                       CULLING RATE      0.31

FIRST PERIOD  LBS. FEED       5606.
              FORAGE QUALITY     2.
              CULLING RATE    0.31

CONCENTRATE LBS.  EAR CORN         0.
                  SHELLED CORN     0.
                  OATS             0.
                  WHEAT            0.
                  BARLEY        4782.
                  SUPPLEMENT     674.
```

```
CORN  CORN FED?  0.

      AMOUNT OF CORN

                JAN.    FEB.    MAR.    APR.     MAY    JUNE
      LBS.       0.      0.      0.      0.      0.      0.

                JULY    AUG.   SEPT.    OCT.    NOV.    DEC.
      LBS.       0.      0.      0.      0.      0.      0.

      % MOISTURE    0.0

      HMC SUPPLEMENT      0.0

PORTION OF HAY EQUIVALENT FROM EACH FORAGE

         JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

  HAY    0.30  0.30  0.30  0.30  0.30  0.30  0.0   0.0   0.30  0.30  0.30  0.30

  HCS    0.25  0.25  0.25  0.25  0.25  0.25  1.00  1.00  0.25  0.25  0.25  0.25

   CS    0.45  0.45  0.45  0.45  0.45  0.45  0.0   0.0   0.45  0.45  0.45  0.45

CALVING INTERVAL          12.80

% HEIFER RAISED              1.00

MAX. COWS                   55.

MAX. HEIFERS UNDER 1 YR.    25.

MAX. HEIFERS OVER 1 YR.     25.

YOUNGSTOCK BEDDING           1.

COW BEDDING                  1.

BEDDING COST
             JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     COWS    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0

  HEIFERS    0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0   0.0
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```
MACH. SYSTEMS  COWS              3.
               HEIFERS           8.
               CORN-APR.         2.
               CORN-MAY          6.
               CORN-JUNE        10.
               C.S.              3.
               C. GRAIN          0.
               WHEAT-SEPT.      14.
               WHEAT-OCT.       17.
               WHEAT-HAR.       14.
               OATS-APR.         0.
               OATS-MAY          0.
               OATS-HAR.         0.
               HAY PLANT        25.
               HCS              21.
               HAY GROW         29.
               HAY              26.
               F.BEANS-MAY      31.
               F.BEANS-JUNE     35.
               F.BEANS-HAR.     30.
               SOYBEANS-MAY      0.
               SOYBEANS-JUNE     0.
               SOYBEANS-HAR.     0.
               BARLEY-APR.      44.
               BARLEY-MAY       47.
               BARLEY-HAR.      38.

ENTER MACH.?  0.

BUY MACH.?    1.

LAND VALUE NOW      144000.

LAND VALUE 10 YRS.         0.050

ACREAGES                         OWN OR RENT   SHARE RENT
                        CORN             32.           0.
                         HAY            125.          40.
                        OATS              0.           0.
                       WHEAT             55.           0.
                      BARLEY              0.         128.
                    SOYBEANS              0.           0.
                     F.BEANS              0.          40.
                GOVT. PROGS.              0.           0.
                       TOTAL            212.         208.

HCS    90.

CS     60.

ACRES RENTED    168.

RENT RATE       12.
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BUILDING CAPACITY  FREE STALLS      46.
                   STANCHIONS        0.
                   PARLOR            1.
                   HEIFERS          25.
                   CALVES           25.
                   U-SILO          375.
                   H-SILO          200.
                   HAY             140.
                   E.CORN            0.
                   GRAIN          6000.
                   HMC               0.

PURCHASE  DAIRY BUILDINGS?  2.
          GRAIN STORAGE?    1.
          HAY STORAGE?      1.

OFF-FARM STORAGE  F.BEANS  0.
                  SOYBEANS 0.
                  WHEAT    0.
                  CORN     0.
                  OATS     0.
                  BARLEY   0.

LABOR HOURS AVAILABLE

 NUMBER      TYPE  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.

     1. OPERATOR  300.  300.  300.  300.  460.  460.  460.  460.  460.  300.  300.  300.

     1.   FAMILY  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.  120.

     1.  HIRE(1)    0.    0.    0.    0.  300.    0.  200.  100.  200.    0.    0.    0.

     0.  HIRE(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

     0.  HIRE(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   RATE

   5.00  HOUR(1)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(2)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

   0.0   HOUR(3)    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.    0.

LABOR COST    5.00

HIRE(1)    333.      1.
HIRE(2)      0.      0.
HIRE(3)      0.      0.
```

```
YIELDS  PLANT FOOD     0.
        BU. OATS       0.

        PERIOD         4.
        PLANT FOOD   300.
        BU. CORN      66.

        PLANT FOOD    80.
        SPRING N     150.
        BU. WHEAT     20.

        PLANT FOOD   230.
        BU. BARLEY    40.

        PLANT FOOD   100.
        TONS 1ST     1.31
        TONS 2ND     0.56
        TONS 3RD     0.0

        PLANT FOOD     100.
        BU. F.BEANS     20.

        BU. SOYBEANS     0.

CUTTINGS  2.

ACRES  PASTURE 1ST     75.
       PASTURE 2ND     75.
       PASTURE 3RD      0.

HARVEST   HCS    270.00
          CS     375.
          HMC      0.

BEGINNING  HCS               15.
           CS                15.
           HAY               27.
           HMC               10.
           EAR CORN           0.
           SHELLED CORN       0.
           WHEAT              0.
           OATS               0.
           BARLEY          2600.
           SOYBEANS           0.
           F.BEANS          600.
           SUPPLEMENT        20.

PLANT FOOD               N  P205   K20
                CORN   57.   55.    0.
            SOYBEANS    0.    0.    0.
             F.BEANS   11.   55.    0.
               WHEAT   78.   44.    0.
                OATS    0.    0.    0.
            HAY-SEED    0.    0.    0.
                 HAY   51.   28.    0.
              BARLEY   78.   44.    0.

SOIL GROUP   41.
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WITHDRAWALS
  JAN.  FEB.  MAR.  APR.   MAY  JUNE  JULY  AUG. SEPT.  OCT.  NOV.  DEC.
  800.  800.  800.  800.  800.  800.  800.  800.  800.  800.  800. 1000.

OFF-FARM INCOME        0.

EXEMPTIONS             6.

ESTIMATED TAX       1500.

ESTIMATED INCOME       0.

DEPR MACHINERY     1.
DEPR CATTLE        1.
DEPR BUILDINGS     1.
SPECIAL 20 PCT?    0.

PENSION RATE       0.

BUSINESS FORM          1.
RETAINED EARNINGS      0.

PARTNERSHIP - CORP INFO

SALARY OR        OTHER   NUMBER OF   PCT OF SHARES  RESIDENCE    HEALTH
PCT OF PROFITS  INCOME  EXEMPTIONS       OWNED        VALUE    INSURANCE

      0.0             0.0       0.0          0.0           0.0        0.0

      0.0             0.0       0.0          0.0           0.0        0.0

      0.0             0.0       0.0          0.0           0.0        0.0

      0.0             0.0       0.0          0.0           0.0        0.0

      0.0             0.0       0.0          0.0           0.0        0.0

DEBTS OUTSTANDING

   BALANCE     RATE  NO.     AMOUNT TYPE TERM   M1    M2    M3    M4    M5    M6   AGE  YRS.

    60000.   0.140  12.      1000.   2.   3.    0.    0.    0.    0.    0.    0.    0.    5.

   15000.   0.140   2.      2500.   2.   2.    3.    8.    0.    0.    0.    0.    0.    3.

    8000.   0.140  12.      2000.   2.   1.    0.    0.    0.    0.    0.    0.    6.    1.

       0.   0.0     0.         0.   0.   0.    0.    0.    0.    0.    0.    0.    0.    0.

       0.   0.0     0.         0.   0.   0.    0.    0.    0.    0.    0.    0.    0.    0.

       0.   0.0     0.         0.   0.   0.    0.    0.    0.    0.    0.    0.    0.    0.

       0.   0.0     0.         0.   0.   0.    0.    0.    0.    0.    0.    0.    0.    0.

       0.   0.0     0.         0.   0.   0.    0.    0.    0.    0.    0.    0.    0.    0.

CASH       5000.
```

LABOR SUMMARY
YEAR OF 1/80 TO 12/80

	HRS. LABOR REQUIRED			SOURCE LABOR (HOURS)				SUR-	LABOR COST	
MONTH	LIVESTOCK	CROPS	TOTAL	OPERTOR	FAMILY	REGULAR	HOURLY	PLUS HOURS	REGULAR	HOURLY
JAN.	269.	18.	287.	300.	120.	0.	0.	133.	333.	0.
FEB.	276.	19.	295.	300.	120.	0.	0.	125.	333.	0.
MAR.	267.	52.	319.	300.	120.	0.	0.	101.	333.	0.
APR.	264.	117.	381.	300.	120.	0.	0.	39.	333.	0.
MAY	254.	103.	357.	460.	120.	300.	0.	523.	333.	0.
JUNE	252.	277.	529.	460.	120.	0.	0.	51.	333.	0.
JULY	256.	175.	431.	460.	120.	200.	0.	349.	333.	0.
AUG.	248.	375.	623.	460.	120.	100.	0.	57.	333.	0.
SEPT.	255.	130.	385.	460.	120.	200.	0.	395.	333.	0.
OCT.	243.	154.	397.	300.	120.	0.	0.	23.	333.	0.
NOV.	262.	28.	291.	300.	120.	0.	0.	129.	333.	0.
DEC.	261.	18.	280.	300.	120.	0.	0.	140.	333.	0.
TOTAL	3110.	1465.	4575.	4400.	1440.	800.	0.	2065.	4000.	0.

ANNUAL FINANCIAL STATEMENT

YEAR OF 1/80 TO 12/80

TYPE OF LOAN	PRINCIPAL PAID	INTEREST PAID
LONG TERM	12000.	7630.
INTERMEDIATE TERM	27588.	2427.
SHORT TERM	9846.	141.

DEBTS OUTSTANDING (END OF YEAR)

	BALANCE DUE	INTEREST RATE	LOAN PERIOD	AGE (MONTHS)
INT. TERM	5428.	14.	3.	7.
INT. TERM	1800.	14.	3.	5.
INT. TERM	13041.	14.	3.	3.
LONG TERM	48000.	14.	5.	12.

FINANCIAL SITUATION

TYPE OF DEBT OR ASSET	TOTAL ASSET	TOTAL DEBT	EQUITY RATIO
LONG TERM	213142.	48000.	0.77
INT. TERM	230324.	20269.	0.91
SHORT TERM	8789.	0.	1.00
TOTAL	452256.	68269.	0.85

ANNUAL CROP PRODUCTION AND FEED UTILIZATION SUMMARY

YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
HAY SILAGE (TONS)	15.	270.	0.	181.	0.	104.
CORN SILAGE (TONS)	15.	375.	0.	179.	0.	211.
HAY (TONS)	27.	83.	100.	138.	0.	47.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	401.	0.	0.	401.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	6133.	6133.	0.	0.
BARLEY (BU.)	2600.	5003.	0.	0.	7603.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	755.	0.	0.	789.	566.
STRAW (TONS)	20.	22.	0.	28.	0.	14.
SUPPLEMENT	4.	0.	69.	73.	0.	0.

ANNUAL DAIRY CATTLE NUMBERS SUMMARY

YEAR OF 1/80 TO 12/80

	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
COWS	45.	0.	0.	11.	0.	54.
HEIFERS OVER 1 YR	29.	0.	0.	9.	0.	14.
HEIFERS UNDER 1 YR	20.	29.	0.	10.	4.	21.
BULL CALVES	0.	39.	0.	33.	6.	0.

ANNUAL INCOME AND EXPENSE SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	VALUE	ITEM	VALUE
CAPITAL INVESTMENT (AVERAGE)		CASH EXPENSE	
LAND	147600.	HIRED LABOR	4000.
BUILDINGS	64357.	GAS + OIL	2117.
MACHINERY	115500.	MACH. REPAIRS	5778.
LIVESTOCK	106450.	CUSTOM HIRE	0.
FEED + SUPPLIES	10000.	CONSTN + REPAIRS	2804.
TOTAL	443907.	INSURANCE	1480.
CASH INCOME		FERTILIZER	6912.
MILK	90320.	SEED	1399.
CATTLE	13754.	SPRAY	1661.
HAY	0.	OTHER CROP	1436.
CORN	1239.	BREEDING	1482.
OATS	0.	VET.	1376.
WHEAT	4534.	MARKETING	878.
BARLEY	18886.		
SOYBEANS	0.	OTHER LIVESTOCK	1982.
FIELD BEANS	3081.	RENT	1982.
GOV’T PAYMENTS	0.	TAXES	87.
TOTAL	131813.	UTILITIES	819.
NON-CASHINCOME		INTEREST	10198.
RISE LAND VALUE	7200.	MISCELLANEOUS	1444.
RISE CATTLE INV.	-5300.	FEED PURCHASE	21144.
RISE FEED INV.	-2421.	TOTAL	68980.
TOTAL	-521.	NON-CASH EXPENSE	
		OPERATOR LABOR	10000.
TOTAL INCOME	131292.	FAMILY LABOR	4536.
TOTAL EXPENSE	138688.	MACH. DEPR.	24244.
RETURN TO MGT. + LABOR	7140.	BUILD. DEPR.	4829.
RETURN ON INVESTMENT	6.51	INTEREST	26099.
		TOTAL	69708.

```
INCOME TAX INFORMATION:

                        TOTAL INCOME TAXES=      0.0

                        INVESTMENT CREDIT =      0.0

                        PENSION PLAN PAYMT=    541.60

                        TAX DEPRECIATION TAKEN:

                                       MACHINERY  =  26607.79

                                       BUILDINGS  =   4828.80

                                       CATTLE     =      0.0

                                       SPECIAL 20%=      0.0

                        RETURN ON INVESTMENT AFTER TAXES    =      6.51

                        LOSSES CARRIED FORWARD      =      0.0

                        UNINCORPORATED BUSINESS TAX =      0.0
```

PRODUCTION YIELDS SUMMARY

YEAR OF 1/80 TO 12/80

CROP OR ANIMAL	NO. OR ACRES	YIELD	LANDLORD SHARE
HAY (TONS)	27.	3.0	0.
HAY SILAGE (TONS)	63.	4.3	0.
CORN	6.	70.	0.
CORN SILAGE (TONS)	26.	14.3	0.
OATS	0.	0.	0.
WHEAT	55.	20.	0.
BARLEY	128.	39.	0.
SOYBEANS	0.	0.	0.
FIELD BEANS	40.	19.	0.
COWS	55.	13855.	0.

BRIEF MONTHLY CASH FLOW SUMMARY

YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME	14022.	8382.	13036.	8552.	7215.	8077.
EXPENSE	3247.	4610.	6444.	5215.	7084.	6725.
CASH INVEST.	0.	0.	0.	1537.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	13974.	1472.	5792.	1000.	1000.	1000.
BORROWED	0.	0.	0.	3026.	15758.	448.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	100.

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME	8265.	24954.	13836.	9810.	8039.	7625.	131813.
EXPENSE	7093.	7699.	6511.	5854.	5017.	3479.	68980.
CASH INVEST.	0.	883.	5525.	0.	0.	0.	7945.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	14673.	1000.	3155.	2471.	2896.	49433.
BORROWED	2428.	0.	13041.	0.	0.	0.	34702.
CASH ON HAND	100.	1000.	1000.	1000.	750.	1000.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JANUARY ---						
HAY SILAGE (TONS)	15.	0.	0.	15.	0.	0.
CORN SILAGE (TONS)	15.	0.	0.	15.	0.	0.
HAY (TONS)	27.	0.	0.	24.	0.	3.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	459.	459.	0.	0.
BARLEY (BU.)	2600.	0.	0.	0.	2600.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	20.	0.	0.	3.	0.	17.
SUPPLEMENT	4.	0.	1.	5.	0.	0.
---FEBRUARY---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	3.	0.	32.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	520.	520.	0.	0.
BARLEY (BU.)	0.	0.	0.	0.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	17.	0.	0.	3.	0.	13.
SUPPLEMENT	0.	0.	6.	6.	0.	0.
---MARCH ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	34.	26.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	518.	518.	0.	0.
BARLEY (BU.)	0.	0.	0.	0.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	13.	0.	0.	3.	0.	10.
SUPPLEMENT	0.	0.	6.	6.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---APRIL ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	33.	24.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	518.	518.	0.	0.
BARLEY (BU.)	0.	0.	0.	0.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	10.	0.	0.	3.	0.	7.
SUPPLEMENT	0.	0.	6.	6.	0.	0.
---MAY ---						
HAY SILAGE (TONS)	0.	0.	0.	0.	0.	0.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	0.	1.	1.	0.	0.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	518.	518.	0.	0.
BARLEY (BU.)	0.	0.	0.	0.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	7.	0.	0.	1.	0.	6.
SUPPLEMENT	0.	0.	6.	6.	0.	0.
---JUNE ---						
HAY SILAGE (TONS)	0.	238.	0.	0.	0.	238.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	0.	27.	0.	0.	0.	27.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	518.	518.	0.	0.
BARLEY (BU.)	0.	0.	0.	0.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	6.	0.	0.	1.	0.	5.
SUPPLEMENT	0.	0.	6.	6.	0.	0.

MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
YEAR OF 1/80 TO 12/80

CROP	BEGINNING	PRODUCED	BOUGHT	FED	SOLD	END
---JULY ---						
HAY SILAGE (TONS)	238.	32.	0.	34.	0.	236.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	27.	29.	0.	0.	0.	56.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	524.	524.	0.	0.
BARLEY (BU.)	0.	0.	0.	0.	0.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	5.	0.	0.	1.	0.	3.
SUPPLEMENT	0.	0.	6.	6.	0.	0.
---AUGUST ---						
HAY SILAGE (TONS)	236.	0.	0.	41.	0.	195.
CORN SILAGE (TONS)	0.	0.	0.	0.	0.	0.
HAY (TONS)	56.	27.	0.	0.	0.	83.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	1100.	0.	0.	1100.	0.
OATS (BU.)	0.	0.	518.	518.	0.	0.
BARLEY (BU.)	0.	4503.	0.	0.	4503.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	0.	0.	0.	0.	600.
STRAW (TONS)	3.	22.	0.	1.	0.	24.
SUPPLEMENT	0.	0.	6.	6.	0.	0.
---SEPT. ---						
HAY SILAGE (TONS)	195.	0.	0.	19.	0.	176.
CORN SILAGE (TONS)	0.	187.	0.	34.	0.	154.
HAY (TONS)	83.	0.	0.	7.	0.	76.
HIGH M. CORN (BU.)	10.	0.	0.	0.	0.	10.
EAR CORN (BU.)	0.	0.	0.	0.	0.	0.
SH. CORN (BU.)	0.	0.	0.	0.	0.	0.
WHEAT (BU.)	0.	0.	0.	0.	0.	0.
OATS (BU.)	0.	0.	524.	524.	0.	0.
BARLEY (BU.)	0.	500.	0.	0.	500.	0.
SOYBEANS (BU.)	0.	0.	0.	0.	0.	0.
FIELD BEANS (CUT.)	600.	189.	0.	0.	789.	0.
STRAW (TONS)	24.	0.	0.	1.	0.	23.
SUPPLEMENT	0.	0.	6.	6.	0.	0.

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        MONTHLY CROP PRODUCTION AND UTILIZATION SUMMARY
                    YEAR OF  1/80 TO 12/80
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     CROP             BEGINNING  PRODUCED   BOUGHT     FED     SOLD    END
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                              ---OCTOBER ---

HAY SILAGE (TONS)       176.       0.        0.       24.      0.    152.
CORN SILAGE (TONS)      154.     187.        0.       43.      0.    299.
HAY (TONS)               76.       0.        0.       10.      0.     66.
HIGH M. CORN (BU.)       10.       0.        0.        0.      0.     10.
EAR CORN (BU.)            0.       0.        0.        0.      0.      0.
SH. CORN (BU.)            0.     206.        0.        0.    206.      0.
WHEAT (BU.)               0.       0.        0.        0.      0.      0.
OATS (BU.)                0.       0.      508.      508.      0.      0.
BARLEY (BU.)              0.       0.        0.        0.      0.      0.
SOYBEANS (BU.)            0.       0.        0.        0.      0.      0.
FIELD BEANS (CUT.)        0.     566.        0.        0.      0.    566.
STRAW (TONS)             23.       0.        0.        3.      0.     20.
SUPPLEMENT                0.       0.        6.        6.      0.      0.

                              ---NOVEMBER---

HAY SILAGE (TONS)       152.       0.        0.       24.      0.    128.
CORN SILAGE (TONS)      299.       0.        0.       43.      0.    255.
HAY (TONS)               66.       0.        0.       10.      0.     57.
HIGH M. CORN (BU.)       10.       0.        0.        0.      0.     10.
EAR CORN (BU.)            0.       0.        0.        0.      0.      0.
SH. CORN (BU.)            0.     195.        0.        0.    195.      0.
WHEAT (BU.)               0.       0.        0.        0.      0.      0.
OATS (BU.)                0.       0.      505.      505.      0.      0.
BARLEY (BU.)              0.       0.        0.        0.      0.      0.
SOYBEANS (BU.)            0.       0.        0.        0.      0.      0.
FIELD BEANS (CUT.)      566.       0.        0.        0.      0.    566.
STRAW (TONS)             20.       0.        0.        3.      0.     17.
SUPPLEMENT                0.       0.        6.        6.      0.      0.

                              ---DECEMBER---

HAY SILAGE (TONS)       128.       0.        0.       25.      0.    104.
CORN SILAGE (TONS)      255.       0.        0.       44.      0.    211.
HAY (TONS)               57.       0.        0.       10.      0.     47.
HIGH M. CORN (BU.)       10.       0.        0.        0.      0.     10.
EAR CORN (BU.)            0.       0.        0.        0.      0.      0.
SH. CORN (BU.)            0.       0.        0.        0.      0.      0.
WHEAT (BU.)               0.       0.        0.        0.      0.      0.
OATS (BU.)                0.       0.      501.      501.      0.      0.
BARLEY (BU.)              0.       0.        0.        0.      0.      0.
SOYBEANS (BU.)            0.       0.        0.        0.      0.      0.
FIELD BEANS (CUT.)      566.       0.        0.        0.      0.    566.
STRAW (TONS)             17.       0.        0.        3.      0.     14.
SUPPLEMENT                0.       0.        6.        6.      0.      0.
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MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JANUARY ---						
COWS	45.	0.	0.	0.	0.	49.
HEIFERS OVER 1 YR	29.	0.	0.	0.	0.	25.
HEIFERS UNDER 1 YR	20.	5.	0.	4.	0.	21.
BULL CALVES	0.	7.	0.	6.	1.	0.
---FEBRUARY---						
COWS	49.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	25.	0.	0.	0.	0.	18.
HEIFERS UNDER 1 YR	21.	4.	0.	2.	0.	23.
BULL CALVES	0.	5.	0.	4.	1.	0.
---MARCH ---						
COWS	56.	0.	0.	1.	0.	56.
HEIFERS OVER 1 YR	18.	0.	0.	7.	0.	12.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	2.	21.
BULL CALVES	0.	3.	0.	3.	0.	0.
---APRIL ---						
COWS	56.	0.	0.	2.	0.	55.
HEIFERS OVER 1 YR	12.	0.	0.	1.	0.	10.
HEIFERS UNDER 1 YR	21.	2.	0.	0.	0.	23.
BULL CALVES	0.	1.	0.	0.	1.	0.
---MAY ---						
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	10.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	0.	23.
BULL CALVES	0.	1.	0.	1.	0.	0.
---JUNE ---						
COWS	56.	0.	0.	1.	0.	55.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	23.	2.	0.	0.	0.	25.
BULL CALVES	0.	4.	0.	3.	1.	0.

MONTHLY DAIRY CATTLE NUMBERS SUMMARY
YEAR OF 1/80 TO 12/80

ANIMAL	BEGINNING	BORN	BOUGHT	SOLD	DIED	END
---JULY ---						
COWS	55.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	25.	3.	0.	2.	0.	25.
BULL CALVES	0.	2.	0.	2.	0.	0.
---AUGUST ---						
COWS	56.	0.	0.	3.	0.	54.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	25.	1.	0.	0.	0.	25.
BULL CALVES	0.	2.	0.	1.	1.	0.
---SEPT. ---						
COWS	54.	0.	0.	0.	0.	56.
HEIFERS OVER 1 YR	11.	0.	0.	1.	0.	9.
HEIFERS UNDER 1 YR	25.	3.	0.	2.	0.	25.
BULL CALVES	0.	4.	0.	4.	0.	0.
---OCTOBER ---						
COWS	56.	0.	0.	3.	0.	53.
HEIFERS OVER 1 YR	9.	0.	0.	0.	0.	10.
HEIFERS UNDER 1 YR	25.	0.	0.	0.	0.	24.
BULL CALVES	0.	1.	0.	1.	0.	0.
---NOVEMBER---						
COWS	53.	0.	0.	0.	0.	55.
HEIFERS OVER 1 YR	10.	0.	0.	0.	0.	11.
HEIFERS UNDER 1 YR	24.	0.	0.	0.	0.	21.
BULL CALVES	0.	5.	0.	4.	1.	0.
---DECEMBER---						
COWS	55.	0.	0.	1.	0.	54.
HEIFERS OVER 1 YR	11.	0.	0.	0.	0.	14.
HEIFERS UNDER 1 YR	21.	5.	0.	0.	2.	21.
BULL CALVES	0.	4.	0.	4.	0.	0.

MONTHLY CASH FLOW STATEMENT
YEAR OF 1/80 TO 12/80

ITEM	JAN.	FEB.	MAR.	APR.	MAY	JUNE
INCOME						
MILK	6412.	7625.	8109.	7809.	7112.	7051.
CATTLE	1277.	757.	4928.	743.	103.	1026.
HAY	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	0.	0.	0.
OATS	0.	0.	0.	0.	0.	0.
WHEAT	0.	0.	0.	0.	0.	0.
SOYBEANS	0.	0.	0.	0.	0.	0.
BARLEY	6332.	0.	0.	0.	0.	0.
FIELD BEANS	0.	0.	0.	0.	0.	0.
GOVT	0.	0.	0.	0.	0.	0.
EXPENSE						
LABOR	333.	333.	333.	333.	333.	333.
GAS AND OIL	81.	88.	121.	193.	174.	364.
MACH. REPAIRS	106.	116.	205.	373.	262.	713.
BUILD. REPAIR	169.	193.	241.	266.	193.	121.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.
CONSERVATION	0.	0.	0.	130.	52.	52.
INSURANCE	10.	10.	963.	10.	10.	10.
FERTILIZER	0.	0.	0.	0.	434.	823.
SEED	0.	0.	0.	0.	196.	655.
SPRAY	0.	0.	0.	0.	1296.	365.
OTHER CROP	11.	11.	21.	30.	92.	398.
BREEDING	98.	137.	59.	234.	215.	98.
VET	102.	117.	118.	117.	117.	116.
MARKETING	234.	0.	0.	0.	0.	0.
OTHER LIVESTOCK	147.	168.	170.	168.	168.	167.
RENT	0.	0.	0.	0.	991.	0.
TAXES	0.	43.	0.	0.	0.	0.
UTILITIES	61.	70.	70.	69.	70.	69.
MISCELLANEOUS	49.	46.	90.	73.	189.	175.
FEED	764.	2558.	2598.	2555.	1640.	1617.
INTEREST-SHORT	93.	0.	0.	0.	0.	10.
INTEREST-INT.	290.	33.	780.	0.	0.	0.
INTEREST-LONG	700.	688.	677.	665.	653.	642.
CAPITAL SALES						
MACHINERY	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
CASH INVESTMENT						
LIVESTOCK	0.	0.	0.	0.	0.	0.
MACHINERY	0.	0.	0.	1537.	0.	0.
BUILDINGS	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.
PRINCIPAL						
SHORT	8000.	0.	0.	0.	0.	0.
INT.	4974.	472.	4792.	0.	0.	0.
LONG	1000.	1000.	1000.	1000.	1000.	1000.
BORROWED						
SHORT	0.	0.	0.	0.	769.	448.
INT.	0.	0.	0.	3026.	14989.	0.
LONG	0.	0.	0.	0.	0.	0.
TOTALS						
INCOME	14022.	8382.	13036.	8552.	7215.	8077.
EXPENSE	3247.	4610.	6444.	5215.	7084.	6725.
CASH INVESTMENT	0.	0.	0.	1537.	0.	0.
WITHDRAWAL	800.	2300.	800.	800.	800.	800.
PRINCIPAL	13974.	1472.	5792.	1000.	1000.	1000.
BORROWED	0.	0.	0.	3026.	15758.	448.
CASH ON HAND	1000.	1000.	1000.	1000.	100.	100.

MONTHLY CASH FLOW STATEMENT

ITEM	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
INCOME							
MILK	7852.	8079.	8306.	8043.	7035.	6886.	90320.
CATTLE	412.	1042.	1194.	1134.	397.	739.	13754.
HAY	0.	0.	0.	0.	0.	0.	0.
CORN	0.	0.	0.	632.	607.	0.	1239.
OATS	0.	0.	0.	0.	0.	0.	0.
WHEAT	0.	4534.	0.	0.	0.	0.	4534.
SOYBEANS	0.	0.	0.	0.	0.	0.	0.
BARLEY	0.	11299.	1255.	0.	0.	0.	18886.
FIELD BEANS	0.	0.	3081.	0.	0.	0.	3081.
GOVT	0.	0.	0.	0.	0.	0.	0.
EXPENSE							
LABOR	333.	333.	333.	333.	333.	333.	4000.
GAS AND OIL	244.	279.	199.	200.	89.	84.	2117.
MACH. REPAIRS	467.	2371.	556.	383.	118.	110.	5778.
BUILD. REPAIR	193.	217.	193.	193.	193.	241.	2414.
CUSTOM HIRE	0.	0.	0.	0.	0.	0.	0.
CONSERVATION	52.	52.	52.	0.	0.	0.	390.
INSURANCE	10.	10.	418.	10.	10.	10.	1480.
FERTILIZER	2633.	0.	1511.	1511.	0.	0.	6912.
SEED	0.	147.	201.	201.	0.	0.	1399.
SPRAY	0.	0.	0.	0.	0.	0.	1661.
OTHER CROP	278.	404.	75.	91.	15.	11.	1436.
BREEDING	78.	78.	137.	117.	78.	156.	1482.
VET	117.	116.	117.	114.	115.	114.	1376.
MARKETING	0.	504.	108.	16.	16.	0.	878.
OTHER LIVESTOCK	168.	167.	168.	164.	165.	164.	1982.
RENT	0.	0.	0.	0.	991.	0.	1982.
TAXES	0.	0.	0.	43.	0.	0.	87.
UTILITIES	70.	68.	70.	66.	69.	68.	819.
MISCELLANEOUS	190.	195.	169.	139.	85.	46.	1444.
FEED	1615.	1557.	1598.	1552.	1541.	1549.	21144.
INTEREST-SHORT	15.	23.	0.	0.	0.	0.	141.
INTEREST-INT.	0.	560.	0.	126.	616.	22.	2427.
INTEREST-LONG	630.	618.	607.	595.	583.	572.	7630.
CAPITAL SALES							
MACHINERY	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
CASH INVESTMENT							
LIVESTOCK	0.	0.	0.	0.	0.	0.	0.
MACHINERY	0.	883.	5525.	0.	0.	0.	7945.
BUILDINGS	0.	0.	0.	0.	0.	0.	0.
LAND	0.	0.	0.	0.	0.	0.	0.
PRINCIPAL							
SHORT	0.	1846.	0.	0.	0.	0.	9846.
INT.	0.	11827.	0.	2155.	1471.	1896.	27588.
LONG	1000.	1000.	1000.	1000.	1000.	1000.	12000.
BORROWED							
SHORT	628.	0.	0.	0.	0.	0.	1846.
INT.	1800.	0.	13041.	0.	0.	0.	32856.
LONG	0.	0.	0.	0.	0.	0.	0.
TOTALS							
INCOME	8265.	24954.	13836.	9810.	8039.	7625.	131813.
EXPENSE	7093.	7699.	6511.	5854.	5017.	3479.	68980.
CASH INVESTMENT	0.	883.	5525.	0.	0.	0.	7945.
WITHDRAWAL	800.	800.	800.	800.	800.	1000.	11300.
PRINCIPAL	1000.	14673.	1000.	3155.	2471.	2896.	49433.
BORROWED	2428.	0.	13041.	0.	0.	0.	34702.
CASH ON HAND	100.	1000.	1000.	1000.	750.	1000.	0.

BRIEF ANNUAL SUMMARY
YEAR OF 1/80 TO 12/80

ITEM	VALUE
NO. COWS	55.
TOTAL INVESTMENT	443907.
CASH INCOME	131813.
CASH EXPENSE	68980.
RETURN ON INVESTMENT	6.51
RETURN TO LABOR AND MANAGEMENT	7140.
TOTAL DEBT	68269.
TOTAL DEBT HIGHEST MONTH	79423.

Appendix G

PARAMETER CHANGES REQUIRED FOR OPTIMAL FEED ANALYSIS

The refinements required to allow the model to function in this application are explained here. The systematic operation of the model as described in the previous chapter is given specific values to derive the actual results for the change of feed application. The required operations are as follows.

The initial run of the simulator uses the input values found in Appendix C. These values simulated give the results found in Appendix F, Section 6. These are the values that will be compared in the final analysis. The conversion procedure outlined in Appendix E as previously discussed is used to derive the values found in Table 21 using equation 1. These values are the basic farm inputs used in the linear program.

The dairy ration consists of 1/3 concentrate and 2/3 roughage for an animal producing 13,500 pounds of milk per year (6129 kilograms).[82] Funks thesis states that a seven kilogram ration of concentrate is required for a similar production volume.[83] The feed compliment is set up containing seven kilograms of concentrate and fourteen kilograms of roughage.

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[82] Ibid. Principles and Practices of Commercial Farming, p.384.

[83] Funk,R.A., op. cit. p.55.

TABLE 21

Price And Quantity Feed Requirements For MPS

Table 21

Price and Quantity Feed Requirements for MPS

Feed	COPS Price[a] ($/kg.)	Simulated Upper Restraint[b] for MPS (kg.)		MPS Price[c] ($/kg.)	MPS Quantity[d] for Simulator (%)
Soymeal				.1850	14.29
Buy corn	.1181				
Farm corn[e]	1,000.00				
Canola				.1750	3.00
Alfalfa				.1084	
Wheat	.1646				
Farm wheat	.1505	(1,100)[f]	4.31		
Barley	.1130				
Farm barley	.1782	(5,003)[f]	15.703		
Rye	.1165				
Middlings				.0774	.0001
Shorts				.1241	.0001
Oats	.0908				23.21
Farm oats	1,000.00				
Alfalfa Brome[f]				.0238	10.0
Farm alfalfa brome	1,000.00				
Alfalfa hay	.0413				19.56
Farm alfalfa hay	.0510	(83)[g]	10.86		
Barley straw				.0176	
Oat straw		(22)[g]	2.88	.0138	
Molasses				.1187	
Corn silage	.0208	(375)[g]	49.1		49.1
Fababeans	.1542				
Farm faba	.2795	(755)[f]	2.76		
Haylage	.0212	(275)[g]	36.0		36.0
Tritical	1,000.00				

[a] The COPS price shows the price paid for off-farm product and the cost of production for on-farm production for the example produced.

[b] The simulated quantity is the quantity produced in the simulator converted by equation (1) to restrain the MPS LP.

[c] The MPS price is for the feeds that are not produced on-farm or supplied by COPS. The values are taken from the respective sources of FUNK's thesis for 1979 values.

[d] The MPS quantity is that derived by the MPS LP constrained as defined in Appendix E by the MPS output.

[e] Crops not grown on farm are forced out of the optimal solution by prices of $1,000.00/kg.

[f] The bracketed values are the total production of the crop in bushels.

[g] The bracketed value is total production in tons.

This means forages should be held to 2/3 of the ration at the upper bound and the concentrate should have an upper bound of 1/3 of the ration. Hay silage has been added to the MPS linear program ration generator to allow for a feed that is used extensively in Manitoba.[84]

The roughage component of the ration has also been constrained in the linear program to a range of sixty to sixty-six percent of the total feed ration. This is the standard breakdown given by Principles and Practices as previously discussed.[85] In the original program there was an upper limit in effect by itself which reduces the strength of the optimal solution. The change parallels feeding practices more closely.

The specific restraints to the model are defined in the linear program in two ways. A very high price will allow a required feed which contains a basic ingredient into the basic solution only after all other feeds of lower price with the same ingredient are used. The use of feed restraints in this fashion removes any infeasable solution problem due to restrictive bounds. The second bounding operation is that of a definite upper bound on quantity. This restrains the input directly and can cause infeasibility if no other source is available. The specific constraints used in the linear program in the model are shown in Table 22 . As an example Canola has been restrained to 3% because of tighter markets than for soymeal. Canola is a byproduct of rapeseed from the crushing process. Due to the market for rapeseed rather than the bypro-

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[84] National Research Council, Joint United States-Canada Tables of Feed Composition, (National Academy of Sciences, N.C.R. Publication number 659, 1959.) p.67.

[85] Ibid. Principles and Practices of Commercial Farming, p.384.

ducts by buyers the supply is limited.[86]

The optimal solution for this analysis is shown in Appendix F (section 1). The values of the feed are a percentage of a total ration based on twenty-one kilograms of feed per day as 100 percent. Table 22 shows the various feeds that are used as the activity column. The underlined values are alternative percentages of the specific nutrient that would make up 100 percent of the ration. The remaining feeds are broken into the two groups of concentrate and roughage. The constraint on forage brings it into the solution at the lower level of sixty percent. The forages in the particular optimal solution are: (1)Alfalfa-Brome Hay, (2)Alfalfa Hay, (3)60% moisture Corn Silage and (4)70% Hay Silage. Their respective ration quantities are: (1)10%, (2)19.56%, (3)49.1%, and (4)36.0% in this optimal solution. The values of corn silage and hay silage adjusted for moisture are: (3)19.46% and (4)10.8% respectively. The sum of the roughages equals 60 percent with the above requirements. The weight of the concentrate used is derived from equation 4 (Appendix E). The concentrate is broken into two groups for use in run two of the simulator; those of specific feeds that can go directly into the simulator as specified in the model and those that must be aggregated into the supplement. Oats are the only concentrate used directly. The rest are aggregated as supplement. The values for the roughages and the concentrate are found in Table 23 in the optimal solution column. The values of the linear program are now converted back to units consistent with the simulator requirements. Equation two

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[86] Canadian International Grains Institute, <u>Grains and Oilseeds: Handling, Marketing and Processing</u>, (Canadian International Grains Institute, second edition, 1975.) p.620.

and three (Appendix E) show the procedure for conversion of the price and quantity for use by the simulator. This process requires values shown in table 23 to be used by the simulator. The alterations are required due to the use of kilograms by the linear program and units of bushels and tons in the simulator.

TABLE 22

Constraints On The MPS Linear Program Specific To This Analysis

Table 22

Constraints on the MPS LP Specific to this Analysis[a]

Feed	Bounded Quantities	Feed	Price Restrictions
Mebnmeal	.001	Soy 49	1,714
Bldmeal	.001	Farmcorn	1,000
Distsol	9.	Fishmeal	1,000
Rye	30.	Mebnmeal	1,000
Canola	3.0	Poulfeat	1,000
Tallow	.001	Bldmeal	1,000
Poulfeat	.001	Distsol	1,000
Molasses	1.	Oyster	1,000
Frmcnsil	49.1	Limeston	1,000
Tritical	50.0	Phosrock	1,000
Middling	.001	Rye	1,000
Shorts	.001	Farmoats	1,000
Fmalfhay	10.86	Methion	1,000
Oatstraw	2.88	Lysine	1,000
Farmfaba	2.76	Fmalfbrm	1,000
Frmwheat	4.31	Tritical	1,000
Frmbrly	15.70		
Haylage	36.0		
Alfabrom	10.0		

[a] Constraints as required by the feed requirements of a dairy animal and the production given by the specified producer.

TABLE 23

Conversion of Values For Use In Simulation

Table 23

Conversion of Values for Use in Simulation

Feed Name	Optimal Solution Compliment	Supplement[a] Component %	Price		
			MPS	Supplement[b]	Simulator[c]
Soymeal	14.29	82.65	.1858	15.36	
Canola	3.0	17.35	.175	3.04	
Middlings	10×10^{-4}	5.7×10^{-4}	.0774	4.4×10^{-5}	
Shorts	10×10^{-4}	5.7×10^{-4}	.1241	7.1×10^{-5}	
Oats	23.21		.0908		1.40
Alfalfa brome	10.0		.0238		21.61
Alfalfa hay	19.56		.0413		37.50
Corn silage	49.1		.0208		18.89
Hay silage	36.0		.0212		19.25
Supplement Component	17.29	100		18.39	167.01
Roughage	60.0				
Concentrate	40.5	42.69			

[a] The supplement is determined by summing the components and determining a percentage for each with respect to the total.

[b] Price of the supplement is a weighted price value determined by equation (2) of the model.

[c] The units are in bushels for oats. The rest are in tons (2,000 pounds).

TABLE 24

Bushel Weight of Grains In Kilograms

Table 24

Bushel Weights of Grains in Kg.

	Pounds	Kg.
Barley	48	21.773
Oats	34	15.422
Wheat	60	27.216
Corn	56	25.404
Fababeans	56	25.404
Rye	56	25.404
Tons	2,000	908.00

Source: Principles and Practices of Commercial Farming (University of Manitoba, Fourth edition, 1974) pages 760-762.