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Programmable Calculator Program: Input Form

Michigan State University

Cooperative Extension Service

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12 pages

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Michigan State University

# Cooperative Extension Service....

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TI-59  
TelCal 55:1

## PROGRAMMABLE CALCULATOR PROGRAM

**OBJECTIVE:** To balance a ration for a dairy cow given the requirements and feeds available. The program is designed to serve as a teaching aid in understanding Basic Dairy Nutrition.

# INPUT FORM

## Part I *Getting Started ...*



<u>STEP</u>	<u>INPUT DESCRIPTION</u>	<u>INPUT VALUE</u>	<u>PRESS</u>
1.	Turn calculator off, and back on, to clear program.		
2.	Insert side 1 of the card containing TelCal 55:1. If the calculator has read the card successfully, a "1" will appear and remain stationary. If a flashing "O" appears, repeat step 3 & 2.		
3.	Clear Display .....		(CLR)
4.	Insert side "2" of the card. If the calculator reads side 2 successfully, a "2" will appear and remain stationary. If a "O" appears, repeat steps 3 & 4.		
5.	Clear Display .....		(CLR)
6.	Clear Memory .....		(A)

(Continued on next page)



<u>STEP</u>	<u>INPUT DESCRIPTION</u>	<u>VALUE</u>	<u>PRESS</u>	<u>REVISED RATION</u>
7.	Estimated % Moisture of Ration (15% will not affect Dry Matter Intake) From Table 1.	__	(STO) 09	_____
8.	Weight of the cow (Cwt)	__	(STO) 10	_____
9.	Milk Production (lbs/day) (to nearest whole pound)	__	(STO) 11	_____
10.	Butterfat (%)	__	(STO) 12	_____

## For Your Farm . . . What is your Forage Program?

### FORAGE I. \_\_\_\_\_

11.	Pounds fed per day (to nearest pound)	__	(STO) 13	_____
12.	Dry Matter D.M.	__	(STO) 14	_____
13.	Total Protein C.P.	__	(STO) 15	_____
14.	Net Energy N.E. (MCal. lb.)	__	(STO) 16	_____
15.	Calcium	__	(STO) 17	_____
16.	Phosphorus	__	(STO) 18	_____

### FORAGE II. \_\_\_\_\_

17.	Pounds fed per day (to nearest pound)	__	(STO) 19	_____
18.	Dry Matter D.M.	__	(STO) 20	_____
19.	Total Protein C.P.	__	(STO) 21	_____
20.	Net Energy N.E. (MCal/lb)	__	(STO) 22	_____
21.	Calcium	__	(STO) 23	_____
22.	Phosphorus	__	(STO) 24	_____

*NOTE: To run program again as a revised ration, re-enter lines 8, 9, and 10, if you have run Part 2.  
This is not necessary when Part 2 has not been entered.*



STEP	INPUT DESCRIPTION	VALUE	PRESS	REVISED RATION
<b>YOUR GRAIN CHOICES</b>				
<b>GRAIN I.</b> _____				
23.	Enter proportion of Grains I & II, (dry basis) that is, Grain I as a decimal. If only one grain, line 23 is 1.00.	_____	(STO) 25	_____
24.	Dry Matter D.M.	_____	(STO) 26	_____
25.	Total Protein C.P.	_____	(STO) 27	_____
26.	Net Energy N.E. (MCal/lb)	_____	(STO) 28	_____
27.	Calcium	_____	(STO) 29	_____
28.	Phosphorus	_____	(STO) 30	_____
<i>NOTE: Grain I + Grain II = 1.0</i>				
<b>GRAIN II.</b> _____				
29.	% of Grain II in farm grain mix	_____	(STO) 31	_____
30.	Dry Matter D.M.	_____	(STO) 32	_____
31.	Total Protein C.P.	_____	(STO) 33	_____
32.	Net Energy N.E. (MCal/lb)	_____	(STO) 34	_____
33.	Calcium	_____	(STO) 35	_____
34.	Phosphorus	_____	(STO) 36	_____
<b>PROTEIN SUPPLEMENT</b> _____				
35.	Dry Matter D.M.	_____	(STO) 37	_____
36.	Total Protein C.P.	_____	(STO) 38	_____
37.	Net Energy (MCal)	_____	(STO) 39	_____
38.	Calcium	_____	(STO) 40	_____
39.	Phosphorus	_____	(STO) 41	_____



# Dry Matter is the Key . . .

<u>STEP</u>	<u>OUTPUT DESCRIPTION</u>	<u>PRESS</u>	<u>VALUE</u>	<u>REVISED RATION</u>
<b>REQUIREMENTS OF THE COW</b>				
40.	Dry Matter Intake (lbs/day)	B	_____	_____
41.	Total Protein needs (lbs/day)	R/S	_____	_____
42.	Net Energy (MCal/day)	R/S	_____	_____
43.	Calcium (lbs/day)	R/S	_____	_____
44.	Phosphorus (lbs/day)	R/S	_____	_____
45.	Magnesium (lbs/day)	R/S	_____	_____
46.	Sulfur (lbs/day)	R/S	_____	_____
<b>NUTRIENTS FROM FORAGES</b>				
47.	Dry Matter (lbs/day) <i>Warning: If Dry Matter of forage is greater than Dry Matter Intake (line 40), an error has been made. Re-adjust forages fed.</i>	R/S	_____	_____
48.	Total Protein (lbs/day)	R/S	_____	_____
49.	Net Energy (MCal/day)	R/S	_____	_____
50.	Calcium(lbs/day)	R/S	_____	_____
51.	Phosphorus (lbs/day)	R/S	_____	_____
<b>SUGGESTED AMOUNTS OF GRAINS TO FEED</b>				
52.	% Protein in grain mix (dry basis)	R/S	_____	_____
53.	Pounds of supplement/day lbs/Hd/day	R/S	_____	_____
54.	Pounds of Grain I/day lbs/Hd/day	R/S	_____	_____
55.	Pounds of Grain II/day lbs/Hd/day_____	(from next page)	_____	_____
56.	Pounds of Dry Matter from grains and supplement/day (lbs/day)	R/S	_____	_____
57.	Total Dry Matter from grains, supplement, and forages	R/S	_____	_____

*Warning: Dry Matter should not be greater than Dry Matter Intake (lines 57 & 40).*

**NOTE:** Press R/S again. This will cause a 0 to appear. This signifies the end of this program. DO NOT TURN CALCULATOR OFF OR CLEAR MEMORY (CLR). Go to program card 1a and 1b.



# Part 2

## DAIRY RATION BALANCER - 3 & 4

Enter second part of program. Do not turn off calculator or clear memory.

<u>STEP</u>	<u>ENTER PROGRAM</u>	<u>VALUE</u>	<u>PRESS</u>	<u>REVISED RATION</u>
1.	Clear Display.....		(CLR)	
2.	Enter card side 1b	<u>1</u>		
3.	Clear Display.....		(CLR)	
4.	Enter card side 2b	<u>2</u>		
5.	Clear Display.....		(CLR)	
6.	If you are feeding two farm grains, lbs/day of Grain II.	<u>        </u>	(2nd) B'	<u>        </u>
7.	To clear calculating memories		(C)	

### YOUR MINERAL PROGRAM!

<u>STEP</u>	<u>INPUT DESCRIPTION</u>	<u>VALUE</u>	<u>PRESS</u>	
	<b>MINERAL SUPPLEMENT No. 1</b>	<u>                                </u>		
	<i>(NOTE: Must contain phosphorus)</i>			
8.	Calcium (% Ca)	<u>  .  .  .  </u>	(STO) 42	<u>        </u>
9.	Phosphorus (% P)	<u>  .  .  .  </u>	(STO) 43	<u>        </u>
10.	Salt (%)	<u>  .  .  </u>	(STO) 44	<u>        </u>
	<b>MINERAL SUPPLEMENT NO. 2</b>	<u>                                </u>		
11.	Calcium (% Ca)	<u>  .  .  .  </u>	(STO) 45	<u>        </u>

## Here's Your Ration . . .

<u>STEP</u>	<u>OUTPUT DESCRIPTION</u>	<u>PRESS</u>	<u>VALUE</u>	
1.	Pounds of mineral I needed/day	D	<u>  .  .  .  </u>	<u>        </u>
2.	Pounds of mineral II needed/day	R/S	<u>  .  .  .  </u>	<u>        </u>



<u>STEP</u>	<u>OUTPUT DESCRIPTION</u>	<u>PRESS</u>	<u>VALUE</u>	<u>REVISED RATION</u>
3.	Pounds of salt needed/day	R/S	_____	_____
4.	Pounds of trace mineralized salt/day to include in ration	R/S	_____	_____
5.	Pounds of calcium in ration/day	R/S	_____	_____
6.	Pounds of calcium <u>required</u> /day	R/S	_____	_____
7.	Pounds of phosphorus in ration/day	R/S	_____	_____
8.	Pounds of phosphorus <u>required</u> /day	R/S	_____	_____
9.	Calcium/Phosphorus ratio	R/S	_____/1	_____
10.	Pounds of Protein in ration/day	R/S	_____	_____
11.	Pounds of Protein <u>required</u> /day	R/S	_____	_____
12.	MCal of net energy in ration/day	R/S	_____	_____
13.	MCal of net energy <u>required</u> /day	R/S	_____	_____
14.	Total lbs. of grain mix to feed/day	R/S	_____	_____
15.	% Protein in grain mix (as fed basis)	R/S	_____	_____

### GRAIN MIX

Proportion of grains, supplement, and minerals fed/day.

16.	Grain I (lbs)	R/S	_____	_____
17.	Grain II (lbs)	R/S	_____	_____
18.	Supplement (lbs)	R/S	_____	_____
19.	Mineral I (lbs)	R/S	_____	_____
20.	Mineral II (lbs)	R/S	_____	_____
21.	Trace Mineralized Salt (lbs)	R/S	_____	_____
22.	Total (lbs)	R/S	_____	_____

END OF PROGRAM

TABLE 1

<b>Forage Program</b>	<b>% Moisture of Total Ration</b>
Corn silage—minimum hay ...	45 - 50%
Half corn silage—half hay .....	30 - 35%
Haylage .....	20 - 35%
Dry hay .....	15 - 20%



# TABLE 2 FEED NUTRIENTS CHART

Feed Description	(1) Dry Matter	(2) Protein	(3) Net Energy MCal	(4) Ca.	(5) Phos.
<b>CONCENTRATES:</b>					
Alfalfa meal - 15%	.921	.161	0.47	.0132	.0024
Alfalfa meal - 17%	.930	.183	0.48	.0143	.0026
Alfalfa meal - 20%	.931	.215	0.50	.0162	.0029
Alfalfa meal - 22%	.927	.237	0.52	.0159	.0030
Barley	.89	.133	0.99	.0007	.0044
Beans, Navy	.90	.254	1.03	.0007	.0033
Beans, Soy	.90	.421	0.97	.0025	.0059
Beet Pulp	.91	.097	0.85	.0002	.0033
Brewers Grain, Dry	.93	.251	0.68	.0111	.0048
Corn, Shelled	.85	.108	.915	.0112	.0022
Corn Shelled - 30% Moisture	.70	.108	.915	.0112	.0022
Corn, Shelled - 30% Moisture w/Urea	.70	.122	.915	.0002	.0026
Corn, Cob	.86	.086	0.99	.0002	.0022
Corn, Cob - 30% Moisture	.70	.086	0.99	.0002	.0022
Corn, Cob - 30% Moisture w/Urea	.70	.196	0.99	.0002	.0022
Corn Gluten Feed	.85	.220	0.75	.0030	.0070
Corn Gluten Meal	.914	.472	0.88	.0113	.0038
Cotton Seed Meal	.93	.447	0.75	.0020	.0099
Flax	.938	.256	1.15	.0026	.0055
Hominy Feed	.897	.118	0.94	.0006	.0070
Linseed Oil Meal, Hydraulic	.91	.387	0.95	.0042	.0084
Linseed Oil Meal, Solvent	.91	.402	0.86	.0040	.0081
Meat Scraps	.94	.584	0.77	.0848	.0419
Meat & Bone Scraps	.94	.529	0.73	.1057	.0529
Molasses, Cane	.73	.041	0.81	.0066	.0009
Molasses, Beet	.78	.100	0.86	.0011	.0001
Oats, Ground	.90	.133	0.87	.0009	.0033
Rye	.895	.141	0.79	.0010	.0033
Soybean Oil Meal - 44%	.90	.508	1.01	.0029	.0064
Soybean Oil Meal - 50%	.92	.548	1.00	.0029	.0064
Speltz	.90	.120	0.85	.0009	.0033
Urea	1.00	2.810	0.00	.0000	.0000



# TABLE 2 FEED NUTRIENTS CHART

Feed Description	(1) Dry Matter	(2) Protein	(3) Net Energy MCal	(4) Ca.	(5) Phos.
<u>CONCENTRATES CON'T:</u>					
Wheat, Soft	.89	.115	1.07	.0029	.0064
Wheat, Hard	.901	.175	1.05	.0029	.0064
Wheat Bran, Hard	.90	.193	0.82	.0013	.0029
Wheat Bran, Soft	.90	.162	0.82	.0004	.0029
Wheat Shorts	.887	.191	0.76	.0014	.0092
Wheat Middlings	.896	.202	0.78	.0009	.0093
Wheat Mill Run	.90	.194	0.77	.0009	.0090
Wheat Screenings	.904	.169	0.83	.0009	.0040
Whey	.93	.133	0.60	.0100	.0080
Barley, Lightweight	.891	.134	0.68	.0007	.0036
Barley Screenings	.866	.134	0.80	.0007	.0037
Corn Cobs	.904	.028	0.35	.0012	.0004
Citrus Pulp	.901	.069	0.77	.0227	.0017
Fat, Beef Tallow	.005	.000	0.17	.0000	.0000
Feather Meal	.932	.944	0.67	.0000	.0000
Flat Screenings	.916	.178	0.71	.0040	.0047
Malt	.906	.158	0.85	.0000	.0052
Millet	.906	.132	0.80	.0006	.0033
Milo - 8% C.P.	.89	.088	0.86	.0004	.0033
Milo - 9% C.P.	.89	.100	0.86	.0004	.0035
Milo - 10% C.P.	.89	.111	0.86	.0004	.0037
Rice Mill	.90	.064	0.30	.0009	.0066
Sorghum Grain	.896	.124	0.94	.0004	.0034
Sunflower Meal	.943	.500	0.67	.0028	.0067
<u>MINERALS:</u>					
Di-Calcium Phosphate	1.00	.000	0.00	.2650	.2000
Bone Meal	1.00	.000	0.00	.3000	.1400
Mono-Sodium Phosphate	1.00	.000	0.00	.0000	.2200
Limestone	1.00	.000	0.00	.3830	.0000
Salt	1.00	.000	0.00	.3830	.0000
Magnesium Oxide	1.00	.000	0.00	.0000	.0000



# TABLE 2 FEED NUTRIENTS CHART

Feed Description	(1) Dry Matter	(2) Protein	(3) Net Energy MCal	(4) Ca.	(5) Phos.
<u>MINERALS CON'T:</u>					
Rock Phosphate	1.00	.000	0.00	.2400	.1800
Sodium Tri-Polyphosphate	.96	.000	0.00	.0000	.2500
Commercial Mineral Supplement	1.00	.000	0.00		
<u>ROUGHAGES:</u>					
Alfalfa Hay - PreBloom	.90	.211	0.49	.0150	.0030
Alfalfa Haylage - PreBloom	.50	.212	0.49	.0150	.0030
Alfalfa Haylage - PreBloom	.40	.212	0.49	.0150	.0030
Alfalfa Silage - PreBloom	.30	.212	0.49	.0150	.0030
Alfalfa Hay - Bud	.90	.184	0.47	.0124	.0023
Alfalfa Haylage - Bud	.50	.184	0.47	.0124	.0023
Alfalfa Haylage - Bud	.40	.184	0.47	.0124	.0023
Alfalfa Silage - Bud	.30	.184	0.47	.0124	.0023
Alfalfa Hay - 1/2 Bloom	.90	.169	0.44	.0133	.0022
Alfalfa Haylage - 1/2 Bloom	.50	.169	0.44	.0133	.0022
Alfalfa Haylage - 1/2 Bloom	.40	.169	0.44	.0133	.0022
Alfalfa Silage - 1/2 Bloom	.30	.169	0.44	.0133	.0022
Alfalfa Hay - Full Bloom	.90	.156	0.42	.0126	.0020
Alfalfa Haylage - Full Bloom	.50	.156	0.42	.0126	.0020
Alfalfa Haylage - Full Bloom	.40	.156	0.42	.0126	.0020
Alfalfa Silage - Full Bloom	.30	.156	0.42	.0126	.0020
Alfalfa Hay - Severe Rain Damage	.90	.123	0.33	.0119	.0021
Mix Hay - Alfalfa & Brome	.89	.126	0.44	.0081	.0026
Mixed Haylage - Alfalfa & Brome	.50	.126	0.44	.0081	.0026
Mixed Haylage - Alfalfa & Brome	.40	.126	0.44	.0081	.0026
Mixed Silage - Alfalfa & Brome	.30	.126	0.44	.0081	.0026
Mixed Hay - Alfalfa & Timothy	.89	.118	0.43	.0081	.0024
Mixed Haylage - Alfalfa & Timothy	.50	.118	0.43	.0081	.0024
Mixed Haylage - Alfalfa & Timothy	.40	.118	0.43	.0081	.0024
Mixed Silage - Alfalfa & Timothy	.30	.118	0.43	.0081	.0024
Mixed Hay - Clover & Timothy	.88	.101	0.43	.0070	.0020
Mixed Haylage - Clover & Timothy	.50	.101	0.43	.0070	.0020
Mixed Haylage - Clover & Timothy	.40	.101	0.43	.0070	.0020



# TABLE 2 FEED NUTRIENTS CHART

Feed Description	(1) Dry Matter	(2) Protein	(3) Net Energy MCal	(4) Ca.	(5) Phos.
<b>ROUGHAGES CON'T:</b>					
Mixed Silage - Clover & Timothy	.30	.101	0.43	.0070	.0020
Brome Grass Hay - Flower Stage	.90	.084	0.54	.0043	.0028
Brome Grass Hay - Mature Stage	.94	.063	0.38	.0031	.0014
Clover Hay - Alsike	.88	.147	0.50	.0131	.0025
Clover Hay - Red	.88	.149	0.47	.0161	.0022
Clover Hay - Stemmy	.883	.118	0.41	.0127	.0023
Orchard Grass Hay	.88	.127	0.43	.0045	.0038
Timothy Hay - PreBloom	.87	.136	0.51	.0066	.0035
Timothy Hay - Mid-Bloom	.88	.085	0.44	.0041	.0018
Timothy Hay - Late Bloom	.87	.078	0.40	.0034	.0021
Alfalfa Pasture (Gr.Ch.) Pre-1/2 Bloom	.18	.206	0.45	.0150	.0030
Alfalfa Pasture (Gr.Ch.) 1/2-Full Bloom	.253	.156	0.42	.0126	.0028
Alfalfa & Brome Pasture (Gr. Chop)	.205	.120	0.44	.0097	.0026
Alfalfa & Timothy Pasture (Gr. Chop)	.219	.110	0.44	.0089	.0023
Clover Pasture (Gr. Chop) - Alsike	.22	.148	0.50	.0131	.0025
Clover Pasture (Gr. Chop) - Red	.181	.150	0.47	.0150	.0028
Sorghum & Sudan Silage (Late)	.26	.085	0.50	.0042	.0015
Sorghum & Sudan Silage (Early)	.16	.140	0.57	.0064	.0023
Oat Hay	.881	.098	0.42	.0023	.0021
Prairie Hay	.907	.066	0.37	.0036	.0013
Bermuda Grass Hay (Common)	.90	.078	0.36	.0041	.0021
Bermuda Grass Hay (Coastal)	.90	.102	0.46	.0030	.0020
Corn Silage	.32	.092	0.62	.0033	.0027
Corn Silage w/Urea @ 8 lb/ton	.32	.115	0.71	.0028	.0022
Corn Silage w/Urea @ 10 lb/ton	.32	.124	0.71	.0028	.0022
Corn Silage w/Urea @ 12 lb/ton	.32	.135	0.71	.0028	.0022
Corn Silage w/Urea @ 15 lb/ton	.32	.146	0.71	.0028	.0022
Corn Silage w/Prosil @ 50 lb/ton	.32	.146	0.73	.0050	.0050
Corn Silage (Low Moisture)	.50	.075	0.61	.0020	.0022
Corn Silage (High Magnesium)	.32	.080	0.75	.0028	.0022
Barley Straw	.90	.041	0.25	.0036	.0011
Barley Silage (Boot)	.724	.115	0.58	.0030	.0030
Barley Silage (Flower)	.655	.093	0.50	.0030	.0030
Barley Silage (Dough)	.68	.088	0.48	.0030	.0030
Corn Stalks	.906	.065	0.30	.0060	.0010



# TABLE 2 FEED NUTRIENTS CHART

Feed Description	(1) Dry Matter	(2) Protein	(3) Net Energy MCal	(4) Ca.	(5) Phos.
ROUGHAGES CON'T:					
Milo Green Chop	.227	.079	0.50	.0039	.0022
Milo Stalks	.91	.035	0.26	.0064	.0012
Milo Heads	.40	.089	0.70	.0016	.0030
Oat Silage (Flower)	.30	.140	0.60	.0033	.0030
Oat Silage (Dough)	.30	.120	0.47	.0033	.0030
Rye Silage (Boot)	.672	.131	0.55	.0060	.0055
Rye Silage (Flower)	.60	.088	0.44	.0060	.0055
Rye Silage (Dough)	.608	.072	0.41	.0060	.0055
Wheat Silage (Boot)	.568	.149	0.55	.0040	.0036
Wheat Silage (Flower)	.542	.114	0.51	.0040	.0036
Wheat Silage (Dough)	.675	.086	0.44	.0014	.0022
Cottonseed Hulls	.907	.043	0.32	.0014	.0007
Peanut Hulls	.923	.019	0.04	.0028	.0007
Rice Hulls	.92	.016	0.15	.0011	.0008
Rice Hulls (Ammoniated)	.92	.111	0.15	.0011	.0008



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