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Dairy Guidelines

PREPARED BY EXTENSION DAIRY SCIENCE SPECIALISTS

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A Guide for Feeding Dairy Cows

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In feeding a dairy herd, too often low-producing cows are over-fed while the high producers are underfed. Since the forage (silage and/or hay) portion of the ration usually is group-fed, the grain portion must be individually fed in order to feed high producers adequately and limit the grain to low producers.

Table 1 may be used for balancing a ration for any cow that is producing any quantity of milk containing normal levels of butterfat. In using the table other information is needed, such as nutrient requirements (Table 2) and composition of forages and grains. A forage analysis from V.P.I. is more accurate than the averages in Table 3, but for grains this table is satisfactory.

The percent protein needed in the grain mixture can be calculated from Table 1 (line 12). The amount of protein provided in the grain mixture will depend upon how nearly the cow's requirements are met by protein supplied in the forage and how much grain mixture is fed.

If corn silage is fed as the only source of forage, the grain mixture must contain at least 20% total protein to meet requirements. If 8 or more pounds of good alfalfa hay are being fed daily, a 16% mixture will be adequate.

Table 4 is a guide for feeding grain to lactating cows. It is based upon free-choice feeding of corn silage alone. It will also serve as a guide when free-choice corn silage and a limited amount of alfalfa hay are fed. A forage analysis is needed on the silage before you can decide which column to use (column 4, 5, or 6). For example, assume that a cow is producing 48 lbs. of 3.6% milk (column 1) and being fed corn silage that has 18 therms of net energy per 100 lbs., (column 5). The ratio of grain to milk would be 1:3. Thus, dividing 48 lbs. of milk by 3 equals 16 lbs. of grain to be fed per day.

High-producing cows being milked in a parlor will not have time to eat more than 0.7 to 1.0 lbs. of grain per minute. Therefore, any cow producing more than 40 or 50 lbs. of milk daily should be fed some grain separate from milking time. A base amount, between 10 and 30 lbs., should be fed to these cows in a separate lot or barn. The cows could be grouped and the extra grain fed on the silage or in a manger.

TABLE 1. BALANCING A RATION

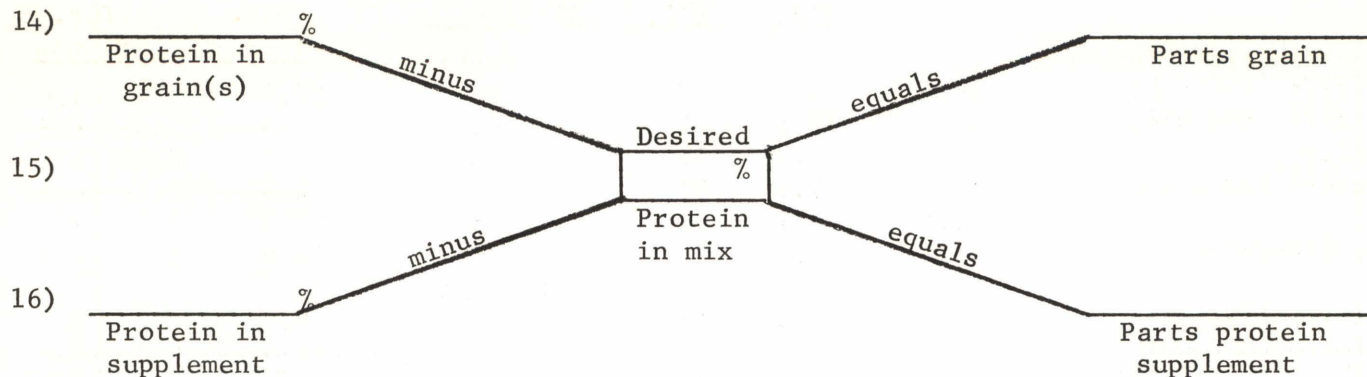
		(a) N.E. <u>Therms</u>	(b) D.P. <u>Pounds</u>
<u>Requirements:</u> (See Table 2)			
1) Maintenance: _____ lbs. cow		_____	_____
2) Milk: _____ lbs. _____ % B.F.		_____	_____
3) Pregnancy, growth, condition		_____	_____
4) Total daily		_____	_____
<hr/>			
<u>Meeting Requirements:</u>			
	<u>Composition</u>		
<u>Forages:</u> (See Table 3 or V.P.I. Forage Analysis)	N.E. D.P. Therms/lb. %	N.E. Therms	D.P. Pounds
5) _____ Silage _____ lbs. fed x _____ = _____		_____	_____
6) _____ Hay _____ lbs. fed x _____ = _____		_____	_____
7) _____ Other _____ lbs. fed x _____ = _____		_____	_____
8) Total from forage		_____	_____
9) Needed from grain (line 4 minus line 8)		_____	_____
10) Pounds grain needed (line 9a ÷ .70) (70 therms per 100 lbs. is avg. for most commercial mixes)		_____ lbs.	xxxxxxx
11) Percent digestible protein in mixture (line 9b ÷ line 10)		xxxxxxx	_____
12) Percent total protein in mixture (line 11b ÷ .80) (In oil meals about 80% of protein is digestible)			_____ %

Formulating a Grain Mixture:

13) If more than one grain is used in the mix, determine the percent protein among grains. If only one grain is used, omit line 13 and move to line 14.

		<u>Composition (See Table 3)</u> <u>Total Protein</u> (%)			<u>Protein</u> (lbs.)
_____ (grain & lbs.)	x	_____	=	_____	
_____ (grain & lbs.)	x	_____	=	_____	
_____ (grain & lbs.)	x	_____	=	_____	
Totals _____ lbs.		xxxxxxxxx	=	_____ lbs.	
Total grain in mixture (to line 18)					
_____ lbs.	÷	_____ lbs.	x 100	=	_____ %
Total Protein					
Total Grain					
Protein in grains (To line 14)					

Proportions of ingredients to make desired protein mix.



Determining pounds protein supplement needed to mix with grain.

17) $\frac{\text{Parts protein supplement (line 16)}}{\text{Parts grain (line 14)}} = \frac{\text{By weight supplement is of grain (to line 18)}}{\%}$

18) $\frac{\text{Total grain in mixture (from line 13)}}{\text{lb.}} \times \frac{\text{By weight supplement is of grain (line 17)}}{\%} = \frac{\text{Protein supplement to add to grains}}{\text{lb.}}$

TABLE 2. DAILY NUTRIENT REQUIREMENTS

Maintenance:

Weight (lbs.)	Dig. Pro* (lbs.)	T.D.N.* (lbs.)	E.N.E.** Therms	Ca. gms.	P. gms.
800	.51	6.1	5.4	10	10
1000	.61	7.1	6.3	13	13
1200	.71	8.1	7.2	15	15
1400	.79	9.0	8.2	17	17
1600	.88	10.0	9.0	19	19

Reproduction: (Add to maintenance during last 2 to 3 months of gestation)

900	.56	5.4	4.8	10	8
1200	.61	6.6	5.4	13	11
1500	.72	7.8	5.8	16	14

Production: (Requirements per pound of milk)

For cows producing more than 77 lbs. of milk daily.

Fat %	Dig. Pro*	T.D.N.*	E.N.E.**	Ca.	P.
3.5	.053	.39	.34	1.3	0.9
4.0	.056	.42	.36	1.3	0.9
5.0	.062	.48	.41	1.3	0.9

For cows producing 44 to 77 lbs. of milk daily.

3.5	.048	.35	.32	1.1	0.8
4.0	.051	.37	.34	1.1	0.8
5.0	.056	.42	.39	1.1	0.8

For cows producing less than 44 lbs. of milk daily.

3.5	.043	.31	.30	1.0	0.7
4.0	.046	.33	.32	1.0	0.7
5.0	.050	.38	.37	1.0	0.7

*N.R.C. **Cornell proposed standards

TABLE 3. SOURCE OF NUTRIENTS^{a/}

	Protein (%)		T.D.N. (%)	E.N.E. ^{b/} (Th/100 Lbs.)	Fiber (%)	Ca. P ^{c/} (Gms./Lb.)	
	Total	Dig.				Ca.	P
	(Hays)						
Alfalfa, Early blm.	16.6	11.4	52	42	26.8	5.1	1.0
Alfalfa, Mid blm.	15.2	10.8	51	41	27.5	5.5	0.9
Barley	7.7	4.3	50	38	23.0	0.8	1.2
Clover, Red	13.1	7.9	52	40	26.5	6.5	0.9
Oat	6.4	3.1	56	45	27.5	1.0	1.0
Orchard-Grass	11.2	6.7	50	39	29.9	1.8	1.5
	(Silages)						
Alfalfa (30% DM)	5.3	3.6	17	13	9.1	2.2	0.7
Alfalfa (36% DM)	6.4	4.5	22	18	10.9	2.3	0.6
Barley ^{d/} Dough (38% DM)	2.5	1.6	23	19	26.0	0.4	0.4
Corn ^{d/} Dent (29% DM)	2.3	1.2	19	14	6.3	0.5	0.3
Corn ^{d/} Hard Dent (35% DM)	2.7	1.5	23	18	6.0	0.5	0.3
Oat (32% DM)	3.1	1.8	19	14	10.0	0.6	0.5
Sorghum, Grain	2.3	0.6	16	13	7.8	0.5	0.3
	(Grains and Protein Concentrates)						
Barley	9.1 ^{e/}	6.8 ^{e/}	78	80	5.3	0.4	1.9
Cottonseed Meal	41.6	33.7	64	69	10.7	0.7	5.0
Corn, Dent No. 2	8.9	6.8	81	81	2.3	0.1	1.4
Corn and Cob Meal	7.4	5.3	73	72	8.7	0.2	1.0
Oats	11.2 ^{e/}	8.4 ^{e/}	68	70	10.7	0.5	1.6
Peanut Meal	47.4	43.1	75	78	13.1	0.9	3.0
Soybean Meal	45.8	41.2	73	74	5.8	1.5	3.1
Soybeans, Seeds	36.8	33.1	81	81	6.4	1.1	2.7
Wheat	10.9 ^{e/}	9.0 ^{e/}	79	79	2.2	0.2	2.1
Wheat Bran	16.0	12.5	62	62	10.0	0.6	5.3
Molasses	3.0	1.7	67	80	0	3.0	0.4
Sorghu Milo	11.0	8.6	84	82	2.4	---	---

a/ Values taken from N.R.C. publication 1349.

b/ E.N.E. is calculated from N.R.C. values in publication 1349.

c/ If Ca. and P content is expressed in %, multiply by 454 to convert to gms.

d/ V.P.I. Forage Testing Program values.

e/ Values from analysis of Virginia grown grains, 1967.

TABLE 4. GRADUATED THUMB RULES FOR FEEDING GRAIN TO DAIRY COWS

(Free choice feeding of corn silage with or without limited hay feeding. It may be necessary to limit silage feeding in order to get adequate grain intake to support high levels of production.)

Milk Per Day (% Fat)			Net Energy of Silage (Therms)		
3.0-3.9	4.0-4.9	5.0-up	12-16	17-21	22-up
(1)	(2)	(3)	(4)	(5)	(6)
	(Lbs.)		(Ratio of grain to milk)		
10-15	-----	-----	-----	-----	-----
16-25	10-15	-----	1:5	1:6	1:10
26-35	16-25	10-15	1:4	1:5	1:8
36-45	26-35	16-25	1:3	1:4	1:5
46-55	36-45	26-35	1:2.5	1:3	1:4
56-65	46-55	36-45	1:2.2	1:2.5	1:3
66-80	56-65	46-55	1:2	1:2.2	1:2.5
81-up	66-up	56-up	Feed to appetite		