THE EFFECTIVE APPLICATION OF THE MATHEMATICAL MODEL FOR ESTIMATING THE OPPORTUNITY COST OF MAINTAINING WETLANDS

STAGE I

OF

A THREE STAGE STUDY

FOR THE

CANADIAN WILDLIFE SERVICE

BY

PRAIRIE AGRI-MANAGEMENT CONSULTANTS LIMITED

JUNE 1969

FOREWARD

A study entitled "A Method of Estimating the Opportunity Cost of Maintaining Wetlands in Western Canada" was conducted by Agri-Management Associates in the fall of 1968. One of the recommendations of this study was that a sensitivity analysis of the model to changes in prices and resources be conducted. This analysis would in effect show the factors of importance when estimating the opportunity costs of maintaining wetlands. It would also show the degree to which these factors affect the payment schedule for inducing farmers to leave wet areas of their farms as wetland.

As a result of the above mentioned recommendation, Prairie Agri-Management Consultants Limited have agreed to conduct a sensitivity analysis of the mathematical model.

In order to make the study more effective and efficient the staged approach has been used. Briefly the three proposed stages are as follows:

Stage I - To conduct a general sensitivity analysis of the model to changes in all prices and all resources to determine which prices and resources are significant.

Stage II - To conduct a sensitivity analysis of particular prices and resources found to be of significance in Stage I.

Stage III - To build an additional block to the mathematical model which will allow the inclusion of a wildlife productivity rating on wetlands and to test the sensitivity of the model to changes in the productivity rating.

The following is a report of the findings of Stage I of the study.

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I INTRODUCTION AND OBJECTIVES

The purpose of this study was to provide information for the effective application of the linear programming model for estimating the opportunity cost of maintaining wetlands in Western Canada. The type of information required is defined in the following three objectives.

The first objective was to make additions to the linear programming model used in the previous study[1] which will allow for variation in the agricultural production of drained native wetland. The second objective was to conduct a general sensitivity analysis of the model to changes in prices. The third objective was to conduct a general sensitivity analysis of the model to changes in resources. It was anticipated that the sensitivity analysis would give a measure of the stability of the model as well as point out the particular factors which have a significant effect on the opportunity cost of maintaining wetlands.

In the previous study[1] it was stated that a farm cannot have both hogs and dairy cattle at the same time. This meant that the linear programming model had to be solved twice; once with dairy and without hogs and again with hogs and without dairy. Since

[1] "A Method of Estimating the Opportunity Cost of Maintaining Wetlands in Western Canada", A report on a pilot study using base data from the county of Lamont, prepared by Agri-Management Associates, December 1968.

solving the program twice would serve no purpose, both hogs and dairy were included in the program. The dairy herd had a maximum of 50 as in the previous study. The effect was that both dairy and hogs did enter the solution but the solution is the most profitable one even though it is hypothetical.

II ADDITIONS TO THE MATHEMATICAL MODEL

In the original model it was assumed that all wetland in cultivated areas that was drained could be used as cultivated land and have the same production level as the surrounding cultivated land. All wetland in native land areas which was drained was assumed to be useful only as native land for native hay and native pasture. The model was revised to allow drained wetland in native areas to be used as low production native land, high production native land or as cultivated land. The drained land allocated to these particular categories is proportioned by percentages. The proportions for high and low production native land may be used for the production of pasture and hay only, while the proportion for cultivated land may be used for the growing of any crops normally grown on cultivated land.

The portion of the matrix which was revised is shown in Figure 1. The coefficients shown in Figure 1 are defined in Table 1.

The revised values for AA1, AA2, and AA3 are estimates only. Data is not available for these coefficients so that the values should be calculated for individual case studies. Also the value for Y6A was estimated to be two because generally speaking low lying land will produce more because of better moisture conditions than will ordinary native land.

PROGRAM NAME ADDITIONS TO CWS WETLAND EVALUATION PROGRAM

DATA NAME

DATE JUNE 1969

COMMENTS:

NO.	CONSTRAINT NAME		UNIT	CODE	RHS	UNIT CODE SIGN	COLUMN NAME: CULTIVATED LAND (ACRES) CULT LNDA	LOW PRODUCTION NATIVE LAND (ACRES) NATV LNDA	DRAIN WETLAND (CULT) ACRES DRAN CULA	DRAIN WETLAND (NATIVE) ACRES DRAN NATA	HIGH PRODUCTION NATIVE LAND: GRASS HAY (ACRES) NHAY AHP	HIGH PRODUCTION NATIVE LAND: PASTURE (ACRES) NPAS TAHP
0	FUNCTIONAL		$	GMARGIN$	0	N						
1												
18												
19	GRASS HAY		Ton	GRASSHAY	0	≤					Y5A	
20												
21												
22												
23												
24	PASTURE		Ac	PASTURE	0	≤						Y6A
25												
26												
27	PRESENT HIGH PROD. NAT. LAND		Ac	NATLANDH	0	≥				-AA2	1	1
28	PRESENT CULTIVATED LAND		Ac	CULTLAND	B1	≥	1		-1	-AA3		
29	PRESENT LOW PROD NATIVE LAND		Ac	NATLAND	B2	≥		1		-AA1		
30	CULTIVATED LAND USE	MAX % GRAIN	Ac	GRAIN	0	≤	A1					
31		MIN % GRASS	Ac	GRASS	0	≥	A2					
32		MIN % FALLOW	Ac	FALLOW	0	≥	A3					
33	NATIVE LAND-MAX% HAY		Ac	NATHAY	0	≤		A4				
34	WETLAND	AVAILABLE CULT	Ac	WETCULT	B3	=			+1			
35		AVAILABLE NATIVE	Ac	WETNAT	B4	=				+1		
36		DRAINABLE IN CULT	Ac	WETCDR	B3A	≥			+1			
37		DRAINABLE IN NAT	Ac	WETNDR	B4A	≥				+1		
38												
39												

Figure 1. Additions to the original matrix.

TABLE 1. COEFFICIENT DEFINITIONS AND VALUES FOR THE REVISED MATRIX

Coefficient	Description	Unit	Standard Value	Column Name	Row Name	Revised Value
AA1	Fraction of drained native wetland for low production.	Dec.	-1.0	DRANNATA	NATLAND	-0.6
AA2	Fraction of drained native wetland for high production. (grass. hay and pasture)	Dec.	-0.0	DRANNATA	NATLANDH	-0.3
AA3	Fraction of drained native wetland for cultivated land uses.	Dec.	-0.0	DRANNATA	CULTLAND	-0.1
Y5	Low production yield of native hay.	Ton/ Acre	0.0	NHAYA	GRASSHAY	0.2
Y5A	High production yield of native hay.	Ton/ Acre	0.0	NHAYAHP	GRASSHAY	0.6
Y6	Summer pasture from low production native wetland (native pasture equivalent acres)	Acres/ Acre	0.0	NWETLNDA	PASTURE	0.5
Y6A	Summer pasture form high production native wetland (native pasture equivalent acres)	Acres/ Acre	0.0	NPASTAHP	PASTURE	2.0

III SENSITIVITY OF THE MODEL TO CHANGES IN RESOURCES

1. Procedures (for resource variations)

The original mathematical model with the additions described in Section II of this report was used for all of the analyses for this section. Two computer runs were made. In the first run all of the resources (specified in the right hand side of the matrix) were varied in 10% increments from -20% of the original to +50% of the original. At each 10% increase instructions were given to print the solution. The same procedure was followed in the second run except that only the capital resources (of the right hand side) were varied.

2. Changes in the Solution (for resource variations)

The results of the first computer run (varying all of the resources in the right hand side) revealed that no change would occur in the selection of activities which were in the solution when the right hand side was varied from 20% less than the original right hand side to an infinitely greater right hand side. For the second run (where only the capital resources of the right hand side were varied) the solutions are shown in Table 2. From the table it may be noted that the amount of land in the solution for cultivated land uses and native land uses remained constant as the availability of capital increased. The amount of cultivated wetland which was drained was at the maximum allowable in the program (80%) while

TABLE 2. SOLUTIONS FOR VARIATIONS IN THE AVAILABILITY OF CAPITAL

		ORIGINAL CAPITAL RESOURCES							
ACTIVITY	UNIT	-20%	-10%	±0%	+10%	+20%	+30%	+40%	+50%
Gross Margin	($)	26792	28632	30317	31868	33399	34929	36460	37984
Cultivated Land	(ac)	550	550	550	550	550	550	550	550
- Grain	"	173	186	172	181	201	221	241	275
- Grass	"	239	226	239	230	211	191	171	138
- Fallow	"	137	137	137	137	137	137	137	137
- Wetland	"	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
- Drained Land	"	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Native Land	"	68	68	68	68	68	68	68	68
- Hay - High Product.	"	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
- Hay - Low Product.	"	34	34	34	34	34	34	34	34
- Pasture - Low Prod.	"	34	34	34	34	34	34	34	34
- Wetland	"	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
- Drained Land	"	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Land Purchased	"	160	160	160	160	160	160	160	160
Cultivated Land Rented	"	160	160	160	160	160	160	160	160
Crops - Wheat	"	86	93	86	91	101	110	120	137
- Barley	"	52	42	51	46	32	18	4	0
- Flax	"	17	19	17	18	20	22	24	26
- Rapeseed	"	17	19	17	18	20	22	24	27
- Legume Hay	"	223	205	222	214	192	171	150	114
- Oat Hay	"	0	0	0	9	28	48	68	115
- Barley Hay	"	0	13	0	0	0	0	0	84
- Legume Silage	"	17	21	17	17	19	20	22	23

TABLE 2. (Continued)

ACTIVITY	UNIT	ORIGINAL CAPITAL RESOURCES -20%	-10%	±0%	+10%	+20%	+30%	+40%	+50%
Feeds Purchased									
- Oats	(bu)	0	294	598	1563	2906	4249	5592	6659
- Grass Hay	(ton)	235	211	235	214	166	119	72	33
Livestock									
- Sow Units	(no)	0	23	48	72	96	120	144	168
- Weaner Pigs Sold	"	0	320	749	1152	1536	1920	2304	2688
- Market Pigs Sold	"	0	47	14	0	0	0	0	0
- Dairy Cow Herd	"	50	50	50	50	50	50	50	50

Capital resources increased through the specified range. Drained native wetland also remained at the maximum allowable level (80%) as capital increased. Although the total amount of cultivated land used remained constant as capital increased, the allocation of the land between grain uses and grass uses varied depending upon which was more profitable at the various levels of available capital. The dairy herd remained at its limit indicating that it is the most profitable animal enterprise. The second most Profitable animal enterprise is the hog enterprise which increased with increasing capital resources.

3. Opportunity Costs of Maintaining Wetlands (for resource variations)

The opportunity costs of maintaining wetlands for run one (where all resources were varied) did not change as resources increased. (See Table 3 and Figure 2). The opportunity costs of maintaining wetlands for run two varied only slightly and are shown in Table 4 and Figure 3.

TABLE 3. OPPORTUNITY COST FOR VARIATIONS IN ALL RESOURCES

	WETLAND		OPPORTUNITY COST* AT PERCENTAGE OF ORIGINAL LEVEL OF ALL RESOURCES			
	Drained (Acres)	Not Drained (Acres)	-20	Original 0	+20	+50
Cultivated Areas	11.7**	3.34**	15.30	15.30	15.30	15.30
Native Areas	4.48**	1.12**	0.79	0.79	0.79	0.79

* Cost to farmer if wetland not drained.

** These values are for the original resource level and changed in the same proportion as the change in land resources.

TABLE 4. OPPORTUNITY COST FOR VARIATIONS IN CAPITAL RESOURCES

	WETLAND		OPPORTUNITY COST* AT PERCENTAGE OF ORIGINAL LEVEL OF CAPITAL RESOURCES			
	Drained (Acres)	Not Drained (Acres)	-20	Original 0	+20	+50
Cultivated Areas	11.7	3.34	15.33	15.30	15.20	15.28
Native Areas	4.48	1.12	0.71	0.79	0.98	1.01

* Cost to farmer if wetland not drained.

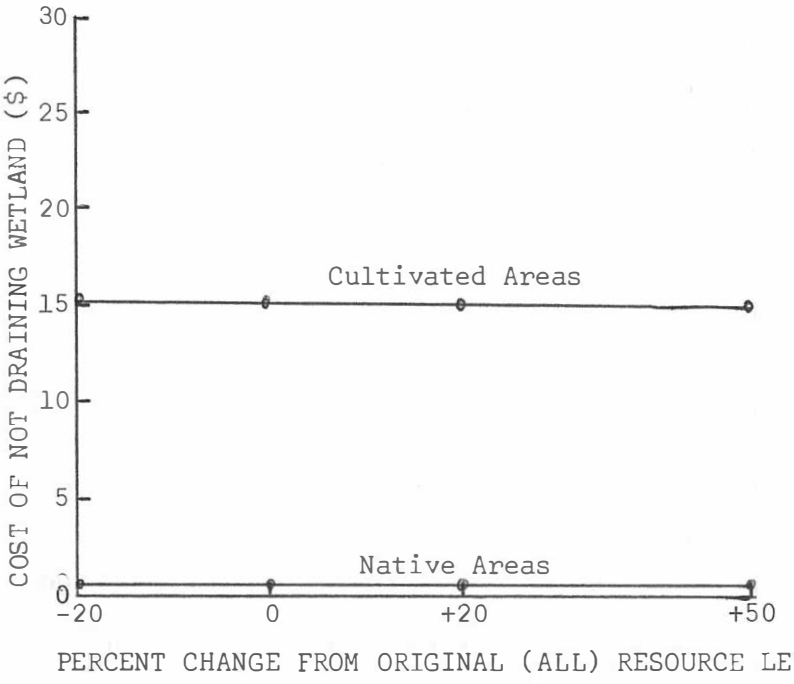

Figure 2. Opportunity cost changes as all resources increase.

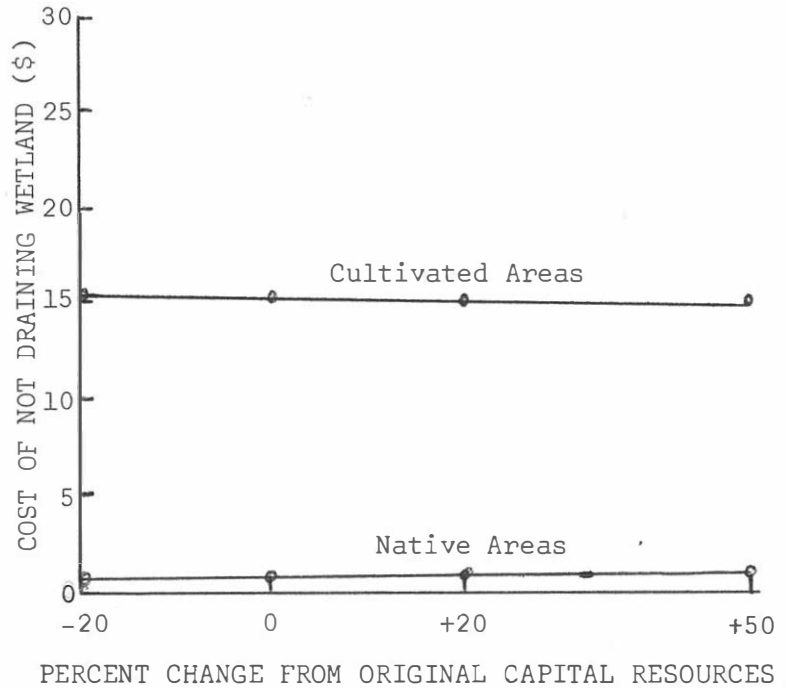

Figure 3. Opportunity cost changes as captial increases.

4. Conclusions and Discussion (for resource variations)

It is evident from the foregoing analysis that the model is fairly stable when resources are varied. In other words, the scale of farming has no bearing on the opportunity cost of maintaining wetlands. This conclusion is reasonable when one considers that the farming operation represented by this mathematical model is assumed to be operating at the optimum and therefore, whether the farmer is operating with a very limited amount of resources or a lot of resources, the value of the land to him on a per acre basis remains constant. In reality the operator of a large farm may be operating more efficiently than the operator of a very small farm. Therefore, managerial ability whould be taken into consideration when dealing with any individual case study.

The availability of capital when the amount of land remains constant has little effect on the value of the land to that farmer.

IV SENSITIVITY OF MODEL TO CHANGES IN PRICES

1. Procedures (for price variations)

The original model with the additions specified in Section I of this report was used for this analysis. Resources were left at the original level but prices were varied from -20% of the original values to +50% of the original values in 10% increments. Both the cost of inputs to the farming operation as well as the prices of produce sold were varied in the first run. In the second run the costs of primary inputs were left constant at their original levels while the prices of produce purchased and sold were varied from the -20% level to the +50% level in 10% increments. (Clearly the purchase price of a commodity such as cows must be equal to or greater than the selling price of the same commodity. Otherwise, there would be a profit in just buying and selling cows and this would defeat the purpose of the mathematical program. For this reason both the purchase prices and the selling prices of produce were increased.)

2. Changes in the solutions (for price variations)

The results of the first run (where all prices were varied) showed that the solution would not change when all prices were increased. The selection of enterprises and units of these enterprises did not change when the prices of all goods bought and sold were varied from -20% of the original prices to prices infinitely

TABLE 5. SOLUTIONS FOR VARIATIONS IN THE SELLING PRICES OF FARM PRODUCE

ACTIVITY	UNIT	ORIGINAL PRICES OF GOODS SOLD -20%	-10%	±0%	+10%	+20%	+30%	+40%	+50%
Gross Margin	$	22246	26278	30317	34432	38707	43021	47422	51939
Cultivated Land	(ac)	550	550	550	550	550	550	550	550
- Grain	"	173	173	173	339	357	354	332	357
- Grass	"	239	239	239	74	55	58	81	55
- Fallow	"	137	137	137	137	137	137	137	137
- Wetland	"	3.3	3.3	3.3	3.3	3.3	3.3	3.3	3.3
- Drained Land	"	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
Native Land	"	66	68	68	68	68	68	68	68
- Hay - High Product.	"	0	1.3	1.3	1.3	1.3	1.3	1.3	1.3
- Hay - Low Product.	"	33	34	34	34	34	34	34	34
- Pasture - Low Prod.	"	33	34	34	34	34	34	34	34
- Wetland	"	5.6	1.1	1.1	1.1	1.1	1.1	1.1	1.1
- Drained Land	"	0	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Land Purchased	"	160	160	160	160	160	160	160	160
Cultivated Land Rented	"	160	160	160	160	160	160	160	160
Crops - Spring Wheat	"	86	86	86	169	179	177	166	179
- Barley	"	52	52	52	80	89	91	34	29
- Flax	"	17	17	17	34	10	0	0	0
- Rapeseed	"	17	17	17	34	36	35	33	36
- Legume Hay	"	223	223	223	55	35	37	57	27
- Oat Hay	"	0	0	0	22	44	50	98	50
- Legume Silage	"	17	17	17	18	20	20	24	27
- Grain Silage	"	0	0	0	0	0	0	0	64

TABLE 5. (Continued)

ACTIVITY	UNIT	ORIGINAL PRICES OF GOODS SOLD -20%	-10%	±0%	+10%	+20%	+30%	+40%	+50%
Feeds Purchased									
- Oats	(bu)	442	441	598	402	709	801	0	0
- Grass Hay	(ton)	235	235	235	182	129	114	0	0
Livestock									
- Sow Units	(no)	48	48	48	46	45	45	40	40
- Weaner Pigs Sold	"	768	768	750	680	612	592	306	312
- Market Pigs Sold	"	0	0	14	64	112	127	334	330
- Dairy Cow Herd	"	50	50	50	50	50	50	50	50

greater. The gross margin increased in the same proportion as the price level increase. In other words, a 10% increase in the price level resulted in a 10% increase in the gross margin.

In the second run (where only the prices of produce bought and sold were varied) the solution did change. The solutions for price levels from -20% of the original to +50% of the original in 10% increments are shown in Table 5. Note that throughout the variation in prices, the amount of land in cultivated land use and native land use remained constant. However, there was a shift in the allocation of cultivated land between grain uses and grass uses as the level of prices increased. The dairy herd remained at the maximum of 50. There was a shift from raising weaner pigs to sell as weaner pigs, to keeping some of the weaner pigs for market hogs as the level of prices increased. As in the previous study dairy cattle are the most profitable animal enterprise, followed by hogs. No beef cattle entered any of the solutions. Generally for a 10% increase in selling prices, there was approximately a 14% increase in the gross margin.

3. The Opportunity Costs of Maintaining Wetlands (for price variations)

The opportunity cost of maintaining wetlands in cultivated areas for run 1 (all prices were varied) increased by $1.53 per acre for a 10% increase in the price level. For native areas the figure was $0.08. (See table 6 and figure 4).

TABLE 6. OPPORTUNITY COST FOR VARIATIONS IN ALL FARM PRICES

	WETLAND		OPPORTUNITY COST* AT PERCENTAGE OF ALL FARM PRICES			
	Drained (Acres)	Not Drained (Acres)	-20	Original 0	+20	+50
Cultivated Areas	11.70	3.34	12.25	15.30	18.37	22.96
Native Areas	4.48	1.12	0.64	0.79	0.95	1.19

* Cost to farmer if wetland not drained.

TABLE 7. OPPORTUNITY COST FOR VARIATIONS IN THE SELLING PRICES OF FARM PRODUCE

	WETLAND		OPPORTUNITY COST* AT PERCENTAGE OF THE SELLING PRICES OF FARM PRODUCE			
	Drained (Acres)	Not Drained (Acres)	-20	Original 0	+20	+50
Cultivated Areas	11.70	3.34	10.36	15.30	20.61	28.90
Native Areas	0	5.60	0.38**	-	-	-
	4.48	1.12	-	0.79	2.37	4.63

* Cost to farmer if wetland not drained.

** This case only - cost to farmer if wetland is drained.

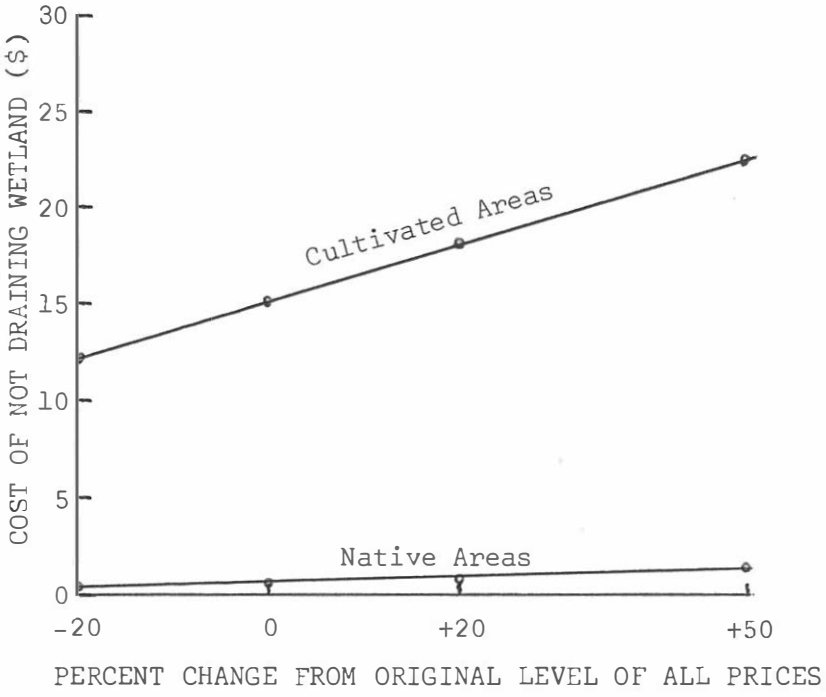

Figure 4. Opportunity cost changes as all prices increase.

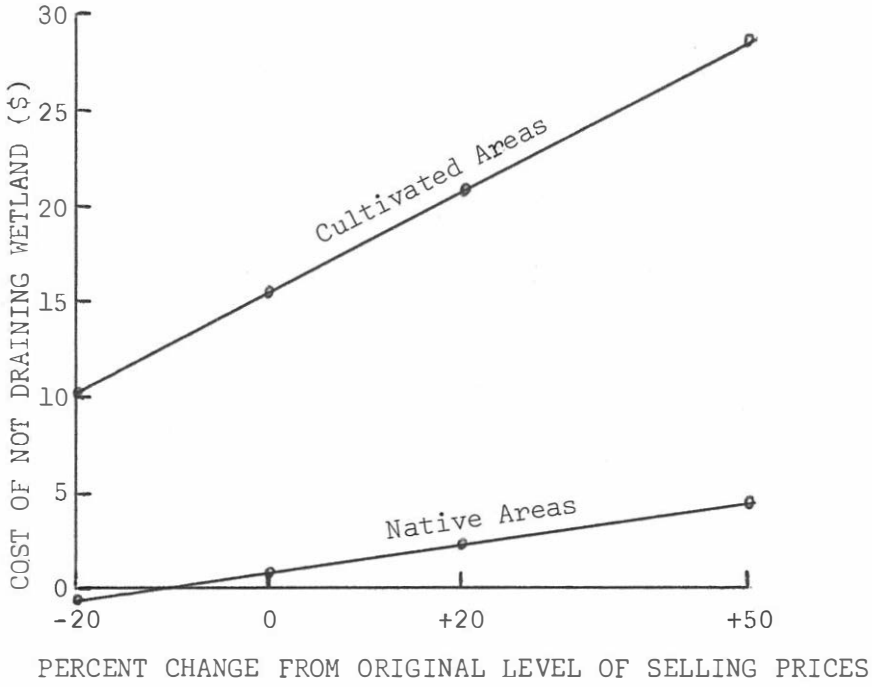

Figure 5. Opportunity cost changes as the selling prices of farm produce increase.

For run 2 (where only selling prices were varied) the increase in the opportunity cost of maintaining wetlands per 10% increase in selling prices was $2.72 per acre in cultivated areas and $0.55 per acre in native areas. (see table 7 and figure 5). Also it became unprofitable to drain native wetland when selling prices were decreased from their original level. The opportunity cost changes in run 2 are higher than in run 1 because costs remained constant in the second run, resulting in a larger profit margin.

4. Conclusions and Discussion (for price variations)

The opportunity cost of maintaining wetlands increases as prices increase. As the margin or profit on farm enterprises increases, the opportunity cost of maintaining wetlands also increases, and at a faster rate than when all prices increased. It was usually profitable to drain as much wet area as possible. However, it did become unprofitable to drain native wetland when the profit margin declined.

V RESUME OF CONCLUSIONS AND RECOMMENDATIONS

The overall sensitivity analysis has shown that the model is stable and fairly insensitive to changes in resources and prices. The optimum solution or best program for the farmer remained relatively the same and varied only moderately as resources and prices increased. However, the results of this study leave a number of questions unanswered. Some of these questions are as follows:

1. To what extent will the opportunity cost of maintaining wetland vary with the cost of draining wetlands?
2. Is there any difference in the opportunity cost of maintaining wetland for a dairy farm and a beef farm?
3. Will the yields on native hay effect the sensitivity of the model in any way?
4. Would an increase in the limit on dairy cows bring about any significant change in the opportunity costs of maintaining wetlands?
5. Will a different use allocation of drained native land have any effect on the opportunity cost of maintaining these wetlands?

An investigation into the above questions will reveal the effect that these factors have on the opportunity cost of maintaining wetlands. The investigation will show whether or not the value of wetland to farmers with greatly differing programs is, in fact, within as narrow a range as indicated by this study.

APPENDICES

APPENDIX A

COMPUTER LISTING OF REVISED MODEL

The following pages contain a listing of the computer card input for the revised model. This listing includes only the cards with the coefficients of the matrix and does not include the computer control program cards.

CWS WET EVAL SEN ANAL-CAPITAL -201

NAME CWSR1

ROWS

N	GMARGINS
N	GM1
L	CAPOPER
L	CAPLIVES
L	CAPMACH
L	CAPBUILD
L	CAPRLEST
G	LNDWWHT
G	SPRWHEAT
G	OATS
G	BARLEY
G	RYE
G	FLAX
G	RAPESD
G	MUSTARD
G	LEGHAY
G	MIXHAY
G	OATHAY
G	BARLHAY
G	GRASSHAY
G	LEGSIL
G	GRAINSIL
G	GRASSIL
G	MIXSIL
G	PASTURE
G	STRAW
G	WPASTUR
L	NATLANDH
L	CULTLAND
L	NATLAND
G	GRAIN
L	GRASS
L	FALLOW
G	NATVHAY
E	WETCULT
E	WETNAT
L	WETCDR
L	WETNDR
E	LINKC
E	LINKN
L	BUYLAND
L	RENTCULT
L	RENTNAT
G	QUOTA
L	GRAINBL
L	GRASSBL
G	WWHEATA
G	SWHEATA
G	OATSA
G	BARLEYA
G	RYEA
G	FLAXA

G RAPESA
G MUSTARDA
G LEGHAYA
G MIXHAYA
G OATHAYA
G BARLYHA
G GRASSHA
G LEGSILA
G GRAINSIA
G GRSSILA
G MIXSILA
G PASTA
L SILOCAP
L TRCULT
L TRDRILL
L TRHAR
L TRFOR
L CULTIV
L SEED
L HARR
L WINDR
L BALER
L FORHV
L COMBINE
L WINDRHV
L CAPOPER1
L CAPOPER2
L CAPOPER3
L CAPLIVE1
L CAPLIVE2
L CAPLIVE3
L CAPMACH1
L CAPMACH2
L CAPMACH3
L CAPBLDG1
L CAPBLDG2
L CAPBLDG3
L CAPREAL1
L CAPREAL2
L CAPREAL3
L CAPLIMOP
L CAPLIMLV
L CAPLIMMC
L CAPLIMBD
L CAPLIMRE
L CAPLIMOL
L CAPLIMBR
L CAPALL
G DAIRYBUL
L DRYCOW
L MAXDAIRY
G MINDAIRY
G MILK
G DCINTAKE

L DCDE
L DCDP
L DCCA
L DCP
L DBCAP
G DVEAL
G DPAST
L SOWDE
L SOWDP
L SOWINT
L SOWSUP
L SOWRF
G SOWSPERB
L SOWS
L SOWBARN
L WEANERS
L WEANDE
L WEANDP
L WEANINT
L WEANSUP
L FEEDERHG
L FHDE
L FHDP
L FHINT
L FHSUP
L MARKTHOG
L FEEDBARN
L MILL
L COWDE
L COWDP
L COWINT
G COWWP
G COWSPERB
L COWS
G CULLCOW
G STRCALF
G HFRCALF
L CALFDE
L CALFDP
L CALFINT
L CALFRF
L CALFSP
L FATHER
L FATSTR
L WCALFDE
L WCALFDP
L WCALFINT
L YEARLGST
L YEARLGHF
L YRLGDE
L YRLGDP
L YRLGINT
L YRLGRF
L YRLGPS

L PATYPST
L PATYRHP
L PRESULT
L RESULTS

CULTIVS

CULTLAMA	CULTLAND	1.00000	GRAIN	1.00000	
CULTLAMA	LIVEC	- 1.00000	SOYTA	10.00000	
CULTLAMA	FALLOW	.25000	GRASS	.10000	
WATVLAMA	WATLAND	1.00000	WATWAY	.20000	
WATVLAMA	LIVC	- 1.00000			
GRAILAM	GRAI	- 1.00000	LIVEC	1.00000	
GRAILAM	GRAINSL	- 1.00000	SOYBEATA	.20000	
GRAILAM	OATSA	1.00000	BARLEYA	1.00000	
GRAILAM	RYEA	1.00000	FLAXA	.10000	
GRAILAM	RAPESA	.10000	OATHAYA	1.00000	
GRAILAM	BARLYEA	1.00000	GRAINSIA	1.00000	
GRAILAM	WPASTUR	.10000			
GRASSA	GWARGINS	- 4.42000	CAPOPER	4.42000	
GRASSA	GRASS	- 1.00000	LIVEC	1.00000	
GRASSA	GRASSSL	- 1.00000	LEGHAYA	1.00000	
GRASSA	MIXHAYA	1.00000	GRASSHA	1.00000	
GRASSA	LEGSILA	1.00000	GRSSILA	1.00000	
GRASSA	MIXSILA	1.00000	PASTA	1.00000	
GRASSA	WPASTUR	1.00000			
GFALLOMA	GWARGINS	- 1.25000	CAPOPER	1.25000	
GFALLOMA	FALLOW	- 1.00000	LIVEC	1.00000	
CULTLAMA	GRASSINS	- 2.17000	CAPOPER	2.17000	
CULTLAMA	WETCULT	1.00000	WPASTUR	2.00000	
WHAYA	WATWAY	- 1.00000	LIVEC	1.00000	
HAYA	GRASSHAY	.20000	CAPOPER	.36000	
WHAYA	GWARGINS	- .36000			
WSOYPASA	PASTURE	1.00000	LIVEC	1.00000	
WILDPASA	WPASTUR	1.00000	LIVEC	1.00000	
WBETLAMA	LETMAT	1.00000	PASTURE	.30000	
WOYLAMA	CULTLAND	- .76600	WATLAND	- .19000	
WOYLAMA	WOYLAND	1.00000	WETLND	- .80200	
WOYLAMA	WETCUL	- .02500	WETMAT	- .61000	
WOYLAMA	WETCULT	- .03400	CAPLEST	92.00000	
WBETCULA	GWARGINS	- 6.00000	CAPOPER	6.00000	
WETCULA	CULTLAND	- 1.00000	WBETCULT	1.00000	
WBETMATA	GWARGINS	- 3.00000	CAPOPER	3.00000	
WBETMATA	WATLAND	- 1.00000	WBETMAT	1.00000	
WRAICULA	CULTLAND	- 1.00000	WETCUR	1.00000	
WRAICULA	WETCULT	1.00000	CAPLEST	60.00000	
WRAIMATA	WATLAND	- .61000	WETLND	1.00000	
WRAIMATA	WETMAT	1.00000	CULTLAND	- .19000	
WRAIMATA	WATLANDR	- .30000	CAPLEST	- 60.00000	
SELLAMDA	CULTLAND	.76600	WATLAND	.19000	
SELLAMDA	WETMAT	.01000	WETCULT	.03400	
SELLAMDA	WETNDR	.00300	WETCUR	.02500	
SELLAMDA	CAPLEST	- 92.00000			
LEASCULA	GWARGINS	5.00000	CULTLAND	1.00000	
LEASMATA	GWARGINS	2.00000	WATLAND	1.00000	
WRAYAMP	WATLANDR	1.00000	GRASSHAY	.60000	

NPASTAHP	NATLANDH	1.00000	PASTURE		2.00000
GWWHEATA	GMARGIN$ -	9.00000	CAPOPER		9.00000
GWWHEATA	GRAINBL	1.00000	WWHEATA	-	1.00000
GSWHEATA	GMARGIN$ -	9.00000	CAPOPER		9.00000
GSWHEATA	GRAINBL	1.00000	SWHEATA	-	1.00000
GSWHEATA	CULTIV	1.00000	SEED		1.00000
GSWHEATA	HARR	1.00000	COMBINE		1.00000
GSWHEATA	WINDRHV	1.00000	STRAW		.50000
GSWHEATA	SPRWHEAT	25.00000			
GOATSA	GMARGIN$ -	8.00000	CAPOPER		8.00000
GOATSA	GRAINBL	1.00000	OATSA	-	1.00000
GOATSA	CULTIV	1.00000	SEED		1.00000
GOATSA	HARR	1.00000	COMBINE		1.00000
GOATSA	WINDRHV	1.00000	STRAW		.80000
GOATSA	OATS	40.00000			
GBARLEYA	GMARGIN$ -	8.50000	CAPOPER		8.50000
GBARLEYA	GRAINBL	1.00000	BARLEYA	-	1.00000
GBARLEYA	CULTIV	1.00000	SEED		1.00000
GBARLEYA	HARR	1.00000	COMBINE		1.00000
GBARLEYA	WINDRHV	1.00000	STRAW		.70000
GBARLEYA	BARLEY	30.00000			
GRYEA	GMARGIN$ -	7.40000	CAPOPER		7.40000
GRYEA	GRAINBL	1.00000	RYEA	-	1.00000
GRYEA	CULTIV	1.00000	SEED		1.00000
GRYEA	HARR	1.00000	COMBINE		1.00000
GRYEA	WINDRHV	1.00000	RYE		20.00000
GFLAXA	GMARGIN$ -	7.75000	CAPOPER		7.75000
GFLAXA	GRAINBL	1.00000	FLAXA	-	1.00000
GFLAXA	CULTIV	1.00000	SEED		1.00000
GFLAXA	HARR	1.00000	COMBINE		1.00000
GFLAXA	WINDRHV	1.00000	FLAX		11.00000
GRAPESA	GMARGIN$ -	6.00000	CAPOPER		6.00000
GRAPESA	GRAINBL	1.00000	RAPESA	-	1.00000
GRAPESA	CULTIV	1.00000	SEED		1.00000
GRAPESA	HARR	1.00000	COMBINE		1.00000
GRAPESA	WINDRHV	1.00000	RAPESD		18.00000
GMUSTRDA	GMARGIN$ -	5.95000	CAPOPER		5.95000
GMUSTRDA	GRAINBL	1.00000	MUSTARDA	-	1.00000
GMUSTRDA	CULTIV	1.00000	SEED		1.00000
GMUSTRDA	HARR	1.00000	COMBINE		1.00000
GLEGHAYA	GRASSBL	1.00000	LEGHAYA	-	1.00000
GLEGHAYA	WINDR	1.00000	BALER		1.20000
GLEGHAYA	LEGHAY	1.20000	CAPOPER		1.93000
GLEGHAYA	GMARGIN$ -	1.93000			
GMIXHAYA	GRASSBL	1.00000	MIXHAYA	-	1.00000
GMIXHAYA	WINDR	1.00000	BALER		.90000
GMIXHAYA	MIXHAY	.90000	CAPOPER		1.55000
GMIXHAYA	GMARGIN$ -	1.55000			
GOATHAYA	GMARGIN$ -	8.00000	CAPOPER		8.00000
GOATHAYA	GRAINBL	1.00000	OATHAYA	-	1.00000
GOATHAYA	WINDR	1.00000	BALER		1.70000
GOATHAYA	OATHAY	1.70000			
GBARHAYA	GMARGIN$ -	8.50000	CAPOPER		8.50000
GBARHAYA	GRAINBL	1.00000	BARLYHA	-	1.00000

GBARHAYA	WINDR		1.00000	BALER		1.70000
GBARHAYA	BARLHAY		1.70000			
GRASSHYA	GRASSRL		1.00000	GRASSHA	-	1.00000
GRASSHYA	WINDR		1.00000	BALER		.80000
GRASSHYA	GRASSHAY		.80000	CAPOPER		1.42000
GRASSHYA	GMARGINS	-	1.42000			
GLEGSILA	GRASSRL		1.00000	LEGSILA	-	1.00000
GLEGSILA	SILOCAP		1.00000	WINDR		1.00000
GLEGSILA	FORHV		4.00000	LEGSIL		4.00000
GLEGSILA	CAPOPER		1.24000	GMARGINS	-	1.24000
GRANSILA	GMARGINS	-	8.00000	CAPOPER		8.00000
GRANSILA	GRAINRL		1.00000	GRAINSIA	-	1.00000
GRANSILA	SILOCAP		1.00000	WINDR		1.00000
GRANSILA	FORHV		5.00000	GRAINSIL		5.00000
GRASSILA	GRASSRL		1.00000	GRSSILA	-	1.00000
GRASSILA	SILOCAP		1.00000	WINDR		1.00000
GRASSILA	FORHV		2.80000	GRASSIL		2.80000
GRASSILA	CAPOPER		.99000	GMARGINS	-	.99000
GMIXSILA	GRASSRL		1.00000	MIXSILA	-	1.00000
GMIXSILA	SILOCAP		1.00000	WINDR		1.00000
GMIXSILA	FORHV		3.10000	MIXSIL		3.10000
GMIXSILA	CAPOPER		1.05000	GMARGINS	-	1.05000
GTAMPASA	GRASSRL		1.00000	PASTA		1.00000
GTAMPASA	PASTURE		5.00000			
MTRACTOR	GMARGINS	-	21.00000	CAPMACH		147.00000
MTRACTOR	TRCULT	-	1.00000	TRDRILL	-	1.00000
MTRACTOR	TRHAR	-	1.00000	TRFOR	-	1.00000
MCULVATR	GMARGINS	-	30.00000	CAPMACH		210.00000
MCULVATR	TRCULT		8.90000	CULTIV	-	120.00000
MDRILL	GMARGINS	-	45.00000	CAPMACH		315.00000
MDRILL	TRDRILL		4.30000	SEED	-	58.00000
MHARROW	GMARGINS	-	6.30000	CAPMACH		44.40000
MHARROW	TRHAR		1.40000	HARR	-	22.00000
MWINDRW	GMARGINS	-	153.00000	CAPMACH		1075.00000
MWINDRW	WINDRHV	-	101.00000	WINDR	-	140.00000
MBALER	GMARGINS	-	29.00000	CAPMACH		200.00000
MBALER	BALER	-	60.00000			
MFORHRV	GMARGINS	-	47.00000	CAPMACH		333.00000
MFORHRV	TRFOR		2.50000	FORHV	-	60.00000
MCOMBIN	GMARGINS	-	279.00000	CAPMACH		1950.00000
MCOMBIN	COMBINE	-	112.00000			
BWHEATB	GMARGINS	-	1.75000	CAPOPER		1.75000
BWHEATB	SPRWHEAT		1.00000			
BOATSB	GMARGINS	-	.60000	CAPOPER		.60000
BOATSB	OATS		1.00000			
BARLEYB	GMARGINS	-	1.05000	CAPOPER		1.05000
BARLEYB	BARLEY		1.00000			
BRYEB	GMARGINS	-	1.05000	CAPOPER		1.05000
BRYEB	RYE		1.00000			
BLEGHAYT	GMARGINS	-	25.00000	CAPOPER		25.00000
BLEGHAYT	LEGHAY		1.00000			
BMIXHAYT	GMARGINS	-	24.00000	CAPOPER		24.00000
BMIXHAYT	MIXHAY		1.00000			
BOATHAYT	GMARGINS	-	15.00000	CAPOPER		15.00000

BOATHAYT	OATHAY		1.00000			
BARLHAYT	GMARGINS	-	15.00000	CAPOPER		15.00000
BARLHAYT	BARLHAY		1.00000			
BGRSHAYT	GMARGINS	-	15.00000	CAPOPER		15.00000
BGRSHAYT	GRASSHAY		1.00000			
BLEGSILT	GMARGINS	-	1000.00000	CAPOPER		1000.00000
BLEGSILT	LEGSIL		1.00000			
BGRNSILT	GMARGINS	-	1000.00000	CAPOPER		1000.00000
BGRNSILT	GRAINSIL		1.00000			
BGRASILT	GMARGINS	-	1000.00000	CAPOPER		1000.00000
BGRASILT	GRASSIL		1.00000			
SWWHEAQB	LNDWWHT	-	1.00000	QUOTA	-	1.00000
SSWHETQB	SPRWHEAT	-	1.00000	QUOTA	-	1.00000
SSWHETQB	GMARGINS		1.70000			
SOATSQB	OATS	-	1.00000	QUOTA	-	1.00000
SOATSQB	GMARGINS		.60000			
SBARLYQB	BARLEY	-	1.00000	QUOTA	-	1.00000
SBARLYQB	GMARGINS		1.05000			
SRYEB	RYE	-	1.00000	GMARGINS		1.05000
SFLAXB	FLAX	-	1.00000	GMARGINS		3.00000
SRAPESB	RAPESD	-	1.00000	GMARGINS		2.15000
SMUSTRDB	MUSTARD	-	1.00000	GMARGINS		2.00000
SLEGHAYT	LEGHAY	-	1.00000	GMARGINS		25.00000
SMIXHAYT	MIXHAY	-	1.00000	GMARGINS		24.00000
SOATHAYT	OATHAY	-	1.00000	GMARGINS		15.00000
SBARHAYT	BARLHAY	-	1.00000	GMARGINS		15.00000
SGRSHAYT	GRASSHAY	-	1.00000	GMARGINS		15.00000
SLEGSILT	LEGSIL	-	1.00000			
SGRNSILT	GRAINSIL	-	1.00000			
SGRSILT	GRASSIL	-	1.00000			
SMIXSILT	MIXSIL	-	1.00000			
SWWHTNQB	LNDWWHT	-	1.00000			
SSWHTNQB	SPRWHEAT	-	1.00000	GMARGINS		1.20000
SOATSNQB	OATS	-	1.00000	GMARGINS		.55000
SBARLNQB	BARLEY	-	1.00000	GMARGINS		.95000
POPER1	CAPOPER	-	1.00000	CAPOPER1		1.00000
POPER1	CAPLIMOP		1.00000	CAPLIMOL		1.00000
POPER1	CAPALL		1.00000	GMARGINS	-	.06000
POPER2	CAPOPER	-	1.00000	CAPOPER2		1.00000
POPER2	CAPLIMOP		1.00000	CAPLIMOL		1.00000
POPER2	CAPALL		1.00000	GMARGINS	-	.10000
POPER3	CAPOPER	-	1.00000	CAPOPER3		1.00000
POPER3	CAPLIMOP		1.00000	CAPLIMOL		1.00000
POPER3	CAPALL		1.00000			
PLIVE1	CAPLIVES	-	1.00000	CAPLIVE1		1.00000
PLIVE1	CAPLIMLV		1.00000	CAPLIMOL		1.00000
PLIVE1	CAPALL		1.00000			
PLIVE2	CAPLIVES	-	1.00000	CAPLIVE2		1.00000
PLIVE2	CAPLIMLV		1.00000	CAPLIMOL		1.00000
PLIVE2	CAPALL		1.00000	GMARGINS	-	.08000
PLIVE3	CAPLIVES	-	1.00000	CAPLIVE3		1.00000
PLIVE3	CAPLIMLV		1.00000	CAPLIMOL		1.00000
PLIVE3	CAPALL		1.00000			
PMACH1	CAPMACH	-	1.00000	CAPMACH1		1.00000

PMACH1	CAPLIMMC		1.00000	CAPALL	1.00000
PMACH2	CAPMACH	-	1.00000	CAPMACH2	1.00000
PMACH2	CAPLIMMC		1.00000	CAPALL	1.00000
PMACH2	GMARGINS	-	.07000		
PMACH3	CAPMACH	-	1.00000	CAPMACH3	1.00000
PMACH3	CAPLIMMC		1.00000	CAPALL	1.00000
PBUILD1	CAPBUILD	-	1.00000	CAPBLDG1	1.00000
PBUILD1	CAPLIMBD		1.00000	CAPLIMBR	1.00000
PBUILD1	CAPALL		1.00000		
PBUILD2	CAPBUILD	-	1.00000	CAPBLDG2	1.00000
PBUILD2	CAPLIMBD		1.00000	CAPLIMBR	1.00000
PBUILD2	CAPALL		1.00000	GMARGINS	- .06000
PBUILD3	CAPBUILD	-	1.00000	CAPBLDG3	1.00000
PBUILD3	CAPLIMBD		1.00000	CAPLIMBR	1.00000
PBUILD3	CAPALL		1.00000		
PRE1	CAPRLEST	-	1.00000	CAPREAL1	1.00000
PRE1	CAPLIMRE		1.00000	CAPLIMBR	1.00000
PRE1	CAPALL		1.00000	GMARGINS	- .07000
PRE2	CAPRLEST	-	1.00000	CAPREAL2	1.00000
PRE2	CAPLIMRE		1.00000	CAPLIMBR	1.00000
PRE2	CAPALL		1.00000		
PRE3	CAPRLEST	-	1.00000	CAPREAL3	1.00000
PRE3	CAPLIMRE		1.00000	CAPLIMBR	1.00000
PRE3	CAPALL		1.00000		
DAIRYCOW	DAIRYBUL	-	1.00000	DRYCOW	1.00000
DAIRYCOW	MAXDAIRY		1.00000	MINDAIRY	1.00000
DAIRYCOW	MILK		100.00000	DCINTAKE	13500.00000
DAIRYCOW	DCDE		5419.00000	DCDP	193.00000
DAIRYCOW	DCCA		9.43000	DCP	9.43000
DAIRYCOW	DBCAP		1.00000	DPAST	10.00000
DAIRYCOW	DVEAL		.60000	CAPOPER	2.00000
DAIRYCOW	GMARGINS	-	2.00000		
DMILK	MILK	-	1.00000	DCDE	65.00000
DMILK	DCDP		4.55000	DCCA	.23000
DMILK	DCP		.17000	GMARGINS	5.00000
BDRYCOW	CAPLIVES		300.00000	DRYCOW	- 1.00000
SDRYCOW	DRYCOW		1.00000	CAPLIVES	- 300.00000
DRYBARN	GMARGINS	-	2.50000	CAPBUILD	25.00000
DRYBARN	DBCAP	-	1.00000		
BLDSILO	GMARGINS	-	2.00000	CAPBUILD	40.00000
BLDSILO	SILOCAP	-	1.00000		
DRYBULL	GMARGINS	-	200.00000	CAPLIVES	1000.00000
DRYBULL	DAIRYBUL		50.00000	DCINTAKE	7300.00000
DRYBULL	DCDE		8030.00000	DCDP	394.00000
DVEALA	DVEAL	-	1.00000	GMARGINS	25.00000
DCWHEATB	SPRWHEAT	-	1.00000	DCINTAKE	- 60.00000
DCWHEATB	DCDE	-	95.00000	DCDP	- 7.08000
DCWHEATB	DCCA	-	.03000	DCP	- .29000
DCOATSB	OATS	-	1.00000	DCINTAKE	- 34.00000
DCOATSB	DCDE	-	46.30000	DCDP	- 2.99000
DCOATSB	DCCA	-	.03400	DCP	- .11900
DCBARLYB	BARLEY	-	1.00000	DCINTAKE	- 45.00000
DCBARLYB	DCDE	-	74.90000	DCDP	- 4.22000
DCBARLYB	DCCA	-	.03800	DCP	- .20200

DCOATHYT	OATHAY	-	1.00000	DCINTAKE	- 2000.00000
DCOATHYT	DCDE	-	2240.00000	DCDP	- 61.00000
DCOATHYT	DCCA	-	4.60000	DCP	- 4.20000
DCBARHYT	BARLHAY	-	1.00000	DCINTAKE	- 2000.00000
DCBARHYT	DCDE	-	2000.00000	DCDP	- 86.00000
DCBARHYT	DCCA	-	3.60000	DCP	- 2.60000
DCLEGHYT	LEGHAY	-	1.00000	DCINTAKE	- 2000.00000
DCLEGHYT	DCDE	-	1932.00000	DCDP	- 216.00000
DCLEGHYT	DCCA	-	24.00000	DCP	- 4.00000
DCMXHAYT	MIXHAY	-	1.00000	DCINTAKE	- 2000.00000
DCMXHAYT	DCDE	-	2040.00000	DCDP	- 144.00000
DCMXHAYT	DCCA	-	14.10000	DCP	- 4.06000
DCGRSHYT	GRASSHAY	-	1.00000	DCINTAKE	- 2000.00000
DCGRSHYT	DCDE	-	2080.00000	DCDP	- 96.00000
DCGRSHYT	DCCA	-	7.60000	DCP	- 4.20000
DCLEGSLT	LEGSIL	-	1.00000	DCINTAKE	- 700.00000
DCLEGSLT	DCDE	-	680.00000	DCDP	- 72.00000
DCLEGSLT	DCCA	-	9.60000	DCP	- 3.20000
DCGRNSLT	GRAINSIL	-	1.00000	DCINTAKE	- 700.00000
DCGRNSLT	DCDE	-	760.00000	DCDP	- 36.00000
DCGRNSLT	DCCA	-	2.40000	DCP	- 2.00000
DCGRSILT	GRASSIL	-	1.00000	DCINTAKE	- 700.00000
DCGRSILT	DCDE	-	520.00000	DCDP	- 34.00000
DCGRSILT	DCCA	-	4.60000	DCP	- 1.60000
DCMXHSLT	MIXSIL	-	1.00000	DCINTAKE	- 700.00000
DCMXHSLT	DCDE	-	565.00000	DCDP	- 34.00000
DCMXHSLT	DCCA	-	4.60000	DCP	- 1.60000
DCPASTRT	PASTURE	-	5.00000	DCINTAKE	- 2000.00000
DCPASTRT	DCDE	-	2000.00000	DCDP	- 38.00000
DCPASTRT	DCCA	-	10.00000	DCP	- 1.20000
DCPASTRT	DPAST	-	5.00000		
DCSUPLT	GMARGIN$	-	107.00000	CAPOPER	107.00000
DCSUPLT	DCINTAKE	-	2000.00000	DCDE	- 2400.00000
DCSUPLT	DCDP	-	512.00000	DCCA	- 56.00000
DCSUPLT	DCP	-	14.00000		
HSOW	GMARGIN$	-	10.00000	CAPOPER	10.00000
HSOW	SOWDE		4000.00000	SOWDP	375.80000
HSOW	SOWINT	-	2756.00000	SOWSUP	264.00000
HSOW	SOWRF	-	412.00000	SOWSPERB	- 1.00000
HSOW	SOWS		1.00000	SOWBARN	34.40000
HSOW	WEANERS	-	16.00000		
HWHEAT	SPRWHEAT	-	33.30000	SOWDE	- 3200.00000
HWHEAT	SOWDP	-	278.00000	SOWINT	2000.00000
HWHEAT	MILL		1.00000		
HOAT	OATS	-	58.80000	SOWDE	- 2600.00000
HOAT	SOWDP	-	222.00000	SOWINT	2000.00000
HOAT	MILL		1.00000		
HBARLEYT	BARLEY	-	41.70000	SOWDE	- 2800.00000
HBARLEYT	SOWDP	-	232.00000	SOWINT	2000.00000
HBARLEYT	MILL		1.00000		
HSUPLMNT	GMARGIN$	-	100.00000	CAPOPER	100.00000
HSUPLMNT	SOWDE	-	3000.00000	SOWDP	- 700.00000
HSUPLMNT	SOWINT		2000.00000	SOWSUP	- 2000.00000
HALFHAYT	LEGHAY	-	1.00000	SOWDE	- 1160.00000

HALFHAYT	SOWDP	-	326.00000	SOWINT	2000.00000
HALFHAYT	SOWRF		2000.00000	MILL	1.00000
HBOAR	GMARGIN$	-	15.00000	CAPOPER	15.00000
HBOAR	CAPLIVES		100.00000	SOWDE	3812.00000
HBOAR	SOWDP		360.00000	SOWINT	- 2000.00000
HBOAR	SOWSUP		300.00000	SOWSPERB	30.00000
HBOAR	SOWBARN		30.00000		
HBUYSOWS	CAPLIVES		80.00000	SOWS	- 1.00000
HSELSOWS	CAPLIVES	-	75.00000	SOWS	1.00000
HSELWEAN	WEANERS		1.00000	GMARGIN$	12.00000
HBUYWEAN	WEANERS	-	1.00000	CAPLIVES	12.50000
HBUYWEAN	GMARGIN$	-	12.50000		
HSOWBARN	GMARGIN$	-	60.00000	CAPOPER	20.00000
HSOWBARN	CAPBUILD		600.00000	SOWBARN	- 100.00000
HGRWWEN	GMARGIN$	-	2.00000	CAPOPER	2.00000
HGRWWEN	WEANERS		1.00000	WEANDE	474.00000
HGRWWEN	WEANDP		63.80000	WEANINT	- 343.00000
HGRWWEN	WEANSUP		51.00000	FEEDERHG	- 1.00000
HGRWWEN	FEEDBARN		.60000		
HWEAWHAT	SPRWHEAT	-	33.30000	WEANDE	- 3200.00000
HWEAWHAT	WEANDP	-	278.00000	WEANINT	2000.00000
HWEAWHAT	MILL		1.00000		
HWEANOAT	OATS	-	58.80000	WEANDE	- 2600.00000
HWEANOAT	WEANDP	-	222.00000	WEANINT	2000.00000
HWEANOAT	MILL		1.00000		
HWEABART	BARLEY	-	41.70000	WEANDE	- 2800.00000
HWEABART	WEANDP	-	232.00000	WEANINT	2000.00000
HWEABART	MILL		1.00000		
HWEANSUP	GMARGIN$	-	130.00000	CAPOPER	130.00000
HWEANSUP	WEANDE	-	3000.00000	WEANDP	- 700.00000
HWEANSUP	WEANINT		2000.00000	WEANSUP	- 2000.00000
HSFEEDER	FEEDERHG		1.00000	GMARGIN$	22.00000
HBFEEDER	FEEDERHG	-	1.00000	CAPLIVES	28.00000
HBFEEDER	GMARGIN$	-	28.00000		
HGFEEDER	GMARGIN$	-	2.00000	CAPLIVES	2.00000
HGFEEDER	FEEDERHG		1.00000	FHDE	502.00000
HGFEEDER	FHDP		48.30000	FHINT	- 356.00000
HGFEEDER	FHSUP		35.60000	MARKTHOG	- 1.00000
HGFEEDER	FEEDBARN		.60000		
HFWHEAT	SPRWHEAT	-	33.30000	FHDE	- 3200.00000
HFWHEAT	FHDP	-	278.00000	FHINT	2000.00000
HFWHEAT	MILL		1.00000		
HFOAT	OATS	-	58.80000	FHDE	- 2600.00000
HFOAT	FHDP	-	222.00000	FHINT	2000.00000
HFOAT	MILL		1.00000		
HFBARLET	BARLEY	-	41.70000	FHDE	- 2800.00000
HFBARLET	FHDP	-	232.00000	FHINT	2000.00000
HFBARLET	MILL		1.00000		
HFSUPLMT	GMARGIN$	-	120.00000	CAPOPER	120.00000
HFSUPLMT	FHDE	-	3000.00000	FHDP	- 700.00000
HFSUPLMT	FHINT		2000.00000	FHSUP	- 2000.00000
HSELPIG	MARKTHOG		1.00000	GMARGIN$	42.00000
HFINBARN	GMARGIN$	-	80.00000	CAPOPER	25.00000
HFINBARN	CAPBUILD		800.00000	FEEDBARN	- 100.00000

FBULL	GMARGIN$	-	92.00000	CAPOPER	92.00000
FBULL	CAPLIVES		600.00000	PASTURE	- 10.00000
FBULL	COWDE		4500.00000	COWDP	252.00000
FBULL	COWINT	-	2.54000	COWSPERB	40.00000
FCOW	GMARGIN$	-	12.00000	CAPOPER	12.00000
FCOW	PASTURE	-	10.00000	COWDE	3480.00000
FCOW	COWDP		130.00000	COWINT	- 1.82000
FCOW	COWSPERB	-	1.00000	COWS	1.00000
FCOW	CULLCOW		.20000	STRCALF	.45000
FCOW	HFRCALF		.25000	COWWP	2.00000
FCOAT	OATS	-	41.70000	MILL	1.00000
FCOAT	COWDE	-	2600.00000	COWDP	- 176.00000
FCOAT	COWINT		1.00000		
FCBARLYT	BARLEY	-	58.80000	MILL	1.00000
FCBARLYT	COWDE	-	3120.00000	COWDP	- 168.00000
FCBARLYT	COWINT		1.00000		
FCLEGHYT	LEGHAY	-	1.00000	COWDE	- 1980.00000
FCLEGHYT	COWDP	-	212.00000	COWINT	1.00000
FCMXHAYT	MIXHAY	-	1.00000	COWDE	- 1930.00000
FCMXHAYT	COWDP	-	150.00000	COWINT	1.00000
FCOAHAYT	OATHAY	-	1.00000	COWDE	- 1800.00000
FCOAHAYT	COWDP	-	76.00000	COWINT	1.00000
FCBLYHYT	BARLHAY	-	1.00000	COWDE	- 1960.00000
FCBLYHYT	COWDP	-	86.00000	COWINT	1.00000
FCGRSHYT	GRASSHAY	-	1.00000	COWDE	- 1880.00000
FCGRSHYT	COWDP	-	88.00000	COWINT	1.00000
FCLEGSLT	LEGSIL	-	1.00000	COWDE	- 720.00000
FCLEGSLT	COWDP	-	68.00000	COWINT	.35000
FCGRNSLT	GRAINSIL	-	1.00000	COWDE	- 760.00000
FCGRNSLT	COWDP	-	36.00000	COWINT	.30000
FCGRSSLT	GRASSIL	-	1.00000	COWDE	- 520.00000
FCGRSSLT	COWDP	-	34.00000	COWINT	.30000
FCMXDSLT	MIXSIL	-	1.00000	COWDE	- 520.00000
FCMXDSLT	COWDP	-	34.00000	COWINT	.30000
FCSTRAWT	GMARGIN$	-	5.00000	CAPOPER	5.00000
FCSTRAWT	STRAW	-	1.00000	COWDE	- 1800.00000
FCSTRAWT	COWDP	-	28.00000	COWINT	1.00000
FCWNPAST	WPASTUR	-	5.00000	COWDE	- 2000.00000
FCWNPAST	COWDP	-	4.00000	COWINT	1.00000
FCWNPAST	COWWP	-	5.00000		
FCBUYCOW	CAPLIVES		250.00000	COWS	- 1.00000
FCSELCOW	CAPLIVES	-	240.00000	COWS	1.00000
FCSLCLCW	CULLCOW	-	1.00000	GMARGIN$	180.00000
FCSLCLFS	STRCALF	-	1.00000	GMARGIN$	115.00000
FCBYCLFS	STRCALF		1.00000	CAPLIVES	120.00000
FCBYCLFS	GMARGIN$	-	120.00000		
FCSLCLFH	HFRCALF	-	1.00000	GMARGIN$	85.00000
FCBYCLFH	HFRCALF		1.00000	CAPLIVES	90.00000
FCBYCLFH	GMARGIN$	-	90.00000		
FCFTCLFS	GMARGIN$	-	10.00000	CAPOPER	10.00000
FCFTCLFS	STRCALF	-	1.00000	CALFDE	5222.00000
FCFTCLFS	CALFDP		389.00000	CALFINT	- 1.98000
FCFTCLFS	CALFRF	-	.59000	FATSTR	- 1.00000
FCFTCLFS	FEEDLTW		1.00000		

FOFTCLFH	GMARGINS	-	10.00000	CAPOPER		10.00000
FOFTCLFH	HFRCALF	-	1.00000	CALFDE		5251.00000
FOFTCLFH	CALFDP		319.00000	CALFINT	-	1.98000
FOFTCLFH	CALFRF	-	.59500	FATHFR	-	1.00000
FOFTCLFH	FEEDLTM		1.00000			
FOWHEAT	SPRWHEAT	-	33.30000	MILL		1.00000
FOWHEAT	CALFDE	-	3420.00000	CALFDP	-	248.00000
FOWHEAT	CALFINT		1.00000			
FOATST	OATS	-	58.80000	MILL		1.00000
FOATST	CALFDE	-	2600.00000	CALFDP	-	176.00000
FOATST	CALFINT		1.00000			
FOBARLYT	BARLEY	-	41.10000	MILL		1.00000
FOBARLYT	CALFDE	-	3120.00000	CALFDP	-	168.00000
FOBARLYT	CALFINT		1.00000			
FOLEGHYT	LEGHAY	-	1.00000	CALFDE	-	1980.00000
FOLEGHYT	CALFDP	-	212.00000	CALFINT		1.00000
FOLEGHYT	CALFRF		1.00000			
FOMXDHYT	MIXHAY	-	1.00000	CALFDE	-	1930.00000
FOMXDHYT	CALFDP	-	150.00000	CALFINT		1.00000
FOMXDHYT	CALFRF		1.00000			
FOATHAYT	OATHAY	-	1.00000	CALFDE	-	1800.00000
FOATHAYT	CALFDP	-	76.00000	CALFINT		1.00000
FOATHAYT	CALFRF		1.00000			
FOBRLYHT	BARLHAY	-	1.00000	CALFDE	-	1920.00000
FOBRLYHT	CALFDP	-	86.00000	CALFINT		1.00000
FOBRLYHT	CALFRF		1.00000			
FOGRSHYT	GRASSHAY	-	1.00000	CALFDE	-	1880.00000
FOGRSHYT	CALFDP	-	88.00000	CALFINT		1.00000
FOGRSHYT	CALFRF		1.00000			
FOLEGSLT	LEGSIL	-	1.00000	CALFDE	-	720.00000
FOLEGSLT	CALFDP	-	68.00000	CALFINT		.35000
FOLEGSLT	CALFRF		.30000			
FOGRNSLT	GRAINSIL	-	1.00000	CALFDE	-	760.00000
FOGRNSLT	CALFDP	-	36.00000	CALFINT		.30000
FOGRNSLT	CALFRF		.30000			
FOGRSILT	GRASSIL	-	1.00000	CALFDE	-	520.00000
FOGRSILT	CALFDP	-	34.00000	CALFINT		.30000
FOGRSILT	CALFRF		.30000			
FOMXDSLT	MIXSIL	-	1.00000	CALFDE	-	520.00000
FOMXDSLT	CALFDP	-	34.00000	CALFINT		.30000
FOMXDSLT	CALFRF		.30000			
FOSTRAWT	GMARGINS	-	5.00000	CAPOPER		5.00000
FOSTRAWT	STRAW	-	1.00000	CALFDE	-	1800.00000
FOSTRAWT	CALFDP	-	28.00000	CALFINT		1.00000
FOSTRAWT	CALFRF		1.00000	CALFSP		1.00000
FOSUPLMT	GMARGINS	-	90.00000	CAPOPER		90.00000
FOSUPLMT	CALFDE	-	3200.00000	CALFDP	-	560.00000
FOSUPLMT	CALFINT		1.00000	CALFSP	-	20.00000
FCFATSTR	FATSTR		1.00000	GMARGINS		245.00000
FCFATHFR	FATHFR		1.00000	GMARGINS		214.00000
FWSTCALF	GMARGINS	-	6.00000	CAPOPER		6.00000
FWSTCALF	STRCALF		1.00000	WCALFDE		2420.00000
FWSTCALF	WCALFDP		144.00000	WCALFINT	-	1.21000
FWSTCALF	YEARLGST		1.00000	FEEDLTM		1.00000

FWHFCALF	GMARGINS	-	6.00000	CAPOPER	6.00000
FWHFCALF	HFRCALF		1.00000	WCALFDE	2230.00000
FWHFCALF	WCALFDP		139.00000	WCALFINT	- 1.15000
FWHFCALF	YEARLGHF		1.00000	FEEDLTS	1.00000
FWHEAT	SPRWHEAT	-	33.30000	WCALFDE	- 3420.00000
FWHEAT	WCALFDP	-	248.00000	WCALFINT	1.00000
FWHEAT	MILL		1.00000		
FWOAT	OATS	-	58.80000	WCALFDE	- 2600.00000
FWOAT	WCALFDP	-	176.00000	WCALFINT	1.00000
FWOAT	MILL		1.00000		
FWBARLET	BARLEY	-	41.70000	WCALFDE	- 3120.00000
FWBARLET	WCALFDP	-	168.00000	WCALFINT	1.00000
FWBARLET	MILL		1.00000		
FWLEGHYT	LEGHAY	-	1.00000	WCALFDE	- 1980.00000
FWLEGHYT	WCALFDP	-	212.00000	WCALFINT	1.00000
FWMIXHYT	MIXHAY	-	1.00000	WCALFDE	- 1930.00000
FWMIXHYT	WCALFDP	-	150.00000	WCALFINT	1.00000
FWOATHYT	OATHAY	-	1.00000	WCALFDE	- 1800.00000
FWOATHYT	WCALFDP	-	76.00000	WCALFINT	1.00000
FWBARHYT	BARLHAY	-	1.00000	WCALFDE	- 1920.00000
FWBARHYT	WCALFDP	-	86.00000	WCALFINT	1.00000
FWGRSHYT	GRASSHAY	-	1.00000	WCALFDE	- 1880.00000
FWGRSHYT	WCALFDP	-	88.00000	WCALFINT	1.00000
FWLEGSLT	LEGSIL	-	1.00000	WCALFDE	- 720.00000
FWLEGSLT	WCALFDP	-	58.00000	WCALFINT	.35000
FWGRNSLT	GRAINSIL	-	1.00000	WCALFDE	- 760.00000
FWGRNSLT	WCALFDP	-	36.00000	WCALFINT	.30000
FWGRSSLT	GRASSIL	-	1.00000	WCALFDE	- 520.00000
FWGRSSLT	WCALFDP	-	34.00000	WCALFINT	.30000
FWMXDSLT	MIXSIL	-	1.00000	WCALFDE	- 520.00000
FWMXDSLT	WCALFDP	-	34.00000	WCALFINT	.30000
FWSTRAWT	GMARGINS	-	5.00000	CAPOPER	5.00000
FWSTRAWT	STRAW	-	1.00000	WCALFDE	- 1800.00000
FWSTRAWT	WCALFDP	-	28.00000	WCALFINT	1.00000
FWSUPLMT	GMARGINS	-	90.00000	CAPOPER	90.00000
FWSUPLMT	WCALFDE	-	3200.00000	WCALFDP	- 560.00000
FWSUPLMT	WCALFINT		1.00000		
FWSLYLGS	YEARLGST		1.00000	GMARGINS	155.00000
FWBYYLGS	YEARLGST	-	1.00000	CAPLIVES	161.00000
FWBYYLGS	GMARGINS	-	161.00000		
FWSLYLGH	YEARLGHF		1.00000	GMARGINS	130.00000
FWBYYLGH	YEARLGHF	-	1.00000	CAPLIVES	136.00000
FWBYYLGH	GMARGINS	-	136.00000		
FSYRLGS	GMARGINS	-	8.00000	CAPOPER	8.00000
FSYRLGS	YEARLGST		1.00000	YRLGDE	4194.00000
FSYRLGS	YRLGDP		242.00000	YRLGINT	- 1.63000
FSYRLGS	YRLGRF	-	.44000	FATYRST	- 1.00000
FSYRLGS	FEEDLTS		1.00000		
FSYRLGH	GMARGINS	-	8.00000	CAPOPER	8.00000
FSYRLGH	YEARLGHF		1.00000	YRLGDE	4010.00000
FSYRLGH	YRLGDP		237.00000	YRLGINT	- 1.71000
FSYRLGH	YRLGRF	-	.44000	FATYRHF	- 1.00000
FSYRLGH	FEEDLTS		1.00000		
FYWHEAT	SPRWHEAT	-	33.30000	YRLGDE	- 3420.00000

	FYWHEAT	YRLGDP	-	248.00000	YRLGINT		1.00000
	FYWHEAT	MILL		1.00000			
	FYOAT	OATS	-	58.80000	YRLGDE	-	2600.00000
	FYOAT	YRLGDP	-	176.00000	YRLGINT		1.00000
	FYOAT	MILL		1.00000			
	FYBRLEYT	BARLEY	-	41.70000	YRLGDE	-	3120.00000
	FYBRLEYT	YRLGDP	-	168.00000	YRLGINT		1.00000
	FYBRLEYT	MILL		1.00000			
	FYLEGHYT	LEGHAY	-	1.00000	YRLGDE	-	1980.00000
	FYLEGHYT	YRLGDP	-	212.00000	YRLGINT		1.00000
	FYLEGHYT	YRLGRF		1.00000			
	FYMXHYT	MIXHAY	-	1.00000	YRLGDE	-	1980.00000
	FYMXHYT	YRLGDP	-	150.00000	YRLGINT		1.00000
	FYMXHYT	YRLGRF		1.00000			
	FYOATHYT	OATHAY	-	1.00000	YRLGDE	-	1800.00000
	FYOATHYT	YRLGDP	-	76.00000	YRLGINT		1.00000
	FYOATHYT	YRLGRF		1.00000			
	FYBLYHYT	YRLGDE	-	1920.00000	YRLGDP	-	86.00000
	FYBLYHYT	YRLGINT		1.00000	YRLGRF		1.00000
	FYGRSHYT	GRASSHAY	-	1.00000	YRLGDE	-	1680.00000
	FYGRSHYT	YRLGDP	-	88.00000	YRLGINT		1.00000
	FYGRSHYT	YRLGRF		1.00000			
	FYLEGSLT	LEGSIL	-	1.00000	YRLGDE	-	720.00000
	FYLEGSLT	YRLGDP	-	68.00000	YRLGINT		.35000
	FYLEGSLT	YRLGRF		.35000			
	FYGRNSLT	GRAINSIL	-	1.00000	YRLGDE	-	760.00000
	FYGRNSLT	YRLGDP	-	36.00000	YRLGINT		.30000
	FYGRNSLT	YRLGRF		.30000			
	FYGRSSLT	GRASSIL	-	1.00000	YRLGDE	-	520.00000
	FYGRSSLT	YRLGDP	-	34.00000	YRLGINT		.30000
	FYGRSSLT	YRLGRF		.30000			
	FYMXDSLT	MIXSIL	-	1.00000	YRLGDE	-	520.00000
	FYMXDSLT	YRLGDP	-	34.00000	YRLGINT		.30000
	FYMXDSLT	YRLGRF		.30000			
	FYSUMPST	PASTURE	-	5.00000	YRLGDE	-	1600.00000
	FYSUMPST	YRLGDP	-	80.00000	YRLGINT		1.00000
	FYSUMPST	YRLGRF		1.00000			
	FYSTRAWT	GMARGIN$	-	5.00000	CAPOPER		5.00000
	FYSTRAWT	YRLGPS		1.00000	STRAW	-	1.00000
	FYSTRAWT	YRLGDE	-	1800.00000	YRLGDP	-	28.00000
	FYSTRAWT	YRLGINT		1.00000	YRLGRF		1.00000
	FYSUPLMT	GMARGIN$	-	90.00000	CAPOPER		90.00000
	FYSUPLMT	YRLGDE	-	3200.00000	YRLGDP	-	560.00000
	FYSUPLMT	YRLGINT		1.00000	YRLGPS	-	20.00000
	FYSLFSTR	FATYRST		1.00000	GMARGIN$		245.00000
	FYSLFHFR	FATYRHF		1.00000	GMARGIN$		215.00000
	FEEDLOTS	GMARGIN$	-	6.00000	CAPOPER		2.00000
	FEEDLOTS	CAPBUILD		60.00000	FEEDLTM	-	1.00000
	FEEDLOTS	FEEDLTS	-	1.00000			
	MILLSIZE	GMARGIN$	-	400.00000	CAPOPER		400.00000
	MILLSIZE	MILL	-	100.00000			
RHS							
	CWSRHS	MAXDAIRY		40.00000	CAPALL		96000.00000
	CWSRHS	CAPLIMBR		40000.00000	CAPLIMOL		24000.00000

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CWSRHS	CAPLIMRE	40000.00000	CAPLIMRD	32000.00000
CWSRHS	CAPLIMMC	24000.00000	CAPLIMLV	16000.00000
CWSRHS	CAPLIMOP	16000.00000	CAPREAL1	40000.00000
CWSRHS	CAPBLDG2	24000.00000	CAPBLDG1	8000.00000
CWSRHS	CAPMACH2	12800.00000	CAPMACH1	12800.00000
CWSRHS	CAPLIVE2	8000.00000	CAPLIVE1	8000.00000
CWSRHS	CAPOPER2	8000.00000	CAPOPER1	8000.00000
CWSRHS	RENTNAT	128.00000	RENTCULT	128.00000
CWSRHS	BUYLAND	128.00000	WETNDR	2.56000
CWSRHS	WETCDR	6.16000	WETNAT	3.20000
CWSRHS	WETCULT	7.68000	NATLAND	28.00000
CWSRHS	CULTLAND	204.00000		
CWSRHS1	CULTLAND	25.50000	NATLAND	3.50000
CWSRHS1	WETCULT	.96000	WETNAT	.40000
CWSRHS1	BUYLAND	16.00000	WETCDR	.77000
CWSRHS1	WETNDR	.32000	RENTCULT	16.00000
CWSRHS1	RENTNAT	16.00000	CAPOPER1	1000.00000
CWSRHS1	CAPOPER2	1000.00000	CAPLIVE1	1000.00000
CWSRHS1	CAPLIVE2	1000.00000	CAPMACH1	1600.00000
CWSRHS1	CAPMACH2	1600.00000	CAPBLDG1	1000.00000
CWSRHS1	CAPBLDG2	3000.00000	CAPREAL1	5000.00000
CWSRHS1	CAPLIMOP	2000.00000	CAPLIMLV	2000.00000
CWSRHS1	CAPLIMMC	3000.00000	CAPLIMBD	4000.00000
CWSRHS1	CAPLIMRE	5000.00000	CAPLIMOL	3000.00000
CWSRHS1	CAPLIMBR	5000.00000	CAPALL	12000.00000
CWSRHS1	MAXDAIRY	5.00000		

ENDATA

APPENDIX B

EXAMPLE CONTROL PROGRAM FOR SENSITIVITY ANALYSIS

The following pages contain a listing of the computer control program for conducting a general sensitivity analysis on all resources. A control program for conducting a sensitivity analysis on other factors would be similar.

```
CONTROL PROGRAM COMPILER

0001                    PROGRAM
0002                    INITIALZ
0059                     TITLE('CWS WET EVAL SEN ANAL-CAPITAL -20%')
0060                    MOVE(XDATA,'CWSLP')
0061                    MOVE(XPBNAME,'CWSWETLD')
0062                    MOVE(XOBJ,'GMARGINS')
0063                    MOVE(XRHS,'CWSRHS')
0064                    CONVERT('SUMMARY')
0065                    MOVE(XDATA,'CWSREVIS')
0066                    MOVE(XPBNAME,'CWSWTLDR')
0067                    MOVE(XOLDNAME,'CWSWETLD')
0068                    REVISE('SUMMARY')
0069                     MOVE(XDATA,'CWSR1')
0070                    MOVE (XPBNAME,'CWSRHSSA')
0071                     MOVE(XOLDNAME,'CWSWTLDR')
0072                     REVISE('SUMMARY')
0073                     BCDOUT
0074                    SETUP('MAX')
0075                    CRASH
0076                    DUAL
0077                    PRIMAL
0078                    SOLUTION
0079                    RANGE
0080                     MOVE(XCHCOL,'CWSRHS1')
0081                    XPARAM=0.0
0082                    XPARMAX=2.0
0083                    XPARDELT=2.0
0084                     TITLE('CWS WET EVAL SEN ANAL-CAPITAL    0%')
0085                    PARARHS
0086                    SOLUTION
0087                    RANGE
0088                    XPARAM=0.0
0089                    XPARMAX=4.0
0090                    XPARDELT=4.0
0091                     TITLE('CWS WET EVAL SEN ANAL-CAPITAL +20%')
0092                    PARARHS
0093                    SOLUTION
0094                    RANGE
0095                    XPARAM=0.0
0096                    XPARMAX=7.0
0097                    XPARDELT=7.0
0098                     TITLE('CWS WET EVAL SEN ANAL-CAPITAL +50%')
0099                    PARARHS
0100                    SOLUTION
0101                    RANGE
0102                    EXIT
0103                    PEND
```