

# Dairy Ration Estimation

By G. W. Atkeson, Ag. Agent, Ionia-Montcalm Co.;  
J. W. Thomas & C. Meadows (Retired), Animal Science Dept.;  
J. R. Shaltry, Regional Dairy Agent, East-Central

## How to Figure Your Ration Needs:

Follow the example first — then use the Dairy Ration Estimation Tables (p. 4) to calculate your own ration. (Open bulletin flat for ease in using tables.)

## Procedure

- TABLE A, Requirements.** Select the desired pounds (lb) of milk in column 1. The lb of TDN and lb crude protein required for a 1,300 lb cow producing 3.5% milk is opposite this value (columns 2 and 3). Enter these two values in line a of TABLE F.
- TABLES B, C AND D, Feed Sources.** Select the lb of hay, haylage, corn silage and/or corn fed. "Average" hay (haylage) = 13% crude protein content on a dry basis; "good" = 16.7% and "excellent" = 20%. In lines to the right of lb fed is lb of TDN and crude protein in that amount of feed. Record these TDN and protein amounts in lines b, c, d, and e of TABLE F. Then add these lines for lb TDN and lb protein from these feeds, and enter this sum on line f of TABLE F.
- CALCULATE** lb TDN and lb protein still needed by subtracting line f from line a, to obtain line g.
- Use the value for lb TDN still needed from line g and locate approximate lb TDN needed in column 1 of TABLE E, Grain mix.
  - Corresponding value in Column 2 of TABLE E is lb grain to be fed/cow/day to furnish that amount of TDN needed.
  - To the right of lb TDN needed, locate a value nearest to the lb protein needed on that same line. Now, you can determine the protein percent (%) needed in that amount of grain. (Since 2.7 is between 2.5 and 2.9, 15% protein is needed.) To calculate grain ingredients needed to achieve that % protein, follow instructions on next page.

## EXAMPLE RATION — TABLE F

		1b TDN	1lb Protein
(a) Requirements for:	55 lb milk	32.0	6.0
(b) Nutrients in forages and corn fed	6 lb hay , good	3.3	0.9
(c)	14 lb haylage, 50% moisture, good	4.4	1.2
(d)	20 lb corn silage 0 NPN	4.4	0.5
(e)	10 lb HM corn (shelled)	<u>6.6</u>	<u>0.7</u>
(f) Total nutrients		18.7	3.3
(g) Nutrients still needed (subtract line f from line a)		13.3	2.7

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## MY RATION #1 — TABLE F

		lb TDN	lb Protein
(a) Requirements for:	___ lb milk	___	___
(b) Nutrients in forages and corn fed	___ lb hay , ___	___	___
(c)	___ lb haylage, ___% moisture, ___	___	___
(d)	___ lb corn silage ___ NPN	___	___
(e)	___ lb HM corn (___)	==	==
(f) Total nutrients		___	___
(g) Nutrients still needed (subtract line f from line a)		___	___

## MY RATION #2 — TABLE F

		lb TDN	lb Protein
(a) Requirements for:	___ lb milk	___	___
(b) Nutrients in forages and corn fed	___ lb hay , ___	___	___
(c)	___ lb haylage, ___% moisture, ___	___	___
(d)	___ lb corn silage ___ NPN	___	___
(e)	___ lb HM corn (___)	==	==
(f) Total nutrients		___	___
(g) Nutrients still needed (subtract line f from line a)		___	___

### Example Calculation of Grain Mix Proportions

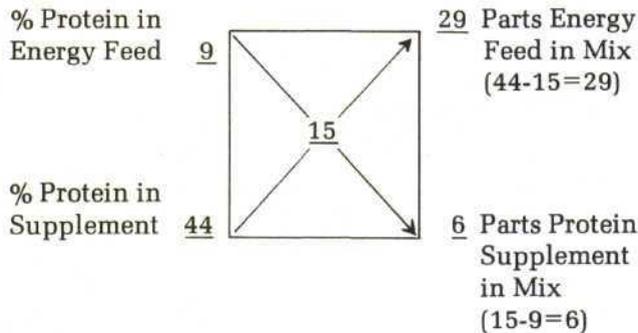
Desired Batch Size: 3,000 lb

Desired Crude Protein: 15%

Available ingredients:

Energy feed (shelled corn: 9% crude protein)

Protein supplement (soybean meal: 44% crude protein)



35 Total Parts in Grain Mix

### COMPOSITION OF GRAIN MIX:

(1) parts energy feed ÷ total parts in grain mix = fraction or percent of energy feed

$$(29 \div 35 = .829 \text{ or } 82.9\%)$$

(2) parts protein feed ÷ total parts in grain mix = fraction or percent of energy feed

$$(6 \div 35 = .171 \text{ or } 17.1\%)$$

(3) total batch size × fraction of energy feed = pounds of energy feed

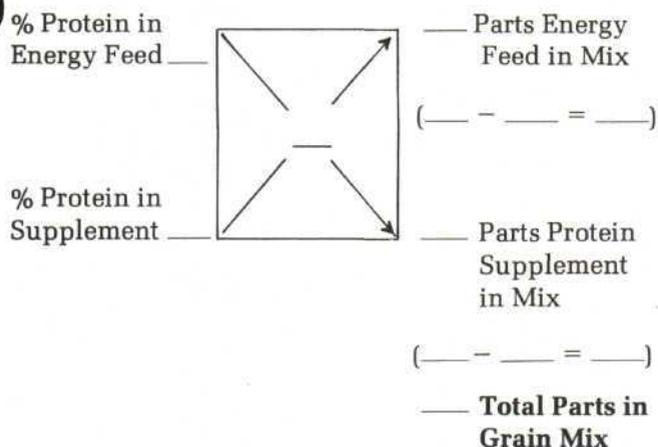
$$(3,000 \times .829 = 2,487)$$

(4) total batch size × fraction of protein feed = pounds of protein feed

$$(3,000 \times .171 = 513)$$

YOUR DESIRED BATCH SIZE \_\_\_\_\_ (lb)

YOUR DESIRED CRUDE PROTEIN \_\_\_\_\_ (%)



### COMPOSITION OF GRAIN MIX

(1) parts energy feed ÷ total parts in grain mix =  
fraction or percent of energy feed  
(\_\_\_\_\_ ÷ \_\_\_\_\_ = \_\_\_\_\_ or \_\_\_\_\_%)

(2) parts protein feed ÷ total parts in grain mix =  
fraction of percent of energy feed  
(\_\_\_\_\_ ÷ \_\_\_\_\_ = \_\_\_\_\_ or \_\_\_\_\_%)

(3) total batch size × fraction of energy feed =  
pounds of energy feed  
(\_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_)

(4) total batch size × fraction of protein feed =  
pounds of protein feed  
(\_\_\_\_\_ × \_\_\_\_\_ = \_\_\_\_\_)

### Example — Using a Mixture of Home Grown Feeds

Feeds	Proportions Available	Crude Protein %	Calculating Crude Protein in Mixture
Oats (32 lb/bu)	1/4	12	.25 × 12 = 3.0
Corn (56 lb/bu)	1/2	9	.5 × 9 = 4.5
Barley (48 lb/bu)	1/4	13	.25 × 13 = <u>3.25</u>
			10.75

Thus, there is 10.75% crude protein in a combination of 1/4 oats (.25), 1/2 corn (.50), 1/4

barley (.25) by weight. Round off to 11% and use 11 in center of Pierson square to calculate amount of this mixture to use with your protein supplement. Same procedure can be used when two or more roughages are fed.

## Thumb Rules

### MINERALS

1. Add 1% trace mineral salt to a grain mix, or add 1/2% trace mineral salt to a total mixed ration (TMR).
2. Add 1% dicalcium phosphate or proper mineral mix to a grain mix, or 1/2% mineral mix to a TMR, or more specifically:
  - a) Rations high in corn silage should be supplemented with a high calcium (Ca) (15-20%) and low phosphorus (P) (6-12%) mineral (2:1)
  - b) Alfalfa diets should be supplemented with a high P (14-18%) and low Ca (0-8%) mineral.
  - c) Rations consisting of 1/2 corn silage and 1/2 alfalfa should be supplemented with a low Ca (10%) and moderate P (12-18%) mineral (1:1)

### FEEDING

3. Maximum grain consumption in a milking parlor is 12-18 lb/cow/day (6-9 lb/milking).
4. For good rumination and to attain maximum intake feed 3 to 5 lb (or more) of long stemmed hay/cow/day.
5. Provide continuous access to a fresh water source.
6. It takes 1.24 lb of high moisture corn to equal nutrients in 1.0 lb of dry corn.
7. Dry matter intake =  
(2 + (.02 × \_\_\_ lb milk)) × \_\_\_ cwt body wt
8. Use proper "lead factor" at Step 1 — TABLE A.

This ration estimation only evaluates energy and protein needs. More complete ration balancing programs are available using the MSU Computer Programs: Telplan 31 or Telcal 56:3 (TI-59 Calculator) available through your local County Extension Service Office.

# DAIRY RATION ESTIMATION

MILK & REQUIREMENTS			FEED SOURCES																	GRAIN MIX																	
Milk, lb/day	TDN Protein		Hay, lb fed	Haylage						ALFALFA QUALITY						Corn Silage				High Moisture Corn (30%)				Protein Needed/Cow/Day, lb.													
				lb fed when percent moisture is						Average		Good		Excellent		lb fed	TDN			lb fed	Shelled		W/Cob		lb TDN	lb fed	protein % of grain mix:										
				40	45	50	55	60	65	TDN	Protein	TDN	Protein	TDN	Protein		TDN	Protein	+ NPN		TDN	Protein	TDN	Protein			12	14	16	18	20	22	24	32	38	44	55
25.	19	3.3	4.	5	6	7	8	9	10	2.0	.5	2.2	.6	2.4	.7	15.	3.3	.4	.6	4.	2.6	.3	2.4	.2	3.0	4.	.4	.6	.6	.7	.8	.9	1.0	1.3	1.5	1.8	2.2
30.	20	3.7	6.	9	10	11	12	14	15	3.0	.7	3.3	.9	3.6	1.1	20.	4.4	.5	.8	6.	3.9	.4	3.6	.4	4.5	6.	.7	8.	1.0	1.1	1.2	1.3	1.4	1.9	2.3	2.6	3.3
35.	22	4.1	8.	12	13	14	16	18	21	4.0	1.0	4.4	1.2	4.8	1.4	25.	5.5	.7	1.0	8.	5.3	.6	4.8	.5	6.6	8.	1.1	1.1	1.3	1.4	1.6	1.8	1.9	2.6	3.0	3.5	4.4
40.	24	4.5	10.	15	16	18	20	23	26	5.0	1.2	5.5	1.5	6.0	1.8	30.	6.6	.8	1.2	10.	6.6	.7	6.0	.6	7.5	10.	1.2	1.4	1.6	1.8	2.0	2.2	2.4	3.2	3.8	4.4	
45.	26	4.9	12.	18	19	22	24	27	31	6.0	1.5	6.6	1.8	7.2	2.2	35.	7.9	.9	1.4	12.	7.9	.9	7.2	.7	9.0	12.	1.4	1.7	1.9	2.2	2.4	2.6	2.9	3.8	4.6		
50.	30	5.3	14.	21	23	25	28	32	36	7.0	1.7	7.7	2.1	8.4	2.5	40.	8.8	1.0	1.6	14.	9.2	1.0	8.4	.8	10.5	14.	1.7	2.0	2.2	2.5	2.8	3.1	3.4	4.5			
55.	32	6.0	16.	24	26	29	32	36	41	8.0	2.0	8.8	2.4	9.6	2.9	45.	9.9	.9	1.4	16.	10.6	1.1	8.4	1.0	12.0	16.	1.9	2.2	2.6	2.9	3.2	3.5	3.8				
60.	34	6.4	18.	27	29	32	36	41	46	9.0	2.2	9.9	2.7	10.8	3.2	50.	11.0	1.0	1.6	18.	11.9	1.3	10.8	1.1	13.5	18.	2.2	2.5	2.9	3.2	3.6	4.0	4.3				
65.	36	6.8	20.	30	33	36	40	45	51	10.0	2.4	11.0	3.0	12.0	3.6	55.	12.1	1.4	2.2	20.	13.2	1.4	12.0	1.2	15.0	20.	2.4	2.8	3.2	3.6	4.0	4.4	4.8				
70.	38	7.3	22.	33	36	40	44	50	57	11.0	2.6	12.1	3.3	13.2	4.0	60.	13.2	1.6	2.4	22.	14.5	1.6	13.2	1.3	16.5	22.	2.6	3.1	3.5	3.9	4.4	4.8	5.3				
75.	40	7.7	24.	36	39	43	48	54	62	12.0	2.9	13.2	3.6	14.4	4.3	65.	14.3	1.7	2.6	24.	15.8	1.7	14.4	1.4	18.0	24.	2.9	3.4	3.8	4.3	4.8	5.3	5.8				
80.	42	8.1	26.	39	42	47	52	59	67	13.0	3.1	14.3	3.9	15.6	4.7	70.	15.4	1.8	2.8	26.	17.2	1.8	15.6	1.6	19.5	26.	3.1	3.6	4.2	4.6	5.2	5.7	6.2				
85.	44	8.5	28.	42	46	50	56	63	72	14.0	3.4	15.4	4.2	16.8	5.0	75.	16.5	2.0	3.0	28.	18.5	2.0	16.8	1.7	21.0	28.	3.4	3.9	4.5	5.0	5.6	6.2	6.7				
0	13	2.1	30.	45	49	54	60	68	77	15.0	3.6	16.5	4.5	18.0	5.4	80.	17.2	2.1	3.0	30.	19.8	2.1	18.0	1.8	22.5	30.	3.6	4.2	4.8	5.4	6.0	6.6	7.2				
			32.	48	52	58	64	72	82	16.0	3.8	17.6	4.8	19.2	5.8	85.	18.5	2.2	3.0	32.	21.1	2.3	19.2	1.9	24.0	32.	3.8	4.5	5.1	5.8	6.4	7.0	7.7				
			34.	51	56	61	68	77	87	17.0	4.1	18.7	5.1	20.4	6.1	90.	19.8	2.3	3.0	34.	22.4	2.4	20.4	2.0	25.5	34.	4.1	4.8	5.4	6.1	6.8	7.5	8.2				
			36.	54	59	65	72	81	93	18.0	4.3	19.8	5.4	21.6	6.5	95.	20.9	2.4	3.0	36.	23.8	2.6	21.6	2.2	27.0	36.	4.3	5.0	5.8	6.5	7.2	7.9	8.6				
			38.	57	62	68	76	86	98	19.0	4.6	20.9	5.7	22.8	6.8	100.	22.0	2.5	3.0	38.	25.1	2.7	22.8	2.3	28.5	38.	4.6	5.3	6.1	6.8	7.6	8.4	9.1				
			40.	60	65	72	80	90	103	20.0	4.8	22.0	6.0	24.0	7.2	105.	24.0	2.6	3.0	40.	26.4	2.8	24.0	2.4	30.0	40.	4.8	5.6	6.4	7.2	8.0	8.8	9.6				

lb fed are on "as fed" basis

Values for TDN and protein in TABLES A, B, C and D are expressed as pounds (lb)