EXTENSION BULLETIN E-1376

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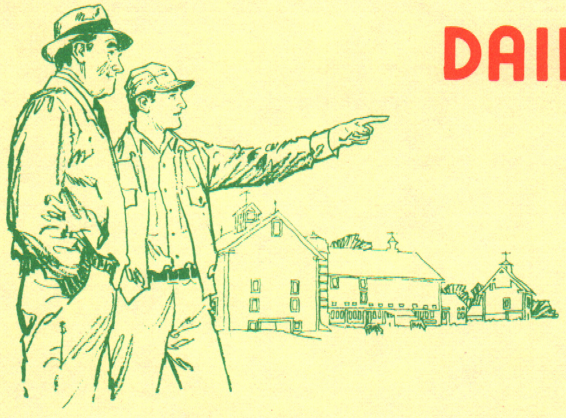
TI-59
TelCal 55:1

PROGRAMMABLE CALCULATOR PROGRAM



DAIRY RATION BALANCER

A SELF TEACHING PACKET

INSTRUCTION for 55:1

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1855

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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.

Part I *Getting Started ...*

STEP	INPUT DESCRIPTION	INPUT VALUE	PRESS
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)

PART 1 Getting Started

Procedure

The purpose of this self-teaching programmable calculator packet is to help you, the modern dairyman, design a practical ration for your milk cows. You will find several tables to assist you, starting on page 6.

Let's get acquainted with the **TI-59 Programmable Calculator (Figure 1).**

The popularity of hand-held calculators is indeed impressive, with total sales of pocket calculators now numbering in the millions.

As you will see, a programmable calculator can actually function as a complete computer system, greatly increasing its range of applications. It is likely that future innovations in programmable calculators will appear in the marketplace with increasing frequency.

Locate the switch. You will find it at the very top left hand corner. Once you have turned the calculator on, you will see a red zero appear at the right hand side of the display board.

Now we must load in the program instructions. To do this, place the first program card into the slot on the right side of the calculator. As the card is inserted, you will hear the drive motor activate. Continue to push the card into the slot until the drive wheels start pulling the card from your fingers. At this point, let go—the calculator will do the rest. A red "1" will appear on the display board if the card was successfully read. Pull the card out of left hand side. A flashing number means there is a problem, and you should press Clear Display (CLR) and repeat. After side one (1) has been read, press Clear Display (CLR), turn card to opposite end with the brown side up and repeat the reading process to enter side two (2). Once again, a red "2" should appear on the display.

Clear Display .....**(CLR)**

Clear Memory .....**(A)**

We suggest that you first work through the example illustrated in this manual. This will give you confidence in entering information into the calculator and will check to see that your calculator is working properly. If your answers do not match ours, check your inputs as illustrated on page 3. If your answers still don't agree, re-enter your program card. However, **do not press A.** Simply press B for output. If you are still having problems, a problem lies in your program card or calculator. Call your agent for assistance.

Proceed to page 2

STEP	INPUT DESCRIPTION	VALUE	PRESS	REVISED RATION
7.	Estimated % Moisture of Ration (15% will not affect Dry Matter Intake) From Table 1.	45	(STO) 09	
8.	Weight of the cow (Cwt)	14.0	(STO) 10	
9.	Milk Production (lbs/day) (to nearest whole pound)	60	(STO) 11	
10.	Butterfat (%)	4.0	(STO) 12	

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

FORAGE I. Corn Silage

11.	Pounds fed per day (to nearest pound)	45	(STO) 13	
12.	Dry Matter D.M.	.37	(STO) 14	
13.	Total Protein C.P.	.092	(STO) 15	
14.	Net Energy N.E. (MCal. lb.)	.62	(STO) 16	
15.	Calcium	.0033	(STO) 17	
16.	Phosphorus	.0027	(STO) 18	

FORAGE II. Alfalfa Hay

17.	Pounds fed per day (to nearest pound)	10	(STO) 19	
18.	Dry Matter D.M.	.87	(STO) 20	
19.	Total Protein C.P.	.170	(STO) 21	
20.	Net Energy N.E. (MCal/lb)	.45	(STO) 22	
21.	Calcium	.0134	(STO) 23	
22.	Phosphorus	.0028	(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.

The first step in balancing your ration is to determine the nutrient requirements of your dairy cow. We can calculate this requirement by knowing the cow's weight, milk production, and butterfat test.

Appetite is an often-overlooked factor in ration balancing. Although there are many factors which influence appetite, such as feed quality, we can calculate the actual quantity of feed a cow should consume and report this as dry matter consumed in pounds per day. Besides feed quality and palatability, moisture of the feed is the most important factor to consider in consumption. **High moisture silages tend to reduce dry matter consumption.**

In order to receive the best possible answer, we are asking you to think about the moisture content of the feeds you are feeding. After doing that, look at Table 1 and choose what you consider is the appropriate moisture level of a ration composed of your feeds. Enter this number on line 7 of the input form. After running this program, you may want to "fine tune" this number and rerun the program. We encourage you to do so. However, if you do not want the moisture content of your feeds to influence dry matter intake, place the number 15 on line 7.

Stage of lactation also affects appetite. During the first 2 to 4 weeks of lactation, appetite is low but gradually increases until it peaks at about the same time as peak milk production. Thereafter, appetite declines at a rate similar to the lactation curve and is only about 70% of peak appetite by the 10th month of lactation.

Place the **average weight (in cwt)** of the group of cows you are balancing for on line 8. Example: Average wt. - 1,400 lbs. = 14.0 (cwt).

Place **milk production desired** on line 9. Example **60 lbs.**

Place **butterfat test desired** on line 10. Example 4.0%.

What Is Your Forage Program?

This program lets you decide what forages you want to feed and in what quantities. The calculator will then match available grains to equal maintenance and production.

Choose the **amount of Forage 1** to be fed and place on line 11.

The nutritional information of your forage can be found in Table 2 and should be entered on lines 12 through 16.

Choose the amount of Forage 2 to be fed and place on line 17. Likewise, fill in the nutritional values from Table 2 on lines 18 through 22.

Proceed to page 3

STEP	INPUT DESCRIPTION	VALUE	PRESS	REVISED RATION
	YOUR GRAIN CHOICES			
	GRAIN I. Shelled Corn			
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.	0.80	(STO)25	
24.	Dry Matter D.M.	.77	(STO) 26	
25.	Total Protein C.P.	.108	(STO) 27	
26.	Net Energy N.E. (MCal/lb)	0.915	(STO) 28	
27.	Calcium	.0012	(STO) 29	
28.	Phosphorus	.0022	(STO) 30	
	NOTE: Grain I + Grain II = 1.0			
	GRAIN II. Ground Oats			
29.	% of Grain II in farm grain mix	.20	(STO) 31	
30.	Dry Matter D.M.	.90	(STO) 32	
31.	Total Protein C.P.	.133	(STO) 33	
32.	Net Energy N.E. (MCal/lb)	0.87	(STO) 34	
33.	Calcium	.0009	(STO) 35	
34.	Phosphorus	.0033	(STO) 36	
	PROTEIN SUPPLEMENT Soybean Meal 44%			
35.	Dry Matter D.M.	.90	(STO) 37	
36.	Total Protein C.P.	.508	(STO) 38	
37.	Net Energy (MCal)	1.00	(STO) 39	
38.	Calcium	.0029	(STO) 40	
39.	Phosphorus	.0064	(STO) 41	

Your Grain Choices.

This program will allow you to feed two grains and a protein supplement. However, you must decide in what proportion to each other. On line 23, place how much of Grain I will be considered of the two grains. The same applies to Grain II on line 29.

Example: Grain I will be 80% of grains (Shelled Corn)
Grain II will be 20% of grains (Ground Oats)
Line 23 = .10
Line 29 = .20
Line 23 + 29 must = 1. If there is no Grain II, then Grain I = 1.00.

Nutritional information of your grain may be obtained from Table 3 and placed on lines 24 through 28, and 35 through 39. Do this the same way you did the forages.

The protein supplement may be soybean meal or a commercial supplement. Place this information on lines 35 through 39.

Now let's enter the information into the calculator. To place the value of a particular line in the calculator, use the numeric keys. Then press the store button (STO) located in the programming keys and then the storage number (numeric keys). **See Figure 1.**

Example: Line 24 is .77

Press	Display
.77	.77
STO	.77
24	.77

Enter lines 7 through 39 into the calculator in the fashion described above. Remember to enter those decimals and zeros which are printed for you on the input form.

Oops! Did I make an error?

At this point you may be wondering if you made a mistake in entering your information. Let's ease our conscience and check a couple. To do so, press the recall (RCL) button and the storage location you wish to check.

Example: Check line 35, which is 90% D.M. Simply recall storage 37.

Press	Display
RCL	previous number on display
37	.90

NOTE: Need to change an entry? Simply enter the new number on the display and then press the storage location it is to replace.

Proceed to page 4

Dry Matter is the Key . . .

STEP	OUTPUT DESCRIPTION	PRESS	VALUE	REVISED RATION
40.	Dry Matter Intake (lbs/day)	B	43.05	
41.	Total Protein needs (lbs/day)	R/S	6.6	
42.	Net Energy (MCal/day)	R/S	31	
43.	Calcium (lbs/day)	R/S	.29	
44.	Phosphorus (lbs/day)	R/S	.147	
45.	Magnesium (lbs/day)	R/S	.081	
46.	Sulfur (lbs/day)	R/S	.081	
47.	Dry Matter (lbs/day)	R/S	25.4	
	Warning: If Dry Matter of forage is greater than Dry Matter Intake (line 40), an error has been made. Re-adjust forages fed.			
48.	Total Protein (lbs/day)	R/S	3.01	
49.	Net Energy (MCal/day)	R/S	14.3	
50.	Calcium(lbs/day)	R/S	.171	
51.	Phosphorus (lbs/day)	R/S	.069	
52.	% Protein in grain mix (dry basis)	R/S	20.3	
53.	Pounds of supplement/day lbs/Hd/day	R/S	4.46	
54.	Pounds of Grain I/day lbs/Hd/day	R/S	14.2	
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	17.7	
57.	Total Dry Matter from grains, supplement, and forages	R/S	43.06	
	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.

Now, you're ready for the output of Part 1.

If you have been following the example in this packet, you should receive answers very close to those on the opposite page. They may not be exactly the same due to rounding off.

Press the B Key and you will see your first answer appear. Write this down on the output portion of your form (or check sample).

Press the R/S key, and each answer will appear in order. Write these down on the output portion of your form (or check sample).

What happened? The calculator went through the program you read into it on the card, added the information you stored in its memory, and then calculated these results. Let's look at them.

Lines 40 and 41 are the nutrient requirements of your cow. In other words, she must have these nutrient levels to achieve the production you requested. Magnesium and sulfur requirements are given for your consideration but are not balanced for in the mineral calculations. **Line 40** is especially important because the most frequent failure of a ration is in the cow's inability to consume enough dry matter to give sufficient nutrients.

Lines 47 through 51 are the nutrients supplied by the forages. Another quick check to see if things are going properly is line 47. If the dry matter of line 47 is close or exceeds the D.M.I. of line 40, your cow will not be able to eat enough of this ration to achieve production. Remember, **you supplied the roughages and the quantity you wanted to feed.**

Suggested Amounts of Grains to Feed.

In lines 52 through 57 the calculator does its work. It takes the nutrients supplied by the forages and subtracts them from the requirements of your cow. This leaves the nutrients to be supplied by the grain mix. The calculator then formulates the grains and protein supplement to meet these needs. Don't become concerned about Grain II. We will catch it in Part 2, line 6. However, don't overlook line 56. Total dry matter of the ration has to be less or equal to dry matter intake. **If line 57 is greater than line 40,** we suggest you take a close look at your forage program and rerun Part 1. If everything looks good to you now, let's proceed to Part 2.

It is interesting to note that **energy** comprises 70 to 80% of the total nutrient requirements of your ration. Protein comprises 10 to 15% of the total dietary requirements. Minerals catch some 1% between the two. The formulas we used for making these calculations are in the user's manual. You are welcome to review them at your convenience.

NOTE: So you want to change some portion of Part 1. To do this, enter the correct value on the display and press the storage (STO) location to be changed. All other information will remain the same. To receive your new answers press B.

Proceed to page 5

Part 2

DAIRY RATION BALANCER - 3 & 4

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

STEP	ENTER PROGRAM	VALUE	PRESS
1.	Clear Display		(CLR)
2.	Enter card side 1b	1	
3.	Clear Display		(CLR)
4.	Enter card side 2b	2	
5.	Clear Display		(CLR)
6.	If you are feeding two farm grains, lbs/day of Grain II.	3.0	(2nd) B′
7.	To clear calculating memories		(C)

YOUR MINERAL PROGRAM!

STEP	INPUT DESCRIPTION	VALUE	PRESS
	MINERAL SUPPLEMENT No. 1 *(NOTE: Must contain phosphorus)*	Dicalcium Phosphate	
8.	Calcium (% Ca)	.265	(STO) 42
9.	Phosphorus (% P)	.200	(STO) 43
10.	Salt (%)	.00	(STO) 44
	MINERAL SUPPLEMENT NO. 2	Limestone	
11.	Calcium (% Ca)	.383	(STO) 45

Here's Your Ration . . .

STEP	OUTPUT DESCRIPTION	PRESS	VALUE
1.	Pounds of mineral I needed/day	D	.09
2.	Pounds of mineral II needed/day	R/S	.17

REVISED RATION

PART 2.

At this point in the program we must enter more instructions into the calculator. To do this, follow these steps:

	Valve	Press
Clear Display		(CLR)
Enter card 2 Side 1	1	
Clear Display		(CLR)
Enter card 2 Side 2	2	
Clear Display		(CLR)

Your Second Grain!

In order to obtain the output of Grain II, press the yellow second key (2nd) and then the (B) key. Place this answer on line 6. You may also want to place this answer on line 55 of page 4.

To clear the calculating memories, press the (C) key.

Your Mineral Program!

Lines 8 through 12 show the input values of your minerals. Here is the way this program balances for minerals. Mineral I must contain Phosphorus because the Phosphorus requirement of your cow will be met by this mineral. The Calcium requirement will be met by Mineral II **if need be.** So Mineral II need not have Phosphorus.

This is Your Ration!

Lines 1 and 2 are the pounds of Mineral I and II needed by your cow per day. To convert pounds to ounces multiply by 16.

Proceed to page 6

STEP	OUTPUT DESCRIPTION	PRESS	VALUE	REVISED RATION
3.	Pounds of salt needed/day	R/S	.193	
4.	Pounds of trace mineralized salt/day to include in ration	R/S	.193	
5.	Pounds of calcium in ration/day	R/S	.29	
6.	Pounds of calcium required/day	R/S	.29	
7.	Pounds of phosphorus in ration/day	R/S	.147	
8.	Pounds of phosphorus required/day	R/S	.147	
9.	Calcium/Phosphorus ratio	R/S	1.97/1	
10.	Pounds of Protein in ration/day	R/S	6.6	
11.	Pounds of Protein required/day	R/S	6.6	
12.	MCal of net energy in ration/day	R/S	31	
13.	MCal of net energy required/day	R/S	31	
14.	Total lbs. of grain mix to feed/day	R/S	22.2	
15.	% Protein in grain mix (as fed basis)	R/S	16.2	

GRAIN MIX

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

16.	Grain I (lbs)	R/S	641	
17.	Grain II (lbs)	R/S	137	
18.	Supplement (lbs)	R/S	201	
19.	Mineral I (lbs)	R/S	4	
20.	Mineral II (lbs)	R/S	8	
21.	Trace Mineralized Salt (lbs)	R/S	9	
22.	Total (lbs)	R/S	1,000	

END OF PROGRAM

This Program Available Through

Agriculture and Natural Resources Education Institute
410 Agriculture Hall (517) 355-6580
Michigan State University East Lansing, Michigan 48824

Your Ration

As you can see, this page is the listing of the nutritive information for your ration. You see that the required nutrients are **always** met.

However, your cow **may not** achieve the indicated production for several reasons.

1) **Poor feed quality**
2) **Poor feed consumption**
3) **An error in estimating cow weight**
4) **Environmental stress**
5) **Biological stress**

We hope that, in balancing rations, you will learn the value of high quality feeds, and the challenge of getting your cows to eat enough of your ration.

Part 2 of this program may be repeated as many times as necessary. In doing so, do not press (C) as doing this will require re-entering the mineral nutrients.

An added word of caution

If you use two forages and/or two grains and then decide to drop one, be certain to enter a "0" in lbs. of Roughage II fed and change percentage of Grain I to 1.00 and enter a "0" in percentage of Grain II fed.

With the aid of the Dairy Ration Balancer Calculator Program, you have just become acquainted with some of the most important concepts in dairy cattle nutrition. We hope you will want to learn more. Extension Bulletin, E-702 **Basic Dairy Nutrition,** is a good reference to study.

As you work with this program, you will probably discover its limitations. When you do, you are ready for more sophisticated programs. The MSU dairy department has an excellent calculator program, and TelPlan 31 is a computer program that balances the complete ration on a least-cost basis and is available through your County Extension Office.

Credits: Our thanks are extended to Mary Search, Extension Home Economist; and Don Gregg, MSU Information Services, who edited this material and made many helpful suggestions. We also thank Dr. J. W. Thomas and Joe Hlubik who provided the technical equations and checked these results against current Dairy Department recommendations.

TABLE 1

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

FIGURE 1—A Programmable Calculator

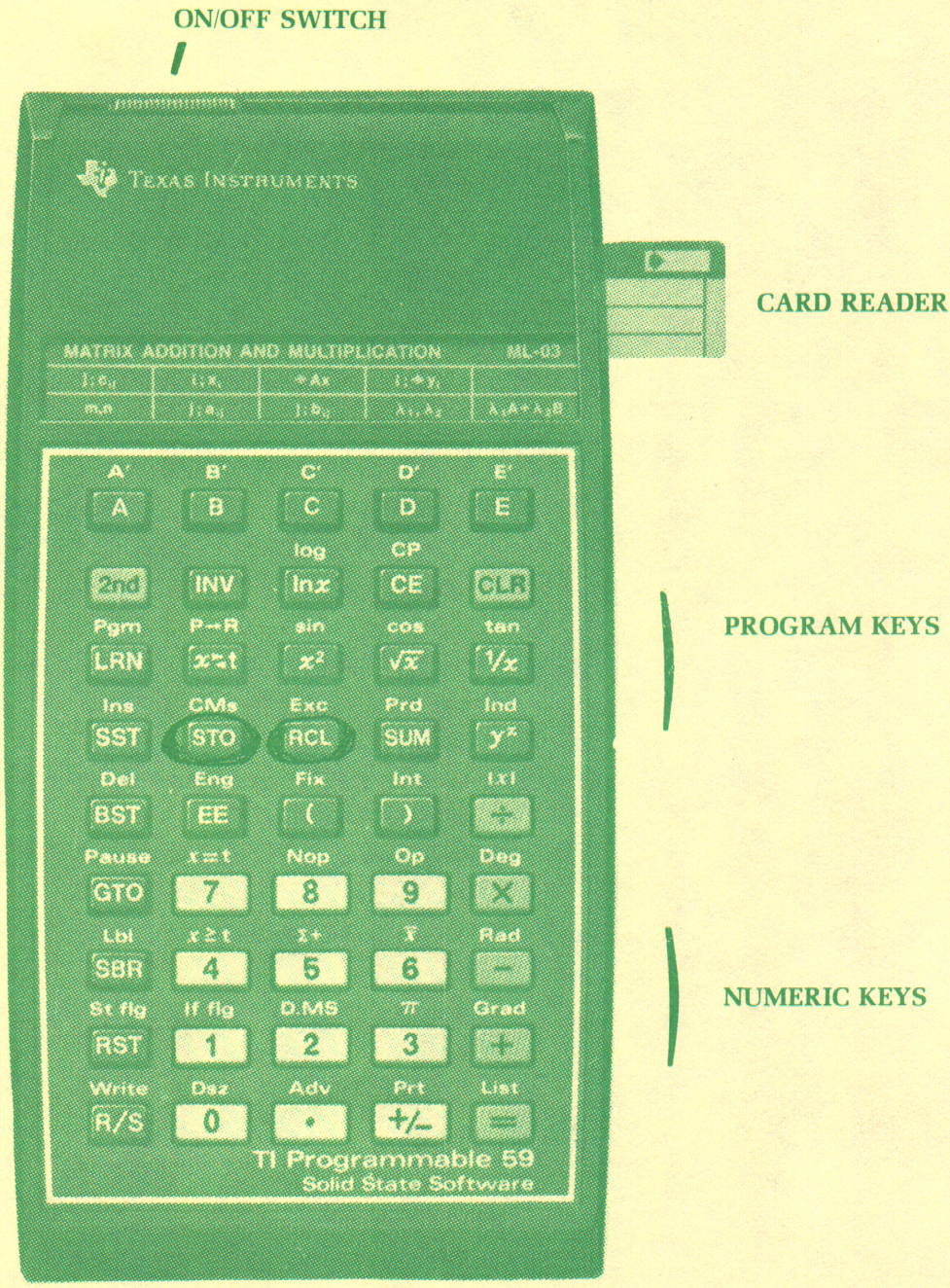

TABLE 2 FEED NUTRIENTS CHART

Feed Description	(1) Dry Matter	(2) Protein	(3) Net Energy MCal	(4) Ca.	(5) Phos.
CONCENTRATES:					
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	.0011	.0048
Corn, Shelled	.85	.108	.915	.0012	.0022
Corn Shelled - 30% Moisture	.70	.108	.915	.0012	.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	.0013	.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.
CONCENTRATES CON'T:					
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
MINERALS:					
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.
MINERALS CON'T:					
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		
ROUGHAGES:					
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.
ROUGHAGES CON'T:					
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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